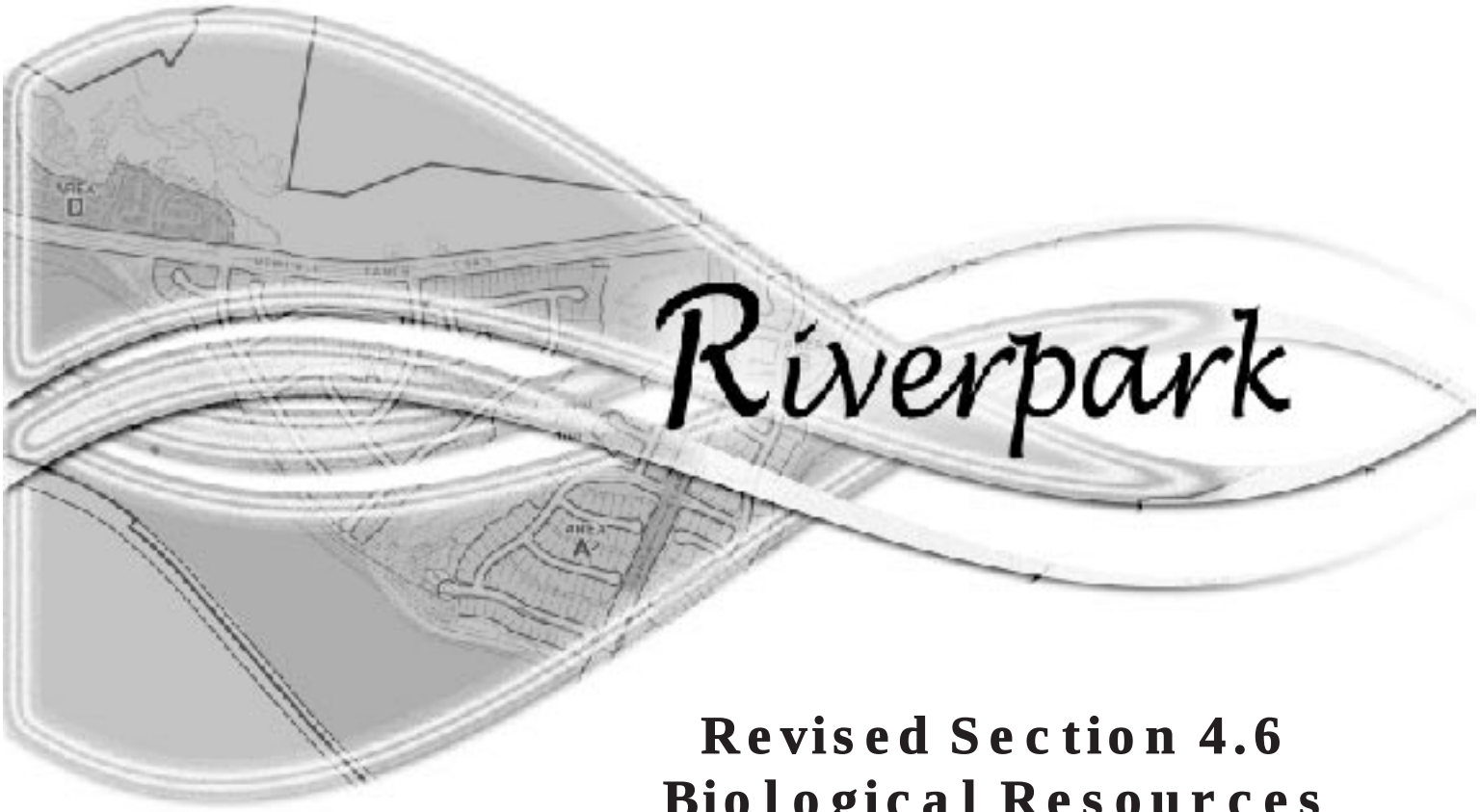

Revised Section 4.6
Biological Resources

Draft
Environmental Impact Report

SCH No. 2002091081

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4.6 BIOLOGICAL RESOURCES

1. SUMMARY

A total of 14 different plant communities were identified and characterized during the field investigations Two of these communities, southern willow scrub and southern riparian scrub, are considered of special status by resource agencies. In addition, six special-status plants and eleven special-status wildlife species were identified as occurring on the site. None of these species are currently listed as Threatened or Endangered by state or federal resource agencies. In addition, a total of 87 oak trees under the jurisdiction of the City's Oak Tree Ordinance occur on the site. A total of approximately 14,000 linear feet of the project site occurs along the Santa Clara River. Four ephemeral and two intermittent drainages also occur on the site. A total of approximately 345 acres of Santa Clara River or drainage habitat is within the Army Corps of Engineers (ACOE) and/or California Department of Fish and Game (CDFG) regulatory jurisdiction. The Santa Clara River also functions as an east-west movement corridor for a variety of wildlife species.

Approximately 361 acres of the project site occurs within the City of Santa Clarita Significant Ecological Area (SEA). A total of 37.0 acres of habitat within this SEA (representing approximately 10 percent of the total habitat within SEA boundaries on the project site) will be disturbed or converted to urban development as a result of project implementation resulting in permanent impact. Approximately 13 of those acres (4 percent of the SEA total) will only be temporarily disturbed as a result of proposed bank stabilization activities and will be replaced upon completion of the bank stabilization.

A Natural River Management Plan (NRMP) that analyzes impacts associated with the implementation of various public improvements (bank stabilization, trails, bridges, utility crossings, etc.) along and within portions of the Santa Clara River adjacent to Newhall Land properties (including the Riverpark project site) was prepared in 1997 and approved in 1998. To minimize impacts of the project on biological resources, the applicant has proposed measures from the NRMP be incorporated into the project design.

The principal direct impact of implementation of the proposed project is to convert approximately 317 acres of the project site (about 46 percent) from an undeveloped to a developed and partially restored condition. A total net loss of 280 acres of wildlife habitat/natural open space as a result of conversion of undeveloped property to a developed condition will occur. Significant impacts would occur to special-status plant communities, special-status plant and wildlife species, and as a result of the loss of land within the City of Santa Clarita SEA (Santa Clara River). Significant impacts resulting from project implementation would be mitigated in part by preserving over 400 acres of the site as open space and as a result of incorporating mitigation measures adopted as part of the NRMP into the

project design plan. Impacts that would remain significant after mitigation would be the total net loss of 280 acres of wildlife habitat/natural open space as a result of conversion of undeveloped property to developed, impacts to the SEA and associated riverine habitat (as identified by the resource line) and riverbed, and impacts to adjacent upland habitat within 100 feet of the riparian resource line.

2. INVESTIGATIVE METHODS

a. Literature Review

In order to use published information to preliminarily identify special-status plant and animal species (those species considered Rare, Threatened, Endangered, or otherwise sensitive by various state and federal resource agencies) that have been known to historically occur in the vicinity of the project site, the 2002 update of the California Natural Diversity Data Base (CNDDB) as well as the 2002 California Native Plant Society (CNPS) electronic data base, for the Newhall and Mint Canyon California USGS 7.5-minute quadrangle maps were reviewed. Other data sources reviewed included: (1) the Federal Register listing package for each federally listed Endangered or Threatened species potentially occurring on the project site or in the project vicinity; (2) literature from scientific sources pertaining to habitat requirements of special-status species potentially occurring on the project site; (3) other environmental or biological documentation of the project site (if available on the particular subject) or properties in the immediate vicinity; and (4) distributional information contained in Hall (1981) and Williams (1986) to determine the potential for common and special-status mammals to occur on the project site; Grinnel and Miller (1984) and Garrett and Dunn (1981) for common bird occurrences; Stebbins (1985) for reptiles and amphibians; California Department of Fish and Game (CDFG 2003), Sawyer, Keeler-Wolf (1995), Holland (1986) and Munz (1974) for plant community descriptions occurring within the project vicinity; and Pavlik (1992) and Skinner and Pavlik (1994) for oak tree information.

Sources used to determine the sensitivity status of biological resources are: Plants – U.S. Fish and Wildlife Service (USFWS 1993 and 1996), California Department of Fish and Game (CDFG 2003), CNDDB 2002, and (CNPS) (Skinner and Pavlik 1994-1999); Wildlife – USFWS (1994 and 1996), CDFG (2003), CNDDB (2002), Williams (1986), and Remsen (1978); Habitats – California Department of Fish and Game (CDFG 2003) (pers. comm. Keeler-Wolf) and Sawyer, Keeler-Wolf (1995).

(1) Background

On November 30, 1998, the ACOE, CDFG, and the California Regional Water Quality Control Board (RWQCB) approved the Natural River Management Plan (NRMP) for the Santa Clara River. The NRMP

is a long-term, master plan that provides for the construction of various infrastructure improvements on lands adjacent to the Santa Clara River and portions of two of its tributaries. More specifically, the NRMP governs a portion of the main-stem of the Santa Clara River from Castaic Creek to one-half mile east of the Los Angeles Department of Water and Power Aqueduct and portions of San Francisquito Creek and the Santa Clara River South Fork, Los Angeles County, California. The project site is located within the portion of the river now governed by the NRMP.

In connection with this approval, the following permits were issued by the following agencies:

- Army Corps of Engineers (ACOE) – Permit No. 94-00504-BAH under Section 404 of the Federal Clean Water Act. Section 404 of the Federal Clean Water Act allows for certain activities that result in the discharge of fill or dredged materials into "Waters of the U.S." or in this case the Santa Clara River. Prior to issuing this permit, the ACOE had completed an endangered species consultation (pursuant to Section 7 of the federal Endangered Species Act) with the United States Fish and Wildlife Service.

- California Department of Fish and Game (CDFG) – 1603 Streambed Alteration Agreement No. 5-502-97 and Incidental Take Permit No. 2081-1998-49-5. In summary, the Streambed Alteration Agreement allows for activities that alter the "…natural flow or change the bed, channel or bank of the river…" The Incidental Take Permit applies to all state listed species pursuant to Fish and Game Code Section 2081(b).

- California Regional Water Quality Control Board (Los Angeles Region) – Order No. 99-104 related to waste discharge associated with the improvements included in the NRMP.

The NRMP was prepared in response to an ACOE request to prepare a long-range management plan for projects and activities potentially affecting the Santa Clara River and San Francisquito Creek. More specifically, the NRMP, and its certified EIS/EIR (NRMP EIS/EIR), analyze impacts associated with the implementation of various infrastructure improvements (bank stabilization, bridges, utility crossings, storm drain outlets, etc.) along and within portions of the Santa Clara River adjacent to Newhall Land properties, including the Riverpark project site. The NRMP, and its EIR/EIS, are available at the City of Santa Clarita, Planning and Building Services Department, 23920 Valencia Boulevard, Suite 302, Santa Clarita, California, and are incorporated in this EIR by reference.

Due to the discovery in 2001 of a southwestern arroyo toad (*Bufo californicus*) within the NRMP boundaries (in a location west of the confluence of San Francisquito Creek and the Santa Clara River, approximately 1.5 miles west of the Riverpark project site), additional Section 7 (of the Endangered Species Act) consultation between the ACOE and the U.S. Fish and Wildlife Service was initiated. Prior to initiating this consultation, the ACOE and CDFG had removed certain stretches of the Santa Clara River and San Francisquito Creek from the consultation area as these areas lacked the necessary habitat requirements for the arroyo toad. The areas covered by the NRMP but designated as "no may effect" included the Santa Clara River 1,000 feet upstream of the Bouquet Canyon Road Bridge (including most

of the Riverpark site), San Francisquito Creek north of the Newhall Ranch Road Bridge and the South Fork of the Santa Clara River south of the Valencia Boulevard Bridge. This consultation, along with the preparation of a Biological Opinion (dated November 15, 2002) (**Appendix 4.6**), resulted in the issuance of a modification to the 1998 ACOE Section 404 Permit (issued June 23, 2003) (**Appendix 4.6**) that includes provisions for the protection of the arroyo toad in the affected NRMP area. (The Biological Opinion and the Section 404 modification are incorporated in this EIR and are also available at the City of Santa Clarita, Planning and Building Services Department, 23920 Valencia Boulevard, Suite 302, Santa Clarita, California.)

(2) Implementation of the NRMP

The permits issued by the affected agencies (ACOE, CDFG, RWQCB) allow Newhall Land or its designee to engage in construction and maintenance activities for the various infrastructure improvements included within the NRMP. Within the Riverpark site, those improvements include the bank stabilization, toe or erosion protection, various outlet structures, and the Newhall Ranch Road/Golden Valley Road Bridge. The NRMP, through its permits and EIR/EIS, includes certain requirements/ conditions and mitigation measures associated with the implementation of the approved improvements.

Prior to initiating an individual project under the NRMP, such as the Riverpark bank stabilization or the Newhall Ranch Road/Golden Valley Road Bridge, Newhall Land (or its designee) must submit to the ACOE and CDFG a Verification Request Letter (VRL), VRL Variance or Request for Amendment and accessory documentation (maps, exhibits, photographs, etc.) showing that the particular planned improvement is consistent with the NRMP and the accessory agency permits.

Upon submittal of the VRL, the ACOE and CDFG have 45 days in which to make their determination on the individual project's consistency with the NRMP and accessory agency permits. The ACOE and CDFG approvals of the request constitute the final approvals from ACOE, CDFG and RWQCB to initiate construction of the project.

(3) Application of the NRMP to the Riverpark Project

As indicated above, various infrastructure improvements and subsequent maintenance activities are governed by and permitted through the approved NRMP and accessory agency permits. Those

improvements addressed by the NRMP, and its EIS/EIR, that are located on the Riverpark project site include:

Bridges –

- Newhall Ranch Road/Golden Valley Road Bridge (6-lane), 550 feet long, 110 feet wide.
- Santa Clarita Parkway Bridge (6-lane), 500-1,000 feet long, 110 feet wide.

Bank Stabilization (including accessory storm drain outlets) –

- Approximately 2,500 feet of ungrouted rip-rap from Bouquet Canyon Road to the Newhall Ranch Road/Golden Valley Road Bridge.
- Approximately 11,000 feet of buried bank protection from Bouquet Canyon Road to the Newhall Ranch Road/Golden Valley Road Bridge.

The NRMP EIS/EIR reviewed and evaluated the biological context and impacts of these river-related improvements and imposed conditions to mitigate their potential impacts. The applicable improvements proposed by the Riverpark project will be finally permitted under the NRMP, via the VRL process described above, and will be subject to NRMP's conditions/mitigation. To the extent that the Riverpark project improvements differ from those approved in the NRMP, those differences will be discussed in the applicable EIR sections.

b. Field Surveys

General biological field surveys were conducted by qualified biologists on the project site and in the vicinity in spring and summer of 2002 and spring 2003 to inventory observable wildlife, map and characterize on-site habitats, and to evaluate the potential of the site to support special-status species. Focused presence/absence surveys conducted specifically for this project were for the following: special-status plants (April 2002; April, May, and June 2003); protocol coastal California gnatcatcher (*Polioptila californica californica*) (2002-2003); protocol unarmored three-spine stickleback (*Gasterosteus aculeatus williamsoni*) (spring 2003); protocol arroyo toad (*Bufo microscaphus californicus*) (spring 2002, 2003); western spadefoot toad (*Spea hammondii*) (March and May 2003, March 2004); and special-status birds other than the coastal California gnatcatcher (spring 2003). General surveys were conducted for mammals in spring 2003. All surveys were conducted according to published CNPS, CDFG and/or USFWS survey protocols for the appropriate target species. Technical reports documenting the methods and results of these focused surveys are included within **Appendix 4.6**. Focused presence/absence surveys conducted on Newhall properties that include the Riverpark project site include annual avian surveys since 1993 and

annual arroyo toad surveys, including California red-legged frog (*Rana aurora draytonii*) since 2001. Technical reports documenting the methods and results of these focused surveys are included within **Appendix 4.6**.

During all general and focused surveys, direct observations of reptiles, birds, and mammal species were recorded, as was wildlife sign such as scat and tracks. In addition to species actually detected, expected use of the site by various wildlife species was evaluated from habitat analysis, combined with known habitat preferences of locally occurring wildlife species.

Names used to describe plant communities, where applicable, follow the nomenclature of California Department of Fish and Game (CDFG 2003) which is based, in part, on the descriptions contained within A Manual of Vegetation by Sawyer, Keeler-Wolf (1995). Common plant names are taken from Hickman (1993) Roberts (1989), Beauchamp (1986), Munz (1974), and Abrams (1923 and 1944). References used for the nomenclature of wildlife include: The Society for the Study of Amphibians and Reptiles (2000), the American Ornithologists' Union (2000), and Jones et al. (1982) for mammals.

3. EXISTING CONDITIONS

The Riverpark project site is located on the Newhall 7.5-minute USGS quadrangle map in northern Los Angeles County (**Figure 4.6-1**). The site is located within the City of Santa Clarita and is surrounded by a mixture of urban development and vacant land. The property is generally situated south of the Castaic Lake Water Agency Rio Vista Water Treatment Plant, east of Bouquet Canyon Road and north of Soledad Canyon Road (**Figure 4.6-2**). A portion of the Santa Clara River is included within the project site and runs along the southern boundary of the site.

Topography across the Riverpark site varies and includes the Santa Clara River, terraces above the river, relatively flat graded and disked areas, and gently to steeply sloping hillsides. Elevation at the project site ranges from approximately 1200 feet to 1620 feet above mean sea level. The project site includes a total area of approximately 695 acres. Habitat on the Riverpark site varies in quality from relatively high biological value, particularly within the Santa Clara River channel on the western portion of the site, to highly disturbed areas of low biological value such as in upland areas along the edge of the Santa Clara River.

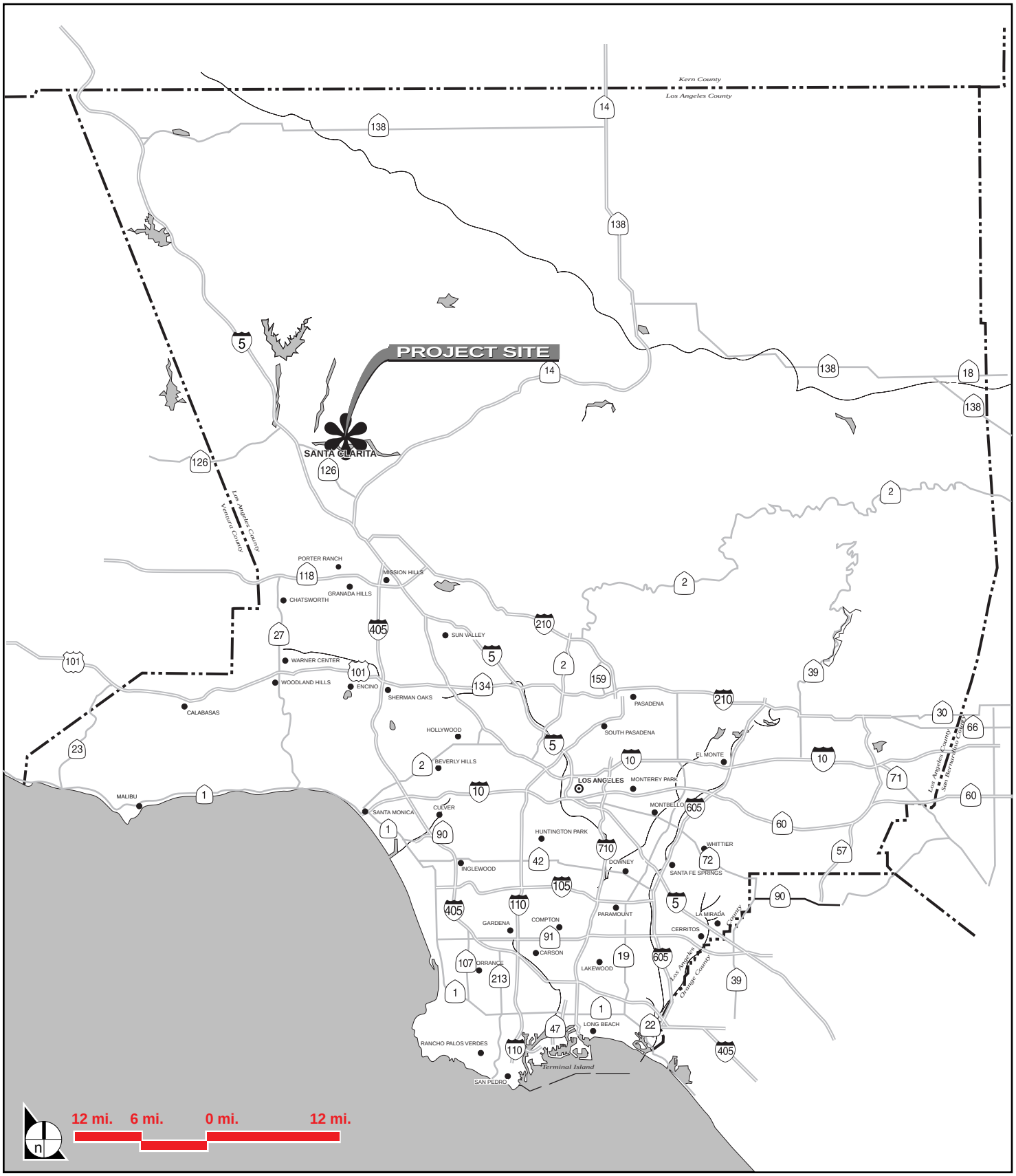
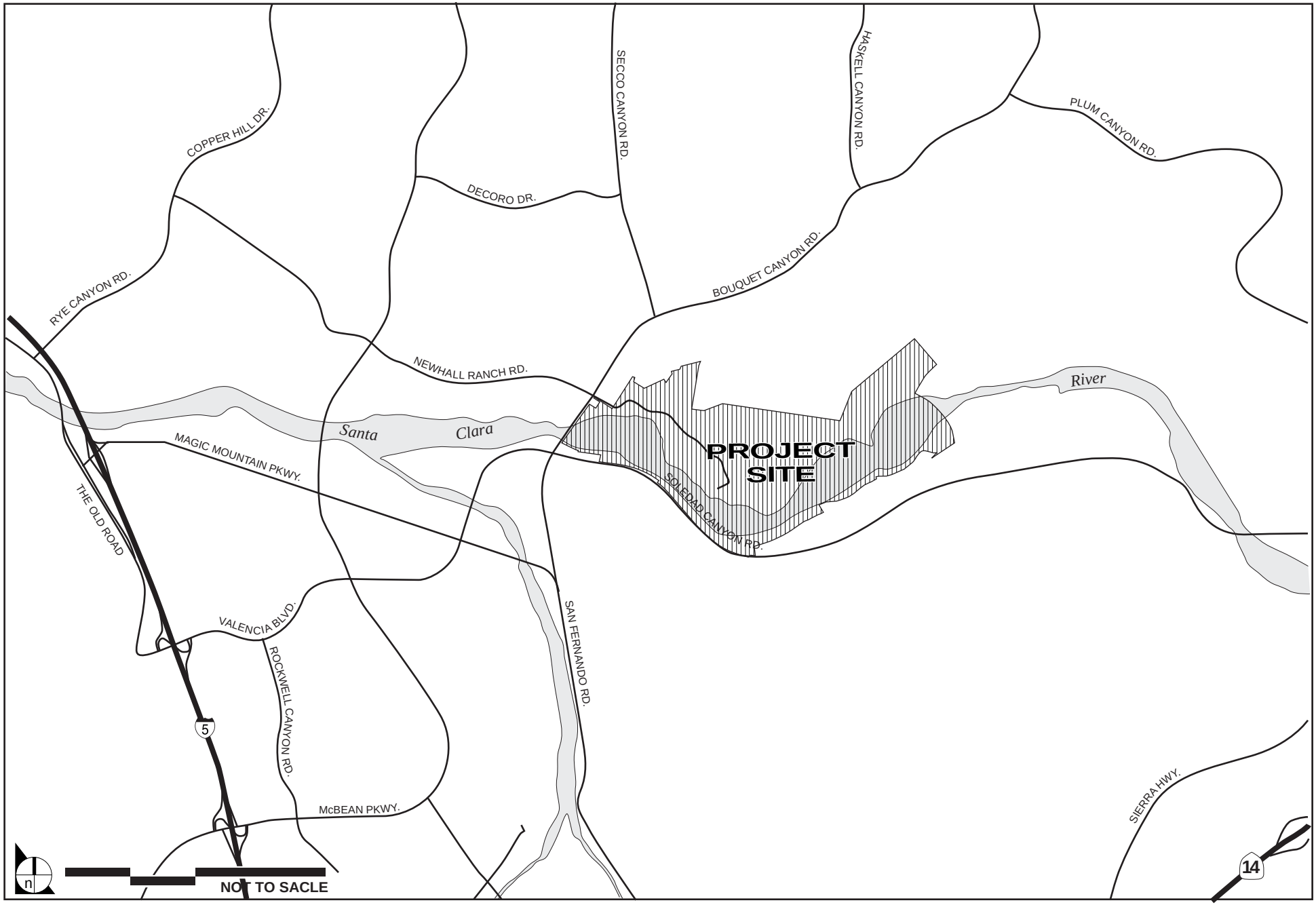


FIGURE **4.6-1**

Regional Location

112-16•10/03



SOURCE: Impact Sciences, Inc., November, 2002.

FIGURE **4.6-2**

Project Vicinity

112-16•08/03

4. BIOLOGICAL RESOURCES

The plant and wildlife resources that characterize the Riverpark project site are discussed below. Those resources considered "common" are discussed first; resources considered of special-status by local, state, and/or federal resource agencies are discussed under the **Special-Status Biological Resources** heading of this document.

a. Plant Communities

A total of 14 different plant communities were identified and characterized during the field investigations (see **Figure 4.6-3 [Map Box]**). Five of the plant community descriptions in this report follow CDFG (2003) and/or Holland (1986). The remaining nine described communities do not fit a defined plant community classification and are, therefore, defined by their dominant species and sometimes obvious associate species where two habitat types may intergrade. A complete list of plant species observed on the Riverpark site is provided in tabular form in **Appendix 4.6**.

The 14 plant communities present on site include the following: (1) disked fields, (2) non-native grassland, (3) non-native grassland with scattered shrubs, (4) planted sage scrub, (5) Riversidian sage scrub, (6) chamise chaparral, (7) coastal sage chaparral scrub, (8) holly-leaf cherry, (9) mulefat scrub, (10) southern willow scrub, (11) southern riparian scrub, (12) riverwash, (13) mixed oak/grass, and (14) developed with mixed trees. A series of dirt roads occur on the project site within several of the plant communities. The areas associated with these roads, which comprise approximately 7.2 acres of the project site, is not described as a separate plant community, since they are void of vegetation. The plant communities vary in structure and quality on the site due to disturbance history and edaphic factors (such as topography, soil type, soil moisture, and aspect). Each of these communities is discussed in detail below. Those communities that are also considered of special status by resource agencies are discussed further under the **Special-Status Biological Resources** heading.

(1) Disked Fields

Some areas of the project site are agricultural fields that are periodically disturbed by disking for agricultural or fire control purposes. These fields have been disked on an annual basis or as necessary to accommodate agricultural use of portions of the property. At the time of the surveys, these fields had grass cover and ruderal vegetation with native and non-native species. Species observed include brome grasses (*Bromus diandrus, B. madritensis* ssp. *rubens*), hare barley (*Hordeum murinum*), shortpod mustard (*Hirschfeldia incana*), red-stemmed filaree (*Erodium cicutarium*), goosefoot (*Chenopodium album,*

C. californicum), rancher's fireweed (*Amsinkia menziesii*), poverty weed (*Iva axillaris* ssp. *robustior*), and jimson weed (*Datura wrightii*). Approximately 92.0 acres (12.6 percent of total project area) of the site includes disked fields.

(2) Non-Native Grassland

This community occurs on relatively flat terrain and occasionally on gentle slopes throughout the Riverpark site. It occurs in various upland locations as 22 fragmented segments with contiguous areas ranging in size from approximately 0.2 to 6.9 acres. Annual introduced grasses up to approximately 0.5 meter in height are dominant in the non-native grassland on site. Non-native grasslands typically occur on fine-textured, usually clay soils, that are moist to wet in the winter, but dry in the summer and fall (Holland 1986). Grass species recorded in this assemblage on site include several brome species and wild oats (*Avena fatua, A. barbata*). Introduced herbaceous species present include red-stemmed filaree, small-seed sandmat (*Chamaesyce polycarpa*), and shortpod mustard. Scattered native plants recorded in the non-native grasslands include wishbone bush (*Mirabilis californica*), California fuschia (*Epilobium canum*), tansy phacelia (*Phacelia tanacetifolia*), and California thistle (*Cirsium occidentalle* var. *californicum*). The area of non-native grassland totals approximately 67.9 acres (9.3 percent of total project area) of the Riverpark site.

(3) Non-Native Grassland with Scattered Shrubs

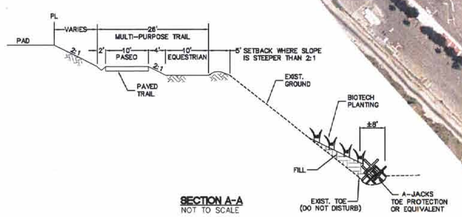
Sparsely scattered native shrubs occur in a few of the predominantly non-native grassland areas. These areas are distinct enough to be considered a separate plant association from other non-native grasslands. Species observed include California buckwheat (*Eriogonum fasciculatum*), goldenbush (*Ericameria palmeri* var. *pachylepis*), skunkbush (*Rhus trilobata*), and California sagebrush (*Artemisia californica*). This plant association totals approximately 12.1 acres (1.7 percent of total project area) on site.

(4) Planted Sage Scrub

In the northwestern portion of the Riverpark project site, several slopes have been previously cut or graded for the installation of water lines and slope drains. These relatively steep slopes were restored by hydroseeding native shrubs using primarily California buckwheat. Some California sagebrush is also present. These areas are distinct from surrounding scrub communities as they support relatively few plant species and have not established a vegetative understory. The area of planted scrub on-site totals approximately 37.0 acres (5.1 percent of total project area).

SECTION B-B
NOT TO SCALE

TYPICAL GRADING LIMITS
NOT TO SCALE



SECTION A-A
NOT TO SCALE

FEET
200 100 0 200 400
INCHES
1 1/2 0 1 2

LEGEND:

- PROPERTY PROJECT BOUNDARY
- PROPOSED MAJOR ARTERIALS
- PROPOSED FUTURE MAJOR ARTERIALS
- GRADING DAYLIGHT LINE
- PROPOSED GRADING LIMITS
- RESOURCE LINE
- UPLAND PRESERVATION ZONE (100' FROM RESOURCE)
- BUFFER ZONE (150' FROM RESOURCE)
- FEMA/SEA LINE
- 404/1603 JURISDICTION LINE
- O[1] OAK TREE

PLANT COMMUNITIES:

DF – DISKED FIELD
NNG – NON-NATIVE GRASSLAND
NNG W/SHRUBS – NON-NATIVE GRASSLAND WITH SHRUBS
PS – PLANTED SAGE SCRUB
RSS – RIVERSIDIAN SAGE SCRUB
CHC – CHAMISE CHAPARRAL
SCS – COASTAL SAGE CHAPARRAL SCRUB
HLCS – HOLLY-LEAF CHERRY SCRUB
MFS – MULEFAT SCRUB
SWS – SOUTHERN WILLOW SCRUB
SRS – SOUTHER RIPARIAN SCRUB
RW – RIVERWASH
OW – MIXED OAK/GRASS
MT – DEVELOPED AREA WITH MIXED TREES

SENSITIVE PLANT SPECIES:

Cc – CALOCHORTUS CLAVATUS VAR. GRACILIS
Cp – CALYSTEGIA PEIRSONII
Cpl – CALOCHORTUS PLUMMERAE
Dp – DELPHINIUM PARRYI
Hp – HARPAGONELLA
Jc – JUGLANS CALIFORNIA

River Park
Tentative Tract No. 53425
VEGETATION IMPACTS

DEIR
Map #16

PSOMAS

DATE: 5/20/03 REVISED ON: 12/24/03
JOB No: 1VAL0215.06

NEWHALL LAND

RP057-01.dwg

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(5) Riversidian Sage Scrub

This community is a xeric type of coastal sage scrub generally found south of Point Conception in California (Holland 1986), particularly along the coastal side of the Santa Susana, Santa Monica, San Gabriel and San Bernardino mountain ranges. It supports low, soft-woody shrubs up to one meter in height. Plant growth occurs in late winter and spring after the rains, with most species flowering in spring and summer. Typical stands are relatively open and dominated by California sagebrush, California buckwheat, and annual grasses such as foxtail chess (*Bromus madritensis* ssp. *rubens*), each attaining 20 percent or greater cover. Riversidian sage scrub (RSS) is found on xeric sites such as steep slopes, severely drained soils, or relatively clayey soils that are slow to release moisture. It typically intergrades with several Southern California chaparrals.

Although the majority of the plant species identified within this community on site are those typically associated with RSS, it should be noted that the project site occurs within a region where intergrading occurs with Venturan coastal sage (VSS). Many of the sage scrub plant species observed on site are also associated with VSS but the total composition of sage scrub plant species on the site is more closely associated with RSS than VSS.

This community is found on sloping terrain throughout the site. The dominant species is California buckwheat (*E. f.* var. *foliolosum*). Less dominant species include thickleaf yerba santa (*Eriodictyon crassifolium* var. *nigrescens*), California sagebrush, purple sage (*Salvia leucophylla*), black sage (*S. mellifera*), white sage (*S. apiana*), goldenbush, encelias (*Encelia actoni, E. californica*), chaparral mallow (*Malicothamnus fasciculatus*), Our Lord's candle (*Yucca whipplei*), linear-leaved stillingia (*Stillingia linearifolia*), California-aster (*Lessingia filaginifolia* var. *filaginifolia*), California broom (*Lotus scoparius*), beavertail cactus (*Opuntia basilaris* var. *basilaris*), giant wild-rye (*Leymus condensatus*), and cotton-thorn (*Tetradymia comosa*). Introduced annual grasses prevalent in the understory are dominated by foxtail chess and wild oats. Native needle grasses (*Nassella cernua, N. lepida*) are present in the interstitial spaces of the shrubs. Herbaceous understory species include non-native shortpod mustard, red-stemmed filaree, and tocalote (*Centaurea melitensis*), as well as native wishbone bush, fascicled tarweed (*Hemizonia fasciculata*), woolly-fruited lomatium (*Lomatium dasycarpum* ssp. *dasycarpum*), malacothrix (*Malacothrix saxatilis* var. *tenuifolia*), and chia (*Salvia columbariae*). Riversidian sage scrub covers approximately 143.4 acres (19.7 percent of total project area) of the project site.

It should be noted that the eastern most 80 acres (approximately) is included in a much larger area that is currently being proposed by the Fish and Wildlife Service (FWS) as critical habitat for the coastal California gnatcatcher. However, at this time it is only being proposed. Although the RSS that occurs on

the project site is considered suitable habitat for the coastal California gnatcatcher, no coastal California gnatcatchers were found on the project site during FWS protocol surveys, as noted later in this Draft EIR.

(6) Chamise Chaparral

This type of chaparral is found in small, scattered patches on flat to sloping terrain, mostly in the northeastern part of the Riverpark site. Chamise chaparral is the most common type of chaparral in Southern California and is dominated by chamise (*Adenostoma fasciculatum*) shrubs from 1 to 3 meters in height. This community is often dense and impenetrable and has a sparse understory (Holland 1986). It is adapted to repeated fires and is found on shallow, dry soils on xeric slopes and ridges. Growth is greatest in the spring and reduced in the summer; flowering occurs from late winter to early summer. Typically, several other native shrubs occur in this chaparral association. However, on the Riverpark site, the small patches of this community consist almost exclusively of chamise. Approximately 2.2 acres (0.3 percent of total project area) of chamise chaparral are present on the Riverpark site.

(7) Coastal Sage Chaparral Scrub

In some areas of the site, primarily on west-facing slopes, chamise chaparral and Riversidian sage scrub intergrade. Where these different plant communities blend, characteristics of each component can be observed. Although plant and wildlife species that would be associated with the individual communities can be found within this plant community, it is considered a different habitat type than either of its individual components because of the change in plant species composition.

The overstory within this habitat type is relatively open, and the understory generally supports annual grasses and herbaceous species. Plant species observed in this area include chamise, California buckwheat, California sagebrush, chaparral mallow, and black sage. This mixed plant community totals approximately 8.6 acres (1.2 percent of total project area) on the site.

(8) Holly-leaf Cherry

A stand of holly-leaf cherry scrub occurs in the northeastern portion of the Riverpark site. It occurs on relatively flat terrain on the low terraces of a canyon that leads to the Santa Clara River. The stand is dominated by relatively large, mature shrubs of holly-leaf cherry (*Prunus ilicifolia* ssp. *ilicifolia*) 3 to 5 meters in height. Other shrub associates present include skunkbrush and spiny redberry (*Rhamnus crocea*). Native understory species present include woolly star (*Eriastrum densifolium* ssp. *elongatum*), scarlet bugler (*Penstemon centranthifolius*), and linear-leaved stillingia. Additional understory species

include red-stemmed filaree, lastarriaea (*Lastarriaea coriacea*), valley lessingia (*Lessingia glandulifera* var. *glandulifera*), Mediterranean schismus (*Schismus barbatus*), beavertail cactus, and primroses (*Camissonia micrantha*, *C. californica*). Approximately 12.9 acres (1.8 percent of total project area) supports this community.

(9) Mulefat Scrub

Several very small patches of this community occur primarily in the western portion of the Riverpark site, adjacent to the river floodplain. Mule fat scrub typically is a tall, semi-woody and herbaceous riparian scrub, and is nearly monotypic. An early seral community, it often grades to riparian woodland or forest (Holland 1986). The dominant species found in this community is native mule fat (*Baccharis salicifolia*). The understory supports mostly introduced species such as brome grasses and shortpod mustard. Approximately 1.2 acre (0.2 percent of total project area) of mule fat scrub occurs on the Riverpark site.

(10) Southern Willow Scrub

Several small patches of this community occur within four tributary drainages of the Santa Clarita River on the Riverpark site. Willow scrub is a broad-leaved, winter-deciduous riparian community, typically too dense to allow understory development. It is a relatively early seral community, often succeeding to cottonwood-sycamore forests (Holland 1986). On the project site, this community includes arroyo willow (*Salix lasiolepis*), narrow-leaf willow (*S. exigua*), Fremont cottonwood (*Populus fremontii* ssp. *fremontii*), Mexican elderberry (*Sambucus mexicana*), tree tobacco (*Nicotiana glauca*), mule fat, and western poison oak (*Toxicodendron diversilobum*). The understory is sparse or absent, but includes Mexican rush (*Juncus mexicanus*), western rageweed (*Ambrosia psilostachya*), and giant wild rye. This community totals approximately 1.9 acres (0.3 percent total area) on the Riverpark site.

(11) Southern Riparian Scrub

This community is found within the Santa Clara River floodplain, on relatively flat terraces immediately adjacent to the riverbed. The vegetation consists of a combination of mule fat scrub and southern willow scrub species including mule fat, arroyo willow, narrow-leaf willow, red willow (*Salix laevigata*), Fremont cottonwood, scale-broom (*Lepidospartum squamatum*) and the highly invasive non-native tamarisk (*Tamarix* sp.) and giant reed (*Arundo donax*). Additional native species occurring in the southern riparian scrub include Great Basin sagebrush (*Artemisia tridentata*), shad-scale (*Atriplex canescens* ssp. *linearis*), Mexican elderberry, thickleaf yerba santa, cholla (*Opuntia prolifera*), and mugwort (*Artemisia douglasiana*).

Approximately 161.4 acres (22.2 percent of total project area) of this riparian community is present on site.

Riparian habitat can exist in a variety of conditions, much of which depends on the amount of available water and the extent of exotic invasive plants. Generally, a perennial source of water would allow for increased plant growth. A similar, but more developed riparian habitat occurs within the Santa Clara River downstream from the project site, west of the Bouquet Canyon Road Bridge. The portion of the Santa Clara River at and downstream of the confluence of Bouquet Canyon Creek, immediately west of the project site, is provided with a permanent source of recycled water from the Saugus Water Reclamation Plant (Plant No. 26). Additional water in this stretch comes in the form of runoff from adjacent development and Bouquet Creek. Consequently, the quality of the habitat differs from that on and adjacent to the project site. Generally, the amount of surface water and the amount of riparian vegetation is greater downstream of the site and Bouquet Creek than on the site.

(12) Riverwash

The stretch of the main channel of the Santa Clara River that occurs within the project site boundaries is sparsely vegetated and subject to scouring by seasonal storm flows. Soils are sandy riverwash and gravel, and in places form sand bars and low terraces within the channel. During site surveys, scattered elements of southern riparian scrub vegetation (see above) were observed. Shrub species found in the drier portions of the riverbed include mule fat, tamarisk, scale-broom, giant reed, California broom, woolly star, and California buckwheat. Smaller species growing in the riverbed include buckwheat (*Eriogonum baileyi*), Mediterranean schismus, cryptantha (*Cryptantha micrantha*), hairy goldenaster (*Heterotheca sessiliflora* ssp. *fastigiata*), tumble mustard (*Sisymbrium altrissimum*), foxtail chess, slender pectocarya (*Pectocarya linearis* ssp. *ferocula*), and annual bur-sage (*Ambrosia acanthicarpa*). Fremont cottonwood and willows are scattered individually or in small clumps in the channel; no riparian forest associations are present. Because of the dynamic nature of vegetation growth within the river channel (vegetation species, density, and extent can vary depending upon frequency and extent of scouring water flows and periods of low water or drought), the plant composition within the river channel can change from year to year. Riverwash totals approximately 176.2 acres (24.2 percent of total project area) of the project site.

(13) Mixed Oak/Grass

Small patches of oak trees occur in the central part of the Riverpark site, mostly on or at the base of north-facing and west-facing slopes. Typically, oak woodlands have a single dominant oak species, but at the

Riverpark site, four species are present and three co-dominate. These species include coast live oak (*Quercus agrifolia* var. *agrifolia*), the winter-deciduous Valley oak (*Q. lobata*), one blue oak (*Q. douglasii*), and scrub oak (*Q. berberidifolia*). Coast live oaks can reach 10 to 25 meters in height, and typically occur away from the direct influence of the ocean in shaded canyons and on north-facing slopes (Holland 1986). Valley oaks are California's largest broad-leaved tree, reaching 15 to 35 meters in height. Scrub oak is a shrubby oak that grows 2 to 5 meters in height, and is relatively common within its range. This species typically occurs in alluvial soils in valleys and also on slopes in the southern coast ranges. A few large and mature individual Valley oaks are scattered across the site. The shrub layer in the mixed oak/grass is poorly developed and the herbaceous layer often includes annual grasses that have replaced the native perennial grasses once commonly associated with this community. This community, as it occurs on site, has not been described as a sensitive habitat; however, all individual oak trees of the genus *Quercus* are protected by City ordinance. Approximately 2.3 acres (0.3 percent of total project area) of mixed oak/grass occur on site.

(14) Developed Area with Mixed Trees

A canyon area located in the central part of the site is currently occupied by buildings, trailers, and equipment storage areas. Many large and mature native and non-native trees occur in this developed area, some of which may be plantings and some of which occur naturally. Native species observed include western sycamore (*Platanus racemosa*), southern California black walnut (*Juglens californica*), Fremont cottonwood, and Mexican elderberry. Non-native species include eucalyptus (*Eucalyptus* ssp.), Peruvian pepper tree (*Schinus molle*), and various conifers. The developed area with mixed trees totals approximately 8.3 acres (1.1 percent of total project area) on the Riverpark site.

b. Common Wildlife Resources

Discussed below are representative common wildlife species (those not provided a sensitivity status by regulatory agencies) that were observed on the project site during the field surveys. Because wildlife typically utilize a variety of plant communities, wildlife species observed or likely to occur on the site are described by taxonomic group. A complete list of wildlife species observed on the Riverpark site is provided in tabular form in **Appendix 4.6**. Special-status wildlife species present or potentially occurring on the project site are discussed under the **Special-Status Biological Resources** heading.

(1) Amphibians and Reptiles

The Santa Clara River is ephemeral along portions of its reach with a perennial input of urban runoff in various places. Water generally occurs only after recent rains within the reach of the Santa Clara River occurring on the project site. During years of sufficient rainfall, water within the river channel may be present into spring and early summer, providing habitat for amphibians within the project reach.

Amphibian populations on the project site are expected to be low on the site, due in large measure to the lack of persistent or permanent surface water in the drainages and within the Santa Clara River channel on a year-round basis. However, as some amphibious species may move considerable distances from breeding sites during the non-breeding season, there is potential for a few amphibian species to occur. Western toad and Pacific chorus frog, both of which are abundant locally in disturbed sites and even urban situations, would be expected to occur on the project site. On two occasions during the spring and summer of 2003, and on one occasion during winter of 2004, passers-by claimed to have detected vocalizations of amphibious species on the western end of the project site and reported them to CDFG. A survey was immediately conducted to determine the amphibian species occurring within the area. The only species detected and documented during the 2003~~both~~ surveys were the common western toad and Pacific chorus frog (Crawford 2003c and d). At the request of the California Department of Fish and Game, an additional focused survey for western spadefoot toad was conducted on March 4 to 6, 2004. This focused survey resulted in the detection of this species on the site, which is discussed further below ~~in~~under the **Special-Status Biological Resources** heading. ~~No other amphibian species were observed or detected during these site surveys.~~

Common reptile species observed on the project site include western fence lizard (*Sceloporus occidentalis*), side-blotched lizard (*Uta stansburiana*), San Diego alligator lizard (*Elgaria malticarinata webbii*), western skink (*Eumeces skiltonianus*), common kingsnake (*Lampropeltis getulus*), and southern Pacific rattlesnake (*Crotalus viridis helleri*).

(2) Birds

The diversity of structure and plant communities present on site provides both forage and nesting habitat for several locally occurring common bird species. Some species are known to be closely associated with specific plant communities, whereas other species utilize a variety of habitat types for foraging and breeding. Bewick's wren (*Thryomanes bewickii*), California thrasher (*Toxostoma redivivum*), spotted towhee (*Pipilo erythrophthalmus*) and California towhee (*P. crissalis*) were regularly observed in the scrub habitats. In open scrub and grassland habitats, species including Say's phoebe (*Saynoris saya*), northern

mockingbird (*Mimus polyglottos*), morning dove (*Zenaida macroura*), European starling (*Sturnus vulgaris*), and white-throated swift (*Aeronautes saxatalis*) were observed. Representative species detected in the woodland areas include Anna's hummingbird (*Calypte anna*), house finch (*Carpodacus mexicanus*), bushtit (*Psaltriparus minimus*), Nuttall's woodpecker (*Picoides nuttallii*), oak titmouse (*Baeolophus inornatus*), scrub jay (*Aphelocoma coerulescens*), and black-headed grossbeak (*Pheucticus melanocephalus*).

Because of the presence of large agricultural areas, open fields, and open space areas in the region, in addition to open oak woodland habitat on site, a number of raptor (birds-of-prey) species occur in the project vicinity. Some of these species, including turkey vulture (*Cathartes aura*), red-tailed hawk (*Buteo jamaicensis*), and American kestrel (*Falco sparverius*), were observed foraging over the open grassland and scrub habitat on the site. Though only one actual nesting, by the special-status raptor species white-tailed kite (Guthrie 1999), was observed, several additional common raptor species potentially nest on site.

(3) Mammals

A variety of mammal species occur in the vicinity of the site. Large species including mule deer (*Odocoileus hemionus*), coyote (*Canis latrans*), and bobcat (*Lynx rufus*) were detected by scat and tracks during the site surveys. Dusky-footed woodrat (*Neotoma fuscipes*) nests were observed adjacent to two of the on-site canyons. Desert cottontail (*Sylvilagus auduboni*), California ground squirrel (*Spermophilus beecheyi*), and Botta's pocket gopher (*Thomomys bottae*) were abundant in many of the more open areas of the site. Additional species observed during night surveys or detected by scat were common raccoon (*Procyon lotor*), domestic cat (*Felis cattus*), striped skunk (*Mephitis mephitis*), Virginia opossum (*Didelphis virginana*), deer mouse (*Peromyscus maniculatus*) and brush rabbit (*Sylvilagus bachmani).* Several other small rodent species are expected to also occur on site in each of the habitat types present. A few common bat species including big brown bat (*Eptesicus fuscus*) and California myotis (*Myotis californicus*) also potentially forage and temporarily roost on site. However, as the site does not support ideal roosting habitat and is not situated adjacent to permanent open water, most bat species known to occur in the project vicinity would not be expected to utilize on-site resources on more than an infrequent basis. Most of the locally occurring bat species typically feed on insects over aquatic habitats.

c. Special-Status Biological Resources

The following is a discussion of special-status plant and animal species observed and potentially occurring on the Riverpark site. Results and conclusions are based on habitat types present on the site, a review of the CNDDB (2002) and CNPS (2002) databases and other pertinent literature, known geographic ranges of these species, and data collected during general and focused field surveys. Also

included in this section is a discussion of plant communities on the project site that are considered unique, of relatively limited distribution, or that are under the jurisdiction of state and/or federal resource agencies.

(1) Plant Species

Special-status plant species include those that are: (i) state or federally listed as Rare, Threatened, or Endangered; (ii) proposed for state or federal listing as Rare, Threatened, or Endangered; (iii) federal candidate species for listing, or (iv) considered Federal Species of Concern. Plants included on Lists 1, 2 or 4 of the CNPS inventory are also considered of special status. CNPS List 1, List 2, and List 4 species are included because the CNPS is a recognized authority by the CDFG on the status of Rare plant populations in California and because the criteria for plant species to be placed on List 1, List 2, and List 4 are similar to criteria that CDFG and USFWS use for species considered as candidates for listing or that are already listed as Threatened or Endangered (List 1 and List 2), or have populations that are in decline such that they warrant further observation (List 4). Because CNPS List 3 species are defined by the CNPS as those plants about which more information is needed in order to assign to either List 1, 2, or 4 and would generally not meet the definition of "Rare, Threatened, or Endangered" as defined by CEQA, species on this list are not considered of "special status".

The focused special-status plant surveys that were conducted in 2002 were carried out in late April (surveys were conducted only during April since there was a very low rainfall that year in Southern California that resulted in annual plants having a particularly short-lived blooming period) and the surveys conducted in 2003 were carried out in April, May and June to accommodate the blooming periods of various species potentially occurring in the region or previously reported in the CNDDB.

Table 4.6-1, **Special-Status Plant Species Known to Occur the Riverpark Area**, addresses 27 special-status plant species that are known to occur in the project vicinity and were consequently the focus of on-site surveys. The list was compiled based on occurrence records of species in the project vicinity, documented geographic distributions of these species, and known habitat requirements. Those species observed on the site, or those not observed but for which suitable habitat occurs, are discussed in more detail below.

Table 4.6-1
Special-Status Plant Species Known to Occur in the Riverpark Area

Common Name *Scientific Name*	Sensitivity Status			Habitat	Growth Form (Blooming)	On-Site Status
	Federal	State	CNPS			
Braunton's milk-vetch *Astragalus brauntonii*	FE	--	1B	Closed-cone coniferous forest, chaparral, coastal scrub, valley and foothill grassland / recent burns or disturbed areas, carbonate soils.	PH-b (March-July)	No suitable habitat on site. Not observed during focused plant surveys.
Nevin's barberry *Berberis nevinii*	FE	CE	1B	Chaparral, coastal scrub, cismontane woodlands, riparian scrub.	Sh-e (March-April)	Suitable habitat occurs on site, but not observed during focused plant surveys.
Slender mariposa lily *Calochortus clavatus* var. *gracilis*	--	--	1B	Chaparral, coastal sage scrub.	PH-b (Mar-May)	Species identified on site during focused plant surveys.
Plummer's mariposa lily *Calochortus plummerae*	--	--	1B	Chaparral, cismontane woodlands, coastal scrub, lower coniferous forests, and grasslands; valley granitic soils.	PH-b (May-July)	Species identified on site during focused plant surveys.
Late-flowering mariposa lily *Calochortus weedii* var. *vestus*	--	--	1B		PH-b (May-July)	Suitable habitat occurs on site, but not observed during focused plant surveys.
Peirson's morning-glory *Calystegia peirsonii*	--	--	4	Chaparral, chenopod scrub, coastal scrub.	PH-r (May-June)	Species identified on site during focused plant surveys.
Southern tarplant *Centromadia parryi* ssp. *Australis*	--	--	1B	Chaparral, coastal scrub; sandstone rocky outcrops.	Sh-d (July-November)	No suitable habitat occurs on site. Not observed during focused plant surveys.
San Fernando Valley spineflower *Chorizanthe parryi* ssp. *Fernandina*	FC	CE	1B	Coastal scrub; sandy soils.	AH (April-June)	Suitable habitat occurs on site, but not observed during focused plant surveys.

Table 4.6-1 (continued)
Special-Status Plant Species Known to Occur in the Riverpark Area

Common Name *Scientific Name*	Sensitivity Status			Habitat	Growth Form (Blooming)	On-Site Status
	Federal	State	CNPS			
Santa Susana tarplant *Deinandra minthornii*	--	CR	1B	Chaparral, coastal scrub; sandstone rocky outcrops.	Sh-d (July-November)	No suitable habitat occurs on site. Not observed during focused plant surveys.
Dune larkspur *Delphinium parryi* ssp. *blockmaniae*	--	--	1B	Maritime chaparral, coastal dunes.	PH (April-May)	Species identified on site during focused plant surveys.
Slender-horned spineflower *Dodecahema leptoceras*	FE	CE	1B	Chaparral, coastal scrub (alluvial fan), cismontane woodland, sandy soils.	AH (April-June)	Suitable habitat occurs on site, but not observed during focused plant surveys.
Blochman's dudleya *Dudleya blochmaniae* ssp. *Blochmaniae*	[FSC]	--	1B	Coastal bluff scrub, Coastal scrub; rocky, often clay or serpentine soils.	PH (April-June)	Suitable habitat occurs on site, but not observed during focused plant surveys.
Many-stemmed dudleya *Dudleya multicaulis*	[FSC]	--	1B	Chaparral, coastal scrub, and grasslands; often associated with clay soils.	PH (May-July)	Suitable habitat occurs on site, but not observed during focused plant surveys.
Conejo dudleya *Dudleya parva*	FT	--	1B	Chaparral, coastal scrub, often associated with clay soils.	PH (May-July)	Suitable habitat occurs on site, but not observed during focused plant surveys.
Palmer's grappling hook *Harpagonella palmeri* var. *palmeri*	--	--	4	Chaparral, coastal scrub, valley and foothill grasslands.	AH (March-April)	Species identified on site during focused plant surveys.
Round-leaved filaree *Erodium macrophyllum*	--	--	2	Cismontane woodland, valley and foothill grassland; clay soils.	AH (March-May)	No suitable habitat on site. Not observed during focused plant surveys.
Los Angeles sunflower *Helianthus nuttallii* ssp. *Parishii*	--	--	1A	Coastal salt and freshwater marshes and swamps.	PH	No suitable habitat on site. Not observed during focused plant surveys.

Table 4.6-1 (continued)
Special-Status Plant Species Known to Occur in the Riverpark Area

Common Name *Scientific Name*	Sensitivity Status			Habitat	Growth Form (Blooming)	On-Site Status
	Federal	State	CNPS			
Southern California black walnut *Juglans californica* var. *californica*	--	--	4	Chaparral, cismontane woodland, coastal scrub.	T-d	Species observed during focused plant surveys.
Southwestern spiny rush *Juncus acutus* ssp. *Leopoldii*	--	--	4	Coastal dune (mesic), meadows (alkaline seeps), coastal salt marsh.	PH-r (May-June)	No suitable habitat on site. Not observed during focused plant surveys.
Davidson's bush mallow *Malacothamnus davidsonii*	--	--	1B	Chaparral, cismontane woodland, coastal sage scrub, riparian woodland.	Sh-d (June-Jan)	Suitable habitat occurs on site, but not observed during focused plant surveys.
Spreading navarretia *Navarretia fossalis*	FT	--	1B	Chenopod scrub, marshes and swamps, playas, vernal pools.	AH (April-June)	No suitable habitat on site. Not observed during focused plant surveys.
Chaparral nolina *Nolina cismontana*	--	--	1B	Chaparral, coastal scrub, sandstone gabbro soils.	SH-e (April-June)	No suitable habitat on site. Not observed during focused plant surveys.
Short-joint beavertail cactus *Opuntia basilaris* var. *brachyclada*	--	--	1B	Chaparral, Joshua tree woodland, Mojavean desert scrub, pinyon and juniper woodland.	Sh-ss (April-June)	Suitable habitat occurs on site, but not observed during focused plant surveys.
California Orcutt grass *Orcuttia californica*	FE	CE	1B	Vernal pools.	AH (April-Aug)	No suitable habitat on site. Not observed during focused plant surveys.
Lyon's pentachaeta *Pentachaeta lyonii*	FE	CE	1B	Chaparral, coastal scrub, valley and foothill grassland; volcanic endemic soils.	AH (Mar-Aug)	No suitable habitat occurs on site. Not observed during focused plant surveys.
Pringle's yampah *Perideridia pringlei*	--	--	4	Chaparral, cismontane woodland, coastal scrub, pinyon and juniperwoodlands; serpentinite, clay soils.	PH (April-Aug)	No suitable habitat on site. Not observed during focused plant surveys.

Table 4.6-1 (continued)
Special-Status Plant Species Known to Occur in the Riverpark Area

Common Name *Scientific Name*	Sensitivity Status			Habitat	Growth Form (Blooming)	On-Site Status
	Federal	State	CNPS			
Rayless ragwort *Senecio aphanactis*	--	--	2	Cismontane woodland, coastal scrub/alkaline.	AH (January-April)	Marginal suitable habitat on site. Not observed during focused plant surveys.

Key:
Status: Listing status definitions are provided in **Appendix 4.6.**
Federal: FE = Federal Endangered; FC = Federal Candidate

State: CE = California Endangered; CR = California Rare
CNPS: List 1A = Presumed extinct
List 1B = Plants Rare and Endangered in California and elsewhere
List 2 = Plants Rare, Threatened, or Endangered in California, but more common elsewhere
List 4 = Plants of limited distribution – A watch list

Growth Form:

AH =	Annual Herb	Sh = Shrub	-r = rhizommatous
PH =	Perennial Herb	-b = bulb	-e = evergreen
T =	Tree	-d = deciduous	-ss = stem succulent

(a) Species Observed On Site

Slender mariposa lily (*Calochortus clavatus* var. *gracilis*), ***CNPS List 1B.*** Approximately 80 individual plants were found in 12 locations, mostly on north-facing slopes and ridges. **Figure 4.6-3 (Map Box)** illustrates the locations of all the recorded populations. The plants were most often found on sandy clay soils in openings within coastal sage scrub. Elevations ranged from 1,235 feet to 1,350 feet. Most plants were flowering during at least one field observation.

Plummer's mariposa lily (*Calochortus plummerae*), ***CNPS List 1B.*** There were seven individual plants found in three locations, mostly on south-facing slopes and ridges. **Figure 4.6-3** illustrates the locations of all the recorded populations. The plants were located on sandy clay soils with gravel and stones associated with coastal sage scrub. Elevations ranged from 1,225 feet to 1,335 feet. All plants were flowering, and some were fruiting, during field observation.

Dune larkspur (*Delphinium parryi*), ***CNPS List 1B.*** There were approximately 445 individual plants of this species noted in eight locations on north-facing slopes. **Figure 4.6-3** illustrates the locations of all the

recorded populations. The plants were observed in openings within coastal sage scrub. Elevations ranged from 1,250 feet to 1,320 feet. Most plants were flowering during field investigations.

Peirson's morning-glory (*Calystegia peirsonii*), ***Federal Species of Concern, CNPS List 4.*** Approximately 4,400 individuals of this species were observed in 29 locations on site. **Figure 4.6-3** illustrates the locations of all the recorded populations. All of the populations were located on relatively gentle slopes (generally south-facing) or in flat areas. On site, the plants are associated with various grassland and coastal sage scrub species in sandy to gravelly/stoney soils. Location elevations range from 1,250 feet to 1,450 feet. Most plants were in vegetative form and some were flowering during field investigations.

Palmer's grappling hook (*Harpagonella palmeri*), ***CNPS List 4.*** Approximately 2,640 individuals of this species were located in eleven locations on south-facing slopes and ridges. The plants were found in on sandy clay soils with gravel, stones and rocks in sparsely vegetated and exposed areas within coastal sage scrub. Elevations ranged from 1,320 feet to 1,430 feet. Most plants had flowers and fruit during the field investigation.

California black walnut (*Juglans californica*), ***CNPS List 4.*** Three populations of walnut trees, consisting of four, five, and twelve individual trees respectively, were detected during the surveys. All three populations occur in the area of the site presently occupied by buildings in a valley in the central part of the site (**Figure 4.6-3**). The walnut trees occur on relatively flat terrain at an elevation of about 1,200 feet. Some of these trees may have been planted, while others appeared to have grown naturally.

Oak trees (*Quercus* spp.) ***City of Santa Clarita Oak Tree Preservation and Protection Policy***. All eligible trees of the genus *Quercus* are subject to the provisions of Resolution No. 90-177 of the City Council of the City of Santa Clarita. The horticultural surveys completed for the project site revealed 87 oak trees qualified for jurisdiction under the City's ordinance. Specific locations of oak trees as well as other characteristics are addressed in the horticultural report, **Appendix 4.6**.

(b) Species Not Observed but for which Suitable Habitat Occurs

Slender-horned spineflower (*Dodecahema leptoceras*), ***Federal Endangered, California Endangered, CNPS List 1B.*** The holly-leaf cherry scrub community found in the northeastern corner of the site has several understory species that are associates of the slender-horned spineflower, as observed previously by FLx from a known population in the region (FLx pers. comm.). At this specific location on the project site, the soils are medium to coarse terrace/riverwash sands, also similar to areas where slender-horned spineflower is found. A known location (not on Newhall Land property) of this species was checked in

April 2003 as a reference; the species had germinated and some plants were flowering. Therefore, if slender-horned spineflower exists on the project site, it should have been observed in 2003, but it was not found (FLx 2003) (Hendrickson 1996).

A known off-site population of the sensitive San Fernando Valley spineflower was also field-checked as a reference population in April 2003. This species had germinated and was observed flowering. Although potential habitat exists for this plant on the project site, the species was not found. The technical report, prepared by FLx (2002-2003), discusses the methods and results of plant surveys on more detail, and it is located in **Appendix 4.6**.

Suitable habitat occurs on the site for ten other special-status plant species. However, none of these species were observed on the site during focused surveys that were conducted during the blooming periods of each species. Had any of these species occurred on the site during the time the surveys were conducted, they likely would have been observed.

(2) Wildlife Species

The term special-status wildlife includes those species that are state or federally listed as Threatened or Endangered, have been proposed or are candidates for listing as Threatened or Endangered, are considered State Species of Special Concern, CDFG Special Animals, California Protected or Fully Protected Species, and/or are Federal Species of Concern.

Twelve~~Eleven~~ special-status species were observed during site surveys: western spadefoot toad (*Spea hammondii*), sharp-shinned hawk (*Accipiter striatus*), Cooper's hawk (*Accipiter cooperi*), white-tailed kite (*Elanus leucurus*), western yellow-billed cuckoo (*Coccyzus americanus occidentalis*), loggerhead shrike (*Larius ludovicianus*), yellow warbler (*Dendroica petechia brewsteri*), summer tanager (*Piranga rubra*), Southern California rufous-crowned sparrow (*Aimophila ruficeps*), Bell's sage sparrow (*Amphispiza belli belli*), tricolored blackbird (*Agelaius tricolor*), San Diego black-tailed jackrabbit (*Lepus californicus bennettii*), and San Diego desert woodrat (*Neotoma lepida intermedia*). However, a total of 51 potential species are addressed in this report based on an evaluation of on-site habitats compared with each species' life history requirements, occurrence records of species in the project vicinity, and documented geographic distribution of each species. All special-status wildlife species addressed in this report are listed in **Table 4.6-2, Special-Status Wildlife Species Known to Occur or Potentially Occur in the Riverpark Area**. Those species observed or with habitat occurring on the project site are discussed in more detail below.

Table 4.6-2
Special-Status Wildlife Species Known to Occur or Potentially Occur in the Riverpark Area

Common Name *Scientific Name*	Status Federal	Status State	Habitat Requirements	On-Site Status
INVERTEBRATES				
Crustacea Order Anostraca	(fairy shrimp)			
San Diego fairy shrimp *Branchinecta sandiegoensis*	FE	--	Vernal pools.	No indication of vernal or other seasonal pools were detected during site surveys. Soils present on site are not suitable to support vernal/seasonal pools.
Riverside fairy shrimp *Streptocephalus woottoni*	FE	--	Vernal pools.	No indication of vernal or other seasonal pools were detected during site surveys. Soils present on site are not suitable to support vernal/seasonal pools.
Insecta Order Lepidoptera	(butterflies and moths)			
San Emigdio blue butterfly *Plebulina emigdionis*	[FSC]	--	Often near streambeds, washes or alkaline areas. Associated with *Atriplex canescens.*	No recent documented occurrences in the area. However, suitable habitat is present on site as low numbers of the host plant *Atriplex canescens* were recorded. Not observed during focused surveys. (Bruyea 2003)
FISHES				
Arroyo chub *Gila orcutti*	[FSC]	CSC	Slow-moving or backwater sections of warm to cool streams with mud or sand substrates.	The riverbed was dry during time of survey. However, during years with sufficient rainfall, the on-site portion of river channel is known to support variable flows, at which time it is expected arroyo chubs occurring elsewhere in the river and would be able to occur on site.
Santa Ana sucker *Catastomus santaanae*	FT	CSC	Occupies small-to medium-sized perennial streams with water ranging in depth from a few centimeters to a meter or more.	The riverbed was dry during time of survey. However, during years with sufficient rainfall, the on-site portion of river channel is known to support variable flows, at which time it is expected suckers occurring elsewhere in the river would be able to occur on site. Resource agencies have classified only certain populations of this species as threatened. The population in the Santa Clara River system is not included in this Threatened status.
Steelhead rainbow trout (Southern California ESU) *Oncorhynchus mykiss*	FE	CSC	Clean, clear, cool, well-oxygenated streams. Need relatively deep pools in migration and gravelly substrate in which to spawn.	Steelhead have not been identified in the Santa Clara River east of Piru Creek that is approximately 10 miles west of the subject site.
Unarmored three-spine stickleback *Gasterosteus aculeatus williamsoni*	FE	CE, CFP	Slow-moving and backwater areas.	The riverbed was dry during time of survey. However, during years with sufficient rainfall, the on-site portion of river channel is known to support variable flows, at which time it is expected unarmored three-spine sticklebacks occurring elsewhere in the river would be able to occur or pass through the stretch of the river that occurs on site. This species has been observed in ponded water within tire tracks on or near the middle to eastern end of the project site (exact location cannot be determined). (Courtois 1999)

Table 4.6-2 (continued)
Special-Status Wildlife Species Known to Occur or Potentially Occur in the Riverpark Area

Common Name *Scientific Name*	Status Federal	Status State	Habitat Requirements	On-Site Status
AMPHIBIANS				
Coast range newt *Taricha torosa torosa*	--	CSC (SLO south)	Grasslands and woodlands; breeds in ponds, reservoirs, and slow-moving streams.	This species requires perennial sources of water require at least a year to metamorphose from its fully aquatic larval stage. Perennial water does not occur on site. Species was not observed during on-site field investigations.
Western spadefoot toad *Spea~~caphiopus~~ hammondii*	[FSC]	CSC~~, CP~~	Open areas in lowland grasslands, chaparral, and pine-oak woodlands; require temporary rain pools that last approximately three weeks and lack exotic predators.	Observed on site during a focused survey in 2004. Adult toads or other signs of the species~~Sign of species~~ were detected~~as present~~ in three of the six seasonal rainpools on site.~~three of six seasonal pools.~~ ~~No indication of vernal or other seasonal rain pools were detected during site surveys and soils present on site are not suitable to support vernal/seasonal pools. Species was not observed during on-site field investigations.~~
Arroyo toad *Bufo microscaphus californicus*	FE	CSC, CP	Restricted to rivers that have shallow, gravely pools adjacent to sandy terraces that have a nearly complete closure of cottonwoods, oaks, or willows, and almost no herbaceous cover; require shallow pools with minimal current, little to no emergent vegetation, and a sand or pea gravel substrate overlain with flocculent silt for egg deposition.	Focused surveys following U.S. Fish and Wildlife Service protocol were conducted in the river on the project site in 2002 and 2003 with no indication of species presence. An associated habitat analysis determined project site upland habitat to be of low value to this species.
California red-legged frog *Rana aurora draytonii*	FT	CSC, CP	Permanent water sources such as ponds, lakes, reservoirs, streams, and adjacent riparian woodlands.	Permanent water source doesn't exist on site. A pond occurs approximately 200 yards west of the project site and the Bouquet Canyon Road Bridge. Focused surveys for species were conducted in the river on the project site in 2001 and 2002 with no indication of species presence.

Table 4.6-2 (continued)
Special-Status Wildlife Species Known to Occur or Potentially Occur in the Riverpark Area

Common Name *Scientific Name*	Status Federal	Status State	Habitat Requirements	On-Site Status
REPTILES				
Southwestern pond turtle *Clemmys marmorata pallida*	[FSC]	CSC, CP (full species)	Streams, ponds, freshwater marshes, and lakes with growth of aquatic vegetation.	The riverbed was dry during site surveys. Though variable flows are known to occur seasonally, such flows are generally swift and little to no ponding occurs on site. This species was not observed during site surveys.
San Diego horned lizard *Phrynosoma coronatum blainvillii*	[FSC]	CSC, CP (full species)	Relatively open grasslands, scrublands, and woodlands with fine, loose soil.	Suitable habitat occurs on site in association with open scrub and riverbank habitats. Species is known to occur in the project region. This species was not observed during site surveys.
California horned lizard *Phrynosoma coronatum frontale*	[FSC]	CSC, CP (full species)	Exposed gravelly-sandy soils with minimal shrubs, riparian woodland clearings, dry chamise chaparral, and annual grasslands with scattered seepweed or saltbush.	Suitable habitat occurs on site in association with open scrub and riverbank habitats. Species is known to occur in the project region. This species was not observed during site surveys.
Coastal whiptail *Cnemidophorus tigris multiscutatus*	[FSC]	--	Open areas in semiarid grasslands, scrublands, and woodlands.	Suitable habitat occurs on site in association with open scrub and riverbank habitats. Species is known to occur in the project region. This species was not observed during site surveys.
Silvery legless lizard *Anniella pulchra pulchra*	[FSC]	CSC	Stabilized dunes, beaches, dry washes, pine, oak, and riparian woodlands, and chaparral; associated with sparse vegetation with sandy or loose, loamy soils.	Suitable habitat occurs on site in association with open scrub and riverbank habitats. Occurrence of species has not been recently reported in the site vicinity and species not observed on site during field surveys.
Two-striped garter snake *Thamnophis hammondii*	[FSC]	CSC, CP	Perennial and intermittent streams having rocky or sandy beds and artificially-created aquatic habitats (man-made lakes and stock ponds); requires dense riparian vegetation.	The riverbed was dry during site surveys. Though variable flows are known to occur seasonally, such flows are generally swift and little to no ponding occurs on site. This species not observed during site surveys.

Table 4.6-2 (continued)
Special-Status Wildlife Species Known to Occur or Potentially Occur in the Riverpark Area

Common Name *Scientific Name*	Status Federal	 State	Habitat Requirements	On-Site Status
BIRDS				
Western least bittern (nesting) *Ixobrychus exilis hesperis*	[FSC], MNBMC	CSC	This bittern's habitat is centered on dense emergent wetlands of cattails and tules for nearly all of its needs.	No suitable habitat present on site. Not observed during focused bird surveys.
White-tailed kite (nesting) *Elanus leucurus*	MNBMC	CFP	Open vegetation and uses woodlands for cover.	Species known from area and suitable foraging habitat and limited nesting habitat occurs on site. One nest observed by this species (Guthrie 1999) during focused bird surveys.
Northern harrier (nesting) *Circus cyaneus*	--	CSC	Coastal salt marsh, freshwater marsh, grasslands, and agricultural fields.	Suitable nesting habitat does not occur on the project site, but could occasionally forage on/over the site. Not observed during focused bird surveys.
Sharp-shinned hawk (nesting) *Accipiter striatus*	--	CSC	Nests in woodlands and forages over dense chaparral and scrublands.	Marginal nesting habitat occurs in limited areas on the project site; could occasionally forage on/over the site. One observation was made during focused bird surveys. (Guthrie 1995)
Cooper's hawk (nesting) *Accipiter cooperi*	--	CSC	Dense stands of live oaks and riparian woodlands.	Marginal nesting habitat occurs in limited areas on the project site; could occasionally forage on/over the site. Several individual observations were made by Guthrie in 1995–1998 and 2000. No nesting observations were made during surveys.
Ferruginous hawk (wintering) *Buteo regalis*	[FSC], MNBMC	CSC	Grasslands, agricultural fields, and open scrublands.	Infrequent seasonal migrant. Suitable foraging area present. Not observed during focused bird surveys.
Golden eagle (nesting & wintering) *Aquila chrysaetos*	--	CSC,CFP	Mountains, deserts, and open country. Nest habitat consists primarily of cliffs and rocky ledges, sometimes trees and rarely ground and man-made structures.	Suitable nesting habitat is very limited on site, but species is known from the project vicinity and may periodically forage on site. Not observed during focused bird surveys.
Merlin (wintering) *Falco columbarius*	--	CSC	Coastlines, wetlands, woodlands, agricultural fields, and grasslands.	Marginal suitable/typical habitat present on the site. Not observed during focused bird surveys.
Prairie falcon (nesting) *Falco mexicanus*	--	CSC	Grasslands, savannas, rangeland, agricultural fields, and desert scrub; requires sheltered cliff faces for shelter and nesting.	Suitable nesting habitat does not occur on the project site, but could occasionally forage on/over the site. Not observed during focused bird surveys.

Table 4.6-2 (continued)
Special-Status Wildlife Species Known to Occur or Potentially Occur in the Riverpark Area

Common Name *Scientific Name*	Status Federal	 State	Habitat Requirements	On-Site Status
BIRDS				
Western yellow-billed cuckoo (nesting) *Coccyzus americanus occidentalis*	FC, MNBMC (full species)	CE	Nests along the broad, lower flood-bottoms of larger river systems; riparian forests and riparian jungles of willow, often mixed with cottonwoods, with understory of blackberry, nettles, or wild grape.	Typical nesting habitat is not present on site. Very few occurrences of species recorded from project region. One individual observed during focused surveys and thought to be a migrant. (Guthrie 1997)
Western burrowing owl (burrow sites) *Athene cunicularia hypugea*	[FSC], MNBMC	CSC	Grasslands and open scrub, particularly with ground squirrel burrows.	Few suitable burrow sites present on the project site and disturbance may be too great in more suitable open areas. Not observed during focused bird surveys.
Long-eared owl (nesting) *Asio otus*	--	CSC	Dense, riparian and live oak thickets near meadow edges, and nearby woodland and forest habitats. Also found in dense conifer stands at higher elevations.	Suitable nesting habitat is not present on the project site, but could occasionally forage on/over the site. Not observed during focused bird surveys.
Southwestern willow flycatcher (nesting) *Empidonax traillii extimus*	FE	CE	Riparian woodlands that contain water and low willow thickets.	Suitable habitat not present on site. Not observed during focused bird surveys.
California horned lark *Eremophila alpestris actia*	--	CSC	Grasslands, disturbed areas, agriculture fields, and beach areas.	Some suitable foraging habitat occurs in open areas on site. The site is heavily disturbed in the open areas and this species is a ground nester. Not observed during focused bird surveys.
Bank swallow (nesting) *Riparia riparia*	--	CT	Colonial nester; nests primarily in riparian and other lowland habitats west of the desert. Requires vertical banks/cliffs with fine-textured/sandy soils near streams, rivers, lakes, ocean to dig nesting hole.	Limited suitable habitat on site and no recent records of occurrence in the area. Not observed during focused bird surveys.
Coastal California gnatcatcher *Polioptila californica californica*	FT	CSC	Coastal sage scrub in areas of flat or gently sloping terrain.	Marginal habitat occurs in limited areas on the project site; however this species has been documented in the project area. Not observed during focused bird surveys.

Table 4.6-2 (continued)
Special-Status Wildlife Species Known to Occur or Potentially Occur in the Riverpark Area

Common Name *Scientific Name*	Status Federal	Status State	Habitat Requirements	On-Site Status
BIRDS				
Loggerhead shrike *Lanius ludovicianus*	[FSC], MNBMC	CSC	Grasslands with scattered shrubs, trees, fences or other perches.	Suitable nesting and foraging habitat present. Species documented in project area and observed during 1993 focused bird surveys (Guthrie 1993) and 2003 coastal California gnatcatcher focused surveys.
Least Bell's vireo (nesting) *Vireo bellii pusillus*	FE, MNBMC	CE	Riparian vegetation with extensive willows below 2,000 ft.	Marginal suitable habitat occurs in limited areas on the project site. Not observed during focused bird surveys.
Yellow warbler (nesting) *Dendroica petechia brewsteri*	--	CSC	Riparian thickets and woodlands.	Nesting habitat exists along portions of the Santa Clara River and within the large drainage channel. Several individuals observed during spring and early summer, most considered migrants but some were present into June and July in 1995 and 1996.
Yellow-breasted chat (nesting) *Icteria virens*	--	CSC	Riparian thickets and riparian woodlands with a dense understory.	Suitable nesting habitat is not present on site. Not observed during focused bird surveys.
Summer tanager (nesting) *Piranga rubra*	--	CSC	Cottonwood-willow riparian habitats, especially older, dense stands along rivers and streams.	Marginal nesting habitat exists along portions of the Santa Clara River and within the large drainage channel. One individual observed on one occasion, not seen on subsequent visits; considered a migrant.
Southern California rufous-crowned sparrow *Aimophila ruficeps canescens*	[FSC]	CSC	Coastal sage scrub.	Observed on site during general wildlife surveys and focused bird surveys. Suitable nesting and foraging habitat present.
Bell's sage sparrow (nesting) *Amphispiza belli belli*	[FSC], MNBMC	CSC	Saltbush scrub and chaparral.	Suitable nesting habitat occurs in limited areas on the project site, species is known from the project vicinity and may periodically forage on site. Observed during focused bird surveys. (Crawford 2003)
Tricolored blackbird (nesting colony) *Agelaius tricolor*	[FSC], MNBMC	CSC	Freshwater marshes and riparian scrub.	Limited nesting and forging habitat present. Although several red-winged blackbirds were observed on few occasions, one tricolored blackbird was observed during focused bird surveys. (Guthrie 1995)

Table 4.6-2 (continued)
Special-Status Wildlife Species Known to Occur or Potentially Occur in the Riverpark Area

Common Name *Scientific Name*	Status Federal	Status State	Habitat Requirements	On-Site Status
MAMMALS				
Yuma myotis *Myotis yumanensis*	[FSC]	CSC	Found in a variety of habitats; optimal habitats are open forests and woodlands with sources of water over which to feed.	Though this species is expected to be relatively common along the Santa Clara River, the reach of the river on the project site does not support water for most of the year. This species may periodically fly over the site, but it is expected to frequent more suitable habitat that occurs off site. This species was not observed during site surveys.
Spotted bat *Euderma maculata*	[FSC]	CSC	Deserts, scrublands, chaparral, and coniferous woodlands.	Limited suitable habitat occurs on the project site. Very few spotted bats have been recorded from the project vicinity. This species was not observed on the site.
Pale big-eared bat *Corynorhinus townsendii pallescens*	[FSC] (Full Species)	CSC (Full Species)	Utilizes a variety of communities, including conifer and oak woodlands and forests, arid grasslands and deserts, and high-elevation forests and meadows.	Though this species is expected to be relatively common along the Santa Clara River, the reach of the river on the project site does not support water for most of the year. This species may periodically fly over the site, but it is expected to frequent more suitable habitat that occurs off site. This species was not observed during site surveys.
Pallid bat *Antrozous pallidus*	--	CSC	Arid habitats, including grasslands, shrublands, woodlands, and forests; prefers rocky outcrops, cliffs, and crevices with access to open habitats for foraging.	Suitable foraging and limited roosting habitat occurs on site for this species. Pallid bats have been recorded from project region but not observed on the site.
Western mastiff bat *Eumops perotis*	[FSC] (ssp. *californicus*)	CSC	Primarily arid lowlands and coastal basins with rugged, rocky terrain, along with suitable crevices for day-roosts.	Very limited suitable roosting habitat present on site. Some limited foraging opportunities if species occurs in vicinity; however, this species was not observed on the site during surveys.
San Diego desert woodrat *Neotoma lepida intermedia*	--	CSC	Chaparral, coastal sage scrub, understory of tree thickets.	Suitable habitat occurs on the site. San Diego desert woodrat was observed on site during site surveys.
San Diego black-tailed jackrabbit *Lepus californicus bennettii*	[FSC]	CSC	Chaparral and coastal sage scrub.	Suitable habitat occurs on the site. Black-tailed jackrabbits were observed on site during site surveys.

Table 4.6-2 (continued)
Special-Status Wildlife Species Known to Occur or Potentially Occur in the Riverpark Area

Common Name *Scientific Name*	Status Federal	 State	Habitat Requirements	On-Site Status
MAMMALS				
Ringtail *Bassariscus astutus*	--	CFP	Prefers a mixture of forest and shrubland habitats in close association with rocky areas or riparian habitats.	Limited suitable habitat on site; presence was not detected during site surveys.
American badger *Taxidea taxus*	--	CSA	Drier open stages of shrub, forest, and herbaceous habitats with friable soils.	Limited suitable habitat on site; presence was not detected during site surveys.
Mountain lion *Felis concolor browni*	--	CFP	Occurs in a variety of scrub and forested habitats.	The Santa Clara River is a known movement corridor for large mammals such as the mountain lion. This species is known to occur in the project region. No suitable denning sites are present on the property, though this site may be part of a local lion's home range.

KEY:

(nesting) = For most taxa the CNDDB is interested in sightings for the presence of resident populations. For some species (primarily birds), the CNDDB only tracks certain parts of the species range or life history (e.g., nesting locations). The area or life stage is indicated in parenthesis after the common name.

Status:

Federal -- U.S. Fish and Wildlife Service
FE: Federally Endangered
FT: Federally Threatened
FPE: Federally Proposed Endangered
FPT: Federally Proposed Threatened
FC: Federal Candidate for listing as Threatened or Endangered

MNBMC: Migratory Non-game Birds of Management Concern (not shown for Federally listed or proposed Threatened or Endangered species)

[FSC]: Federal Species of Concern
Species denoted with this term primarily include those considered C2 species under the old classification system. This term is only to be used as a "term-of-art" and is not to imply any legal protection or inclusion on the Federal ESA list.

State -- California Department of Fish and Game
CE: California Endangered
CT: California Threatened
CFP: California Fully Protected
CP: California Protected
CSC: California Species of Special Concern
CSA: California Special Animal (species with no official federal or state status, but are included on CDFG's Special Animals list)

(a) Special-Status Wildlife Species Observed on the Site

Western spadefoot toad (*Spea hammondii*) ***California Species of Special Concern, Federal Species of Concern***. This species' range covers the central portion of northern California, the Great Valley, and coast ranges from San Francisco to Baja California (Stebbins 1985). In Southern California, this species is most commonly found in shallow, temporary seasonal rainpools and vernal pools (seasonal pools that are typically underlain by a claypan, hardpan, basalt, or other semi-impervious substrate and that support specific plant species that have adapted to the seasonal and often alkaline conditions of these pools) after winter and spring rains (Sloan 1964). The western spadefoot toad is typically a nocturnal species. It can be found by checking for tadpoles and small egg masses attached to rocks or submerged vegetation in vernal or other seasonal pools (Behler and King 1979).

Adults or sign (egg masses) of this species were observed in three of the six on-site seasonal rainpools (no vernal pools occur on the project site) in the winter of 2004 (Crawford 2004). These seasonal rainpools were located on the western, west-central, and central portions of the project site. Based on the locations and number of seasonal rainpools and number of egg masses observed, 16-20 pairs of breeding western spadefoot toads were estimated to be occurring on the project site in 2004.

Sharp-shinned hawk (*Accipiter striatus*); ***California Species of Special Concern.*** This raptor is a fairly common migrant and winter resident in the project region. It is known to roost in intermediate to high-canopy forests and typically forages in openings at edges of woodlands, agricultural fields, and shorelines (CDFG 1990a). Sharp-shinned hawks most commonly prey on small birds, but will also take small mammals, reptiles, and insects. This species typically nests in the northern forests of the state and is not expected to nest on the site. One individual was observed during focused bird surveys (Guthrie 1995).

Cooper's hawk (*Accipiter cooperi*); ***California Species of Special Concern.*** Cooper's hawk is primarily a yearlong resident where it occurs, which includes the project vicinity. It typically nests in dense woodlands near open water or riparian areas. Cooper's hawks typically prey on small birds, but will also take small mammals and reptiles that it usually spots while utilizing patchy woodlands and edge habitats (CDFG 1990a). Suitable dense nesting habitat is lacking on the project site; however, suitable foraging habitat is present. Cooper's hawks are relatively common in the site vicinity and were observed on several occasions during focused surveys (Guthrie 1995–1998 and 2000).

White-tailed kite (*Elanus leucurus*); ***California Fully Protected, Migratory Non-Game Birds of Management Concern.*** White-tailed kite utilizes a variety of habitats, but is generally associated with riparian woodlands situated near open grassland an/or agricultural fields. This species is a yearlong resident in coastal and valley lowlands. White-tailed kites are known to occur in the vicinity of the

project area, and since suitable nesting and foraging habitat is present on site, this species has a high potential to nest on site. During the ten years of focused bird surveys conducted on the project site, there was one nesting observation by Guthrie in 1999 in a large cottonwood along the north side of the Santa Clara River just upstream of Bouquet Canyon Bridge.

Western yellow-billed cuckoo (*Coccyzus americanus occidentalis*) ***California Endangered.*** Yellow-billed cuckoo populations occur in the West in a few scattered locations in Southern California, Arizona, and New Mexico. Yellow-billed cuckoos inhabit riparian forests, particularly cottonwood and willow, overgrown pastures, and orchards. Marginal habitat occurs along portions of the Santa Clara River. One individual was observed on one occasion and was considered to be a migrant (Guthrie 1997).

Loggerhead shrike (*Lanius ludovicianus*); ***California Species of Special Concern, Federal Species of Concern.*** This bird is a resident species in Southern California. It inhabits grasslands, agriculture, chaparral, and desert scrub; it is absent only from the mountainous zones. Population declines due to urbanization have been noted. Loggerhead shrikes feed on small reptiles and insects, which they often impale on sticks or thorns before eating. The loggerhead shrike was observed on the project site during two focused surveys (Guthrie 1993, Crawford 2003). Suitable nesting and foraging habitat occurs on site.

Yellow warbler (*Denroica petechia brewsteri*); ***California Species of Special Concern.*** Yellow warblers prefer wet riparian thicket habitat but are also found in large cottonwoods in drier riparian areas. One to several yellow warblers have been observed on the project site during focused surveys by Guthrie during the years 1993, 1995, 1996–1998 and 2002. A drop in number after May indicates that most birds were migrants. However, in 1995 and 1996, one to four individuals were observed into early July and were presumably breeders (Guthrie 1997). No nesting observations were made during site surveys.

Summer tanager (*Piranga rubra*); ***California Species of Special Concern.*** This species is typically known as a migrant in Southern California, but is known to nest along the Colorado River and in scattered desert areas. The summer tanager requires riparian woodlands or forest dominated by cottonwoods (*Populus* spp.) and willows (*Salix* spp.) (Garret and Dunn 1981). Marginal habitat occurs along the Santa Clara River (scattered willow and cottonwood trees) and within the large canyon in the central portion of the project site. Only one individual was observed during field surveys (Guthrie 2003) and was not observed on subsequent site visits. Therefore, it is considered to be a migrant and not nesting on the project site.

Southern California rufous-crowned sparrow (*Aimophila ruficeps canescens*); ***California Species of Special Concern, Federal Species of Concern.*** This species most commonly nests and forages in mixed chaparral and coastal sage scrub habitats that occur on relatively steep, often rocky hillsides. A few individual rufous-crowned sparrows were observed in coastal sage scrub habitat during focused coastal California gnatcatcher surveys (Crawford 2002 and 2003) and focused bird surveys (Guthrie 2003). No nests were

observed; however, suitable nesting habitat does exist on some of the heavily scrub vegetated slopes on the site.

Bell's sage sparrow (*Amphispiza belli belli*); ***California Species of Special Concern, Federal Species of Concern.*** The Bell's sage sparrow has a spotty distribution; breeding range is along the coastal slopes from Trinity County south into northwestern Baja California. Locally, it can be found in chaparral habitats, especially chamise chaparral. This race is essentially sedentary. Male sage sparrows show high site tenacity to breeding territory, even when the habitat is altered dramatically (Ehrlich et al. 1988). This bird was observed on the on the project site during the 2003 focused California gnatcatcher surveys.

Tricolored blackbird (*Agelaius tricolor*); ***California Species of Special Concern.*** The tricolored blackbird is a resident in California. It is common locally throughout the Central Valley and in coastal districts from Sonoma County south. Tricolored blackbirds nest near fresh water, preferably in emergent wetland with tall, dense cattails or tules, but also in thickets of willow, blackberry, wild rose, tall herbs. Limited nesting habitat occurs on the project site; however, during years of greater rainfall, nesting habitat is increased. One tricolored blackbird was observed on one occasion on site within the Santa Clara River (Guthrie 1995).

San Diego desert woodrat (*Neotoma lepida intermedia*); ***California Species of Special Concern, Federal Species of Concern.*** The San Diego desert woodrat is associated with moderate to dense scrub canopies, rock crevices, and in other protected areas where nest-building materials are available. This species is highly adaptable and may depend upon succulents for water. Desert woodrats have a high potential to occur in the dense, undisturbed chamise chaparral and coastal sage scrub habitats on the project site. Scat of this species was detected in this habitat and the type and location of the midden further confirmed the presence of this species.

San Diego black-tailed jackrabbit (*Lepus californicus bennettii*); ***California Species of Special Concern, Federal Species of Concern.*** The black-tailed jackrabbit occurs in a variety of habitats including deserts, pastures, row crops and open scrub. They feed on several species of grasses and herbs, including many cultivated crops (Jameson and Peeters 1988). Several jackrabbits were observed in the riverbed, open terraces, and disked fields during the 2002 general site survey and 2003 focused mammal survey. The jackrabbit occupies areas on site that are occasionally disturbed by natural means or disking operations, such as the riverbed and disked fields. Because of the regular disturbance to these areas, the on-site habitat for the jackrabbit is considered to be moderate in quality.

(b) Special-Status Wildlife Species Not Observed But With Habitat Occurring On Site

Arroyo chub (*Gila orcutti*); ***California Species of Special Concern, Federal Species of Concern*; Santa Ana sucker** (*Catastomus santaanae*); ***Federally Listed Threatened Species, California Species of Special Concern*; Unarmored three-spine stickleback** (*Gasterosteus aculeatus williamsoni*); ***Federally Listed Endangered Species, California Listed Endangered Species.*** As discussed in the site description, the portion of the Santa Clara River that occurs within the project boundaries did not support any flowing or standing water at the time of surveys. Although during certain years water can be present into June or July (Guthrie 1993, 1995, 1998), the river is typically dry during the summer months, especially during drier than normal years as was the case in 2002. However, during the rainy season (primarily winter) the watershed east of the project site drains enough water into the river to deliver what are sometimes substantial flows through the project area. As these three special-status fish species are all known to occur in the Santa Clara River (Courtois 1999, Crawford 2003) both upstream and downstream of the project site, it is expected that all three species could potentially be present within the stretch that passes through the site during times when appropriate water depths are present.

Coast horned lizard (*Phrynosoma coronatum*); ***California Protected Species, California Species of Special Concern, Federal Species of Concern***. The Riverpark project site is situated in an area where the documented ranges of two subspecies of coast horned lizard, San Diego horned lizard (*P.c. blainvillii*) and California horned lizard (*P.c. frontale*), overlap. Both of these species are afforded the same sensitivity status by CDFG. Coast horned lizards feed almost exclusively on native harvester ants and occur in a variety of habitats including scrub, grassland, sandy washes, and woodland—typically where there are sands or other fine loose soils where they can bury themselves. This species was not detected during the site surveys. However, patches of suitable habitat exist in coastal sage scrub, chaparral, and open river terrace habitats on the Riverpark site. In addition, native harvester ants were present on the project site.

Coastal whiptail (*Cnemidophorus tigris multiscutatus*); ***Federal Species of Concern***. This subspecies of western whiptail is most commonly associated with arid to semiarid, open scrub habitats where it has room for running. It may also be found in woodlands and streamside habitats, but generally avoids densely vegetated areas. The Riverpark project site is situated within documented range of this species and there are suitable areas of open scrub habitat on site; however, none were observed during site surveys.

Pallid bat (*Antrozous pallidus*); ***California Species of Special Concern***. The pallid bat is a locally common species of grasslands, shrublands, woodlands, and forests. It is most common in open, dry habitats with rocky areas for roosting (CDFG 1990b). Prey include insects and spiders that are often taken on the ground. Permanent roosts are typically in caves or mines where the pallid bat can retreat from high

temperatures. Night roosts may be in more open habitat. Suitable permanent roosts for this species were not detected on the Riverpark site. However, suitable foraging and night roosts are present.

(3) Sensitive Plant Communities Present On Site

CDFG Wildlife and Habitat Data Analysis Branch has developed a "List of California Terrestrial Natural Communities." The most recent version of this list, dated September 2003, is derived from the CNDDB and is intended to supersede all other lists developed from the CNDDB. It is based on the detailed classification put forth in A Manual of California Vegetation (Sawyer and Keeler-Wolf 1995).

The primary purpose of the CNDDB classification is to assist in the characterization and rarity of various vegetation types. For the purposes of this Draft EIR, plant communities denoted on the list as Rare in the September 2003 version, or that are otherwise regulated by local, state, and/or federal resource agencies, are considered of "special status".

As previously described, two plant communities occur on the Riverpark site that are considered sensitive by CDFG. A brief description of these communities follows. These habitats are discussed in greater depth under the **Plant Communities** heading of this section.

Southern willow scrub. Southern willow scrub is known to support a high number of both resident and migrating special-status wildlife species, particularly birds. For this reason, and because of the decline in the amount and quality of riparian habitats remaining in California, this community is denoted by the CDFG as special status. The majority of this plant community also occurs within CDFG jurisdiction pursuant to Section 1600 of the Fish and Game Code.

Southern riparian scrub. Most forms of southern riparian scrub in Southern California are denoted by CDFG as special status because they are declining in acreage and because of the large number of common and special-status wildlife species that are often associated with this community. The majority of this plant community occurs within CDFG and ACOE jurisdiction.

d. Jurisdictional Waters, Streambed and Riparian Resources

The portion of the Santa Clara River and seven small ephemeral drainages that occur on site are under the jurisdictional authority of various federal and state regulatory agencies. Impacts to "Waters," streambeds and adjacent riparian vegetation, as defined in the regulations cited below, typically require authorizations from the agencies. The regulatory agencies and the limits of their jurisdiction are discussed below.

(1) U.S. Army Corps of Engineers (ACOE)

Federal regulations of "Waters of the U.S." stem from Section 10 of the Federal Rivers and Harbors Act of 1899, enacted to regulate activities within navigable waters. In 1972, the federal Clean Water Act was passed. This act regulates discharges into "Waters of the U.S." Section 404 of this act regulates activities including fills placed into wetlands that are adjacent to navigable waters.

"Waters of the U.S." are defined in 33 CFR 328.3(a) as:

- All waters which are currently used, or were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide;
- All interstate waters including interstate wetlands;
- All other waters such as intrastate lakes, rivers, streams (including intermittent streams), mudflats, potholes, wet meadows, playa lakes, or natural ponds, the use, degradation or destruction of which could affect interstate or foreign commerce including any such waters;
- Which are or could be used by interstate or foreign travelers for recreational or other purposes;
- From which fish or shellfish are or could be taken and sold in interstate or foreign commerce;
- Which are used or could be used for industrial purpose by industries in interstate commerce;
- All impoundments of waters otherwise defined as "Waters of the U.S." under the definition;
- The territorial seas;
- Tributaries of "Waters of the U.S.";
- Wetlands adjacent to "Waters of the U.S."

ACOE jurisdiction in non-tidal waters typically extends to the ordinary high water mark (OHWM). The OHWM for intermittent streams, for example, can be determined by "the fluctuations of water as indicated by physical characteristics such as clear, natural lines impressed on the bank, shelving, changes in the character of soil, destruction of terrestrial vegetation, the presence of litter and debris, or other appropriate means that consider the characteristics of the surrounding areas" [33 CFR 328.3(e)]. In arid areas of the southwest, the OHWM may occur at a lower level than where the typical physical indicators are present, due to unusually high flows, not occurring on a typical annual cycle. (Allen, et al. 2001).

Most impacts to areas delineated as "Waters of the U.S.", if determined to be jurisdictional by the ACOE, requires a project to obtain approval under the authority of the Clean Water Act and its implementing regulations.

(2) California Department of Fish and Game (CDFG)

The State of California regulates water resources under Sections 1600 to 1619 of the Fish and Game Code of California. Section 1602 mandates that:

> *"An entity may not substantially divert or obstruct the natural flow of, or substantially change or use any material from the bed, channel, or bank of any river, stream, or lake or dispose of debris, waste, or other material…where it may pass into any river stream, or lake…."*

Unless certain requirements are met CDFG considers most natural drainages to be streambeds unless it can be demonstrated otherwise. Streambeds are defined in the California Code of Regulations Title 14, Chapter 1, Section 1.72 as follows:

> *"A stream is a body of water that follows at least periodically or intermittently through a bed or channel having banks and that support fish or other aquatic life. This includes watercourses having surface or subsurface flow that supports or has supported riparian vegetation."*

CDFG jurisdiction includes ephemeral, intermittent, and perennial watercourses, and is often extended to the limit of riparian habitats that are located contiguous to the water resource and that function as part of the watercourse system. In this analysis, the area generally corresponding to the limit of riparian habitats located contiguous to the water resource is also referred to as the "resource line." Section 2785(e) of the Fish and Game Code of California states:

> *"Riparian habitat means lands which contain habitat which grows close to and which depends on soil moisture from a nearby freshwater source."*

(3) Regional Water Quality Control Board (RWQCB)

Section 401 of the Federal Clean Water Act authorizes the State of California to certify federal permits and licenses. The state's implementing regulations to conduct certifications are codified under the California Code of Regulations Title 23 Waters, Sections 3830–3869. Projects qualifying for an ACOE Section 404 Permit must submit materials for review to the appropriate RWQCB and request a Section 401 Certification. Much of the same information (project description, potential impacts, mitigation measures) necessary to apply for ACOE Section 404 and CDFG Section 1603 Permits is required for the Section 401 Certification.

Direct and indirect impacts on wetland and riparian areas may be subject to the jurisdiction of several state and federal agencies, including the CDFG, the Los Angeles RWQCB and the ACOE. Areas potentially under the jurisdiction of these agencies are briefly discussed below. A jurisdictional

delineation of waters and streambeds associated with the Santa Clara River has been completed and confirmed by the agencies, as part of the Natural River Management Plan and subsequent permits.

(4) Summary of Jurisdiction

The on-site portion of the Santa Clara River is approximately 14,155 linear feet and supports southern riparian scrub vegetation (161.4 acres), southern willow scrub vegetation (1.9 acres), mulefat scrub vegetation (1.2 acres) and riverwash (176.2 acres), as described earlier in this document. A jurisdictional delineation for the Santa Clara River was conducted in association with the development of the NRMP. Within the reach of the Santa Clara River that occurs on the project site, the boundary of jurisdiction for ACOE and CDFG were determined to be the same. Based on that delineation, the total area under ACOE and CDFG jurisdiction within the Santa Clara River is 340.7 acres.

The Santa Clara River and its associated ephemeral drainages flow through the project site. There are a total of seven drainages located on the project site (**Figure 4.6-4**). Drainages 1 and 5 are intermittent streambeds, while Drainages 2, 3, 4, 6, and 7 are ephemeral streambeds. Because Drainages 2, 3, 4, and 5 do not connect to the Santa Clara River or any other "navigable waters", as defined by the Clean Water Act, these drainages are, therefore, not under the jurisdiction of the ACOE. The following briefly describes each of these drainages and the amount of ACOE and/or CDFG jurisdiction associated with each drainage.

Drainage 1 is an intermittent stream, which occurs within the main canyon located in the center of the project site. It consists of one main channel and a small tributary channel that occur within a disturbed area of the site. The tributary channel is approximately 260 feet in length and the main channel is approximately 2,728 feet in length. This drainage is located within a disturbed area that has been developed for many years. Because the channel discharges into the Santa Clara River, it is considered a "Waters of the U.S.," as defined by the Clean Water Act and, therefore, under the regulatory jurisdiction of the ACOE. The CDFG also has jurisdiction of the streambed and associated riparian vegetation. The ACOE jurisdiction is approximately 0.4 acre and the CDFG jurisdiction is approximately 2.7 acres.

Drainage 2 is an ephemeral streambed, which consists of one main channel and a smaller tributary channel. The total length of the main channel is approximately 784 feet and the tributary is approximately 336 feet. The total amount of CDFG jurisdiction is approximately 0.7 acre.

Drainage 3 is an ephemeral streambed totaling approximately 210 feet in length. CDFG jurisdiction totals approximately 0.2 acre.

FIGURE **4.6-4**

Drainage Locations

112-16•02/04

Drainage 4 is an ephemeral streambed, which consists of one main channel and a smaller tributary channel. The length of the main channel within the project boundary is approximately 1040 feet, and the tributary is approximately 104 feet. A total of approximately 0.38 acre is within CDFG jurisdiction. Drainage 4 continues north of the project boundary and grading limits.

Drainage 5 is an intermittent stream. The channel is well defined in the upper reaches of the streambed, but is less defined in the lower reaches. In some areas of the lower reaches, there are no obvious channels or banks. The length of the drainage within the project boundary and the grading limits is approximately 1,040 feet. A total of approximately 0.16 acre is within CDFG jurisdiction.

Drainage 6 occurs at the eastern edge of the project site and is essentially in a natural condition. This drainage consists of one main channel and two smaller tributary channels. The total length of the main channel and two tributaries is approximately 1,418 feet. Part of drainage 6 is outside the project boundary and the grading limits. The length of the main channel within the project boundary and the grading limits is approximately 572 feet. Only one of the two tributaries are within the project boundary and the grading limits. The length of the tributary within the project boundary and the grading limits is approximately 104 feet. Because the channel discharges into the Santa Clara River, this drainage is under ACOE jurisdiction. Total ACOE jurisdiction within the project boundary and grading limits is approximately 0.18 acre; the total CDFG jurisdiction is approximately 0.37 acre.

Drainage 7 is a barely-defined ephemeral streambed 200 feet in length and 1 to 2 feet wide, or less than 0.1 acre in size. This drainage appears erosional in character within a broad swale with very little gradient.

The total length of all seven drainages within the project boundary and grading limits is approximately 7,250 feet. The total amount of acreage under jurisdiction of the CDFG within the project boundary and grading limits is approximately 4.51 acres. The total amount of acreage under jurisdiction of the ACOE is approximately 0.58 acre. The combined acreage of both CDFG and ACOE jurisdictional resources is approximately 5.09 acres.

e. Wildlife Movement Corridors

Over the past several decades, the Santa Clarita Valley has seen extensive urban development. The Riverpark project site is located within the center of the City of Santa Clarita with existing development generally occurring to the north, south, east, and west (**Figure 4.6-5**). Undeveloped property is located south of the Soledad Canyon Road corridor, which is south of the Riverpark site; however, most of this property is covered by a specific plan and development of this property is anticipated in the future. In addition, development will continue in the nearby Plum Canyon area to the north of the site (City of Santa Clarita General Plan, Land Use Map, 2003). As such, the upland portions of the project site no

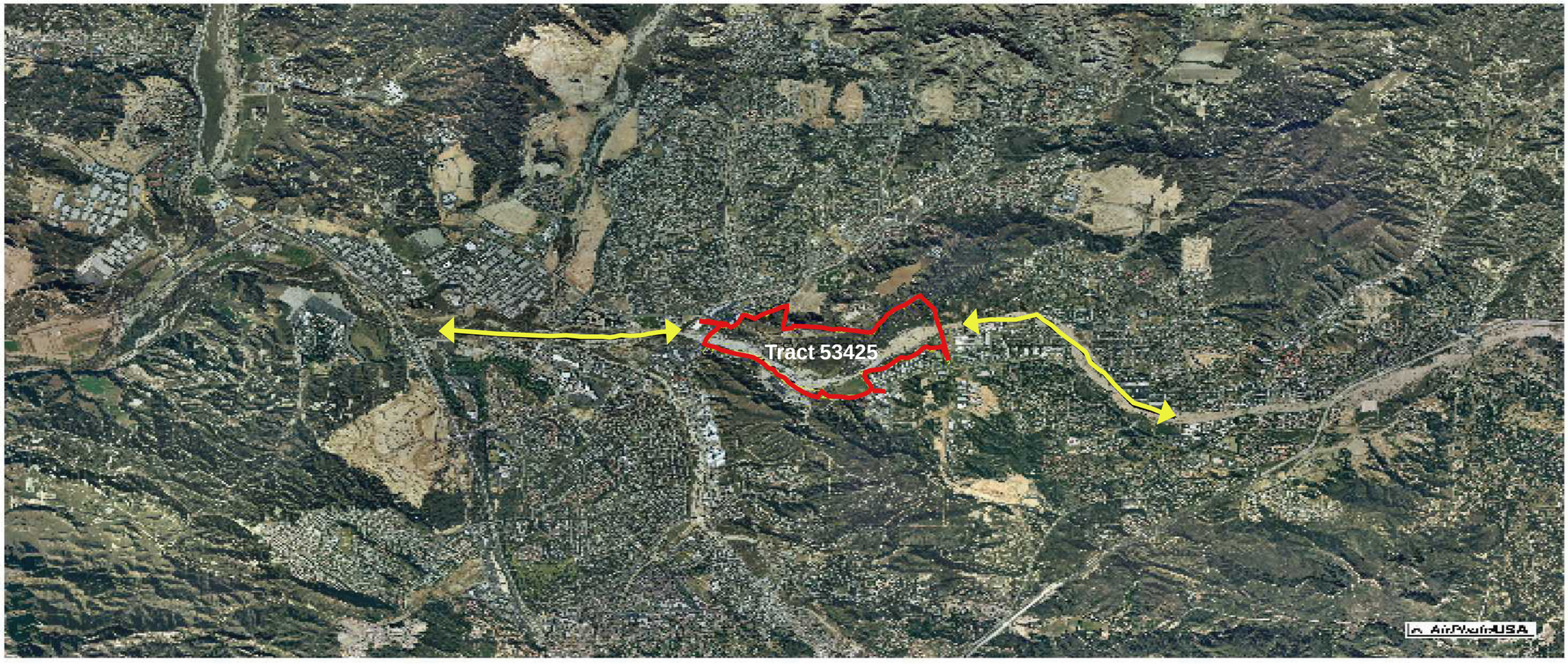
longer function as a north-south corridor between the Santa Clara River and upland open space areas. The Santa Clara River, however, passes through the site and functions as an east-west corridor.

Habitat used by wildlife as movement corridors link together large areas of open space that are otherwise separated by rugged terrain, changes in vegetation, by human disturbance, or by the encroachment of urban development. The fragmentation of natural habitat creates isolated 'islands' of vegetation that may not individually provide sufficient area to accommodate sustainable populations and can adversely impact genetic and species diversity. Corridors mitigate the effects of this fragmentation by: (1) allowing animals to move between remaining habitats, which allows depleted populations to be replenished and promotes genetic exchange with separate population; (2) providing escape routes from fire, predators, and human disturbances, thus reducing the risk that catastrophic events (such as fire, flood, or disease) will result in population or species extinction; and (3) serving as travel paths for individual animals as they wander about or disperse from their home ranges in search of food, water, mates, and other needs.

The low hills, ridgelines and canyons occurring on the project site are similar in character and biotic communities to the larger foothills extending from the Santa Clara drainage into the Angeles National Forest and northward to the San Andreas rift zone. Lower elevations on the La Liebre and Sierra Pelona ranges support vast expanses of coastal scrub and chaparral formations, varying in composition according to slope angle, orientation, soil characteristics and disturbance history. Plants and animals within this system historically would have been able to maintain populations at fairly constant carrying capacity levels because support resources are relatively evenly distributed, with no particular concentration areas.

Alluvial scrub and riparian species populations are arrayed along marginal terraces and channels, so their populations tend to be rather linear, often with low within-site densities but extensively distributed geographically. Aquatic species in habitats such as this portion of the Santa Clara River are adapted to persisting in systems that periodically undergo high-energy seasonal flows, scouring, siltation and summer drying. Their populations generally are capable of rapid movement and colonization of surface water systems, with individual densities and species diversity ebbing and flowing with the seasonal changes in the river.

The major habitat corridor passing through the site is the Santa Clara River. It is known to be an important migration and genetic dispersion corridor for many wildlife species occurring in the area. Its headwaters are located in the San Gabriel Mountains to the east of the project site and the River empties into the Pacific Ocean approximately 50 miles to the west. Along this stretch, the Santa Clara River is adjoined in numerous places with large open spaces and is a primary seasonal movement route for aquatic taxa, riparian obligate species (resident and migratory), and larger, more mobile terrestrial animals.



Legend:

- **Project Boundary**
- **Wildlife Movement Corridors**

NOT TO SCALE

FIGURE **4.6-5**

Wildlife Movement Corridors

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It also functions as a dispersal and linkage route for juvenile and displaced individuals of species that maintain metapopulations within the low elevation ranges of coastal Southern California. Existing development in the surrounding area further increases the importance of this east/west corridor as several larger species such as deer, coyote, bobcat, and fox are forced toward the river channel for refuge and to access otherwise disjunct foraging areas.

f. Significant Ecological Area (SEA) 23 – Santa Clara River SEA

The portion of the Santa Clara River within the project site was originally designated as SEA 23 by the County of Los Angeles. Because this area in now incorporated within the City of Santa Clarita, the County no longer has SEA jurisdiction over this portion of the river. However, the City of Santa Clarita has adopted their own policies with respect to SEAs, such as the stretch of the Santa Clara River contained in the Riverpark site (**Figure 4.6-6**). The City of Santa Clarita uses the Federal Emergency Management Agency 100-year storm limit line as the limits of the Santa Clara River SEA. A complete discussion of these City policies can be found in **Section 4.7, Land Use**, of this Draft EIR.

5. PROJECT IMPACTS

a. Methodology

Direct impacts of a proposed project on biological resources can take several forms, but typically involve the loss, modification, or disturbance of natural habitat (i.e., plant communities or other naturally occurring areas) which in turn, directly affects plant and wildlife species dependent on that habitat. To determine areas of expected impact on biological resources, proposed grading plans were evaluated and compared with vegetation and wildlife maps. The level of significance of potential impacts on habitat areas is determined by an evaluation of the overall biological value of a habitat area with respect to significance threshold criteria (described below). The relative value of each of the plant communities present on site is measured by such factors as its disturbance history, biological diversity, importance to particular plant and wildlife species, uniqueness or sensitivity status, as well as the surrounding environment and the presence of special-status resources. The significance of impacts with respect to direct impacts on individuals or populations of plant and animal species takes into consideration the number of individual plants or animals potentially affected, how common or uncommon the species is both on the project site and from a regional perspective, and the sensitivity status if the species is considered of special status by resource agencies. These factors are evaluated based on the results of on-site biological surveys and studies, results of literature and database reviews, discussions with biological experts, and established and recognized ecological and biodiversity theory and assumptions.

It should be noted that this portion of the EIR addresses the direct and indirect biological impacts of the proposed project resulting from the conversion of land to development-related land uses. The impacts generated by the hydrological changes to the river corridor resulting from the installation of bank stabilization, toe or erosion protection, and the Newhall Ranch Road/Golden Valley Road Bridge across the Santa Clara River are addressed in **Section 4.20, Floodplain Modifications**.

b. Significance Threshold Criteria

(1) CEQA Guidelines

Significant impacts on biological resources posed by the proposed project were determined from criteria stated in CEQA Guidelines. Appendix G (Environmental Checklist) of the CEQA Guidelines states that a project could have a significant impact on biological resources if it would:

- have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations or by the CDFG or USFWS;
- have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, or regulations or by the CDFG or USFWS;
- have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means;
- interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites;
- conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance; or
- conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state Habitat Conservation Plan.

Section 15065(a) of the CEQA Guidelines also states that a project may have a significant effect on the environment when the project has the potential to:

- substantially degrade the quality of the environment;
- substantially reduce the habitat of a fish or wildlife species;
- cause a fish or wildlife population to drop below self-sustaining levels;
- threaten to eliminate a plant or animal community; or
- reduce the number or restrict the range of an Endangered, Rare, or Threatened species.

EXISTING TANK

PROPOSED TANK #2

PROPOSED TANK #1

EXISTING TANK

BOUQUET CANYON ROAD

NEWHALL RANCH ROAD

GOLDEN VALLEY ROAD

EATON CANYON

City of Santa Clarita SEA

Natural Park Area

SANTA CLARA RIVER

SOLEDAD CANYON ROAD

LEGEND

Project Boundary

City of Santa Clarita Significant Ecological Area (SEA)

800' 400' 0 800'

SCALE IN APPROXIMATE FEET

FIGURE **4.6-6**

City of Santa Clarita Significant Ecological Area (SEA)

112-16•10/03

(2) Thresholds Specific to City of Santa Clarita

(a) Santa Clarita General Plan

Several policies within the City's General Plan provide for the preservation and protection of sensitive habitat and wildlife areas. In particular, Policy 5.3 of the General Plan provides for the utilization of creative site planning to avoid and minimize disturbance to Significant Ecological Areas and other sensitive habitat. Policy 3.5 of the Open Space and Conservation Element recommends that only passive and compatible recreation uses be allowed within a SEA. Policy 5.8 provides for the preservation and protection of designated wildlife movement corridors from undue encroachment and disruption. Policy 3.10 of the Open Space and Conservation Element also provides for the preservation of wildlife corridors through the use of adequate setbacks. The General Plan also discusses the provision for trails. Please see **Section 4.7, Land Use**, for a complete discussion regarding the project's consistency with the Open Space and Conservation and Parks and Recreation Elements Goals and Policies, concerning resource protection and trails.

(b) City Oak Tree Ordinance

City of Santa Clarita Ordinance No. 89-10, as well as the Oak Tree Preservation and Protection Guidelines developed by the City, provide for the protection of oak trees within the City limits. This ordinance establishes that it shall be the policy of the City to require the preservation of healthy oak trees and that removal, cutting, pruning, relocation, damage, or encroachment into the protected zone of any oak trees measuring six inches or larger in circumference (at DBH) on public or private property can only be done in accordance with a valid oak tree permit issued by the City. Impacts to trees that fall within the criteria set by the ordinance are considered potentially significant.

An oak tree report was prepared in May 2003, and a subsequent addendum dated September 18, 2003, for oak trees within the project site. This report is included in its entirety in **Appendix 4.6**.

(3) Additional Area-Specific Thresholds

Significance criteria defined in the CEQA Guidelines address relatively broad biological issues that are not always specific to the unique biological resources of a given site or location. As such, an EIR can refine the criteria used to define significance based on the unique conditions that occur on a project site

when particular circumstances justify criteria more stringent than, or in addition to, thresholds of significance already in place. In the case of this project, the protection of riparian resources and the riparian/upland ecotone was considered an important issue.

The structural diversity of the various riparian and aquatic vegetation communities in the Santa Clara River drainage provides habitat for a large variety of plant and wildlife species, including a number of special-status species. Each of these species, particularly wildlife, has differing home range and natural history requirements. While some species are riparian-obligate (i.e., satisfy their forage, cover, and breeding habitat needs almost entirely within riparian vegetation communities), other species utilize both the riparian habitat as well as adjacent upland vegetation as part of their home range. A number of studies have found that even the more riparian-dependent wildlife species also require adjacent upland habitats to meet home range foraging and breeding requirements (Doyle 1990; Schaefer and Brown 1992), indicating that the overall viability of riparian associated wildlife species extends beyond the riparian canopy and includes adjacent upland habitat.

However, the characteristics, quality, and extent of upland habitat that is necessary to protect the diversity of wildlife species dependent upon riparian habitat may differ depending on the geographic region and the particular requirements of the riparian species to be protected. Previous studies have recommended preserving (and restoring, if necessary) a minimum of at least 100 feet of high quality upland habitat (upland preserve zone), as measured from the outer edge of the riparian habitat associated with the Santa Clara River ("resource line"), to adequately provide for the foraging and breeding habitat requirements of riparian-associated wildlife and to maintain species diversity within the riparian ecosystem, inclusive of the riparian/upland ecotone (Impact Sciences 1997). No development or recreational uses would be appropriate in this upland habitat. Because most of the upland habitat currently adjacent to the riparian edge is comprised of agricultural and disturbed/ruderal fields and is, therefore, considered of relatively low biological value, the applicant would need to revegetate these areas with appropriate native upland habitat (i.e., Great Basin sage scrub, coastal sage scrub, or scrub/grassland mix) that either historically occurred in the area or that would be of higher biological value to riparian and upland wildlife species.

Consequently, the following additional threshold has been established for this project:

- Preservation of less than 100 feet of high quality upland vegetation (after planting), as measured from the outer edge of the riparian resource associated with the Santa Clara River to adjacent urban

development, will be presumed to be a significant impact on the riparian ecosystem associated with the Santa Clara River.

c. Construction Impacts

The impacts associated with the NRMP activities, including those that would occur on the Riverpark site, were addressed, mitigated and permitted through the EIS/EIR prepared by ACOE and CDFG for the NRMP. To minimize impacts of the project on biological resources, the applicant has proposed that the below measures from the NRMP be incorporated into the project design:

a) Construction activities in the riverbed shall be restricted to the following areas of temporary disturbance: (1) an 85-foot-wide zone that extends into the river from the base of the rip-rap gunite or soil cement bank protection from where it intercepts the river bottom; (2) 100 feet on either side of the outer edge of a new bridge or bridge to be modified; (3) 50-foot-wide corridor for all utility lines; and (4) 20-foot-wide temporary access ramps and roads to reach construction sites. The locations of these temporary construction sites and the routes of all access roads shall be shown on maps submitted with the Verification Request Letter submitted to the ACOE and CDFG for individual project approval. The construction plans should indicate what type of vegetation, if any, would be temporarily disturbed and the post-construction activities to facilitate natural revegetation of the temporarily disturbed areas.

b) All native riparian trees in temporary construction areas with a 4-inch dbh or greater shall be replaced at a 3:1 ratio using 1 to 5 gallon container plants in the temporary construction areas in the winter following the construction disturbance. The growth and survival of the replacement trees shall meet the performance standards specified in later mitigation measures. In addition, the growth and survival of the planted trees shall be monitored for five years in accordance with the methods and reporting procedures specified in a later mitigation measure.

c) Native vegetation within temporary construction areas shall be mulched and spread over the temporary impact areas once construction is completed in order to facilitate revegetation. Areas temporarily disturbed by construction activities shall also be weeded annually, as needed, for up to five years following construction. These areas shall be annually monitored for five years after construction to document colonization by weeds and native plants. Weeds shall be removed by hand, an approved herbicide application, and/or by equipment. In the event that native plant cover does not reach 50 percent of the pre-construction native plant cover within three years, the applicant shall revegetate the temporary construction area in accordance with the methods specified in later mitigation measures. Annual monitoring reports on the status of the natural recovery of temporarily disturbed areas shall be submitted to the ACOE and CDFG as part of the Annual Mitigation Status Report and Mitigation Accounting Form to be submitted to the ACOE and CDFG by April 1st of each year.

d) Permanent removal of riparian habitats shall be replaced by creating riparian habitats of similar functions and values in the project area. Wetland restoration shall be in-kind and at a 1:1 replacement ratio [except as indicated in Item f)] below for new habitat installed two years in advance of the removal of habitat at the construction site. If replacement habitat cannot be installed two years in advance of the project, the ratios listed below will apply. As described in Item c), lower replacement ratios may be appropriate if a ACOE-approved hydrogeomorphic method (HGM) of assessing replacement ratios indicates lower ratios would ensure replacement of habitat values and functions.

Timing of Mitigation	Value of Habitat Affected*	Proposed Ratio Required for Revegetation
Habitat installation completed 2 years or more prior to construction impact	N/A	1:1
Habitat installation completed less than 2 years in advance of impact	Low Medium High	1:1 2:1 3:1

* High (NRMP EIS/EIR mapping units 1, 2, 3, 6), Medium (NRMP EIS/EIR mapping units 4, 7), Low (NRMP EIS/EIR mapping units 5, 8)

e) Creation of new riparian habitats shall occur at suitable sites in or adjacent to the watercourses included in the NRMP. Habitat restoration sites in the riverbed shall only be located in areas where the predominant habitats present are dry open floodplain, weedy herbaceous, or their functional equivalent. The highest priority habitat restoration sites should be new riverbed areas created during the excavation of uplands for bank protection. Restoration sites may also occur at locations outside the riverbed where there are appropriate hydrologic conditions to create a self-sustaining riparian habitat and where upland and riparian habitat values are absent or very low. All sites shall contain suitable hydrological conditions and surrounding land uses to ensure a self-sustaining functioning riparian habitat. Candidate restoration sites shall be selected by the applicant described in the Annual Mitigation Status Report that will be submitted to the ACOE by April 1st of each year. Sites will be approved when restoration plans are submitted to the ACOE and CDFG as part of the Verification Request Letters submitted for individual projects, or as part of the Annual Mitigation Status Report and Mitigation Accounting Form.

f) Replacement habitat shall be designed to replace the functions and values of the habitats being removed. At this time, the replacement habitat shall be restored in accordance with the acreage replacement ratios described in Item a). The replacement habitats shall have similar dominant trees and understory shrubs and herbs as the affected habitats. In addition, the replacement habitats shall be designed to replicate the density and structure of the affected habitats once the replacement habitats have reached mature status. Replacement ratios that are lower than those listed in Item a) may be used if a ACOE-approved HGM is applied in which habitat functions and values of both the affected habitat and the replacement habitat are quantified.

g) Average plant spacing shall be determined based on an analysis of habitats to be replaced. Typical plant spacing is presented below for use in developing willow-cottonwood woodland habitat as an example only. The applicant shall develop similar tree spacing specifications for habitats to be restored. Plant spacing specifications shall be reviewed and approved by the ACOE and CDFG when restoration plans are submitted to the ACOE as part of the Verification Request Letters submitted to the ACOE and CDFG for individual projects or as part of the Annual Mitigation Status Report and Mitigation Accounting Form.

Species	Average Plant Spacing (feet)	Height (feet)	
		After 3 years	After 5 years
Arroyo willow	8	10	15
Black willow	8-10	12	18
Sandbar willow	8	4	6
Red willow	8	9	15
Cottonwood	20	7	12

h) Each tree and shrub species used in restoration shall have a minimum of 80 percent survival after three years and 70 percent survivorship after five years. Key indicator tree species to be used in the riparian restoration program shall achieve a minimum growth at the end of three years and five years as described above in Item e). Performance standards for cover shall be developed for each

individual habitat type being created, based on the observed natural cover in undisturbed habitats in the project area. These standards shall be approved by the ACOE and CDFG after they have reviewed the Annual Mitigation Status Report and Mitigation Accounting Form Minimum growth, survivorship, and cover performance at the mitigation sites shall be measured based on random samples taken during years three and five at each individual mitigation site, or at other sampling intervals if the ACOE' hydrogeomorphic methodology is used by the applicant.

i) If the minimum growth, survivorship, and/or cover are not achieved at the time of the three and five year evaluations, then the applicant shall be responsible for taking the appropriate corrective measures as to achieve the specified growth, survivorship, and/or cover criteria. The applicant shall be responsible for any costs incurred during the revegetation or in subsequent corrective measures. If acts of God (flood, fires, or drought) occur after the vegetation has met the three-year criteria for growth, survival, and cover, the applicant will not be responsible for replanting damaged areas. If these events occur prior to the plants meeting the three-year criteria, the applicant shall be responsible for replanting the area one time only.

j) The applicant shall be responsible for weeding all restoration sites to prevent an infestation of non-native weeds for a period of five years after the initial habitat restoration, regardless of the success of the planted species. The cover of non-native plant species at the mitigation sites shall not exceed 10 percent at any time, within this five-year period.

k) Temporary irrigation shall be installed, as necessary, for plant establishment. Irrigation shall continue as needed to meet the three- and five-year performance criteria regarding survivorship and growth. Irrigation shall be terminated in the winter to provide the least stress to plants. Removal of the irrigation system shall occur in conjunction with an appropriate "weaning" procedures to minimize plant stress. Irrigation shall be terminated at the earliest opportunity after achieving the five-year criteria.

l) As an alternative to the restoration of habitats to compensate for permanent removal of riparian habitats, the applicant (at the discretion of the ACOE and CDFG) may remove exotic plant species from the project area in locations: (1) where there is an infestation of exotics such as *Arundo donax* such that the natural habitat functions and values are substantially degraded and at risk, and where the cover of exotics is equal to or exceeds 25 percent of the ground; or (2) other areas where exotic removal would be strategic in a watershed approach to weed management, as determined by the ACOE and CDFG. The weed removal sites shall be selected in logical manner to ensure that the eradication of weeds from specific sites will contribute to the overall control of exotics in the NRMP watercourses. Removal areas shall be kept free of exotic plant species for five years after initial treatment. In addition, native riparian vegetation must become established through natural colonization and meet the revegetation plant cover goals established by the ACOE and CDFG under Item f) after five years.

m) The removal program shall utilize methods and procedures approved by the ACOE and CDFG to remove exotics, including but not limited to, mechanical equipment in specific areas, handcutting, and the application of herbicides to stumps. Exotic plant species removal credit will be given as shown below (except when weed removal is used to mitigate for loss of habitat for sensitive riparian bird species where the ACOE and CDFG may require higher ratios). Weed eradication plans shall be submitted to the ACOE and CDFG for approval as part of the Verification Request Letters submitted to the ACOE and CDFG. The plans shall describe the proposed methods and the conditions of the site to be treated. A monitoring program shall be implemented to document the effectiveness of the removal and the natural establishment of native vegetation in the weeded area.

	Mitigation Ratios for Exotic Removal	
Value of Riparian Habitat to be Removed	**2 Years in Advance**	**< 2 Years in Advance**
High (NRMP EIS/EIR mapping units 1, 2, 3, 6)	3:1	4:1
Medium (NRMP EIS/EIR mapping units 4, 7)	2:1	3:1
Low (NRMP EIS/EIR mapping units 5, 8)	1:1	2:1

n) Prior to initiating construction for the installation of bridges, storm drain outlets, utility lines, and/or bank protection, all construction sites and access roads within the riverbed, as well as all riverbed areas within 300 feet of the construction site and access road, shall be inspected by a qualified biologist for the presence of arroyo toads, unarmored three-spine stickleback and arroyo chub. The ACOE and the CDFG shall be notified of the inspection and shall have the option of attending. If either agency is not represented, the biologist shall file a written report of the inspection with the agency not in attendance within 14 days of the survey and no sooner than 30 days prior to any construction work in the riverbed.

o) Construction work areas and access roads shall be cleared of the species listed above immediately before the prescribed work is to be carried out, immediately before any equipment is moved into or through the stream or habitat areas, and immediately before diverting any stream water. The removal of such species shall be conducted by a qualified biologist using procedures approved by the ACOE and CDFG, and with the appropriate collection and handling permits. Species shall be relocated to nearby suitable habitat areas. A plan to relocate these species shall be submitted to the ACOE and CDFG for review and approval no later than 30 days prior to construction. Under no circumstances shall the unarmored three-spine stickleback be collected or relocated, unless USFWS personnel or their agents implement this measure.

p) All stream flows traversing a construction site or temporary access road shall be diverted around the site and under access roads (using a temporary culverts or crossings that allow fish passage). A temporary diversion channel shall be constructed using the least damaging method possible, such as blading a narrow pilot channel through an open sandy river bottom. The removal of wetland and riparian vegetation to construct the channel shall be avoided to the greatest extent feasible. The temporary channel shall be connected to a natural channel downstream of the construction site prior to diverting the stream. The integrity of the channel and diversion shall be maintained throughout the construction period. The original stream channel alignment shall be restored after construction, provided suitable conditions are present at the work site after construction. A temporary stream diversion plan shall be included in the Verification Request Letters submitted to the ACOE and CDFG. This procedure can only be implemented if: (1) there are assurances by the applicant that the fully protected unarmored three-spine stickleback will not be taken or possessed; or (2) USFWS personnel or their agents implement this measure.

q) A qualified biologist shall be present when any stream diversion takes place, and shall patrol the areas both within, upstream, and downstream of the work area to rescue any species stranded by the diversion of the stream water. Species that are collected shall be relocated to suitable downstream of the work area. Under no circumstances shall the unarmored three-spine stickleback be collected or relocated, unless USFWS personnel or their agents implement this measure.

r) The removal of any riparian habitat suitable for breeding, nesting, foraging, and temporary usage during migration by special-status species from the project footprint (i.e., boundaries of temporary and permanent impacts) shall be mitigated through the creation or enhancement of similar riparian habitat at an approved mitigation site, or by the removal of exotic species from an area of existing similar habitat. The requirement for replacing suitable habitat by either creating new habitat or removing exotic species from existing habitat shall follow the replacement ratios and timing requirements in later mitigation measures. Habitat to be created to mitigate for the loss of riparian habitat shall be designed specifically to replicate the appropriate species mixture and vegetative structure for these species. Existing habitat to be weeded as mitigation for the loss of riparian habitat must be located adjacent to similar habitat that is to be replaced and infested with invasive weeds. The first priority for habitat mitigation for sensitive bird species will be the creation or restoration of habitat rather than weed removal. The final habitat replacement or exotic removal plans for impacts to these types of habitats shall be reviewed by the ACOE and CDFG.

s) Beginning 30 or more days prior to the removal of any suitable riparian habitat that will occur during the riparian bird breeding and nesting season of March 15th through September 1st, the applicant shall arrange for weekly bird surveys to detect the above riparian bird species in the habitats to be removed, and any other such habitat within 300 feet of the construction work areas. The surveys shall be conducted by a qualified biologist using CDFG and/or USFWS survey protocols. The

surveys shall continue on a weekly basis, with the last survey being conducted no more than 7 days prior to the initiation of construction work.

t) In the event that a special-status species is observed in the habitats to be removed or in other habitats within 300 feet of the construction work areas, the applicant has the option of delaying all construction work in the suitable habitat or within 300 feet of the suitable habitat until after September 1st, or continuing the surveys in order to locate any nests. If an active nest is found, clearing and construction within 300 feet of the nest shall be postponed until the nest is vacated and juveniles have fledged, and when there is no evidence of a second attempt at nesting. Limits of construction to avoid a nest site shall be established in the field with flagging and stakes or construction fencing. Construction personnel shall be instructed on the ecological sensitivity of the area.

u) Locating and determining the status of a nest shall be performed in accordance with approved procedures by the USSFWS and CDFG. The ACOE and CDFG shall be notified at least 14 days prior to the first scheduled survey and shall have the option of attending. Results of the surveys, including surveys to locate nests, shall be provided to the ACOE and CDFG no later than 5 days prior to construction. The results shall include a description of any nests located and measures to be implemented to avoid nest sites. No surveys will be necessary if the work is completed outside of the riparian bird breeding and nesting season, i.e., from September 1st through March 15th.

v) Thirty days prior to construction activities in areas of the "upland impact zone" associated with individual NRMP projects, a qualified biologist shall conduct a survey to capture and relocate individual San Diego and California horned lizard, silvery legless lizard, coastal western whiptail, pallid bat, San Diego black-tailed jackrabbit, and San Diego desert woodrat in order to avoid or minimize take of these sensitive species. Individuals shall be relocated to nearby undisturbed areas with suitable habitat. Pre-construction surveys shall only be conducted in areas dominated by Riversidian coastal sage scrub or coastal sage – chaparral scrub or if construction will occur within 300 feet of native upland habitat. Results of the surveys and relocation efforts shall be provided to CDFG in the Annual Mitigation Status Report. Collection and relocation of animals shall only occur with the proper scientific collection and handling permits.

w) Construction activities shall be limited to the following areas of temporary disturbance: (1) an 85 foot-wide zone that extends into the river from the base of the rip-rap or gunite bank protection where it intercepts the river bottom; (2) 60 feet on either side of the outer edge of a new bridge or bridge to be modified; (3) 50-foot-wide corridor for all utility lines; and (4) 20-foot-wide temporary access ramps and roads to reach construction sites. The locations of these temporary construction sites and the routes of all access roads shall be shown on maps submitted with the Verification Request Letters for individual projects that are submitted to the CDFG and ACOE. Any variation from these limits shall be noted, with a justification for a variation. The construction plans should indicate what type of vegetation, if any, would be temporarily disturbed, and the post-construction activities to facilitate natural revegetation of the temporarily disturbed areas. The boundaries of the construction site and any temporary access roads within the riverbed shall be marked in the field with stakes and flagging. No construction activities, vehicular access, equipment storage, stockpiling, or significant human intrusion shall occur outside the work area and access roads.

x) Equipment shall not be operated in areas of ponded or flowing water unless there are no practicable alternative methods to accomplish the construction work, and only after prior approval by the CDFG and the ACOE. Approval shall be acquired by submitting a request to CDFG and ACOE no later than 30 days prior to construction. The request must contain a biological evaluation demonstrating that no sensitive fish, amphibians, and/or reptiles are currently present, or likely to be present during construction, at the construction site or along access roads.

y) Temporary sediment retention ponds shall be constructed downstream of construction sites that are located in the riverbed under the following circumstances: (1) the construction site contains flowing or ponded water that drains off site into the undisturbed streamflow or ponds, as allowed for certain areas under Item a) above; or (2) streamflow is diverted around the construction site, but the work is occurring in the period November 1st through April 15th when storm flows could inundate the

construction site. The sediment ponds shall be constructed of riverbed material and shall prevent sediment-laden water from reaching undisturbed ponds or streamflows. To the extent feasible, ponds shall be located in barren or sandy river bottom areas devoid of existing riparian scrub, riparian woodland, or aquatic habitat. The ponds shall be maintained and repaired after flooding events, and shall be restored to pre-construction grades and substrate conditions within 30 days after construction has ended at that particular site. The location and design of sediment retention ponds shall be included in the Storm Water Pollution Prevention Plan (SWPPP) prepared by the applicant for all construction activities that require a NPDES General Construction Activity Storm Water Permit.

z) Installation of bridges, culverts, or other structures shall not impair movement of fish and aquatic life. Bottoms of temporary culverts shall be placed at or below channel grade. Bottoms of permanent culverts shall be placed below channel grade.

aa) Water containing mud, silt, or other pollutants from construction activities shall not be allowed to enter a flowing stream or be placed in locations that may be subject to normal storm flows during periods when storm flows can reasonably be expected to occur.

bb) Vehicles shall not be driven or equipment operated in areas of ponded or flowing water, or where wetland vegetation, riparian vegetation, or aquatic organisms may be destroyed, except as otherwise provided for in the 404 Permit or 1603 Agreement.

cc) Silt settling basins, installed during the construction process, shall be located away from areas of ponded or flowing water to prevent discolored, silt-bearing water from reaching areas of ponded or flowing water during normal flow regimes.

dd) If a stream channel has been altered during the construction and/or maintenance operations, its low flow channel shall be returned as nearly as practical to pre-project topographic conditions without creating a possible future bank erosion problem, or a flat wide channel or sluice-like area. The gradient of the streambed shall be returned to pre-project grade, to the extent practical, unless it is represents a wetland restoration area.

ee) Temporary structures and associated materials not designed to withstand high seasonal flows shall be removed to areas above the high water mark before such flows occur.

ff) Staging/storage areas for construction equipment and materials shall be located outside of the ordinary high water mark.

gg) Any equipment or vehicles driven and/or operated within or adjacent to the stream shall be checked and maintained daily, to prevent leaks of materials that if introduced to water could be deleterious to aquatic life.

hh) Stationary equipment such as motors, pumps, generators, and welders which may be located within the riverbed construction zone shall be positioned over drip pans. No fuel storage tanks shall be allowed in the riverbed.

ii) The applicant shall use best efforts to ensure that no debris, bark, slash sawdust, rubbish, cement or concrete or washing thereof, oil, petroleum products, or other organic material from any construction, or associated activity of whatever nature, shall be allowed to enter into, or be placed where it may be washed by rainfall or runoff into, watercourses included in the permit. When construction operations are completed, any excess materials or debris shall be removed from the work area.

jj) No equipment maintenance shall be done within or near any stream where petroleum products or other pollutants from the equipment may enter these areas with stream flow.

kk) If water diversions are required to perform work within the Santa Clara River, the applicant shall utilize provisions for the protection of arroyo toad, unarmored three-spine stickleback, arroyo chub,

Santa Ana sucker, southwestern pond turtle and two-striped garter snake, including securing appropriate Endangered species permits. Those provisions are as follows:

- Prior to initiating construction, the site shall be inspected by a qualified biologist for the presence of the species listed above. The ACOE and the Department will be notified of the inspection and will have the option of attending. If either agency is not represented, the biologist will file a written report of the inspection with the agency not in attendance within ten days of completion of the survey. If any of the species listed above are present, the following conditions will apply:

  - The site shall be surveyed and cleared of the species listed above immediately before the work is to be carried out, immediately before any equipment is moved into or through the stream, and immediately before diverting any stream water. Any species found shall be moved out of the construction area and replaced in the stream in a manner or place to assure their survival.

  - Blocking nets, or fences with 1/4 inch square mesh, 18 inches high and buried 6 inches, shall be placed upstream and downstream of the work area to assure that none of the species move into the area.

ll) A qualified biologist will be present at the moment any stream diversion takes place and will patrol the areas, both within and downstream of the work area, to rescue any species stranded by diversion of stream water. If the possibility exists that additional downstream sections of the stream will be dewatered, additional biologists will be available for downstream patrol. This rescue patrol will continue until all dewatered portions of the stream are determined to be cleared.

mm) Once the construction site or a portion of the site and work area boundary has been determined to contain none of the species listed above, the site shall be fenced with construction fencing along the riverside- and construction personnel and equipment will not enter the river beyond the fence.

nn) A water control system will be installed to intercept stream flow upstream of the site and carry it around the site. The system will be completed before turning water into it. The process of turning water into the bypass system shall be done so as to minimize sediment movement.

- The Operator will use best efforts to insure that no debris, bark, slash, sawdust, rubbish, cement, concrete, or washings thereof, oil or petroleum products, or other organic material from construction or associated activity will be allowed to enter into or be placed where it may be washed by rainfall or runoff into the river. Sediment management best management practices shall be used during construction.

- Impacts to Endangered species may require appropriate Endangered species permits.

oo) Pilot channels constructed to divert flows around work areas shall be sized to maintain existing water velocities, with wide, shallow channels being utilized. The channel should be kept as small as possible, extending no more than 25 feet upstream and downstream of the work area. Construction of pilot channels should start downstream. Once water is diverted into the new channel, the original channel should be visually inspected and any stranded fish shall be removed and returned to the water downstream of the diversion. Once the diversion is no longer needed, the area shall be restored as closely as practical to its original configuration.

pp) The use of a pump to divert flows around a work site is also acceptable. The pump must have at least a 1/4-inch screen. Water should be discharged downstream, within 25 feet of the work area. Any dams installed across flowing water for the diversion shall be removed upon completion of construction and the area shall be restored as closely as practical to its original configuration.

qq) The Operator shall utilize a Maintenance Notification and Emergency Maintenance Notification forms (Exhibits 1 and 2 of the NRMP) to alert the ACOE and the Department of work to be performed. In non-emergency situations, the form should be filled out and faxed or mailed to the ACOE and the Department at least two weeks in advance of the work. If the work may adversely

impact Endangered species, the ACOE, the Department and LACDPW shall meet in the field to resolve the issue. LACDPW may contact the ACOE and the Department to identify areas of potential Endangered species habitat. If the ACOE and the Department believe the work may adversely impact Endangered species or its habitat resources or the LACDPW wishes to consult with the ACOE and the Department, a field meeting will be scheduled. At the field meeting, the ACOE and the Department will provide information regarding Endangered or Threatened species that could be impacted by the project. If take of an Endangered species will occur, the appropriate Endangered species permits will be required. To the extent that a USFWS Section 7 and a CDFG Section 2081 Memorandum of Agreement have been completed for the species present, the mitigation measures shall be implemented and construction may proceed as outlined in these documents.

rr) The notification is provided to demonstrate consistency with the policies of the NRMP. In non-emergency situations, the ACOE and the Department must respond to the notification within 20 working days if they believe that the work is inconsistent with the NRMP, at which time a field meeting will be scheduled to review the site and determine how the work may proceed. If the ACOE and the Department do not respond within 20 working days, the work shall proceed as described in the notification. However, appropriate Endangered species permits will be required for impacts to Endangered species.

It should be noted that some of the activities permitted through the NRMP on the Riverpark site have been scaled back as part of the Riverpark project, and those improvements would now have less of an impact than would have occurred if constructed as described in the NRMP. More specifically, in the area of A1, the "top of bank stabilization" proposed with the project has been set back anywhere from 50-320 feet from where the NRMP permitted the stabilization. Additionally, the Riverpark project does not include bank stabilization from the eastern terminus of the "toe protection" to the western bridge abutment for the Newhall Ranch Road/Golden Valley Road Bridge. Under the NRMP, bank stabilization was permitted in this area. Finally, the project does propose two encroachments beyond the bank stabilization line permitted by the NRMP. One is necessary to save a Heritage oak tree (Tree No. 74) and encroaches up to 80 feet beyond the NRMP bank stabilization line. The second encroachment occurs at the Newhall Ranch Road/Golden Valley Road Bridge and is necessary to accommodate a change in the alignment for the bridge from what was shown in the NRMP and to accommodate a trail connection from the Class 1 bike trail on Newhall Ranch Road to the Santa Clara River Trail. The top of bank stabilization in this area encroaches up to 230 feet from what was shown and permitted in the NRMP. It should also be noted that while the NRMP addresses many of the biological impact issues addressed in this section, the City of Santa Clarita is conducting its own impact analysis of this project, which includes floodway and erosion protection, through this EIR.

The following section focuses on the effects of implementation of the proposed project on plant communities, common and special-status plant and wildlife species, special-status habitats, and wildlife movement corridors and whether these effects exceed the thresholds of significance. Because most biological resources, particularly plants and wildlife, are dependent upon the condition, extent, and character of specific ecosystems and habitat types, impacts on these resources are generally discussed in

terms of the effect of project-related activities on natural habitat areas, (i.e., on plant communities). However, direct impacts with respect to specific plant and wildlife resources (e.g., active nests, dens, and individual plants and animals) are also evaluated and discussed when impacts on these resources, in and of themselves, could be considered significant or conflict with local, state and federal statutes or regulations.

The principal direct impact of implementation of the proposed project is to convert approximately 317 acres of the project site (about 46 percent) from an undeveloped to a developed and partially restored condition. The approximate acreage and percentage of each of the vegetation/habitat types expected to be disturbed on the site as a result of project implementation are provided in **Table 4.6-3**, **Riverpark Habitat Acreages and Impacts**, and are described below. Only those plant communities directly impacted are discussed.

(1) Plant Communities

(a) Disked Field

The direct impact of implementation of the proposed project on this habitat type is to convert 83.5 acres to residential use and 1.2 acres to graded slopes. This combined loss represents about 90.7 percent of this habitat type on the site.

The existing habitat is highly disturbed by on-going disking activities. Consequently, this habitat type is considered of low biological resource value. Although there are areas of ruderal vegetation, non-native, and native grasses for a portion of the year, there is no available habitat on the site for animals to nest, roost or find shelter and little opportunity for insectivores to forage. Because of the low biological value of these disked areas, and because no special-status resources occur in these areas, the loss of this land use would not be a significant impact.

Table 4.6-3
Riverpark Habitat Acreages and Impacts

Vegetation Type	Vegetation Map ID	Existing Area (acres)	Temporary Project Impact Area (acres) due to Road/Bridge Construction	Temporary Project Impact Area (acres) due to Trail Construction	Temporary Project Impact Area (acres) due to Commercial Development	Temporary Project Impact Area (acres) due to Residential Development	Temporary Project Impact Area (acres) due to Graded Open Spaces	Temporary Project Impact Area (acres) Total	Permanent Project Impact Area (acres) due to Road/Bridge Construction	Permanent Project Impact Area (acres) due to Trail Construction	Permanent Project Impact Area (acres) due to Commercial Development	Permanent Project Impact Area (acres) due to Residential Development	Permanent Project Impact Area (acres) due to Graded Open Spaces	Permanent Project Impact Area (acres) Total	Undisturbed Area (acres) w/ Project
Disked Field	DF	92	0.1	0	0	0	1.2	1.3	18.2	3.2	0	47.7	14.5	83.6	7.2
Non-native Grassland and Non-native Grassland with Scattered Shrubs	NNG and NNGW/ SHRUBS	80	5.2	0	0.3	1.0	5.1	11.6	24.3	0.2	1.8	20.7	5.7	52.7	15.7
Planted Sage Scrub	PS	37.0	0	0	0	0.3	0.8	1.1	14.1			6.2	2.5	22.8	13.1
Riversidian Sage Scrub	RSS	143.4	2.9	0.1	0	1.6	5.5	10.1	20.6	0.6	0	52.5	21.8	95.5	37.8
Chamise Chaparral	CHC	2.2	0	0	0	0.1	0	0.1	0	0	0	1.9	0	1.9	0.2
Coastal Sage - Chaparral Scrub	SCS	8.6	0	0	0	0.4	0.3	0.7	0.7	0.1	0	1.5	1.6	3.9	4
Holly-leafed Cherry Scrub	HLCS	12.9	7.6	0	0	0.7	0	8.3	1.7	0	0	1.2	0	2.9	1.7
Mule Fat Scrub	MFS	1.2	0	0	0	0	0	0	0.3	0	0	0.8	0	1.1	0.1
Southern Willow Scrub	SWS	1.9	0	0	0	0.1	0	0.1	0.3	0	0	0.8	0.3	1.4	0.4
Southern Riparian Scrub	SRS	161.4	1.7	0	0	0	5.7	7.4	5.3	4	1.1	0	11	21.4	132.6
Riverwash	RW	176.2	6.7	0.1	0	0	3.5	10.3	1.3	0.3	0	0	1.3	2.9	163
Mixed Oak Woodland	MOW	2.3	0	0	0	0	0.1	0.1	0	0	0	0.1	0.3	0.4	1.8
Developed Area with Mixed Trees	MT	8.3	0	0	0	0	1.9	1.9	0	0	0	0	4	4	2.4
TOTALS		727.4	24.2	0.2	0.3	4.2	24.1	53	86.8	8.4	2.9	133.4	63	294.5	380

(b) Non-Native Grassland and Non-native Grassland with Scattered Shrubs

The direct impact of implementation of the proposed project to these two habitat types is to convert 38.8 acres to residential and 7.8 acres to graded slope areas. This combined loss represents about 76.4 percent of these habitat types on the site.

Due to the severely disturbed and fragmented nature of the grassland on the site and its dominance by non-native species, most of the grassland vegetation on the site was considered of relatively low botanical value at the time of the general field surveys.

Peirson's morning glory (*Calystegia peirsonii*) and Palmer's grappling hook (*Harpagonella palmeri*) were identified in two locations in the non-native grassland vegetation during focused surveys. These species are listed by CNPS as List 4 species (a "watch" list to which vulnerability to threats are considered low). An estimated 16 of the 29 locations (approximately 3,900 of the estimated 6,920 number of plants) within the non-native grassland habitat will be impacted. No other special-status plant or wildlife species are known to occur within the non-native grassland community on the site. Various raptor species may forage over these grassland communities on the site in search of rodents or other prey. However, no active raptor nests were observed on the site or immediate vicinity that would rely on these particular on-site communities as an important source of prey to support a nest. In addition, no raptor species residing in the Santa Clarita region forage exclusively on grassland habitat; most raptor species known to occur in this area forage over a variety of habitat types in order to increase their chances to obtain prey.

Because the remaining grassland areas on the project site do not currently support populations of special-status wildlife species and because of the low sensitivity status of Peirson's morning glory and Palmer's grappling hook, the loss of these plants would not be considered a substantial adverse effect on a special-status species. Also, the loss of grassland habitat would not substantially affect raptor species that potentially utilize this community as foraging habitat. Because of the relatively low botanical value of this community on the site, and because non-native grasslands are fairly common in the region, the permanent loss of 67.9 acres of non-native grassland will not substantially affect special-status plant or wildlife resources and will not cause a population of plant or wildlife species to drop below self-sustaining levels. Therefore, the loss of this habitat would not be a significant impact.

(c) Planted Sage Scrub

The impact of implementation of the proposed project on this habitat type would be to permanently convert approximately 22.8 acres for the construction of the extension of Newhall Ranch Road and

approximately 1.1 acres for graded slopes. This combined loss represents about 64.6 percent of this habitat type on the site. This habitat type has little diversity due to the relatively few species present and no established vegetative understory. Therefore, this plant community on the project site currently has relatively low biological value.

Because this community on the project site does not currently support populations of special-status plant or wildlife species, and because of the relatively low biological value of this community on the site, the permanent loss of 24 acres of planted sage scrub will not substantially affect special-status resources and will not cause a population of plant or wildlife species to drop below self-sustaining levels. Therefore, the loss of this habitat would not be a significant impact.

(d) Riversidian Sage Scrub

Implementation of the proposed project will result in the permanent loss of approximately 95.5 acres of Riversidian sage scrub due to residential development and approximately 10.1 acres to graded slopes. This loss represents approximately 73.6 percent of the total Riversidian sage scrub vegetation present on the site.

The various densities of Riversidian sage scrub vegetation on the site provide habitat for a variety of plant and animal species including several special-status species. Five special-status plants (slender mariposa lily, Plummer's mariposa lily, dune larkspur, Peirson's morning-glory, Palmer's grappling hook) and two special-status bird species (southern California rufous-crowned sparrow and loggerhead shrike) were observed within portions of the Riversidian sage scrub on the project site. The conversion of Riversidian sage scrub on the site will result in the loss of populations of the five special-status plant species. Specific impacts to these special-status plant species are discussed later in this section.

Most of the Riversidian sage scrub patches were in relatively good condition at the time of the on-site surveys, with the exception of an herbaceous understory that was partially comprised of non-native species; therefore, this habitat on the site is considered of moderate to high biological value. However, because this habitat type is not considered as special-status by CDFG, and because the loss of Riversidian sage scrub would not, therefore, be considered a substantial adverse effect on a sensitive natural community identified by the DFG or USFWS, the loss of the Riversidian sage scrub would not be considered a significant impact.

(e) Chamise Chaparral

The direct impact of implementation of the proposed project on chamise chaparral vegetation is to permanently convert 1.9 acres of this habitat to residential and approximately 0.1 acre to graded slopes. This loss represents approximately 90.9 percent of the total chamise chaparral vegetation present on the site. No special-status plant or animal species were observed within chaparral vegetation during site surveys. Typically, chamise chaparral habitat is comprised of more than one plant species. Since the chaparral present on site is nearly monotypic (comprised of a single species), consisting almost exclusively of chamise, and because of the relatively small amount on the site, this habitat type is considered to be of low to moderate biological value.

Because no special-status species were observed in this habitat type during surveys, because chaparral is not considered by resource agencies as sensitive or declining, and because the amount of habitat affected is small, the loss of approximately 2 acres of chaparral is not considered a substantial loss of wildlife habitat and will not significantly reduce the number or restrict the range of a special-status species. Therefore, this loss is not considered a significant impact.

(f) Coastal Sage Chaparral Scrub

Implementation of the proposed project will result in the permanent loss of 3.9 acres of this habitat type present on the site to residential and 0.7 acre to graded slope. This loss represents approximately 53.5 percent of this habitat type present on the site. The coastal sage chaparral scrub vegetation provides habitat for a variety of plant and animal species; one individual slender mariposa plant, a special-status species, was observed within this community. The slender mariposa lily is not considered a common understory component of coastal sage chaparral scrub, but where it occurs it is typically found within scrub habitat types, depending on soil conditions. Most of the coastal sage chaparral scrub patches were in relatively good condition at the time of the on-site surveys.

Because coastal sage chaparral scrub is not considered by resource agencies as sensitive, the loss of approximately 3.9 acres of this plant community on the site is not considered a substantial loss of wildlife habitat and will not significantly reduce the number or restrict the range of a special-status species. Therefore, this loss is not considered a significant impact. The loss of special-status species, including the slender mariposa lily, as a result of the conversion of coastal sage chaparral scrub on the site are addressed later in this section.

(g) Holly-leaf Cherry

The direct and permanent loss of approximately 1.2 acres of holly-leaf cherry scrub to residential, 1.7 acres to road and bridge construction and 0.7 acre to graded slopes would occur with the implementation of the project. This combined loss represents approximately 67.9 percent of the holly-leaf cherry scrub on the site.

Because holly-leaf cherry scrub on the project site is not known to support special-status plant or wildlife species, and because this plant community is not considered to be sensitive by resource agencies, the loss of 3.6 acres of this habitat type is not considered a significant impact.

(h) Mulefat Scrub

Implementation of the proposed project will result in the permanent loss of 0.8 acre of this habitat type present on the site to residential and 0.3 acre to the construction of road and bridges. This loss represents approximately 91.2 percent of this habitat type present on the site. This habitat type is located in five locations along the edge of the Santa Clara River near the western end of the project site. All of the mulefat scrub on the site consists of small, degraded patches ranging in size from 0.1 to 0.4 acre. No special-status plants or wildlife were observed on the site associated with this habitat type. Consequently, the mulefat scrub on the site is considered of relatively low biological value.

Because of the relatively low biological value of the mulefat scrub on the site, and because of the overall small amount of habitat that will be removed relative to existing habitat within the region, the loss of 1.2 acres of mule fat scrub on the project site is not considered a substantial loss of wildlife habitat and will not substantially affect special-status species. Therefore, this loss is not considered a significant impact.

(i) Southern Willow Scrub

The direct and permanent loss of approximately 1.1 acres of southern willow scrub to residential, 0.3 acre to construction of road and bridges and 0.1 acre to a graded slope would occur with the implementation of the project. This loss represents about 78.9 percent of the southern willow scrub on the site. During the field investigation, the southern willow scrub habitat appeared to be in a healthy mature condition; therefore, it is considered of moderate to high biological value.

Southern willow scrub on the project site is not known to support special-status plant or wildlife species. Due to the sensitivity status of this community by the state, the fact that the majority of this vegetation

type will be removed due to the development of the residential area, and because this habitat is under the jurisdiction of the ACOE and/or CDFG, the loss of this habitat type on the site would be considered a potentially significant impact. However, the project design will incorporate NRMP measures d) through m) above. All riparian vegetation areas that will be temporarily disturbed as a result of grading, bank stabilization, or other construction activities will be planted and restored pursuant to NRMP measures a) through c) above. With these measures incorporated into the project design, the loss of this habitat type on the site is not considered a significant impact.

(j) Southern Riparian Scrub

The direct and permanent loss of approximately 4 acres of southern riparian scrub would occur due to the construction of the pedestrian and equestrian trails, 5.3 acres to construction of road and bridge, 1.1 acres to commercial development, 11.0 acres to graded open space. This loss represents about 13.3 percent of the southern riparian scrub on the site. An additional 5.7 acres would be temporarily impacted during the construction phase of the buried bank stabilization and 1.7 acres due to road and bridge construction. The project design proposes to re-vegetate these areas for erosion control purposes (please see the heading, **Mitigation Measures**, for a discussion on how this temporary impact will be mitigated to a level that is less than significant.) The majority of this habitat that would be permanently removed occurs along the western portion of the site in Area A1.

The project design proposes to preserve in perpetuity approximately 133.6 acres of southern riparian scrub on the site. This majority of the portion of the project site that occurs within the Santa Clara River, including areas of riverwash, will be conveyed to the City of Santa Clarita for continued use as natural open space.

Southern riparian scrub on the project site supports special-status wildlife species. For this reason, as well as because of the sensitive nature of this plant community, its overall high biological value, the amount of this habitat that will be removed, and because this habitat is under the jurisdiction of the ACOE and/or CDFG, the permanent loss of 21.2 acres of this habitat type and the temporary impact to an additional 6.5 acres of this habitat type would be considered a potentially significant impact. However, the project design will incorporate NRMP measures d) through m) above. All riparian vegetation areas that will be temporarily disturbed as a result of grading, bank stabilization, or other construction activities will be planted and restored pursuant to NRMP measures a) through c) above. With these measures incorporated into the project design, the loss of this habitat type on the site is not considered a significant impact.

(k) Riverwash

The direct and permanent loss of approximately 0.3 acre of riverwash would occur due to the construction of the pedestrian and equestrian trails, 1.3 acres to construction of road and bridge, 1.3 acres to graded open space. An additional 6.7 acres would be temporarily impacted due to the construction of road and bridges, 0.1 acre due to trail construction and 3.5 acres due to graded open space. This combined impact represents about 7.5 percent of the riverwash on the site. The project design proposes to re-vegetate the areas that will be temporarily impacted for erosion control (see the heading **Mitigation Measures**, for further discussion on how this temporary impact will be mitigated to a level that is less than significant.). The habitat that would be permanently removed occurs along the western portion of the site associated with the bank stabilization adjacent to Bouquet Canyon Bridge.

As with the southern riparian scrub habitat, the riverwash area is typically dry in the late spring and summer months. During unusual weather events, water can be present into July. During years when vegetation amounts are greater, the potential for this habitat type to support special-status species is greater. Some special-status species that were observed within the Santa Clara River by Guthrie can be presumed to occur within this habitat. As many as seven special-status bird species could occur within this area.

Because of the potential to support special-status species during high water levels, and because this habitat is within the jurisdiction of ACOE and CDFG, the permanent loss of 2.9 acres of riverwash and the temporary impact to an additional 10.3 acres of riverwash on the project site would be considered a substantial adverse effect on a sensitive natural community regulated by the CDFG and/or ACOE and a potentially substantial adverse effect on a special-status species. Therefore, this loss would be considered a potentially significant impact. However, the project design will incorporate NRMP measures d) through m) above. All riparian vegetation areas that will be temporarily disturbed as a result of grading, bank stabilization, or other construction activities will be planted and restored pursuant to NRMP measures a) through c) above. With these measures incorporated into the project design, the permanent loss of and temporary impacts to this habitat type on the site is not considered a significant impact.

(l) Mixed Oak/Grass

The project site contains approximately 2.3 acres of mixed oak/grass habitat. Implementation of the proposed project would convert approximately 0.4 acre to residential use and graded open space. Approximately 0.1 acre would be temporarily impacted due to graded open space. Also, individual trees located in various locations on the project site would be impacted. As stated in **Appendix 4.6**, a total of

15 oak trees will be removed (two of which are dead); of these, 12 will be relocated to remaining open space or landscaped areas. A total of 70 trees will be retained within open space areas on the project site. Of the trees to remain on the project site, the protected zone of 3 additional oak trees would be encroached upon as a result of project implementation. Of the 10 heritage oak trees on the site, 5 will be retained in place, 2 dead heritage oak trees will be removed and 3 are proposed for relocation to preserved open space areas within the project site.

Although no special-status plant or wildlife species were observed in this particular habitat during site surveys, mixed oak/grass areas provide habitat for a variety of common wildlife species. In particular, the large mature trees within this habitat type can be important to a number of raptor species known to occur in this region for both foraging, perching, and nesting. The loss of 0.5 acre is a relatively small amount in terms of habitat for common wildlife species and is not considered a significant impact from a habitat perspective. The loss of oak trees and required mitigation is addressed later in this section.

(m) Developed Area with Mixed Trees

The direct and permanent loss of approximately 4.0 acres of mixed trees to graded open space and 1.9 acres to graded slopes would occur with the implementation of the project. This loss represents about 71.1 percent of the mixed trees on the site.

This area on the project site has a large component of non-native species and is not known to support special-status plant or wildlife species, California black walnut (a CNPS list 4 species). Approximately half of the individual black walnut trees will be removed due to implementation of the proposed project. This portion of the site is also characterized by a large amount of trash, debris, and some building. Because of the relatively low status of a CNPS list 4 species and because of the relatively low biological value of this habitat in terms of plant species composition, the loss of 5.8 acres of this habitat is not considered a significant impact to this plant community. However, the large mature trees within this habitat type could be important to a number of raptor species for both foraging, perching, and nesting. Specific impacts to nesting birds are discussed later in this report. Because of the existing areas of mature trees within the vicinity of the project site (to the north and south) the permanent loss of this foraging, perching and nesting habitat for raptor species is not considered significant. The combined loss of 5.9 acres is a relatively small amount in terms of habitat for common wildlife species and is not considered a significant impact from a habitat perspective; however, the loss of oak trees would be addressed through issuance of an oak tree permit, as provided by the City of Santa Clarita Oak Tree Ordinance. The loss of oak trees (trees numbered 10, 11 and 12) and impacts to individual special-status plant species are addressed later in this section.

(2) Wildlife Habitat/Natural Open Space

As previously discussed, each of the vegetation communities on the project site provides habitat for a variety of common wildlife species and even some special-status species. When viewed individually, the loss of most of a vegetation community on the project site may not represent a substantial loss of wildlife habitat or the loss of a plant community considered sensitive by resource agencies. However, most wildlife species depend on a variety of habitat types to meet various ecological and life history requirements (i.e., food, shelter, nesting). The total loss of all the vegetation communities on the site is approximately 280 acres. Based on the evaluation of the relative value of on-site habitats discussed earlier in this document, it is assumed that the habitats on the site, when considered together, have a greater value to wildlife and the area's ecosystem than separately or individually. Therefore, the net loss of 280 acres of currently undeveloped land represents a substantial loss of habitat for wildlife species and natural open space and is considered a significant impact.

(3) Common Wildlife

Construction activity and grading operations of the proposed project could temporarily disturb common wildlife species on the site. Some species would be expected to relocate to other areas of similar habitat within the local area. However, wildlife that emigrate from the site are vulnerable to mortality by predation, potential conflicts with people and cars, and unsuccessful competition for food and territory. In addition, species of low mobility (particularly amphibians and reptiles) could be eliminated during site preparation and construction.

Replacement of existing vegetation with structures and ornamental landscaping would eliminate natural communities on developed portions of the site and result in a reduction in native wildlife species diversity. A number of animal species would be replaced with a fauna composed of species more tolerant of, or even dependant upon, urban settings.

Because of the relatively common nature of wildlife species that would be displaced or lost as a result of construction activities and the introduction of less-desirable non-natural vegetation, project implementation is not expected to cause a current fish or wildlife population on or adjacent to the project site to drop below self-sustaining levels. Therefore, no significant impacts on common wildlife reptile, amphibian, or mammal species are expected to occur.

However, a number of bird species could be adversely affected as a result of implementation of the proposed project. The proposed project includes removal of mature trees from the property.

Construction-related activities could result in the direct loss of active nests or the abandonment of active nests by adult birds during that year's nesting season. Depending on the number and extent of bird nests on the site that may be disturbed or removed, the loss of active bird nests would be a potentially significant impact. However, the project design will incorporate NRMP measures r) through u) above. Therefore, with these measures incorporated into the project design, no significant impacts will occur to nesting bird species. The Migratory Bird Treaty Act and the California Fish and Game Code prohibit the take—defined as destroy, harm, harass, etc.—bird nests with eggs or young.

(4) Special-Status Plant and Wildlife Resources

(a) Special-Status Plant Species

Six special-status plant species were observed on the project site. Three of these species, **southern California black walnut**, **Palmer's grappling hook**, and **Peirson's morning-glory**, are CNPS List 4 species and occur in relatively small numbers on the site. Portions of these populations will be removed as a result of project implementation. Because CNPS List 4 plants are not considered "Rare" from a statewide perspective, are not defined as "Rare, Threatened, or Endangered" pursuant to the California Endangered Species Act, are not eligible for state listing as "Threatened" or "Endangered", and vulnerability or susceptibility to threats to these species on a statewide basis are considered low at this time (CDFG 2000), the loss of any individuals of these species would not be considered a substantial adverse effect on a special-status species nor would it be expected to reduce regional populations of the species to below self-sustaining numbers. Therefore, the loss of these plants would not be considered a significant impact.

Approximately 80 individual **slender mariposa lily** plants within twelve populations were identified on the project site during field investigations. The implementation of the proposed project would result in the loss of three populations (approximately 24 individual plants or 15 percent of the total population on the site). CNPS lists this species as 1B (Rare, Threatened, or Endangered in California and elsewhere). The loss of these plants would represent a substantial adverse effect on a special-status species and, therefore, would be considered a significant impact.

There were approximately seven individual **Plummer's mariposa lily** plants within three populations identified on the project site during field investigations. The implementation of this project would result in the loss of all seven plants. Although the number of plants could be considered minor (only seven individual plants), CNPS lists this species as 1B. The loss of these plants would thus represent a

substantial adverse effect on a special-status species and, therefore, would be considered a significant impact.

There were approximately 445 individual **Parry's larkspur** plants within eight populations identified on the project site during field investigations. CNPS lists this species as 1B. The implementation of this project would result in the loss of three populations (approximately 170 individual plants). Because of the sensitivity status of this species and because it would meet the definition of "Rare" pursuant to CEQA, the loss of these plants would represent a substantial adverse effect on a special-status species and, therefore, would be considered a significant impact.

The remaining plant species addressed in **Table 4.6-1** were not observed on the site during focused surveys conducted during a time when these plants, had they occurred, should have been observed. Consequently, these species are not expected to occur on the site and, therefore, no significant impact to these species will occur.

The proposed project has been designed in a manner to minimize oak tree impacts. Most of the small canyon located in the middle of the project site where the majority of the oak trees are located (67 of the total 87 oak trees located on site) will be preserved as parkland/open space.

The City's Unified Development Code establishes requirements for the protection of oak trees that are two inches in diameter or greater as measured at four and one half feet above natural grade. The City requires a permit for cutting, moving, removal, or encroachment into the protective zone (drip zone plus five feet) of such trees. The oak tree map found in **Appendix 4.6** depicts the oak trees proposed to be preserved, removed, relocated, and those trees that may be encroached upon by project grading. A more detailed discussion of the oak trees on the site and expected impacts to these trees can be found in **Appendix 4.6, Oak Tree Report Riverpark Project**, and the associated addendum**.**

As stated in **Appendix 4.6**, a total of 15 oak trees will be removed; of these, 12 will be relocated to remaining open space or proposed landscape areas. A total of 70 trees will be retained in their present locations within open space areas on the project site. Of the trees to remain on the project site, the protected zone of three oak trees would be encroached upon as a result of project implementation. Of the 10 Heritage oak trees on the site, 5 will be retained in place, 2 dead Heritage oak trees will be removed and 3 are proposed for relocation to preserved open space areas within the project site.

Despite project design measures to minimize impacts on oaks, 3 trees will be permanently removed and others (relocation or encroachment upon trees) could be adversely impacted. Because of the sensitivity

status of oak trees in the City of Santa Clarita, the risks associated with relocation, the removal of 3 oak trees, the relocation of 12, and the encroachment into the protected zone of 3 oak trees would be considered a significant impact.

Richard Johnson and Associates conducted a recent study of oak trees that were translocated within other Newhall Land properties to determine the success of the trees after several years. The translocations date back to 1988. Of the 28 trees that were surveyed, 16 had increased in health while the remaining 12 remained in a similar health or in the same condition as when transplanting occurred. A copy of this report is included in the **Appendix 4.6**.

(b) Special-Status Wildlife

The potential direct impacts on special-status wildlife species occurring, or potentially occurring on the project site are discussed below in terms of the actual loss of active nests, dens, and individual animals. Impacts with respect to the loss of nesting or foraging habitat of special-status wildlife species are addressed under the **Plant Communities** heading.

Species Observed on the Site

The **western spadefoot toad** is a California Species of Special Concern and Federal Species of Concern and was observed on the project site during the 2004 focused survey. During this survey, adults and sign (eggs) of western spadefoot toad were observed in three of six seasonal rainpools pools; from 16 to 20 pairs of toads are estimated to be breeding on the project site. The seasonal rainpools that supported this species in 2004 are located in areas proposed for development. The potential loss of 16 to 20 pairs of western spadefoot toad, and an unknown number of young toads expected to hatch from the egg masses, would be considered a substantial adverse effect on a special-status species; therefore, this loss is considered a significant impact.

During construction and site preparation activities, special-status species, such as **southern California rufous-crowned sparrow, loggerhead shrike, northern harrier** and **Bell's sage sparrow** occurring within habitat proposed for conversion are expected to displace to remaining undisturbed Riversidian sage scrub habitat on site, or immediately adjacent off site. However, construction and site preparation activities within Riversidian sage scrub habitat, if conducted during the nesting season of this species, could result in the direct loss of active nests, including eggs, young, or incubating adults.

Depending on the number and extent of nests on the site that may be disturbed or removed should they occur prior to project implementation, the loss of active nests of these species, if they occurred, would be considered a substantial effect on these special-status species and, therefore, a potentially significant impact.

The **San Diego black-tailed jackrabbit** is a California Species of Special Concern mammal and was observed on the project site during the 2002 general survey and the 2003 focused mammal survey. This species is known to occur within the region of the project site in areas such as open scrub habitat, ruderal, disked and agricultural fields. Where this species occurs within the region, it is common and found in relatively high numbers in some locations (e.g., coastal Orange County and the high desert of northern Los Angeles County). The habitat on the project site for this species is considered of moderate quality. Most individual jackrabbits are expected to disperse to remaining open space areas and the actual number of individual animals that would be lost due to grading and/or construction activities is expected to be low. Because this species is not state or federally listed as Endangered or Threatened, because it is considered relatively abundant in suitable habitat areas within its range, and because the direct loss of individual jackrabbits is expected to be low, it is expected that the regional population would not drop below a self-sustaining level with the implementation of this project. Therefore, the loss of any individual jackrabbits associated with the implementation of this project would not be considered a significant impact.

Special-Status Wildlife Species Not Observed but with High Potential of Occurring

Fifteen butterfly taxa are considered to be locally sensitive in the region. One species, **San Emigdio blue** (*Plebulina emigdionis*), has a reasonable chance of occurring on the proposed project site or may occur in the future in areas subject to disturbance. Focused butterfly surveys, with particular focus on the San Emigdio blue, were conducted on the project site in 2003; none were observed.

The San Emigdio blue is primarily dependent upon a relatively narrow range of larval food plants and/or adult nectar sources associated with plants that occur in natural areas of the site. Therefore, their distribution may be relatively limited throughout the region. However, these species can be relatively common where appropriate food plants and other habitat features are present. The food plant for this species (*Atriplex canescens*) is located in the southern riparian scrub habitat on site. Impacts to potential habitat for this species include approximately 27.7 acres of southern riparian scrub.

Given the amount of suitable habitat present and that no species were observed on the site during field surveys, only a relatively low number of individuals could be expected to occur there. The loss of

relatively low number of individuals that might occur in the 27.7 acres of impacted habitat is not considered a substantial adverse effect because it is not expected to cause regional populations of this species to decrease below self-sustaining levels. Therefore, this potential loss of butterflies would not be considered a significant impact.

The **unarmored three-spine stickleback**, **arroyo chub,** and **arroyo toad** are known to occur within the Santa Clara River in the vicinity of the project site. Focused surveys for these species were conducted in 2003 and no individuals were observed within the project boundary. However, during and just after large rainfall events and when water flows are sufficient, the two fish species could move through this stretch of the river as part of their transitory movements from known breeding populations upstream. Consequently, direct mortality of individuals of these species, though unlikely due to the intermittent nature of the water flows through the project site, could occur during these conditions as a result of bank stabilization or site preparation and construction activities associated with the Newhall Ranch Road/Golden Valley Road Bridge.

The "Biological Opinion" written by the USFWS for the NRMP states that it is unlikely for the arroyo toad to occur from a point approximately 1,000 feet east of the Bouquet Canyon Bridge due to the lack of suitable habitat. Most of the project is outside of this "may affect" area, as indicated by the Biological Opinion. Therefore, it is unlikely that impacts would occur to individual arroyo toads.

The loss, though unlikely, of **arroyo chub** to bank stabilization and/or construction activities, depending on the number occurring on the site, could be considered a potentially significant impact to the population. The **unarmored three-spine stickleback** is considered a federally listed Endangered species and the loss, though unlikely, of these individuals, if present during construction, could also be considered a substantial adverse effect on the population of these special-status species and, therefore, would be a potentially significant impact. However, the project design will incorporate NRMP measures n) through q) above. With these measures incorporated into the project design no significant impacts will occur to these special-status fish species.

San Diego horned lizard, **California horned lizard**, **silvery legless lizard**, **coastal western whiptail**, **white-tailed kite**, **northern harrier**, **Cooper's hawk**, **California horned lark**, **pallid bat,** and **San Diego desert woodrat**, all California Species of Special Concern, could potentially occur within various habitat types on site, including oak woodland, Riversidian sage scrub, non-native grassland, and southern riparian scrub. Although none of these species were observed during the 2002 and 2003 general biological surveys or focused surveys for various species on the site, suitable habitat exists for these species and they are known to occur in similar habitat in the vicinity.

Should these species occur on the site during project implementation, direct mortality of individuals of these species could occur as a result of site preparation and development activities. If large numbers of individuals of these species would be affected such that the mortality would be considered a substantial adverse effect on a special-status species, this mortality would be considered a significant impact. Measures to minimize direct mortality of individual animals during the construction phase of the project are described in the various mitigation measures below.

The remaining special-status wildlife species addressed in **Table 4.6-2** have a low to moderate potential of occurring on the site. Implementation of NRMP measure v) above would minimize mortality of individuals of these species should they occur on the site during construction and/or grading activities. Because none of the remaining special-status wildlife species addressed in **Table 4.6-2** were observed during the project site surveys, and because these species would likely only occur on the site in the future in low numbers (due to overall habitat quality and quantity for these particular species), the potential loss of any individuals of these species would not be considered a substantial adverse effect on regional populations of these species; therefore, the direct loss of individuals of these species, if they occurred, would not be considered a significant impact.

(5) Jurisdictional Resources

(a) Regulatory Framework

Direct and indirect impacts on the Santa Clara River and adjacent riparian areas are likely subject to the jurisdiction of several state and federal agencies, including the ACOE, the CDFG, and the Los Angeles RWQCB. The NRMP and subsequent programmatic permits have been prepared and adopted by these state and federal agencies. These programmatic permits designate what types and quantities of impacts are permitted, with specified mitigation measures for the various types of impacts. Permitted activities include stream bank protection, trails, stormwater treatment and outfall structures, utility crossings, and related facilities.

As previously stated, the Santa Clara River, and ~~six~~ seven small drainages run through portions of the project site. A jurisdictional delineation was conducted for the River within the project site in 1997 as part of the NRMP to determine the areas under jurisdiction of the ACOE as "Waters of the U.S." and CDFG under Section 1600 of the California Fish and Game Code. The portion of this project within and along the banks of the Santa Clara River would be impacted as a result of the construction of buried bank stabilization and the Newhall Ranch Road/Golden Valley Road Bridge crossing. This area is also addressed in the NRMP. The implementation of the project would result in the following impacts to "Waters of the U.S.":

(b) Impacts on Jurisdictional Resources

Permanent Impacts within Jurisdictional Area from Buried Bank Stabilization and Impacts Associated with Newhall Ranch Road/Golden Valley Road Bridge

Approximately 9 acres of the riverbed (southern riparian scrub and riverwash habitat within the jurisdictional delineation) would be filled for bank stabilization and for the construction of Newhall Ranch Road/Golden Valley Road Bridge. However, approximately 3 acres of upland habitat would be located within the new bank stabilization area and could be excavated to create new riverbed habitat as part of the mitigation program described in the section that follows. The net result of these actions would be a potential permanent net loss of approximately 6 acres of ACOE and CDFG jurisdictional southern riparian scrub and riverwash habitat. The loss of habitat under the jurisdiction of ACOE and CDFG is considered a significant impact under CEQA. Impacts to specific plant communities that are under the jurisdiction of these agencies are addressed within the appropriate plant community section of this draft EIR.

Temporary Construction Impacts within Jurisdictional Area from Buried Bank Stabilization and Impacts Associated with Newhall Ranch Road/Golden Valley Road Bridge

Approximately 11.1 acres of the riverbed (southern riparian scrub and riverwash habitat) within the jurisdictional line would be temporarily disturbed due to installation of the bank stabilization and bridge. Impacts to specific plant communities that are under the jurisdiction of ACOE and CDFG are addressed within the appropriate plant community section of this draft EIR. The NRMP measures that are incorporated into the project design that will minimize to a less than significant level are also discussed in these sections.

Permanent Impacts within the Riverpark Project Resource Line from Buried Bank Stabilization and Impacts Associated with Newhall Ranch Road/Golden Valley Road Bridge

Approximately 16.1 acres of the riverbed within the resource line (any riparian habitat directly associated with the Santa Clara River, but not necessarily within the jurisdictional delineation) would be filled for the construction of Newhall Ranch Road/Golden Valley Road Bridge. The majority of the habitat that would be permanently removed occurs along the western portion of the site near Bouquet Canyon Bridge. The loss of habitat within the resource line would be considered a significant impact under CEQA. Impacts to specific plant communities that are under the jurisdiction of ACOE and CDFG are addressed within the appropriate plant community section of this draft EIR. The NRMP measures that are incorporated into the project design that will minimize to a less than significant level are also discussed in these sections.

Temporary Construction Impacts within the Resource Line from Buried Bank Stabilization and Impacts Associates with Newhall Ranch Road/Golden Valley Road Bridge

Approximately 21.8 acres of the riverbed within the resource line would be temporarily disturbed due to installation of the bank protection and bridge. Impacts to specific plant communities that are under the jurisdiction of ACOE and CDFG are addressed within the appropriate plant community section of this draft EIR. The NRMP measures that are incorporated into the project design that will minimize to a less than significant level are also discussed in these sections.

Implementation of this project would also result in impacts to ACOE and CDFG jurisdictional areas associated with ~~six~~ seven drainage channels in the upland portion of the project site. The impacts to these channels are summarized below:

Channel #1 – All 0.4 acre within ACOE jurisdiction and all 2.7 acres within CDFG jurisdiction would be impacted as a result of the implementation of this project.

Channel #2 – All 0.7 acre within CDFG jurisdiction would be impacted as a result of the implementation of this project.

Channel #3 – All 0.2 acre within CDFG jurisdiction would be impacted as a result of the implementation of this project.

Channel #4 – All 0.4 acre within CDFG jurisdiction would be impacted as a result of the implementation of this project.

Channel #5 – All 0.2 acre within CDFG jurisdiction would be impacted as a result of the implementation of this project.

Channel #6 – All 0.2 acre within ACOE jurisdiction and all 0.4 acre within CDFG jurisdiction would be impacted as a result of the implementation of this project.

Channel #7 – All (<) 0.1 acre within CDFG jurisdiction would be impacted as a result of the implementation of this project.

Impacts to specific plant communities that are under the jurisdiction of ACOE and CDFG are addressed within the appropriate plant community section of this draft EIR. The NRMP measures that are incorporated into the project design that will minimize to a less than significant level are also discussed in these sections.

(6) Impacts on Habitat Adjacent to Santa Clara River Riparian Area

As previously discussed, the upland habitat communities immediately adjacent to the river corridor are important to riparian wildlife species that also utilize these areas as part of their life history requirements. In general, upland habitat within 100 feet from the riparian resource edge associated with the river is considered of highest value with respect to riparian wildlife species and is necessary to maintain species diversity within the riparian ecosystem and adequately buffer this ecosystem from adjacent incompatible land uses.

As stated in the significance threshold criteria, providing an upland preserve area of less than 100 feet (in areas where at least 100 feet of upland habitat from the riparian resource currently occurs) of high quality habitat would be presumed to be a significant impact on the riparian ecosystem associated with the Santa Clara River. Based on an analysis of the approximately 14,155 linear feet of riparian edge within the project, the following indicates the linear footage that meets, exceeded, or did not meet the 100-foot width threshold:

- 2,910 linear feet (20.6 percent) meets or exceeds 100 feet in width;
- 470 linear feet (3.3 percent) is between 50 and 100 feet in width; and
- 10,775 linear feet (76.1 percent) is between 0 and 50 feet in width.

As shown, 79.4 percent of the area would not meet the 100-foot threshold setback. However, many of the proposed areas in which 100 feet of preserved upland habitat is not met, these areas are characterized with high bluffs that begin less than 100 feet of the riparian resource line or are disturbed due to past agricultural operations. In addition, 2,100 linear feet of the area within the 100-foot threshold setback that would be impacted is due to the construction of Newhall Ranch Road. The placement of the extension of this road within the project site is limited because of the existing termination point.

A portion of the 100-foot riparian/upland area to be impacted consists of ruderal habitat that has been historically disturbed by agricultural operations and dirt stockpiling. Under the proposed project, the remaining area within the 100-foot riparian upland preserve zone would be restored as high quality upland habitat. An additional 85 acres of disturbed or degraded upland habitat would also be preserved at various locations beyond the 100-foot threshold line. While active habitat restoration within areas of low biological value would enhance the upland area adjacent to the river, an overall minimum of 100 feet project-wide would still not be preserved. Therefore, this impact on the riparian ecosystem is still considered significant.

Portions of the proposed recreational trail will be constructed within 100 feet of the riparian resource edge (i.e., within the upland preserve zone). Construction of the trail will result in the permanent loss of approximately 10 acres of upland habitat. Placement of the trail within the 100-foot threshold will fragment the upland habitats in this area, essentially isolating the remaining upland areas between the trail and proposed development. For species dependent upon upland habitats adjacent to the river, this will decrease the amount of contiguous habitat available to them as foraging or cover habitat. Because of its linear nature, the trail may even serve as a barrier to upland movement for some species. Fragmentation of upland habitats adjacent to the river may lower the value of these areas as movement corridor habitat for species utilizing the river and associated vegetation as a regional habitat linkage. Because of the loss of upland habitat values, the placement of the trail within the 100-foot setback threshold is considered a significant impact.

The majority of Area B of the proposed project occurs on a bluff overlooking the Santa Clara River. Because the bluff occurs adjacent to the river, the 100-foot upland preserve zone occurs within the upland portion on top of the bluff. The impacts to the 100-foot upland preserve zone within Area B would occur in this area on top of the bluff. The position of this upland zone at the top of steep cliffs of the bluff limit the use of this upland area by riparian species such as small mammals and some birds.

The presence of the trail in close proximity to the Santa Clara River would also allow greater access to this sensitive resource area by humans and domestic animals. Impacts of the trail with respect to increased human and domestic animal activity are discussed in more detail under the Indirect Impacts section.

(7) Project Design Features That Minimize Impacts to Santa Clara River Riparian Resources and Adjacent Upland Habitat

Notwithstanding the significant impacts indicated above, it is important to identify several project design features and actions that the applicant has included into the project design plan to lessen the magnitude of impacts to riparian and related upland resources. These features and actions include:

- Movement of proposed development, including certain buried bank stabilization activities, further away from the river than permitted by the Natural River Management Plan (NRMP) and described in its associated EIS/EIR. Elimination of bank stabilization in areas of the project where stabilization was permitted by the NRMP.

- Construction and placement of a fenced barrier along the outer edge of the upland area to minimize encroachment and disturbance to these areas and the riparian resource as a result of adjacent urban development. This barrier shall consist of a wood ranch-rail type fence, approximately 4 - 5 feet in height and buried to a depth of not less than 1 foot, with hedge-like plantings of native vegetation on both sides of its entire length. The fence design shall ultimately allow wildlife to pass through so as not to inhibit wildlife movement along and to/from the river corridor.

- Bank stabilization will be set back from most of the resources to minimize alteration of the existing riparian vegetation and banks of the river channel. In those areas that would impact riparian and

upland vegetation, all vegetation will be replaced with native plant species similar to that being removed immediately after the completion of the bank stabilization. All graded areas for the buried bank stabilization will be returned to naturalized contours, not to exceed 4:1 slope angles, and will be vegetated entirely with native species as part of the upland buffer zone enhancement. Where slope angles occur within the setback, and alluvial or riparian scrub are not appropriate for vegetation cover due to drainage, coastal sage scrub, approximating existing formations locally, may be substituted.

- Planting remaining upland habitat areas within 100 feet of the riparian resource edge with native upland species similar to that which historically occurred in the area (likely to be either coastal sage scrub or alluvial scrub). The area shall be planted at a density to achieve a minimum of 40 percent plant cover (with a maximum of 70 percent) by the dominant or co-dominant plant species of that particular plant community, or as determined by a qualified plant biologist. The area shall be maintained by the applicant as high quality upland habitat for a minimum of 5 years after planting.

As indicated above, the NRMP proposes a series of activities along the Santa Clara River and its tributaries, including the installation of bank protection at various locations through the Riverpark site. The NRMP was the subject of an EIS/EIR prepared jointly by the United States ACOE and CDFG, and that EIS/EIR and the NRMP were certified and approved by those agencies in 1998. Master permits were then issued by the ACOE and DFG for the NRMP activities, including those proposed for the Riverpark site.

As part of the Riverpark project, the applicant has elected to move certain components of the project further away from the river, and has eliminated bank stabilization in certain areas, than what was permitted by the NRMP, thereby, reducing the amount of riparian area impacted by development when compared with the riparian area that could be developed under the NRMP. As shown in **Figure 4.6-7**, a total of 13.2 net acres of riparian area that could be developed under the NRMP-related permits would no longer be developed if the Riverpark project were developed as proposed. There are two small areas where the proposed project encroaches within the approved development line as presented in the NRMP. One area of proposed development encroaches approximately 80 feet into the NRMP area in an effort to preserve a Heritage oak tree. The other encroachment is due to the construction of Newhall Ranch Road and encroaches approximately 200 feet.

As shown in **Table 4.6-3**, of the area to be permanently impacted between 0 and 100 feet from the riparian resource area (approximately 47 acres), approximately 40 percent of the impacted area (19.1 acres) would be impacted by the installation of regional roads/bridges and the River Trail.

Permanent alteration of approximately 47.4 acres (15,396 linear feet) of ACOE and CDFG jurisdictional area will result from project implementation. The impacts to the Santa Clara River are considered permanent for this evaluation because the channel and banks will be re-contoured. However, the basic shape and size of the channel and banks will not be changed. While these actions do not eliminate or completely avoid the significant impacts that would occur to riparian and related upland areas due to the project, they do partially lessen the impact of development.

(8) Wildlife Movement Corridors

The proposed project design would preserve the integrity of the Santa Clara River as a wildlife movement corridor and minimize impacts on local and regional wildlife movement by maintaining nearly all of the Santa Clara River as open space. As previously discussed NRMP measures a) through m) will be incorporated into the project design and will minimize the impacts to riparian vegetation and replace any vegetation temporary or permanently removed. Therefore, the riparian vegetation that will be removed as a result of project implementation will not substantially affect the ability of resident and non-resident species to use the river as a movement corridor. It is acknowledged that some wildlife species also utilize adjacent upland habitats as foraging areas during periods of active movement, particularly during periods of high water flows. As proposed, the project plan will preserve and restore various amounts of upland habitat, up to approximately 126 feet in Area B (which includes the bluff area) adjacent to the river system that will allow some species, especially larger mammals, to use these adjacent upland areas as movement corridors.

Newhall Ranch Road (Newhall Ranch Road/Golden Valley Road Bridge). The bridge is proposed to be approximately 800 feet in length and a maximum of 116 feet in width. It will average approximately 11-22 feet in height above the riverbed with an estimated 9 vertical support columns or piers extending into the riverbed. The piers will be approximately 80 feet apart from one another. When confronted with bridges or overpasses along a preferred movement corridor, wildlife, particularly larger mammals, will move under these structures as long as there is adequate vertical and horizontal spacing, a natural (dirt, sand, vegetation) substrate on which to travel while under the structure, and an openness effect that allows the animal to detect light, open space and habitat at the exiting end of the structure. The proposed Newhall Ranch Road/Golden Valley Road Bridge will adequately meet these requirements and is not expected to significantly alter wildlife movement along the river during dry periods because it is similar to other existing upstream and downstream bridges. Consequently, implementation of the proposed project will not substantially interfere with the movement of any terrestrial wildlife species; therefore no significant impacts on terrestrial wildlife movement corridors will occur. Potential impacts on fish movement are discussed under impacts to fish species.

(9) Significant Ecological Areas

A total of 37.0 acres of habitat within Santa Clara River SEA (representing approximately 10 percent of the total habitat within SEA boundaries on the project site) will be disturbed or converted to urban development as a result of project implementation resulting in permanent impact. Approximately 13.0 of those acres (4 percent of the SEA total) will only be temporarily disturbed as a result of proposed bank stabilization activities and will be replaced upon completion of the bank stabilization.

EXISTING TANK

PROPOSED TANK #2

PROPOSED TANK #1

EXISTING TANK

AREA E

AREA D

AREA A1

AREA A2

AREA B

AREA C

BOUQUET CANYON ROAD

NEWHALL RANCH ROAD

GOLDEN VALLEY ROAD

SOUTH FORK

Natural Park Area

Santa Clara River

CANYON ROAD

(NOT A PART)

LEGEND

- Proposed Grading Limits
- 404/1603 Jurisdiction Line
- Area Requiring Amendment to NRMP
- Area Permitted for Development per NRMP

Note: The hook ramp and Golden Valley Road generally up to the southern bridge abutment have been analyzed in a previous environmental document.

800' 400' 0 800'

SCALE IN APPROXIMATE FEET

FIGURE **4.6-7**

Proposed Project Grading Limit Line vs. Jurisdictional Resource Line

112-16•09/03

Within the SEA boundaries, a total of 9.0 acres of disked field, 0.5 acres of non-native grassland, 2.0 acres of river wash and 14.5 acres of southern riparian scrub habitat representing a total of 24.0 acres of SEA habitat (10 percent of the total SEA habitat within the project site), will be permanently lost as a result of the project. The locations of these impacts are generally along the northern bank of the Santa Clara River west of the proposed Santa Clarita Parkway Bridge and primarily as a result of the proposed bank stabilization and traffic improvements. Impacts to riparian habitat within the SEA as a result of trails, project construction and grading activities, and bank stabilization and bridge maintenance activities, are the same as those discussed above.

Because of the relatively small amount of each habitat type within the SEA to be removed, and because the habitat areas to be removed are disjointed and spread out over the entire SEA area within the project site boundary, the permanent loss of 24.0 acres of habitat within the SEA boundaries is not expected to detract from the overall integrity and value of the SEA, in and of itself. In particular, this loss of area will not adversely affect the unarmored three-spine stickleback, the state and federally listed Endangered fish species for which the SEA was originally designed to protect (County of Los Angeles General Plan). In addition, the project plan will preserve and enhance various amounts of upland habitat, up to approximately 126 feet in Area B (which includes the bluff area), adjacent to the river that will serve as a buffer between habitats within the SEA and adjacent urban development. Impacts to riparian plant communities within the SEA are addressed within the appropriate plant community section of this draft EIR. However, because of the overall sensitivity of SEAs, and because any permanent loss of habitat within a SEA will effectively reduce the overall size of the SEA, the permanent net loss of 24.0 acres within the Santa Clara River SEA is considered a significant impact.

d. Operational Impacts

Indirect impacts on biological resources would occur to those habitat areas surrounding the project site after the completion of the proposed project. It is expected that implementation of the proposed project would result in indirect impacts to biological resources in the following ways:

- An increased human and domestic animal presence in the area and noise associated with this presence;
- Increase in populations of non-native plant species;
- Increased light and glare;
- Stormwater runoff; and
- Construction activities.

Indirect impacts associated with the proposed project are not quantifiable but are reasonably foreseeable. As such, the discussion that follows provides a common-sense identification of the types of secondary impacts and their relative magnitude such that decision makers and the general public are aware of the indirect impact potential associated with implementation of the proposed project. This type of analysis is consistent with the requirements of CEQA.

(1) Increased Human and Domestic Animal Presence

Implementation of the proposed project would increase human and domestic animal presence in the area. Increased recreational and other human activity around these habitats could: (1) displace a number of wildlife species, (2) increase the amount of refuse and pollutants in the area, (3) compact soils, and (4) trample ground-dwelling flora and fauna, and increases human activities adjacent to the river could also deter some animals, especially larger more secretive mammal species, such as coyote and mountain lion, from utilizing these habitats.

Off-road vehicle use in the riverbeds can also be expected to increase in proportion to population increases in the area. With no physical constraints in place to contain equestrians on designated trails or to exclude off-road vehicles, additional recreational use increases the likelihood of intrusion into sensitive habitat areas, trampling of habitats, noise disturbances to wildlife (especially if within the breeding season of birds and raptors) which can result in nest abandonment, and introduction of non-native plant species. Depending upon the season and location, this additional use can also cause increased erosion, siltation, and disruption of the hydrologic regime of the creek and river, possibly resulting in disturbance of downstream breeding ponds for special-status fish species, including the unarmored three-spine stickleback. Wildlife using the riparian ecosystem as movement corridors may also be disturbed and inadvertently flushed from hiding places, causing animals to avoid the area and potentially decrease use of the area as a movement corridor.

Increased use of the site by domestic animals can disturb nesting or roosting sites and disrupt the normal foraging activities of wildlife in adjacent habitat areas. Should this activity occur frequently, and over a long time period, these disturbances may have a long-term effect on the behavior of both common and special-status animals and can result in their extirpation from the area. Feral cats, as well as house cats, can cause substantial damage to the species composition of natural areas through predation, including populations of special-status species. Increased urban development can lead to higher numbers of cowbirds (which are highly adapted and attracted to urban settings) adjacent to and within the riparian areas, leading in turn to higher levels of nest parasitism of songbirds including common and sensitive bird species.

While it is acknowledged that the river already receives a certain amount of equestrian and off-road vehicle use, as well as domestic animal use, an increase in these uses as a result of project implementation, taken together, could substantially effect the quality of these areas as wildlife habitat, would potentially interfere with the movement of wildlife, and would potentially reduce the population of wildlife species, including special-status bird and fish species. Therefore, the increased use of the river areas by humans and domestic animals is considered a significant impact.

(2) Increase in Populations of Non-Native Species

Non-native plant and wildlife species (e.g., tamarisk, giant cane, salt cedar, European starlings, house sparrows, red foxes, etc.) are typically attracted to developed and urban environments and potentially displace native species because of their ability to compete more effectively for resources. Non-native plants tend to be more adaptable to urban settings and adjacent open space areas and can out-compete native plants for available resources.

However, historical and ongoing development in the vicinity of the project site has likely supported continual and ongoing increases and proliferation of non-native plant and wildlife species populations in remaining natural habitats. Because the project site is essentially surrounded by various levels of development, non-native and urban-adapted plant and wildlife species already occur on the project site and surrounding area (most were observed during various on-site surveys). Consequently, the proposed project is not expected to substantially increase the distribution of non-native plants and wildlife in the remaining open spaces in the project site area and therefore will not substantially or adversely affect common or special-status plant or wildlife populations in the area beyond what they are currently exposed. Therefore, impacts on the remaining natural areas as a result of potential increases in non-native plants and wildlife resulting from project implementation are not expected to be significant.

(3) Increased Light and Glare

The development of a residential community would increase the number of nighttime light and glare sources on the site over current levels, which are relatively low. Nighttime illumination is known to adversely affect some species of animals in natural areas. Nighttime light can disturb breeding and foraging behavior and can potentially alter breeding cycles of birds, mammals, and nocturnal invertebrates. Light could deter some animal species, especially the larger mammals, from using the Santa Clara River as a wildlife movement corridor. If uncontrolled, such light could adversely impact the composition and behavior of the animal species that occur in these areas. Because of the potential disruption to breeding and foraging behavior of wildlife species remaining on, adjacent to, and in proximity to the project site, increased nighttime lighting and glare is considered a potentially significant impact of the proposed project.

(4) Stormwater and Urban Runoff

Over-irrigation of landscaped areas, especially when combined with the use of chemicals, could lead to runoff that contains pesticides, herbicides, nitrates, and other contaminants. Any runoff that flows into the riparian corridor that contains high levels of nutrients, particularly fertilizers and waste products such as nitrogen and phosphorous, can result in eutrophication (excessive nutrient buildup). This in turn can result in depletion of available oxygen due to increased Biological Oxygen Demand (BOD) and reduce available dissolved oxygen for fish and other aquatic organisms. Other chemicals, pesticides, and herbicides can also adversely affect aquatic systems.

Paved surfaces could also contribute runoff into the riparian corridor during storm events. Depending on the magnitude and frequency of storm events and the overall level of the water quality, this runoff can cause increased eutrophication, depleted oxygen levels, long-term build-up of toxic compounds and heavy metals, and other adverse effects to biological resources associated with aquatic systems.

Since the use of chemicals and the extent of over-irrigation for landscaping within common and residential areas cannot be determined prior to project implementation, impacts related to stormwater and irrigation runoff could substantially affect special-status species potentially occurring downstream from the project site, substantially diminish habitat for fish, wildlife, or plants, and substantially degrade the quality of the environment. Therefore, these impacts would be considered potentially significant.

(5) Construction Activities

Construction and grading activities associated with project implementation that are proposed adjacent to or within the Santa Clara River ecosystem could adversely affect sensitive vegetation and wildlife within portions of the ecosystem not directly affected. These activities can result in the following impacts: displacement and disturbance of certain species of wildlife from noise and human activity that could result in possible nest or den abandonment during the breeding season of both common and special-status species; siltation and erosion into creek and river drainages that could adversely affect fish spawning and movement; excessive dust accumulation on vegetation that could result in the degradation or loss of some plant species; and soil compaction around remaining trees. Because these activities could substantially degrade biological resources within the ecosystem and possibly reduce the number of special-status species, these impacts, while temporary, are considered potentially significant. Any such actions with the potential to affect UTS may also require USFWS permitting pursuant to Section 10(a) under ESA.

6. MITIGATION MEASURES PROPOSED BY PROJECT

~~a. Mitigation Measures Proposed by Project~~

To minimize significant impacts of the project on biological resources, the applicant has proposed that the following measures from the NRMP be incorporated into the project:

4.6-1

a) Construction activities in the riverbed shall be restricted to the following areas of temporary disturbance: (1) an 85-foot-wide zone that extends into the river from the base of the rip-rap gunite or soil cement bank protection from where it intercepts the river bottom; (2) 100 feet on either side of the outer edge of a new bridge or bridge to be modified; (3) 50-foot-wide corridor for all utility lines; and (4) 20-foot-wide temporary access ramps and roads to reach construction sites. The locations of these temporary construction sites and the routes of all access roads shall be shown on maps submitted with the Verification Request Letter submitted to the ACOE and CDFG for individual project approval. The construction plans should indicate what type of vegetation, if any, would be temporarily disturbed and the post-construction activities to facilitate natural revegetation of the temporarily disturbed areas.

b) All native riparian trees in temporary construction areas with a 4-inch dbh or greater shall be replaced at a 3:1 ratio using 1 to 5 gallon container plants in the temporary construction areas in the winter following the construction disturbance. The growth and survival of the replacement trees shall meet the performance standards specified in later mitigation measures. In addition, the growth and survival of the planted trees shall be monitored for five years in accordance with the methods and reporting procedures specified in a later mitigation measure.

c) Native vegetation within temporary construction areas shall be mulched and spread over the temporary impact areas once construction is completed in order to facilitate revegetation. Areas temporarily disturbed by construction activities shall also be weeded annually, as needed, for up to five years following construction. These areas shall be annually monitored for five years after construction to document colonization by weeds and native plants. Weeds shall be removed by hand, an approved herbicide application, and/or by equipment. In the event that native plant cover does not reach 50 percent of the pre-construction native plant cover within three years, the applicant shall revegetate the temporary construction area in accordance with the methods specified in later mitigation measures. Annual monitoring reports on the status of the natural recovery of temporarily disturbed areas shall be submitted to the ACOE and CDFG as part of the Annual Mitigation Status

Report and Mitigation Accounting Form to be submitted to the ACOE and CDFG by April 1st of each year.

d) Permanent removal of riparian habitats shall be replaced by creating riparian habitats of similar functions and values in the project area. Wetland restoration shall be in-kind and at a 1:1 replacement ratio [except as indicated in Item f)] below for new habitat installed two years in advance of the removal of habitat at the construction site. If replacement habitat cannot be installed two years in advance of the project, the ratios listed below will apply. As described in Item c), lower replacement ratios may be appropriate if a ACOE-approved hydrogeomorphic method (HGM) of assessing replacement ratios indicates lower ratios would ensure replacement of habitat values and functions.

Timing of Mitigation	Value of Habitat Affected*	Proposed Ratio Required for Revegetation
Habitat installation completed 2 years or more prior to construction impact	N/A	1:1
Habitat installation completed less than 2 years in advance of impact	Low Medium High	1:1 2:1 3:1

* High (NRMP EIS/EIR mapping units 1, 2, 3, 6), Medium (NRMP EIS/EIR mapping units 4, 7), Low (NRMP EIS/EIR mapping units 5, 8)

e) Creation of new riparian habitats shall occur at suitable sites in or adjacent to the watercourses included in the NRMP. Habitat restoration sites in the riverbed shall only be located in areas where the predominant habitats present are dry open floodplain, weedy herbaceous, or their functional equivalent. The highest priority habitat restoration sites should be new riverbed areas created during the excavation of uplands for bank protection. Restoration sites may also occur at locations outside the riverbed where there are appropriate hydrologic conditions to create a self-sustaining riparian habitat and where upland and riparian habitat values are absent or very low. All sites shall contain suitable hydrological conditions and surrounding land uses to ensure a self-sustaining functioning riparian habitat. Candidate restoration sites shall be selected by the applicant described in the Annual Mitigation Status Report that will be submitted to the ACOE by April 1st of each year. Sites will be approved when restoration plans are submitted to the ACOE and CDFG as part of the Verification Request Letters submitted for individual projects, or as part of the Annual Mitigation Status Report and Mitigation Accounting Form.

f) Replacement habitat shall be designed to replace the functions and values of the habitats being removed. At this time, the replacement habitat shall be restored in accordance with the acreage replacement ratios described in Item a). The replacement habitats shall have similar dominant trees and understory shrubs and herbs as the affected habitats. In addition, the replacement habitats shall be designed to replicate the density and structure of the affected habitats once the replacement habitats have reached mature status. Replacement ratios that are lower than those listed in Item a) may be used if a ACOE-approved HGM is applied in which habitat functions and values of both the affected habitat and the replacement habitat are quantified.

g) Average plant spacing shall be determined based on an analysis of habitats to be replaced. Typical plant spacing is presented below for use in developing willow-cottonwood woodland habitat as an example only. The applicant shall develop similar tree spacing specifications for habitats to be restored. Plant spacing specifications shall be reviewed and approved by the ACOE and CDFG when restoration plans are submitted to the ACOE as part of the Verification Request Letters submitted to the ACOE and CDFG for individual projects or as part of the Annual Mitigation Status Report and Mitigation Accounting Form.

Species	**Average Plant Spacing (feet)**	**Height (feet)**	
		After 3 years	After 5 years
Arroyo willow	8	10	15
Black willow	8-10	12	18
Sandbar willow	8	4	6
Red willow	8	9	15
Cottonwood	20	7	12

h) Each tree and shrub species used in restoration shall have a minimum of 80 percent survival after three years and 70 percent survivorship after five years. Key indicator tree species to be used in the riparian restoration program shall achieve a minimum growth at the end of three years and five years as described above in Item e). Performance standards for cover shall be developed for each individual habitat type being created, based on the observed natural cover in undisturbed habitats in the project area. These standards shall be approved by the ACOE and CDFG after they have reviewed the Annual Mitigation Status Report and Mitigation Accounting Form Minimum growth, survivorship, and cover performance at the mitigation sites shall be measured based on random samples taken during years three and five at each individual mitigation site, or at other sampling intervals if the ACOE' hydrogeomorphic methodology is used by the applicant.

i) If the minimum growth, survivorship, and/or cover are not achieved at the time of the three and five year evaluations, then the applicant shall be responsible for taking the appropriate corrective

measures as to achieve the specified growth, survivorship, and/or cover criteria. The applicant shall be responsible for any costs incurred during the revegetation or in subsequent corrective measures. If acts of God (flood, fires, or drought) occur after the vegetation has met the three-year criteria for growth, survival, and cover, the applicant will not be responsible for replanting damaged areas. If these events occur prior to the plants meeting the three-year criteria, the applicant shall be responsible for replanting the area one time only.

j) The applicant shall be responsible for weeding all restoration sites to prevent an infestation of non-native weeds for a period of five years after the initial habitat restoration, regardless of the success of the planted species. The cover of non-native plant species at the mitigation sites shall not exceed 10 percent at any time, within this five-year period.

k) Temporary irrigation shall be installed, as necessary, for plant establishment. Irrigation shall continue as needed to meet the three- and five-year performance criteria regarding survivorship and growth. Irrigation shall be terminated in the winter to provide the least stress to plants. Removal of the irrigation system shall occur in conjunction with an appropriate "weaning" procedure to minimize plant stress. Irrigation shall be terminated at the earliest opportunity after achieving the five-year criteria.

l) As an alternative to the restoration of habitats to compensate for permanent removal of riparian habitats, the applicant (at the discretion of the ACOE and CDFG) may remove exotic plant species from the project area in locations: (1) where there is an infestation of exotics such as *Arundo donax* such that the natural habitat functions and values are substantially degraded and at risk, and where the cover of exotics is equal to or exceeds 25 percent of the ground; or (2) other areas where exotic removal would be strategic in a watershed approach to weed management, as determined by the ACOE and CDFG. The weed removal sites shall be selected in logical manner to ensure that the eradication of weeds from specific sites will contribute to the overall control of exotics in the NRMP watercourses. Removal areas shall be kept free of exotic plant species for five years after initial treatment. In addition, native riparian vegetation must become established through natural colonization and meet the revegetation plant cover goals established by the ACOE and CDFG under Item f) after five years.

m) The removal program shall utilize methods and procedures approved by the ACOE and CDFG to remove exotics, including but not limited to, mechanical equipment in specific areas, handcutting, and the application of herbicides to stumps. Exotic plant species removal credit will be given as shown below (except when weed removal is used to mitigate for loss of habitat for sensitive riparian

bird species where the ACOE and CDFG may require higher ratios). Weed eradication plans shall be submitted to the ACOE and CDFG for approval as part of the Verification Request Letters submitted to the ACOE and CDFG. The plans shall describe the proposed methods and the conditions of the site to be treated. A monitoring program shall be implemented to document the effectiveness of the removal and the natural establishment of native vegetation in the weeded area.

Value of Riparian Habitat to be Removed	Mitigation Ratios for Exotic Removal	
	2 Years in Advance	< 2 Years in Advance
High (NRMP EIS/EIR mapping units 1, 2, 3, 6)	3:1	4:1
Medium (NRMP EIS/EIR mapping units 4, 7)	2:1	3:1
Low (NRMP EIS/EIR mapping units 5, 8)	1:1	2:1

n) Prior to initiating construction for the installation of bridges, storm drain outlets, utility lines, and/or bank protection, all construction sites and access roads within the riverbed, as well as all riverbed areas within 300 feet of the construction site and access road, shall be inspected by a qualified biologist for the presence of arroyo toads, unarmored three-spine stickleback and arroyo chub. The ACOE and the CDFG shall be notified of the inspection and shall have the option of attending. If either agency is not represented, the biologist shall file a written report of the inspection with the agency not in attendance within 14 days of the survey and no sooner than 30 days prior to any construction work in the riverbed.

o) Construction work areas and access roads shall be cleared of the species listed above immediately before the prescribed work is to be carried out, immediately before any equipment is moved into or through the stream or habitat areas, and immediately before diverting any stream water. The removal of such species shall be conducted by a qualified biologist using procedures approved by the ACOE and CDFG, and with the appropriate collection and handling permits. Species shall be relocated to nearby suitable habitat areas. A plan to relocate these species shall be submitted to the ACOE and CDFG for review and approval no later than 30 days prior to construction. Under no circumstances shall the unarmored three-spine stickleback be collected or relocated, unless USFWS personnel or their agents implement this measure.

p) All stream flows traversing a construction site or temporary access road shall be diverted around the site and under access roads (using a temporary culverts or crossings that allow fish passage). A temporary diversion channel shall be constructed using the least damaging method possible, such as blading a narrow pilot channel through an open sandy river bottom. The removal of wetland and riparian vegetation to construct the channel shall be avoided to the greatest extent feasible.

The temporary channel shall be connected to a natural channel downstream of the construction site prior to diverting the stream. The integrity of the channel and diversion shall be maintained throughout the construction period. The original stream channel alignment shall be restored after construction, provided suitable conditions are present at the work site after construction. A temporary stream diversion plan shall be included in the Verification Request Letters submitted to the ACOE and CDFG. This procedure can only be implemented if: (1) there are assurances by the applicant that the fully protected unarmored three-spine stickleback will not be taken or possessed; or (2) USFWS personnel or their agents implement this measure.

q) A qualified biologist shall be present when any stream diversion takes place, and shall patrol the areas both within, upstream, and downstream of the work area to rescue any species stranded by the diversion of the stream water. Species that are collected shall be relocated to suitable downstream of the work area. Under no circumstances shall the unarmored three-spine stickleback be collected or relocated, unless USFWS personnel or their agents implement this measure.

r) The removal of any riparian habitat suitable for breeding, nesting, foraging, and temporary usage during migration by special-status species from the project footprint (i.e., boundaries of temporary and permanent impacts) shall be mitigated through the creation or enhancement of similar riparian habitat at an approved mitigation site, or by the removal of exotic species from an area of existing similar habitat. The requirement for replacing suitable habitat by either creating new habitat or removing exotic species from existing habitat shall follow the replacement ratios and timing requirements in later mitigation measures. Habitat to be created to mitigate for the loss of riparian habitat shall be designed specifically to replicate the appropriate species mixture and vegetative structure for these species. Existing habitat to be weeded as mitigation for the loss of riparian habitat must be located adjacent to similar habitat that is to be replaced and infested with invasive weeds. The first priority for habitat mitigation for sensitive bird species will be the creation or restoration of habitat rather than weed removal. The final habitat replacement or exotic removal plans for impacts to these types of habitats shall be reviewed by the ACOE and CDFG.

s) Beginning 30 or more days prior to the removal of any suitable riparian habitat that will occur during the riparian bird breeding and nesting season of March 15th through September 1st, the applicant shall arrange for weekly bird surveys to detect the above riparian bird species in the habitats to be removed, and any other such habitat within 300 feet of the construction work areas. The surveys shall be conducted by a qualified biologist using CDFG and/or USFWS survey protocols. The surveys shall continue on a weekly basis, with the last survey being conducted no more than 7 days prior to the initiation of construction work.

t) In the event that a special-status species is observed in the habitats to be removed or in other habitats within 300 feet of the construction work areas, the applicant has the option of delaying all construction work in the suitable habitat or within 300 feet of the suitable habitat until after September 1st, or continuing the surveys in order to locate any nests. If an active nest is found, clearing and construction within 300 feet of the nest shall be postponed until the nest is vacated and juveniles have fledged, and when there is no evidence of a second attempt at nesting. Limits of construction to avoid a nest site shall be established in the field with flagging and stakes or construction fencing. Construction personnel shall be instructed on the ecological sensitivity of the area.

u) Locating and determining the status of a nest shall be performed in accordance with approved procedures by the USSFWS and CDFG. The ACOE and CDFG shall be notified at least 14 days prior to the first scheduled survey and shall have the option of attending. Results of the surveys, including surveys to locate nests, shall be provided to the ACOE and CDFG no later than 5 days prior to construction. The results shall include a description of any nests located and measures to be implemented to avoid nest sites. No surveys will be necessary if the work is completed outside of the riparian bird breeding and nesting season, i.e., from September 1st through March 15th.

v) Thirty days prior to construction activities in areas of the "upland impact zone" associated with individual NRMP projects, a qualified biologist shall conduct a survey to capture and relocate individual San Diego and California horned lizard, silvery legless lizard, coastal western whiptail, pallid bat, San Diego black-tailed jackrabbit, and San Diego desert woodrat in order to avoid or minimize take of these sensitive species. Individuals shall be relocated to nearby undisturbed areas with suitable habitat. Pre-construction surveys shall only be conducted in areas dominated by Riversidian coastal sage scrub or coastal sage – chaparral scrub or if construction will occur within 300 feet of native upland habitat. Results of the surveys and relocation efforts shall be provided to CDFG in the Annual Mitigation Status Report. Collection and relocation of animals shall only occur with the proper scientific collection and handling permits.

w) Construction activities shall be limited to the following areas of temporary disturbance: (1) an 85 foot-wide zone that extends into the river from the base of the rip-rap or gunite bank protection where it intercepts the river bottom; (2) 60 feet on either side of the outer edge of a new bridge or bridge to be modified; (3) 50-foot-wide corridor for all utility lines; and (4) 20-foot-wide temporary access ramps and roads to reach construction sites. The locations of these temporary construction sites and the routes of all access roads shall be shown on maps submitted with the Verification Request Letters for individual projects that are submitted to the CDFG and ACOE. Any variation

from these limits shall be noted, with a justification for a variation. The construction plans should indicate what type of vegetation, if any, would be temporarily disturbed, and the post-construction activities to facilitate natural revegetation of the temporarily disturbed areas. The boundaries of the construction site and any temporary access roads within the riverbed shall be marked in the field with stakes and flagging. No construction activities, vehicular access, equipment storage, stockpiling, or significant human intrusion shall occur outside the work area and access roads.

x) Equipment shall not be operated in areas of ponded or flowing water unless there are no practicable alternative methods to accomplish the construction work, and only after prior approval by the CDFG and the ACOE. Approval shall be acquired by submitting a request to CDFG and ACOE no later than 30 days prior to construction. The request must contain a biological evaluation demonstrating that no sensitive fish, amphibians, and/or reptiles are currently present, or likely to be present during construction, at the construction site or along access roads.

y) Temporary sediment retention ponds shall be constructed downstream of construction sites that are located in the riverbed under the following circumstances: (1) the construction site contains flowing or ponded water that drains off site into the undisturbed streamflow or ponds, as allowed for certain areas under Item a) above; or (2) streamflow is diverted around the construction site, but the work is occurring in the period November 1st through April 15th when storm flows could inundate the construction site. The sediment ponds shall be constructed of riverbed material and shall prevent sediment-laden water from reaching undisturbed ponds or streamflows. To the extent feasible, ponds shall be located in barren or sandy river bottom areas devoid of existing riparian scrub, riparian woodland, or aquatic habitat. The ponds shall be maintained and repaired after flooding events, and shall be restored to pre-construction grades and substrate conditions within 30 days after construction has ended at that particular site. The location and design of sediment retention ponds shall be included in the Storm Water Pollution Prevention Plan (SWPPP) prepared by the applicant for all construction activities that require a NPDES General Construction Activity Storm Water Permit.

z) Installation of bridges, culverts, or other structures shall not impair movement of fish and aquatic life. Bottoms of temporary culverts shall be placed at or below channel grade. Bottoms of permanent culverts shall be placed below channel grade.

aa) Water containing mud, silt, or other pollutants from construction activities shall not be allowed to enter a flowing stream or be placed in locations that may be subject to normal storm flows during periods when storm flows can reasonably be expected to occur.

bb) Vehicles shall not be driven or equipment operated in areas of ponded or flowing water, or where wetland vegetation, riparian vegetation, or aquatic organisms may be destroyed, except as otherwise provided for in the 404 Permit or 1603 Agreement.

cc) Silt settling basins, installed during the construction process, shall be located away from areas of ponded or flowing water to prevent discolored, silt-bearing water from reaching areas of ponded or flowing water during normal flow regimes.

dd) If a stream channel has been altered during the construction and/or maintenance operations, its low flow channel shall be returned as nearly as practical to pre-project topographic conditions without creating a possible future bank erosion problem, or a flat wide channel or sluice-like area. The gradient of the streambed shall be returned to pre-project grade, to the extent practical, unless it is represents a wetland restoration area.

ee) Temporary structures and associated materials not designed to withstand high seasonal flows shall be removed to areas above the high water mark before such flows occur.

ff) Staging/storage areas for construction equipment and materials shall be located outside of the ordinary high water mark.

gg) Any equipment or vehicles driven and/or operated within or adjacent to the stream shall be checked and maintained daily, to prevent leaks of materials that if introduced to water could be deleterious to aquatic life.

hh) Stationary equipment such as motors, pumps, generators, and welders which may be located within the riverbed construction zone shall be positioned over drip pans. No fuel storage tanks shall be allowed in the riverbed.

ii) The applicant shall use best efforts to ensure that no debris, bark, slash sawdust, rubbish, cement or concrete or washing thereof, oil, petroleum products, or other organic material from any construction, or associated activity of whatever nature, shall be allowed to enter into, or be placed where it may be washed by rainfall or runoff into, watercourses included in the permit. When construction operations are completed, any excess materials or debris shall be removed from the work area.

jj) No equipment maintenance shall be done within or near any stream where petroleum products or other pollutants from the equipment may enter these areas with stream flow.

kk) If water diversions are required to perform work within the Santa Clara River, the applicant shall utilize provisions for the protection of arroyo toad, unarmored three-spine stickleback, arroyo chub, Santa Ana sucker, southwestern pond turtle and two-striped garter snake, including securing appropriate Endangered Species Permits. Those provisions are as follows:

- Prior to initiating construction, the site shall be inspected by a qualified biologist for the presence of the species listed above. The ACOE and the Department will be notified of the inspection and will have the option of attending. If either agency is not represented, the biologist will file a written report of the inspection with the agency not in attendance within ten days of completion of the survey. If any of the species listed above are present, the following conditions will apply:

  – The site shall be surveyed and cleared of the species listed above immediately before the work is to be carried out, immediately before any equipment is moved into or through the stream, and immediately before diverting any stream water. Any species found shall be moved out of the construction area and replaced in the stream in a manner or place to assure their survival.

  – Blocking nets, or fences with 1/4 inch square mesh, 18 inches high and buried 6 inches, shall be placed upstream and downstream of the work area to assure that none of the species move into the area.

ll) A qualified biologist, approved by the City, will be present at the moment any stream diversion takes place and will patrol the areas, both within and downstream of the work area, to rescue any species stranded by diversion of stream water. If the possibility exists that additional downstream sections of the stream will be dewatered, additional biologists will be available for downstream patrol. This rescue patrol will continue until all dewatered portions of the stream are determined to be cleared.

mm) Once the construction site or a portion of the site and work area boundary has been determined to contain none of the species listed above, the site shall be fenced with construction fencing along the riverside- and construction personnel and equipment will not enter the river beyond the fence.

nn) A water control system will be installed to intercept stream flow upstream of the site and carry it around the site. The system will be completed before turning water into it. The process of turning water into the bypass system shall be done so as to minimize sediment movement.

- The Operator will use best efforts to insure that no debris, bark, slash, sawdust, rubbish, cement, concrete, or washings thereof, oil or petroleum products, or other organic material from construction or associated activity will be allowed to enter into or be placed where it may be washed by rainfall or runoff into the river. Sediment management best management practices shall be used during construction.

- Impacts to Endangered species may require appropriate Endangered Species Permits.

oo) Pilot channels constructed to divert flows around work areas shall be sized to maintain existing water velocities, with wide, shallow channels being utilized. The channel should be kept as small as possible, extending no more than 25 feet upstream and downstream of the work area. Construction of pilot channels should start downstream. Once water is diverted into the new channel, the original channel should be visually inspected and any stranded fish shall be removed and returned to the water downstream of the diversion. Once the diversion is no longer needed, the area shall be restored as closely as practical to its original configuration.

pp) The use of a pump to divert flows around a work site is also acceptable. The pump must have at least a 1/4-inch screen. Water should be discharged downstream, within 25 feet of the work area. Any dams installed across flowing water for the diversion shall be removed upon completion of construction and the area shall be restored as closely as practical to its original configuration.

qq) The Operator shall utilize a Maintenance Notification and Emergency Maintenance Notification forms (Exhibits 1 and 2 of the NRMP) to alert the ACOE and the Department of work to be performed. In non-emergency situations, the form should be filled out and faxed or mailed to the ACOE and the Department at least two weeks in advance of the work. If the work may adversely impact Endangered species, the ACOE, the Department and LACDPW shall meet in the field to resolve the issue. LACDPW may contact the ACOE and the Department to identify areas of potential Endangered species habitat. If the ACOE and the Department believe the work may adversely impact Endangered species or its habitat resources or the LACDPW wishes to consult with the ACOE and the Department, a field meeting will be scheduled. At the field meeting, the ACOE and the Department will provide information regarding Endangered or Threatened species that could be impacted by the project. If take of an Endangered species will occur, the appropriate Endangered

Species Permits will be required. To the extent that a USFWS Section 7 and a CDFG Section 2081 Memorandum of Agreement have been completed for the species present, the mitigation measures shall be implemented and construction may proceed as outlined in these documents.

rr) The notification is provided to demonstrate consistency with the policies of the NRMP. In non-emergency situations, the ACOE and the Department must respond to the notification within 20 working days if they believe that the work is inconsistent with the NRMP, at which time a field meeting will be scheduled to review the site and determine how the work may proceed. If the ACOE and the Department do not respond within 20 working days, the work shall proceed as described in the notification. However, appropriate Endangered Species Permits will be required for impacts to Endangered species.

7. MITIGATION MEASURES PROPOSED BY THIS EIR

The following discussion describes measures proposed within this Draft EIR to avoid, minimize, or reduce significant or potentially significant impacts on biological resources. These measures are also designed to ensure compliance with state and federal statutes and regulations regarding special-status plant and animal species.

a. Resource Management and Monitoring Plan

4.6-2 Prior to issuance of a Grading Permit for the project, the applicant shall obtain the services of a qualified biologist who must, at a minimum, have a degree in botany, biology, wildlife biology or ornithology and experience in developing management plans for the flora and fauna, plant community and wildlife habitats found in the Southern California area, to develop a RMMP to serve as a guideline for managing and monitoring mitigation areas for specific species, plant communities, jurisdictional resource areas, and habitats. The RMMP shall be submitted to the City of Santa Clarita Planning and Building Services at least 30 days prior to issuance of a Grading Permit for the project, and shall include the following:

a. A **Planting Plan**, at a minimum, that lists all appropriate native plants to be included in all revegetation mitigation areas. The planting plan shall be developed by a qualified biologist as approved by the City.

b. **Procedures** regarding the removal of non-native vegetation, planting of native vegetation, translocation of trees, planting of container stock, irrigation, and equipment use.

c. **Maps** that illustrate the specific location of mitigation areas.

d. **Procedures outlining monitoring and maintenance activities** including frequency and timing of monitoring visits, plant maintenance, and irrigation maintenance.

e. **Specific criteria** that will specify what goals must be accomplished at each mitigation area before the mitigation is deemed a success.

f. **Adaptive Management and Contingency actions** that will specify what actions will be taken in the event success criteria are not met.

g. **The source of funding** that will be required to successfully carry out all procedures outlined in the RMMP.

4.6-3 Unless directed otherwise by a lead agency, responsible agency, or regulatory agency, the monitoring of results will be maintained for a period of five years. The frequency of monitoring visits may vary by task category, but generally quarterly visits are conducted for the first three years followed by two subsequent annual visits. An annual report shall be produced by the biologist conducting the monitoring activities and will be provided to the lead agency and appropriate regulatory agencies.

b. ACOE Waters of the U.S. and CDFG Streambeds

4.6-4 Newhall shall prepare an amendment or variance to the NRMP and mitigate in accordance with the above requirements.

c. Special-Status Plant Species

(1) Parry's larkspur, Slender and Plummer's mariposa lilies

4.6-5 To minimize direct loss of Parry's larkspur, slender and Plummer's mariposa lilies in areas subject to disturbance, additional field surveys to determine amount of area covered by these species and approximate densities shall be conducted during the appropriate blooming period for these species prior to site preparation and/or grading activities in areas potentially supporting this species. Locations of individual plants or plant populations shall be appropriately flagged, and (1) seeds from a representative mix of individual plants shall be

collected and sown in appropriate habitats, or on cut slopes, and (2) the bulbs shall be harvested and transplanted to areas of appropriate habitat which are not subject to further disturbance. The goal will be to produce replacement populations of in-kind plants reaching maturity, at a ratio of 1:1 with respect to the number and density of plants (estimated) to be lost. The areas to be preserved and maintained as open space within the Riverpark project site contain habitat suitable to support these species. All seed collecting, planting, and transplanting procedures shall be identified in the RMMP and appropriate management, monitoring, success criteria, and adaptive management guidelines for the mitigation of impacts to these species shall also be identified.

(2) Oak Trees

4.6-6 While the majority of oak trees on the site will be retained in place, three live trees will be removed and 12 will be relocated. Appropriate approvals shall be obtained prior to oak trees being removed, subject to the Oak Tree Preservation Ordinance (Ordinance 89-1) and the City of Santa Clarita Oak Tree Preservation and Maintenance Guidelines. Prior to grading, oak trees near construction/grading areas that will not be removed will be protected during the grading and construction phases of the project by appropriate fencing that extends 5 feet beyond the tree canopy's dripline, or 15 feet from the trunk, whichever is greater.

4.6-7 Additional specific mitigation measures are described in detail in the Oak Tree Report produced by Tree Life Concern, Inc. (**Appendix 4.6**) and listed below. The mitigation measures described in this report are supported by the City's Oak Tree Specialist and exceed the requirements of the City of Santa Clarita tree ordinance.

Equipment damage to the limbs, trunks and roots must be avoided. Even slight trunk injuries can result in long-term, life threatening pathogenic maladies. No storage of equipment or debris within the Protective Zone (dripline plus 5 feet) will be allowed. No dumping of construction wastewater i.e., paint, stucco, concrete, clean-up, etc. within Protective Zones, Generally, fencing shall be placed at the Protective Zone of any oak or groups of oaks within 50 feet of proposed construction activity. Protective Fencing must remain in place during construction projects and shall not be moved or removed without prior written approval from the Department of Community Development under the direct supervision of the Project Consulting Arborist.

Protective Fencing shall be at least 4 feet in height with a visible sign attached at 50 feet intervals which reads: [WARNING - THIS FENCE IS FOR THE PROTECTION OF THIS TREE AND SHALL NOT BE REMOVED OR RELOCATED WITHOUT WRITTEN AUTHORIZATION FROM THE CITY OF SANTA CLARITA COMMUNITY DEVELOPMENT DEPARTMENT]

If possible, complete pruning of the larger California Live or Valley oaks, is recommended for health and weight reduction (inspect for occupied woodpecker nests prior to removal of larger dead snags). Any cuts over 2 feet in diameter would require a "Pruning Permit" from the City. After pruning, the installation of support cables to prevent future main crotch failures is recommended (refer to the Summary of Field Inspection for specific tree and cable numbers). All cables should be a minimum of 5/16 inch diameter EHS (Extra High Strength) and attached with 5/8-inch diameter, galvanized thru-bolts. Heavy-duty 3/8-inch thimbles are to be utilized at each attachment point. These recommendations are presented for consideration by the City, current and/or future property owners.

Care should be taken to avoid placing any sprinklers within watering distance to the trunk of an oak tree. Generally, sprinklers should not reach within 15 feet of a mature oak trunk. Grass or ground covers must never be planted next to the trunks. Too much moisture near the base of an oak is generally believed to be their leading cause of death in residential settings. Oak Root Fungus is the result of over-watering. Oak trees survive and thrive on annual rainfall alone and generally do not need supplemental irrigation except during periods of drought. Watering should take place at or near the dripline. Landscape plans should leave the area within the dripline of an oak tree in a native or natural setting.

Care must be taken to limit grade changes near the trunk areas. The grade should not be lowered or raised around the trunks of trees. This can lead to plant stress from oxygen deprivation or Oak Root Fungus at the root collar.

Mitigation for the tree removals/relocations includes the dedication of a 24-acre property with oak tree habitat. This property is directly adjacent to the 4.25-acre active neighborhood park and contains a majority of the oak trees on the project site. The proposed mitigation (dedication of 24 acres of oak habitat open space and the transplanting of oak trees on site including the costs associated with the corresponding five-year maintenance plan of said trees) for oak tree impacts is consistent with the provisions of the City's Oak Tree Preservation Ordinance.

Protective fencing shall be installed around all oaks not listed for removal. Place protective fencing at the PZ as shown on the TLM. The fencing can be repositioned as needed to allow for grading near the oaks listed as "impacted". The project arborist must be present during the fence placement. Final fencing locations shall be inspected by the City prior to the commencement of development activities. Regular inspections of this fencing shall occur during site development.

An Oak Tree Information Packet including the City of Santa Clarita Oak Tree Protection and Preservation Guidelines must be available on site during construction. The property owner and contractor should be familiar with the contents of these documents.

Vehicle travel along dirt roadways to and from the site may create a heavy coating of dust on the foliage of nearby oaks. These oaks should be hosed off periodically during construction activities.

All work performed within the Protective Zone (dripline plus 5 feet) of any oak shall be accomplished by utilizing hand tools only and must be 'monitored' by the project's Oak Tree Consultant.

All roots over 1.5-inch diameter will be clean cut at a 45-degree angle and treated by the Consulting Arborist.

No oaks outside the property line are to be impacted by this construction project.

The leaf-litter build-up under the canopies of the oaks on this site is ideal for healthy tree growth and root development. Do not alter or remove if possible. A 3-inch layer of mulch may be advisable in settings where leaf-litter has been lost.

Do not remove the aluminum tags numbering each oak on this site.

No construction materials are to be stored or discarded within the PZ of any oak. Rinse water, concrete residue, liquid contaminates (paint, thinners, gasoline, oils, etc.) of any type shall not be deposited in any form at the base of an oak.

No vehicles shall be parked within the PZ of an oak. No construction vehicles are to be parked under the shade (within the PZ) of an oak.

(a) Oak Transplantation

The oak trees listed for transplanting shall be professionally "boxed" and relocated on site to the designated "storage area" (see TLM). A qualified transplant company shall perform the relocations (it is anticipated that Valley Crest Tree Company will be performing the relocations). To enhance the success of each tree for long-term survival the relocations will be monitored by the Project Arborist. The size of box for each tree will be determined by the Arborist and Valley Crest representative. Consideration will be given to the buttress spread, as well as the trunk diameter. Generally, the larger the box, the greater

the probability of success. In every case where a decision is to be made between a smaller size box and a larger box, i.e., 180- or 192-inch box, the box of choice will be the 192-inch box.

Under the direction of the Project Arborist, side-boxing/root-pruning operations shall take place during the months of November through January. These trees will then be maintained in situ for a 90-day period prior to bottom-board installation and relocation to the "storage site".

A "storage site" has been designated (see TLM) with a permanent water supply, which will be accessible to each boxed tree.

The Project Arborist (in conjunction with the relocation company) will determine if and when fungicides, fertilizer or soil amendments are needed. Each tree will be monitored for any condition that may require a specific treatment to enhance survivability before, during and after relocation.

Prior to side-boxing and root pruning the soil moisture content must be sufficient to maintain the rootball intact during this process.

Each oak should be lightly pruned at this point to remove deadwood, stubs, broken limbs, crossing limbs or for clearance purposes. The pruning will be monitored.

The excavation process will first begin with a back-hoe. As roots are encountered the back-hoe will be removed and roots 2 inches or larger will be hand excavated and clean-cut with a handsaw. The exposed cuts will be treated with a Bordeaux linseed oil solution to help prevent desiccation. All roots shall be clean cut with pruning shears or by handsaw. Root balls that are exposed to full sun will be tarped until the side-box wall is installed.

After side-boxing/root-pruning operations the trees will remain in place for approximately 90 days before the bottom boards are installed.

The boxed trees will be hoisted by the box itself (not by the trunk) and carried to the storage area.

The orientation of each oak (north, south, east, west) will be carefully maintained during the storage process. The project arborist will mark each box for proper direction while in storage. This is important to prevent damage from sunburn.

Valley Crest shall guy-wire each tree as needed into the box and/or into the ground as needed. The storage area is notoriously windy and extra attention will be paid to securing the trees until planting. The guy-wires will be placed through hose-sections where they are in contact with the tree.

When planting the oaks, the planter-hole (pit) location will be partially filled with loosened native soil. The size of the hole will be 2 feet larger than the box size. If drainage is determined to be a concern, PVC drain tubes will be installed in a rectangular fashion with breather ports attached at four locations. The bottom of the pit will be filled with 8 inches of gravel and a layer of permeable soil-cloth will be placed over the gravel.

An 8-inch layer of native soil will then be placed over the cloth and the tree install backfilled. This will allow for monitoring any possible water pooling at the base of each tree. Unamended native soil will be utilized for the backfill unless a soil analysis indicates that amendments will be required.

A soil analysis will be performed at the planting site 30 days prior to relocation. The backfill soil will be compacted to normal (native-soil compaction).

The height of the root ball is critically important in the long-term survival of a transplanted oak. Each rootball will be placed at least 6 inches above existing grade. This will allow for settling and ensure that water does pool at the root collar.

Soil watering-basins will be constructed to properly irrigate the entire rootball of each tree. The trees will be monitored by relocation company and the Project Arborist on a weekly basis to determine current condition and maintenance requirements.

4.6-8 All revegetation, restoration, and enhancement measures within mixed oak woodlands shall be documented in the Resource Management and Monitoring Plan and shall include, at a minimum, the following: (1) the location of the planting/revegetation areas (to be coordinated with the City; (2) the species of oaks and other plant species to be planted within the protected zone of the oaks; (3) planting procedures; (4) a schedule and action plan to maintain the plantings; and (5) a list of criteria by which to measure success of the plantings, as well as contingency measures if the plantings are not successful.

d. Special-Status Wildlife

Mitigation measures to avoid take of state and federally listed Threatened and/or Endangered species have been identified in the NRMP EIS/EIR and in the Section 1603 Streambed Alteration Agreement issued by CDFG for the NRMP. A detailed program of mitigation measures is set forth in the NRMP Section 1603 Streambed Alteration Agreement and a blanket Section 7 Endangered Species Permit has been issued in conjunction with the NRMP. In addition, compliance with the California Endangered Species Act will occur, as applicable.

Mitigation measures included in the NRMP EIS/EIR and Section 1603 authorization include the following:

- Surveys and site inspections for the least Bell's vireo (vireo) and unarmored three-spine stickleback (UTS) by qualified biologists;
- Installation of blocking nets as specified by FWS for the UTS;
- Specific stream diversion practices utilizing qualified biologists for the UTS; and
- Limitations on construction activities during the nesting season near occupied habitat for the vireo.

~~Measures included in this EIR include:"~~

(1) Western Spadefoot Toad

4.6-9 Prior to the issuance of a grading permit for construction or site preparation activities, the applicant shall retain the services of a qualified biologist, approved by the California Department of Fish and Game, to coordinate the design and construction of spadefoot toad pool habitat and to implement a capture and relocation program.

4.6-10 Under the direct supervision of the qualified biologist, western spadefoot toad habitat shall be created within suitable natural sites on the project site outside of the development envelope. Preliminary surveys indicate that there may be suitable locations in Area C. The actual relocation site design and location shall be approved by CDFG and consist of a shallow excavated pond(s) utilizing an artificial rubber pond liner as a base. The location shall be as far away as possible from any of the homes and roads to be built and shall be at least the size of the largest occupied pond observed on the site in 2004. The relocation pond(s) shall be designed such that it only supports standing water for several weeks following seasonal rains in order that aquatic predators (i.e., fish, bullfrogs, crayfish, etc.) cannot become established. The size and number of

ponds shall be determined by CDFG. Terrestrial habitat surrounding the proposed relocation site shall be as similar in type, aspect, and density to the location of the existing ponds as possible. No site preparation or construction activities shall be permitted in the vicinity of the currently occupied ponds until the design and construction of the pool habitat in preserved areas of the site has been completed and the relocation of all western spadefoot toad adult, tadpoles, and egg masses detected are moved to the created pool habitat to the satisfaction of the monitoring biologist and CDFG.

4.6-11 Based on appropriate rainfall and temperatures, generally between the months of February and April, the biologist shall conduct a series of surveys in all appropriate habitats within the development envelope prior to the initiation of construction activities. Surveys will include evaluation of all previously documented occupied areas and a reconnaissance level survey of the remaining natural areas of the site. All western spadefoot adults, tadpoles, and egg masses encountered shall be collected and released in identified relocation pond(s) described above. All relocation shall take place within the Riverpark project boundaries, unless otherwise directed by CDFG.

4.6-12 The qualified biologist shall monitor the relocation site for a period of five years, or as otherwise directed by CDFG. Specific monitoring requirements and success criteria shall be approved by CDFG. It is expected that minimum requirements will include annual monitoring during and immediately following peak breeding season such that surveys can be conducted for adults as well as for egg masses, larval and post larval toads. Further, survey data will be provided to CDFG by the monitoring biologist following each monitoring period and a written report summarizing the monitoring results will be provided to CDFG at the end of the monitoring effort. Success criteria for the monitoring program shall include verifiable evidence of toad reproduction at the relocation site.

e. Increased Human and Domestic Animal Presence

4.6-~~9~~13 Pets and other domestic animals shall be prohibited with fencing and signage from the open space areas and in any revegetation areas on the project site unless restrained by leash and only in designated areas.

4.6-~~10~~14 Fencing of sufficient height and design (i.e., ranch-rail) shall be constructed between the edge of the fuel modification zone and the river corridor to deter humans and domestic animals from entering open space habitat areas.

4.6-~~11~~15 Native shrubs such as laurel sumac, California coffeeberry, toyon, and coast prickly-pear shall be planted along the fence to further deter access. Final fence design shall be approved by and the City Planning and Building Services Department.

4.6-~~12~~16 Human access into the open space areas shall only occur in designated locations (i.e., existing and future trails). All motorized vehicles are prohibited from entering the preserved natural open space areas with the exception of emergency or maintenance vehicles. Applicant shall post signage reflecting the above requirement.

4.6-~~13~~17 Prohibitions against human, domestic animal, and motorized vehicle use in preserved natural open space areas shall be established by the covenants conditions and restrictions (CC&Rs) recorded with the City Planning and Building Services Department.

4.6-~~14~~18 Interpretative signs shall be constructed and placed in appropriate areas, as determined by the City Planning and Building Services Department, that explain the sensitivity of natural habitats and the need to minimize impacts on these natural areas. The signs will state that they are entering a protected natural area and that all pedestrians must remain on designated trails, all pets are to be restrained on a leash, and that it is illegal to harm, remove, and/or collect native plants and animals. The project applicant shall be responsible for installation of interpretive signs and fencing.

f. Lighting and Glare

4.6-~~15~~19 All street, residential, and parking lot lighting shall be downcast luminaries or directional lighting with light patterns directed away from natural areas. Covenants, Codes and Restrictions (CC&Rs) shall require the exterior lighting within the residential area be limited to low voltage.

g. Construction-Related Activities

The following measures shall be implemented to minimize impacts on remaining biological resources on the site as a result of construction and grading activities and to ensure that potential impacts on these resources will remain less than significant.

4.6-~~16~~20 A qualified biologist shall be retained, as determined by the City of Santa Clarita, as a construction monitor to ensure that incidental construction impacts on biological resources are avoided, or minimized, and to conduct pre-grading field surveys for special-status plant and

wildlife species that may be destroyed as a result of construction and/or site preparation activities. Responsibilities of the construction monitor include the following:

- The construction monitor shall attend pre-grade meetings to ensure that timing/location of construction activities do not conflict with mitigation requirements (e.g., seasonal surveys for plants and wildlife).

- Mark/flag the construction area in the field with the contractor in accordance with the final approved grading plan. Haul roads and access roads shall only be sited within the grading areas analyzed in the project EIR.

- Supervise cordoning of preserved natural areas that lie outside grading areas identified in the project EIR (e.g., with temporary fence posts and colored rope).

- Conduct a field review of the staking (to be set by the surveyor) designating the limits of all construction activity. Any construction activity areas immediately adjacent to riparian areas or other special-status resources should be flagged or temporarily fenced by the monitor, at his/her discretion.

- Conduct meetings with the contractor and other key construction personnel describing the importance of restricting work to designated areas. The monitor should also discuss procedures for minimizing harm/harassment of wildlife encountered during construction.

- Periodically visit the site during construction to coordinate and monitor compliance with the above provisions.

4.6-~~17~~21 Construction personnel shall be prohibited from entry into areas outside the designated construction area, except for necessary construction related activities, such as surveying. All such construction activities shall be coordinated with the construction monitor.

4.6-~~18~~22 Standard dust control measures shall be implemented to reduce impacts on nearby plants and wildlife. This includes replacing ground cover in disturbed areas as quickly as possible; water active sites at least twice daily; suspend all excavating and grading operations when wind speeds (as instantaneous gusts) exceed 25 mph; and restricting traffic speeds on all unpaved roads to 15 mph or less in areas within 200 feet of vegetation.

4.6-~~19~~23 Upon completion of construction, the contractor shall be held responsible to restore any haul roads and access roads that are outside of approved grading limits. This restoration shall be done in consultation with the construction monitor.

In addition, impacts to biological resources as a result of construction and grading activities will be mitigated by implementation of NRMP measures w) through uu) above.

g. Level of Significance After Mitigation

All impacts that are associated with the implementation of this proposed project can be mitigated to a level less than significant except the following:

- The total net loss of 280 acres of wildlife habitat/natural open space as a result of conversion of undeveloped property to developed. Though over 400 acres of the site will remain as open space and some of the habitat can be restored and enhanced within remaining open space areas of the site, there will still be a net loss of habitat for wildlife and open space that cannot be replaced. In effect, while habitat types similar to that impacted can be preserved, planted and/or restored elsewhere, no measures are available that will mitigate a mathematical net loss of 280 acres of open space land as a result of conversion of this land to a developed condition. This net loss represents a significant unavoidable impact.

- Impacts to SEA and associated riverine habitat (as identified by the resource line) and riverbed. While riparian vegetation can be planted and enhanced along preserved portions of the river, there will still be a net loss of 25.5 acres of SEA and associated riparian habitat and riverbed that ultimately cannot be replaced. In effect, while habitat types similar to that impacted can be preserved, planted and/or restored elsewhere, no measures are available that will mitigate a mathematical net loss of 25.5 acres of open space land as a result of conversion of this land to a developed condition. This net loss represents a significant unavoidable impact.

- Impacts to adjacent upland habitat within 100 feet of the riparian resource line. While the 100-foot setback threshold will be upheld in several areas along the river, this threshold will not be met along substantial portions of the project. Those portions of the project site that provide less than 100 feet of preserve upland habitat adjacent to the resource line represent a significant unavoidable impact.

- Impacts to western spadefoot toad. While mitigation measures can be implemented to create habitat and relocate individuals observed on the project site, these measure are not considered highly effective. It is expected that not all individual toads would be captured and relocated and that the created habitat might not meet the specific requirements for this species, thus, not supporting the relocated individuals. The loss of those individuals that are not captured and relocated, and those that are not adaptable to the created habitat, would be considered a significant and unavoidable impact.

8. CUMULATIVE IMPACTS

The proposed project would contribute to the projected urban development in the region. Increasing urbanization of the area will impact biological resources by reducing total habitat area, limiting species diversity, and restricting movement corridors to narrower areas. However, as noted in the assessment of

project impacts, this project preserves portions of the riparian habitat which is most significant to biological resources and, by removing land from agricultural uses and providing for revegetation of some such areas, may enhance the habitat in some ways over its existing condition when such revegetation occurs.

This cumulative impact analysis is divided into two parts, the first part being the assessment of the proposed project's impact in combination with the impacts generated by the City's construction of Santa Clarita Parkway through the project site, including the construction of an additional bridge across the Santa Clara River. The second part of the cumulative analysis addresses the cumulative impacts of the proposed project in combination with several other projects proposed or under construction in the Santa Clarita Valley.

a. Cumulative Impacts of the Proposed Project Including the Extension of Santa Clarita Parkway to Soledad Canyon Road

As proposed by the City of Santa Clarita General Plan, a future extension of Santa Clarita Parkway from the terminus in the project to Soledad Canyon Road, including a bridge over the Santa Clara River will be constructed. This cumulative project is not proposed as part of the Riverpark project, but it would traverse portions of the project site. For this reason, the construction of Santa Clarita Parkway is evaluated separately from other cumulative projects. The impact of the proposed project on biological habitats, inclusive of the bridge, is provided below on **Table 4.6-4**.

As shown in **Table 4.6-4**, the construction of the Santa Clarita Parkway extension from the terminus within the project site southerly to Soledad Canyon Road (including the bridge over the Santa Clara River) would result in additional impacts to 4.6 acres of existing habitat, some of which is considered sensitive. Impacts directly related to the parkway extension would occur primarily to disked fields (1.4 acres), southern riparian scrub (1.~~5~~ 1 acres) and riverwash (1.~~7~~ 3 acres) habitat types. This area would be converted to roadway and bridge land uses. Given the sensitivity of the habitats affected, such impacts would be considered cumulatively significant when combined with the impacts of the proposed project. Given the similarity of habitat of this area when compared with the project site, impacts to sensitive species would be similar in magnitude. In some cases depending on the species in question, the impacts could be significant.

Table 4.6-4
Riverpark Habitat Acreages and Impacts of the Project Plus Santa Clarita Parkway Bridge to Soledad Canyon Road

Vegetation Type	Vegetation Map ID	Existing Proposed Project Area Including Areas of Off-Site Grading (in acres)	Proposed Project Temporary Impact Area (in acres) and % of Total		Proposed Project Permanent Impact Area (in acres) and % of Total		Temporary Impact of Santa Clarita Parkway	Permanent Impact of Santa Clarita Parkway	Impact of the Proposed Project plus Santa Clarita Parkway	Area Disturbed by Off-Site Grading (in acres)	Undisturbed Area w/in Project[1] (in acres)
Disked Field	DF	92	1.3	1.4%	83.5	90.8%		1.4	86.2	0	7.2
Non-native Grassland and Non-native Grassland with Scattered Shrubs	NNG and NNGW/SHRUBS	80	11.6	14.5%	52.7	65.9%			64.3	18.9	15.7
Planted Sage Scrub	PS	37.0	1.1	3.0%	22.8	61.6%			23.9		13.1
Riversidian Sage Scrub	RSS	143.4	10.1	7.0%	95.5	66.6%			105.6	2.3	37.8
Chamise Chaparral	CHC	2.2	0.1	4.5%	1.9	86.4%			2		0.2
Coastal Sage Chaparral Scrub	SCS	8.6	0.7	8.1%	3.9	45.3%			4.6		4
Holly-leafed Cherry	HLCS	12.9	8.3	64.3%	2.9	22.5%			11.2	7.6	1.7
Mule Fat Scrub	MFS	1.2		0.0%	1.1	91.7%			1.1		0.1
Southern Willow Scrub	SWS	1.9	0.1	5.3%	1.4	73.7%			1.5		0.4
Southern Riparian Scrub	SRS	161.4	7.4	4.6%	21.4	13.3%	0.4	1.1	30.3	0.3	132.6
Riverwash	RW	176.2	10.3	5.8%	2.9	1.6%	0.4	1.3	14.9	2.9	163
Mixed Oak/Grass	MOW	2.3	0.1	4.3%	0.4	17.4%			0.5		1.8
Developed Area with Mixed Trees	MT	8.3	1.9	22.9%	4	48.2%			5.9		2.4
TOTALS		**727.4**	**53.0**	**7%**	**294.4**	**40%**	**0.8**	**3.8**	**352.0**	**32.0**	**380**

[1] *Assumes the future extension of Santa Clarita Parkway as undisturbed.*

(1) Impacts to Special-Status Plants and Animals

Impacts to sensitive animals would be similar to the impacts created by the proposed project. Species potentially directly impacted by Santa Clarita Parkway include the riparian species such as the unarmored three-spine stickleback, least Bell's vireo, and Santa Ana sucker, and upland species such as San Diego horned lizard, California horned lizard, Cooper's hawk, California horned lark and San Diego black-tailed jackrabbit. Given the similarity of habitat of this area when compared with the proposed project site, impacts to sensitive species would be proportionally similar in magnitude. In some cases depending on the species in question, the impacts could be significant.

The construction of the Santa Clarita Parkway Bridge and roadway would also impact oak resources. Specifically, two Valley oak trees would be impacted (one removed and one encroached upon), one of which is a Heritage oak tree. Such a cumulative impact would be considered significant.

(2) Impacts to Jurisdictional Resources

Construction of the Santa Clarita Parkway Bridge and roadway would impact resources under the jurisdiction of the ACOE and CDFG. Specifically, impacts to 0.1 acre of land under ACOE jurisdiction would occur and impacts to 0.1 acre of land under CDFG jurisdiction would occur. Such impacts would be considered significant.

(3) Impacts to Wildlife Movement

As indicated in the impact analysis of the proposed project, the proposed project design would generally preserve the integrity of the Santa Clara River as a wildlife movement corridor by maintaining the majority of the Santa Clara River as open space. It is acknowledged that some wildlife species also utilize adjacent upland habitats as foraging areas during periods of active movement, particularly during periods of high water flows. The project plan will preserve and restore various amounts of upland habitat adjacent to the river system that will allow some species, especially the larger mammals such as mountain lion, coyote, bobcat, and fox, to use these adjacent upland areas as movement corridors.

Like the proposed project this additional cumulative project would result in the construction of another bridge across the river. The Santa Clarita Parkway Bridge is proposed to be approximately 800 feet in length and up to 116 feet in width. It will average approximately 20 feet in height above the riverbed with up to 9 vertical support columns extending into the riverbed. The columns will be approximately 100 to 120 feet apart from one another. As indicated for the proposed project, when confronted with bridges or overpasses along a preferred movement corridor, wildlife, particularly larger mammals, will move under these structures as long as there is adequate vertical and horizontal spacing, a natural (dirt, sand, vegetation) substrate on which to travel while under the structure, and an openness effect that allows the animal to see light, open space and habitat at the exiting end of the structure. The proposed Santa Clarita Parkway Bridge will, like the proposed project, adequately meet these requirements and is not expected to significantly alter wildlife movement along the river. Consequently, implementation of the proposed project, in combination with the Santa Clarita Parkway Bridge, will not substantially interfere with the movement of any terrestrial wildlife species; therefore no significant impacts on terrestrial wildlife movement corridors will occur.

(4) Indirect Impacts

Indirect impacts on biological resources would occur to those habitat areas surrounding the Santa Clarita Parkway Bridge site after its completion. Like the proposed project, it is expected that implementation of this cumulative project would result in indirect impacts to biological resources through:

- an increased human and domestic animal presence in the area and noise associated with this presence;
- increasing distribution and proliferation of exotic non-native plant and wildlife species;
- increased light and glare;
- stormwater runoff; and
- construction activities.

Indirect impacts associated with this cumulative project are not quantifiable but are reasonably foreseeable. Such impacts would come primarily through an increase in vehicular traffic across the bridge route itself and the increase light and glare cause by its use. Stormwater runoff from the bridge and roadway would also occur. Various pollutants related to vehicular traffic (e.g., rubber from tires, hydrocarbons from engine exhaust, etc.) would be expected to wash off the road surface into the river and degrade habitat if left unmitigated. Construction activities themselves would also be expected to temporarily and permanently impact habitat along the river corridor. As with the proposed project alone, impacts cause by this cumulative project would, in combination with the proposed project, result in significant indirect biological impacts.

(5) Impacts to SEA 23

A total of 2.8 acres of habitat within Santa Clara River SEA will be disturbed or converted to urban use as a result of Santa Clarita Parkway Bridge construction. Approximately 0.5 acre will be temporarily disturbed as a result of proposed bank stabilization activities and will be replaced upon completion of the bank stabilization to protect the bridge structure. Within the SEA boundaries, a total of 1.5 acres of riverwash, 0.2 acre of southern riparian scrub, and 0.5 acres of disked field representing a total of 2.2 acres of SEA habitat will be permanently lost as a result of this cumulative project. The locations of these impacts are generally along the northern and southern bank of the Santa Clara in the central portion of the project site. Impacts to riparian habitat within the SEA as a result of project construction, grading activities, bank stabilization and bridge maintenance activities, are the same as those discussed previously.

Because of the relatively small amount of each habitat type within the SEA to be removed, like with the proposed project, the permanent loss of an additional 2.2 acres of habitat within the SEA boundaries is not expected to detract from the overall integrity and value of the SEA, in and of itself. In particular, this loss of area will not adversely affect the unarmored three-spine stickleback, the state and federally listed Endangered fish species for which the SEA was originally designed to protect. However, because of the overall sensitivity of SEAs, and because any permanent loss of habitat within a SEA will effectively reduce the overall size of the SEA, any net loss of land within a SEA is considered a significant impact. Therefore, the permanent loss of an additional 2.2 acres of SEA habitat is considered a significant cumulative impact.

b. Cumulative Impacts of the Proposed Project Plus Other Larger Projects

Proposed and reasonably foreseeable projects are briefly described below. Where the potential impacts are known, the impacts likely to be associated with these projects are first identified. The potential for these impacts to combine with similar impacts due to the proposed project is also evaluated. This list of projects is not intended to include all projects that are proposed in the Santa Clarita Valley. Instead, the analysis focuses on those projects that support or would potentially affect similar plant communities, jurisdictional resources, and special-status plant and animal species that occur on the Riverpark site within the Santa Clarita Valley. In particular, those projects that are adjacent to or that otherwise may affect resources associated with the Santa Clara River were included.

(1) Cross Valley Connector (Newhall Ranch Road including the Newhall Ranch Road/Golden Valley Road Bridge)

This project would involve the extension of Newhall Ranch Road, including the Newhall Ranch Road/Golden Valley Road Bridge. Newhall Ranch Road would be extended by approximately 2.0 miles to the east of Bouquet Canyon Road including a bridge over the Santa Clara River connecting with Golden Valley Road. The proposed typical section of the alignment would include a six-lane roadway of approximately 120 feet in width, with a 14-foot median island and pedestrian and bicycle lanes. The proposed Golden Valley Road segment would require the construction of a bridge across the Santa Clara River and would traverse undeveloped open space (e.g., vacant lot, natural riverbed, scrub habitat) parallel to an overhead power line corridor. The proposed roadway is included as Major Arterial Highways in the City's General Plan.

(2) Tesoro del Valle (Upper San Francisquito Creek)

The approved project presently under construction is a master planned community of about 2,500 units on a 1,795-acre site on the west side of San Francisquito Creek. The development would include single- and multi-unit residences, commercial sites, schools, parks, and a fire station. About 1,002 acres of the site would remain in open space, and about 672 acres would remain in a natural undeveloped condition. The project required a General Plan Amendment from Los Angeles County, a Conditional Use Permit, and other local approvals. The project requires substantial grading of hills and the removal of upland habitats and numerous oak trees. The project encroaches into San Francisquito Creek at two locations. About 3.5 acres of the creek will be filled for slopes and a bridge crossing. The lower slopes will contain rip-rap bank protection. Runoff from the project will be directed to water quality basins where aquatic vegetation will be maintained to uptake urban stormwater pollutants before the stormwater is discharged into the creek.

Development of the Tesoro del Valle and the projects along San Francisquito Creek associated with the approved Valencia Company 404 Permit could combine to cause the following potentially significant cumulative impacts: (1) loss of riparian habitat along the margins of the creek; (2) disturbance of riparian wildlife breeding, foraging, and movement due to the proximity of urban development and short-term construction activities; (3) potential degradation of water quality in San Francisquito Creek due to urban stormwater runoff; (4) localized alteration in channel velocities in areas where the existing channel is narrowed; (5) loss of native upland habitats due to land development; (6) permanent loss of prime farmlands; (7) modification of visual qualities due to urban development, bank protection, and bridges; and (8) potential disturbance to habitat for the unarmored three-spine stickleback.

(3) Newhall Ranch Specific Plan

The recently approved Newhall Ranch Specific Plan, approximately 12,000 acres in size and located several miles west of the project site generally between Interstate 5 and the Los Angeles/Ventura County line, has a high diversity of biological resources, including sensitive species and habitats. In addition, portions of the Specific Plan area are important wildlife corridors and habitat linkages between large contiguous blocks of open area. These include the Santa Clara river corridor and the area located in the southern portion of the parcel in the Santa Susana Mountains (referred to as the High Country Special Management Area on the Specific Plan site). Both of these areas have been identified and designated as Significant Ecological Areas by Los Angeles County and have been preserved as such by the Specific Plan, although modified as described herein.

The Newhall Ranch Specific Plan area contains habitat of varying 'conservation value' quality. Studies of the site were used to identify those areas with higher value in terms of conservation biology, and to develop a plan to manage habitats present to minimize impacts to the most sensitive biological resources.

The Newhall Ranch Specific Plan applicant, also The Newhall Land and Farming Company, proposes to preserve as undeveloped land a total of approximately 6,831 acres (or 57 percent of the site); however, portions of development of the Newhall Ranch Specific Plan would occur in some sensitive upland and riparian habitats. Buildout of the Newhall Ranch Specific Plan would result in the construction of approximately 21,000 new homes and several million square feet of supporting commercial and industrial development. Due to the conversion of approximately 5,132 acres of habitat that are in a largely natural condition to a suburban and urban condition, implementation of the Newhall Ranch Specific Plan would substantially diminish habitat for wildlife and plants. Implementation of the Newhall Ranch Specific Plan would also significantly impact sensitive wildlife species, significantly impact the ability of animals to move across portions of the site, and significantly impact several sensitive upland habitat types. All of these are considered unavoidable significant impacts that cannot be fully mitigated.

As indicated in this subsection, several large development projects are proposed for the Los Angeles/Ventura County region. All of these proposed developments would remove natural habitat. The Newhall Ranch Specific Plan will convert approximately 5,132 acres of land from a largely natural, albeit partially disturbed, habitat condition, to that of a suburban/urban environment. That conversion, when added to all the other such conversions of open area that are proposed, will permanently decrease the amount of land available for natural habitats and the flora and fauna that inhabit them. Neither implementation of the project nor any other similar large scale project proposed on the edge of the existing urban environment cannot mitigate from a biological perspective the permanent conversion of large blocks of open area. It is for this reason that the cumulative impact is considered unavoidably significant.

(4) West Creek Project

The proposed West Creek project is located on the west side of San Francisquito Creek, north of Newhall Ranch Road and south of the Copperhill Road Bridge. The proposed project consists of a maximum total of 2,545 residential units, along with a total of 180,000 square feet of neighborhood serving commercial uses, an elementary school and other related development. Circulation will be provided by a series of internal collector roadways that connect to the previously approved extension of Copper Hill Drive, a public street that represents the primary roadway providing ingress and egress to the site. Private recreational facilities will be provided in the central portion of the project site and a network of hiking/biking trails will extend both throughout the project site and along San Francisquito Creek. Buried bank stabilization has been installed along the west side of San Francisquito Creek and the Decoro

Drive Bridge over the creek has been completed. The project site lies partially within Significant Ecological Area 19.

Development of the West Creek project and the other projects along San Francisquito Creek could combine to cause the following potentially significant cumulative impacts: (1) loss of riparian habitat along the margins of the creek; (2) disturbance of riparian wildlife breeding, foraging, and movement due to the proximity of urban development and short-term construction activities; (3) potential degradation of water quality in San Francisquito Creek due to urban stormwater runoff; (4) localized alteration in channel velocities in areas where the existing channel is narrowed; (5) loss of native upland habitats due to land development; (6) permanent loss of prime farmlands; (7) modification of visual qualities due to urban development, bank protection, and bridges; and (8) potential disturbance to habitat for the unarmored three-spine stickleback.

(5) Gate King Project

The applicant is proposing to subdivide a 584-acre site into 60 lots and is requesting General Plan Amendments to change the land use designations in several areas of the site. The site is situated in the southern portion of Santa Clarita, within the community of Newhall. The proposal involves amending the land use designation on about 223 acres, or about 38 percent of the site. The proposed changes would eliminate the residential (RE) and commercial (CC) designations from the site, and would increase the area designated IC from 337.5 acres to about 344 acres. The area designated open space (OS) would increase from 93.2 acres to about 240 acres. The project site includes an estimated 10,680 live oaks and an additional 1,041 oaks that are either dead or have experienced severe fire damage. The proposed development would directly remove 1,000 oaks, or about 9 percent of the total number of oaks on site. Oaks to be removed include 696 coast live oaks and 304 scrub oaks. The 696 coast live oaks to be directly removed do not include 64 trees that were previously removed without City oak tree removal permits. In addition to the oaks that would be directly removed by grading, 336 oaks, or about 3 percent of the site total, could be indirectly affected by site grading and development because of their proximity to areas proposed for grading.

(6) Transit Mix Soledad Canyon Mine

Transit Mix, Inc. has proposed a new aggregate mine for a hillside at the entrance to Soledad Canyon. The surface mine would encompass about 300 acres on mostly private land. A joint EIR/EIS was prepared by the Bureau of Land Management and Los Angeles County Department of Regional Planning. The project would result in significant impacts to upland habitats.

Use of groundwater at the mine site could affect the amount of surface water at the mouth of Soledad Canyon where a population of the unarmored three-spine stickleback is present. A long-term significant impact to this species is not anticipated because the applicant has agreed to a continuous water quality and depth-monitoring program designed to detect and prevent any adverse impacts from groundwater pumping.

(7) Valencia Commerce Center

This project consists of a light industrial and commercial development over 1,500 acres on undeveloped farmlands north of State Route 126, west of Interstate 5, and immediately east and downslope of the Regional Post office. Castaic Creek traverses the site. A 404 Permit was issued for this project by the ACOE to line the existing banks with gunite bank protection. Castaic Creek contains dense riparian woodland and supports the least Bell's vireo and arroyo toad. As such, construction of the Valencia Commerce Center and the development projects associated with the proposed Valencia Company 404 Permit could cause the following potentially significant cumulative impacts: (1) loss of riparian habitat from the study area; (2) disturbance of riparian wildlife due to the proximity of urban development; (3) potential degradation of water quality in the Santa Clara River due to urban stormwater runoff; (4) permanent loss of prime farmlands; (5) temporary and permanent disturbance to habitat for the least Bell's vireo; and (6) modification of visual qualities due to urban development, bank protection, and bridges.

(8) Castaic Junction Project

The 114.2 gross-acre project site is located within unincorporated Los Angeles County in the Santa Clarita Valley. The irregularly-shaped parcel is immediately south of the intersection of Henry Mayo Road and The Old Road. North of this intersection is the I-5/SR-126 interchange. The southern project boundary is defined by the Santa Clara River. The project applicant proposes to subdivide the parcel into 27 lots and to develop them with 1,377,200 square feet of light industrial building area (lots 1, 8-17, 19, 20, and 24-27), 446,600 square feet of office space (lots 2-7), and 55,700 square feet of retail space (lots 18, and 21- 23), totally 1,879,500 square feet. Under the proposed zoning of M 1-1/2 (Restricted Heavy Manufacturing), the site could be developed with any use with the exception of those listed in Section 22.32.100 of the Planning and Zoning Code, and as permitted under Section 22.32.110 et seq. of the Code; however, it is the intent of the project applicant to develop the site with light industrial, warehouse, office, and retail uses.

The Holser Fault traverses the western portion of the site. The site is within the 100-year floodplain of the Santa Clara River and a portion of it is within Significant Ecological Area (SEA) 23, which includes the Santa Clara River and the habitat for the protected unarmored three-spine stickleback.

(9) Castaic Lake Water Agency Reclaimed Water Master Plan

Castaic Lake Water Agency (CLWA) has prepared a Reclaimed Water Master Plan as part of their plan to increase the amount and reliability of the overall water supply. The project would use effluent from County Sanitation Districts of Los Angeles' two local wastewater treatment plants (Saugus and Valencia). Treated wastewater would be diverted from discharge to the river and instead, conveyed by pipelines to customers of reclaimed water such as golf courses, landscaped areas, and certain industrial uses. At this time, CLWA has approval from the Regional Board and Sanitation Districts to reclaim up to 1,700 acre-feet per year. The Master Plan indicates that up to 10,000 acre-feet per year may be feasibly reclaimed and used in the study area in the next 10 years.

Diverting effluent from the river could reduce surface flows, groundwater recharge, and habitat for the unarmored three-spine stickleback. The significance of this impact is unknown pending further environmental studies. However, it is likely that diversion from the river will only offset the past, present, and future increases in imported water use in the region that result in steadily increasing discharges of treated wastewater into the river. Hence, the effects on surface water, groundwater, and aquatic habitat may be negligible. To the extent that this conclusion is supported by future studies, no significant cumulative impact is anticipated with the proposed project.

(10) Los Angeles County Sanitation Districts' Facilities Plan

The Districts operate two wastewater treatment plants in the study area, the Saugus Plant and the Valencia Plant, which discharge about 16 million gallons a day of tertiary treated water into the Santa Clara River where it supports riparian vegetation and the unarmored three-spine stickleback. The Districts issued a Notice of Preparation in August 1996 for a Facilities Plan EIR. The plan will address the overall wastewater conveyance, treatment, and disposal needs of the Districts through the year 2015. The plan is expected to include specific facility improvements such as new and enlarged pipelines, plant expansion, modified operations, new treatment methods, and physical improvements to the two plants. The plan could be considered growth inducing, instead of a reaction to proposed development. The plan will not specifically address reclaimed water projects. The plan is being prepared due to the increasing amount of wastewater being produced in the region as the urban population increases.

The proposed facilities plan is not expected to result in any significant impacts beyond localized and temporary impacts due to physical improvements to the systems. Hence, the potential for significant cumulative impacts with the proposed project is considered very low.

(11) North Valencia II Specific Plan

This approved project entails the annexation of 596.2 acres of land and the entitlement to develop the undeveloped portion of the annexation area (391.2 acres). Approximately 205 acres of this area is already developed with commercial and industrial uses. The remaining portions of the Newhall Ranch Specific Plan area are presently under development. The project approvals allow the developer to construct 1,900 dwelling units (1,400 single-family detached, 500 multi-family attached), 210,000 square feet of commercial/retail uses, a 15.9-acre community park, 20-acre school site, 4.1 acres of private neighborhood parks, 93.4 acres of natural open space and over 9 miles of trails and paseos. The 596.2-acre project includes approximately 391.2 acres of Specific Plan area and 205 acres of existing industrial and commercial development in the Valencia Industrial Center. The Significant Ecological Area in the project area is the San Francisquito Creek. The General Plan states that, "…[t]his area was designated as an SEA primarily because of the threat of loss of suitable habitat for the unarmored three-spine stickleback (*Gasterosteus aculeatus williamsoni)*, a federally and state listed endangered species."

The project is a diverse and balanced mix of land uses ranging from commercial retail to high density multi-family and low to medium density single-family residential uses. These uses provide land uses which support the local vicinity and region (e.g., new housing would be provided to support existing and new employment opportunities expected to occur in the Santa Clarita Valley); commercial land uses which provide services for new residents; neighborhood parks and a school site to provide local recreational and educational support for new and existing residents. The trail system will serve the recreational needs of both a local and regional area. The creek area on the site is devoted to conservation (approximately 93.4 acres of the 596.2-acre site). This area, termed the San Francisquito Creek Conservation Area, is intended to respond to the City's desire to maintain the creek and SEA as an area devoted to the protection and preservation of important biological resources. Nevertheless, impacts on riparian resources and the riparian ecosystem and impacts on SEA 19 are considered cumulatively significant. Also, human and domestic animal use of riparian and upland habitat areas is expected to continue to occur as a result of project implementation and; therefore, will remain cumulatively significant.

(12) Curtis Sand and Gravel Mine Expansion

The Curtis Sand and Gravel Mine occur near Lang, about 10 miles upstream of the study area. It encompasses about 185 acres and about 1.5 miles of the Santa Clara River. Sand and gravel have been extracted from uplands and the riverbed for many decades. The ACOE is currently evaluating a 404 Permit application to continue skimming riverbed sediments at the mine site, at an average annual rate of about 200,000 tons. Mining will remove riparian vegetation in the riverbed. Hydrologic studies by the applicant have indicated that no adverse hydrologic impacts would occur downstream of the mine site.

Proposed mining operations could cause localized impacts to hydrologic conditions, water quality, and riparian habitat. However, no cumulative impacts with the proposed 404 Permit are anticipated due to the great distance between the two projects. Nevertheless, from a regional viewpoint, both projects would contribute to the reduction in riparian habitats along the river.

(13) Santa Clara River Enhancement and Management Plan

In 1994, a multi-agency committee formally initiated the Santa Clara River Enhancement and Management Plan. The committee consists of various parties and "stakeholders" along the river, including federal, state, and local agencies; water districts; farmers; property owners; and environmental organizations. The plan is designed to provide information on the land use, governmental, and resource conflicts along the river and its 500-year floodplain, extending from near Acton to the Pacific Ocean. The plan may eventually contain guidelines and approaches to resolving such conflicts that would be presented to the decision-making bodies of the counties and municipalities along the river for consideration. The overall objective of the plan is to resolve such conflicts in order to streamline permitting, reduce regulatory burdens, provide an overall resource management data base and analytic framework and resolve traditional conflicts between land use and resource protection.

(14) North Valencia Specific Plan No. I (Industrial Park)

While a majority of the North Valencia Specific Plan is already constructed, a relatively small portion remains to be built. The remaining portion of the project would result in the construction of 167,000 square feet of industrial/business park on 7.7 acres. The Business Park designation is intended for industrial type uses per the North Valencia No. I Annexation Specific Plan. These uses will allow general industrial, research and development, limited retail/commercial, warehousing and office use related to these uses. Primary access to the site is through Avenue Tibbitts, Anza Drive, and Avenue Hopkins.

(15) Bouquet Canyon Bridge Widening

This project would result in the widening of the Bouquet Canyon Road Bridge over the Santa Clara River to eight lanes, which would add one lane in each direction. The project consists of design and construction of roadway improvements, including the median, the relocation of a 36-inch effluent line on the south side of the bridge, the relocation of three sewer siphons on the east side of the bridge, a bike lane undercrossing on the north end of the bridge and a bike ramp from the bridge to the bike lane undercrossing on the north end of the bridge. Impacts associated with the project include hydrological and biological impacts associated with construction activities.

(16) Fair Oaks Ranch

The Fair Oaks project (Tentative Tract Map 52833) involves the construction of 1,033 residential units on 602 acres just outside the eastern boundary of the City of Santa Clarita. Phase II of the Fair Oaks Ranch development involves the construction of 738 single-family homes, 336 multi-family dwellings, 153 luxury apartments, a 6-acre public park, and dedication of 321 acres of open space just outside the eastern boundary of the City of Santa Clarita. Traffic/transportation, air quality and biological resource impacts could occur with project implementation.

(17) Tick Canyon

This project is proposed to occur at the northern terminus of Shadow Pines Boulevard, outside of the present City limits. It is proposed to consist of 492 single-family units and a 34-acre park site on 500 acres. Traffic/transportation, geological, air quality and biological resource impacts could occur with project implementation.

(18) Bee Canyon

The Bee Canyon project is proposed on a 211-acre parcel of land located between the Transit Mix project indicated above and State Route 14, easterly of Soledad Canyon Road. The applicant is requesting 556 single-family modular units, and the project would require the lengthy extension of public utilities. Traffic/transportation, geological, air quality and biological resource impacts could occur with project implementation.

(19) Tract 42670

This project consists of a mixed commercial/industrial project to be located along Golden Valley Road in the center of the City of Santa Clarita. The 220-acre site would be developed with up to six million square feet of buildings. This project has been approved by the City and under construction. Transportation/access and air quality are potential impacts associated with the project.

(20) Synergy Project

This project is proposed in the City of Santa Clarita and is located at terminus of Ermine Road, adjacent to the site. The project site is 208 acres in size and the project would consist of 916 multi-family and 95 single-family dwelling units. Hydrology, transportation/access, biological resources, water quality, and air quality are expected to be potentially significant impacts.

(21) Whittaker – Bermite (Old Porta Bella Project)

Specific Plan No. 91-001, proposes a comprehensive plan for development of a 996-acre site with approximately 1,678 single-family homes and 1,560 multi-family units on 399 acres. Approximately 91 acres is planned for commercial and industrial uses, 14 acres for institutional uses, and 58 acres consisting of streets. The remaining 434 acres would be devoted to natural open space and recreational uses. Traffic/transportation, geological, air quality and biological resource impacts could occur with project implementation.

b. Summary of Project-Related Cumulative Impacts

The above analysis indicates that potentially significant cumulative impacts could occur to various environmental biological resources due to the combined impacts of the proposed project and following nearby projects: Santa Clarita Parkway extension, Tesoro del Valle, Newhall Ranch Specific Plan, West Creek, North Valencia II Specific Plan, Valencia Commerce Center, and Curtis Sand and Gravel Mine Expansion. These resources include upland habitats such as coastal sage scrub, oak trees, riparian habitat associated with Santa Clara River, wildlife movement corridors, special-status species (including unarmored three-spine stickleback, western spadefoot toad, and arroyo toad), resources within SEA 23, and increased use of sensitive riparian resources by human and domestic animals. Potentially significant cumulative impacts include loss of riparian habitat, disturbance of riparian wildlife habitat due to nearby urban development, and effects on habitat for the unarmored three-spine stickleback, least Bell's vireo, western spadefoot toad, and the arroyo toad, when present. While most of these projects include the

implementation of measures that will mitigate specific biological impacts, most will still result in a net loss of biological resources, particularly natural habitat areas.

Because of the high biological value of riparian and wetland habitats and because of the continued loss of these habitats throughout the region, the proposed Riverpark project's contribution to this loss, although relatively small, is considered a significant cumulative impact, both to the vegetation community itself, as well as to its value to the riparian ecosystem. Because of the time it takes for oak trees to reach maturity and contribute biological values equal to that currently occurring on the site, and due to continued loss of these trees in the region, the project's contribution to this loss is considered a significant cumulative impact without mitigation. Continued development in the area also cumulatively contributes to the increase of humans and domestic animals. Because of the substantial amount of disturbance to sensitive resource areas posed by this increase, the project's contribution to this increase is also considered cumulatively significant. Although the proposed project minimizes impacts to the biological resources within the SEA, the net loss of habitat within the SEA, combined with net losses of SEA habitats from other projects, effectively reduces the overall size of the SEA and is considered a significant cumulative impact.

When the potential cumulative effects of the above mentioned projects are viewed from a regional wildlife movement perspective, the major movement corridors between the Santa Clara River Valley and the Santa Susana Mountains and Los Padres/Angeles National Forest lands would still be preserved. Therefore, no significant cumulative impacts would occur with respect to regional wildlife movement.

The project would result in unavoidable significant impact to the net loss of wildlife habitat/natural open space; loss of SEA and associated riparian habitat and riverbed and impacts to adjacent upland habitat within 100 feet of the riparian source line. All other impacts (e.g., oak trees) will be mitigated to less than significant.

9. CUMULATIVE MITIGATON MEASURES

Some of these impacts on biological resources may be mitigated to levels of insignificance as individual projects are conditioned during the local land use permitting process. The proposed project would similarly mitigate impacts to some of these resources to less than significant levels. In addition, the City can impose various mitigation measures within its jurisdiction related to cumulative impacts on biology. It can require that developments in the city provide similar protections for biological resources as are set forth for this project, including setbacks or "buffer" zones between development and riparian habitat as determined by site-specific assessments of those areas, revegetation, habitat enhancements, and physical

improvements to minimize the likelihood of human and animal intrusion. Absent site-specific studies of these areas in the context of the development actually proposed, it cannot be determined whether these mitigation measures will be as effective in reducing adverse impacts in other projects as they are expected to be for the proposed project.

For developments which may occur outside the City's boundaries, which at present is the vast majority of expected buildout, mitigation measures will be under the control of the County, the ACOE, CDFG, and other agencies.

Because of the high biological value of riparian and wetland habitats and because of the continued loss of these habitats throughout the region, and because the high biological value of these areas after planting and restoration will likely not be realized for some time and never be truly replicated, impacts on riparian resources cannot be mitigated. Because the net loss of SEA habitat can't be replaced, impacts remain significant. In addition, because it is unknown whether measures to mitigate increased human and domestic animal impacts, biological resources can feasibly reduce these impacts, and because human and domestic animal use of riparian and upland habitat areas is expected to continue to occur as a result of project implementation, this impact will remain cumulatively significant.

10. UNAVOIDABLE SIGNIFICANT IMPACTS

a. Project

The project would result in unavoidable significant impacts to individual western spadefoot toads; the net loss of wildlife habitat/natural open space; loss of SEA and associated riparian habitat and riverbed and impact to adjacent upland habitat within 100 feet of the riparian resource line.

b. Cumulative

Significant cumulative impacts that remain unavoidably significant like the proposed project, include the net loss of wildlife habitat/natural open space, loss of SEA and associated riparian habitat and riverbed and impacts to adjacent upland habitat within 100 feet of the riparian resource line, because it can be expected that proponents of other projects will similarly not be able to mitigate projects.

APPENDIX 4.6

Biological Data and Reports

compliance·biology

March 15, 2004

Mr. Glenn Adamick
Newhall Land
23823 Valencia Boulevard
Valencia, CA 91355

Subject: Results of Focused Western Spadefoot Toad Surveys on the Riverpark Project Site

Dear Mr. Adamick,

The purpose of this letter report is to provide you with the results of updated biological data collected on the approximately 695-acre Riverpark project site located in the City of Santa Clarita, Los Angeles County, California. Based on information provided by California Department of Fish and Game (CDFG) personnel and local citizens, Newhall Land requested that Compliance Biology conduct an additional survey with the specific focus of determining presence or absence of the western spadefoot (*Spea* [Scaphiopus] *hammondii*).

BACKGROUND

General reptile and amphibian surveys were conducted on the Riverpark project site in spring of 2002 in association with the preparation of an Environmental Impact Report (EIR) for the proposed project. As is typical with large scale biological evaluations, surveys were timed in mid-spring such that the greatest diversity of amphibian and reptile species could be detected. Several days were spent surveying the site and recording numerous reptile and amphibian species. At the time of these initial surveys, there were no indications of seasonal rainpools that would suggest the presence of western spadefoot. However, western spadefoot toad was still included in the table of special-status species with a potential to occur in the project area.

In spring 2003, following local citizens' claims of hearing spadefoot toad calls at a rainpool located immediately inside and north of the security gate at the current terminus of Newhall Road, two additional focused surveys for the species were conducted. These focused surveys were conducted in March 2003 and in May 2003. Both surveys were within the range of documented spadefoot toad activity.

The March 2003 survey was specifically focused on detecting the presence or absence of western spadefoot toad. There had been enough rain in the previous two weeks to leave the seasonal rainpool relatively full and temperatures were thought to be moderate enough to trigger

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breeding. However, the survey by Dave Crawford of Compliance Biology, Inc. and a separate site visit by CDFG Biologist Morgan Wehtje on the same day, only revealed the presence of the common western toad (*Bufo boreas*) and Pacific chorus frog (*Hyla regilla*).

The May 2003 survey was directed by Newhall Land to ensure no special-status reptiles or amphibians were present in the western-most portion of the Riverpark project. The subject area totaled approximately 3 acres and included the seasonal rainpool surveyed in March 2003. The surveys were directed by Newhall Land to ensure special-status reptiles and amphibians - particularly western spadefoot due to the concerns in March - would not be impacted in that area, as it was scheduled for brush clearance. Brush clearance is required annually in that area as part of the County Fire Department fuel modification requirements associated with the structures situated adjacent and west of the Riverpark site (e.g. Von's). The seasonal rainpool was completely dry and there was no indication that any special-status reptiles or amphibians were present within the fuel modification area at that time.

The focused surveys conducted on March 4-6, 2004 indicate that this species is now present on the Riverpark site. It is likely that western spadefoot toads were not previously identified on the site because one or more necessary seasonal conditions were not optimal for breeding at the time of those initial surveys. The combination of required seasonal conditions such as the amount of rain, the timing of the rain, air temperature, and possibly lunar stage do not all occur at the same time every year. Some anecdotal information from other field biologists suggests that western spadefoot toads have appeared in seasonal rainpools after multiple focused annual surveys at the same location. As such, it is not unusual that western spadefoot has been detected in seasonal rainpools that had been surveyed the year before. The following discussion provides detailed information regarding the results of the most recent survey effort.

INTRODUCTION

The western spadefoot is a small toad that is currently considered by CDFG as a California Species of Special Concern. This status does not afford the species protection under the state Endangered Species Act, but impacts to the species from projects are considered when those projects are reviewed under the California Environmental Quality Act (CEQA).

Western spadefoot toad adults only enter aquatic habitats for breeding. They spend most of the year in a dormant to semi-dormant state in small mammal burrows in upland habitat adjacent to the rainpool sites. This species requires seasonal rainpools that last a minimum of four weeks as

eggs take from 1 to 6 days to hatch and metamorphosis can be completed within 3 to 11 weeks (Jennings and Hayes 1994). Breeding habitat must be seasonal such that predators including bullfrogs and predatory fish do not become established. Breeding adults typically emerge during and/or immediately following relatively warm rains in late winter to early spring. Female western spadefoot toads deposit small clusters of 10 to 42 eggs to plant stems or other debris in the pool (Jennings and Hayes 1994).

On March 4, 2004 an initial visit was conducted by Dave Crawford of Compliance Biology, Inc. at the seasonal rainpool located at the terminus of Newhall Road. As conditions for the species were optimal at that time (i.e. recent rains and relatively warm temperatures) it was expected that if spadefoot were present on the subject property, they would be evident at that time.

During that initial visit, survey methods were limited to walking the perimeter of the rainpool during daylight hours and observing. Within a few minutes, a pair of western spadefoot toads was observed in amplexus near the edge of the rainpool. Further evaluation of the rainpool revealed that there were numerous egg masses Mr. Crawford attributed to western spadefoot. Based on the findings of the initial survey, focused surveys were arranged for the entire Riverpark project site and were initiated on March 5, 2004.

METHODS

On March 5 and 6, 2004, the entire River Park project site was surveyed for the presence of suitable breeding rainpools for western spadefoot toads. Most of the flat lowland portions of the site were methodically walked and hilltops were utilized as vantage points to survey remaining areas for standing water. Additionally, all dirt roads were surveyed as western spadefoot toads are known to utilize deep road ruts that fill with rainwater (pers. observation).

Any rainpools detected were thoroughly surveyed for any evidence of western spadefoot toad adults, tadpoles or eggs. Rainpools having evidence of the presence of western spadefoot toads were mapped on a scaled topographic map.

RESULTS

A total of six seasonal rainpools were detected on the River Park site. Of those six, three (3) had evidence of western spadefoot toad (Exhibit 1). The following provides a description of each occupied rainpool and the evidence detected. Photos of each occupied rainpool are provided in **Attachment A**. Photos of an adult toad and egg masses are provided in **Attachment B**.

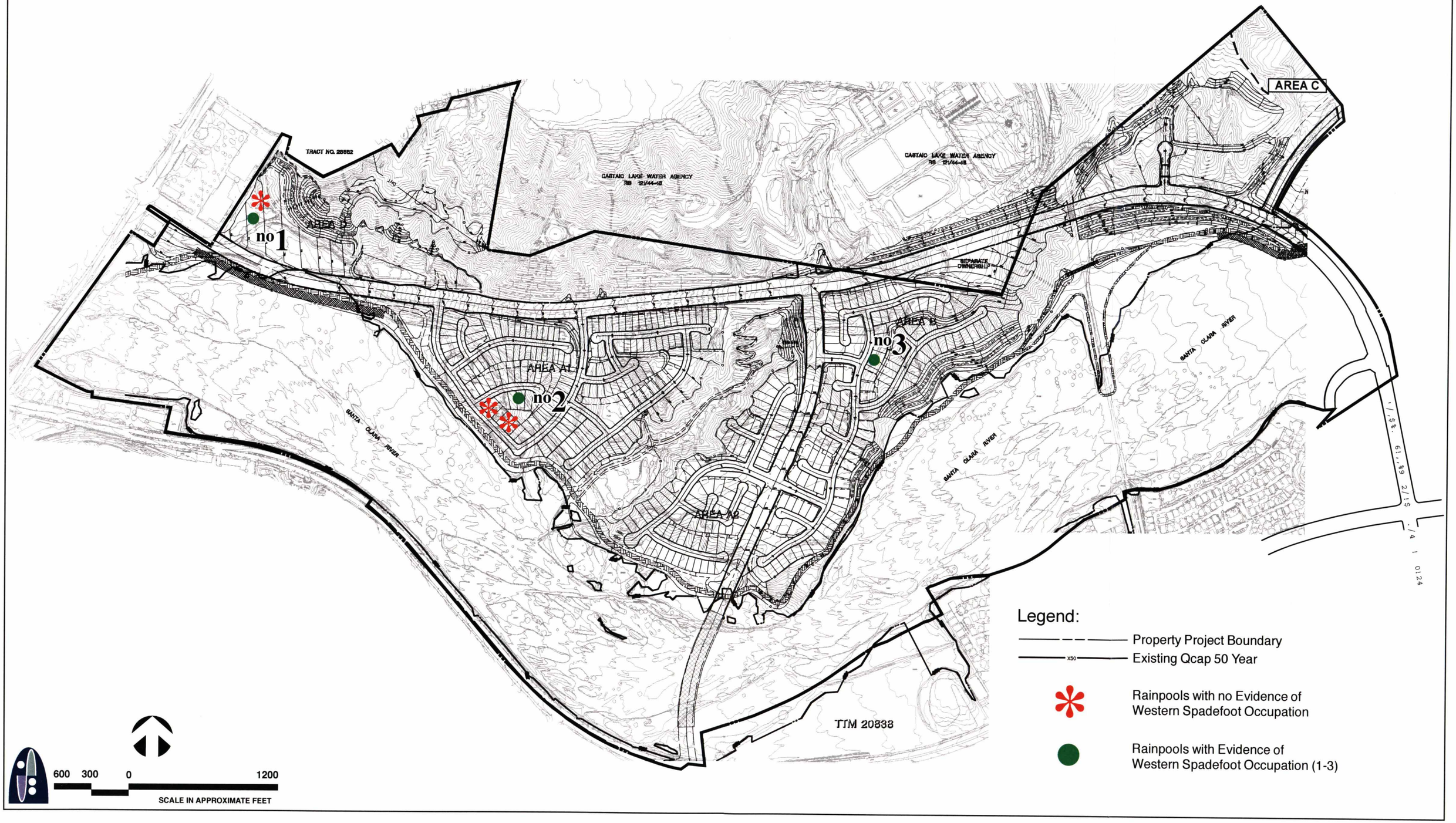

exhibit 1

SEASONAL RAINPOOLS

Occupied Rainpool 1

- Located immediately inside and north of the security gate at the terminus of Newhall Road, this seasonal rainpool was approximately 60'x30' in size and 10 inches at maximum depth. The majority of the rainpool perimeter consists of mature mule fat (*Baccharis salicifolia*) and dense mustard (*Hirschfeldia incana*). There was one opening approximately 8 feet in width with only bare soil sloping into the water.
- One pair of western spadefoot adults was observed in a state of amplexus on March 4, 2004. A single adult spadefoot toad was observed on March 5, 2004.
- Numerous egg masses (>30) were observed on submerged vegetation. The number of eggs in each mass ranged from 4 to approximately 30.

There was a range of development stages in the egg masses observed that suggests there may have been several days from the time the first and last masses were laid. The number of egg masses observed suggest several pairs of western spadefoot utilized Area 1 this season.

Occupied Rainpool 2

- A seasonal rainpool approximately 70'x30' in size and 8 inches at maximum depth was observed approximately one half mile ESE of the Newhall Road security gate, about 100 feet south of the existing dirt road. The pond is adjacent to a turn out area marked for construction equipment storage (none was present at the time of survey). Vegetation in and around the pool was sparse and limited to weedy species.
- Two small egg masses were observed on a single submerged twig. The number of eggs in both masses totaled approximately 30. Most of the eggs had already hatched and a few small tadpoles were swimming in the immediate vicinity of the egg masses. The remaining un-hatched eggs had small wriggling tadpoles in them that appeared ready to hatch.

Based on the number of eggs observed, it is possible only one pair of western spadefoot toads utilized this pond for breeding this breeding season.

Occupied Rainpool 3

- This rainpool was no more than a road rut that at the time of survey was approximately 10'x2' with a maximum depth of about 6 inches. This seasonal rainpool was located on the dirt road, in the northern central portion of the site approximately 1,200 feet due south of the Castaic water treatment facility.

- 8 to 10 egg masses were observed among the submerged annual weeds in the pool. Most of the eggs had already hatched and numerous small tadpoles were swimming throughout the pool.
- The number of individual eggs could not be determined as most had already hatched and were dissolving. However, based on the number and general size of the egg masses, it is estimated that as many as 3 or 4 pairs of spadefoot toads may have utilized this habitat for breeding this breeding season. .

CONCLUSIONS

The results of the focused surveys indicate that western spadefoot toad is present on the Riverpark project site. It is expected that all of the occupied rainpools on the site were detected because the entire Riverpark site was evaluated and because of the existing habitat conditions. As breeding took place successfully this season, it is further expected that the remaining unoccupied rainpools present on the site do not currently provide all of the elements that trigger breeding in western spadefoot toads.

As previously stated, initial site surveys for this species did not detect their presence. This non-detection is not unusual in that their presence is typically only detectable for a few weeks a year when weather conditions are ideal. Further, in some dry years western spadefoot toads may not emerge to breed at all as seasonal pools either do not fill or do not remain viable long enough for tadpoles to fully metamorphose. The timing of surveys is critical to their detection. Weather conditions must be within a very narrow range of suitability for adults to emerge and may vary from one year to the next by several months depending upon timing of rainfall. The weather conditions and timing of the surveys apparently coincided this season.

The March 2004 survey results suggest that a moderately sized population exists on the project site. The evidence detected in the three occupied rainpools on site suggests possibly 16 to 20 breeding pairs are currently present on site. The numbers of egg masses and tadpoles observed suggest that the existing population is viable. However, as all three of the occupied rainpools detected occur within the areas of proposed development, project implementation would likely result in a significant reduction of a local population.

Should the preparer of the EIR determine that project impacts would result in significant or potentially significant impacts to western spadefoot, mitigation measures would be required to

minimize the degree of impact. The following discussion provides recommended mitigation measures based on previous experience with CDFG regarding this species and development project impacts.

RECOMMENDED MITIGATION

Prior to the issuance of a grading permit for construction or site preparation activities, the applicant shall retain the services of a qualified biologist. The biologist must be approved by the California Department of Fish and Game to implement a capture and relocation program.

Suitable natural sites shall be selected on the project site outside of the development envelope, where western spadefoot toad habitat shall be created under the direct supervision of the qualified biologist. Preliminary surveys indicate there may be suitable locations in Area C. The actual relocation site design and location shall be approved by CDFG and consist of a shallow excavated pond(s) utilizing an artificial rubber pond liner as a base. The location shall be as far away as possible from any of the homes and roads to be built and shall be at least the size of the largest occupied pond observed on the site. The relocation pond(s) shall be designed such that it only supports standing water for several weeks following seasonal rains such that aquatic predators (i.e., fish, bullfrogs, crayfish, etc.) cannot become established. Terrestrial habitat surrounding the proposed relocation site shall be as similar in type, aspect, and density to the location of the existing ponds as possible. No site preparation or construction activities shall be permitted in the vicinity of the currently occupied ponds until the relocation habitat construction and relocation of all western spadefoot toad adult, tadpoles, and egg masses detected are moved to the relocation habitat to the satisfaction of the monitoring biologist.

Based on appropriate rainfall and temperatures, generally between the months of February and April, the biologist shall conduct a series of thorough surveys in all appropriate habitats within the development envelope. Surveys will include evaluation of all previously documented occupied areas and a cursory survey of the remaining natural areas of the site. All western spadefoot adults, tadpoles, and egg masses encountered shall be collected and released in the relocation pond(s). All relocation shall take place within the Riverpark project boundaries unless otherwise directed by CDFG.

The qualified biologist shall monitor the relocation site for a period of five years, or as otherwise directed by CDFG. Specific monitoring requirements and success criteria shall be approved by CDFG. It is expected that minimum requirements will include annual monitoring during and

immediately following peak breeding season such that surveys can be conducted for calling adults as well as for egg masses, larval and post larval toads. Further, survey data will be provided to the regulatory agencies by the monitoring biologist following each monitoring period and a written report summarizing the monitoring results will be provided to the regulatory agencies at the end of the monitoring effort. Success criteria for the monitoring program shall include verifiable evidence of toad reproduction at the relocation site.

Although there have been few attempts at relocation of western spadefoot to date, it is my professional opinion that if the relocation pools and surrounding upland habitats are properly constructed, and both eggs and tadpoles are relocated, there should be a very good possibility of success.

Please feel free to contact me if you have any questions regarding the information provided in this report.

Sincerely,

Dave Crawford
Principal Biologist

REFERENCES

California Natural Diversity Data Base (CNDDB). 2004. Computer Reports for the Newhall and Val Verde, California USGS 7.5-minute quadrangle maps.

CDFG. 2003. Special Animals [species of special concern]. State of California, The Resources Agency, Department of Fish and Game, Natural Heritage Division, Natural Diversity Data Base, January 2003 update.

Jennings, Mark R. and Marc P. Hayes. 1994. *Amphibian and Reptile Species of Special Concern in California.* Final report submitted to California Department of Fish and Game. Contract No. 8023.

Stebbins, R. C. 1985. *Western Reptiles and Amphibians.*, 2nd ed. Houghton-Mifflin Company. Boston, Massachusetts.

APPENDIX A
OCCUPIED RAINPOOL PHOTOGRAPHS

Occupied Rainpool 1

Occupied Rainpool 2

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Occupied Rainpool 3

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APPENDIX B
ADULT AND EGGMASS PHOTOGRAPHS

Adult western spadefoot

Adult western spadefoot

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Western spadefoot egg masses (left of center and lower left center)

Western spadefoot egg mass (lower center)

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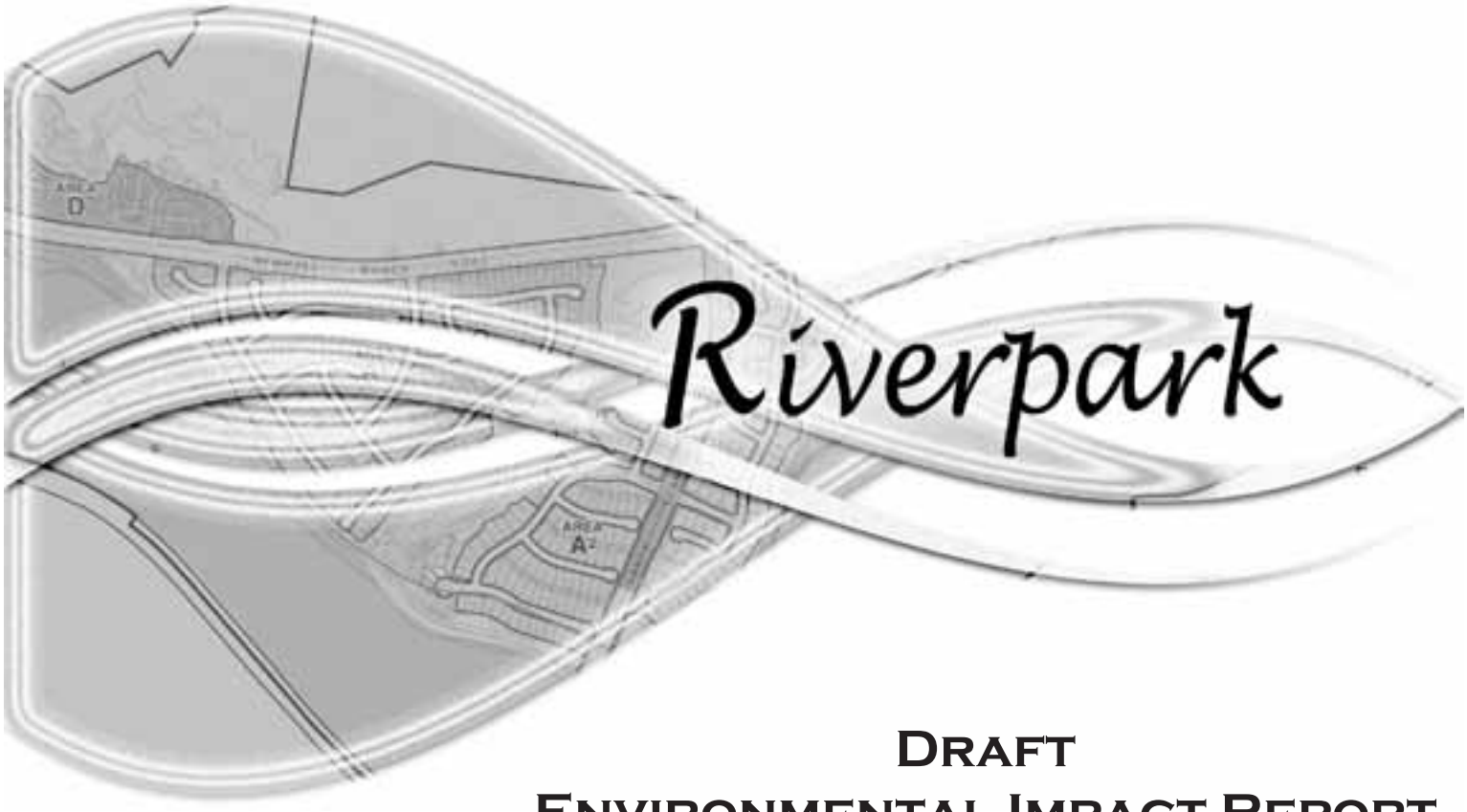

Draft
Environmental Impact Report

SCH No. 2002091081

Volume II – Appendices

Prepared for:

City of Santa Clarita
Department of Planning & Building Services
23920 Valencia Boulevard, Suite 302
Santa Clarita, California 91355

Prepared by:

Impact Sciences, Inc.
30343 Canwood Street, Suite 210
Agoura Hills, California 91301

March 2004

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APPENDIX I

Notice of Preparation and Initial Study; Responses to Notice of Preparation

REVISED NOTICE OF PREPARATION

TO: State Clearinghouse
Office of Planning Research
P.O. Box 3044
Sacramento, CA 95812-3044

FROM: City of Santa Clarita
23920 Valencia Blvd., Suite 300
Santa Clarita, CA 91355

SUBJECT: **Revised Notice of Preparation of Draft Environmental Impact Report**

The City of Santa Clarita will be the lead agency and will prepare an Environmental Impact Report for the project identified below. We need to know the views of your agency as to the scope and content of the environmental information which is germane to your agency's statutory responsibilities in connection with the proposed project. Your agency will need to use the EIR prepared by our agency when considering your permit or other approval for the project.

The **revised project description,** location, and the probable environmental effects are contained in the attached materials. A copy of the Initial Study is attached. As indicated, the project description has changed. If this revision changes any of your previous comments please respond with written comments within the time frame referenced below.

Due to the time limits mandated by State law, your response must be sent at the earliest possible date, but not later than 30 days after receipt of this notice.

Please send your written response to Jeff Hogan, Associate Planner or Wendy Deats, Assistant Planner II at the address shown above. We would appreciate the name of a contact person in your agency.

Project Title: Riverpark (Panhandle); Master Case #02-175

Project Applicant: Newhall Land and Farming Company

Date: October 13, 2003

Title: Jeff Hogan, Associate Planner

Telephone: (661) 255-4330

Reference: California Administrative Code, Title 14, Sections 15082(a), 15103, 15375.

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REVISED INITIAL STUDY
CITY OF SANTA CLARITA

Lead Agency:

City of Santa Clarita
23920 Valencia Boulevard, Suite 300
Santa Clarita, California 91355

Contact Person & Phone Number:

Jeff Hogan, Associate Planner
Wendy Deats, Assistant Planner II
City of Santa Clarita
Department of Planning and Building Services
23920 Valencia Boulevard
Santa Clarita, California 93155
(661) 255-4330

Master Case:

MC 02-175; Tentative Tract Map 53425; General Plan Amendment 02-002; Zone Change 02-002; Conditional Use Permit 02-009; Hillside Review 02-003; Oak Tree Permit 02-025; and Adjustment 02-010.

Project Introduction:

The applicant, The Newhall Land and Farming Company, proposes the future development of a 695.4-acre site at the terminus of Newhall Ranch Road, east of Bouquet Canyon Road between the Castaic Lake Water Agency property and the Santa Clara River, north of Soledad Canyon Road. The proposal is titled Riverpark is located within the General Plan Valley Center Concept (VCC) overlay area and includes the development of 744 multi-family units, 439 single-family dwellings, and 40,000 square feet of commercial uses. A 27.4-acre park is also proposed adjacent to the Santa Clara River and approximately 330 acres of river area will remain in a natural state and be conveyed to the City of Santa Clarita. Full build-out of the project also includes the extension of Newhall Ranch Road from its western terminus, in the general vicinity of Bouquet Canyon Road, easterly to the Golden Valley Road interchange at Soledad Canyon. This extension includes the construction of a bridge over the Santa Clara River . The project also includes the construction of a portion of Santa Clarita Parkway. The current zoning of the project site is: 23.7 acres of Industrial Commercial (IC); 199.9 acres of Commercial Office Planned Development (CO PD); 150.4 acres of Community Commercial Planned Development (CC PD), 6.7 acres of Community Commercial (CC), and 37.4 acres of Mobile Home Park (MHP). The remaining 277.3 acres is within the Residential Medium zone. The applicant is proposing to change the zoning of the site to Residential Medium (RM) with a Planned Development (PD) overlay. The site will require 5.5 million cubic yards of grading (plus 3.6 mcy of removal and recompaction, overexcavation, and landslide remediation) which will be balanced on-site. The grading is required for construction of the project, as well as grading associated with the construction of Newhall Ranch Road and Golden Valley Road Bridge.

Bank stabilization will be constructed along the Santa Clara River for approximately 2,200 linear feet for the east-west extension of

Newhall Ranch Road and approximately 6,000 linear feet for the project development.

Project Description:

The applicant proposes to develop six parcels of land totaling 695.4 acres of land for single- and multi-family uses. A tentative tract map is required to subdivide the six lots into 439 single-family lots, 744 multi-family units (5 lots), two commercial lots, HOA lots, a private street lot, recreation lots, a water quality basin lot, a park lot, maintained slope lots adjacent to public right of way, river trail lots, bridge lots, open space lots, and Santa Clara River lots totaling 545 lots. A General Plan Amendment will change the land use designations of the project site to Residential Medium and Community Commercial with SEA and VCC overlays and will define the specific alignments for Santa Clarita Parkway and Newhall Ranch Road. A zone change will change the zoning designations of the site to Residential Medium and Community Commercial with a Planned Development overlay (RM PD and CC PD). Residential Medium will permit a density up to 11 dwellings per acre and the Community Commercial allows a 37.5 percent floor area ratio. A conditional use permit is required to implement the Planned Development Overlay, to allow building heights in excess of two stories and 35' tall, approval of the Hillside Innovative Application, and vehicular gating of Planning Area C. A hillside development review is required for development on slopes with an average cross slope of greater than 10%. The oak tree permit is required for the removal of 15 of the 87 oak trees on site and 3 oak tree encroachments. An adjustment is required to allow for a maximum 20% reduction in the minimum lot size and lot width for lots within Planning Area A1, a 16 foot front yard setback on a traditional garage facing street design, and 7 foot high property line walls facing public streets.

Project Location:

The Riverpark area is 695.4 acres in area and is located at the terminus of Newhall Ranch Road, east of Bouquet Canyon Road, north of Soledad Canyon Road, adjacent to the Santa Clara River.

General Plan/Zoning Designation:

The General Plan designations of the subject sites are Residential Medium, Industrial Commercial, Community Commercial, Commercial Office and Mobile Home Park. In addition, portions of the site are located within the Valley Center Concept (VCC) overlay and Significant Ecological Area overlay. The applicant is proposing to change the general plan land use designations to Residential Medium and Community Commercial maintaining the VCC and SEA overlays. The existing zoning of the project site includes Industrial Commercial (IC), Residential Medium (RM), Commercial Office with a Planned Development overlay (CO PD), Community Commercial (CC) and Community Commercial with a Planned Development overlay (CC PD) and Mobile Home Park (MHP). The applicant is proposing to change the zoning to Residential Medium Planned Development (RM PD) and Community Commercial Planned Development (CCPD).

Project Applicant:

Newhall Land and Farming Company
23823 Valencia Boulevard
Valencia, California 91355
Attn: Glenn Adamick (661) 255-4003

Surrounding Land Uses and Setting:

The Riverpark site incorporates approximately 695.4 acres of land east of Bouquet Canyon, north of Soledad Canyon Road along the Santa Clara River. Both Bouquet Canyon Road and Soledad

Canyon Road are major arterials carrying traffic though the center of the City. Open space borders the site to the north, Soledad Canyon Road borders the site to the south, undeveloped land borders to the site to the east and commercial uses border the site to the west. The site is located in the center of the City with community of Saugus to the north and west, the community of Canyon Country to the east and the Porta Bella Specific Plan to the south across Soledad Canyon Road.

Other public agencies whose approval is required (e.g. permits, financing approval, or participation agreement):

Army Corps of Engineers, U.S. Fish and Wildlife Services, California Department of Transportation, California Department of Fish & Game, Castaic Lake Water Agency, Metropolitan Transportation Authority

ENVIRONMENTAL FACTORS POTENTIALLY AFFECTED

The environmental factors checked below would be affected by this project, involving at least one impact that is a "Potentially Significant Impact" or "Potentially Significant Impacts Unless Mitigation Measures Incorporated" as indicated by the checklist on the following pages.

[X]	Land Use and Planning	[X]	Transportation/ Circulation	[X]	Public Services
[X]	Population and Housing	[X]	Biological Resources	[X]	Recreation
[X]	Geological Problems	[X]	Noise	[X]	Aesthetics
[X]	Water	[X]	Hazards	[X]	Cultural Resources
[X]	Stormwater Management & Recycling	[X]	Mandatory Tests of Significance	[X]	Utilities and Service System
[X]	Air Quality	[X]	Energy and Mineral Resources		

DETERMINATION:

On the basis of this initial evaluation:

[ ] I find that the proposed project COULD NOT have a significant effect on the environment, and a NEGATIVE DECLARATION will be prepared.

[ ] I find that although the proposed project could have a significant effect on the environment, there will not be a significant effect in this case because the mitigation measures described on an attached sheet have been added to the project. A NEGATIVE DECLARATION will be prepared.

[X] I find that the proposed project MAY have a significant impact on the environment, and an ENVIRONMENTAL IMPACT REPORT is required.

[ ] I find that the proposed project MAY have a significant effect(s) on the environment, but at least one effect 1) has been mitigated adequately in an earlier document pursuant to applicable legal standards, and 2) has been addressed by mitigation measures based on the earlier analysis as described on attached sheets, if the effect is a "potentially significant impact" or "potentially significant unless mitigated." An ENVIRONMENTAL IMPACT REPORT, but it must analyze only the effects that remain to be addressed.

[ ] I find that although the proposed project could have a significant effect on the environment, there WILL NOT be a significant effect in this case because all potentially significant effects (a) have been analyzed adequately in an earlier EIR pursuant to applicable standards, and (b) have been avoided or mitigated pursuant to that earlier EIR, including revisions or mitigation measures that are imposed upon the proposed project.

Prepared By:

(Signature)

Wendy Deats
Assistant Planner II

10.13.03

(Date)

Approved By:

(Signature)

Jeff Hogan
Associate Planner

10/13/03

(Date)

ENVIRONMENTAL IMPACTS:

		Potentially Significant Impact	Potentially Significant Impact Unless Mitigation Incorporated	Less than Significant Impact	No Impact
I.	LAND USE AND PLANNING. Would the proposal:				
a)	Conflict with General Plan designation or zoning?	[X]	[ ]	[ ]	[ ]
b)	Conflict with applicable environmental plans or policies adopted by agencies with jurisdiction over the project?	[ ]	[X]	[ ]	[ ]
c)	Be incompatible with existing land use in the city?	[ ]	[X]	[ ]	[ ]
d)	Disrupt or divide the physical arrangement of an established community (including a low-income or minority community)?	[ ]	[ ]	[ ]	[X]
e)	Affect a Significant Ecological Area (SEA)?	[X]	[ ]	[ ]	[ ]
f)	Other_____	[ ]	[ ]	[ ]	[ ]
II.	POPULATION AND HOUSING. Would the proposal:				
a)	Cumulatively exceed official regional or local population projections?	[ ]	[ ]	[X]	[ ]
b)	Create a net loss of jobs?	[ ]	[ ]	[X]	[ ]
c)	Displace existing housing, especially affordable housing?	[ ]	[ ]	[ ]	[X]
d)	Other_____	[ ]	[ ]	[ ]	[ ]
III.	GEOLOGIC PROBLEMS. Will the proposal result in:				
a)	Unstable earth conditions or in changes in geologic substructures?	[X]	[ ]	[ ]	[ ]
b)	Disruptions, displacements, compaction or overcovering of the soil?	[X]	[ ]	[ ]	[ ]

		Potentially Significant Impact	Potentially Significant Impact Unless Mitigation Incorporated	Less than Significant Impact	No Impact
c)	Change in topography or ground surface relief features?	[X]	[ ]	[ ]	[ ]
d)	The destruction, covering or modification of any unique geologic or physical features?	[ ]	[ ]	[X]	[ ]
e)	Any increase in wind or water erosion of soils, either on or off the site?	[X]	[ ]	[ ]	[ ]
f)	Exposure of people or property to geologic hazards such as earthquakes, landslides, mudslides, ground failure, or similar hazards?	[X]	[ ]	[ ]	[ ]
g)	Changes in deposition, erosion or siltation?	[X]	[ ]	[ ]	[ ]
h)	Other modification of a wash, channel, creek, or river?	[X]	[ ]	[ ]	[ ]
i)	Earth movement (cut and/or fill) of 10,000 cubic yards or more?	[X]	[ ]	[ ]	[ ]
j)	Development and/or grading on a slope greater than 25% natural grade?	[X]	[ ]	[ ]	[ ]
k)	Development within the Alquist-Priolo Special Studies Zone?	[ ]	[ ]	[ ]	[X]
l)	Other_____	[ ]	[ ]	[ ]	[ ]
IV.	WATER. Would the proposal result in:				
a)	Changes in absorption rates, drainage patterns, or the rate and amount of surface runoff?	[X]	[ ]	[ ]	[ ]
b)	Exposure of people or property to water related hazards such as flooding?	[X]	[ ]	[ ]	[ ]
c)	Discharge into surface waters or other alteration of surface water quality (e.g. temperature, dissolved oxygen, or turbidity)	[X]	[ ]	[ ]	[ ]
	Changes in the amount of surface water				

		Potentially Significant Impact	Potentially Significant Impact Unless Mitigation Incorporated	Less than Significant Impact	No Impact
d)	in any water body?	[X]	[ ]	[ ]	[ ]
e)	Changes in currents, or the course of direction of water movements?	[X]	[ ]	[ ]	[ ]
f)	Changes in the quantity of ground waters, either through direct additions or withdrawals, or through interception of an aquifer by cuts or excavations or through substantial loss of groundwater recharge capability?	[X]	[ ]	[ ]	[ ]
g)	Altered direction or rate of flow of groundwater?	[X]	[ ]	[ ]	[ ]
h)	Impacts to groundwater quality?	[X]	[ ]	[ ]	[ ]
i)	Substantial reduction in the amount of groundwater otherwise available for public water supplies?	[X]	[ ]	[ ]	[ ]
j)	Other_____	[ ]	[ ]	[ ]	[ ]
V.	STORMWATER MANAGEMENT AND RECYCLING. Would the proposal result in:				
a)	Would the proposed project result in storm water system discharges from areas for materials storage, vehicle or equipment fueling, vehicle or equipment maintenance (including washing), waste handling, hazardous materials handling or storage, delivery areas or loading docks, or other outdoor work areas?	[ ]	[X]	[ ]	[ ]
b)	Would the proposed project result in a significant environmentally harmful increase in the flow rate or volume of the project site or surrounding areas?	[ ]	[X]	[ ]	[ ]
c)	Would the proposed project result in storm water discharges that would significantly impair the beneficial uses of receiving waters or areas that provide water quality benefits (e.g., riparian corridors, wetlands, etc.)?	[X]	[ ]	[ ]	[ ]

		Potentially Significant Impact	Potentially Significant Impact Unless Mitigation Incorporated	Less than Significant Impact	No Impact
d)	Would the proposed project cause harm to the biological integrity of drainage systems and water bodies?	[X]	[ ]	[ ]	[ ]
e)	Does the proposed project include provisions for the separation and reuse of materials?	[ ]	[ ]	[ ]	[X]
VI.	AIR QUALITY. Would the proposal:				
a)	Violate any air quality standard or contribute to an existing or projected air quality violation?	[X]	[ ]	[ ]	[ ]
b)	Expose sensitive receptors to pollutants?	[ ]	[X]	[ ]	[ ]
c)	Create objectionable odors?	[ ]	[X]	[ ]	[ ]
d)	Other_____	[ ]	[ ]	[ ]	[ ]
VII.	TRANSPORTATION/CIRCULATION. Would the proposal result in:				
a)	Increased vehicle trips or traffic congestion?	[X]	[ ]	[ ]	[ ]
b)	Hazards to safety from design features (e.g. sharp curves or dangerous intersections) or incompatible uses?	[ ]	[ ]	[ ]	[X]
c)	Inadequate emergency access or access to nearby uses?	[ ]	[X]	[ ]	[ ]
d)	Insufficient parking capacity onsite or offsite?	[ ]	[ ]	[ ]	[X]
e)	Hazards or barriers for pedestrians or bicyclists?	[ ]	[ ]	[ ]	[X]
f)	Conflicts with adopted policies supporting alternative transportation (e.g. bus stops, bicycle racks)?	[ ]	[ ]	[ ]	[X]
g)	Disjointed pattern of roadway improvements	[ ]	[ ]	[X]	[ ]
h)	Other_____	[ ]	[ ]	[ ]	[ ]

		Potentially Significant Impact	Potentially Significant Impact Unless Mitigation Incorporated	Less than Significant Impact	No Impact
VIII.	BIOLOGICAL RESOURCES. Would the proposal result in impacts to:				
a)	Endangered, threatened or rare species or their habitats (including but not limited to plants, fish, insects, animals, and birds)?	[X]	[ ]	[ ]	[ ]
b)	Oak trees?	[X]	[ ]	[ ]	[ ]
c)	Wetland habitat or blueline stream?	[X]	[ ]	[ ]	[ ]
d)	Wildlife dispersal or migration corridors?	[X]	[ ]	[ ]	[ ]
e)	Other: Bank Stabilization	[X]	[ ]	[ ]	[ ]
IX.	ENERGY AND MINERAL RESOURCES. Would the proposal:				
a)	Conflict with adopted energy conservation plans?	[ ]	[X]	[ ]	[ ]
b)	Use nonrenewable resources in a wasteful and inefficient manner?	[ ]	[ ]	[ ]	[X]
c)	Result in the loss of availability of a known mineral resource that would be of future value to the region and the residents of the State?	[ ]	[X]	[ ]	[ ]
d)	Other_____	[ ]	[ ]	[ ]	[ ]
X.	HAZARDS. Would the proposal involve:				
a)	A risk of accidental explosion or release of hazardous substances (including but not limited to oil, pesticides, chemicals, or radiation)?	[ ]	[X]	[ ]	[ ]
b)	Possible interference with an emergency response plan or emergency evacuation plan?	[ ]	[X]	[ ]	[ ]
c)	The creation of any health hazard or	[ ]	[ ]	[ ]	[X]

		Potentially Significant Impact	Potentially Significant Impact Unless Mitigation Incorporated	Less than Significant Impact	No Impact
	potential health hazard?				
d)	Exposure of people to existing sources of potential health hazards (e.g. electrical transmission lines, gas lines, oil pipelines)?	[X]	[ ]	[ ]	[ ]
e)	Increased fire hazard in areas with flammable brush, grass, or trees?	[ ]	[X]	[ ]	[ ]
f)	Other_____	[ ]	[ ]	[ ]	[ ]
XI.	NOISE. Would the proposal result in:				
a)	Increases in existing noise levels?	[X]	[ ]	[ ]	[ ]
b)	Exposure of people to severe noise levels or vibration?	[ ]	[X]	[ ]	[ ]
c)	Other_____	[ ]	[ ]	[ ]	[ ]
XII.	PUBLIC SERVICES. Would the proposal have an effect on, or result in a need for new or altered government services in any of the following areas:				
a)	Fire protection?	[X]	[ ]	[ ]	[ ]
b)	Police protection?	[X]	[ ]	[ ]	[ ]
c)	Schools?	[X]	[ ]	[ ]	[ ]
d)	Maintenance of pubic facilities, including roads?	[X]	[ ]	[ ]	[ ]
e)	Other government services?	[X]	[ ]	[ ]	[ ]
XIII.	UTILITIES. Would the proposal result in a need for new systems or supplies, or substantial alterations to the following utilities:				
a)	Power or natural gas?	[X]	[ ]	[ ]	[ ]
b)	Communications systems?	[X]	[ ]	[ ]	[ ]
c)	Local or regional water treatment or distribution facilities?	[X]	[ ]	[ ]	[ ]

	Potentially Significant Impact	Potentially Significant Impact Unless Mitigation Incorporated	Less than Significant Impact	No Impact
d) Sewer or septic tanks?	[X]	[ ]	[ ]	[ ]
e) Storm water drainage?	[X]	[ ]	[ ]	[ ]
f) Solid waste disposal?	[X]	[ ]	[ ]	[ ]
g) Local or regional water supplies?	[X]	[ ]	[ ]	[ ]
h) Other_____	[ ]	[ ]	[ ]	[ ]
XIV. AESTHETICS. Would the proposal:				
a) Affect a scenic vista open to public view?	[X]	[ ]	[ ]	[ ]
b) Have a negative aesthetic effect?	[X]	[ ]	[ ]	[ ]
c) Create light or glare?	[X]	[ ]	[ ]	[ ]
d) Other_____	[ ]	[ ]	[ ]	[ ]
XV. CULTURAL RESOURCES. Would the proposal:				
a) Disturb paleontological or archaeological resources?	[X]	[ ]	[ ]	[ ]
b) Have the potential to cause a physical change which would affect unique ethnic cultural values?	[ ]	[X]	[ ]	[ ]
c) Restrict existing religious or sacred uses within the potential impact area?	[ ]	[ ]	[ ]	[X]
d) Affect a recognized historical site?	[X]	[ ]	[ ]	[ ]
e) Other_____	[ ]	[ ]	[ ]	[ ]
XVI. RECREATION				
a) Will the proposal result in an impact upon the quality or quantity of existing recreation opportunities?	[X]	[ ]	[ ]	[ ]
XVII. MANDATORY FINDINGS OF SIGNIFICANCE				

		Potentially Significant Impact	Potentially Significant Impact Unless Mitigation Incorporated	Less than Significant Impact	No Impact
a)	Does the project have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?	[X]	[ ]	[ ]	[ ]
b)	Does the project have the potential to achieve short-term, to the disadvantage of long-term, environmental goals? (A short-term impact on the environment is one which occurs in a relatively brief, definitive period of time while long-term impacts will endure well into the future.)	[ ]	[ ]	[ ]	[X]
c)	Does the project have impacts which are individually limited but cumulatively considerable? (A project may impact on two or more separate resources where the impact on each resource is relatively small, but where the effect of the total of those impacts on the environment is significant.)	[ ]	[X]	[ ]	[ ]
d)	Does the project have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?	[X]	[ ]	[ ]	[ ]

XVIII. DEPARTMENT OF FISH AND GAME 'DE MINUMUS' FINDING

a)	Will the project have an adverse effect either individually or cumulatively, on fish and wildlife resources? Wildlife shall be defined for the purpose of this question as "all wild animals, birds, plants, fish, amphibians, and related ecological communities, including the habitat upon which the wildlife depends for its continued viability."	[X]	[ ]	[ ]	[ ]

IXX. DISCUSSION OF ENVIRONMENTAL IMPACTS AND/OR EARLIER ANALYSIS:

Section and Subsections	Evaluation of Impact
I. LAND USE AND PLANNING	a) The proposed development of this site is for single -family residences and multi-family units.. The site consists of six lots totaling 695.4 acres. The site is currently zoned Industrial Commercial (IC), Community Commercial Planned Development (CC PD), Commercial Office (CO PD), Residential Medium (RM) and Mobile Home Park (MHP) and is located within the Valley Center Concept (VCC) area and Significant Ecological Area overlay. The zoning of the subject site is consistent with the General Plan designations. The applicant is proposing to change the General Plan designation to Residential Medium and Community Commercial maintain the VCC and SEA overlays and the zoning to Residential Medium and Community Commercial with a Planned Development. The site would be developed for 744 multi-family units and 439 single-family units along with a 27.4-acre park. Further analysis is needed to evaluate the land use modifications. The Industrial Commercial (IC) zone permits a limited, low patronage range of commercial use, quasi industrial and light industrial activities; encourages the provision of employee recreation opportunities; and acts as a transitional zone" (UDC Section 17.11.020.O). The Community Commercial (CC) zone "is intended for retailing and service uses of a community-wide nature that attract people from beyond the immediate neighborhood. The zone will typically include at least one or two major users and shall not be construed to be an allowance for a proliferation of small, multi-tenant convenience commercial centers located on corners and in strip commercial fashion along the City's streets" (UDC Section 17.11.020.J). The Commercial Office (CO) "is intended primarily for offices and professional services. Retail and services uses may be considered on the ground floor of such development; however, this shall not be construed to permit commercial centers or large single-tenant retail stores. Commercial office developments are generally located in centers or as individual buildings along major and secondary highways" (UDC Section 17.11.020.L). The proposed Residential Medium (RM) zone corresponds to small groupings of attached dwellings such as duplexes, triplexes, and fourplexes with a density up to 11.0 dwelling units per acre. This zone is consistent with typical densities for mobile home parks. Additional uses are permitted that are complimentary to, and can exist in harmony with, a residential neighborhood" (UDC Section 17.11.020.F). The Planned Development overlay is intended to accomplish more creative designs for development, economical and efficient use of land that is harmonious with the environment, and ensure development is consistent with approved applications. The applicant is also requesting to implement the planned development overlay, to allow building heights in excess of two-stories and 35' tall, approval of the Hillside Innovative Application, and vehicular gating of Planning Area C. The conditional use permit procedure provides flexibility in the Unified Development Code (UDC) use regulations to account for the widely varying needs of certain uses. Because of their unusual characteristics, and in order to achieve the special purposes in certain districts, conditional uses require special consideration. In order to achieve these purposes, the Planning Commission and City Council are empowered to grant and deny applications for conditional use permits and impose reasonable conditions upon granting conditional use permits. The applicant is also requesting a hillside review to develop on slopes of greater than 10%.

Section and Subsections	Evaluation of Impact
	The intent of the hillside ordinance is to "regulate the development and alteration of hillside areas and ridgelines, to minimize the adverse effects of hillside development and to provide for the safety and welfare of the City of Santa Clarita while allowing for the reasonable development of hillside areas." The applicant is requesting an oak tree permit to remove 15 oak trees. A total of 87 total oak trees are located on site. Lastly, the applicant is requesting an adjustment to allow for a maximum 20% reduction in the minimum lot size and lot width for lots within Planning Area A1. The adjustment also includes to allow for a 16 foot front yard setback on a traditional garage facing street design with a minimum driveway length of 18 feet and to allow for 7 foot high property line block walls facing public streets. These requests will be further analyzed. b) The proposed project is located within the Valley Center Concept (VCC) overlay area. This overlay designates the central portion of the City in order to create a focal point for the City. The purpose of this overlay is to permit and encourage master planning providing a wide range of Valley-wide activities. The concept is intended to develop a central core that would include higher intensity and density for residential and commercial land uses. The project would provide residential and recreational activities, however, no commercial or any other land uses are proposed and therefore, may not consistent with the goals of the Valley Center Concept (VCC) overlay. c) Completion of the proposed project will provide 439 single family residences and 744 multi-family units with access from the future Newhall Ranch Road and other future local streets. Located north of the project site is the Castaic Lake Water Agency (CLWA) property used for administrative offices and a treatment facility, east of the site is vacant land, south of the site is the Santa Clara River and west of the site, along Bouquet Canyon Road are existing commercial uses. Impacts may occur to the existing land uses because the site is predominantly vacant due to traffic, noise, light and glare. d) The project is located in a predominantly vacant area. On the subject site there are several buildings utilized for a business, which currently operates on site, the LA Aqueduct, a water tank. In addition, there may other utility structures on site. No communities are established in this area. Therefore, construction of the project will not divide or disrupt any existing community. The proposal will establish a new community within the center of the City. Therefore, no impact is anticipated. e) The project is located within and adjacent to a Significant Ecological Area (SEA). The SEA is a category used to designate areas of importance to the community for preservation and protection. Development within these SEA areas is limited and appropriate environmental studies are required to ensure the protection of this area. The Santa Clara River will be maintained predominantly in a natural state and in accordance with the Natural River Management Plan. All development is outside of the SEA boundaries with exception of the bank stabilization and a portion of the Newhall Ranch Road and Golden Valley Road Bridge (reviewed under a separate EIR). Potential impacts exist to the Santa Clara River and require technical studies to demonstrate that the Santa Clara River and any habitat and other resources will be preserved. f) Other: No additional impacts are identified at this time for land use and planning. Potential impacts may result from this proposal and will be evaluated within the Environmental Impact Report. Any mitigation measures to reduce impacts to less than significant will be listed in the DEIR Mitigation Monitoring and Reporting Program.

Section and Subsections	Evaluation of Impact
II. POPULATION AND HOUSING	a) This project proposes to build 1,183 residential units, including both single- and multi-family. This will add approximately 3,430 persons to the population based on 2.9 persons per household. The estimated population for the City of Santa Clarita is 224,500 by 2020. Therefore, it can be expected that the project will not induce substantial population growth exceeding official regional or local population projections. b) The Santa Clarita Valley is considered housing rich and jobs poor. The proposal does not include any commercial, office or industrial type uses and therefore, will create a significant amount of jobs. The proposal will displace an existing business on the site, however, the jobs may be relocated within the Valley. The site is used by this business primarily for storage and it is not anticipated that this project will result in a substantial decrease in jobs. However, additional analysis is required to determine the net loss of any jobs. c) The proposed project will not displace any existing housing because the land is predominantly vacant. No significant impacts would occur. d) Other: No additional impacts with regards to population and housing are identified at this time. Potential impacts may result from this proposal and will be evaluated within the Environmental Impact Report. Any mitigation measures to reduce impacts to less than significant will be listed in the DEIR Mitigation Monitoring and Reporting Program.
III. GEOLOGIC PROBLEMS	a) The project requires 5.5 million cubic yards of cut and fill grading to develop the site as proposed. Additional remedial grading of 3.6 million yards is also proposed. The proposed project will require fill to level areas around the hillsides to create building pads on the site for development. Further analysis is required to determine if any geologic substructures will be impacted as a result of this project. There may be significant impacts to the earth conditions because substantial grading will occur and further analysis is required. b)The approval of the proposed project would result in disruption, displacement, compaction and over-covering of soil. The majority of the site will require grading activities for proposed project development causing potentially significant impacts to the existing conditions and further analysis is required. c) The project site has moderate to severe slopes, which require substantial topographical modifications. Therefore, there may be significant impacts as a result and further analysis is needed in the EIR. d) The project site is predominantly vacant and does not contain any known unique geologic or topographic features. Further review and analysis will confirm any features and then significance will be determined. e) Construction activity associated with the proposed improvements may result in a short-term wind and water driven erosion of soils. The proposed improvements will require extensive grading, which will expose soils to wind and rain. This impact is generally considered short term in nature, however, due to the size of the project, further analysis is required. Development activity would remove a majority of the natural vegetation on the site and replace the land with building pads for residential units. This is also considered a potential impact and requires additional analysis. f) The proposed project is located in hillside areas in addition to relatively level ground. The modification of the hillside could possibly expose people or property to geologic hazards such as landslides, mudslides, ground failure,

Section and Subsections	Evaluation of Impact
	or any similar type hazards. All of Southern California is located in an earthquake prone region. The project may result potentially significant impacts to geologic hazards and requires further analyzed in the EIR. g) As discussed above, the majority of the site will be graded. Consequently the project will create changes in soil deposition, erosion, and siltation. The project will be subject to the National Pollutant Discharge Elimination System (NPDES) General Permit, which will require mechanisms that will minimize soil deposition, erosion or siltation, however, the extent of the impact will require additional analysis in the EIR. h) The site is bounded to the south by the Santa Clara River, however, other than bank stabilization and the construction of a portion of Newhall Ranch Road, the Santa Clara River will remain is a natural state. In addition to the river, a blue line stream may traverse the property and will require evaluation. Therefore, potentially significant impacts may result to these resources and further analysis in the EIR is required. i) The proposed project will result in earth movement of approximately 5.5 million cubic yards of cut and fill plus additional remedial grading. This may result in a potentially significant impact to the existing conditions on site and will be further evaluated in the EIR. j) The project area has significant slopes of greater than 25 percent, which will result in extensive grading. These impacts will be evaluated within the EIR. k) Although, the proposed project is not located within an Alquist-Priolo Special Studies Zone it is in close proximity to the site. l) Other: No additional impacts with regard to geologic problems are identified at this time. Potential impacts may result from this proposal and will be evaluated within the Environmental Impact Report. Any mitigation measures to reduce impacts to less than significant will be listed in the DEIR Mitigation Monitoring and Reporting Program.
IV. WATER	a) Development of the proposed project would include 744 multi-family units , 439 single-family units, up to 40,000 square feet of commercial floor space as well as the extension of two major highways. Development of this magnitude will significantly increase impermeable or impervious features. Increased runoff from impermeable surfaces would increase total site runoff. This impact requires further analysis in the EIR. b) The proposed project may expose people or property to water related hazards, such as flooding. However, as development of the site occurs, the appropriate storm drain system will be installed to accommodate flows from a capital storm. Bank stabilization will be constructed in conjunction with the proposal, which will provide further protection from water hazards. In addition there may be water tanks on site that could potentially expose people to water hazards. The impacts to hazards related to water issues will be further analyzed in detail within the EIR. c) As development occurs, the project area would be subject to urban contaminants such as motor oils, gasoline, etc. Development of the site would create additional contaminants generated by the residential uses. Runoff on the future streets will be directed into the gutters and channeled toward catch basins, which will filter out many of the solid pollutants from the runoff. Construction activities associated with the proposed project will not discharge into surface waters or alter surface water quality because the project will be required to incorporate National Pollutant Discharge Elimination System (NPDES) General Permit mechanisms designed to

Section and Subsections	Evaluation of Impact
	reduce and eliminate such discharges. However, potentially significant impacts may still result from a development of this magnitude and therefore, water-related issues require further analysis in the EIR. d) The proposed development may substantially increase the amount of surface water in nearby water bodies, due to an increase in hardscape on the project site. This issue requires further analysis in the EIR. e) Development of the proposed project may also create a change in currents or the course of the direction of water due to the amount of water runoff generated to alter these resources. This requires further analysis in the EIR. f) Construction of the project may change the quantity of ground waters, either through direct additions or withdrawals, or through interception of an aquifer by cuts or excavations, or through substantial loss of groundwater recharge capability because the new amount of proposed hardscape necessary to construct the project is substantial and further analysis is required in the EIR. g) Construction of the project may require major cuts in the soil surface that will disturb groundwater flows thereby altering the direction or flow of groundwater, which requires further analysis in the EIR. h) The project may have impacts to groundwater quality and will be analyzed within the EIR. i) Water will be needed during construction activities for watering of exposed soil to minimize airborne dust and dirt and may significantly increase the demand on public water supplies. Although this impact is potentially significant, it would be short-term, however once the residences are occupied, there would be a long-term increase in the demand for public water. This will be further analyzed in the EIR. j) Other: No additional issues related to water are identified at this time. Potential impacts may result from this proposal and will be evaluated within the Environmental Impact Report. Any mitigation measures to reduce impacts to less than significant will be listed in the DEIR Mitigation Monitoring and Reporting Program.
V. STORMWATER MANAGEMENT & RECYCLING	a)The project may result in substantial stormwater discharges during construction activities. A new drainage system will be required to be incorporated into the project. However, due to the magnitude of the project further analysis is required in the EIR. b) The project may result in a potentially significant environmentally harmful increase in the flow rate or volume of the project site or surrounding areas. This impact requires further analysis in the EIR. c) The project may have a substantial increase in stormwater discharges from the site and may impair the beneficial uses of receiving waters or areas that provide water quality benefits. This will be analyzed in the EIR. d) A project of this magnitude may result in a significant increase in stormwater discharges and may cause harm to the biological integrity of drainage systems and water bodies and requires further analysis in the EIR. e) Waste materials expected to be generated are typical construction debris, including concrete and asphalt. Although impacts may be significant, they are short term in nature. Furthermore, the addition of residences may significantly increase the solid waste disposal at landfills and other waste disposal facilities. This significance of this impact will be further analyzed in the EIR. f) Other: No additional issues related to stormwater management and recycling have been identified at this time. Potential impacts may result from this proposal and will be evaluated within

Section and Subsections	Evaluation of Impact
	the Environmental Impact Report. Any mitigation measures to reduce impacts to less than significant will be listed in the DEIR Mitigation Monitoring and Reporting Program.
VI. AIR QUALITY	a) Development of the proposed project would generate exhaust emissions from construction equipment and vehicles traveling to and from the site. All construction-generated impacts are short term and will be mitigated with appropriate building and engineering requirements. In addition, this project will result in the construction of new roadways and additional traffic on the existing roadways. The impact to the air quality will be significant and further analysis is required. b) The project includes development of residential uses. These uses are typically identified as sensitive receptors. No commercial or industrial uses are proposed with the project. Future development adjacent to the project site will evaluate the impacts to the residential uses. Therefore, at this time it is not anticipated that there may be potentially significant impacts to any sensitive receptors. c) Construction activities would involve the use of a variety of gasoline or diesel-powered equipment that will emit exhaust fumes. These impacts may be potentially significant, however short term in nature. Upon occupancy of the residences, vehicle traffic would increase significantly and may have a significant impact to air quality. These impacts require further analysis. d) Other: No additional issues related to air quality have been identified at this time. Potential impacts may result from this proposal and will be evaluated within the Environmental Impact Report. Any mitigation measures to reduce impacts to less than significant will be listed in the DEIR Mitigation Monitoring and Reporting Program.

Section and Subsections	Evaluation of Impact
VII. TRANSPORTATION/ CIRCULATION	a) The proposed project will result in a significant increase in vehicle trips in this area. Currently, the site is vacant with the exception of one contractor business that operates at the site. The project includes the development of 744 multi-family units which would result in 4,910 vehicle trips per day and 439 single-family residences which would result in 4,170 trips per day. This would total approximately 9,080 trips per day. Additionally the project would add up to 40,000 square feet of commercial floor space generating ..... trips. The addition of this many trips per day may create additional traffic congestion on other roadways, including but not limited to Bouquet Canyon Road, Soledad Canyon Road and Golden Valley Road. In addition, the project is located in the center of the city and three General Plan roadways cross the site. The project will require the construction of two major arterials, Newhall Ranch Road and Golden Valley Road including a bridge over the Santa Clara River. A portion of Newhall Ranch Road, also known as the Cross Valley Connector, will be constructed in conjunction with the the project. Furthermore, Santa Clarita Parkway is another north - south General Plan major arterial that is presently shown on the City's Circulation map. A traffic study should be prepared and further analyses are required to analyze these impacts to the City's transportation system. b) The project will not be constructed with any roadways that do not comply with City standards for roadways, therefore, it is not anticipated to have any impacts from design features. c) Construction and operation of the project may result in inadequate emergency services to this area. This may create the necessity for emergency services to expand in order to have access to this area and be able to respond in an appropriate amount of time. This requires further analysis in the EIR. d) No parking currently exists on the site. The project will be designed to accommodate all parking for residential uses. Therefore, the impacts are anticipated to be less than significant. e) Construction of the site will cause periodic activity that would result in the temporary presence of hazards and barriers, such as construction equipment, open trenches, demolition debris, and stockpiled material at the project site. No bike trails exist at this time and therefore, will not be impacted. Once completed, the project will provide a River trails system and bike trails along the some of the roadways. Further analysis is required to mitigate the impacts during construction. f) The project will result in many roadways throughout the site. All roadway improvements will be designed and constructed meet the City standards. Therefore, the impacts are anticipated to be less than significant. g) The proposed project will not result in a disjointed pattern of roadway improvements. The project and any associated roadway constructed will be designed and developed in compliance with the City's standards. h) Other: No additional traffic and circulation impacts have been identified at this time. Potential impacts may result from this proposal and will be evaluated within the Environmental Impact Report. Any mitigation measures to reduce impacts to less than significant will be listed in the DEIR Mitigation Monitoring and Reporting Program.

Section and Subsections	Evaluation of Impact
VIII. BIOLOGICAL RESOURCES	a) The proposed development is adjacent to the Santa Clara River and may potentially impact endangered, rare or threatened species or plants. The California Department of Fish and Game has the California Natural Diversity Database which should be utilized for determining the potential for species and plants on the site. Surveys and other research should also be conducted in accordance with the procedures set forth by Fish and Game to whether or not potential habitat exists on site. Although approximately 330 acres of natural river area will remain undisturbed there is still the potential impacts to the biological resources of the Santa Clara River. Further studies and analysis is required in the EIR. b) Several oak trees protected by the City's Oak Tree Ordinance exist on the site. Therefore, an oak tree report shall be prepared analyzing the impacts to the oaks. The oak tree report shall be included in the EIR and will provide mitigation for any impacted oaks in accordance with the City's Ordinance. c) The proposed project site may impact any federally protected wetlands through direct removal, filling, hydrological interruption, or other means. The California Department of Fish and Game and the Army Corps of Engineers will determine the boundaries to wetlands and will have jurisdiction. Further analysis is required in the EIR. d) The proposed project may impact a wildlife corridor. Further analysis is required to determine if there is a migration corridor on site that will be impacted by the proposal. e) Other: Bank stabilization will be constructed in conjunction with the project. The bank stabilization will be analyzed within the EIR for this project and within the EIR for the future Newhall Ranch Road and the Golden Valley Road bridge. Further analysis is required to determine the impact to the biological resources. Potential impacts may result from this proposal and will be evaluated within the Environmental Impact Report. Any mitigation measures to reduce impacts to less than significant will be listed in the DEIR Mitigation Monitoring and Reporting Program.
IX. ENERGY AND MINERAL RESOURCES	a) The proposed project is not anticipated to conflict with adopted energy conservation plans, however, this should issue be further reviewed and determined to have no impact. b) The project may result in the use of nonrenewable resources and requires further analysis in the EIR. c) The proposed project is not known at this time to have a mineral resource and further analysis is required in the EIR. d) Other: No additional issues related to energy and mineral resources have been identified at this time. Potential impacts may result from this proposal and will be evaluated within the Environmental Impact Report. Any mitigation measures to reduce impacts to less than significant will be listed in the DEIR Mitigation Monitoring and Reporting Program.

Section and Subsections	Evaluation of Impact
X. HAZARDS	a) Residential uses do not typically generate hazardous materials, and consequently, development on the project site would not create a significant risk of accidental explosion or release of hazardous substance. b) The proposed project will result in additional roadways, which will increase the ease of emergency evacuation and/or emergency response. Further analysis needs to be provided in the EIR. c) No significant hazards to human health are expected to occur with the construction and operation of the project. d) Development is proposed in close proximity to high-pressure gas mains, water lines and possibly other utility lines which is common within California. California Public Utility Commission has mandated safety requirements and the applicant will be required to comply with those requirements. The site is also in close proximity to Southern California Edison electrical transmission lines traverse portions of the project site. Any potential impacts will be further analyzed in the EIR. e) The project site is not located within an area that is heavily vegetated with flammable brush, grass or trees. The project includes approximately 300 acres of natural vegetation that would be at risk of fire hazard. Therefore, further analysis is required. g) Other: No additional issues related to hazards have been identified at this time. Potential impacts may result from this proposal and will be evaluated within the Environmental Impact Report. Any mitigation measures to reduce impacts to less than significant will be listed in the DEIR Mitigation Monitoring and Reporting Program.
XI. NOISE	a) The project site is located in an undeveloped area with little on-site generated noise. The project would result in increased noise generated from the residential uses and the new roadways that will be constructed. Further analysis is required in the EIR. b) The project site will have added noise levels and vibrations and require further analysis in the EIR. c) Other: No additional issues regarding noise have been identified at this time. Potential impacts may result from this proposal and will be evaluated within the Environmental Impact Report. Any mitigation measures to reduce impacts to less than significant will be listed in the DEIR Mitigation Monitoring and Reporting Program.
XII. PUBLIC SERVICES	a) The proposed project includes approximately 1,183 new residences that would require fire services. This would result in a potentially significant impact to the current fire services. Additional fire stations and personnel may be required as a result of this proposal. Further analysis is required. b) As the residential population increases, there may be an impact to police services. Additional services will be required to serve the new residences. Further analysis is required to determine the impact. c) As the population increases, additional need for school facilities may be required. This impact requires further analysis in the EIR. d) The project will require the construction of a new major arterial through the project site. The City of Santa Clarita is in the process of preparing an EIR for this new roadway. The new roadway will require street maintenance, including but not limited to, street sweeping, landscaping maintenance, street light maintenance and will be added to the capital improvement projects that occur annually. This will result in a significant impact to these services. e) The proposal will result in an increase to the permanent resident population,

Section and Subsections	Evaluation of Impact
	and as such would result in an increased need for libraries, community centers, or related government services. Thus, further analysis is required to address these issues. f) Other: No additional issues related to public services have been identified at this time. Potential impacts may result from this proposal and will be evaluated within the Environmental Impact Report. Any mitigation measures to reduce impacts to less than significant will be listed in the DEIR Mitigation Monitoring and Reporting Program.
XIII. UTILITIES	a) The proposal will includes the expansion of the existing utility system throughout the project site. This includes requiring the services of Southern California Edison, Southern California Gas Company, and Pacific Bell telephone company, in addition to cable companies and telecommunication companies. This impact is potentially significant and further analysis is required to address this issue. b) Pacific Bell will provide telephone service to the area. Telephone facilities will be located within the public rights-of-way. No overhead telephone facilities will be permitted. However, new telephone lines are not existing in the area and will be required to be extended to service this new community. This will result in a potentially significant impact and further analysis is required in the EIR. c) The proposed project will result in the addition of approximately 1,183 new residences that will substantially increase the demand for wastewater treatment resulting in a significant impact on local and regional water treatment and distribution facilities. Additional facilities may be required to accommodate the new community. Therefore, further analysis is required. d) The proposed project will result in a potentially significant increase to the amount of sewage generated. Therefore, potentially significant impacts related to sewers or septic tanks require further analysis. e) The proposed project will require the construction of new storm water drainage facilities or expansion of existing facilities. Expansion of the system will be required to accommodate the proposed housing units. This will result in a potentially significant impact and requires further analysis. f) The project, once occupied by residents will generate a significant amount of solid waste that will need to be picked up and transported to appropriate waste facilities. At this time, the City of Santa Clarita exports virtually all its wastes except for those wastes that can be recycled, to the Chiquita Canyon Landfill. Further analysis is required in the EIR to determine the impact to solid waste and recycling facilities g) The proposed project may create a need for local or regional water supplies. Further analysis is required in the EIR. h) Other: No additional issues related to utilities have been identified at this time. Potential impacts may result from this proposal and will be evaluated within the Environmental Impact Report. Any mitigation measures to reduce impacts to less than significant will be listed in the DEIR Mitigation Monitoring and Reporting Program.

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XIV. AESTHETICS	a) The project will significantly modify the appearance of the hillside as viewed along Soledad Canyon Road, between Bouquet Canyon Road and the future Golden Valley Road. In addition, the appearance from Bouquet Canyon Road and San Fernando Road will also be affected. The appearance of this site will be potentially significantly changed and further analysis, including photo simulations is required in the EIR. b) The overall project could potentially impact the aesthetics of the area. Special care needs to be given to the project site due to its high visibility. The site is highly visible from three major arterials and is currently in a natural state. Development may potentially impact the views as seen from these roadways. Further analysis is required to mitigate the impacts to the aesthetics. c) The site is currently vacant with no lighting. Development of the residences will include street lighting along with light generated by each residential unit. This will have a potential impact on the light and glare that will be generated and seen by adjacent roadways and residential uses. Further analysis is required in the EIR. d) Other: No additional issues related to aesthetics have been identified at this time. Potential impacts may result from this proposal and will be evaluated within the Environmental Impact Report. Any mitigation measures to reduce impacts to less than significant will be listed in the DEIR Mitigation Monitoring and Reporting Program.
XV. CULTURAL RESOURCES	a) The proposed site is predominantly undeveloped and vacant. The site has identified cultural sites, which will be addressed within the EIR. Any discovery of other paleontological or archaeological resources will be evaluated. b) The proposed project has the potential to cause a physical change which would affect unique ethnic cultural values because the site has two village sites which may have potentially significant impacts to cultural resources. Further analysis is required in the EIR. c) The proposed project would not restrict existing religious or sacred uses within the project area. d) Cultural sites have been identified on the project site and therefore, development may significantly impact these historical sites. e) Other: No additional issues related to cultural resources need to be addressed. Potential impacts may result from this proposal and will be evaluated within the Environmental Impact Report. Any mitigation measures to reduce impacts to less than significant will be listed in the DEIR Mitigation Monitoring and Reporting Program.
XVI. RECREATION	a) The proposed project will create in 1,183 new households. This will result in increased usage of the City's recreational services, thereby causing a need to provide additional recreational opportunities for the community. The proposed project will have over 300 acres of river area, in addition to a 27-acre passive park on the site which will contribute to the recreation provided

Section and Subsections	Evaluation of Impact
	to the community. Dedication or improvement of recreation facilities is based upon the generation of a residential population. The potential impacts to recreational services will be further evaluated within the EIR. b) Other: No additional issues related to recreation need to be addressed. Potential impacts may result from this proposal and will be evaluated within the Environmental Impact Report. Any mitigation measures to reduce impacts to less than significant will be listed in the DEIR Mitigation Monitoring and Reporting Program.
XVII. MANDATORY FINDINGS OF SIGNIFICANCE	a) – d) The analysis of the issues raised by the checklist questions indicates that project impacts are generally considered to be potentially significant impacts that require further analysis within an Environmental Impact Report. These areas include land use and planning; population & housing; air quality; hazards; biological resources; energy and mineral resources; cultural resources; public services; utilities and service system; aesthetics; and recreation. These areas may require technical studies, photo simulations and other research to provide appropriate environmental documentation for this project.
XVIII. DEPARTMENT OF FISH AND GAME 'DE MINIMUS' FINDING	a) There is evidence that this proposed project may have the potential for an adverse effect, either individually or cumulatively on wildlife resources as defined by Fish and Game Code Section 711.2. Therefore, the proposed project will require biological studies to determine and address the impacts.

Letters from Agencies in Response to Revised Notice of Preparation

STATE OF CALIFORNIA

Governor's Office of Planning and Research

State Clearinghouse

Gray Davis
Governor

Tal Finney
Interim Director

Notice of Preparation

October 20, 2003

RECEIVED
PLANNING DIVISION

OCT 27 2003

PLANNING AND BUILDING SERVICES
CITY OF SANTA CLARITA

To: Reviewing Agencies

Re: Riverpark
SCH# 2002091081

Attached for your review and comment is the Notice of Preparation (NOP) for the Riverpark draft Environmental Impact Report (EIR).

Responsible agencies must transmit their comments on the scope and content of the NOP, focusing on specific information related to their own statutory responsibility, within 30 days of receipt of the NOP from the Lead Agency. This is a courtesy notice provided by the State Clearinghouse with a reminder for you to comment in a timely manner. We encourage other agencies to also respond to this notice and express their concerns early in the environmental review process.

Please direct your comments to:

Jeff Hogan and/or Wendy Deats
City of Santa Clarita
23920 Valencia Boulevard, Suite 300
Santa Clarita, CA 91355

with a copy to the State Clearinghouse in the Office of Planning and Research. Please refer to the SCH number noted above in all correspondence concerning this project.

If you have any questions about the environmental document review process, please call the State Clearinghouse at (916) 445-0613.

Sincerely,

Scott Morgan
Associate Planner, State Clearinghouse

Attachments
cc: Lead Agency

1400 TENTH STREET P.O. BOX 3044 SACRAMENTO, CALIFORNIA 95812-3044
(916)445-0613 FAX(916)323-3018 www.opr.ca.gov

Document Details Report
State Clearinghouse Data Base

SCH# 2002091081
Project Title Riverpark
Lead Agency Santa Clarita, City of

Type NOP Notice of Preparation

Description The applicant proposes to develop six parcels of land totaling 695.4 acres of land for single-and multi-family uses. A tentative tract map is required to subdivide the six lots into 439 single-family lots, 744-multi-family units (5 lots), two commercial lots, HOA lots, a private street lot, recreation lots, a water quality basin lot, a park lots, bridge lots, open space lots, and Santa Clara River lots totaling bridge lots, open space lots, and Santa Clara River lots totaling 545 lots.

Lead Agency Contact

Name Jeff Hogan and/or Wendy Deats
Agency City of Santa Clarita
Phone 661-255-4330 **Fax**
email
Address 23920 Valencia Boulevard, Suite 300
City Santa Clarita **State** CA **Zip** 91355

Project Location

County Los Angeles
City Santa Clarita
Region
Cross Streets East of Bouquet Canyon, norht of Soledad Canyon Road
Parcel No.
Township **Range** **Section** **Base**

Proximity to:

Highways
Airports
Railways
Waterways Santa Clara River
Schools
Land Use Residential Medium, Industrial Commercial, Community Commercial, Commercial Office and Mobile Home Park.
Industrial Commercial (IC), Residential Medium (RM), Commercial Office with a Planned Development overlay (CO PD), Community Commercial (CC) and Community Commercial with a Planned Development overlay (CC PD) and Mobile Home Park (MHP).

Project Issues Landuse; Traffic/Circulation; Public Services; Population/Housing Balance; Biological Resources; Recreation/Parks; Geologic/Seismic; Noise; Aesthetic/Visual; Water Quality; Toxic/Hazardous; Archaeologic-Historic; Water Supply; Other Issues; Air Quality; Minerals

Reviewing Agencies Resources Agency; Department of Conservation; Office of Historic Preservation; Department of Parks and Recreation; Department of Water Resources; Department of Fish and Game, Region 5; Office of Emergency Services; Native American Heritage Commission; State Lands Commission; California Highway Patrol; Department of Housing and Community Development; Caltrans, District 7; State Water Resources Control Board, Division of Water Quality; Department of Toxic Substances Control; Regional Water Quality Control Board, Region 4

Date Received 10/20/2003 **Start of Review** 10/20/2003 **End of Review** 11/18/2003

Note: Blanks in data fields result from insufficient information provided by lead agency.

OP Distribution List

County: Los Angeles

SCH# ~~2002091081~~

esources Agency

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  William Laudermilk
  Region 4
- **Dept. of Fish & Game 5**
  Don Chadwick
  Region 5, Habitat Conservation Program
- **Dept. of Fish & Game 6**
  Gabrina Gatchel
  Region 6, Habitat Conservation Program
- **Dept. of Fish & Game 6 I/M**
  Tammy Allen
  Region 6, Inyo/Mono, Habitat Conservation Program
- **Dept. of Fish & Game M**
  Tom Napoli
  Marine Region

Other Departments

- **Food & Agriculture**
  Steve Shaffer
  Dept. of Food and Agriculture
- **Dept. of General Services**
  Robert Sleppy
  Environmental Services Section
- **Dept. of Health Services**
  Wayne Hubbard
  Dept. of Health/Drinking Water

Independent Commissions,Boards

- **Delta Protection Commission**
  Debby Eddy
- **Office of Emergency Services**
  John Rowden, Manager
- **Governor's Office of Planning & Research**
  State Clearinghouse

- **Native American Heritage Comm.**
  Debbie Treadway
- **Public Utilities Commission**
  Ken Lewis
- **State Lands Commission**
  Jean Sarino
- **Tahoe Regional Planning Agency (TRPA)**
  Lyn Barnett

Business, Trans & Housing

- **Caltrans - Division of Aeronautics**
  Sandy Hesnard
- **Caltrans - Planning**
  Ron Helgeson
- **California Highway Patrol**
  Lt. Julie Page
  Office of Special Projects
- **Housing & Community Development**
  Cathy Creswell
  Housing Policy Division

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  Student Intern, 401 Water Quality Certification Unit
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  Lahontan Region (6)
  - **RWQCB 6V**
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  Colorado River Basin Region (7)
- **RWQCB 8**
  Santa Ana Region (8)
- **RWQCB 9**
  San Diego Region (9)

- **Other** _____

COUNTY OF LOS ANGELES

DEPARTMENT OF PUBLIC WORKS

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JAMES A. NOYES, Director

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ADDRESS ALL CORRESPONDENCE TO:
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PLANNING DIVISION
DEC 17 2003
PLANNING AND BUILDING SERVICES
CITY OF SANTA CLARITA

IN REPLY PLEASE
REFER TO FILE: WM-4

December 4, 2003

Mr. Jeff Hogan
Associate Planner
City of Santa Clarita
23920 Valencia Boulevard, Suite 300
Santa Clarita, CA 91355

Dear Mr. Hogan:

RESPONSE TO A REVISED NOTICE OF PREPARATION OF A DRAFT ENVIRONMENTAL IMPACT REPORT RIVER PARK MASTER CASE NO. 02-175 CITY OF SANTA CLARITA

Thank you for the opportunity to provide comments on the subject document. The proposed project includes the development of 744 multifamily units, 439 single-family dwellings, and 40,000 square feet of commercial uses. A 27.4-acre park is also proposed adjacent to the Santa Clarita River. The 695.4 acres are located at the terminus of Newhall Ranch Road, east of Bouquet Canyon Road, north of Soledad Canyon Road, and adjacent to the Santa Clara River in the City of Santa Clarita. We have reviewed the submittal and offer the following comments:

Environmental Programs

As projected in the Los Angeles County Countywide Siting Element, which was approved in late 1997 by a majority of the cities in the County of Los Angeles with a majority of the population and by the County Board of Supervisors in January 1998, a shortfall in permitted daily landfill capacity may be experienced in the County within the next few years. The construction activities associated with the proposed project and the postdevelopment operation over the life of the proposed project will increase the generation of solid waste and may negatively impact solid waste management infrastructure in the County. Therefore, the proposed environmental document must identify what measures the project proponent plans to implement to mitigate the impact.

Mitigation measures may include implementation of waste reduction and recycling programs to divert the solid waste, including construction waste, from the landfills.

The California Solid Waste Reuse and Recycling Access Act of 1991, as amended, requires each development project to provide an adequate storage area for collection and removal of recyclable materials. The environmental document should include/discuss standards to provide adequate recyclable storage areas for collection/storage of recyclable materials for commercial establishments in this project.

Should any operation within the subject project include the construction, installation, modification or removal of underground storage tanks, our Environmental Programs Division must be contacted for required approvals and operating permits.

Food service establishments may be required to provide a grease treatment device and will be subject to review and approval by our Environmental Programs Division.

If you have any questions, please contact Mr. Wilson Fong at (626) 458-3581.

Geotechnical and Materials Engineering

The requested Environmental Impact Report (EIR) must be submitted for review.

The EIR shall address the geotechnical issues identified in the Notice of Preparation/Initial Study.

A description of the project and the associated grading, i.e., existing and proposed grades, etc., must be shown on a topographic map. Also, all geotechnical hazards must be identified, and any mitigation measures discussed in detail. The requested information shall be included in the appropriate documents, as requested by others.

Portions of the project site are located within both mapped potentially liquefiable areas and mapped potential seismically induced landslide areas, per the State of California Seismic Hazard Zone Map, Newhall Quadrangles. However, liquefaction analysis and seismic slope stability analyses are not warranted at this time. Detailed liquefaction and seismic stability analyses, conforming to the requirements of the State of California Division of Mines and Geology Special Publication 117, must be conducted at the tentative map and/or grading/building plan stages.

If you have any questions, please contact Mr. Amir Alam at (626) 458-4925.

Land Development

Hydrology and Standard Urban Storm Water Mitigation Plan (SUSMP) Review

This environmental document has been reviewed only for drainage and SUSMP impacts to County of Los Angeles areas and facilities. There are no comments regarding drainage and SUSMP at this time.

Pursuant to recent legislation related to Senate Bill 221 and Senate Bill 610, the EIR shall address the adequacy of the water supply to ensure availability of water for the new development without adversely affecting existing users. The document shall provide for review the water supply assessment and water supply verification from water purveyors of the project.

If you have any questions, please contact Mr. Timothy Chen at (626) 458-4921.

Transportation Planning

We have reviewed the subject document and the proposed project will not have any significant impacts on Los Angeles County highways.

If you have any questions, please contact Mr. Hubert Seto at (626) 458-4349.

Traffic and Lighting

The proposed project has the potential to significantly impact the County and County/City roadways and intersections in the area. We would like the opportunity to review the related environmental documents and traffic study upon its completion. The County's methodology shall be used when evaluating the County and/or County/City intersections. The study shall also address the cumulative impacts generated by this and nearby developments and include the level of service analysis for the affected intersections. If traffic signals or other mitigation measures are warranted at the affected intersections, the developer shall determine its proportionate share of traffic signal or other mitigation costs and submit this information to Public Works for review and approval. A copy of our Traffic Impact Analysis Report Guidelines is enclosed.

If you have any questions, please contact Ms. Jennifer Frary of our Traffic Studies Section at (626) 300-4792.

Watershed Management

San Gabriel River/Santa Clara Watersheds

Sections IV and V: Water and Storm Water Management

We agree with the subject document's analysis and findings of potential significant impacts that will require further analysis in the EIR. Also, the proposed project should include investigation of watershed management opportunities to maximize capture of local rainfall on the project area, eliminate incremental increases in flows to the storm drain or natural channel system, and provide filtering of flows to capture contaminants originating from the project site.

If you have any questions, please contact Mr. Arfan Haidary at (626) 458-4329.

If you have any questions regarding the environmental review process of Public Works, please contact Ms. Massie Munroe at (626) 458-4359.

Very truly yours,

JAMES A. NOYES
Director of Public Works

ROD H. KUBOMOTO
Assistant Deputy Director
Watershed Management Division

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Enc.

Traffic Impact Analysis Report Guidelines

January 1, 1997

Prepared by the County of Los Angeles
Department of Public Works

James A. Noyes
Director of Public Works

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(01/22/99)

I. Introduction

The County of Los Angeles Department of Public Works has established the following Guidelines for the preparation of Traffic Impact Analysis (TIA) reports. The purpose of these Guidelines is to establish procedures to ensure consistency of analysis and the adequacy of information presented and timely review by County staff. It is strongly recommended that the applicant's traffic engineer consult with County staff before beginning the study to establish the scope and basic assumptions of the study and any deviations from these Guidelines to avoid unnecessary delays or revisions. For assistance in the TIA scoping process, the Traffic and Lighting Division, Traffic Studies Unit, can be contacted at (626) 458-5909.

II. Requirements

Generally, the Department staff is concerned with adverse impacts on traffic if:

1. Traffic generated by a project considered alone or cumulatively with other related projects, when added to existing traffic volumes, exceeds ~~certain~~ capacity thresholds of ~~an~~ intersection or roadway, ~~contributes to an unacceptable level of service (LOS), or exacerbates~~ an existing congested condition.

2. Project generated traffic interferes with the existing traffic flow (e.g., due to the location of access roads, driveways, and parking facilities).

3. Proposed access locations do not provide for adequate safety (e.g., due to limited visibility on curving roadways).

4. Nonresidential uses generate commuter or truck traffic through a residential area.

5. Project generated traffic significantly increases on a residential street and alters its residential character.

A traffic report must be prepared by a registered Civil or Traffic Engineer. A traffic report is generally needed if a project generates over 500 trips per day or where other possible adverse impacts as discussed in the Analysis and Impact Section (see page 4) of these Guidelines are identified. Before a full review is conducted, the County staff will check the completeness of the TIA report using the attached check list (Exhibit A). If the report is missing any of the check list items, it will be returned for revision.

III. TIA Report Contents

A. Project Description

The following information is required:

1. A description of the project, including those factors which quantify traffic generators, e.g., dwelling units, square feet of office space, persons to be employed, restaurant seats, acres of raw land, etc. For residential developments, the description should indicate the type of residence, (e.g., one level or townhouse condominiums, and if its use is for families, adults or retirees).

2. A plot plan showing proposed driveways, streets, internal circulation, and any new parking facilities on the project site.

3. A vicinity map showing the site location and the study area relative to other transportation systems.

4. A brief history of the projects that are part of the phased Master Plan or a parent tract/parcel map.

B. Transportation Circulation Setting

The following information is required:

1. **Existing and Proposed Site Uses**

   A description of the permitted and/or proposed uses of the project site in terms of the various zoning and land use categories of the County, and the status and the usage of any facilities currently existing on the site.

2. **Existing and Proposed Roadways and Intersections**

   A description of existing streets and roadways, both within the project site (if any) and in the surrounding area. Include information on the roadway classifications (per the Highway Plan), the number of lanes and roadway widths, signalized intersections, separate turn lanes, and the signal phases for turning movements.

Existing daily directional and peak-hour through and turning traffic volumes on the roadways surrounding and/or logically associated with the project site, including Secondary and Major highways and freeways. Local streets affected by the project should also be shown. Each report shall include appendices providing count data used in the preparation of the report. The source and date of the traffic volume information shall be indicated. Count data should not be over one year old. Since peak volumes vary considerably, a ten percent daily variation is not uncommon, especially on recreational routes or roadways near shopping centers; therefore, representative peak-hour volumes are to be chosen carefully.

All assumed roadways and intersections or any other transportation circulation improvements must be identified and discussed. The discussion should include the scope and the status of the assumed improvements including the construction schedule and financing plan. It should be noted that all assumed roadways and intersections or any other transportation circulation improvements will be made a condition of approval for the project to be in place prior to the issuance of building permits. If assumed improvements do not get built on time due to an unforeseeable condition, traffic conditions for a different assumed highway network or other mitigation measures will be considered if a traffic study is submitted with a different assumed network or other measures are recommended to mitigate the traffic impact in question.

C. Analysis and Impact

The following information is required:

1. Trip Generation Analysis

Tabulate the estimated number of daily trips and a.m. and p.m. peak-hour trips generated by the proposed project entering and exiting the site. Trip generation factors and source are to be included. The trip generation rates contained in the latest edition of the Institute of Transportation Engineers Trip Generation manual should generally be used, except in the case of condominiums/townhomes when the following rates should be used per unit:

	ADT	A.M.-Peak	P.M.-Peak
		Outgoing/Incoming	Outgoing/Incoming
Condominiums/ Townhomes	8.0	0.48/0.06	0.26/0.47

There may be a trip reduction due to internal and/or pass-by trips. Internal trip reduction can only be applied for mixed-use types of developments and pass-by trip reduction for retail/commercial types of developments. Internal or pass-by trip reduction assumptions will require analytical support based on verifiable actual similar developments to demonstrate how the figures were derived and will require approval by the County.

2. Trip Distribution

Diagrams showing the percentages and volumes of the project and nearby project's a.m. and p.m. peak-hour trips logically distributed on the roadway system must be provided. The Regional Daily Trip Distribution Factors (Exhibit D-3) contained in the Congestion Management Program (CMP) Land Use Analysis Guidelines shall be referenced for regional trip distribution assumptions. If it is assumed that new routes will alter traffic patterns, adequate backup including traffic distribution maps must be provided showing how and why these routes will alter traffic patterns.

The study area should include arterial highways, freeways, and intersections generally within a one-mile radius of the project site.

Note: This distance may be greater than one-mile for rural areas depending on the proximity to nearby signalized intersections and the availability of master plan access routes.

3. Related Projects List

A list of related projects that are approximately within a one-and-a-half mile radius of the project site and would reasonably be expected to be in place by the project's build out year must be included in the report. Related projects shall include all pending, approved, recorded, or constructed projects that are not occupied at the time of the existing traffic counts.

The County of Los Angeles Department of Regional Planning (DRP) and other public agencies (if necessary) should be contacted to obtain the latest listings. A table and a map showing the status, project/zone change/conditional use permit/parcel map/tract number, and the location of each project must be provided. For a computer printout of the listing of all filed projects within the County, Land Development Management Section of the DRP, at (213) 974-6481 can be contacted.

4. **LOS Analysis**

If it appears that the project's generated traffic alone or together with other projects in the area could worsen the LOS of an intersection or roadway, a "before" and "after" LOS analysis is necessary. The Intersection Capacity Utilization (ICU) or Critical Movement Analysis are two methods often used to assess existing and future LOS at intersections.

If the ICU planning method is used, a maximum of 1,600 vehicles per hour per lane should be used (2,880 vehicles per hour should be used for dual left-turn lanes) and a ten percent yellow clearance cycle should be included. Intersection LOS analysis and calculation work sheets, as well as diagrams showing turning volumes shall be included in the report for the following traffic conditions:

(a) Existing traffic;
(b) Existing traffic plus ambient growth to the year the project will be completed (preproject);
(c) Traffic in (b) plus project traffic;
(d) Traffic in (c) with the proposed mitigation measures (if necessary);
(e) Traffic in (c) plus the cumulative traffic of other known developments; and
(f) Traffic in (e) with the proposed mitigation measures (if necessary).

The project's impact on two-lane roadways should also be analyzed for all of the above traffic conditions if those two-lane roadways are used for access. LOS service analysis contained in the Highway Capacity Analysis, Chapter 8, Two-Lane Highways, should be used to evaluate the project's impact. For simplified analysis, use the established significant impact thresholds for two-lane roadways as shown on page 7.

5. Significant Impact Threshold

For intersections, the impact is considered significant if the project related increase in the volume to capacity (v/c) ratio equals or exceeds the threshold shown below.

INTERSECTIONS		
Preproject		Project /C Increase
LOS	V/C	
C	0.71 to 0.80	0.04 or more
D	0.81 to 0.90	0.02 or more
E/F	0.91 or more	0.01 or more

The project is deemed to have a significant impact on two-lane roadways when it adds the following percentages based on LOS of the preproject conditions.

TWO-LANE ROADWAYS				
		Percentages Increase in Passenger Car Per Hour (PCPH) by Project		
		Preproject LOS		
Directional Split	Total Capacity (PCPH)	C	D	E/F
50/50	2,800	4	2	1
60/40	2,650	4	2	1
70/30	2,500	4	2	1
80/20	2,300	4	2	1
90/10	2,100	4	2	1
100/0	2,000	4	2	1

6. **Analysis Discussion**

Discuss conclusions regarding the adverse impacts caused by the proposed project on the roadway system. If the cumulative traffic impact of this and other projects require mitigation measures, such as traffic signals, then estimate the percent share using the project percent share formula given in the Section III D of the TIA Guidelines. When the proposed project and other nearby developments are expected to significantly impact adjacent roadways, the developer may be required to enter into a secured agreement to contribute to a benefit district to fund major roadway and bridge improvements in the region. Also, for all recommendations to increase the number of travel lanes on a street or at an intersection as a mitigation measure, the report must clearly identify the impacts associated with such a change such as whether or not additional right of way will be required and whether it is feasible to acquire the right of way based on the level of development of the adjacent land and buildings (if any).

Discuss other possible adverse impacts on traffic. Examples of these are: (1) the limited visibility of access points on curved roadways; (2) the need for pavement widening to provide left-turn and right-turn lanes at access points into the proposed project; (3) the impact of increased traffic volumes on local residential streets; and (4) the need for road realignment to improve sight distance.

Projects which propose to amend the County's General Plan Land Use and substantially increase potential traffic generation must provide an analysis of the project at current planned land use versus proposed land use in the build out condition for the project area. The purpose of such analysis is to provide decision makers with the understanding of the planned circulation network's ability to accommodate additional traffic generation caused by the proposed General Plan Land Use amendments.

D. Traffic Models and Model Generated TIA's

Computerized traffic models are planning tools used to develop future traffic projections based on development growth patterns. The Department currently operates two traffic models, one for the Santa Clarita Valley and another for the Ventura Corridor area. The Department can test proposed development project traffic impacts for the public in these areas for a fee. For assistance in the traffic modeling, the Planning Division, Transportation Planning/Assessments Section, can be contacted at (626) 458-4351.

The project percent share should be based on the peak-hour volumes that warrant signals. If both peak hours satisfy the installation of signals, the average of the two peak-hour volumes should be used in the percent share analysis.

F. Mitigation Measures

The following information is required.

Identify feasible mitigation measures which would mitigate the project and/or other related projects' significant impacts to a level of insignificance. Also, identify those mitigation measures which will be implemented by others. Those mitigation measures that are assumed to be implemented by others will be made a condition of approval for the project to be in place prior to issuance of building permits. Mitigation measures may include, but are not limited to, the following:

1. **Traffic Engineering Techniques.**

   a. Locate access points to optimize visibility and reduce potential conflict.
   b. Design parking facilities to avoid queuing into public streets during peak arrival periods.
   c. Provide additional off-street parking.
   d. Dedicate visibility easements to assure adequate sight distance at intersections and driveways.
   e. Signalize or modify traffic signals at intersections.
   f. Install left-turn phasing and/or multiple turning lanes to accommodate particularly heavy turning movements.
   g. Widen the pavement to provide left- or right-turn lanes to lessen the interference with the traffic flow.[1]
   h. Widen intersection approaches to provide additional capacity.
   I. Prohibit left turns to and from the proposed development.
   j. Restrict on-street parking during peak hours to increase street capacity.[1]

2. **Contribute to a benefit district to fund major capital improvements**

[1] Physical roadway improvements to improve capacity should be considered before considering parking restrictions.

a. Construct a grade separation.
b. Improve or construct alternate routes.
c. Complete proposed routes shown on the Los Angeles Highway Plan.
d. Improve freeway interchanges (bridge, widening, modifications, and etc.).

3. **Transportation System Management (TSM) Techniques**[2]

a. Establish flexible working hours.
b. Encourage employee use of carpools and public transportation (specific measures must be indicated).
c. Establish preferential parking for carpools.
d. Restrict truck deliveries to Major and Secondary highways and encourage deliveries during the off-peak hours.
e. Establish a monitoring program to ensure that project traffic volumes do not exceed projected traffic demand.

Note: When it appears that other jurisdictions will be impacted by a development, the Department will request that the involved jurisdiction also review the TIA. A written response from that jurisdiction should be provided with appropriate follow-up to the lead County agency.

G. CMP Guidelines

The following information is required:

Where the project meets the criteria established in the County of Los Angeles' CMP Land Use Analysis Guidelines, a CMP analysis must be provided. A copy of the latest Guidelines will be available upon request. A CMP TIA is required for all projects required to prepare an Environmental Assessment based on local determination or projects requiring a traffic study.

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2 Contributions to a benefit district and/or TSM techniques may not be used to lower LOS in the capacity calculations.

The geographic area examined in the TIA must include the following, at a minimum.

- All CMP arterial monitoring intersections (see Exhibit B of the Guidelines), including freeway on- or off-ramp intersections, where the proposed project will add 50 or more trips during either the a.m. or p.m. peak hours.
- Main line freeway monitoring locations (see Exhibit C of the Guidelines) where the project will add 150 or more trips, in either direction, during the a.m. or p.m. weekday peak hours.
- Caltrans must also be consulted to identify other specific locations to be analyzed on the State highway system.

If, based on these criteria, the TIA identifies no facilities for study, no further traffic analysis is required.

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Attach.

EXHIBIT A
TRAFFIC IMPACT ANALYSIS REPORT CONTENTS CHECK LIST

Note: Before a full review is conducted, PW's staff will check the completeness of the Traffic Impact Analysis Report. If the Report is missing any of the items listed below, it will be returned for revision.

CONTENT	YES/ NO	COMMENT
Site Plan • Access locations • Interior circulation		
Trip Generation Rates • Institute of Transportation Engineers (ITE) trip generation rates • Documentation for alternate rates		
Trip Distribution • Regional • Local project (am/pm) • Local related projects(am/pm)		
Traffic Counts • Taken within one year • Date/Time		
Discounting • Internal trip discounts for mixed use developments • Pass-by trip discounts for commercial/retail developments • Backup		
Level of Service Calculations • Intersection Capacity Utilization (ICU) or Criteria Movement Analysis • 10 percent yellow clearance for ICU planning method • 1,600 vehicles per lane (vpl); 2,880 vpl for dual left-turn lanes for ICU planning method • Calculation sheets • Scenarios as required per Guidelines • Existing/Future lane configurations		
Signal Warrant Analysis • Peak-hour/Average Daily Traffic per the State of California Department of Transportation standards		
Mitigation Measures • Project impacts • Cumulative developments impacts • Projects percent share of the cost to mitigate cumulative development impacts		
Congestion Management Program Analysis		

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WATER RECLAMATION
SOLID WASTE MANAGEMENT

COUNTY SANITATION DISTRICTS
OF LOS ANGELES COUNTY

1955 Workman Mill Road, Whittier, CA 90601-1400
Mailing Address: P.O. Box 4998, Whittier, CA 90607-4998
Telephone: (562) 699-7411, FAX: (562) 699-7414
www.lacsd.org

JAMES F. STAHL
Chief Engineer and General Manager

RECEIVED
PLANNING DIVISION
NOV 06 2003
PLANNING AND BUILDING SERVICES
CITY OF SANTA CLARITA

November 4, 2003

File No: 26-00.04-00

Mr. Jeff Hogan, Associate Planner
Department of Planning and Building Services
City of Santa Clarita
23920 Valencia Boulevard, Suite 302
Santa Clarita, CA 91355

Dear Mr. Hogan:

Tentative Tract Map No. 53425, Master Case No. 02-175, Riverpark

The County Sanitation Districts of Los Angeles County (Districts) received a Revised Notice of Preparation of a Draft Environmental Impact Report for the subject project on October 20, 2003. The proposed development is located within the jurisdictional boundaries of District No. 26. We offer the following comments regarding sewerage service:

- Previous comments submitted by the Districts in correspondence dated October 1, 2002 (copy enclosed), to your agency, still apply to the subject project with the following updated information.
- The Santa Clarita Valley Joint Sewerage System currently processes an average flow of 18.3 million gallons per day.
- The expected average wastewater flow from the project site is 243,204 gallons per day.

If you have any questions, please contact the undersigned at (562) 699-7411, extension 2717.

Very truly yours,

James F. Stahl

Ruth I. Frazen

Ruth I. Frazen
Engineering Technician
Planning & Property Management Section

RIF:eg

Enclosures

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WATER RECLAMATION
SOLID WASTE MANAGEMENT

COUNTY SANITATION DISTRICTS
OF LOS ANGELES COUNTY

1955 Workman Mill Road, Whittier, CA 90601-1400
Mailing Address: P.O. Box 4998, Whittier, CA 90607-4998
Telephone: (562) 699-7411, FAX: (562) 699-5422
www.lacsd.org

JAMES F. STAHL
Chief Engineer and General Manager

October 1, 2002

File No: 26-00.04-00

Mr. Jeff Hogan, Associate Planner
City of Santa Clarita
23920 Valencia Boulevard, Suite 300
Santa Clarita, CA 91355

Dear Mr. Hogan:

Tentative Tract Map No. 53425, Riverpark (Panhandle)

The County Sanitation Districts of Los Angeles County (Districts) received a Notice of Preparation of a Draft Environmental Impact Report for the subject project on September 19, 2002. The proposed development is located within the jurisdictional boundaries of District No. 26. We offer the following comments regarding sewerage service:

1. Because of the project's location, the flow originating from the proposed project would have to be transported to the Districts' trunk sewer by local sewers which are not maintained by the Districts. If no local sewer lines currently exist, it is the responsibility of the developer to convey any wastewater generated by the project to the nearest local sewer and/or Districts' trunk sewer. Local sewers west of the project area convey wastewater to the Districts' Bouquet Canyon Relief Trunk Sewer, located in Bouquet Canyon Road at Espuella Drive and Newhall Ranch Road. This 24-inch diameter trunk sewer has a design capacity of 11.6 million gallons per day (mgd) and conveyed a peak flow of 5.2 mgd when last measured in 2001.

2. The Districts operate two water reclamation plants (WRPs), the Saugus WRP and the Valencia WRP in order to provide wastewater treatment in the Santa Clarita Valley. These facilities are interconnected to form a regional treatment system known as the Santa Clarita Valley Joint Sewerage System (SCVJSS) which has a permitted treatment capacity of 19.1 mgd. A two phase expansion of the Valencia WRP has been currently approved which will increase the treatment capacity of the SCVJSS by 15 mgd. The first phase, scheduled to be completed by mid 2003, will consist of a 9 mgd expansion and is expected to meet the Regional Growth Management Plan forecasted demand through 2010. The second phase, scheduled to be completed by early 2010, will consist of an additional 6 mgd expansion and will increase the SCVJSS treatment capacity to 34.1 mgd which will be sufficient to meet the demand until 2015. The SCVJSS currently processes an average flow of 17.3 mgd.

3. The expected average wastewater flow from the project site is 238,323 gallons per day. A copy of the Districts' average wastewater generation factors is enclosed for your information.

4. The Districts are empowered by the California Health and Safety Code to charge a fee for the privilege of connecting (directly or indirectly) to the Districts' Sewerage System or **increasing the existing strength and/or quantity of wastewater attributable to a particular parcel or operation already connected**. This connection fee is required to construct an incremental expansion of the Sewerage System to accommodate the proposed project which will mitigate the impact of this project on the present Sewerage System. Payment of a connection fee will be required before a permit to connect to the sewer is issued. A copy of the Connection Fee Information Sheet is enclosed for your convenience. For more specific information regarding the connection fee application procedure and fees, please contact the Connection Fee Counter at extension 2727.

5. In order for the Districts to conform with the requirements of the Federal Clean Air Act (CAA), the design capacities of the Districts' wastewater treatment facilities are based on the regional growth forecast adopted by the Southern California Association of Governments (SCAG). Specific policies included in the development of the SCAG regional growth forecast are incorporated into the Air Quality Management Plan, which is prepared by the South Coast Air Quality Management District in order to improve air quality in the South Coast Air Basin as mandated by the CAA. All expansions of Districts' facilities must be sized and service phased in a manner which will be consistent with the SCAG regional growth forecast for the counties of Los Angeles, Orange, San Bernardino, Riverside, Ventura, and Imperial. The available capacity of the Districts' treatment facilities will, therefore, be limited to levels associated with the approved growth identified by SCAG. As such, this letter does not constitute a guarantee of wastewater service, but is to advise you that the Districts intend to provide this service up to the levels which are legally permitted and to inform you of the currently existing capacity and any proposed expansion of the Districts' facilities.

If you have any questions, please contact the undersigned at (562) 699-7411, extension 2717.

Very truly yours,

James F. Stahl

Ruth I. Frazen

Ruth I. Frazen
Engineering Technician
Planning & Property Management Section

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Enclosures

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TABLE 1

LOADINGS FOR EACH CLASS OF LAND USE

DESCRIPTION	UNIT OF MEASURE	FLOW (Gallons Per Day)	COD (Pounds Per Day)	SUSPENDED SOLIDS (Pounds Per Day)
RESIDENTIAL				
Single Family Home	Parcel	260	1.22	0.59
Duplex	Parcel	312	1.46	0.70
Triplex	Parcel	468	2.19	1.05
Fourplex	Parcel	624	2.92	1.40
Condominiums	Parcel	195	0.92	0.44
Single Family Home (reduced rate)	Parcel	156	0.73	0.35
Five Units or More	No. of Dwlg. Units	156	0.73	0.35
Mobile Home Parks	No. of Spaces	156	0.73	0.35
COMMERCIAL				
Hotel/Motel/Rooming House	Room	125	0.54	0.28
Store	1000 ft^2	100	0.43	0.23
Supermarket	1000 ft^2	150	2.00	1.00
Shopping Center	1000 ft^2	325	3.00	1.17
Regional Mall	1000 ft^2	150	2.10	0.77
Office Building	1000 ft^2	200	0.86	0.45
Professional Building	1000 ft^2	300	1.29	0.68
Restaurant	1000 ft^2	1,000	16.68	5.00
Indoor Theatre	1000 ft^2	125	0.54	0.28
Car Wash				
Tunnel - No Recycling	1000 ft^2	3,700	15.86	8.33
Tunnel - Recycling	1000 ft^2	2,700	11.74	6.16
Wand	1000 ft^2	700	3.00	1.58
Financial Institution	1000 ft^2	100	0.43	0.23
Service Shop	1000 ft^2	100	0.43	0.23
Animal Kennels	1000 ft^2	100	0.43	0.23
Service Station	1000 ft^2	100	0.43	0.23
Auto Sales/Repair	1000 ft^2	100	0.43	0.23
Wholesale Outlet	1000 ft^2	100	0.43	0.23
Nursery/Greenhouse	1000 ft^2	25	0.11	0.06
Manufacturing	1000 ft^2	200	1.86	0.70
Dry Manufacturing	1000 ft^2	25	0.23	0.09
Lumber Yard	1000 ft^2	25	0.23	0.09
Warehousing	1000 ft^2	25	0.23	0.09
Open Storage	1000 ft^2	25	0.23	0.09
Drive-in Theatre	1000 ft^2	20	0.09	0.05

TABLE 1
(continued)
LOADINGS FOR EACH CLASS OF LAND USE

DESCRIPTION	UNIT OF MEASURE	FLOW (Gallons Per Day)	COD (Pounds Per Day)	SUSPENDED SOLIDS (Pounds Per Day)
COMMERCIAL				
Night Club	1000 ft^2	350	1.50	0.79
Bowling/Skating	1000 ft^2	150	1.76	0.55
Club	1000 ft^2	125	0.54	0.27
Auditorium, Amusement	1000 ft^2	350	1.50	0.79
Golf Course, Camp, and Park (Structures and Improvements	1000 ft^2	100	0.43	0.23
Recreational Vehicle Park	No. of Spaces	55	0.34	0.14
Convalescent Home	Bed	125	0.54	0.28
Laundry	1000 ft^2	3,825	16.40	8.61
Mortuary/Cemetery	1000 ft^2	100	1.33	0.67
Health Spa, Gymnasium				
With Showers	1000 ft^2	600	2.58	1.35
Without Showers	1000 ft^2	300	1.29	0.68
Convention Center, Fairground, Racetrack, Sports Stadium/Arena	Average Daily Attendance	10	0.04	0.02
INSTITUTIONAL				
College/University	Student	20	0.09	0.05
Private School	1000 ft^2	200	0.86	0.45
Church	1000 ft^2	50	0.21	0.11

INFORMATION SHEET FOR APPLICANTS
PROPOSING TO CONNECT OR INCREASE THEIR DISCHARGE TO
THE COUNTY SANITATION DISTRICTS OF LOS ANGELES COUNTY SEWERAGE SYSTEM

THE PROGRAM

The County Sanitation Districts of Los Angeles County are empowered by the California Health and Safety Code to charge a fee for the privilege of connecting to a Sanitation District's sewerage system. Your connection to a City or County sewer constitutes a connection to a Sanitation District's sewerage system as these sewers flow into a Sanitation District's system. The County Sanitation Districts of Los Angeles County provide for the conveyance, treatment, and disposal of your wastewater. **PAYMENT OF A CONNECTION FEE TO THE COUNTY SANITATION DISTRICTS OF LOS ANGELES COUNTY WILL BE REQUIRED BEFORE A CITY OR THE COUNTY WILL ISSUE YOU A PERMIT TO CONNECT TO THE SEWER.**

I. WHO IS REQUIRED TO PAY A CONNECTION FEE?

1. Anyone connecting to the sewerage system for the first time for any structure located on a parcel(s) of land within a County Sanitation District of Los Angeles County.
2. Anyone increasing the quantity of wastewater discharged due to the construction of additional dwelling units on or a change in land usage of a parcel already connected to the sewerage system.
3. Anyone increasing the improvement square footage of a commercial or institutional parcel by more than 25 percent.
4. Anyone increasing the quantity and/or strength of wastewater from an industrial parcel.
5. If you qualify for an Ad Valorem Tax or Demolition Credit, connection fee will be adjusted accordingly.

II. HOW ARE THE CONNECTION FEES USED?

The connection fees are used to provide additional conveyance, treatment, and disposal facilities (capital facilities) which are made necessary by new users connecting to a Sanitation District's sewerage system or by existing users who significantly increase the quantity or strength of their wastewater discharge. The Connection Fee Program insures that all users pay their fair share for any necessary expansion of the system.

III. HOW MUCH IS MY CONNECTION FEE?

Your connection fee can be determined from the Connection Fee Schedule specific to the Sanitation District in which your parcel(s) to be connected is located. A Sanitation District boundary map is attached to each corresponding Sanitation District Connection Fee Schedule. Your City or County sewer permitting office has copies of the Connection Fee Schedule(s) and Sanitation District boundary map(s) for your parcel(s). If you require verification of the Sanitation District in which your parcel is located, please call the Sanitation Districts' information number listed under Item IX below.

IV. WHAT FORMS ARE REQUIRED*?

The Connection Fee application package consists of the following:

1. Information Sheet for Applicants (this form)
2. Application for Sewer Connection

3. Connection Fee Schedule with Sanitation District Map (one schedule for each Sanitation District)

*Additional forms are required for Industrial Dischargers.

V. WHAT DO I NEED TO FILE?

1. Completed Application Form
2. A complete set of architectural blueprints (not required for connecting one single family home)
3. Fee Payment (checks payable to: County Sanitation Districts of Los Angeles County)
4. Industrial applicants must file additional forms and follow the procedures as outlined in the application instructions

VI. WHERE DO I SUBMIT THE FORMS?

Residential, Commercial, and Institutional applicants should submit the above listed materials either by mail or in person to:

County Sanitation Districts of Los Angeles County
Connection Fee Program, Room 130
1955 Workman Mill Road
Whittier, CA 90601

Industrial applicants should submit the appropriate materials directly to the City or County office which will issue the sewer connection permit.

VII. HOW LONG DOES IT TAKE TO PROCESS MY APPLICATION?

Applications submitted by mail are generally processed and mailed within three working days of receipt. Applications brought in person are processed on the same day provided the application, supporting materials, and fee is satisfactory. Processing of large and/or complex projects may take longer.

VIII. HOW DO I OBTAIN MY SEWER PERMIT TO CONNECT?

An approved Application for Sewer Connection will be returned to the applicant after all necessary documents for processing have been submitted. Present this approved-stamped copy to the City or County Office issuing sewer connection permits for your area at the time you apply for actual sewer hookup.

IX. HOW CAN I GET ADDITIONAL INFORMATION?

If you require assistance or need additional information, please call the County Sanitation Districts of Los Angeles County at (562) 699-7411, extension 2727.

X. WHAT ARE THE DISTRICTS' WORKING HOURS?

The Districts' offices are open between the hours of 7:00 a.m. and 4:00 p.m., Monday through Thursday, and between the hours of 7:00 a.m. and 3:00 p.m. on Friday, except holidays. When applying in person, applicants must be at the Connection Fee counter at least 30 minutes before closing time.

CITY OF SANTA CLARITA

COUNTY OF LOS ANGELES
FIRE DEPARTMENT

5823 Rickenbacker Road
Commerce, California 90040

MASTER CASE # 02-175
REVISED

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PLANNING AND BUILDING SERVICES
CITY OF SANTA CLARITA

CONDITIONS OF APPROVAL FOR SUBDIVISIONS - INCORPORATED

Subdivision No: **53425** Map Date **Fire Dept. 09/03/03**

C.U.P. _____ City **Santa Clarita**

☐ **FIRE DEPARTMENT HOLD** on the tentative map shall remain until verification from the Los Angeles County Fire Dept. Planning Section is received, stating adequacy of service. Contact (323) 881-2404.

☒ Access shall comply with Section 902 of the Fire Code, which requires all weather access. All weather access may require paving.

☒ Fire Department Access shall be extended to within 150 feet distance of any exterior portion of all structures.

☒ Where driveways extend further than 300 feet and are of single access design, turnarounds suitable for fire protection equipment use shall be provided and shown on the final map. Turnarounds shall be designed, constructed and maintained to insure there integrity for Fire Department use. Where topography dictates, turnarounds shall be provided for driveways that extend over 150 feet in length.

☒ Private driveways shall be indicated on the final map as "Private Driveway and Firelane" with the widths clearly depicted and shall be maintained in accordance with the Fire Code. All required fire hydrants shall be installed, tested and accepted prior to construction.

☒ Vehicular access must be provided and maintained serviceable throughout construction to all required fire hydrants. All required fire hydrants shall be installed, tested and accepted prior to construction.

☒ This property is located within the area described by the Fire Department as "Very High Fire Hazard Severity Zone" (formerly Fire Zone 4). A "Fuel Modification Plan" shall be submitted and approved prior to final map clearance. (Contact Fuel Modification Unit, Fire Station #32, 605 North Angeleno Avenue, Azusa, CA 91702-2904, Phone (626) 969-5205, for details).

☒ Provide Fire Department or City approved street signs and building access numbers prior to occupancy.

☐ Additional fire protection systems shall be installed in lieu of suitable access and/or fire protection water.

☐ The final concept map, which has been submitted to this department for review, has fulfilled the conditions of approval recommended by this department for access only.

☐ These conditions shall be secured by a C.U.P. and/or Covenant and Agreement approved by the County of Los Angeles Fire Department prior to final map clearance.

☐ The Fire Department has no additional requirements for this division of land.

Comments: **REVISED CONDITIONS. A second means of access is required prior to the construction of the 501st dwelling unit. The number of dwelling units includes all single family homes, and all the units within the apartments and town-homes. Please refer to page 3 for additional conditions for access. No fire station is required for development mitigation for this project.**

INSPECTOR **Wally Collins** DATE **September 3, 2003**

Land Development Unit – Fire Prevention Division – (323) 890-4243, Fax (323) 890-9783

COUNTY OF LOS ANGELES
FIRE DEPARTMENT

5823 Rickenbacker Road
Commerce, California 90040

REVISED

WATER SYSTEM REQUIREMENTS – INCORPORATED

Subdivision No: **53425** Map Date **Fire Dept. 09/03/03**

C.U.P. _____ City **Santa Clarita**

☒ Provide water mains, fire hydrants and fire flows as required by the County of Los Angeles Fire Department, for all land shown on map which shall be recorded.

☒ The required fire flow for public fire hydrants at this location is **5000** gallons per minute at 20 psi for a duration of **5** hours, over and above maximum daily domestic demand. **3** Hydrant(s) flowing simultaneously may be used to achieve the required fire flow.

☒ The required fire flow for private on-site hydrants is **2500** gallons per minute at 20 psi. Each private on-site hydrant must be capable of flowing **2500** gallons per minute at 20 psi with two hydrants flowing simultaneously, one of which must be the furthest from the public water source.

☒ Fire hydrant requirements are as follows:

Install **79** public fire hydrant(s). Upgrade / Verify ____ existing Public fire hydrant(s).
Install **24** private on-site fire hydrant(s).

☒ All hydrants shall measure 6"x 4"x 2-1/2" brass or bronze, conforming to current AWWA standard C503 or approved equal. All on-site hydrants shall be installed a minimum of 25' feet from a structure or protected by a two (2) hour rated firewall.

☒ Location: As per map on file with the office.
☒ Other location: **Please refer to the attached Tentative Tract Map for hydrant locations.**

☒ All required fire hydrants shall be installed, tested and accepted or bonded for prior to Final Map approval. Vehicular access must be provided and maintained serviceable throughout construction.

☐ The County of Los Angeles Fire Department is not setting requirements for water mains, fire hydrants and fire flows as a condition of approval for this division of land as presently zoned and/or submitted.

☐ Additional water system requirements will be required when this land is further subdivided and/or during the building permit process.

☐ Hydrants and fire flows are adequate to meet current Fire Department requirements.

☐ Upgrade not necessary, if existing hydrant(s) meet(s) fire flow requirements.

SUBMIT COMPLETED (ORIGINAL ONLY) FIRE FLOW AVAILABILITY FORM TO THIS OFFICE FOR REVIEW.

COMMENTS: **REVISED CONDITIONS. Please refer to page 3 for additional water system requirements.**

All hydrants shall be installed in conformance with Title 20, County of Los Angeles Government Code and County of Los Angeles Fire Code, or appropriate City regulations. This shall include minimum six-inch diameter mains. Arrangements to meet these requirements must be made with the water purveyor serving the area.

By Inspector **Wally Collins** WC Date **September 3, 2003**

COUNTY OF LOS ANGELES
FIRE DEPARTMENT

5823 Rickenbacker Road
Commerce, California 90040

REVISED

SUBDIVISION, WATER AND ACCESS REQUIREMENTS

ADDITIONAL PAGE

SUBDIVISION NO **53425** PAGE NO. **3**

REVISED CONDITIONS

ADDITIONAL ACCESS REQUIREMENTS FOR PUBLIC STREETS:

1. Street widths for this project shall conform to the widths indicated on the cross-sections on this Tract Map. All street widths shall be measured from the curb flow line to curb flow line.

2. Temporary turn-arounds are required for the end of Newhall Ranch Road and end of Santa Clarita Parkway. The turn-arounds shall be either a cul-de-sac bulb with a 32-foot center line or a hammer-head design, which would be posted and red curbbed "NO PARKING - FIRE LANE". These temporary turnarounds are required to stay in place until the bridges have been completed and are opened to an existing street.

3. All streets with center medians shall have a minimum paved width of 20 feet on each side of the median, with street posted and red curbed "NO PARKING - FIRE LANE".

4. The traffic circle at the end of "N" Street is approved. The area surronding the traffic circle shall posted and red curbed "NO PARKING -FIRE LANE".

5. If gates are installed, provide 4 sets of gate detail plans to the Department's Land Development Unit prior to any approvals for this Tract Map, and the construction of any dwelling unit. Gates shall conform to the Department's Regulation #5.

6. Due to "N" Street extending greater than 700 feet in length, "N" Street shall a minimum street width of 36 feet, curb-flow-line to curb-flow-line, not 34 feet as indicated on the map. Provide four (4) revised copies of this page only of the Tract Map indicating this correction. This is required to be submitted to the Land Development Unit prior to any approvals of this Tract Map.

ADDITIONAL ACCESS REQUIREMENTS FOR ON-SITE ACCESS FOR AREA "C" & AREA "D":

1. Provide a minimum unobstructed driveway width of 28 feet, clear-to-sky to posted and red curbed "NO PARKING - FIRE LANE". Each turning radius shall be 42 feet from the center-line.

2. If gates are installed, provide 4 sets of gate detail plans to the Department's Land Development Unit prior to any approvals for this Tract Map, and the construction of any dwelling unit. Gates shall conform to the Department's Regulation #5. Gates shall be the same width as the driveway (28 feet), with all gate acessory hardware out of the accessway when the gate is in the fully open position.

3. Additional access requirements may be needed during the building construction process.

ADDITIONAL WATER SYSTEM REQUIREMENTS:

1. The required fire flow for nineteen (20) public fire hydrants located on Newhall Ranch Road, adjacent to Area "C" and Area "D", is 5000 gpm at 20 psi for 5 hours with 3 fire hydrants flowing.

2. Fifty-eight (59) public fire hydrants are required to be installed on all other streets, including Newhall Ranch Road, as indicated on the tract map. The required fire flow is 1250 gpm at 20 for 2 hours with one (1) fire hydrant flowing.

3. Twenty-two (24) on-site fire hydrants are required within Area "C" & Area "D". The required fire flow is 2500 gpm at 20 psi for 2 hours with two (2) fire hydrants flowing.

By Inspector: **Wally Collins** WC Date: **September 3, 2003**

Land Development Unit – Fire Prevention Division – (323) 890-4243, Fax (323) 890-9783

DEPARTMENT OF TRANSPORTATION
DISTRICT 7, REGIONAL PLANNING
IGR/CEQA BRANCH
120 SO. SPRING ST.
LOS ANGELES, CA 90012
PHONE (213) 897-6536
FAX (213) 897-1337
E-Mail:NersesYerjanian@dot.ca.gov

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CITY OF SANTA CLARITA

Flex your power!
Be energy efficient!

Mr. Jeff Hogan, Associate Planner
Office of Planning
City of Santa Clarita
23920 Valencia Blvd., Suite 302
Santa Clarita, CA. 91355

IGR/CEQA# 031056NY
Revised NOP/TTMap# 53425
744 Multi Family Units, 439 Single Family Units
& 40,000 SF Commercial uses
LA/126 & 14/13.5

October 23, 2003

Dear Mr. Hogan:

Thank you for including the California Department of Transportation (Caltrans) in the environmental review process for the revised Notice of Preparation for the Tentative Tract Map# 53425 in Santa Clarita.

Based on the information received, and to assist us in our efforts to completely evaluate and assess the impacts of this project on the State transportation system, a traffic study in advance of the DEIR should be prepared to analyze the following information:

Please reference the Department's **Traffic Impact Study Guideline** on the Internet at http://www.dot.ca.gov/hq/traffops/developserv/operationalsystems/reports/tisguide.pdf

1. Presentations of assumptions and methods used to develop trip generation, trip distribution, choice of travel mode, and assignments of trips to state route 126 & 14.

2. Consistency of project travel modeling with other regional and local modeling forecasts and with travel data. The IGR/CEQA office may use indices to check results. Differences or inconsistencies must be thoroughly explained.

3. Analysis of ADT, AM, and PM peak-hour volumes for both existing and future conditions in the affected area. This should include freeways, interchanges, and intersections, and all HOV facilities. Interchange Level of Service should be

specified (HCM2000 method requested). Utilization of transit lines and vehicles, and of all facilities, should be realistically estimated. Future conditions would include build-out of all projects (see next item) and any plan-horizon years.

4. Inclusion of all appropriate traffic volumes. Analysis should include traffic from the project, cumulative traffic generated from all specific approved developments in the area, and traffic growth other than from the project and developments. That is, include: existing + project + other projects + other growth.

5. Discussion of mitigation measures appropriate to alleviate anticipated traffic impacts. These mitigation discussions should include, but not be limited to, the following:
- description of transportation infrastructure improvements
- financial costs, funding sources and financing
- sequence and scheduling considerations
- implementation responsibilities, controls and monitoring

Any mitigation involving transit, HOV, or TDM must be rigorously justified and its effects conservatively estimated. Improvements involving dedication of land or physical construction may be favorably considered.

6. Specification of developer's percent share of the cost, as well as a plan of realistic mitigation measures under the control of the developer. The ratio should be estimated, of additional traffic due to the project, to that amount of increase in traffic for which real mitigation must be provided (see Traffic Impact Study Guidelines). We note for purposes of determining project share of costs, the number of trips from the project on each traveling segment or element is estimated in the context of forecasted traffic volumes which include build-out of all approved and not yet approved projects, and other sources of growth. Analytical methods such as select-link travel forecast modeling might be used.

The Department as a commenting agency under CEQA has jurisdiction superceding that of MTA in identifying the freeway analysis needed for this project. Caltrans is responsible for obtaining measures that will off-set project vehicle trip generation that worsens Caltrans facilities and hence, it does not adhere to the CMP guide of 150 or more vehicle trips added before freeway analysis is needed. MTA's Congestion Management Program in acknowledging the Department's role, stipulates that Caltrans must be consulted to identify specific locations to be analyzed on the State Highway System.

Mr. Hogan October 23, 2003

We look forward to reviewing the DEIR. We expect to receive a copy from the State Clearinghouse. However, to expedite the review process, you may send two copies in advance to the undersigned at the following address:

Stephen Buswell
IGR/CEQA Branch Chief
Caltrans District 07
Regional Transportation Planning Office
120 S. Spring St., Los Angeles, CA 90012

If you have any questions regarding this response, please call the Project Engineer/Coordinator Mr. Yerjanian at (213) 897-6536 and refer to IGR/CEQA # 031056NY.

Sincerely,

STEPHEN J. BUSWELL
IGR/CEQA Branch Chief
Transportation Planning Office

County of Los Angeles
Sheriff's Department Headquarters
4700 Ramona Boulevard
Monterey Park, California 91754-2169
(661) 255-1121

Leroy D. Baca, Sheriff

November 21, 2003

Mr. Jeff Hogan, Associate Planner
City of Santa Clarita
23920 Valencia Boulevard, Suite 300
Santa Clarita, California 91355

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PLANNING AND BUILDING SERVICES
CITY OF SANTA CLARITA

Dear Mr. Hogan:

RIVERPARK PROJECT
MASTER CASE # 02-175

The proposed Project consisting of 1,183 dwelling units located at the terminus of Newhall Ranch Road, east of Bouquet Canyon between the Castaic Lake Water Agency property and the Santa Clara River, north of Soledad Canyon Road, is within the jurisdiction of the Los Angeles County Sheriff's Department, Santa Clarita Valley Station, 23740 Magic Mountain Parkway, Valencia, California. The station is located approximately 3 to 4 miles from the project site.

It is anticipated that the non-emergent response time to a request for service would be approximately 40-50 minutes. The priority response time would be approximately 8-10 minutes and the response time under emergent circumstances would be approximately 5-8 minutes. All response times are approximations, only, and would be dependent on both the deployment of area radio cars and traffic conditions.

This station serves an area of 656 square miles, which is made up of the City of Santa Clarita and unincorporated County area between the Los Angeles City Limits to the South, the Kern County Line to the North and involving all area between the Ventura County Line to the West and the township of Agua Dulce to the East. The population served by our station is approximately 200,000 residents.

Our ideal officer to population ratio is one deputy per 1,000 residents and with our current staffing of 161 sworn deputies currently assigned, our ratio is less than ideal at one deputy per every 1,243 residents. According to the figures released by the Department of Finance as of January, 1998, residential density is 3.011 persons per dwelling unit. This proposed project will generate a population increase of 3,562. Based on the above, the project would require 3 additional deputies to the station complement.

Our primary concern is our ability to provide an adequate level of protection and service to all areas we police. Due to the rapidly expanding population of the Santa Clarita Valley and its record-setting home building, it is difficult to project the impact of this project on law enforcement.

Adding this project and other projects in progress, either proposed, approved or committed, it is certain they will all significantly strain our resources to the breaking point. Additionally, the increase in required field personnel for this project alone, will necessitate a concomitant increase in support resources such as detectives, complaint desk officers, vehicles and portable radios. While not directly a builder's matter, our ability to provide a sufficient level of law enforcement services must be considered when applications for new projects such as these are considered.

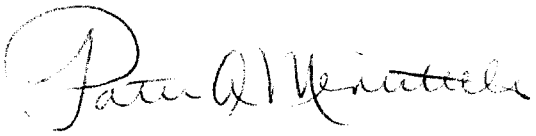
It is suggested, for the security and safety of the residents, that the builder apply defensible space concepts in its construction designs, and the following crime prevention measures be implemented during site and building layout design:

- Provide lighting in open areas and parking lots;
- Ensure the visibility of doors and windows from the street and between buildings;
- Provide adequate parking spaces in the parking lots to accommodate shoppers, employees and residents;
- Ensure that the required building address numbers are lighted and readily apparent from the street for emergency response agencies.

Should you have further questions, please feel free to call me at (661) 255-1121 extension 5102, or Deputy Patrick Rissler at extension 5159.

Sincerely,

LEROY D. BACA, SHERIFF



Patti A. Minutello, Captain
Santa Clarita Valley Station

PAM:par

SCOPE

Santa Clarita Organization for Planning and the Environment

TO PROMOTE, PROTECT AND PRESERVE THE ENVIRONMENT, ECOLOGY AND QUALITY OF LIFE IN THE SANTA CLARITA VALLEY

POST OFFICE BOX 1182, SANTA CLARITA, CA 91386

1-14-03

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PLANNING AND BUILDING SERVICE
CITY OF SANTA CLARITA

Attn: Jeff Hogan/Wendy Deats
City of Santa Clarita
23920 Valencia Blvd.
Santa Clarita, Ca. 91355

Re: Revised Notice of Preparation, River Park Project

Thank-you for the opportunity to comment on issues that should be disclosed in the upcoming EIR. We agree with the categories you have checked on the first page of the NOP and the potentially affected environmental factors indicated on page 3, but believe that the fiscal impact of this proposal and the jobs/housing balance should also be discussed. We concur with your determination that an EIR must be provided. We request that we receive that document for review when it becomes available.

We generally agree with the areas you have found to be of potentially significant impact except on page 12 Item XVII b. and c. Both these items should be check "Potentially significant." Degrading critical habitat for endangered species, loss of water recharge areas, adding additional water users before an adequate water supply is identified, and reducing the flood plain of the Santa Clara River are all impacts that will produce long-term negative and unmitigatable impacts to the water shed. The cumulative impacts of this project when considered with all the other projects along the Santa Clara River and its tributaries are severe.

We request that the project be designed around all native oaks, particularly the rare blue oak located on the property. At this early date, tree removals could be avoided by better and more creative project design. Open pavers should be incorporated into the project mitigation to ensure tree survival. Any oak removals should have a required replacement on site of at minimum a two to 1 ratio.

Cumulative analysis of impacts to the watershed must address loss of recharge areas and surface flows, impacts to water supply, increased flood flows and water velocities and cumulative losses to species and habitats. Cumulative analysis should be prepared with an eye to the parameters and goals enumerated in the recent Appellate Court decision Communities for a Better Environment v. California Resources Agency (Oct. 28, 2002). (Third District Docket # is C038844.)

Landscaping should be accomplished with native plants to reduce water usage and reduce the spread of exotics in natural areas.

Dual plumbing should be required so that gray water could be used to water open areas. Recycled water is not currently available in this location, so dual plumbing would afford the only opportunity for using recycled water.

The City must carefully evaluate the required SB610 assessment for compliance with the law. This section of the water code does NOT allow reliance on the Urban Water Management Plan for compliance. Reported water supplies must be currently available or contracted. An independent water supply analysis should be obtained to accurately asses water availability.

This project contains several working water supply wells. Proper closure of these wells and impacts to new well sites should be addressed in the EIR. Also, financial costs to Valencia Water Co. rate payers should be disclosed.

Evaluation of water supply impacts by ammonium perchlorate should be analyzed. Variability of State Water project supplies should be disclosed. The City should not rely on the CLWA Urban Water Management Plan to properly disclose water supply as this document is currently being litigated and may be set aside, causing a domino effect on this project approval.

When evaluating biological impacts, we request that the City hire an independent biologist to do species surveys including surveys for the Arroyo Toad and endangered bird and plant species. Newhall Land did not produce complete and accurate in the past, nor was survey protocol correctly followed. Hazing machines were used to scare of endangered birds during their nesting seasons and a siting of the arroyo toad and finding of the slender-horned spine flower colonies were either not reported or inadequately reported. Brush grading of habitat areas has already occurred on site. We question why such brushing should have occurred PRIOR to the preparation of an Environmental Impact Report in a sensitive habitat area. Since normally brushing permits are required, we wonder why the City would have issued such a permit with full knowledge that a project requiring the preparation of an EIR was being proposed. We ask that these issues be addressed in the EIR. Also, when discussing biological impacts, we request that historical information PRIOR to brush grading, be used as the habitat baseline and that historical surveys prior to bush grading be included in the EIR.

Impacts to wildlife movement should be discussed. Comments from all conservation agencies engaged in ensuring viability of wildlife should be solicited, including the Santa Monica Mountains Conservancy.

This project is located in a floodway and liquefaction hazard area as determined by the State Depart of Conservation, Division of Mines and Geology. These hazards must be thoroughly disclosed in the EIR so that future residents are aware of potential health and safety factors.

This project will require permits from Regional Water Quality Control Board, Dept. of Fish and Game, Army Corps of Engineers and others. Attention should be given to ensure that the project will comply with regulations of all other permitting agencies. This could best be accomplished by applying to those agencies concurrently so that any required changes can be incorporated early in the planning process.

Thank-you for your time and attention to our comments. We look forward to receiving a copy of the DEIR for review.

Sincerely,

Pat Saletore

SANTA CLARITA WATER, A DIVISION OF CASTAIC LAKE WATER AGENCY

SCWD

22722 SOLEDAD CANYON ROAD • SANTA CLARITA, CALIFORNIA 91350 • (661) 259-2737
MAILING ADDRESS: P.O. BOX 903 • SANTA CLARITA, CALIFORNIA 91380-9003

September 11, 2003

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PLANNING AND BUILDING SERVICES
CITY OF SANTA CLARITA

Ms. Wendy Deats
Planning Department
City of Santa Clarita
23920 Valencia Boulevard, Suite 300
Santa Clarita, CA 91355

Re: SB 610 Water Supply Assessment for "Riverpark (Panhandle)" Project,
Tentative Tract Map 53425

Dear Ms. Deats:

As requested by your letter of July 14, 2003, attached is the SB 610 Water Supply Assessment for the above mentioned project. The Castaic Lake Water Agency Board of Directors approved the Assessment on September 10, 2003 on behalf of the CLWA Santa Clarita Water Division, which is the retail water purveyor for the project.

If you have any questions or comments, please call Mary Lou Cotton, Water Resources Manager, at 661/297-1600.

Sincerely,

W. J. Manetta, Jr.
Retail Manager

WJM/naf
Enclosure

cc: Mr. Glenn Adamick, The Newhall Land and Farming Company

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PLANNING AND BUILDING SERVICES
CITY OF SANTA CLARITA

SB 610
WATER SUPPLY ASSESSMENT
for
THE RIVER PARK PROJECT

August 7, 2003

Prepared by:
Santa Clarita Water Division of
Castaic Lake Water Agency

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1.0 INTRODUCTION

This report is a Water Supply Assessment (Assessment) prepared at the request of the City of Santa Clarita for the proposed River Park project ("Project"). The Assessment has been drafted pursuant to the requirements of Senate Bill 610 (Costa; Chapter 643, Stats. 2001) ("SB 610") which requires the public water systems which may supply water to certain proposed development projects to prepare a water supply assessment for use by the planning agency in compliance with the California Environmental Quality Act (CEQA).[1]

This Assessment has been prepared by the Santa Clarita Water Division (SCWD)[2] of the Castaic Lake Water Agency (CLWA). SCWD will be the retail water supplier to the Project and is the operator of a "public water system" as defined by SB 610. As the operator of the public water system which may provide water to the proposed River Park development, SCWD is responsible for preparing an SB 610 Water Supply Assessment.[3]

An SB 610 Water Supply Assessment is required for any "project" that is subject to the California Environmental Quality Act (CEQA)[4] and proposes, *inter alia*, residential development of more than 500 dwelling units.[5] The River Park project is a qualifying project under this definition.

This Assessment will provide information to the City of Santa Clarita for its consideration in making a determination as to whether there is a sufficient water supply available to serve the River Park project.[6] The Assessment has been submitted to the city within 90-days of its request to the public water system.[7] The City of Santa Clarita requested this Assessment from SCWD on July 16, 2003.

No Assessment has been previously prepared for the River Park project that complies with the requirements of SB 610.[8]

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[1] SB 610 amended section 21151.9 of the California Public Resources Code, and amended sections 10631, 10656, 10910, 10911, 10912, and 10915 of, repealed section 10913 of, and added and amended section 10657 of, the California Water Code.

[2] SCWD is the "public water system" for purposes of this Assessment as defined by Water Code § 10912 (b), (c). A public water system has 3,000 or more service connections and provides piped water to the public for human consumption.

[3] Water Code 10910(b).

[4] Public Resources Code § 21080.

[5] Water Code § 10912(a)(1). This section also includes other types of development which are defined as a "project" by this section of the code.

[6] Water Code § 10911(c) states that the lead agency shall determine, based on the entire record, whether projected water supplies will be sufficient to satisfy the demands of the project, in addition to existing and planned future uses.

[7] Water Code § 10910 (g)(1).

[8] Water Code § 10910(h) states that if a project has been the subject of a Water Supply Assessment that complies with the requirements of this part, no additional water supply Assessment shall be required for

1.1 River Park Project

The River Park project is a proposed residential development consisting of single and multi-family housing on a 695 acre site in the City of Santa Clarita. It includes 439 single-family dwellings, 744 apartments, 40,000 square feet of commercial building area, and a 29-acre passive park, of which a maximum of eight (8) acres would be landscaped and irrigated. The Project site is located at the terminus of Newhall Ranch Road, east of Bouquet Canyon Road between CLWA property and the Santa Clara River, north of Soledad Canyon Road. Home construction is anticipated to begin in 2006 and will continue until build-out in 2009. At build-out, total water demand for the project is estimated to be less than 700 acre-feet per year (afy) (Table 1.1).

1.2 Purpose of the Assessment

The purpose of the Assessment is to provide an analysis of whether the SCWD water system has sufficient projected water supplies to meet the projected demands of the Project.[9] Specifically this Assessment evaluates whether the total projected water *supply*, determined to be available for the Project during normal, single dry, and multiple dry water years over the next 20 years, will meet the projected water *demand* associated with the proposed Project, in addition to existing and planned future water uses, including agriculture and manufacturing uses.[10] If the water supply is anticipated to be insufficient, the Assessment must describe measures being taken to obtain an adequate supply.[11]

SB 610 requires this Assessment to be included in the Environmental Impact Report prepared for the River Park project pursuant to the California Environmental Quality Act (CEQA).[12] The relationship between the Assessment and other River Park environmental documents is discussed in more detail in the following paragraphs.

subsequent projects that were part of a larger project for which a Water Supply Assessment was completed and that has complied with the requirements of this part and for which the public water system, or the city or county, has concluded that its water supplies are sufficient to meet the projected water demand associated with the proposed project, in addition to the existing and planned future uses, unless there has been substantial changes in the project or circumstances since approval of the Assessment.

[9] Water Code § 10910(c).

[10] Water Code § 10910 (c) (4).

[11] Water Code § 10911(a).

[12] Water Code § 10911(b), (c).

Table 1.1 – Estimated Water Demands

(Using SCWD Water Duty Factors From 2001)

LAND USE CATEGORY	AMOUNT	WATER DUTY FACTOR	WATER DEMAND (AFY)
Single Family Units	439 units	0.55 af/unit	241.45
Apartments	744 units	0.19 af/unit	141.36
Park	8 Acres	3 af per acre	24.0
Other Misc. Landscaping (irrigated common landscaping, pocket parks, etc.)	93 Acres	3 af per acre	279.0
Commercial (40,000 sq. ft.)	3 Acres	0.0289 af/ 100 sq ft	11.56
TOTAL PROJECT:			**697.37**

1.3 Castaic Lake Water Agency

The Castaic Lake Water Agency is a public water agency that serves an area of 195 square miles in Los Angeles and Ventura Counties. CLWA is a water wholesaler that provides about half of the water that Santa Clarita households and businesses use. CLWA, through the SCWD, also provides retail water service to the area previously served by the Santa Clarita Water Company. CLWA operates two potable water treatment plants, storage facilities and over 17 miles of transmission pipelines, and has initiated recycled water service. CLWA supplements local groundwater supplies with State Water Project (SWP) water from Northern California. This water is treated and delivered to the local water retailers, including the SCWD. The other three retail purveyors served by CLWA are: Los Angeles County Water District #36, Newhall County Water District, and Valencia Water Company.

1.4 Santa Clarita Water Division

In September 1999 CLWA acquired the Santa Clarita Water Company, an investor-owned retail water company serving the eastern part of the Santa Clarita Valley.[13] The former Santa Clarita Water Company was incorporated into CLWA's Santa Clarita Water Division, which continues to serve the same area with Santa Clarita Water Company's facilities. SCWD's service area includes portions of the City of Santa Clarita and unincorporated portions of Los Angeles County in the communities of Saugus, Canyon Country, and Newhall. SCWD supplies water from both groundwater wells and CLWA imported water. The SCWD is the retailer that will serve the River Park project. The project is located within the SCWD service area.

1.5 2000 Urban Water Management Plan

The water demand associated with the proposed River Park project is consistent with the projected future water demand figures in the most recent Urban Water Management Plan (UWMP) adopted by CLWA and the Santa Clarita Valley's retail purveyors: Los Angeles

[13] CLWA acquired 100% the capital stock in Santa Clarita Water Company by way of a judgment in eminent domain in Los Angeles County Superior Court case number BC 215065, entered on September 2, 1999. Subsequently, CLWA's authority to own the Santa Clarita Water Company and to provide retail water service through the former assets of the Company has been challenged in *Klajic v. Castaic Lake Water Agency* (California Court of Appeal, 2nd Dist, case number B161069). In addition, the public agency borrowing undertaken by CLWA to finance the acquisition of the Santa Clarita Water Company has been challenged in *Plambeck v. Stone and Youngberg* (LASC case no. BC249168). The cases are currently pending, but neither case seeks relief affecting the availability of water to Santa Clarita Water Company, SCWD or CLWA.

County Waterworks District # 36, Newhall County Water District, the Santa Clarita Water Company and the Valencia Water Company. The timing of the Project places it well within the timeframe for calculating "planned future uses" within the 2020 water supply projection included in the 2000 UWMP. Pertinent information from the UWMP, as well as other reports and analyses of water supply and demand, is considered in this Assessment. The final version of the Urban Water Management Plan was adopted by the CLWA Board of Directors on December 20, 2000 and submitted to the California Department of Water Resources.[14] Since adoption of the UWMP by the CLWA Board of Directors, additional documents, such as the State Water Project Delivery Reliability Report 2003, have been released that contain information and data that may update the UWMP. State law requires a revision of the UWMP by December 31, 2005, and any new information or data will be incorporated into that revision.

1.6 Reliance on the 2000 UWMP to Document Water Supply and Demand

SB 610 requires the Assessment to document the water demand for existing uses, planned future uses and the proposed development. Water Code §10910(c)(2) states that if the projected water demand associated with the proposed project was accounted for in the most recently adopted urban water management plan, the public water system may incorporate and consider the requested information from the urban water management plan in preparing the Assessment. The 2000 UWMP projections were based upon projected development based on the Los Angeles County Assessor's Land Use Codes (and General Plan documents) adopted by the City of Santa Clarita and by the County of Los Angeles, and did anticipate and take into account in its overall projections of demand, a level of development in the CLWA area consistent with that proposed by the River Park project. Pursuant to §10910(c)(2), this Assessment considers the data and findings included in the UWMP document in its determination of whether there is sufficient water supply to serve the River Park project because the Project's water demand is factored into the 20-year projection as a "planned future use."

The UWMP assumed that connections would increase by about 2,240 new connections per year. Connection data compiled and maintained by CLWA since 2000 (the year the UWMP was prepared) shows 2,249 new connections in 2000, 2,822 new connections in 2001 and 2,080 new connections in 2002. These actual numbers track closely with the assumptions from the UWMP.

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[14] The validity and sufficiency of the UWMP were challenged in *County of Ventura v. Castaic Lake Water Agency*, (Kern County Superior Court case no. 245365-RJO). The trial court has ruled that UWMP meets the requirements of law. The Friends of the Santa Clara River have filed a notice of appeal from the Superior Court judgment, although the final judgment, including the award of costs, has not been filed. The County of Ventura has determined not to appeal the judgment.

1.7 Information Relied Upon in Preparation of this Assessment

Information from the following documentation has been relied upon in the preparation of this Assessment. The referenced documents are incorporated into this Assessment as if fully set forth herein. Copies of the referenced documents are available for review at the Castaic Lake Water Agency and copies can be obtained upon the payment of a fee to cover the cost of reproduction.

1.7.1 2000 Urban Water Management Plan, Castaic Lake Water Agency, Newhall County Water District, Santa Clarita Water Company and Valencia Water Company.

1.7.2 Santa Clarita Valley Water Report 2002, April 2003, CLWA, Los Angeles County Waterworks District #36, Newhall County Water District, and Valencia Water Company.

1.7.3 2001 Update Report, Hydrogeologic Conditions in the Alluvial and Saugus Formation Aquifer Systems, Richard C. Slade & Associates LLC (July 2002) ("Slade (2002)" herein).

1.7.4 Castaic Lake Water Agency, Capital Improvement Program, Kennedy-Jenks Consultants, 2003

1.7.5 The State Water Project Delivery Reliability Report, California Department of Water Resources, May 2003

1.7.6 Water Supply Contract Between the State of California Department of Water Resources and the Castaic Lake Water Agency, 1963 (plus amendments, including the "Monterey Amendment," 1995, and Amendment No. 18, 1999, the transfer of 41,000 acre-feet of Table A Amount from Kern

County Water Agency to Castaic Lake Water Agency)[15]

1.7.7 2002 Point of Delivery Agreement Among the Department of Water Resources of the State of California, Castaic Lake Water Agency and Kern County Water Agency (Semitropic Groundwater Storage Program).[16]

[15] CLWA's contract rights to SWP water total 95,200 acre feet per year ("afy"), including a water transfer of 41,000 afy approved in 1999 from two water agencies in Kern County. CLWA's Environmental Impact Report prepared in connection with the 41,000 afy water transfer was challenged in *Friends of the Santa Clara River v. Castaic Lake Water Agency* (Los Angeles Superior Court Case No. PC 018110). The courts have required CLWA to re-certify the EIR but have held that CLWA may continue to utilize the 41,000 afy under the transfer.

[16] Due to availability of SWP water during 2002, CLWA entered into a groundwater banking agreement in 2002. Twenty-four thousand acre feet of SWP water, contracted to CLWA, was stored within the Semitropic Groundwater Storage Program in Kern County so that CLWA may withdraw the water in future years of shortage. The Negative Declaration prepared by CLWA was challenged in *California Water Network v. Castaic Lake Water Agency* (Ventura County Superior Court case no. CIV 215327), which is pending.

2.0 WATER SUPPLY ASSESSMENT

Based on the information contained in the 2000 UWMP and other supporting information relied upon in the preparation of this Assessment SCWD concludes there will be a sufficient water supply available at the time the River Park project is ready for occupancy, to meet the needs of the project in addition to existing and other planned future uses.

CLWA has existing water entitlements, rights and contracts to meet future demand as needed over time, and has committed sufficient capital resources and planned investments in various water programs and facilities to serve all of its existing and planned customers, including SCWD's customers. SCWD water entitlements, rights and contracts for local supplies, in addition to imported supplies provided by CLWA are sufficient to serve all of its existing and planned customers. SCWD has also identified an operational strategy combined with a prudent and flexible management approach to ensuring water reliability.

SCWD's current service area-wide demands are approximately 27,000 afy[17]. As mentioned previously, the River Park project will require less than 700 afy at build-out. The conclusions of the SCWD as stated in the 2000 UWMP related to the requirements of the SB 610 Assessment for River Park are as follows:

2.1 Average/Normal Year Water Assessment

The UWMP indicates that no shortages are anticipated within the Agency's service area in an average/normal water year through 2020 if projected imported and local supplies are developed as estimated.[18] Total projected water demands for the CLWA through the year 2020 are compared with the supplies projected to be available to meet demands in this analysis. The following table summarizes the data from the UWMP.

"Future Planned Water Supply Programs" as listed below, are included in the UWMP to indicate examples of how CLWA would add reliability and flexibility to its water supply portfolio. Programs such as these will be analyzed by CLWA and contracts entered into as need and cost-effectiveness are determined through time. Future Water Supply Assessments will reflect these contractual agreements.

[17] This represents average year demand. Dry year demand is approximately 10% higher.
[18] Castaic Lake Water Agency, 2000 Urban Water Management Plan (December 2000) p.4-2.

Table 2.1 Average/Normal Water Year

SUPPLY AND DEMAND ASSESSMENT[19] (Acre-Feet Per Year)	Year 2005	Year 2010	Year 2015	Year 2020
EXISTING WATER SUPPLY PROGRAMS:				
Local Supplies				
Alluvial Aquifer	35,000	35,000	35,000	35,000
Saugus Formation	11,000	11,000	11,000	11,000
Recycled Water	1,700	1,700	1,700	1,700
Imported Supplies[20]				
SWP Table A Amount	56,073	56,073	56,073	56,073
TOTAL EXISTING SUPPLIES:	**103,773**	**103,773**	**103,773**	**103,773**
Total Estimated Demand	81,700	90,100	100,700	113,100
Difference Surplus/(Deficit)	22,073	13,673	3,073	(9,327)
FUTURE PLANNED WATER SUPPLY PROGRAMS:				
Local Supplies				
Recycled Water		9,000	14,000	17,000
Imported Supplies				
Water Transfers	5,200	5,200	5,200	5,200
TOTAL PLANNED SUPPLIES:	**5,200**	**14,200**	**19,200**	**22,200**

[19] Excerpted from Table 4-1 of the UWMP

[20] 56,073 af represents approximately 58.9% of CLWA's contractual Table A Amount. Normal year supply based on assumptions from the UWMP. The DWR SWP Delivery Reliability Report (2003) indicates greater reliability of Table A deliveries (72 to 76%) than was assumed for the 2000 UWMP

2.2 Single Dry Year Water Assessment

The UWMP evaluated the estimated dry-year demands and projected supplies for the year 2010 for the purpose of assessing a single dry year. This year was selected in order to show the results of local and imported water supply development over the next 10 years. In May 2003 DWR finalized its State Water Project Delivery Reliability Report. For the worst-case scenario single dry year (1977, with a one in 73 year probability of occurrence), DWR estimates that SWP deliveries to contractors would be approximately 20 percent of contract amounts. If projected imported and local supplies are developed as indicated, no shortages are anticipated within the Agency's service area for the extreme-case single dry-year scenario analyzed.

2.3 Multiple Dry Year Water Assessment

The UWMP estimated the minimum water supply available during each of the three water years, 2001, 2002, and 2003.[21] The surface and groundwater supplies included in this analysis are reflective of supplies available during the 1987-92 drought years, and in particular, 1990, 1991, and 1992. The supplies available from recycling projects are assumed to experience no reduction in a dry year but are also assumed not to be fully on-line at this early stage of the 20-year projection. Demand reductions of 10% based on short-term water conservation programs are assumed for these dry-year scenarios (this level of conservation was achieved during the 1987-1992 drought). If projected imported and local supplies are developed as indicated, no shortages are anticipated within the Agency's service area in the dry-year scenarios analyzed.[22] Years 1, 2 and 3 in Table 2.1 represent demand projections for 2003 through 2005. The single and multiple dry year water supply and demand assessments from the UWMP are summarized in the following table[23].

Information concerning "Future Planned Water Supply Programs" as listed below, from the UWMP and other sources was included to indicate examples of how CLWA would add reliability and flexibility to its water supply portfolio. Programs such as these will be analyzed by CLWA and contracts entered into as need and cost-effectiveness are determined through time. Future Water Supply Assessments will reflect these contractual agreements.

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[21] UWMP p. 4-3. Hot, dry weather may generate a 10 % increase above normal in both urban and agricultural water usage. This percentage was used to generate the dry-year demands in Table 2.2.

[22] UWMP p. 4-4.

[23] Excerpted from Table 4-2 of the UWMP

Table 2.2 Dry-Year and Multi-Dry Year Water

SUPPLY AND DEMAND ASSESSMENT (Acre-Feet Per Year)				
	Single Dry Year	Multiple Dry Years Year 1	Year 2	Year 3
EXISTING WATER SUPPLY PROGRAMS				
Local Supplies				
Alluvial Aquifer	35,000	32,500	32,500	32,500
Saugus Formation	13,000	13,000	13,000	13,000
Recycled Water	1,700	1,700	1,700	1,700
Imported Supplies[24]				
SWP Table A Amount	19,040	37,890	37,890	37,890
Semitropic Bank Account	7,200	7,200	7,200	7,200
Flexible Storage Account	4,684	1,561	1,561	1,561
TOTAL EXISTING SUPPLIES	**82,624**	**93,851**	**93,851**	**93,851**
Total Estimated Demand	90,900	82,000	83,300	84,600
Voluntary 10% Conservation	9,090	8,200	8,330	8,460
Difference Surplus/(Deficit)	814	11,851	10,551	9,251
FUTURE PLANNED WATER SUPPLY PROGRAMS (2010)[25]				
Local Supplies				

[24] 19,040 af represents 20% of CLWA's contractual Table A Amount. 37,890 af represents 39.8% of CLWA's contractual Table A Amount. Dry year supply based on assumptions from the UWMP.

[25] The UWMP assumed a total of 100,000 af in available future supplies by 2020. Therefore 50,000 af shown herein is assumed to be available by 2010.

Recycled Water	7,300
Saugus (New Wells)	20,000
Imported Supplies	
Water Transfers	3,500
Water Banking/Conjunctive Use	50,000
TOTAL FUTURE PLANNED SUPPLIES	**80,800**

3.0 IDENTIFICATION OF EXISTING WATER SUPPLY SOURCES

3.1 Annual Existing Water Supply Entitlements, Water Rights, or Water Service Contracts

The first substantive requirement of the SB 610 Assessment is the identification and description of the existing water supply sources in the public water system that will serve the Project. Water Code §10910(d) requires the Assessment to include an identification of any existing water supply entitlements, water rights, or water service contracts relevant to the identified water supply for the proposed project, and a description of the quantities of water received in prior years by the public water system. The identification of existing water supplies shall be demonstrated by providing information related to the following:

- Written contracts or other proof of entitlement to an identified water supply;
- Copies of a capital outlay program for financing the delivery of a water supply that has been adopted by the public water system;
- Federal, state, and local permits for construction of necessary infrastructure associated with delivering the water supply; and,
- Any necessary regulatory approvals that are required in order to be able to convey or deliver the water supply.

The current water supply for the Santa Clarita Valley is derived from four primary sources:

(1) Groundwater from the Alluvial Aquifer

(2) Groundwater from the Saugus Formation

(3) Imported SWP water

(4) Recycled Water

Recycled water is now available and currently being used to irrigate a golf course and several landscaped areas. The recycled water system can deliver 1,700 af, with plans to expand its use over the next 20 years.

Within the SCWD service area, these sources of water supply can be characterized as 1) *local supplies*, consisting of groundwater and recycled water, and 2) *imported supplies*, transported via the SWP, consisting of SWP Table A Amount.

Potential future water sources include additional recycled water, desalination, storm water runoff, increased Saugus pumping, and SWP reliability projects.[26]

Historically, local groundwater extracted from the Alluvial Aquifer and Saugus Formation has been the primary source of water in the SCWD's service area. However, since 1980, local groundwater supplies have been supplemented with imported water from the State Water Project.

3.2 Groundwater

Water Code §10910(f) requires this Assessment to include specific information describing groundwater resources if the water supply for a proposed project includes groundwater. Slade (2002) updates prior reports and includes a detailed review of the groundwater resources available to SCWD to supply the Project, including historic yields, estimated capacity and projected future yield capacity. Groundwater is drawn from two aquifer systems within the Santa Clara River Valley East Sub-basin, one of several sub-basins identified along the Santa Clara River in Los Angeles and Ventura counties by updated Bulletin 118 of the California Department of Water Resources. The shallow aquifer system is denominated the Alluvial Aquifer and the deeper aquifer is denominated the Saugus Formation. In addition to the SCWD, other large municipal and larger scale agriculture producers (including Newhall County Water District, Valencia Water Company, the Newhall Land and Farming Company and Wayside Honor Ranch) produce groundwater from the Alluvial Aquifer and Saugus Formation. Aggregate groundwater production by hundreds of other, small scale, water wells is estimated to account for less than 1% of total production from these aquifer systems.

The following sub-parts respond to specific requirements of Water Code §10910(f):

[26] UWMP p.1-11.

3.2.1 Water Code §10910(f)(1).

Review of relevant information contained in the urban water management plan.

Pages 2-2 through 2-6 of the 2000 UWMP provide an overview description of the local Alluvial and Saugus Formation aquifer systems, as well as historical and projected production.

3.2.2 Water Code §10910(f)(2).

Description of any groundwater basin or basins from which the proposed project will be supplied including information concerning adjudication and overdraft.

Slade (2002) Sections 2 through 5 describe two aquifer systems, the Alluvial Aquifer and the Saugus Formation, within the Santa Clara River Valley East Sub-basin ("Basin") and provides a detailed description of the groundwater basins. Slade (2002) also provides an assessment of the operational yield and other parameters of production capacity of the aquifer systems. The Basin is about 22 miles long east to west and about 13 miles wide. Slade (2002) estimates that about 200,000 acre feet of water is in storage in the Alluvial Aquifer and about 1.6 million acre feet is stored in the Saugus Formation. Neither aquifer system is in overdraft at the present time. The Basin has not been adjudicated and has not been identified as overdrafted or projected to be overdrafted by the Department of Water Resources.

3.2.3 Water Code §10910(f)(3)

Description and analysis of the amount and location of groundwater pumped by the public water system for the past five years from any groundwater basin from which the proposed project will be supplied.

Detailed information about the amount and location of groundwater pumped from both the Alluvial Aquifer and Saugus Formation is provided in Slade (2002) Sections 4 and 5, and in the 2002 Water Report. The most recent five year average production (1998-2002) by all producers from the Alluvial Aquifer is 39,000 afy (2002 Water Report). During the same period, total production from the Saugus Formation averaged 4,500 afy, with a low of 3,700 afy (1999) and a high of 5,555 afy (1998) (2002) Water Report, Table II-7).

3.2.4 Water Code §10910(f)(4)

Description and analysis of the amount and location of groundwater that is *projected* to be pumped by the public water system from any basin from which the proposed project will be supplied.

Slade (2002) does not provide detailed descriptions and analysis of locations or yields of specific new wells that may be constructed in the future. The report, however, anticipates that new capacity and replacement wells can be located, designed and operated within the Basin, both within the Alluvial Aquifer and the Saugus Formation, without creating undesirable conditions. Slade (2002), page 85. Groundwater supplies were reviewed in the UWMP and evaluated as to whether supply projections were realistic for average and dry conditions. The review made the following critical findings:[27]

1. Both the Alluvial Aquifer and the Saugus Formation are reasonable and sustainable sources at the yields represented in the 2000 UWMP.
2. The yields are not overstated and will not deplete or "dry up" the groundwater basin.
3. There is no need to reduce the yields for purposes of planning in the context of the UWMP.

Preliminary analyses and recent studies have concluded that additional pumping can be safely carried out in both aquifers.[28] Neither aquifer is in overdraft condition.

3.2.5 Water Code §10910(f) (5)

Analysis of the sufficiency of the groundwater from the basin or basins from which the proposed project will be supplied to meet the projected water demand associated with the proposed project.

Slade (2002) concludes that Alluvial Aquifer has storage capacity of about 200,000 af, with a sustainable operational yield ranging from 30,000 to 40,000 afy. Slade (2002) concludes that Alluvial Aquifer extractions should be reduced to 30,000 to 35,000 afy during dry periods.

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[27] Luhdorff and Scalmanini, Consulting Engineers, Review of Ground-Water Components 2000 Urban Water Management Plan CLWA, NCWD, SCWC, and VWC (December 15, 2000). The review was based on information provided by Richard Slade & Associates. This review and baseline information is included in the appendices of the UWMP.

[28] UWMP p. 1-13 and Slade, 2001 Update Report Hydrogeologic Conditions in the Alluvial and Saugus Formation Aquifer Systems, (dated July 2002), Volume I, see Executive Summary.

Slade (2002) concludes that the Saugus Formation has storage capacity of 1.6 million acre-feet, with a sustainable operational yield of 7,500 to 15,000 afy. Slade (2002) concludes that Saugus Formation extraction can be increased, on an infrequent basis to the range of from 15,000 to 35,000 afy, without creating undesirable conditions. Recent extractions from the Saugus Formation averaged less than 6,000 afy, but averaged 10,500 afy during the 1989 to 1992 drought.

A small portion of the Saugus Formation is contaminated with ammonium perchlorate and four wells have been unavailable since 1997. In November 2002 one Alluvial well was also found to contain perchlorate. An Environmental Oversight Agreement has been signed by CLWA and the purveyors with the California Department of Toxic Substances Control, which includes a Remedial Action Workplan. Planning and development is underway to install treatment facilities to remove the perchlorate contamination and return the wells to service.

3.3 Recycled Water

Wastewater that has been highly treated and disinfected can be reused for landscape irrigation and other purposes. It is not suitable for use as potable water. In 1993, CLWA completed a *Reclaimed Water System Master Plan* to use recycled water as a reliable water source to meet some non-potable demand within the Santa Clarita Valley. The Master Plan is being updated, and the amount of recycled water expected to be produced in the future reaches approximately 17,000 acre-feet per year in 2020.[29]

CLWA is currently under contract for 1,700 acre-feet per year and that amount is now available.

3.4 State Water Project Water

Since 1980, local supplies in the Santa Clarita Valley have been supplemented with imported water from the State Water Project (SWP). This water obtained from the SWP through CLWA, is and will continue as the largest source of water for the Valley. The SWP contract amounts, depending on annual allocation, currently meet more than half of local demand. The reliability of SWP supplies is subject to both annual hydrology and planned improvements to the system.

CLWA's current SWP Table A Amount of 95,200 AFY is affected by, and can be reduced due to, a number of factors, including hydrologic conditions, the status of SWP facilities'

[29] UWMP p. 1-13.

construction and environmental requirements. Because of these factors, SWP supplies are subject to reduction, particularly during drought periods

In May 2003 the California Department of Water Resources completed its *State Water Project Delivery Reliability Report.* The report provides current information on the ability of the SWP to deliver water under existing and future levels of development, assuming historical levels of precipitation.

According to the report, the SWP will, on average, be able to deliver between 72-76 % of the maximum total contract amount of 4.1 million acre-feet per year, provided that an SWP contractor has the ability to utilize or store all of its Table A Amount made available for allocation. The level of deliveries drops to between 19% and 20% for an extraordinary dry year and approximately 40% for multiple dry years. This information will be used in and more fully analyzed in the discussion of CLWA's SWP supplies during the update of its Urban Water Management Plan in 2005.

South Coast
Air Quality Management District
21865 E. Copley Drive, Diamond Bar, CA 91765-4182
(909) 396-2000 • www.aqmd.gov

October 23, 2003

RECEIVED
PLANNING DIVISION
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PLANNING AND BUILDING SERVICES
CITY OF SANTA CLARITA

Mr. Jeff Hogan, Associate Planner
City of Santa Clarita
Dept. of Planning and Building Services
23920 Valencia Blvd.
Santa Clarita, CA 91355

Dear Mr. Hogan:

Revised Notice of Preparation of a Draft Environmental Impact Report for Riverpark (Panhandle), Master Case #02-175

The South Coast Air Quality Management District (AQMD) appreciates the opportunity to comment on the above-mentioned document. The AQMD's comments are recommendations regarding the analysis of potential air quality impacts from the proposed project that should be included in the Draft Environmental Impact Report (EIR).

Air Quality Analysis

The AQMD adopted its California Environmental Quality Act (CEQA) Air Quality Handbook in 1993 to assist other public agencies with the preparation of air quality analyses. The AQMD recommends that the Lead Agency use this Handbook as guidance when preparing its air quality analysis. Copies of the Handbook are available from the AQMD's Subscription Services Department by calling (909) 396-3720.

The Lead Agency should identify any potential adverse air quality impacts that could occur from all phases of the project and all air pollutant sources related to the project. Air quality impacts from both construction and operations should be considered. Construction-related air quality impacts typically include, but are not limited to, emissions from the use of heavy-duty equipment from grading, earth-loading/unloading, paving, architectural coatings, off-road mobile sources (e.g., heavy-duty construction equipment) and on-road mobile sources (e.g., construction worker vehicle trips, material transport trips). Operation-related air quality impacts may include, but are not limited to, emissions from stationary sources (e.g., boilers), area sources (e.g., solvents and coatings), and vehicular trips (e.g., on- and off-road tailpipe emissions and entrained dust). Air quality impacts from indirect sources, that is, sources that generate or attract vehicular trips should be included in the evaluation. An analysis of all toxic air contaminant impacts due to the decommissioning or use of equipment potentially generating such air pollutants should also be included.

Mitigation Measures

In the event that the project generates significant adverse air quality impacts, CEQA requires that all feasible mitigation measures be utilized during project construction and operation to minimize or eliminate significant adverse air quality impacts. To assist the Lead Agency with identifying possible mitigation measures for the project, please refer to Chapter 11 of the AQMD CEQA Air Quality Handbook for sample air quality mitigation measures. Additionally, AQMD's Rule 403 – Fugitive Dust, and the Implementation Handbook contain numerous measures for controlling construction-related emissions that should be considered for use as CEQA mitigation if not otherwise required. Pursuant to state CEQA Guidelines §15126.4 (a)(1)(D), any impacts resulting from mitigation measures must also be discussed.

Data Sources

AQMD rules and relevant air quality reports and data are available by calling the AQMD's Public Information Center at (909) 396-2039. Much of the information available through the Public Information Center is also available via the AQMD's World Wide Web Homepage (http://www.aqmd.gov).

The AQMD is willing to work with the Lead Agency to ensure that project-related emissions are accurately identified, categorized, and evaluated. Please call Charles Blankson, Ph.D., Air Quality Specialist, CEQA Section, at (909) 396-3304 if you have any questions regarding this letter.

Sincerely,

Steve Smith

Steve Smith, Ph.D.
Program Supervisor, CEQA Section
Planning, Rule Development and Area Sources

SS:CB:li

LAC031021-02LI
Control Number

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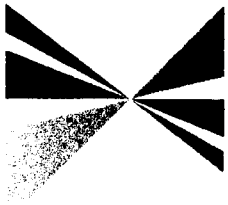

ASSOCIATION of GOVERNMENTS

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Riverside County Transportation Commission: Robin Lowe, Hemet

Ventura County Transportation Commission: Bill Davis, Simi Valley

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November 17, 2003

Mr. Jeff Hogan
Associate Planner
City of Santa Clarita
Department of Planning and Building Services
23920 Valencia Boulevard
Santa Clarita, CA 93155

RE: **Comments on the Revised Notice of Preparation for a Draft Environmental Impact Report for the Riverpark (Panhandle) Project – SCAG No. I 20030603**

Dear Mr. Hogan:

Thank you for submitting the **Revised Notice of Preparation for a Draft Environmental Impact Report for the Riverpark (Panhandle) Project** to SCAG for review and comment. As areawide clearinghouse for regionally significant projects, SCAG reviews the consistency of local plans, projects, and programs with regional plans. This activity is based on SCAG's responsibilities as a regional planning organization pursuant to state and federal laws and regulations. Guidance provided by these reviews is intended to assist local agencies and project sponsors to take actions that contribute to the attainment of regional goals and policies.

We have reviewed the **Revised Notice of Preparation**, and have determined that **the proposed Project is regionally significant per California Environmental Quality Act (CEQA) Guidelines (Section 15206).** The proposed Project considers the construction of more than 500 dwelling units. CEQA requires that EIRs discuss any inconsistencies between the proposed project and the applicable general plans and **regional plans (Section 15125 [d]).** If there are inconsistencies, an explanation and rationalization for such inconsistencies should be provided.

Policies of SCAG's Regional Comprehensive Plan and Guide and Regional Transportation Plan, which may be applicable to your project, are outlined in the attachment. **We expect the DEIR to specifically cite the appropriate SCAG policies and address the manner in which the Project is consistent with applicable core policies or supportive of applicable ancillary policies. Please use our policy numbers to refer to them in your DEIR. Also, we would encourage you to use a side-by-side comparison of SCAG policies with a discussion of the consistency or support of the policy with the Proposed Project.**

Please provide a minimum of 45 days for SCAG to review the DEIR when this document is available. If you have any questions regarding the attached comments, please contact me at (213) 236-1867. Thank you.

Sincerely,

JEFFREY M. SMITH, AICP
Senior Regional Planner
Intergovernmental Review

COMMENTS ON THE REVISED PROPOSAL TO DEVELOP A DRAFT ENVIRONMENTAL IMPACT REPORT FOR THE RIVERPARK (PANHANDLE) PROJECT SCAG NO. I 20020494

PROJECT DESCRIPTION

The proposed Project considers a Tentative Tract Map, Zone Change and General Plan Amendment, Conditional Use Permit, Review and Oak Tree Permit for the development of approximately 1,183 dwelling units. The proposed Project will be developed on approximately 695 acres, and is located east of Bouquet Canyon Road and north of Soledad Canyon Road in the City of Santa Clarita.

CONSISTENCY WITH REGIONAL COMPREHENSIVE PLAN AND GUIDE POLICIES

The **Growth Management Chapter (GMC)** of the Regional Comprehensive Plan and Guide (RCPG) contains the following policies that are particularly applicable and should be addressed in the Draft EIR for the Riverpark (Panhandle) Project.

3.01 The population, housing, and jobs forecasts, which are adopted by SCAG's Regional Council and that reflect local plans and policies, shall be used by SCAG in all phases of implementation and review.

Regional Growth Forecasts

The Draft EIR should reflect the most current SCAG forecasts which are the 2001 RTP (April 2001) Population, Household and Employment forecasts for the North Los Angeles County Council of Governments (NLACOG) subregion and the City of Santa Clarita. These forecasts are as follows:

NLACOG Subregion	2000	2005	2010	2015	2020	2025
Population	576,478	658,450	786,419	912,257	1,083,020	1,259,354
Household	174,293	211,038	264,936	319,701	378,169	442,773
Employment	187,780	218,429	250,111	268,842	285,963	304,163

City of S. Clarita	2000	2005	2010	2015	2020	2025
Population	146,415	151,226	166,822	182,158	202,970	224,460
Household	48,571	54,372	60,227	66,197	72,555	79,581
Employment	48,971	50,783	52,846	54,064	55,179	56,366

3.03 The timing, financing, and location of public facilities, utility systems, and transportation systems shall be used by SCAG to implement the region's growth policies.

GMC POLICIES RELATED TO THE RCPG GOAL TO IMPROVE THE REGIONAL STANDARD OF LIVING

The Growth Management goals to develop urban forms that enable individuals to spend less income on housing cost, that minimize public and private development costs, and that enable firms to be more competitive, strengthen the regional strategic goal to stimulate the regional economy. The evaluation of the proposed project in relation to the following policies would be intended to guide efforts toward achievement of such goals and does not infer regional interference with local land use powers.

3.05 Encourage patterns of urban development and land use, which reduce costs on infrastructure construction and make better use of existing facilities.

3.09 Support local jurisdictions' efforts to minimize the cost of infrastructure and public service delivery, and efforts to seek new sources of funding for development and the provision of services.

3.10 Support local jurisdictions' actions to minimize red tape and expedite the permitting process to maintain economic vitality and competitiveness.

GMC POLICIES RELATED TO THE RCPG GOAL TO IMPROVE THE REGIONAL QUALITY OF LIFE

The Growth Management goals to attain mobility and clean air goals and to develop urban forms that enhance quality of life, that accommodate a diversity of life styles, that preserve open space and natural resources, and that are aesthetically pleasing and preserve the character of communities, enhance the regional strategic goal of maintaining the regional quality of life. The evaluation of the proposed project in relation to the following policies would be intended to provide direction for plan implementation, and does not allude to regional mandates.

3.12 Encourage existing or proposed local jurisdictions' programs aimed at designing land uses which encourage the use of transit and thus reduce the need for roadway expansion, reduce the number of auto trips and vehicle miles traveled, and create opportunities for residents to walk and bike.

3.14 Support local plans to increase density of future development located at strategic points along the regional commuter rail, transit systems, and activity centers.

3.17 Support and encourage settlement patterns, which contain a range of urban densities

3.18 Encourage planned development in locations least likely to cause environmental impact.

3.19 SCAG shall support policies and actions that preserve open space areas identified in local, state and federal plans.

3.20 Support the protection of vital resources such as wetlands, groundwater recharge areas, woodlands, production lands, and land containing unique and endangered plants and animals.

3.21 Encourage the implementation of measures aimed at the preservation and protection of recorded and unrecorded cultural resources and archaeological sites.

3.22 Discourage development, or encourage the use of special design requirements, in areas with steep slopes, high fire, flood, and seismic hazards.

3.23 Encourage mitigation measures that reduce noise in certain locations, measures aimed at preservation of biological and ecological resources, measures that would reduce exposure to seismic hazards, minimize earthquake damage, and to develop emergency response and recovery plans.

GMC POLICIES RELATED TO THE RCPG GOAL TO PROVIDE SOCIAL, POLITICAL, AND CULTURAL EQUITY

The Growth Management Goal to develop urban forms that avoid economic and social polarization promotes the regional strategic goal of minimizing social and geographic disparities and of reaching equity among all segments of society. The evaluation of the proposed project in relation to the policy stated below is intended guide direction for the accomplishment of this goal, and does not infer regional mandates and interference with

local land use powers.

3.24 Encourage efforts of local jurisdictions in the implementation of programs that increase the supply and quality of housing and provide affordable housing as evaluated in the Regional Housing Needs Assessment.

3.27 Support local jurisdictions and other service providers in their efforts to develop sustainable communities and provide, equally to all members of society, accessible and effective services such as: public education, housing, health care, social services, recreational facilities, law enforcement, and fire protection.

REGIONAL TRANSPORTATION PLAN

The **Regional Transportation Plan (RTP)** also has goals, objectives, policies and actions pertinent to this proposed project. This RTP links the goal of sustaining mobility with the goals of fostering economic development, enhancing the environment, reducing energy consumption, promoting transportation-friendly development patterns, and encouraging fair and equitable access to residents affected by socio-economic, geographic and commercial limitations. Among the relevant goals, objectives, policies and actions of the RTP are the following:

Core Regional Transportation Plan Policies

4.01 Transportation investments shall be based on SCAG's adopted Regional Performance Indicators:

Mobility - Transportation Systems should meet the public need for improved access, and for safe, comfortable, convenient, faster and economical movements of people and goods.

- *Average Work Trip Travel Time in Minutes – 25 minutes (Auto)*
- *PM Peak Freeway Travel Speed – 45 minutes (Transit)*
- *PM Peak Non-Freeway Travel Speed*
- *Percent of PM Peak Travel in Delay (Fwy)*
- *Percent of PM Peak Travel in Delay (Non-Fwy)*

Accessibility - Transportation system should ensure the ease with which opportunities are reached. Transportation and land use measures should be employed to ensure minimal time and cost.

- *Work Opportunities within 45 Minutes door to door travel time (Mode Neutral)*
- *Average transit access time*

Environment - Transportation system should sustain development and preservation of the existing system and the environment. (All Trips)

- *CO, ROG, NOx, PM10, PM2.5 – Meet the applicable SIP Emission Budget and the Transportation Conformity requirements*

Reliability – Transportation system should have reasonable and dependable levels of service by mode. (All Trips)

- *Transit – 63%*
- *Highway – 76%*

Safety - Transportation systems should provide minimal accident, death and injury. (All Trips)

- *Fatalities Per Million Passenger Miles – 0*
- *Injury Accidents – 0*

Equity/Environmental Justice - The benefits of transportation investments should be equitably distributed among all ethnic, age and income groups. (All trips)

- *By Income Groups Share of Net Benefits – Equitable Distribution of Benefits among all Income Quintiles*

Cost-Effectiveness - Maximize return on transportation investment (All Trips). Air Quality, Mobility, Accessibility and Safety

- *Return on Total Investment – Optimize return on Transportation Investments*

4.02 Transportation investments shall mitigate environmental impacts to an acceptable level.

4.04 Transportation Control Measures shall be a priority.

4.16 Maintaining and operating the existing transportation system will be a priority over expanding capacity.

AIR QUALITY CHAPTER CORE ACTIONS

The **Air Quality Chapter** core actions related to the proposed project includes:

5.07 Determine specific programs and associated actions needed (e.g., indirect source rules, enhanced use of telecommunications, provision of community based shuttle services, provision of demand management based programs, or vehicle-miles-traveled/emission fees) so that options to command and control regulations can be

assessed.

5.11 Through the environmental document review process, ensure that plans at all levels of government (regional, air basin, county, subregional and local) consider air quality, land use, transportation and economic relationships to ensure consistency and minimize conflicts.

OPEN SPACE CHAPTER ANCILLARY GOALS

Outdoor Recreation

9.01 Provide adequate land resources to meet the outdoor recreation needs of the present and future residents in the region and to promote tourism in the region.

9.02 Increase the accessibility to open space lands for outdoor recreation.

9.03 Promote self-sustaining regional recreation resources and facilities.

Public Health and Safety

9.04 Maintain open space for adequate protection of lives and properties against natural and man-made hazards.

9.05 Minimize potentially hazardous developments in hillsides, canyons, areas susceptible to flooding, earthquakes, wildfire and other known hazards, and areas with limited access for emergency equipment.

Resource Production

9.07 Maintain adequate viable resource production land, particularly lands devoted to commercial agriculture and mining operations.

Resource Protection

9.08 Develop well-managed viable ecosystems or known habitats of rare, threatened and endangered species, including wetlands.

WATER QUALITY CHAPTER RECOMMENDATIONS AND POLICY OPTIONS

The **Water Quality Chapter** core recommendations and policy options relate to the two

water quality goals: to restore and maintain the chemical, physical and biological integrity of the nation's water; and, to achieve and maintain water quality objectives that are necessary to protect all beneficial uses of all waters.

11.07 Encourage water reclamation throughout the region where it is cost-effective, feasible, and appropriate to reduce reliance on imported water and wastewater discharges. Current administrative impediments to increased use of wastewater should be addressed.

CONCLUSIONS

All feasible measures needed to mitigate any potentially negative regional impacts associated with the proposed project should be implemented and monitored, as required by CEQA.

SOUTHERN CALIFORNIA ASSOCIATION OF GOVERNMENTS

Roles and Authorities

THE SOUTHERN CALIFORNIA ASSOCIATION OF GOVERNMENTS (SCAG) is a ***Joint Powers Agency*** established under California Government Code Section 6502 et seq. Under federal and state law, SCAG is designated as a Council of Governments (COG), a Regional Transportation Planning Agency (RTPA), and a Metropolitan Planning Organization (MPO). SCAG's mandated roles and responsibilities include the following:

SCAG is designated by the federal government as the Region's ***Metropolitan Planning Organization*** and mandated to maintain a continuing, cooperative, and comprehensive transportation planning process resulting in a Regional Transportation Plan and a Regional Transportation Improvement Program pursuant to 23 U.S.C. '134, 49 U.S.C. '5301 et seq., 23 C.F.R. '450, and 49 C.F.R. '613. SCAG is also the designated ***Regional Transportation Planning Agency***, and as such is responsible for both preparation of the Regional Transportation Plan (RTP) and Regional Transportation Improvement Program (RTIP) under California Government Code Section 65080 and 65082 respectively.

SCAG is responsible for developing the demographic projections and the integrated land use, housing, employment, and transportation programs, measures, and strategies portions of the ***South Coast Air Quality Management Plan***, pursuant to California Health and Safety Code Section 40460(b)-(c). SCAG is also designated under 42 U.S.C. '7504(a) as a ***Co-Lead Agency*** for air quality planning for the Central Coast and Southeast Desert Air Basin District.

SCAG is responsible under the Federal Clean Air Act for determining ***Conformity*** of Projects, Plans and Programs to the State Implementation Plan, pursuant to 42 U.S.C. '7506.

Pursuant to California Government Code Section 65089.2, SCAG is responsible for ***reviewing all Congestion Management Plans (CMPs) for consistency with regional transportation plans*** required by Section 65080 of the Government Code. SCAG must also evaluate the consistency and compatibility of such programs within the region.

SCAG is the authorized regional agency for ***Inter-Governmental Review*** of Programs proposed for federal financial assistance and direct development activities, pursuant to Presidential Executive Order 12,372 (replacing A-95 Review).

SCAG reviews, pursuant to Public Resources Code Sections 21083 and 21087, Environmental Impacts Reports of projects of regional significance for consistency with regional plans [California Environmental Quality Act Guidelines Sections 15206 and 15125(b)].

Pursuant to 33 U.S.C. '1288(a)(2) (Section 208 of the Federal Water Pollution Control Act), SCAG is the authorized ***Areawide Waste Treatment Management Planning Agency***.

SCAG is responsible for preparation of the ***Regional Housing Needs Assessment***, pursuant to California Government Code Section 65584(a).

SCAG is responsible (with the Association of Bay Area Governments, the Sacramento Area Council of Governments, and the Association of Monterey Bay Area Governments) for preparing the ***Southern California Hazardous Waste Management Plan*** pursuant to California Health and Safety Code Section 25135.3.

Revised July 2001

Terry Tamminen
Agency Secretary
Cal/EPA

Department of Toxic Substances Control

Edwin F. Lowry, Director
1011 N. Grandview Avenue
Glendale, California 91201

Arnold
Schwarzenegger
Governor

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November 19, 2003

Mr. Jeff Hogan
Associate Planner
City of Santa Clarita
23920 Valencia Boulevard, Suite 300
Santa Clarita, California 91355

REVISED NOTICE OF PREPARATION OF DRAFT ENVIRONMENTAL IMPACT REPORT FOR THE RIVERPARK, SCH NO. 2002091081

Dear Mr. Hogan:

The Department of Toxic Substances Control (DTSC) has received your Revised Notice of Preparation of a draft Environmental Impact Report (EIR) for the project mentioned above.

Based on the review of the document, DTSC comments are as follows:

1. The draft EIR needs to identify and determine whether current or historic uses at the Project site have resulted in any release of hazardous wastes/substances at the Project area.

2. The draft EIR needs to identify any known or potentially contaminated site within the Project area. For all identified sites, the draft EIR needs to evaluate whether conditions at the site pose a threat to human health or the environment.

3. The draft EIR should identify the mechanism to initiate any required investigation and/or remediation for any site that may require remediation, and which government agency will provide appropriate regulatory oversight.

4. If during construction of the project, soil contamination is suspected, construction in the area should stop, and appropriate health and safety procedures should be implemented. If it is determined that contaminated soils exists, the draft EIR

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should identify how any required investigation and/or remediation will be conducted, and which government agency will provide regulatory oversight.

DTSC provides guidance for Preliminary Endangerment Assessment preparation and cleanup oversight through the Voluntary Cleanup Program (VCP). For additional information on the VCP please visit DTSC's web site at www.dtsc.ca.gov. If you would like to meet and discuss this matter further, please contact Mr. Alberto Valmidiano, Project Manager, at (818) 551-2870 or me, at (818) 551-2877.

Sincerely,

Harlan R. Jeche

Harlan R. Jeche
Unit Chief
Southern California Cleanup Operations Branch – Glendale Office

cc: Governor's Office of Planning and Research
State Clearinghouse
P.O. Box 3044
Sacramento, California 95812-3044

Mr. Guenther W. Moskat, Chief
Planning and Environmental Analysis Section
CEQA Tracking Center
Department of Toxic Substances Control
P.O. Box 806
Sacramento, California 95812-0806

DEPARTMENT OF TRANSPORTATION
DISTRICT 7, REGIONAL PLANNING
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PHONE (213) 897-6536
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Mr. Jeff Hogan, Associate Planner
Office of Planning
City of Santa Clarita
23920 Valencia Blvd., Suite 302
Santa Clarita, CA. 91355

IGR/CEQA# 031056NY
River Park Project Traffic Analysis
744 Multi Family Units, 439 Single Family Units
& 40,000 SF Commercial uses
LA/5,14,126/13.5

December 29, 2003

Dear Mr. Hogan:

Thank you for including the California Department of Transportation (Caltrans) in the environmental review process for the River Park Project in Santa Clarita.

Based on the information received, Please provide the following backup documents and analysis:

1- Due to close proximity of the project to both I-5 and SR-14 freeways, submit a revised traffic forecast generated by the River Park Project.
2- Provide supporting data that only 1% of the trip generated by this project will use SR-14 at Golden Valley interchange.
3- Provide mitigation measures to offset the traffic impact to State Transportation facilities.

If you have any questions regarding this response, please call the Project Engineer/Coordinator Mr. Yerjanian at (213) 897-6536 and refer to IGR/CEQA # 031208NY.

Sincerely,

Nerses Yerjanian

For: STEPHEN J. BUSWELL
IGR/CEQA Branch Chief
Transportation Planning Office

COUNTY OF LOS ANGELES

FIRE DEPARTMENT

1320 NORTH EASTERN AVENUE
LOS ANGELES, CALIFORNIA 90063-3294
(323) 890-4330

P. MICHAEL FREEMAN
FIRE CHIEF
FORESTER & FIRE WARDEN

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CITY OF SANTA CLARITA

December 19, 2003

Jeff Hogan, Associate Planner
City of Santa Clarita
Department of Planning and Building Services
23920 Valencia Boulevard
Santa Clarita, CA 93155

Dear Mr. Hogan:

NOTICE OF PREPARATION OF A DRAFT ENVIRONMENTAL IMPACT REPORT FOR THE RIVERPARK PROJECT - "SANTA CLARITA" (EIR #1842/2003)

The Notice of Preparation of a Draft Environmental Impact Report for the proposed Riverpark Project has been reviewed by the Planning Division, Land Development Unit, and Forestry Division of the County of Los Angeles Fire Department. The following are their comments:

FIRE PROTECTION AND EMERGENCY MEDICAL SERVICE AVAILABILITY:
The subject development will receive fire protection and paramedic service from the County of Los Angeles Fire Department. We would need a general location map to identify the jurisdictional station(s) for this property.

Additional manpower, equipment, and facilities will be needed to serve this development. Limited tax revenues have restricted the Fire Department's ability to meet new growth needs. Although general plans for upgrading fire protection in this area have been developed, the Department will not be able to implement these plans without specific provisions for the necessary manpower, equipment, and facilities. Mitigation of this problem should be required prior to granting approval of this development. The Fire Department will work with the developer to establish appropriate mitigation arrangements for the proposed project.

The applicant shall participate in an appropriate financing mechanism such as a developer fee or an in-kind consideration in lieu of developer fees to provide funds for fire protection facilities which are required by new commercial, industrial or residential development in an amount proportionate to the demand created by this project. Currently, the developer fee is a set amount per square foot of building space, adjusted annually, and is due and payable at the time a building permit is issued. In the event that the developer fee is no longer in effect at the time of building permit issuance, alternative mitigation measures shall be required.

SERVICE RESPONSIBILITY:
Due to the fact that only limited information is available on this project at the present time, we are not able to respond completely as to how this project will affect our Department. We would like to reserve the right to

respond further at a future date when more specific information is available. In particular, we would need a detailed map showing the location of proposed land uses and existing and proposed roads to calculate response distances/times.

GENERAL REQUIREMENTS:
The proposed development may necessitate multiple ingress/egress access for the circulation of traffic, and emergency response issues. The Department may condition future development to provide additional means of access. The development of this project must comply with all applicable code and ordinance requirements for construction, access, water mains, fire flows and hydrants.

This property is located within the area described by the Forester and Fire Warden as a Fire Zone 4, Very High Fire Hazard Severity Zone (VHFHSZ). All applicable fire code and ordinance requirements for construction, access, water mains, fire hydrants, fire flows, brush clearance, and fuel modification plans must be met. Specific fire and life safety requirements for the construction phase will be addressed at the building fire plan check. There may be additional fire and life safety requirements during this time.

Every building constructed shall be accessible to Fire Department apparatus by way of access roadways, with an all-weather surface of not less than the prescribed width, unobstructed, clear-to-sky. The roadway shall be extended to within 150 feet of all portions of the exterior walls when measured by an unobstructed route around the exterior of the building.

Access roads shall be maintained with a minimum of ten (10) feet of brush clearance on each side. Fire access roads shall have an unobstructed vertical clearance clear-to-sky. Trees overhanging fire access roads shall be maintained to provide a vertical clearance of thirteen (13) feet, six (6) inches. When a bridge is required to be used as part of a fire access road, it shall be constructed and maintained in accordance with nationally recognized standards and designed for a live load sufficient to carry a minimum of 75,000 pounds.

The maximum allowable grade shall not exceed 15% except where the topography makes it impractical to keep within such grade, and then an absolute maximum of 20% will be allowed for up to 150 feet in distance. The average maximum allowed grade including topography difficulties shall be no more than 17%. Grade breaks shall not exceed 10% in ten (10) feet. When involved with a subdivision in a city contracting fire protection with the County of Los Angeles Fire Department, requirements for access, fire flows and hydrants are addressed during the subdivision tentative map stage.

Fire sprinkler systems are required in some residential and most commercial occupancies. For those occupancies not requiring fire sprinkler systems, it is strongly suggested that fire sprinkler systems be installed. This will reduce potential fire and life losses. Systems are now technically and economically feasible for residential use.

COMMERCIAL:
Development may require fire flows up to 5,000 gallons per minute at 20 pounds per square inch residual pressure for up to a five-hour duration. Final fire flows will be based on the size of the buildings, their relationship to other structures, property lines, and types of construction used. Fire hydrant spacing shall be 300 feet and shall meet the following requirements:

1. No portion of lot frontage shall be more than 200 feet via vehicular access from a public fire hydrant.

2. No portion of a building shall exceed 400 feet via vehicular access from a properly spaced public fire hydrant.
3. Additional hydrants will be required if hydrant spacing exceeds specified distances.
4. When cul-de-sac depth exceeds 200 feet on a commercial street, hydrants shall be required at the corner and mid-block.
5. A cul-de-sac shall not be more than 500 feet in length when serving land zoned for commercial use.
6. A Fire Department approved turning area shall be provided at the end of a cul-de-sac.

Turning radii shall not be less than 32 feet. This measurement shall be determined at the centerline of the road. A Fire Department approved turning area shall be provided for all driveways exceeding 150 feet in length and at the end of all cul-de-sacs. All on-site driveways shall provide a minimum unobstructed width of 26 feet, clear-to-sky. The on-site driveway is to be within 150 feet of all portions of the exterior walls of the first story of any building. Driveway width for non-residential developments shall be increased when any of the following conditions will exist:

1. Provide 28 feet in width when a building has three or more stories, or is more than 35 feet in height above access level. The height of the building is measured from the lowest point of access to the height of the eaves. Also, for using fire truck ladders, the centerline of the access roadway shall be located parallel to, and within 30 feet of an exterior wall on one side of the proposed structure.
2. Provide 34 feet in width when parallel parking is allowed on one side of the access roadway/driveway. Preference is that such parking is not adjacent to the structure.
3. Provide 42 feet in width when parallel parking is allowed on each side of the access roadway/driveway.
4. Any access way less than 34 feet in width shall be labeled "Fire Lane" on the final recording map, and final building plans.
5. For streets or driveways with parking restrictions: The entrance to the street/driveway and intermittent spacing distances of 150 feet shall be posted with Fire Department approved signs stating "NO PARKING – FIRE LANE" in three-inch high letters. Driveway labeling is necessary to ensure access for Fire Department use.

HIGH-DENSITY RESIDENTIAL:
Development may require fire flows up to 5,000 gallons per minute at 20 pounds per square inch residual pressure for up to a five-hour duration. Final fire flows will be based on the size of the buildings, their relationship to other structures, property lines, and types of construction used. Fire hydrant spacing shall be 300 feet and shall meet the following requirements:

1. No portion of lot frontage shall be more than 200 feet via vehicular access from a public fire hydrant.
2. No portion of a building shall exceed 400 feet via vehicular access from a properly spaced fire hydrant.
3. When cul-de-sac depth exceeds 200 feet, hydrants will be required at the corner and mid-block.
4. Additional hydrants will be required if the hydrant spacing exceeds specified distances.

Turning radii shall not be less than 32 feet. This measurement shall be determined at the centerline of the road. A Fire Department approved turning area shall be provided for all driveways exceeding 150 feet in length and at the end of all cul-de-sacs. When serving land zoned for residential uses having a density of more than four units per net acre:

1. A cul-de-sac shall be a minimum of 34 feet in width and shall not be more than 700 feet in length.
2. The length of the cul-de-sac may be increased to 1,000 feet if a minimum of 36 feet in width is provided.
3. A Fire Department approved turning area shall be provided at the end of a cul-de-sac.

All on-site driveways shall provide a minimum unobstructed width of 26 feet, clear-to-sky. The on-site driveway is to be within 150 feet of all portions of the exterior walls of the first story of any building. The 26 feet width does not allow for parking, and shall be designated as a "Fire Lane," and have appropriate signage. The 26 feet in width shall be increased to:

1. Provide 28 feet in width when a building has three or more stories, or is more than 35 feet in height above access level. The height of the building is measured from the lowest point of access to the height of the eaves. Also, for using fire truck ladders, the centerline of the access roadway shall be located parallel to, and within 30 feet of an exterior wall on one side of the proposed structure.
2. Provide 34 feet in width when parallel parking is allowed on one side of the access way.
3. Provide 36 feet in width when parallel parking is allowed on both sides of the access way.
4. Any access way less than 34 feet in width shall be labeled "Fire Lane" on the final recording map, and final building plans.
5. For streets or driveways with parking restrictions: The entrance to the street/driveway and intermittent spacing distances of 150 feet shall be posted with Fire Department approved signs stating "NO PARKING – FIRE LANE" in three-inch high letters. Driveway labeling is necessary to ensure access for Fire Department use.

SINGLE-FAMILY/TWO-FAMILY DWELLING UNITS:
Single-family detached homes shall require a minimum fire flow of 1,250 gallons per minute at 20 pounds per square inch residual pressure for a two-hour duration. Two-family dwelling units (duplexes) shall require a fire flow of 1,500 gallons per minute at 20 pounds per square inch residual pressure for a two-hour duration. When there are five or more units taking access on a single driveway, the minimum fire flow shall be increased to 1,500 gallons per minute at 20 pounds per square inch residual pressure for a two-hour duration. Fire hydrant spacing shall be 600 feet and shall meet the following requirements:

1. No portion of lot frontage shall be more than 450 feet via vehicular access from a public fire hydrant.
2. No portion of a structure should be placed on a lot where it exceeds 750 feet via vehicular access from a properly spaced public fire hydrant.
3. When cul-de-sac depth exceeds 450 feet on a residential street, hydrants shall be required at the corner and mid-block.
4. Additional hydrants will be required if hydrant spacing exceeds specified distances.

Fire Department access shall be provided to within 150 feet of all portions of the exterior walls of the first story of any single-unit. If exceeding 150 feet, provide 20 feet, paved width "Private Driveway/Fire Lane" clear-to-sky to within 150 feet of all portions of the exterior walls of the unit. Fire Lanes serving 3-4 units shall be increased to 24 feet in width, and if serving five (5) or more units, the Fire Lane shall be increased to 26 feet. A Fire Department approved turning area shall be provided for all driveways exceeding 150 feet in length and at the end of all cul-de-sacs. Streets or driveways within the development shall be provided with the following:

1. Provide 36 feet in width on all collector streets and those streets where parking is allowed on both sides.
2. Provide 34 feet in width on cul-de-sacs up to 700 feet in length. This allows parking on both sides of the street.
3. Provide 36 feet in width on cul-de-sacs from 701 to 1,000 feet in length. This allows parking on both sides of the street.
4. For streets or driveways with parking restrictions: The entrance to the street/driveway and intermittent spacing distances of 150 feet shall be posted with Fire Department approved signs stating "NO PARKING – FIRE LANE" in three-inch high letters. Driveway labeling is necessary to ensure access for Fire Department use.
5. Turning radii shall not be less than 32 feet. This measurement shall be determined at the centerline of the road.
6. A Fire Department approved turning area shall be provided at the end of a driveway of 300 feet or more in length.

LIMITED ACCESS DEVICES (GATES, ETC.):
All access devices and gates shall meet the following requirements:

1. Any single-gated opening used for ingress and egress shall be a minimum of 26 feet in width, clear-to-sky.
2. Any divided gate opening (when each gate is used for a single direction of travel – i.e., ingress or egress) shall be a minimum width of 20 feet clear-to-sky.
3. Gates and/or control devices shall be positioned a minimum of 50 feet from a public right-of-way, and shall be provided with a turnaround having a minimum of 32 feet of turning radius. If an intercom system is used, the 50 feet shall be measured from the right-of-way to the intercom control device.
4. All limited access devices shall be of a type approved by the Fire Department.
5. Gate plans shall be submitted to the Fire Department prior to installation. These plans shall show all locations, widths and details of the proposed gates.

TRAFFIC CALMING MEASURES:
All proposals for traffic calming measures (speed humps/bumps, traffic circles, roundabouts, etc.) shall be submitted to the Fire Department for review prior to implementation. Should any questions arise regarding design and construction, and/or water and access, please contact Inspector Marvin Dorsey at (323) 890-4243.

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FORESTRY DIVISION:
The statutory responsibilities of the County of Los Angeles Fire Department, Forestry Division include erosion control, watershed management, rare and endangered species, vegetation, fuel modification for Very High Fire

Hazard Severity Zones or Fire Zone 4, archeological and cultural resources, and the County Oak Tree Ordinance. Potential impacts to these areas should be addressed in the Final Environmental Impact Report.

If you have any additional questions, please contact this office at (323) 890-4330.

Very truly yours,

David R. Leininger

DAVID R. LEININGER, CHIEF, FORESTRY DIVISION
PREVENTION BUREAU

DRL:sc

STATE OF CALIFORNIA -- THE RESOURCES AGENCY GRAY DAVIS, *Governor*

DEPARTMENT OF WATER RESOURCES
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CITY OF SANTA CLARITA

October 8, 2003

To: Distribution List

The Department of Water Resources has issued the enclosed *Guidebook for Implementation of Senate Bill 610 and Senate Bill 221 of 2001* to assist water suppliers, cities, and counties in integrating water and land use planning. The bills were effective January 1, 2002.

Senate Bill 610 (Costa) (Chapter 643, Statutes of 2001) and Senate Bill 221 (Kuehl) (Chapter 642, Statutes of 2001) require that approvals of large new developments be linked to assurances that there is an adequate water supply.

A year ago, DWR issued a Draft Guidebook for SB 610 and SB 221. Cities, counties and water agencies have been using it to achieve compliance with the laws. It provides step by step suggestions for developing detailed information about water supplies and completing the SB 610 water supply assessment and the SB 221 verification of sufficient water supply. Minor revisions and a few clarifications have been added to the Guidebook being issued today.

DWR has no regulatory, permitting or any other approval authority concerning water assessments or verifications of sufficient water supply. The Guidebook is an assistance tool only and has no effect on existing State law. The information provided in the Guidebook is not all-inclusive and is not required to be used. In case of any conflict between suggestions contained in the Guidebook and any applicable laws, those laws shall have precedence.

The Guidebook was developed with input from counties, cities, water agencies, the Bureau of Reclamation, State Department of Real Estate, CALAFCO, Sacramento Local Agency Formation Commission, Water Education Foundation, Planning and Conservation League, California Urban Water Conservation Council, the development community, the bills' sponsor, East Bay Municipal Utility District, and the State Attorney General's Office.

The Guidebook, as well as a list of frequently asked questions with responses, is available on the DWR Office of Water Use Efficiency web site at: http://www.owue.water.ca.gov.

If you have any questions or require additional information, you may contact Dave Todd, of DWR's Office of Water Use Efficiency at: (916) 651-7027 or by e-mail at dtodd@water.ca.gov.

Sincerely,

Michael J. Spear
Interim Director

Enclosure

Guidebook for Implementation of Senate Bill 610 and Senate Bill 221 of 2001

to assist water suppliers, cities, and counties in integrating water and land use planning

Prepared by the California Department of Water Resources

October 8, 2003

Note: the Department of Water Resources has no regulatory, permitting or any other approval authority concerning water assessments or verifications of sufficient water supply. This Guidebook is provided only as an assistance tool for land-use agencies and public water systems affected by the legal requirement to prepare water assessments and verifications of sufficient water supply. The information provided in this guidebook is not all-inclusive and is not required to be used. In case of any conflict between suggestions contained in the guidebook, and any applicable laws, those laws shall have precedence.

The California Department of Water Resources (http://wwwdwr.water.ca.gov/) provides assistance to water agencies in implementing the Urban Water Management Planning Act, which is one of the statutes amended by **SB 610.** The Urban Water Management Plan and Urban Water Shortage Contingency Analysis, are also referenced in **SB 221**. As part of its assistance responsibility, DWR has prepared this guidance to assist water suppliers to prepare the water assessments and the written verification of water supply availability required by **SB 610** and **SB 221** respectively.

This material was circulated for comment among all interested parties. Groups that indicated their interest in reviewing materials included:

Association of California Water Agencies
Building Industry Legal Defense Foundation
California Building Industry Association
California Business Properties Association
California Chapter American Planning Association
California Department of Real Estate
California State Association of Counties
California State Attorney General's Office
California Urban Water Agencies
Castaic Lake Water Agency
East Bay Municipal Utility District
Governor's Office of Planning & Research
League of California Cities
Local Government Commission
Metropolitan Water District of Southern California
San Diego County Water Authority
U.S. Bureau of Reclamation

The Department of Water Resources (DWR) plans to revise the guidebook periodically to include new information.

GOVERNOR DAVIS'S MESSAGE UPON SIGNING SB 610 AND SB 221

To the Members of the California Legislature:

I am signing **SB 221** and **SB 610** to advance water supply planning efforts in the State of California. Together, these bills provide an important and necessary foundation for developing comprehensive water policies to prepare California to meet our future water needs.

Most notably, these bills will coordinate local water supply and land use decisions to help provide California's cities, farms and rural communities with adequate water supplies. Additionally, these bills increase requirements and incentives for urban water suppliers to prepare and adopt comprehensive management plans on a timely basis.

While these bills take a significant step toward managing the demand side of California's water equation, more needs to be done to address the need for additional supplies and improved infrastructure.

California's ability to meet its demand for water is further hampered by low rainfall during the past year. It is now necessary to address our water supply and storage needs to ensure that water is not California's next crisis and guarantee our place in the world economy.

Toward that end, I renew my commitment to develop a package of water supply actions to provide reliable and affordable water for California's citizens and the environment. This is why I have recently pledged my support for funding of CALFED programs and activities in the FY 2002 Energy and Water Appropriations bill currently before Congress. Specifically, I re-emphasize the need to aggressively pursue infrastructure projects throughout California including immediate progress on in-Delta storage, expanded Central Valley Project storage in Lake Shasta, expanded storage in Los Vaqueros and Sites reservoirs, additional storage in the upper San Joaquin River watershed, and continued investment in projects that conjunctively use surface and groundwater supplies. Where appropriate, I am directing the Department of Water Resources to assist local water supply agencies to advance these and other important local projects. I am also directing the Department to identify additional modifications to the Urban Water Management Planning Act to ensure adequate local supply and conservation planning.

Sincerely,
GRAY DAVIS
Governor of California

October 8, 2003

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* Ms. Sproul and Mr. Stevens participated in the focus group in response to the Department's request and for the purpose of providing information. Their participation does not represent legal advice from the Attorney General in his separate role as counsel to the Department; nor does the Attorney General's Office necessarily advocate any of the recommendations discussed by the focus group.

Introduction

Senate Bills 610 (Chapter 643, Statutes of 2001) and Senate Bill 221 (Chapter 642, Statutes of 2001) amended state law, effective January 1, 2002, to improve the link between information on water supply availability and certain land use decisions made by cities and counties. SB 610 and SB 221 are companion measures which seek to promote more collaborative planning between local water suppliers and cities and counties. Both statutes require detailed information regarding water availability to be provided to the city and county decision-makers prior to approval of specified large development projects. Both statutes also require this detailed information be included in the administrative record that serves as the evidentiary basis for an approval action by the city or county on such projects. Both measures recognize local control and decision making regarding the availability of water for projects and the approval of projects.

Under **SB 610**, water assessments must be furnished to local governments for inclusion in any environmental documentation for certain projects (as defined in Water Code 10912 [a]) subject to the California Environmental Quality Act. Under **SB 221**, approval by a city or county of certain residential subdivisions requires an affirmative written verification of sufficient water supply.

If coordinated and comprehensive water supply planning is underway at the time that the **SB 610**-water assessment is prepared, compliance with **SB 221** will be greatly facilitated. **SB 221** is intended as a 'fail safe' mechanism to ensure that collaboration on finding the needed water supplies to serve a new large subdivision occurs when it should – before construction begins.

Not every project that is subject to the requirements of **SB 610** would also require the mandatory water verification of **SB 221** (e.g. if there is no subdivision map approval). Conversely, not every project that is subject to the requirements of **SB 221** would also require the environmental document to contain an **SB 610** water supply assessment. Projects approved before January 1, 2002 were not subject to the requirements of **SB 610** or **SB 221**; however, some projects may have been subject to the requirement to prepare a water supply assessment as set forth in Senate Bill 901 of 1995 (Chapter 881, Statues of 1995).

A foundational document for compliance with both **SB 610** and **SB 221** is the Urban Water Management Plan (UWMP). Both of these statutes repeatedly identify the UWMP as a planning document that, if properly prepared, can be used by a water supplier to meet the standards set forth in both statutes. Thorough and complete UWMPs will allow water suppliers to use UWMPs as a foundation to fulfill the specific requirements of these two statutes. Cities, counties, water districts, property owners, and developers will all be able to utilize this document when planning for and proposing new projects.

UWMPs serve as important source documents for cities and counties as they update their General Plan. Conversely General Plans are source documents as water suppliers update their UWMPs. These planning documents are linked and their accuracy and usefulness are interdependent. It is crucial that cities /counties and water suppliers work closely when developing and updating these planning documents.

Special Recommendations

Because water suppliers face statutory time limits within which to provide water supply information, it is recommended that they check with planning staff from the cities and counties that the suppliers serve to see if the planning staff plan to process project permits requiring either water supply assessments or verifications of sufficient water supply.

It is also recommended that city and county planning staff immediately identify water suppliers serving their land-use planning area and determine the availability of water supply information to facilitate timely compliance with **SB 610** and **SB 221**.

Both **SB 610** and **SB 221** suggest that UWMPs may be a good source of information for developing water assessments and verifications. Therefore, it is recommended that each water supplier review its adopted UWMP to determine if the supply and demand analysis meets the requirements of these two laws, including the substantial evidence required by **SB 221**.

Guidebook Structure

The guidebook is designed to provide step-by-step suggestions for completing an **SB 610** water assessment and an **SB 221** verification of sufficient water supply. It includes commonly accepted definitions and examples of various supply and demand scenarios.

The organization of the guidebook roughly follows the flow charts (see pages iii to vii) that reflect the procedural steps that would need to be undertaken to comply with **SB 610** and **SB 221.**

The guidebook can be printed from a PDF document or viewed on a computer screen. It is recommended that the guidebook be printed and placed in a three-ring binder so the reader can see two pages at once. The layout of the guidebook allows the user to read through the preparation directions on the right-hand page and view the related citations from the statute on the left-hand page.

Throughout the guidebook the term:

- Agency is used to refer to city and county governments for SB221.
- Lead agency is used to refer to city and county governments for **SB 610** .
- Water supplier is used to refer to water agencies, water districts, and other water providers.
- UWMP is used to refer to an Urban Water Management Plan
- Assessment is used to refer to an **SB 610** Water Supply Assessment
- Verification is used to refer to an **SB 221** Verification of Sufficient Water Supply

Italicized text indicates the actual wording of the identified law or statute.

Text surrounded by a border signifies information deserving special attention.

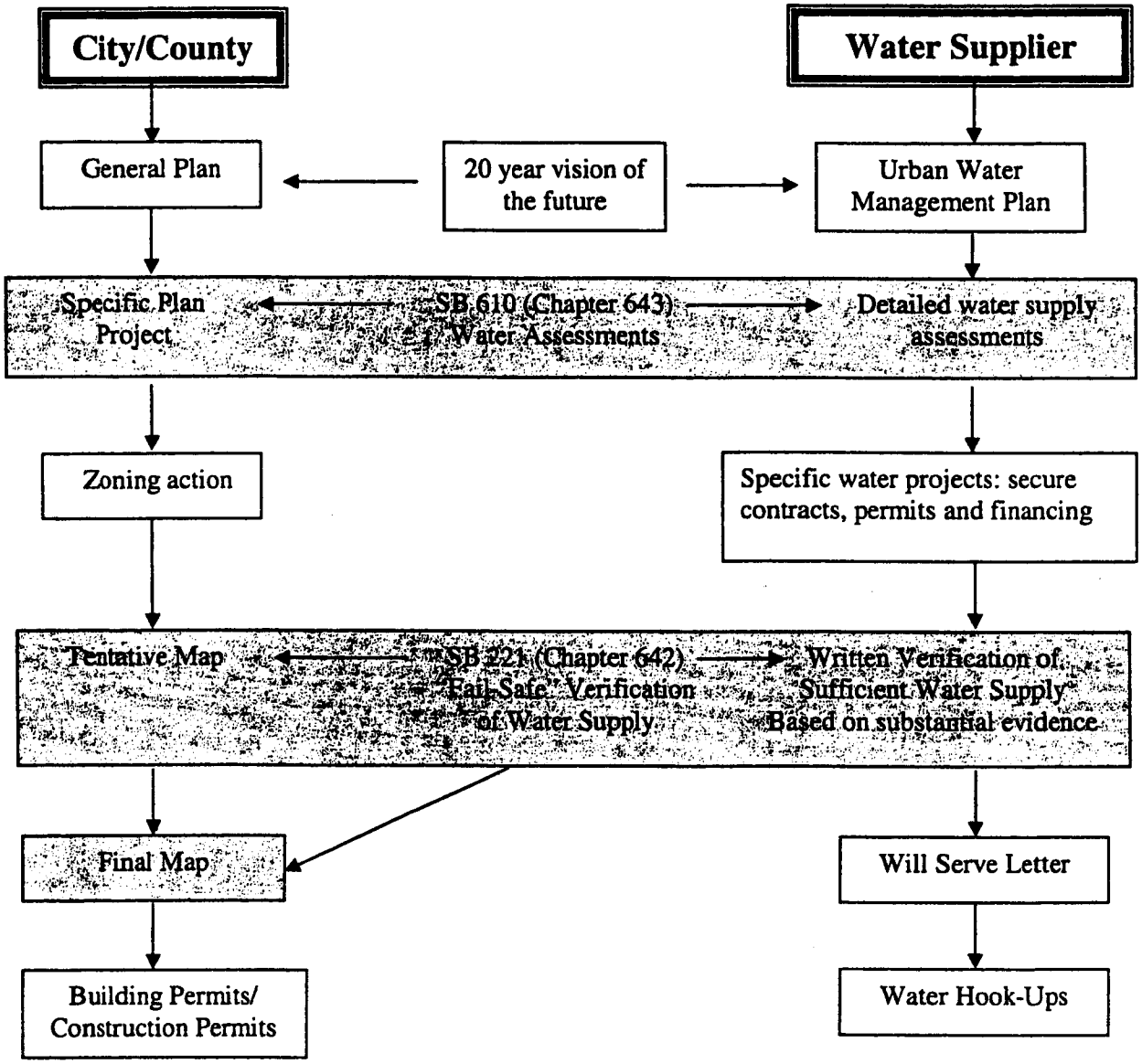
The full texts of **SB 221** and **SB 610** are included as attachments to this document and are available at the web site as either PDF or Microsoft Word documents

Frequently asked questions and responses are located on the Department of Water Resources, Office of Water Use Efficiency web site at: http://www.owue/.

Please provide your suggestions for modifications to these planning tools so that this process continues to improve California's water management and planning capabilities. For assistance and to provide suggestions, please contact the Department of Water Resources, Office of Water Use Efficiency at dtodd@water.ca.gov.

Two laws that integrate land use and water planning

The following chart illustrates the relationship between a local land use agency and a water supplier in their planning processes. The General Plan, prepared by a City or County Planning Department, and the Urban Water Management Plan prepared by a Water Supplier are the critical source documents used to substantiate the information required by **SB 610** and **SB 221** at the local level.



For additional information on either the *California Environmental Quality Act* or General Plan Guidelines, please refer to the publications available from the Governor's Office of Planning and Research at: www.opr.ca.gov.

For information and guidance related to the *Urban Water Management Planning Act,* please refer to the Department of Water Resources, Office of Water Use Efficiency available at: http://www.owue/.

SB 610 Flowchart

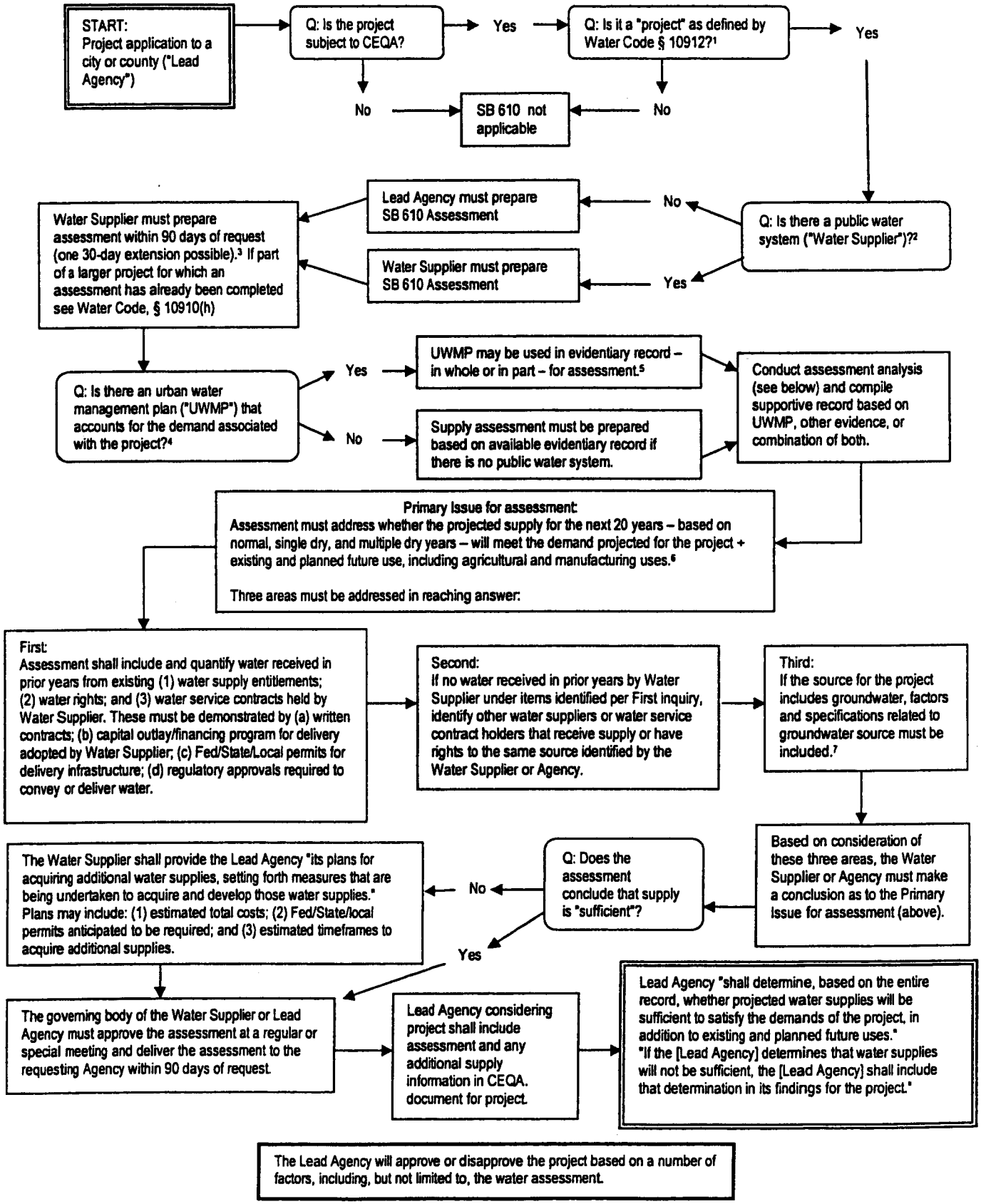


Chart Courtesy of the
The Building Industry Legal Defense

Notes for SB 610 Flowchart

Footnote 1:
California Water Code section 10912.
For the purposes of this part, the following terms have the following meanings:

(a) "Project" means any of the following:

(1) A proposed residential development of more than 500 dwelling units.

(2) A proposed shopping center or business establishment employing more than 1,000 persons or having more than 500,000 square feet of floor space.

(3) A proposed commercial office building employing more than 1,000 persons or having more than 250,000 square feet of floor space.

(4) A proposed hotel or motel, or both, having more than 500 rooms.

(5) A proposed industrial, manufacturing, or processing plant, or industrial park planned to house more than 1,000 persons, occupying more than 40 acres of land, or having more than 650,000 square feet of floor area.

(6) A mixed-use project that includes one or more of the projects specified in this subdivision.

(7) A project that would demand an amount of water equivalent to, or greater than, the amount of water required by a 500 dwelling unit project.

(b) If a public water system has fewer than 5,000 service connections, then "project" means any proposed residential, business, commercial, hotel or motel, or industrial development that would account for an increase of 10 percent or more in the number of the public water system's existing service connections, or a mixed-use project that would demand an amount of water equivalent to, or greater than, the amount of water required by residential development that would represent an increase of 10 percent or more in the number of the public water system's existing service connections.

Footnote 2:
California Water Code section 10912.
(c) "Public water system" means a system for the provision of piped water to the public for human consumption that has 3,000 or more service connections. A public water system includes all of the following:

(1) Any collection, treatment, storage, and distribution facility under control of the operator of the system which is used primarily in connection with the system.

(2) Any collection or pretreatment storage facility not under the control of the operator that is used primarily in connection with the system.

(3) Any person who treats water on behalf of one or more public water systems for the purpose of rendering it safe for human consumption. It also means a system that will become a public water supplier if the project puts it over 3,000 service connections.

Footnote 3:
California Water Code section 10910, subdivision (g)(1).

Footnote 4:
The requirement for and contents of an urban water management plan are provided in California Water Code section 10631, as amended by SB 610 in 2001.

Footnote 5:
California Water Code section 10910, subdivision (c)(2) provides that the UWMP may be used, but it may or may not provide all of the information needed.

Footnote 6:
See California Water Code section 10910, subdivisions (c)(3) & (4); see also Government Code section 66473.7, subdivision (a)(2) [SB 221]

Footnote 7:
California Water Code section 10910, subdivision (f):
(f) If a water supply for a proposed project includes groundwater, the following additional information shall be included in the water assessment:

(1) A review of any information contained in the urban water management plan relevant to the identified water supply for the proposed project.

(2) A description of any groundwater basin or basins from which the proposed project will be supplied. For those basins for which a court or the board has adjudicated the rights to pump groundwater, a copy of the order or decree adopted by the court or the board and a description of the amount of groundwater the public water system, or the city or county if either is required to comply with this part pursuant to subdivision (b), has the legal right to pump under the order or decree. For basins that have not been adjudicated, information as to whether the department has identified the basin or basins as overdrafted or has projected that the basin will become overdrafted if present management conditions continue, in the most current bulletin of the department that characterizes the condition of the groundwater basin, and a detailed description by the public water system, or the city or county if either is required to comply with this part pursuant to subdivision (b), of the efforts being undertaken in the basin or basins to eliminate the long-term overdraft condition.

(3) A detailed description and analysis of the amount and location of groundwater pumped by the public water system, or the city or county if either is required to comply with this part pursuant to subdivision (b), for the past five years from any groundwater basin from which the proposed project will be supplied. The description and analysis shall be based on information that is reasonably available, including, but not limited to, historic use records.

(4) A detailed description and analysis of the amount and location of groundwater that is projected to be pumped by the public water system, or the city or county if either is required to comply with this part pursuant to subdivision (b), from any basin from which the proposed project will be supplied. The description and analysis shall be based on information that is reasonably available, including, but not limited to, historic use records.

(5) An analysis of the sufficiency of the groundwater from the basin or basins from which the proposed project will be supplied to meet the projected water demand associated with the proposed project. A water assessment shall not be required to include the information required by this paragraph if the public water system determines, as part of the review required by paragraph (1), that the sufficiency of groundwater necessary to meet the initial and projected water demand associated with the project was addressed in the description and analysis required by paragraph (4) of subdivision (b) of Section 10631.

SB 221 Flowchart

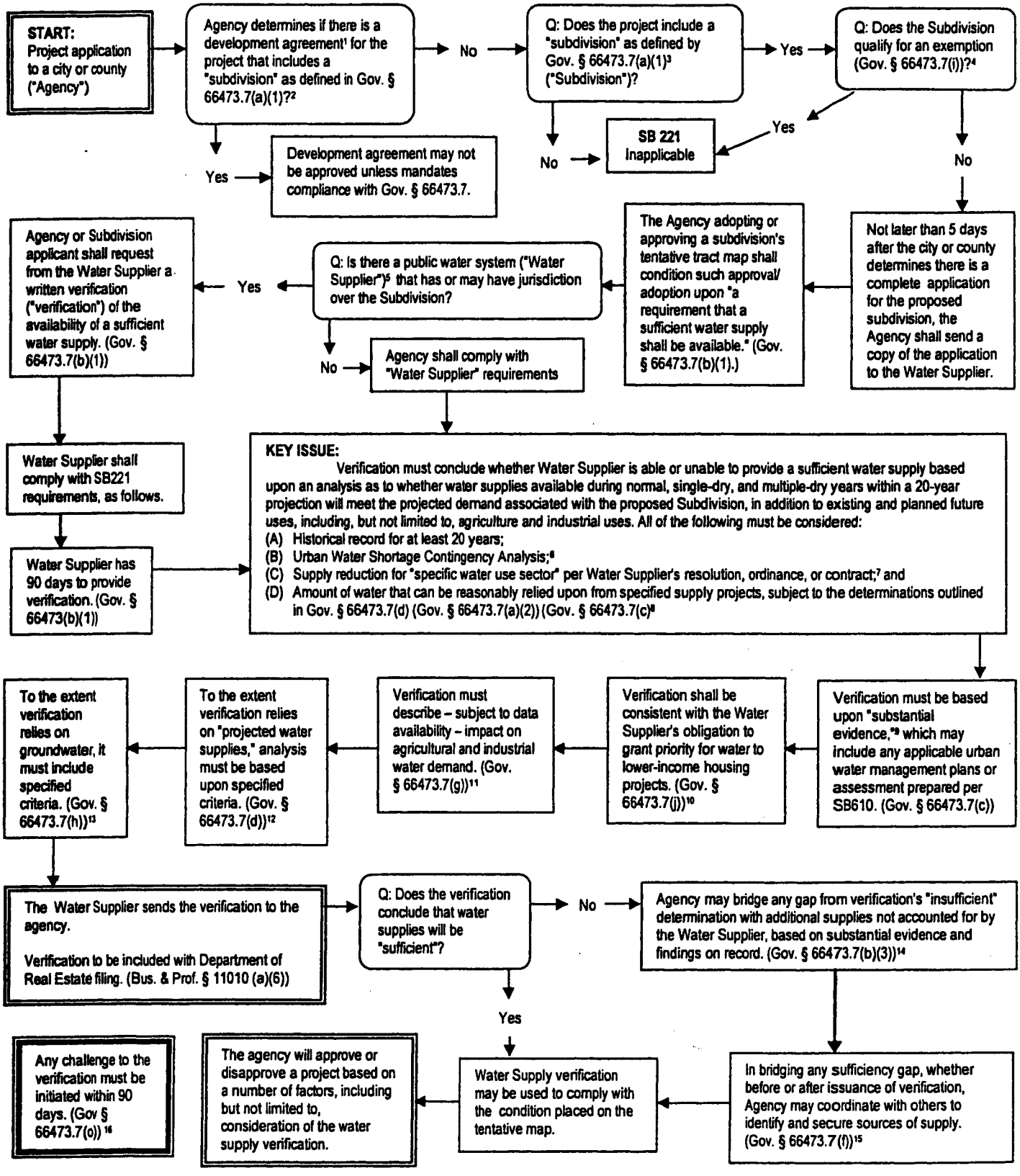


Chart Courtesy of the
The Building Industry Legal Defense Foundation

Notes for SB 221 Flowchart

Footnote 1: Gov. Code § 65867.5

Footnote 2: "Subdivision" is defined as follows per Government Code § 66473.7(a)(1): " 'Subdivision" means a proposed residential development of more than 500 dwelling units, except that for a public water system that has fewer than 5,000 service connections, "subdivision" means any proposed residential development that would account for an increase of 10 percent or more in the number of the public water system's existing service connections." See Government Code § 65867.5(c). (development agreements)

Footnote 3: See note 2.

Footnote 4: Gov. Code § 66473.7(i) provides an exemption for "infill" or "low-income or very-low-income" housing subdivisions as follows: "This section shall not apply to any residential project proposed for a site that is within an urbanized area and has been previously developed for urban uses, or where the immediate contiguous properties surrounding the residential project site are, or previously have been, developed for urban uses, or housing projects that are exclusively for very low and low-income households."

Footnote 5: " 'Public water system' means the water supplier that is, or may become as a result of servicing the subdivision included in a tentative map pursuant to subdivision (b), a public water system, as defined in Section 10912 of the Water Code, that may supply water for a subdivision." (Gov. Code §66473.7(a)(3).) There may be one water supplier for a given project. For example there may be different providers for potable water versus reclaimed water versus groundwater.

Footnote 6: The Urban Water Shortage Contingency Analysis may be prepared pursuant to Water Code § 10632.

Footnote 7: Supply reduction resolution, ordinance, or contract may not conflict with Water Code § 354.

Footnote 8: Specifically, "The amount of water that the water supplier can reasonably rely on receiving from other water supply projects, such as conjunctive use, reclaimed water, water conservation, and water transfer, including programs identified under federal, state, and local water initiatives such as CALFED and Colorado River tentative agreements, to the extent that these water supplies meet the criteria of subdivision (d)." (Gov. Code § 66473.7(a)(2)(D).) Subdivision (d) addresses evidentiary requirements for "projected" water supplies, and these requirements are listed in note 13.

Footnote 9: "The applicable public water system's written verification of its ability or inability to provide a sufficient water supply that will meet the projected demand associated with the proposed subdivision as required by subdivision (b) shall be supported by substantial evidence. The substantial evidence may include, but is not limited to, any of the following:

(1) The public water system's most recently adopted urban water management plan adopted pursuant to Part 2.6 (commencing with Section 10610) of Division 6 of the Water Code.
(2) A water assessment that was completed pursuant to Part 2.10 (commencing with Section 10910) of Division 6 of the Water Code.
(3) Other information relating to the sufficiency of the water supply that contains analytical information that is substantially similar to the assessment required by Section 10635 of the Water Code." (Gov. Code § 66473.7(c).)

Footnote 10: "The determinations made pursuant to this section shall be consistent with the obligation of a public water system to grant a priority for the provision of available and future water resources or services to proposed housing developments that help meet the city's or county's share of the regional housing needs for lower income households, pursuant to Section 65589.7." (Gov. Code § 66473.7(j).)

Footnote 11: "The written verification prepared under this section shall also include a description, to the extent that data is reasonably available based on published records maintained by federal and state agencies, and public records of local agencies, of the reasonably foreseeable impacts of the proposed subdivision on the availability of water resources for agricultural and industrial uses within the public water system's service area that are not currently receiving water from the public water system but are utilizing the same sources of water. To the extent that those reasonably foreseeable impacts have previously been evaluated in a document prepared pursuant to the California Environmental Quality Act (Division 13 (commencing with Section 21000) of the Public Resources Code) or the National Environmental Policy Act (Public Law 91-190) for the proposed subdivision, the public water system may utilize that information in preparing the written verification." (Gov. Code § 66473.7(g).)

Footnote 12: "When the written verification pursuant to subdivision (b) relies on projected water supplies that are not currently available to the public water system, to provide a sufficient water supply to the subdivision, the written verification as to those projected water supplies shall be based on all of the following elements, to the extent each is applicable:

(1) Written contracts or other proof of valid rights to the identified water supply that identify the terms and conditions under which the water will be available to serve the proposed subdivision.
(2) Copies of a capital outlay program for financing the delivery of a sufficient water supply that has been adopted by the applicable governing body.
(3) Securing of applicable federal, state, and local permits for construction of necessary infrastructure associated with supplying a sufficient water supply.
(4) Any necessary regulatory approvals that are required in order to be able to convey or deliver a sufficient water supply to the subdivision." (Gov. Code § 66473.7(d).)

Footnote 13: "Where a water supply for a proposed subdivision includes groundwater, the public water system serving the proposed subdivision shall evaluate, based on substantial evidence, the extent to which it or the landowner has the right to extract the additional groundwater needed to supply the proposed subdivision. Nothing in this subdivision is intended to modify state law with regard to groundwater rights." (Gov. Code § 66473.7(h).)

Footnote 14: "If the written verification provided by the applicable public water system indicates that the public water system is unable to provide a sufficient water supply that will meet the projected demand associated with the proposed subdivision, then the local agency may make a finding, after consideration of the written verification by the applicable public water system, that additional water supplies not accounted for by the public water system are, or will be, available prior to completion of the subdivision that will satisfy the requirements of this section. This finding shall be made on the record and supported by substantial evidence."(Gov. Code. § 66473.7(b)(3).)

Footnote 15: "In making any findings or determinations under this section, a local agency, or designated advisory agency, may work in conjunction with the project applicant and the public water system to secure water supplies sufficient to satisfy the demands of the proposed subdivision. If the local agency secures water supplies pursuant to this subdivision, which supplies are acceptable to and approved by the governing body of the public water system as suitable for delivery to customers, it shall work in conjunction with the public water system to implement a plan to deliver that water supply to satisfy the long-term demands of the proposed subdivision." (Gov. Code § 66473.7(f).)

Footnote 16: "Any action challenging the sufficiency of the public water system's written verification of a sufficient water supply shall be governed by Section 66499.37." (Gov. § 66473.7(o).) Government Section 66499.37 states: "Any action or proceeding to attack, review, set aside, void or annul the decision of an advisory agency, appeal board or legislative body concerning a subdivision, or of any of the proceedings, acts or determinations taken, done or made prior to such decision, or to determine the reasonableness, legality or validity of any condition attached thereto, shall not be maintained by any person unless such action or proceeding is commenced and service of summons effected within 90 days after the date of such decision. Thereafter all persons are barred from any such action or proceeding or any defense of invalidity or unreasonableness of such decision or of such proceedings, acts or determinations. Any such proceeding shall take precedence over all matters of the calendar of the court except criminal.

October 8, 2003

Main Section

Section 1 - Code citations Does SB 610 or SB 221 apply to the proposed development?

SB 610

Water Code section 10910

(a) Any city or county that determines that a project, as defined in Section 10912, is subject to the California Environmental Quality Act Division 13 (commencing with Section 21000) of the Public Resources Code, under Section 21080 of the Public Resources Code shall comply with this part.

Water Code section 10912

For the purposes of this part, the following terms have the following meanings:

(a) "Project" means any of the following:

- *(1) A proposed residential development of more than 500 dwelling units.*
- *(2) A proposed shopping center or business establishment employing more than 1,000 persons or having more than 500,000 square feet of floor space.*
- *(3) A proposed commercial office building employing more than 1,000 persons or having more than 250,000 square feet of floor space.*
- *(4) A proposed hotel or motel, or both, having more than 500 rooms.*
- *(5) A proposed industrial, manufacturing, or processing plant, or industrial park planned to house more than 1,000 persons, occupying more than 40 acres of land, or having more than 650,000 square feet of floor area.*
- *(6) A mixed-use project that includes one or more of the projects specified in this subdivision.*
- *(7) A project that would demand an amount of water equivalent to, or greater than, the amount of water required by a 500 dwelling unit project.*

(b) If a public water system has fewer than 5,000 service connections, then "project" means any proposed residential, business, commercial, hotel or motel, or industrial development that would account for an increase of 10 percent or more in the number of the public water system's existing service connections, or a mixed-use project that would demand an amount of water equivalent to, or greater than, the amount of water required by residential development that would represent an increase of 10 percent or more in the number of the public water system's existing service connections.

SB 221

Government Code section 65867.5

(c) A development agreement that includes a subdivision, as defined in section 66473.7, shall not be approved unless the agreement provides that any tentative map prepared for the subdivision will comply with the provisions of section 66473.7.

Government Code section 66473.7

(a) For the purposes of this section, the following definitions apply:

- *(1) "Subdivision" means a proposed residential development of more than 500 dwelling units, except that for a public water system that has fewer than 5,000 service connections, "subdivision" means any proposed residential development that would account for an increase of 10 percent or more in the number of the public water system's existing service connections.*

(b) (1) The legislative body of a city or county or the advisory agency, to the extent that it is authorized by local ordinance to approve, conditionally approve, or disapprove the tentative map, shall include as a condition in any tentative map that includes a subdivision a requirement that a sufficient water supply shall be available. Proof of the availability of a sufficient water supply shall be requested by the subdivision applicant or local agency, at the discretion of the local agency, and shall be based on written verification from the applicable public water system within 90 days of a request.

(i) This section shall not apply to any residential project proposed for a site that is within an urbanized area and has been previously developed for urban uses, or where the immediate contiguous properties surrounding the residential project site are, or previously have been, developed for urban uses, or housing projects that are exclusively for very low and low-income households.

Section 1 Does SB 610 or SB 221 apply to the proposed development?

Lead Agency (City or County) receives project application or complete application for a proposed subdivision.

Is the project subject to **SB 610**?

1-1 Is the project subject to CEQA? Water Code § 10910(a) Yes ☐ No ☐

If no, see **SB 221** question 1-3, below

If yes, continue

1-2 Is it a "project" as defined by Water Code § 10912(a) or (b)? Yes No

If yes, to comply with **SB 610 go to Section 2, page 4 (SB 221** may also apply – see below)

If no, see **SB 221** question 1-3 below

Note: In determining whether a project would demand an amount of water equivalent to, or greater than, the amount of water required by a 500 dwelling unit project, it is generally acknowledged that one acre-foot of water can serve two to three households on an annual basis; therefore, one dwelling unit typically consumes .3 to .5 acre-feet of water per year, depending upon several factors, including the regional climate. An agency should contact its local water supplier to obtain its advice on the annual water demand for a development within the local community in order to determine whether the water demand for the development under consideration is equivalent to the water demand of a 500 dwelling unit project. Water Code § 10912 (a)(7)

While Water Code § 10912(a) provides that a "project" may include a residential development of 500 or more dwelling units, Water Code § 10912(b) provides a "sliding scale" for determining the size of a project to which **SB 610** would apply, below 500 dwelling units. Since Section 10912(b) provides that a "project" is a proposed development that would increase the number of service connections for a public water system (which currently has fewer than 5,000 service connections) by 10 percent or more, a "project" could be as few as 300 dwelling units. For example, a water utility that has 3,000 service connections would experience an increase in the number of service connections by 10% if it were required to serve a proposed residential development of 300 units, thus making the 300-unit development a "project" under **SB 610**. Similarly, for water utilities that have more than 3,000 service connections, but fewer than 5,000 service connections, the "10 percent test" in Water Code § 10912(b) would apply in determining whether a proposed development is a "project" under **SB 610**.

Is the project subject to **SB 221**?

1-3 Does the tentative map include a "subdivision" as defined by Government Code § 66473.7(a)(1)?

Yes No

If yes, continue, go to **Section 9, Page 40**

If no, stop

Note: Government Code § 66473.7(a) provides that a "subdivision" consists of 500 or more dwelling units in order to be subject to **SB 221**, except that for a public water system that has fewer than 5,000 service connections, Government Code § 66473.7(a) provides a "sliding scale" for determining the number of dwelling units that would constitute a "subdivision," below 500 dwelling units. Because Government Code § 66473.7(a) provides that a "subdivision" for a public water system with fewer than 5,000 service connections is a proposed development that would increase the number of service connections for a public water system by 10 percent or more, a "subdivision" could be as few as 300 dwelling units. For example a water utility that has 3,000 service connections would experience an increase in the number of service connections by 10 percent if it were required to serve a proposed residential development of 300 units, thus making the 300-unit development a "subdivision" under **SB 221**. Similarly, for water utilities that have more than 3,000 service connections, but fewer than 5,000 service connections, the "10% test" in Government Code § 66473.7(a) would apply in determining whether a proposed development is a "subdivision" under **SB 221**.

If neither **SB 610** nor **SB 221** applies, **Stop** – no further action required by **SB 610** or **SB 221**

Note: Special Provisions apply for San Diego County agencies and water suppliers. See Section 17, page 80 for more information. Government Code § 66473.7(k)

Section 2 - Code citations Who will prepare the SB 610 assessment?

Water Code section 10910

(b) The city or county, at the time that it determines whether an environmental impact report, a negative declaration, or a mitigated negative declaration is required for any project subject to the California Environmental Quality Act pursuant to Section 21080.1 of the Public Resources Code, shall identify any water system that is, or may become as a result of supplying water to the project identified pursuant to this subdivision, a public water system, as defined in Section 10912, that may supply water for the project. If the city or county is not able to identify any public water system that may supply water for the project, the city or county shall prepare the water assessment required by this part after consulting with any entity serving domestic water supplies whose service area includes the project site, the local agency formation commission, and any public water system adjacent to the project site.

Water Code section 10912

(c) "Public water system" means a system for the provision of piped water to the public for human consumption that has 3,000 or more service connections. A public water system includes all of the following:

- *(1) Any collection, treatment, storage, and distribution facility under control of the operator of the system which is used primarily in connection with the system.*
- *(2) Any collection or pretreatment storage facility not under the control of the operator that is used primarily in connection with the system.*
- *(3) Any person who treats water on behalf of one or more public water systems for the purpose of rendering it safe for human consumption.*

Water Code section 10910

(c) (1) The city or county, at the time it makes the determination required under Section 21080.1 of the Public Resources Code, shall request each public water system identified pursuant to subdivision (b) to determine whether the projected water demand associated with a proposed project was included as part of the most recently adopted urban water management plan adopted pursuant to Part 2.6 (commencing with Section 10610).

- *(2) If the projected water demand associated with the proposed project was accounted for in the most recently adopted urban water management plan, the public water system may incorporate the requested information from the urban water management plan in preparing the elements of the assessment required to comply with subdivisions (d), (e), (f), and (g).*

Water Code section 10910

(g) (1) Subject to paragraph (2), the governing body of each public water system shall submit the assessment to the city or county not later than 90 days from the date on which the request was received. The governing body of each public water system, or the city or county if either is required to comply with this act pursuant to subdivision (b), shall approve the assessment prepared pursuant to this section at a regular or special meeting.

- *(2) Prior to the expiration of the 90 day period, if the public water system intends to request an extension of time to prepare and adopt the assessment, the public water system shall meet with the city or county to request an extension of time, which shall not exceed 30 days, to prepare and adopt the assessment.*
- *(3) If the public water system fails to request an extension of time, or fails to submit the assessment notwithstanding the extension of time granted pursuant to paragraph (2), the city or county may seek a writ of mandamus to compel the governing body of the public water system to comply with the requirements of this part relating to the submission of the water assessment.*

Section 2 Who will prepare the SB 610 assessment?

2-1 Is there a public water system ("water supplier") for the project? Water Code § 10910(b)

Yes No

A public water system that currently has fewer than 3,000, but would have 3,000 or more service connections as a result of providing water to the proposed project is required to prepare an assessment (Water Code § 10910(b), 10912((b), 10912(c)). Close attention will need to be paid to the number of existing service connections and the number of proposed service connections as a result of serving the proposed development, as well as the percentage increase in the number of service connections, in order to determine whether the water utility is a "public water system" and whether the proposed development is a "project" under **SB 610**. For example, a water utility with fewer than 3,000 service connections may become a "public water system" as a result of supplying water to the proposed development. In other words, a water utility with 2,700 existing service connections would become a "public water system" if it were to serve a proposed development of 400 dwelling units, and an increase in the number of service connections by 400 would also represent a greater than 10% increase in service connections for the water utility, thus making the proposed development subject to an **SB 610** water supply assessment by the water utility.

A public water system is defined in the Water Code as a system that has 3,000 or more service connections and provides piped water to the public for human consumption. Water Code § 10912(c)

SB 610 (Water Code § 10912(c)) defines "public water system" as a water utility with 3,000 or more service connections. In addition, **SB 610** requires the city or county to identify the water system that is, or may become as a result of supplying water to the project, a public water system (Water Code § 10910(b)). This provision suggests that a water utility with fewer than 3,000 service connections currently could become a "public water system" if the number of service connections associated with the new development would increase the number of service connections served by the water utility to more than 3,000.

If no, the lead agency must prepare an **SB 610** assessment. Water Code § 10910(b) – **go to Section 3, page 6**
If the lead agency is unable to identify a water supplier (public water system as defined in **SB 610**), the lead agency is responsible for compliance with the requirements of **SB 610**. Prior to preparing the assessment, the lead agency is required to consult with the following:

- Any entity serving domestic water supplies whose service area includes the project site
- The Local Agency Formation Commission
- Any public water system adjacent to the project site

Even though a water supplier may not be a "public water system" or become a "public water system" as a result of serving the proposed project, it will still be involved, in a consultation role, in the preparation of the assessment. Similarly, even though the water supplier's service area may not include the project site, as long as its service area is adjacent to the project site, it will still be involved, in a consultation role, in the preparation of the assessment.

If yes, lead agency shall request each water supplier to determine whether the projected water demand associated with the proposed project was accounted for in the most recently adopted Urban Water Management Plan. If not, or if the water supplier has no Urban Water Management Plan, the lead agency shall request the water supplier to prepare an **SB 610** assessment. Water Code § 10910(c)

Go to Section 3, page 6

The water supplier must prepare the assessment within 90 days of request. The water supplier may request the lead agency to grant one 30-day extension. Water Code § 10910(g)

a) The statute does not specify a time limit on the preparation of an assessment by the lead agency, if the lead agency is undertaking the assessment because there is no identified water supplier.
b) If the assessment is not received from the water supplier within the prescribed 90-day period, and any requested time extension, the lead agency may seek legal relief. Water Code § 10910(g)(1)(2)(3)

Section 3 - Code citations Has an assessment already been prepared that includes this project?

Water Code section 10910

(h) Notwithstanding any other provision of this part, if a project has been the subject of a water assessment that complies with the requirements of this part, no additional water assessment shall be required for subsequent projects that were part of a larger project for which a water assessment was completed and that has complied with the requirements of this part and for which the public water system, or the city or county if either is required to comply with this part pursuant to subdivision (b), has concluded that its water supplies are sufficient to meet the projected water demand associated with the proposed project, in addition to the existing and planned future uses, including, but not limited to, agricultural and industrial uses, unless one or more of the following changes occurs:

(1) Changes in the project that result in a substantial increase in water demand for the project.

(2) Changes in the circumstances or conditions substantially affecting the ability of the public water system, or the city or county if either is required to comply with this part pursuant to subdivision (b), to provide a sufficient supply of water for the project.

(3) Significant new information becomes available which was not known and could not have been known at the time when the assessment was prepared.

Section 3 Has an assessment already been prepared that includes this project?

3-1 Has this project already been the subject of an assessment? Water Code § 10910(h) Yes No

If no, water supplier or lead agency must prepare **SB 610** assessment. Water Code § 10910(b)
go to Section 4, page 8

If yes, and ALL of the five factors listed below apply:

- the preparer of the assessment determines that it complies with the requirements of **SB 610**
- the assessment determined that sufficient water was available for the project
- there has been no change to the project that would result in a substantial increase in demand
- there has been no change in the circumstances or conditions which substantially affect the ability of the water supplier to provide a sufficient supply of water for the project
- no new information which might affect the assessment has becomes available

then, no additional assessment is required for this project for which the original assessment was prepared.

Assessment is complete – Stop

Note: The completed assessment is ready for inclusion in the environmental documentation for the project.

Otherwise, if any of the five factors do not apply, then an assessment is required.

Continue, go to Section 4, page 8

The preparer of the verification or the assessment may be a water suppler, city or county. Wherever the term "water supplier" appears, the term "preparer" of the verification or assessment also applies.

Section 4 - Code citations Is there a current Urban Water Management Plan?

Water Code section 10910

(c) (1) The city or county, at the time it makes the determination required under Section 21080.1 of the Public Resources Code, shall request each public water system identified pursuant to subdivision (b) to determine whether the projected water demand associated with a proposed project was included as part of the most recently adopted urban water management plan adopted pursuant to Part 2.6 (commencing with Section 10610).

(2) If the projected water demand associated with the proposed project was accounted for in the most recently adopted urban water management plan, the public water system may incorporate the requested information from the urban water management plan in preparing the elements of the assessment required to comply with subdivisions (d), (e), (f), and (g).

(3) If the projected water demand associated with the proposed project was not accounted for in the most recently adopted urban water management plan, or the public water system has no urban water management plan, the water assessment for the project shall include a discussion with regard to whether the public water system's total projected water supplies available during normal, single dry, and multiple dry water years during a 20-year projection will meet the projected water demand associated with the proposed project, in addition to the public water system's existing and planned future uses, including agricultural and manufacturing uses.

(4) If the city or county is required to comply with this part pursuant to subdivision (b), the water assessment for the project shall include a discussion with regard to whether the total projected water supplies, determined to be available by the city or county for the project during normal, single dry, and multiple dry water years during a 20-year projection, will meet the projected water demand associated with the proposed project, in addition to existing and planned future uses, including agricultural and manufacturing uses.

Section 4 Is there a current Urban Water Management Plan?

4-1 Is there an adopted urban water management plan (UWMP)? Water Code § 10910(c)

Yes No

If no, assessment must be prepared based on available information. Water Code § 10910(c)(3)
Read following note and **go to Section 5, page 10**

If the water supplier will prepare the **SB 610** assessment (Water Code § 10910(c)(3), without the benefit of a UWMP, the assessment shall include a determination as to whether the water supplier's total projected water supplies available during normal, single dry, and multiple dry water years during a 20-year projection will meet the projected water demand associated with the proposed project, in addition to the public water system's existing and planned future uses, including agricultural and manufacturing uses.

If the lead agency will prepare the **SB 610** assessment (Water Code § 10910(c)(4), the assessment shall include a discussion as to whether the total projected water supplies, determined to be available during normal, single dry, and multiple dry water years during a 20-year projection, will meet the projected water demand associated with the proposed project, in addition to existing and planned future uses, including agricultural and manufacturing uses.

If yes, continue

4-2 Is the projected water demand for the project accounted for in the most recent UWMP?
Water Code § 10910(c)(2) Yes No

If yes, information from the UWMP related to the projected water demand for the project may also be used for carrying out Section 5, Steps 1 and 2, and Section 7, as outlined in this guidance manual.
Go to Section 5, page 10

If no, assessment must be prepared based on either information contained within the UWMP and/or information available from other sources and reports. Water Code § 10910(c)(3)
Go to Section 5, page 10

Section 5 - Code citations What information should be included in an assessment?

Water Code section 10910

(c) (2) If the projected water demand associated with the proposed project was accounted for in the most recently adopted urban water management plan, the public water system may incorporate the requested information from the urban water management plan in preparing the elements of the assessment required to comply with subdivisions (d), (e), (f), and (g).

(3) If the projected water demand associated with the proposed project was not accounted for in the most recently adopted urban water management plan, or the public water system has no urban water management plan, the water assessment for the project shall include a discussion with regard to whether the public water system's total projected water supplies available during normal, single dry, and multiple dry water years during a 20-year projection will meet the projected water demand associated with the proposed project, in addition to the public water system's existing and planned future uses, including agricultural and manufacturing uses.

(4) If the city or county is required to comply with this part pursuant to subdivision (b), the water assessment for the project shall include a discussion with regard to whether the total projected water supplies, determined to be available by the city or county for the project during normal, single dry, and multiple dry water years during a 20-year projection, will meet the projected water demand associated with the proposed project, in addition to existing and planned future uses, including agricultural and manufacturing uses.

(d)(1) The assessment required by this section shall include an identification of any existing water supply entitlements, water rights, or water service contracts relevant to the identified water supply for the proposed project, and a description of the quantities of water received in prior years by the public water system, or the city or county if either is required to comply with this part pursuant to subdivision (b), under the existing water supply entitlements, water rights, or water service contracts.

(2) An identification of existing water supply entitlements, water rights, or water service contracts held by the public water system, or the city or county if either is required to comply with this part pursuant to subdivision (b), shall be demonstrated by providing information related to all of the following:

(A) Written contracts or other proof of entitlement to an identified water supply.

(B) Copies of a capital outlay program for financing the delivery of a water supply that has been adopted by the public water system.

(C) Federal, state, and local permits for construction of necessary infrastructure associated with delivering the water supply.

(D) Any necessary regulatory approvals that are required in order to be able to convey or deliver the water supply.

(e) If no water has been received in prior years by the public water system, or the city or county if either is required to comply with this part pursuant to subdivision (b), under the existing water supply entitlements, water rights, or water service contracts, the public water system, or the city or county if either is required to comply with this part pursuant to subdivision (b), shall also include in its water assessment pursuant to subdivision (c), an identification of the other public water systems or water service contract holders that receive a water supply or have existing water supply entitlements, water rights, or water service contracts, to the same source of water as the public water system, or the city or county if either is required to comply with this part pursuant to subdivision (b), has identified as a source of water supply within its water assessments.

Section 5 What information should be included in an assessment?

This section is written as if the water supplier is preparing the water assessment. If a lead agency is preparing the assessment, the same approach is used but the water supplies are those identified by the lead agency as available to meet the project's water demands. (Examples will be provided of how a lead agency assessment will differ from a water supplier assessment.)

The question to be answered is:
Will the water supplier's total projected water supplies available during normal, single dry, and multiple dry water years during a 20-year projection meet the projected water demand of the proposed project, in addition to the water supplier's existing and planned future uses, including agricultural and manufacturing uses?

If the water demand for the proposed project was accounted for in the most recently adopted UWMP, information from the UWMP related to the projected water demand for the project may also be used for carrying out Section 5, Steps 1 and 2, and Section 7, as outlined in this guidance manual. Water Code § 10910(c)(2)

The Urban Water Management Planning Act (Water Code § 10631 – see Appendix C) requires the supplier to document water supplies available during normal, single dry, and multiple dry water years during a 20-year projection and the existing and projected future water demand during a 20-year projection. The Act requires that the projected supplies and demands be presented in 5-year increments for the 20-year projection.

If the water demand for the proposed project was **NOT** accounted for in the most recently adopted UWMP,

- The water supplier must prepare an assessment that includes a discussion of whether the total projected water supplies determined to be available for the project during normal, single dry, and multiple dry water years during a 20-year projection will meet the projected water demand associated with the proposed project, in addition to the water supplier's existing and planned future uses, including agricultural and manufacturing uses.
- A city or county, if not able to identify a public water system that may supply water for the project, must prepare an assessment that includes a discussion of whether the total projected water supplies determined to be available for the project during normal, single dry, and multiple dry water years during a 20-year projection will meet the projected water demand associated with the proposed project, in addition to existing and planned future uses, including agricultural and manufacturing uses. Water Code § 10910 subdivisions (b) and (c)(3) and (4)

Supplies from all sources, including wholesaler supplies, require documentation. This documentation includes identifying and quantifying water rights, contracts, and/or entitlements to the supply; associated capital outlay programs; federal, state and local permits for constructing infrastructure for conveying the supply; and any necessary regulatory approvals required for conveyance.

Section 5 - Code Citations
Step One: Documenting wholesale water supplies

Water Code section 10910

(d)(1) The assessment required by this section shall include an identification of any existing water supply entitlements, water rights, or water service contracts relevant to the identified water supply for the proposed project, and a description of the quantities of water received in prior years by the public water system, or the city or county if either is required to comply with this part pursuant to subdivision (b), under the existing water supply entitlements, water rights, or water service contracts.

(2) An identification of existing water supply entitlements, water rights, or water service contracts held by the public water system, or the city or county if either is required to comply with this part pursuant to subdivision (b), shall be demonstrated by providing information related to all of the following:

(A) Written contracts or other proof of entitlement to an identified water supply.

(B) Copies of a capital outlay program for financing the delivery of a water supply that has been adopted by the public water system.

(C) Federal, state, and local permits for construction of necessary infrastructure associated with delivering the water supply.

(D) Any necessary regulatory approvals that are required in order to be able to convey or deliver the water supply.

(e) If no water has been received in prior years by the public water system, or the city or county if either is required to comply with this part pursuant to subdivision (b), under the existing water supply entitlements, water rights, or water service contracts, the public water system, or the city or county if either is required to comply with this part pursuant to subdivision (b), shall also include in its water assessment pursuant to subdivision (c), an identification of the other public water systems or water service contract holders that receive a water supply or have existing water supply entitlements, water rights, or water service contracts, to the same source of water as the public water system, or the city or county if either is required to comply with this part pursuant to subdivision (b), has identified as a source of water supply within its water assessments.

Section 5
Step One: Documenting wholesale water supplies

This section describes the documentation necessary for wholesale water supplies in **SB 610** water assessments.

Many retail water suppliers in California receive supplies from one or more water wholesalers. Under **SB 610**, retail water suppliers are responsible for providing the water assessment to the local agencies. In most cases, the retail water supplier will have better information on the supply availability and system constraints for a particular development project.

Under the requirements of Water Code § 10910 (d), retail water suppliers must document wholesale supplies by:

1) Describing the quantities of water received from each wholesaler in prior years.
2) Identifying any existing entitlements, water rights, and water service contracts held by the retail water supplier for the wholesale supply.
3) Providing written contracts or other proof of entitlements, water rights and service contracts for the wholesaler's supplies; copies of relevant capital outlay programs; federal, state and local permits for construction of necessary infrastructure associated with delivering the wholesale supplies, if any, and; regulatory approvals required in order to convey or deliver the wholesale supply.

If the retail water supplier has not received water supplies from the wholesaler in prior years, then Water Code § 10910 (e), Section 5, Step 2, page 16, may apply.

The retail water supplier should coordinate with the wholesaler in assembling the information necessary to meet the provisions for documenting wholesale supplies. Wholesalers may take varying roles in assisting retail agencies. One possible role is for the wholesaler to fully document its own supplies and demands for the wholesale supplies relied upon in the assessment. In some cases the wholesale supplier's most recent UWMP and related documents may provide valuable information in assembling the information required for the water assessment. Whatever the level of assistance, information provided by a wholesaler will only form one part of the retail water supplier's overall supply assessment.

In situations where one wholesaler sells water to another wholesaler, (sometimes referred to as a "sub-wholesaler"), the retail water supplier should coordinate gathering the necessary information on its wholesale supply with the sub-wholesaler. This may include gathering documentation from both wholesalers' Urban Water Management Plans and/or supplemental reports.

Documentation for groundwater supply is discussed below, see Section 5, Step 2. page 18.

Section 5 - Code Citations
Step Two: Documenting supply

See previous Code citations page

Section 5
Step Two: Documenting supply

Identify and quantify the existing and planned sources of water available to the water supplier in 5-year increments for the 20-year projection. For each identified supply detail the quantity available and whether it is a:

(1) water supply entitlement
(2) water right
(3) water service contract

If any of the listed water sources have never have been used by the water supplier, demonstrate that the source is available by identifying other water suppliers or contract holders that receive and have rights, entitlements, or contracts to the same source. In addition, provide detailed information relating to the following:

(a) written contracts or other proof of entitlement to the source
(b) capital outlay/financing program for delivery adopted by the water supplier
(c) federal/state/local permits for delivery infrastructure
(d) regulatory approvals required to convey or deliver water

Sample Table 1 is an example of how supply source information might be summarized. It will be important to provide a detailed description of each source.

Table 1 Annual amount under each right, entitlement, and/or contract

Supply	AFY	Entitlement	Right	Contract	Ever used
Local Surface	9,300	X			Yes
Wholesaler 1	No limit			X	Yes
Wholesaler 2	4,900			X	No
Groundwater	2,300		X		Yes

Sample Table 2 is an example of how an assessment might summarize the past, current and projected deliveries from each supply source. It is important to develop realistic delivery projections. The entitlement, right or contract amount might overstate or understate the quantity of water that can actually be delivered during normal years. For instance, a contract may be for 5,000 acre feet per year but an additional 2,000 acre feet per year may be available until 2015 due to other contractors not needing full deliveries until that time.

Table 2 Quantify water received in normal year – actual and projected (not maximum possible)

Water Supply Sources	1980	1985	1990	1995	2000	2005	2010	2015	2020
Wholesaler (identify)									
Wholesaler (identify)									
Groundwater									
Local surface water									
Transfers									
Exchanges (in or out)									
Reclaimed Water									
Other (identify)									
Total									

Section 5 - Code citations
Step Two: Documenting supply
If groundwater is a source

Water Code section 10910

(f) If a water supply for a proposed project includes groundwater, the following additional information shall be included in the water assessment:

(1) A review of any information contained in the urban water management plan relevant to the identified water supply for the proposed project.

(2) A description of any groundwater basin or basins from which the proposed project will be supplied. For those basins for which a court or the board has adjudicated the rights to pump groundwater, a copy of the order or decree adopted by the court or the board and a description of the amount of groundwater the public water system, or the city or county if either is required to comply with this part pursuant to subdivision (b), has the legal right to pump under the order or decree. For basins that have not been adjudicated, information as to whether the department has identified the basin or basins as overdrafted or has projected that the basin will become overdrafted if present management conditions continue, in the most current bulletin of the department that characterizes the condition of the groundwater basin, and a detailed description by the public water system, or the city or county if either is required to comply with this part pursuant to subdivision (b), of the efforts being undertaken in the basin or basins to eliminate the long-term overdraft condition.

(3) A detailed description and analysis of the amount and location of groundwater pumped by the public water system, or the city or county if either is required to comply with this part pursuant to subdivision (b), for the past five years from any groundwater basin from which the proposed project will be supplied. The description and analysis shall be based on information that is reasonably available, including, but not limited to, historic use records.

(4) A detailed description and analysis of the amount and location of groundwater that is projected to be pumped by the public water system, or the city or county if either is required to comply with this part pursuant to subdivision (b), from any basin from which the proposed project will be supplied. The description and analysis shall be based on information that is reasonably available, including, but not limited to, historic use records.

(5) An analysis of the sufficiency of the groundwater from the basin or basins from which the proposed project will be supplied to meet the projected water demand associated with the proposed project. A water assessment shall not be required to include the information required by this paragraph if the public water system determines, as part of the review required by paragraph (1), that the sufficiency of groundwater necessary to meet the initial and projected water demand associated with the project was addressed in the description and analysis required by paragraph (4) of subdivision (b) of Section 10631.

Section 5
Step Two: Documenting Supply
If groundwater is a source

If the water sources that will serve the project include groundwater, specific groundwater information must be included in the assessment. Amendments to the Urban Water Management Planning Act (Water Code § 10631 effective January 1, 2002) specify the data necessary to document available groundwater supplies. Water Code § 10631 and Water Code § 10910, effective January 1, 2002, require similar information, Water Code § 10910 limits the groundwater discussion to the basin or basins that will serve the proposed project. Groundwater information provided in response to Water Code § 10631 will generally also meet the groundwater requirements contained in Water Code § 10910 if the same basin(s) is (are) addressed. Water Code § 10631 adds a further requirement: "A detailed description and analysis of the location, amount, and sufficiency of groundwater that is projected to be pumped by the urban water supplier." In addition, a parallel reference to the "sufficiency analysis" is also found in Water Code § 10910(f)(5): "An analysis of the sufficiency of the groundwater from the basin...to meet the projected water demand associated with the proposed project." It is recognized that many suppliers updated their UWMPs before January 1, 2002. Therefore, the plans may not include the groundwater information needed for the assessment. Suppliers can update the UWMP to include the groundwater information, or prepare a separate groundwater assessment for the water supply assessment that could also be a basis for a subsequent update to the UWMP.

Groundwater details (for the basin or basins which will provide water for the proposed project) required to be included in the UWMP include:

(a) Specify if a groundwater management plan or any other specific authorization for groundwater management for the basin has been adopted and how it affects the water supplier's use of the basin.
(b) The description of the groundwater basin may be excerpted from the groundwater management plan, from DWR Bulletin 118, California's Ground Water, or from some other document that has been published and that discusses the basin boundaries, type of rock that constitutes the aquifer, variability of the aquifer material, and total groundwater in storage (average specific yield times the volume of the aquifer).
(c) In an adjudicated basin the amount of water the urban supplier has the legal right to pump should be enumerated in the court decision - attach a copy of the order or decree.
(d) The Department of Water Resources has projected estimates of overdraft, or "water shortage," based on projected amounts of water supply and demand (basin management), at the hydrologic region level in Bulletin 160, California Water Plan Update. Estimates at the basin or subbasin level will be projected for some basins in Bulletin 118. If the basin has not been evaluated by DWR, data that indicate groundwater level trends over a period of time should be collected and evaluated.
(e) If the evaluation indicates an overdraft due to existing groundwater extraction, or projected increases in groundwater extraction, describe actions and/or program designed to eliminate the long term overdraft condition .
(f) If water supplier wells are plotted on a map, or are available from a geographic information system, the amount of water extracted by the water supplier for the past five years can be obtained from the Department of Health Services, Office of Drinking Water and Environmental Management. A useful DHS website is: http://www.dhs.cahwnet.gov/ps/ddwem/dwsap/DWSAPindex.htm
(g) Description and analysis of the amount and location of groundwater pumped by the water supplier for the past five years. Include information on proposed pumping locations and quantities. . The description and analysis is to be based on information that is reasonably available, including, but not limited to, historic use records from DWR, and from other sources.
(h) Analysis of the location, amount, and sufficiency of groundwater that is projected to be pumped by the water supplier.

SB 610 (Water Code § 10910(f)(5)) requires the water supplier to make a determination of the sufficiency of the groundwater from the basin to be used to supply the proposed project. If a determination that includes the proposed project was included in the Urban Water Management Plan, and that information is included in the assessment, no further data is required.

Section 5 - Code citations
Step Two: Documenting supply
If the assessment relies on water supplies never before used

Water Code section 10910

(e) If no water has been received in prior years by the public water system, or the city or county if either is required to comply with this part pursuant to subdivision (b), under the existing water supply entitlements, water rights, or water service contracts, the public water system, or the city or county if either is required to comply with this part pursuant to subdivision (b), shall also include in its water assessment pursuant to subdivision (c), an identification of the other public water systems or water service contract holders that receive a water supply or have existing water supply entitlements, water rights, or water service contracts, to the same source of water as the public water system, or the city or county if either is required to comply with this part pursuant to subdivision (b), has identified as a source of water supply within its water assessments.

Section 5

Step Two: Documenting supply

If the assessment relies on water supplies never before used

If a water supplier, city or county identified existing water supply entitlements, rights, or contracts under which no water has been received in prior years, as a source of water supply for the proposed project in its assessment, it will need to identify other public water systems or water service contractors that receive a water supply, have existing entitlements, water rights, or water service contracts to the same source of water.

Section 5 - Code citations
Step Three: Documenting project demand (Project Demand Analysis)

Water Code section 10910

(c) (2) If the projected water demand associated with the proposed project was accounted for in the most recently adopted urban water management plan, the public water system may incorporate the requested information from the urban water management plan in preparing the elements of the assessment required to comply with subdivisions (d), (e), (f), and (g).

(3) If the projected water demand associated with the proposed project was not accounted for in the most recently adopted urban water management plan, or the public water system has no urban water management plan, the water assessment for the project shall include a discussion with regard to whether the public water system's total projected water supplies available during normal, single dry, and multiple dry water years during a 20-year projection will meet the projected water demand associated with the proposed project, in addition to the public water system's existing and planned future uses, including agricultural and manufacturing uses.

Water Code section 10631 (Urban Water Management Plan Requirements)

(a) Describe the service area of the supplier, including current and projected population, climate, and other demographic factors affecting the supplier's water management planning. The projected population estimates shall be based upon data from the state, regional, or local service agency population projections within the service area of the urban water supplier and shall be in five-year increments to 20 years or as far as data is available.

(e) (1) Quantify, to the extent records are available, past and current water use, over the same five-year increments described in subdivision (a), and projected water use, identifying the uses among water use sectors including, but not necessarily limited to, all of the following uses:
(A) Single-family residential.
(B) Multifamily.
(C) Commercial.
(D) Industrial.
(E) Institutional and governmental.
(F) Landscape.
(G) Sales to other agencies.
(H) Saline water intrusion barriers, groundwater recharge, or conjunctive use, or any combination thereof.
(I) Agricultural.
(2) The water use projections shall be in the same five-year increments described in subdivision (a).

Section 5
Step Three: Documenting project demand (Project Demand Analysis)

SB 610 requires that an assessment document the water demand for existing uses, planned future uses and the proposed development.

> Note:
> If the proposed development was included as part of the projected water demand of the current Urban Water Management Plan, the water demand for the proposed development does not need to be separately analyzed as long as water demand for the purpose of the project has remained substantially the same.

The law (Water Code § 10910(c)(2)) states that if the projected water demand associated with the proposed project was accounted for in the most recently adopted urban water management plan, the water supplier may incorporate the requested information from the urban water management plan in preparing the assessment. The Urban Water Management Planning Act (Water Code § 10631) clearly specifies the data necessary to document the existing and projected future water demand during a -twenty year projection. The code requires that the projected demands be presented in five-year increments for the twenty year projection.

Section 5 - Code citations

Step Three: Documenting project demand (Project Demand Analysis)

Definitions

None

Section 5

Step Three: Documenting project demand (Project Demand Analysis) Definitions

The following definitions of existing uses, planned future uses, proposed project use and agricultural and industrial uses are provided for your consideration only. Both **SB 610** and **SB 221** emphasize local control and decision-making and the information provided in this guidebook is not intended to infringe upon the planning discretion of the water supplier or lead agency.

Existing uses – demand related to current customers, and system uses/losses, during normal years (uses during single dry and multiple dry years will be discussed in Section 5, Step 4). Usually this projection will take account of historic use (during non-dry) years as well as any recent changes in demand characteristics, i.e., changes in per capita use, percentage of use by customer type, demographic variability, etc.).

Planned future uses – the lead agency, as the land-use agency, has information on planned development. Regular communication between the water supplier and lead agency will be essential to ensuring an accurate determination of sufficiency of water supply for future demand.

Planned future uses may include:

- projects that are expected to be completed during the same time frame as the proposed project. These include all new demands ranging from an individual single-family home to large-scale developments.
- proposed developments that have a reserved (or entitlement to) future water supply and are considered to be moving towards construction. Proposed projects that are included in a general or specific plan need not be included if the lead agency determines that they are not likely to begin construction during the period under consideration.
- projects which are not subject to local planning regulation – for example, US military installations, University of California, reservation lands of federally recognized Indian tribes, or lands held in trust for those tribes, etc.

Neither **SB 610**, nor **SB 221** defines planned future uses. However, it would be a reasonable interpretation that planned future uses are those that would be undertaken within the same time frame as the project under consideration. Each preparer of an assessment will determine what planned future uses it will include in the demand calculation to ensure that it is not identifying the same increment of water for more than one future use.

Section 5 - Code citations

Step Three: Documenting project demand (Project Demand Analysis)

Detailing existing and planned future uses

Water Code section 10910

(c) (2) If the projected water demand associated with the proposed project was accounted for in the most recently adopted urban water management plan, the public water system may incorporate the requested information from the urban water management plan in preparing the elements of the assessment required to comply with subdivisions (d), (e), (f), and (g).

(3) If the projected water demand associated with the proposed project was not accounted for in the most recently adopted urban water management plan, or the public water system has no urban water management plan, the water assessment for the project shall include a discussion with regard to whether the public water system's total projected water supplies available during normal, single dry, and multiple dry water years during a 20-year projection will meet the projected water demand associated with the proposed project, in addition to the public water system's existing and planned future uses, including agricultural and manufacturing uses.

Water Code section 10631

(a) Describe the service area of the supplier, including current and projected population, climate, and other demographic factors affecting the supplier's water management planning. The projected population estimates shall be based upon data from the state, regional, or local service agency population projections within the service area of the urban water supplier and shall be in five-year increments to 20 years or as far as data is available.

(e) (1) Quantify, to the extent records are available, past and current water use, over the same five-year increments described in subdivision (a), and projected water use, identifying the uses among water use sectors including, but not necessarily limited to, all of the following uses:

(A) Single-family residential.
(B) Multifamily.
(C) Commercial.
(D) Industrial.
(E) Institutional and governmental.
(F) Landscape.
(G) Sales to other agencies.
(H) Saline water intrusion barriers, groundwater recharge, or conjunctive use, or any combination thereof.
(I) Agricultural.

(2) The water use projections shall be in the same five-year increments described in subdivision (a).

Section 5

Step Three: Documenting project demand (Project Demand Analysis) Detailing existing and planned future uses

A variety of demographic factors may affect water use. The Urban Water Management Planning Act lists several demographic factors to be detailed including current and projected population, climate, density, and the mix of customer types. The assessment may detail water use per identified water use sector as reported in the Urban Water Management Planning Act. The sectors are single-family residential, multifamily, commercial, industrial, institutional and governmental, landscape, sales to other agencies, agricultural and other (saline water intrusion barriers, groundwater recharge, conjunctive use, etc.). Showing the past, current and projected water use by sector is an effective way to show growth patterns. This allows a water supplier to more accurately predict future demand.

The following tables are provided as an example of how to present this type of data. These tables allow the required five-year increments for the 20-year projection to be clearly presented.

Population projections

Year	2000	2005	2010	2015	2020
Population					

Climate data

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
avg precip													
avg temp													
ETO													

Water-use Sectors – use in acre-feet* per year, actual and projected

Customer type	**1990**	**1995**	**2000**	**2005**	**2010**	**2015**	**2020**
Single Family							
Multifamily							
Commercial							
Industrial							
Institutional / gov.							
Landscape Irrigation							
Wholesale							
Agricultural							
Other (specify)							
TOTAL							

*1 AF = 325,851 gallons/year (often demand in new projects is figured in gallons).
Tables with **bold** column headings represent information required by SB 610.

Water-use Sectors – number of connections, actual and projected (Not required by **SB 610**)

Customer type	1990	1995	2000	2005	2010	2015	2020
Single Family							
Multifamily							
Commercial							
Industrial							
Institutional / gov.							
Landscape Irrigation							
Wholesale							
Agricultural							
Other (specify)							
TOTAL							

Section 5 - Code citations
Step Four: Documenting dry year(s) supply

Water Code section 10910

(c) (2) If the projected water demand associated with the proposed project was accounted for in the most recently adopted urban water management plan, the public water system may incorporate the requested information from the urban water management plan in preparing the elements of the assessment required to comply with subdivisions (d), (e), (f), and (g).

If the projected water demand associated with the proposed project was not accounted for in the most recently adopted urban water management plan, or the public water system has no urban water management plan, the water assessment for the project shall include a discussion with regard to whether the public water system's total projected water supplies available during normal, single dry, and multiple dry water years during a 20-year projection will meet the projected water demand associated with the proposed project, in addition to the public water system's existing and planned future uses, including agricultural and manufacturing uses.

Section 5
Step Four: Documenting dry year(s) supply

Section 5 - Code citations

Step Four: Documenting dry year(s) supply

Documenting dry year(s) supply for water suppliers with multiple sources

Water Code section 10910

(c) (2) If the projected water demand associated with the proposed project was accounted for in the most recently adopted urban water management plan, the public water system may incorporate the requested information from the urban water management plan in preparing the elements of the assessment required to comply with subdivisions (d), (e), (f), and (g).

If the projected water demand associated with the proposed project was not accounted for in the most recently adopted urban water management plan, or the public water system has no urban water management plan, the water assessment for the project shall include a discussion with regard to whether the public water system's total projected water supplies available during normal, single dry, and multiple dry water years during a 20-year projection will meet the projected water demand associated with the proposed project, in addition to the public water system's existing and planned future uses, including agricultural and manufacturing uses.

Water Code section 10631 (Urban Water Management Plan requirements)

(c) Describe the reliability of the water supply and vulnerability to seasonal or climatic shortage, to the extent practicable, and provide data for each of the following:

(1) An average water year.
(2) A single dry water year.
(3) Multiple dry water years.

For any water source that may not be available at a consistent level of use, given specific legal, environmental, water quality, or climatic factors, describe plans to supplement or replace that source with alternative sources or water demand management measures, to the extent practicable.

Note: Water Code section 10632 requires that the Urban Water Management Plan include a water shortage contingency analysis.

Water Code section 10632 (Urban Water Management Plan requirements)

10632. The plan shall provide an urban water shortage contingency analysis which includes each of the following elements which are within the authority of the urban water supplier: (a) Stages of action to be undertaken by the urban water supplier in response to water supply shortages, including up to a 50 percent reduction in water supply, and an outline of specific water supply conditions which are applicable to each stage. (b) An estimate of the minimum water supply available during each of the next three water years based on the driest three-year historic sequence for the agency's water supply. (c) Actions to be undertaken by the urban water supplier to prepare for, and implement during, a catastrophic interruption of water supplies including, but not limited to, a regional power outage, an earthquake, or other disaster. (d) Additional, mandatory prohibitions against specific water use practices during water shortages, including, but not limited to, prohibiting the use of potable water for street cleaning. (e) Consumption reduction methods in the most restrictive stages. Each urban water supplier may use any type of consumption reduction methods in its water shortage contingency analysis that would reduce water use, are appropriate for its area, and have the ability to achieve a water use reduction consistent with up to a 50 percent reduction in water supply. (f) Penalties or charges for excessive use, where applicable. (g) An analysis of the impacts of each of the actions and conditions described in subdivisions (a) to (f), inclusive, on the revenues and expenditures of the urban water supplier, and proposed measures to overcome those impacts, such as the development of reserves and rate adjustments. (h) A draft water shortage contingency resolution or ordinance. (i) A mechanism for determining actual reductions in water use pursuant to the urban water shortage contingency analysis.

Section 5

Step Four: Documenting dry(s) year supply

Documenting dry year(s) supply for water suppliers with multiple sources

Single dry and multiple dry years are usually based on historic records from the watersheds that determine the water conditions to a particular supply. The information is often presented as a probability of exceedance or probability of occurrence, as discussed in the example below. Many water suppliers have multiple sources. One way to show how the total supply would be affected is to document how each individual supply will be affected by single dry and multiple dry years.

Example

Probability based estimates for Drake Reservoir supplies have been estimated in a similar manner as those for wholesaler supplies. The Drake Reservoir estimates are based on historical District supplies and the County's Big River Model. This model uses hydrologic data for the period of 1917 through 1993 to estimate reservoir water levels and system yields to the Drake Reservoir member agencies. Based on a review of this data, the District can expect to receive a supply of 9,321 acre feet per year during wet and normal years. During dry years (10 percent probability of occurrence) the Drake Reservoir supply is estimated to be 9,200 acre feet per year. During critical dry years (3 percent probability of occurrence) Drake Reservoir supplies are estimated to be 7,000 acre feet per year. The combined effects of Wholesaler and Drake Reservoir cutbacks on District water supplies are summarized below.

Percent Likelihood	Wet Year 30%	Normal Year 60%	Dry Year 10%	Critical Drought Year 3%
Demand (AFY)	15,000	16,000	17,000	17,000
Supply				
Groundwater	1,500	2,100	3,100	2,300
Drake Reservoir	9,421	9,421	9,200	7,000
West Water Project	4,500	4,500	2,500	1,700
Total	15,421	16,021	14,800	11,000

Projected supply (AF) available by source for single-dry and multiple-dry years

Source	Normal	Single Dry	Multiple - 2	Multiple - 3	Multiple - 4
Local Surface	9,300				
Wholesaler 1	NA				
Wholesaler 2	4,900				
Groundwater	1,100	2,300	2,300		
TOTAL					

Section 5 - Code citations
Step Five: Documenting dry year(s) demand

Water Code section 10910

(c) (2) If the projected water demand associated with the proposed project was accounted for in the most recently adopted urban water management plan, the public water system may incorporate the requested information from the urban water management plan in preparing the elements of the assessment required to comply with subdivisions (d), (e), (f), and (g).

If the projected water demand associated with the proposed project was not accounted for in the most recently adopted urban water management plan, or the public water system has no urban water management plan, the water assessment for the project shall include a discussion with regard to whether the public water system's total projected water supplies available during normal, single dry, and multiple dry water years during a 20-year projection will meet the projected water demand associated with the proposed project, in addition to the public water system's existing and planned future uses, including agricultural and manufacturing uses.

Water Code section 10631 (Urban Water Management Plan requirements)

(c) Describe the reliability of the water supply and vulnerability to seasonal or climatic shortage, to the extent practicable, and provide data for each of the following:

(1) An average water year.
(2) A single dry water year.
(3) Multiple dry water years.

For any water source that may not be available at a consistent level of use, given specific legal, environmental, water quality, or climatic factors, describe plans to supplement or replace that source with alternative sources or water demand management measures, to the extent practicable.

Note: Water Code section 10632 requires that the Urban Water Management Plan include a water shortage contingency analysis.

Water Code section 10632 (Urban Water Management Plan requirements)

10632. The plan shall provide an urban water shortage contingency analysis which includes each of the following elements which are within the authority of the urban water supplier: (a) Stages of action to be undertaken by the urban water supplier in response to water supply shortages, including up to a 50 percent reduction in water supply, and an outline of specific water supply conditions which are applicable to each stage. (b) An estimate of the minimum water supply available during each of the next three water years based on the driest three-year historic sequence for the agency's water supply. (c) Actions to be undertaken by the urban water supplier to prepare for, and implement during, a catastrophic interruption of water supplies including, but not limited to, a regional power outage, an earthquake, or other disaster. (d) Additional, mandatory prohibitions against specific water use practices during water shortages, including, but not limited to, prohibiting the use of potable water for street cleaning. (e) Consumption reduction methods in the most restrictive stages. Each urban water supplier may use any type of consumption reduction methods in its water shortage contingency analysis that would reduce water use, are appropriate for its area, and have the ability to achieve a water use reduction consistent with up to a 50 percent reduction in water supply. (f) Penalties or charges for excessive use, where applicable. (g) An analysis of the impacts of each of the actions and conditions described in subdivisions (a) to (f), inclusive, on the revenues and expenditures of the urban water supplier, and proposed measures to overcome those impacts, such as the development of reserves and rate adjustments. (h) A draft water shortage contingency resolution or ordinance. (i) A mechanism for determining actual reductions in water use pursuant to the urban water shortage contingency analysis.

Section 5
Step Five: Documenting dry year(s) demand

Water use patterns change during dry years. Document expected changes to water demand by sector.

Water-use Sectors – use in acre-feet per year, projected

Customer type	Normal	Single dry	Multiple - 2	Multiple - 3
Single Family				
Multifamily				
Commercial				
Industrial				
Institutional / gov.				
Landscape Irrigation				
Wholesale				
Agricultural				
Other (specify)				
TOTAL				

Section 6 - Code citations

Is the projected water supply sufficient or insufficient for the proposed project?

Water Code section 10910

(c) (2) If the projected water demand associated with the proposed project was accounted for in the most recently adopted urban water management plan, the public water system may incorporate the requested information from the urban water management plan in preparing the elements of the assessment required to comply with subdivisions (d), (e), (f), and (g).

(3) If the projected water demand associated with the proposed project was not accounted for in the most recently adopted urban water management plan, or the public water system has no urban water management plan, the water assessment for the project shall include a discussion with regard to whether the public water system's total projected water supplies available during normal, single dry, and multiple dry water years during a 20-year projection will meet the projected water demand associated with the proposed project, in addition to the public water system's existing and planned future uses, including agricultural and manufacturing uses.

Section 6 Is the projected water supply sufficient or insufficient for the proposed project?

Compare current and projected supply and demand for normal, single dry and multiple dry years. Water suppliers may want to make this comparison with and without the proposed project demand so that the impact of the project is clearly articulated. The tables provide examples of format.

Comparison of current supply and demand for normal, single dry and multiple dry years

Current Supply & Demand	Normal	Single dry	Multiple 2	Multiple 3	Multiple 4
Supply total					
Demand total					
Demand total (including proposed project)					
Difference					
Difference (including proposed project)					

Comparison of 20 year projection of supply and demand for normal, single dry and multiple dry years

2025 Supply & Demand	Normal	Single dry	Multiple 2	Multiple 3	Multiple 4
Supply total					
Demand total					
Demand total (including proposed project)					
Difference					
Difference (including proposed project)					

Water Supply and Demand Comparison table presents a comparison of the District's potable and raw water supplies and demands.

Normal Year by source – current and projected water supply and demand comparison (acre feet per year)

Water Demands	2000	2005	2010	2015	2020
Potable Water	13,040	13,680	14,310	14,930	15,540
Raw Water	810	810	810	810	810
Reclaimed Reduction	0	0	-100	-200	-280
Total	13,850	14,490	15,020	15,540	16,070
Total (including proposed project)					
Water Supply					
Drake Reservoir	9,421	9,421	9,421	9,421	9,421
West Water Project	4,500	4,500	4,500	4,500	4,500
Wells	0	2,300	2,300	2,300	2,300
Total	13,921	16,221	16,221	16,221	16,221
Surplus or (Deficiency)	71	1,731	1,201	681	151
Surplus or (Deficiency) (including proposed project)					

Section 7 - Code citations If the projected supply is determined to be insufficient

Water Code section 10910

(g) (1) Subject to paragraph (2), the governing body of each public water system shall submit the assessment to the city or county not later than 90 days from the date on which the request was received. The governing body of each public water system, or the city or county if either is required to comply with this act pursuant to subdivision (b), shall approve the assessment prepared pursuant to this section at a regular or special meeting.

Water Code section 10911

(a) If, as a result of its assessment, the public water system concludes that its water supplies are, or will be, insufficient, the public water system shall provide to the city or county its plans for acquiring additional water supplies, setting forth the measures that are being undertaken to acquire and develop those water supplies. If the city or county, if either is required to comply with this part pursuant to subdivision (b), concludes as a result of its assessment, that water supplies are, or will be, insufficient, the city or county shall include in its water assessment its plans for acquiring additional water supplies, setting forth the measures that are being undertaken to acquire and develop those water supplies. Those plans may include, but are not limited to, information concerning all of the following:

(1) The estimated total costs, and the proposed method of financing the costs, associated with acquiring the additional water supplies.

(2) All federal, state, and local permits, approvals, or entitlements that are anticipated to be required in order to acquire and develop the additional water supplies.

(3) Based on the considerations set forth in paragraphs (1) and (2), the estimated timeframes within which the public water system, or the city or county if either is required to comply with this part pursuant to subdivision (b), expects to be able to acquire additional water supplies.

Section 7 If the projected supply is determined to be insufficient

7-1 Does the assessment conclude that supply is "sufficient"? Yes No

If yes, water supplier governing body must approve assessment and deliver to lead agency
Water Code § 10910(g)(1) – **go to Section 8, page 38**

The governing body of the water supplier must approve the assessment at a regular or special meeting and deliver the assessment to the requesting lead agency within 90 days of request.

If no, water supplier must include in its assessment its plan to acquire additional water supplies, and the water supplier governing body must approve the assessment and deliver it to the lead agency within 90 days of the request. Water Code § 10911(a)
continue

The water supplier must provide the lead agency "its plans for acquiring additional water supplies, setting forth measures that are being undertaken to acquire and develop those water supplies." Plans may include (1) estimated total costs; (2) federal/state/local permits anticipated to be required; and (3) estimated timeframes to acquire additional supplies.

Note: Water Code § 10911(a) dealing with a water supplier's plans to acquire additional supplies, calls for planning information which is similar to the information which must be provided in the assessment for existing supplies. (See Water Code § 10910(d)(2).) However, actions for acquiring new supplies, which are reflected in such plans, may or may not have progressed to the point of detailed planning or to the point at which compliance with CEQA would be required. The water supplier should indicate the status or stage of development of the actions identified in the plans it provides. Identification of a potential future action in such plans does not by itself indicate that a decision to approve, or to proceed with, the action has been made. If projected supplies are included in the water supply assessment and will be relied upon for a subdivision which will be subject to the provisions of **SB 221**, those projected supplies must also meet the requirements of Gov. Code § 6647.7(d). See discussion at Section 13, Step 1, page 55.

Lead agency, **go to Section 8, page 38**

Water supplier, **Stop – SB 610** responsibilities are complete

Example of "Plans for Acquiring Additional Water Supplies"

Gravel Creek Groundwater Storage Project

SOURCE OF SUPPLY
The Gravel Creek Groundwater Storage Project (Gravel Creek Project) is planned to supply up to 500 acre-feet annually during normal and up to 1,500 acre-feet dry year conditions. During wet and/or surplus years, Bayside would replenish the groundwater with Drake Reservoir spill water and, if necessary, water purchases from outside the County.

EXPECTED SUPPLY CAPABILITY
It is estimated that the Gravel Creek aquifer can hold up to 20,000 acre-feet of additional water. This water could be extracted during normal and dry year conditions at a rate between 500 and 1,500 acre-feet per year.

Section 7 - Code citations (continued)

If the projected supply is determined to be insufficient

See previous Code citations page

Section 7 If the projected supply is determined to be insufficient (continued)

RATIONALE FOR EXPECTED SUPPLY

As a part of the Bayside supply strategy, the Gravel Creek Project could be used to meet normal year demands and to provide a dry-year buffer to meet demands when other supplies are reduced.

Program Facilities: The Gravel Creek Project would consist of four new injection wells and six new production wells.

Historical Record: Bayside's Board of Directors implemented the Gravel Creek Project in April 1999.

Written Contracts or Other Proof: The Gravel Creek Project has been implemented as a component of Bayside's Supply Reliability Plan. The following Actions have occurred:

- 1998 Memorandum of Understanding (MOU) between Bayside and the U. S. Bureau of Reclamation (USBR). This MOU describes the agreement by USBR to provide Bayside with up to 2,000 acre-feet annually of surplus spill water from Drake Reservoir
- April 1999 Board of Directors Adoption of the CEQA Document (Mitigated Negative Declaration) for the Gravel Creek Project at their regularly scheduled Board of Directors meeting
- June 2000 Board of Directors approved the Gravel Creek Project and appropriated an additional $1.35 million for land acquisition, design, water quality monitoring, additional aquifer testing and other tasks. The Board authorized storage of up to 20,000 acre-feet of water, to begin in 2002

Financing: The capital cost of the Gravel Creek Project is estimated to be $2.7 million. This budget is included in Bayside's ten-year capital budget and would be financed through a combination of bonds and water sales revenue.

Federal, State and Local Permits for Construction: Bayside has applied for the appropriate federal, state and local permits for construction and operation of the project. For example, Bayside is currently conducting long-term water quality baseline monitoring in support of a possible Source Water Permit application from the Department of Health Services. One injection and one production well were completed in accordance with New Albion County permitting procedures. These are examples of permits that might be needed, but for each project a determination needs to be made as to what permits are required for the particular proposal.

Water Code section 10911

(b) The city or county shall include the water assessment provided pursuant to Section 10910, and any information provided pursuant to subdivision (a), in any environmental document prepared for the project pursuant to Division 13 (commencing with Section 21000) of the Public Resources Code.

(c) The city or county may include in any environmental document an evaluation of any information included in that environmental document provided pursuant to subdivision (b). The city or county shall determine, based on the entire record, whether projected water supplies will be sufficient to satisfy the demands of the project, in addition to existing and planned future uses. If the city or county determines that water supplies will not be sufficient, the city or county shall include that determination in its findings for the project.

Section 8 Final SB 610 assessment actions by lead agency

The lead agency shall review the water supplier assessment of supply and must decide whether additional water supply information is needed for its consideration of the proposed project.

The lead agency must include the water supply assessment in the Negative Declaration or Draft Environmental Impact Report (environmental document) prepared for the project pursuant to Division 13 (commencing with Section 21000) of the Public Resources Code. The lead agency may include in the environmental documentation the lead agency's evaluation of the assessment, additional supply information and any related documents.

If the lead agency decides that the water supply is insufficient, or the assessment from the water supplier concludes that the water supply for the proposed project is insufficient, the lead agency may still approve the project but it must include that determination, based on the entire record, in the findings for the project. It must include substantial evidence in the record to support its approval of the project.

The lead agency "shall determine, based on the entire record, whether projected water supplies will be sufficient to satisfy the demands of the project, in addition to existing and planned future uses." The lead agency will approve or disapprove a project based on a number of factors, including but not limited to the water supply assessment.

Reminder: Environmental Impact Reports and Negative Declarations that contain a water supply assessment pursuant to § 110911(b) of the Water Code must also be sent to the State Clearinghouse in the Governor's Office of Planning and Research at: P.O. Box 3044, Sacramento, CA 95812-3044 pursuant to California Code of Regulations § 15205 and 15206.

Section 9 - Code citations Does SB 221 apply to this subdivision?

Government Code section 65867.5

(a) A development agreement is a legislative act that shall be approved by ordinance and is subject to referendum.

(b) A development agreement shall not be approved unless the legislative body finds that the provisions of the agreement are consistent with the general plan and any applicable specific plan.

(c) A development agreement that includes a subdivision, as defined in Section 66473.7, shall not be approved unless the agreement provides that any tentative map prepared for the subdivision will comply with the provisions of Section 66473.7.

Government Code section 66473.7

(a) For the purposes of this Section, the following definitions apply:

(1) "Subdivision" means a proposed residential development of more than 500 dwelling units, except that for a public water system that has fewer than 5,000 service connections, "subdivision" means any proposed residential development that would account for an increase of 10 percent or more in the number of the public water system's existing service connections.

Government Code section 66473.7.

(i) This Section shall not apply to any residential project proposed for a site that is within an urbanized area and has been previously developed for urban uses, or where the immediate contiguous properties surrounding the residential project site are, or previously have been, developed for urban uses, or housing projects that are exclusively for very low and low-income households.

Section 9 Does SB 221 apply to this subdivision?

Agency Action

Agency receives a project application for a residential development

Is the project subject to **SB 221**?

9-1 Is there a development agreement for the project that includes a "subdivision" as defined in Government Code § 66473.7 (a)(1) Yes No

If yes, the development agreement shall not be approved unless the agreement provides that any tentative map prepared for the subdivision will comply with the provisions of Government Code § 66473.7, **continue**

If no, continue

9-2 Does the project include a "subdivision" as defined by Government Code § 66473.7(a)(1)? Yes No

If no, stop - SB 221 does not apply.

If yes, continue

Note: Government Code § 66473.7(a)(3), **SB 221** defines "public water system" as the water supplier that is, **or may become as a result of servicing the subdivision included in the tentative map,** a public water system as defined in Water Code section 10912. A water utility with fewer than 3,000 service connections currently would become a "public water system" if the number of service connections associated with the new subdivision would increase the number of service connections served by the water utility to more than 3,000.

Note: Government Code § 66473.7(a) provides that a "subdivision" consisting of 500 or more dwelling units is subject to **SB 221**, except that for a public water system that has fewer than 5,000 service connections, Government Code § 66473.7(a) provides a "sliding scale" for determining the number of dwelling units below 500 that would constitute a "subdivision," subject to **SB 221**. Because Government Code § 66473.7(a) provides that a "subdivision" for a public water system with fewer than 5,000 service connections is a proposed development that would increase the number of service connections for a public water system by 10% or more, a "subdivision" could be as few as 300 dwelling units. For example a water utility that has 3,000 service connections would experience an increase in the number of service connections by 10% if it were required to serve a proposed residential development of 300 units, thus making the 300-unit development a "subdivision" under **SB 221**. Similarly, for water utilities that have more than 3,000 service connections, but fewer than 5,000 service connections, the "10% test" in Government Code § 66473.7(a) would apply in determining whether a proposed development is a "subdivision" under **SB 221**.

The agency adopting or approving subdivision's tentative tract map shall condition such approval/adoption upon "a requirement that a sufficient water supply shall be available." Government Code § 66473.7(b)(1)

Section 10 - Code citations Is the subdivision exempt from SB 221?

Government Code section 66473.7

(i) This Section shall not apply to any residential project proposed for a site that is within an urbanized area and has been previously developed for urban uses, or where the immediate contiguous properties surrounding the residential project site are, or previously have been, developed for urban uses, or housing projects that are exclusively for very low and low-income households.

Section 10 Is the subdivision exempt from SB 221?

Agency Action

10-1 Is the project in an urbanized area or exclusively for low-income households? Yes No

If no, carefully review the text of subsection (i) and consult with the local land use planning agency. Government Code. § 66473.7(i)

If no, go to Section 11, page 44

If yes, substantiate, **continue**

10-2 Is the residential project exempt from **SB 221** because it is within an urbanized area and has been previously developed for urban uses? Government Code § 66473.7(i) Yes No

or

10-3 Is the project proposed for a site where the immediate contiguous properties surrounding the residential project site are, or previously have been, developed for urban uses? Government Code § 66473.7(i)
Yes No

SB 221 emphasizes local decision-making regarding these two definitions.

Urbanized area and urban uses

1. The determination as to whether a project would qualify for the exemption will depend on how the agency defines "urbanized area" and "urban uses." Public Resources Code § 21071 contains a definition of "urbanized areas" which the local agencies may choose to use in determining whether or not a project is in an "urbanized area". Water suppliers should contact their local agency to determine how the terms "urbanized area" and "urban uses" are defined within the local community.

Very low and low-income households

2. Local governments define very low and low-income households in their general plan, specifically in the locally adopted Housing Element. The definition of very low and low income households is usually based on definitions established by the U.S. Department of Housing and Urban Development (HUD) and California Health and Safety Code § 50079.5, §50105, and §50093. Please see the California Department of Housing and Community Development (HCD) website for more details (http://www.hcd.ca.gov/). If the entire project falls under the categories as defined by HUD and HCD, then the proposed subdivision is exempt from **SB 221**. (Public Resources Code § 71080.14(b); See also Public Resources Code § 21080.10(c)(3) and § 21080.7(b)(2).)

If yes, document that the exemption criteria are met and **stop** - no further action required by **SB 221**

If no, the agency shall not approve any final map prepared for the subdivision until the agency governing body has received a written verification that satisfies the condition regarding a sufficient water supply that was placed on the tentative map.

Continue

To complete a **SB 221** verification **continue to Section 11, page 44**

Section 11 - Code citations Who will prepare the SB 221 verification of sufficient water supply?

Government Code section 66473.7

(a) (3) "Public water system" means the water supplier that is, or may become as a result of servicing the subdivision included in a tentative map pursuant to subdivision (b), a public water system, as defined in Section 10912 of the Water Code, that may supply water for a subdivision.

Water Code section 10912

(c) "Public water system" means a system for the provision of piped water to the public for human consumption that has 3,000 or more service connections. A public water system includes all of the following:(1)Any collection, treatment, storage, and distribution facility under control of the operator of the system which is used primarily in connection with the system.(2)Any collection or pretreatment storage facility not under the control of the operator that is used primarily in connection with the system.(3)Any person who treats water on behalf of one or more public water systems for the purpose of rendering it safe for human consumption.

Government Code section 66455.3.

Not later than five days after a city or county has determined that a tentative map application for a proposed subdivision, as defined in Section 66473.7, is complete pursuant to Section 65943, the local agency shall send a copy of the application to any water supplier that is, or may become, a public water system, as defined in Section 10912 of the Water Code, that may supply water for the subdivision.

Government Code section 66473.7

(b) (1) The legislative body of a city or county or the advisory agency, to the extent that it is authorized by local ordinance to approve, conditionally approve, or disapprove the tentative map, shall include as a condition in any tentative map that includes a subdivision a requirement that a sufficient water supply shall be available. Proof of the availability of a sufficient water supply shall be requested by the subdivision applicant or local agency, at the discretion of the local agency, and shall be based on written verification from the applicable public water system within 90 days of a request.

(2) If the public water system fails to deliver the written verification as required by this section, the local agency or any other interested party may seek a writ of mandamus to compel the public water system to comply.

(4) If the written verification is not provided by the public water system, notwithstanding the local agency or other interested party securing a writ of mandamus to compel compliance with this section, then the local agency may make a finding that sufficient water supplies are, or will be, available prior to completion of the subdivision that will satisfy the requirements of this section. This finding shall be made on the record and supported by substantial evidence.

(e) If there is no public water system, the local agency shall make a written finding of sufficient water supply based on the evidentiary requirements of subdivisions (c) and (d) and identify the mechanism for providing water to the subdivision.

Section 11 Who will prepare the SB 221 verification of sufficient water supply?

Agency Action

11-1 Is there a water supplier that has or may have jurisdiction over the subdivision? Yes No

A water supplier that currently has fewer than 3,000 connections, but would have 3,000 or more connections as a result of providing water to the proposed project, is required to prepare a verification (Water Code § 10912(b), 10912(c)). Additionally, a water utility with fewer than 3,000 service connections may become a "public water system" as a result of supplying water to the proposed development (Government Code § 66473.7(a)(3). For example, a water utility with 2,700 existing service connections would become a "public water system" if it were to serve a proposed development of 400 dwelling units, and an increase in the number of service connections by 400 would also represent a greater than 10% increase in service connections for the water utility, thus making the proposed development subject to an **SB 221** written verification by the water utility. Close attention will need to be paid to the number of existing service connections and the number of proposed service connections as a result of serving the proposed development, as well as the percentage increase in the number of service connections, in order to determine whether the water utility is a "public water system" and whether the proposed development is a "subdivision" under **SB 221**.

If yes, read the following section and go to Section 12, page 46

Not later than 5 days after receipt of a complete application for a proposed subdivision, the agency shall send a copy of the application to the water supplier or any water supplier that may become a "public water system" that may supply water for the subdivision. (Government Code § 66455.3). This notification does not constitute a request for verification but is meant to provide the water supplier with an early warning that a request for verification is imminent.

Starting on the day that the water supplier receives the request for verification from the lead agency or the project proponent, the water supplier has 90 days to provide the written verification to the agency. Government Code § 66473.7(a)(3) The verification shall comply with **SB 221** requirements.

If the water supplier does not provide the verification to the agency within 90 days of the request, the agency may seek a writ of mandamus to compel the water supplier to prepare and provide verification. (Government Code § 66473(b)(4)). It is recommended that the water supplier and agency communicate regularly during the 90-day preparation period so that the agency can assist the water supplier in case of difficulty.

If the water supplier does not provide the verification within 90 days, the agency may complete a verification that meets the requirements of the law. Government Code § 66473(b)(4)

If no, agency must prepare **SB 221** verification. Government Code § 66473(e) – **go to Section 13, page 48**

Note: If the agency prepares the written verification, even if there is an existing water supplier, whose service area includes the proposed subdivision, because this supplier is unable or fails to do so, the agency must comply with all of the requirements of **SB 221**.

Section 12 - Code citations Has a verification already been prepared for this subdivision?

Government Code section 66473.7

(c) The applicable public water system's written verification of its ability or inability to provide a sufficient water supply that will meet the projected demand associated with the proposed subdivision as required by subdivision (b) shall be supported by substantial evidence. The substantial evidence may include, but is not limited to, any of the following:

(1) The public water system's most recently adopted urban water management plan adopted pursuant to Part 2.6 (commencing with Section 10610) of Division 6 of the Water Code.

(2) A water assessment that was completed pursuant to Part 2. 10 (commencing with Section 10910) of Division 6 of the Water Code.

(3) Other information relating to the sufficiency of the water supply that contains analytical information that is substantially similar to the assessment required by Section 10635 of the Water Code.

Government Code § 66473.7(l): Nothing in this section shall preclude the legislative body of a city or county, or the advisory agency, at the request of the applicant from making the determinations required in this section earlier than required pursuant to subdivision (a). Note: The correct cross reference should be **subdivision (b) instead of subdivision (a)**

Section 12 Has a verification already been prepared for this subdivision?

The law does not preclude the preparation of a verification of sufficient water supply at an earlier point in time. Government Code § 66473.7(l) The verification document must be prepared prior to the adoption of the final subdivision map.

The verification can use data from the most recently adopted Urban Water Management Plan and/or an **SB 610** assessment if the water demand for the proposed project was accounted for in these documents.

12-1 Is there an urban water management plan (UWMP)? (Government Code § 66473.7)

Yes No

If yes, the written verification of a sufficient water supply may use the Urban Water Management Plan and provide more information where necessary. **Continue**

If no, the written verification must be based on other information which provides substantial evidence which provides substantial evidence supporting the conclusions in the verification.

SB 221 suggests that an Urban Water Management Plan (Gov. Code § 66473.7(c) may be a good source of information for developing a verification. Therefore, it is recommended that each water supplier review its most recently adopted UWMP to determine if the supply and demand analysis will provide the substantial evidence to satisfy **SB 221**. The written verification must be supported by substantial evidence. That information can come from a variety of sources including an Urban Water Management Plan.

SB 221 also suggests that an **SB 610** assessment may be a good source of information for developing verification. The water supplier should determine if any recently prepared **SB 610** assessments relating to the specific subdivision contain supply and demand analyses that meet the substantial evidence required by **SB 221**.

Water supplier or agency, continue, go to Section 13, page 48

Section 13 - Code citations What information should be included in a verification?

Government Code section 66473.7

(a) (2) "Sufficient water supply" means the total water supplies available during normal, single-dry, and multiple-dry years within a 20- year projection that will meet the projected demand associated with the proposed subdivision, in addition to existing and planned future uses, including, but not limited to, agricultural and industrial uses. In determining "sufficient water supply," all of the following factors shall be considered:

(A) The availability of water supplies over a historical record of at least 20 years.

(B) The applicability of an urban water shortage contingency analysis prepared pursuant to Section 10632 of the Water Code that includes actions to be undertaken by the public water system in response to water supply shortages.

(C) The reduction in water supply allocated to a specific water use sector pursuant to a resolution or ordinance adopted, or a contract entered into, by the public water system, as long as that resolution, ordinance, or contract does not conflict with Section 354 of the Water Code.

(D) The amount of water that the water supplier can reasonably rely on receiving from other water supply projects, such as conjunctive use, reclaimed water, water conservation, and water transfer, including programs identified under federal, state, and local water initiatives such as CALFED and Colorado River tentative agreements, to the extent that these water supplies meet the criteria of subdivision (d)

(f) In making any findings or determinations under this section, a local agency, or designated advisory agency, may work in conjunction with the project applicant and the public water system to secure water supplies sufficient to satisfy the demands of the proposed subdivision. If the local agency secures water supplies pursuant to this subdivision, which supplies are acceptable to and approved by the governing body of the public water system as suitable for delivery to customers, it shall work in conjunction with the public water system to implement a plan to deliver that water supply to satisfy the long-term demands of the proposed subdivision.

Section 13 What information should be included in a verification?

This section is written 'as if' the water supplier is preparing the verification. If an agency is preparing the verification, the same approach is used but the water supplies are those identified by the Agency as available to meet the subdivision's water demands. (Examples will be provided of how Agency verification will differ from water supplier verification.)

Verification must demonstrate supply sufficiency by showing that water supplies available during normal, single dry, and multiple dry years within a 20-year projection will meet the projected demand associated with the proposed subdivision, in addition to existing and planned future uses, including, but not limited to, agriculture and industrial uses. All of the following must be considered:

- Historical records for at least 20 years;
- Urban Water Shortage Contingency Analysis prepared for Urban Water Management Plan,
- Supply reduction for "specific water use sector" per water supplier's resolution, ordinance, or contract, and
- Amount of water expected from specified supply projects. (Government Code § 66473.7(a)(2)(A-D).)

Verification must be based upon "substantial evidence," possibly including relevant portions of an Urban Water Management Plan or **SB 610** assessment. Government Code § 66473.7(c)

The Urban Water Management Planning Act (Water Code § 10631 – see Appendix C) requires the supplier to document water supplies available during normal, single dry, and multiple dry water years during a 20-year projection and the existing and projected future water demand during a 20-year projection. The Act requires that the projected supplies and demands be presented in five-year increments for the 20-year projection.

If the water demand for the proposed subdivision was accounted for in the most recently adopted urban water management plan; the water supplier may incorporate information from the UWMP into the verification. (Government Code § 66473.3)

If the water demand for the proposed subdivision was accounted for in a **SB 610** assessment, the water supplier may incorporate information from the UWMP into the verification. (Government Code § 66473.3)
The next section contains sample tables and data to demonstrate one method to present the required data.

Supplies from all sources including wholesaler's supplies, require documentation. This documentation includes identifying: water rights and/or contracts to the supply, associated capital outlay programs; federal, state and local permits for constructing infrastructure for conveying the supply, and; any necessary regulatory approvals required for conveyance.

Provisions for documenting groundwater are discussed below.

Continue, go to Section 13, Step 1, page 50

Section 13 - Code citations
Step One: Documenting supply

Government Code section 66473.7

(a) (2) "Sufficient water supply" means the total water supplies available during normal, single-dry, and multiple-dry years within a 20- year projection that will meet the projected demand associated with the proposed subdivision, in addition to existing and planned future uses, including, but not limited to, agricultural and industrial uses. In determining "sufficient water supply," all of the following factors shall be considered:

(A) The availability of water supplies over a historical record of at least 20 years.

(B) The applicability of an urban water shortage contingency analysis prepared pursuant to Section 10632 of the Water Code that includes actions to be undertaken by the public water system in response to water supply shortages.

(C) The reduction in water supply allocated to a specific water use sector pursuant to a resolution or ordinance adopted, or a contract entered into, by the public water system, as long as that resolution, ordinance, or contract does not conflict with Section 354 of the Water Code.

(D) The amount of water that the water supplier can reasonably rely on receiving from other water supply projects, such as conjunctive use, reclaimed water, water conservation, and water transfer, including programs identified under federal, state, and local water initiatives such as CALFED and Colorado River tentative agreements, to the extent that these water supplies meet the criteria of subdivision (d)

(d) When the written verification pursuant to subdivision (b) relies on projected water supplies that are not currently available to the public water system, to provide a sufficient water supply to the subdivision, the written verification as to those projected water supplies shall be based on all of the following elements, to the extent each is applicable:

(1) Written contracts or other proof of valid rights to the identified water supply that identify the terms and conditions under which the water will be available to serve the proposed subdivision.

(2) Copies of a capital outlay program for financing the delivery of a sufficient water supply that has been adopted by the applicable governing body.

(3) Securing of applicable federal, state, and local permits for construction of necessary infrastructure associated with supplying a sufficient water supply.

(4) Any necessary regulatory approvals that are required in order to be able to convey or deliver a sufficient water supply to the subdivision.

Section 13
Step One: Documenting supply

Documentation of annual historical deliveries should be provided for the previous 20 years. It would be useful to document deliveries from each supply source. Projected deliveries by source can be provided on a yearly basis or, similar to the UWMP, for years ending in 0 and 5. Projected deliveries should not be based on contract amount, maximum diversions, maximum groundwater extractions or other theoretical quantities but on projected availability and demand balanced with source utilization criteria (i.e., limiting groundwater extractions during wet or normal years to provide additional supply during dry years). For instance, a contract may be for 5,000 acre feet per year but an additional 2,000 acre feet per year may be available until 2015, due to other contractors not needing full deliveries until that time. This supply could be provided by another source after that time, but it would be necessary to document it by providing:

(1) Written contracts or other proof of valid rights to the identified water supply that identifies the terms and conditions under which the water will be available to serve the proposed subdivision.
(2) Copies of a capital outlay program for financing the delivery of a sufficient water supply that has been adopted by the applicable governing body.
(3) Securing of applicable federal, state, and local permits for construction of necessary infrastructure associated with supplying a sufficient water supply.
(4) Any necessary regulatory approvals that are required in order to be able to convey or deliver a sufficient water supply to the subdivision.

When the water supplier is relying on a landowner's rights to extract groundwater, the water supplier will also need to show (1) that the landowner's land overlies the particular groundwater basin, and (2) the landowner's rights to extract groundwater have been, or will be, provided or made available to the water supplier so that it can rely on them to serve the particular subdivision. This will usually be a factor only in an adjudicated basin or in basins where groundwater management plans have been adopted.

Note that Government Code § 66473.7 (g) requires the verification to contain a description of reasonably foreseeable impacts of the proposed subdivision on the availability of water resources for agricultural and industrial uses within the public water system's service area that are not currently receiving water from the public water system but are utilizing the same sources of water. Agricultural and industrial businesses not using the public water supply may be using groundwater. However, it is important to note that this provision may have broader applicability than groundwater uses. For example, an agricultural user with riparian rights may be using the same surface water source as the water supplier. Each water supplier will need to evaluate the application of this provision given its own water supply situation. This provision requires the verification to review published records maintained by federal and state agencies and public records of local agencies to determine if the water use for the proposed subdivision will have negative impacts on agricultural and industrial users within the public water system's service area who are using the same source of water. To the extent that any reasonably foreseeable adverse impacts have previously been evaluated in a document prepared pursuant to the California Environmental Quality Act (Division 13 (commencing with Section 21000) of the Public Resources Code) or the National Environmental Policy Act (Public Law 91- 190) relevant to the proposed subdivision, the public water system may utilize that information in preparing the written verification.

Table 13a and 13b are examples of how verification might summarize the past, current and projected deliveries from each source. The text of the verification should specify whether any of the listed sources are projected sources not currently available.

Section 13 - Code citations
Step One: Documenting supply (continued)

See previous Code citations page

Section 13
Step One: Documenting supply (continued)

Table 13a Actual supply received (acre feet per year)

Water Supply Sources	1980	1985	1990	1995	2000
Wholesaler (identify)					
Wholesaler (identify)					
Groundwater					
Local surface water					
Transfers					
Exchanges (in or out)					
Reclaimed Water					
Other (identify)					
Total					

Table 13b Projected deliveries to meet projected demand (not maximum possible)

Water Supply Sources	2005	2010	2015	2020	2025
Wholesaler (identify)					
Wholesaler (identify)					
Groundwater					
Local surface water					
Transfers					
Exchanges (in or out)					
Reclaimed Water					
Other (identify)					
Total					

Tables with bold column headings represent information required by SB 221.

If the water supplier has, or projects, future use of any of the listed supplies - conjunctive use, reclaimed water, water conservation, water transfers, CALFED sources, Colorado River tentative agreements, etc. – the verification should document those supplies as outlined in Government Code § 66473.7(d).

Section 13- Code citations
Step One: Documenting supply
If groundwater is a source

Government Code section 66473.7

(g) The written verification prepared under this section shall also include a description, to the extent that data is reasonably available based on published records maintained by federal and state agencies, and public records of local agencies, of the reasonably foreseeable impacts of the proposed subdivision on the availability of water resources for agricultural and industrial uses within the public water system's service area that are not currently receiving water from the public water system but are utilizing the same sources of water. To the extent that those reasonably foreseeable impacts have previously been evaluated in a document prepared pursuant to the California Environmental Quality Act (Division 13 (commencing with Section 21000) of the Public Resources Code) or the National Environmental Policy Act (Public Law 91- 190) for the proposed subdivision, the public water system may utilize that information in preparing the written verification.

(h) Where a water supply for a proposed subdivision includes groundwater, the public water system serving the proposed subdivision shall evaluate, based on substantial evidence, the extent to which it or the landowner has the right to extract the additional groundwater needed to supply the proposed subdivision. Nothing in this subdivision is intended to modify state law with regard to groundwater rights.

Water Code section 10631

(b) Identify and quantify, to the extent practicable, the existing and planned sources of water available to the supplier over the same five-year increments described in subdivision (a). If groundwater is identified as an existing or planned source of water available to the supplier, all of the following information shall be included in the plan:

(1) A copy of any groundwater management plan adopted by the urban water supplier, including plans adopted pursuant to Part 2.75 (commencing with section 10750), or any other specific authorization for groundwater management.

(2) A description of any groundwater basin or basins from which the urban water supplier pumps groundwater. For those basins for which a court or the board has adjudicated the rights to pump groundwater, a copy of the order or decree adopted by the court or the board and a description of the amount of groundwater the urban water supplier has the legal right to pump under the order or decree.

For basins that have not been adjudicated, information as to whether the department has identified the basin or basins as overdrafted or has projected that the basin will become overdrafted if present management conditions continue, in the most current official departmental bulletin that characterizes the condition of the groundwater basin, and a detailed description of the efforts being undertaken by the urban water supplier to eliminate the long-term overdraft condition.

(3) A detailed description and analysis of the location, amount, and sufficiency of groundwater pumped by the urban water supplier for the past five years. The description and analysis shall be based on information that is reasonably available, including, but not limited to, historic use records.

(4) A detailed description and analysis of the amount and location of groundwater that is projected to be pumped by the urban water supplier. The description and analysis shall be based on information that is reasonably available, including, but not limited to, historic use records.

Section 13
Step One: Documenting supply
If groundwater is a source

When a water supply for a proposed subdivision includes groundwater, the water supplier is required to evaluate, based on substantial evidence, the extent to which it or the landowner has the right to extract the additional groundwater needed to supply the proposed subdivision. When the water supplier is relying on a landowner's rights to extract groundwater, the water supplier will need to show that (1) the landowner has a right to extract the groundwater, and (2) it will be available to the supplier to serve the subdivision.

Note that Government Code § 66473.7 (g) requires the verification to contain a description of reasonably foreseeable impacts of the proposed subdivision on the availability of water resources for agricultural and industrial uses within the public water system's service area that are not currently receiving water from the public water system but are utilizing the same sources of water. Agricultural and industrial businesses not using the public water supply may be using groundwater. However, it is important to note that this provision may have broader applicability than groundwater uses. For example, an agricultural user with riparian rights may be using the same surface water source as the water supplier. Each water supplier will need to evaluate the application of this provision given its own water supply situation. This provision requires the verification to review published records maintained by federal and state agencies and public records of local agencies to determine if the water use for the proposed subdivision will have negative impacts on agricultural and industrial users within the public water system's service area who are using the same source of water. To the extent that any reasonably foreseeable adverse impacts have previously been evaluated in a document prepared pursuant to the California Environmental Quality Act (Division 13 (commencing with Section 21000) of the Public Resources Code) or the National Environmental Policy Act (Public Law 91- 190) relevant to the proposed subdivision, the public water system may utilize that information in preparing the written verification.

The verification must include a determination of the water supplier's ability to provide a sufficient water supply for the proposed subdivision and this can be based on substantial evidence from an UWMP, an **SB 610** assessment (Water Code § 10910), or other substantially similar evidence that would be provided to meet the requirements of the Urban Water Management Planning Act (Water Code § 10631-10635). Thus, if the water sources that will serve the project include groundwater, specific groundwater information must be included in the verification.

As amended in 2001 by the enactment of **SB 610**, the Urban Water Management Planning Act (Water Code § 10631) specifies the data generally necessary to document available groundwater supplies for proposed subdivisions subject to **SB 221** Government Code § 66473.7(h) limits the groundwater evaluation to the basin or basins that will serve the proposed subdivision. Information contained in the UWMP regarding groundwater may be useful to comply with this evaluation requirement. (See discussion at page 19)

Groundwater details required to be included in any UWMP adopted after January 1, 2002 include:

a) Specify if a groundwater management plan or other specific authorization for groundwater management for the basin has been adopted and how it affects the water supplier's use of the basin.
b) The description of the groundwater basin may be excerpted from the groundwater management plan, from DWR Bulletin 118, California's Ground Water, or from some other document that has been published and that discusses the basin boundaries, type of rock that constitutes the aquifer, variability of the aquifer material, and total groundwater in storage (average specific yield times the volume of the aquifer).
c) In an adjudicated basin the amount of water the urban supplier has the legal right to pump should be enumerated in the court decision - attach a copy of the order or decree.
d) The Department of Water Resources has projected estimates of overdraft, or "water shortage," based on projected amounts of water supply and demand (basin management), at the hydrologic region level in Bulletin 160, California Water Plan Update. Estimates at the basin or sub-basin level will be projected for some basins in Bulletin 118. If the basin has not been evaluated by DWR, data that indicate groundwater level trends over a period of time should be collected and evaluated.

Section 13 - Code citations
Step One: Documenting supply
If groundwater is a source (continued)

Water Code section 10631

(h) Where a water supply for a proposed subdivision includes groundwater, the public water system serving the proposed subdivision shall evaluate, based on substantial evidence, the extent to which it or the landowner has the right to extract the additional groundwater needed to supply the proposed subdivision. Nothing in this subdivision is intended to modify state law with regard to groundwater rights.

Section 13

Step One: Documenting supply

If groundwater is a source (continued)

e) If the evaluation indicates an overdraft due to existing groundwater extraction, or projected increases in groundwater extraction, describe actions and/or program designed to mitigate such impacts.

f) If water supplier wells are plotted on a map, or are available from a geographic information system, the amount of water extracted by the water supplier for the past five years can be obtained from the Department of Health Services, Office of Drinking Water and Environmental Management. A useful DHS website is: http://www.dhs.cahwnet.gov/ps/ddwem/dwsap/DWSAPindex.htm

g) Description and analysis of the amount and location of groundwater pumped by the water supplier for the past five years. Include information on proposed pumping locations and quantities. The description and analysis is to be based on information that is reasonably available, including, but not limited to, historic use records from DWR, and from other sources.

h) Description and analysis of the location, amount, and sufficiency of groundwater that is projected to be pumped by the water supplier.

Below is a hypothetical example of how this could be addressed:

Project Description

The Gravel Creek Project includes an office park and a 650 dwelling unit residential development. Estimated use of groundwater to serve the proposed subdivision will be 500 acre-feet per year. The project proponent has identified the American Water District as the water supplier for the proposed subdivision.

Condition of Basin

The proposed subdivision immediately overlies a groundwater basin that is part of an active conjunctive use program by the American water District. The basin is not currently adjudicated. Historical use of the basin has left it 20 feet below its historical average. The average water level has continued to fall over the past 5 years. Extractions from this basin have exceeded safe yield on average over the past 20 years. A basin management plan was established in 2000. The basin management plan describes several programs to reverse the historic overuse of the groundwater basin including voluntary reporting of use by agriculture and industry and an ongoing conjunctive use program implemented by the American Water District.

The attached Urban Water Management Plan by the American Water District provides current and past pumping rates and volumes for all well fields managed by the District, as well as information concerning the importation of surface water supplies as part of the conjunctive use program.

Overlying property owners and current appropriative rights holders are already using water equal to the safe yield of the basin. Any new development, to secure and demonstrate a right as an appropriator, would be required to secure an imported water supply. The imported water supply could then be banked in the basin and be used by the new development.

Proposed Water Supply

Estimated use of groundwater to serve the proposed subdivision will be 500 acre-feet per year. Expansion of existing Well Field A or establishment of a new well field is under evaluation within the Project EIR. The American Water District will be utilizing its existing water service contract to import an additional 700 acre-feet per year of surface water, which will be banked in the groundwater basin as part of the District's ongoing conjunctive use program.

Section 13 - Code citations
Step One: Documenting supply
If groundwater is a source (continued)

See previous Code citations page

Section 13
Step One: Documenting supply
If groundwater is a source (continued)

Evaluation of water right condition

The American Water District has been using the groundwater basin as a source of water supply to serve its existing customers, and intends to store an additional 700 acre-feet per year of surface water in the groundwater basin as part of its ongoing conjunctive use program. The proposed water demand for the subdivision would be 500 acre-feet of year, resulting in extractions from the groundwater basin, which would result in a net benefit to the groundwater basin of approximately 200 acre-feet per year. The American Water District would appear to have sufficient right to extract the necessary 500 acre-feet per year of water to serve the proposed subdivision, based on the parameters of the existing basin management program, the nature of the existing conjunctive use program implemented by American Water District, and the proposed importation of sufficient quantities of surface water to serve the proposed subdivision without decreasing availability of water supply for its existing customers.

Section 13 - Code citations

Step One: Documenting supply

If verification relies on projected water supplies not currently available

Government Code section 66473.7

(d) When the written Verification pursuant to subdivision (b) relies on projected water supplies that are not currently available to the public water system, to provide a sufficient water supply to the subdivision, the written verification as to those projected water supplies shall be based on all of the following elements, to the extent each is applicable:

(1) Written contracts or other proof of valid rights to the identified water supply that identify the terms and conditions under which the water will be available to serve the proposed subdivision.

(2) Copies of a capital outlay program for financing the delivery of a sufficient water supply that has been adopted by the applicable governing body.

(3) Securing of applicable federal, state, and local permits for construction of necessary infrastructure associated with supplying a sufficient water supply.

(4) Any necessary regulatory approvals that are required in order to be able to convey or deliver a sufficient water supply to the subdivision.

Section 13

Step One: Documenting supply

If verification relies on projected water supplies not currently available

If the verification relies on water supplies that are not currently available to the water supplier the verification must substantiate that those supplies will be available when the water is needed.

For instance, if a water supplier plans to establish a long-term water transfer agreement but the agreement has not been completed, the following data is necessary to establish that the water will actually be available when the subdivision is completed

- The water supplier should indicate if it has a written contract that identifies the terms and conditions under which the water will be available to serve the proposed subdivision, i.e., the amount of water to be transferred per year, any exceptions, etc.

> Note: This provision of **SB 221** is different than that in **SB 610** for "written contracts". The duty to provide substantial evidence involves more than simply showing a contract; it requires identification of terms and conditions related to providing service to the proposed subdivision

- If the transfer will require a new or expanded delivery system, the water supplier should indicate if it has formally adopted a capital outlay program for financing the construction.
- The water supplier should indicate if it is securing all applicable federal, state and local permits required to secure and deliver the new water supply.
- The water supplier should indicate if any regulatory approvals are being secured.

If a water supplier receives water from a wholesale water agency, the water supplier will need information and documentation from the wholesaler to satisfy the requirements of **SB 221**.

Below is a hypothetical example of how this could be addressed:

Kanouse Canal Lining Project

Source of supply

The Kanouse Canal Lining Project can provide an annual supply that is delivered to Gotham's service area in the Verde River Aqueduct. In 1988, Public Law 100-675 authorized the Secretary of the Interior to concrete line the Kanouse Canal. The Kanouse Canal Lining Project consists of lining 33 miles of the Kanouse Canal.. The law also authorized the Secretary to enter into a construction or funding agreement with the Kanouse Irrigation District.

Expected supply capacity

The Kanouse Canal Lining Project is expected to yield 76,000 acre-feet per year of supply to Gotham's service area via the Verde River Aqueduct other than when surplus Verde River water is available for California's use when KID elects to use such water and such use does not adversely affect Gotham. Gotham would receive 20,500 acre-feet per year from the Kanouse Canal Lining Project for up to 75 years. The water supply that would be available to Gotham is presented below:

Estimated Water Supplies Available for Gotham's Use Under the Kanouse Lining Project (AFY)

Year	Multiple dry years (1990-1992)	Single dry year (1977 Hydrology)	Average year	Wet year (1985 Hydrology)
2005	20,500	20,500	20,500	20,500
2010	76,700	76,700	76,700	76,700
2015	76,700	76,700	76,700	76,700
2020	76,700	76,700	76,700	76,700

*--Represents expected supply capability for the resource program.

Section 13 - Code citations
Step One: Documenting supply
If verification relies on projected water supplies not currently available (continued)

See previous Code citations page

Section 13
Step One: Documenting supply
If verification relies on projected water supplies not currently available (continued)

Rationale for expected supply

Implementation Status: A Request for Proposal for professional consulting services in the design of canals, project management support and environmental documentation services is scheduled to be issued in February 2003 for the Kanouse Canal Lining Project.

Written Contracts: The following actions have been taken to proceed toward project implementation.

- 1988, Public Law 100-675. Authorized the Department of the Interior to reduce seepage from the existing earthen Kanouse Canal.
- 2002 KID – City of Gotham Transfer Agreement Authorized
- 2001, California Department of Water Resources-Gotham Funding Agreement. Reimburse Gotham for project work necessary to construct the lining of the Kanouse Canal in an amount not to exceed $73 million.

Financing: The construction of the Kanouse Canal is included in Gotham's long range financial plan and capital investment plan. Gotham would initially fund these projects. Up to $200 million of the costs of constructing the projects would be reimbursed by the state of California in accordance with the executed funding agreements.

Federal, state and local Permits for Construction:

- April 2000. The Bureau of Reclamation released the Final EIS/EIR for the Kanouse Canal Lining Project.

Section 13 - Code citations
Step Two: Documenting demand

Government Code section 66473.7

(a) (2) "Sufficient water supply" means the total water supplies available during normal, single-dry, and multiple-dry years within a 20- year projection that will meet the projected demand associated with the proposed subdivision, in addition to existing and planned future uses, including, but not limited to, agricultural and industrial uses. In determining "sufficient water supply," all of the following factors shall be considered:

(A) The availability of water supplies over a historical record of at least 20 years.

(B) The applicability of an urban water shortage contingency analysis prepared pursuant to Section 10632 of the Water Code that includes actions to be undertaken by the public water system in response to water supply shortages.

(C) The reduction in water supply allocated to a specific water use sector pursuant to a resolution or ordinance adopted, or a contract entered into, by the public water system, as long as that resolution, ordinance, or contract does not conflict with Section 354 of the Water Code.

(D) The amount of water that the water supplier can reasonably rely on receiving from other water supply projects, such as conjunctive use, reclaimed water, water conservation, and water transfer, including programs identified under federal, state, and local water initiatives such as CALFED and Colorado River tentative agreements, to the extent that these water supplies meet the criteria of subdivision (d)

Section 13
Step Two: Documenting Demand

SB 221 requires that the verification document the projected 20-year water demand for existing uses, planned future uses and the proposed development, as well as for agricultural, industrial and any other uses the water supplier can identify.

Water suppliers may need to consider the variability of agricultural water use. To document agricultural water use, water suppliers could also consult with the county agricultural commissioner to identify trends in irrigated acreage. To document industrial demand, a water supplier could consult with city and county planners, as well as any economic development agencies.

> Note: If the proposed subdivision was included as part of the projected water demand in the current Urban Water Management Plan, the water demand component of the verification may draw from that existing analysis.

Demand during single dry and multiple dry years varies from demand during normal or wet years. Section 13, Step 4 discusses how the verification might deal with this variance.

Section 13 - Code citations
Step Two: Documenting demand
Definitions

Government Code section 66473.7

(a) For the purposes of this section, the following definitions apply:

(1) "Subdivision" means a proposed residential development of more than 500 dwelling units, except that for a public water system that has fewer than 5,000 service connections, "subdivision" means any proposed residential development that would account for an increase of 10 percent or more in the number of the public water system's existing service connections.

(2) "Sufficient water supply" means the total water supplies available during normal, single-dry, and multiple-dry years within a 20- year projection that will meet the projected demand associated with the proposed subdivision, in addition to existing and planned future uses, including, but not limited to, agricultural and industrial uses. In determining "sufficient water supply," all of the following factors shall be considered:

(A) The availability of water supplies over a historical record of at least 20 years.

(B) The applicability of an urban water shortage contingency analysis prepared pursuant to Section 10632 of the Water Code that includes actions to be undertaken by the public water system in response to water supply shortages.

(C) The reduction in water supply allocated to a specific water use sector pursuant to a resolution or ordinance adopted, or a contract entered into, by the public water system, as long as that resolution, ordinance, or contract does not conflict with Section 354 of the Water Code.

(D) The amount of water that the water supplier can reasonably rely on receiving from other water supply projects, such as conjunctive use, reclaimed water, water conservation, and water transfer, including programs identified under federal, state, and local water initiatives such as CALFED and Colorado River tentative agreements, to the extent that these water supplies meet the criteria of subdivision (d).

(3) "Public water system" means the water supplier that is, or may become as a result of servicing the subdivision included in a tentative map pursuant to subdivision (b), a public water system, as defined in Section 10912 of the Water Code, that may supply water for a subdivision.

Section 13
Step Two: Documenting demand
Definitions

The following definitions of existing uses, planned future uses, proposed project use and agricultural and industrial uses are provided for your consideration only. Both **SB 610** and **SB 221** emphasize local decision making and the information provided in these serves to provide examples. Local agencies may have adopted other definitions and should be consulted.

Existing uses – demand related to current customers, and system uses/losses, during normal years (uses during single dry and multiple dry years will be discussed in Section 5, Step four). Usually this projection will take account of historical use (during non-dry) years as well as any recent changes in demand characteristics, i.e., changes in per capita use, percentage of use by customer type, demographic variability, etc.).

Planned future uses – the agency, as the land-use agency, has information on planned development. Regular communication between the water supplier and agency will be essential to ensuring an accurate determination of sufficiency of water supply for future demand.

Planned future uses may include:

- projects that are expected to be completed during the same time frame as the proposed project. These include all new demands ranging from an individual single-family home to large-scale developments.
- proposed developments that have a reserved (or entitlement to) future water supply and are considered to be moving towards construction. Proposed projects that are included in a general or specific plan need not be included if the agency determines that they are not likely to begin construction during the period under consideration.
- projects which are not subject to local planning regulation – for example, US military installations, University of California, etc.

Neither **SB 610** nor **SB 221** defines planned future uses. However, it would be a reasonable interpretation that planned future uses are those that would be undertaken within the same time frame as the project under consideration. Each preparer of an assessment will determine what planned future uses it will include in the demand calculation to insure that it is not identifying the same increment of water for more than one future use.

Section 13 - Code citations
Step Two: Documenting Demand
Detailing existing and planned future uses

Government Code section 66473.7

(a)(2) "Sufficient water supply" means the total water supplies available during normal, single-dry, and multiple-dry years within a 20- year projection that will meet the projected demand associated with the proposed subdivision, in addition to existing and planned future uses, including, but not limited to, agricultural and industrial uses. In determining "sufficient water supply," all of the following factors shall be considered:

(A) The availability of water supplies over a historical record of at least 20 years.

(B) The applicability of an urban water shortage contingency analysis prepared pursuant to Section 10632 of the Water Code that includes actions to be undertaken by the public water system in response to water supply shortages.

(C) The reduction in water supply allocated to a specific water use sector pursuant to a resolution or ordinance adopted, or a contract entered into, by the public water system, as long as that resolution, ordinance, or contract does not conflict with Section 354 of the Water Code.

(D) The amount of water that the water supplier can reasonably rely on receiving from other water supply projects, such as conjunctive use, reclaimed water, water conservation, and water transfer, including programs identified under federal, state, and local water initiatives such as CALFED and Colorado River tentative agreements, to the extent that these water supplies meet the criteria of subdivision (d)

Section 13
Step Two: Documenting demand
Detailing existing and planned future uses

Water-use Sectors – use in acre-feet per year, actual and projected

Customer type	1990	1995	2000	2005	2010	2015	2020
Single Family							
Multifamily							
Commercial							
Industrial							
Institutional / gov.							
Landscape Irrigation							
Wholesale							
Agricultural							
Other (specify)							
TOTAL							

Water-use Sectors – number of connections, actual and projected (Not required by **SB 221**)

Customer type	1990	1995	2000	2005	2010	2015	2020
Single Family							
Multifamily							
Commercial							
Industrial							
Institutional / gov.							
Landscape Irrigation							
Wholesale							
Agricultural							
Other (specify)							
TOTAL							

Section 13 - Code citations
Step Three: Documenting dry-year(s) supply

Government Code section 66473.7

(a)(2) "Sufficient water supply" means the total water supplies available during normal, single-dry, and multiple-dry years within a 20- year projection that will meet the projected demand associated with the proposed subdivision, in addition to existing and planned future uses, including, but not limited to, agricultural and industrial uses. In determining "sufficient water supply," all of the following factors shall be considered:

(A) The availability of water supplies over a historical record of at least 20 years.

(B) The applicability of an urban water shortage contingency analysis prepared pursuant to Section 10632 of the Water Code that includes actions to be undertaken by the public water system in response to water supply shortages.

(C) The reduction in water supply allocated to a specific water use sector pursuant to a resolution or ordinance adopted, or a contract entered into, by the public water system, as long as that resolution, ordinance, or contract does not conflict with Section 354 of the Water Code.

(D) The amount of water that the water supplier can reasonably rely on receiving from other water supply projects, such as conjunctive use, reclaimed water, water conservation, and water transfer, including programs identified under federal, state, and local water initiatives such as CALFED and Colorado River tentative agreements, to the extent that these water supplies meet the criteria of subdivision (d)

Section 13
Step Three: Documenting dry-year(s) supply

"The description of "Sufficient water supply" should provide a clear picture of a public water system's current supply condition under normal, single dry and multiple dry years including any shortfall compared to demand. The definition of "sufficient water supply" allows latitude for water suppliers to use local discretion and planning scenarios when determining necessary supply and demand.

In developing supply projections, water agencies should take into account the latest urban water shortage contingency analysis done pursuant to water code section 10632. This analysis should include an estimate of the minimum water supply available during each of the next three years based on the driest three-year historical sequence for the agency's water supplies. Different sources of water supplies will have different historical dry year sequences and different yields during multiple year drought conditions based on hydrology, available storage, contract entitlements, water right characteristics, etc. In some cases there is not a direct correlation between hydrology and available water supply (e.g., groundwater, recycled water, water transfers, conservation, desalination). Alternative methodologies can be developed for these supplies that would provide an estimate of reasonably available water supplies.

This provision is not intended to preclude projected water supplies that can be reasonably relied upon, so long as there is substantial evidence put on the record that demonstrates that the projected water supplies will likely be available by the time the housing units are ready for construction. The statute does not require that water needed for new development must already be stored and available for delivery, in order for a local agency to approve a final subdivision map. The statute allows for the water supply to be in the planning phase, as long as a demonstration can be made that substantial progress is being made to bring the water supply on-line by the time the subdivision is ready for construction. Therefore, specific projects emerging from long-range planning regarding conjunctive use; reclaimed water; water conservation; water transfers; and federal, state, and local water initiatives such as CALFED and Colorado River tentative agreements, can be cited within the written verification as long as the projected water supplies meet the test provided in Section 66473.7(d).

Example
Probability based estimates for Drake Reservoir supplies have been statistically calculated based on the County's Big River Model. This model uses hydrologic data for the period of 1917 through 1993 to estimate Drake reservoir inflow and water levels and projected deliveries to member agencies. Based on a review of this data, the District can expect to receive a full contractual supply of 9,300 acre feet per year during wet and normal years. During dry years (10 percent probability of occurrence) the Drake Reservoir District deliveries are estimated to be 8,400 acre feet per year. During critical dry years (5 percent probability of occurrence) Drake Reservoir District deliveries are estimated to be 4,200 acre feet per year. The combined effects of wholesaler and Drake Reservoir cutbacks on District water supplies are summarized in Table 5-3.

Percent Likelihood	Wet Year 25%	Normal Year 60%	Dry Year 10%	Critical Drought Year 5%
Demand (AFY)	16,900	15,000	15,500	14,000
Supply Groundwater	0	1,500	2,500	3,300
Drake Reservoir	9,400	9,300	8,400	4,200
West Water Project	7,500	4,500	2,500	1,700
Total	16,900	15,300	13,900	9,200

Projected acre feet per year available by source for single dry and multiple dry years

Source	Normal	Single-Dry	Multi-dry 1	Multi-dry 2	Multi-dry 3
Local Surface	9,300	9,300	9,300	8,400	4,200
WWP	4,500	1,700	1,700	2,500	3,200
Groundwater	1,500	2,500	2,500	3,300	3,300
Water bank		1,000	1,000	300	2,500
TOTAL	15,300	14,500	14,500	14,500	13,200

Section 13 - Code citations
Step Four: Documenting dry-year(s) demand

Government Code section 66473.7

(a) (2) "Sufficient water supply" means the total water supplies available during normal, single-dry, and multiple-dry years within a 20- year projection that will meet the projected demand associated with the proposed subdivision, in addition to existing and planned future uses, including, but not limited to, agricultural and industrial uses. In determining "sufficient water supply," all of the following factors shall be considered:

(A) The availability of water supplies over a historical record of at least 20 years.

(B) The applicability of an urban water shortage contingency analysis prepared pursuant to Section 10632 of the Water Code that includes actions to be undertaken by the public water system in response to water supply shortages.

(C) The reduction in water supply allocated to a specific water use sector pursuant to a resolution or ordinance adopted, or a contract entered into, by the public water system, as long as that resolution, ordinance, or contract does not conflict with Section 354 of the Water Code.

(D) The amount of water that the water supplier can reasonably rely on receiving from other water supply projects, such as conjunctive use, reclaimed water, water conservation, and water transfer, including programs identified under federal, state, and local water initiatives such as CALFED and Colorado River tentative agreements, to the extent that these water supplies meet the criteria of subdivision (d)

Water Code section 10632 (Urban Water Management Plan requirements)

10632. The plan shall provide an urban water shortage contingency analysis which includes each of the following elements which are within the authority of the urban water supplier: (a) Stages of action to be undertaken by the urban water supplier in response to water supply shortages, including up to a 50 percent reduction in water supply, and an outline of specific water supply conditions which are applicable to each stage. (b) An estimate of the minimum water supply available during each of the next three water years based on the driest three-year historic sequence for the agency's water supply. (c) Actions to be undertaken by the urban water supplier to prepare for, and implement during, a catastrophic interruption of water supplies including, but not limited to, a regional power outage, an earthquake, or other disaster. (d) Additional, mandatory prohibitions against specific water use practices during water shortages, including, but not limited to, prohibiting the use of potable water for street cleaning. (e) Consumption reduction methods in the most restrictive stages. Each urban water supplier may use any type of consumption reduction methods in its water shortage contingency analysis that would reduce water use, are appropriate for its area, and have the ability to achieve a water use reduction consistent with up to a 50 percent reduction in water supply. (f) Penalties or charges for excessive use, where applicable. (g) An analysis of the impacts of each of the actions and conditions described in subdivisions (a) to (f), inclusive, on the revenues and expenditures of the urban water supplier, and proposed measures to overcome those impacts, such as the development of reserves and rate adjustments. (h) A draft water shortage contingency resolution or ordinance. (i) A mechanism for determining actual reductions in water use pursuant to the urban water shortage contingency analysis.

Section 13
Step Four: Documenting dry-year(s) demand

Water use patterns change during dry years. One way to analyze this is to document expected changes to water demand by sector. Calculating the demand component of a 'sufficient water supply', a water agency may take into account those planned reductions in water deliveries contemplated by that agency's water rationing program, if the water agency has one, for responding to water supply shortages associated with droughts. In other words, in determining a 'sufficient water supply', a water agency is not required to plan to provide its customers 100 % of what they delivered during a 'normal' water supply year. Rather, for the purposes of calculating whether or not the water agency is able to take on additional customers without putting existing customers at risk, a water agency may estimate the reductions in supply that customers can endure during future droughts, without experiencing unnecessary hardships or costs. Water agencies may already have in place policies, ordinances, or contracts stipulating drought year supply allocations by water use sector. To the extent these are consistent with water code section 354 they should be considered when determining sufficient water supply.

The urban water shortage contingency analysis also requires the water supplier to have a plan for catastrophic interruptions of water supplies authorizing reductions of up to 50%. While disaster response planning is important, it is entirely different from long-term water supply planning to accommodate growth. Levels of reduction approaching 50% may be necessary for catastrophe planning, but are entirely inappropriate for long-term water supply planning. This level of reduction, for long-term water supply planning, would not provide protection to the water supply needs of existing users.

Factors that can change water use patterns during dry years include educational efforts and rationing policies established in water shortage contingency plans. An urban water shortage contingency analysis can have both voluntary and mandatory rationing during water supply shortages to help control consumption. Rationing requirements should be reasonably achievable for customers to encourage reductions in consumption. A typical rationing sequence would begin with voluntary rationing. In the second or third year of an extended drought, mandatory rationing might be expected. The 50% rationing limit described in Water Code Section 10632, while achievable over a relatively short time period, should be reserved for disaster planning rather than drought planning as it would put many customers under duress and may hinder the goal of consumption reduction over an extended drought period. **SB 221** is designed to protect existing customers' water needs while accommodating future development within the means of the water provider.

Water-use Sectors – use in acre-feet per year, projected

Customer type	Normal	Single dry	Multiple 2	Multiple 3	Multiple 4
Single Family					
Multifamily					
Commercial					
Industrial					
Institutional / gov.					
Landscape Irrigation					
Wholesale					
Agricultural					
TOTAL					

Planned water-use reductions by sector – percentage target reduction

Customer type	Normal	Single dry	Multiple 2	Multiple 3	Multiple 4
Single Family					
Multifamily					
Commercial					
Industrial					
Institutional / gov.					
Landscape Irrigation					
Wholesale					
Agricultural					
TOTAL					

Section 14 - Code citations Determining if the projected water supply is sufficient for the subdivision

Government Code section 66473.7

(a) (2) "Sufficient water supply" means the total water supplies available during normal, single-dry, and multiple-dry years within a 20- year projection that will meet the projected demand associated with the proposed subdivision, in addition to existing and planned future uses, including, but not limited to, agricultural and industrial uses. In determining "sufficient water supply," all of the following factors shall be considered:

(A) The availability of water supplies over a historical record of at least 20 years.

(B) The applicability of an urban water shortage contingency analysis prepared pursuant to Section 10632 of the Water Code that includes actions to be undertaken by the public water system in response to water supply shortages.

(C) The reduction in water supply allocated to a specific water use sector pursuant to a resolution or ordinance adopted, or a contract entered into, by the public water system, as long as that resolution, ordinance, or contract does not conflict with Section 354 of the Water Code.

(D) The amount of water that the water supplier can reasonably rely on receiving from other water supply projects, such as conjunctive use, reclaimed water, water conservation, and water transfer, including programs identified under federal, state, and local water initiatives such as CALFED and Colorado River tentative agreements, to the extent that these water supplies meet the criteria of subdivision (d)

Section 14 Determining if the projected water supply is sufficient for the subdivision

Compare current and projected supply and demand for normal, single dry and multiple dry years. Water suppliers may want to make this comparison with and without the proposed subdivision demand so that the impact of the project is clearly calculated. The tables provide examples of format.

Water Supply and Demand Comparison (acre feet per year) during normal years with proposed subdivision

Water Demands	2000	2005	2010	2015	2020
Potable Water	13,040	13,980	14,610	15,230	15,840
Reclaimed Reduction*	0	0	100	200	280
Total	13,040	13,980	14,710	15,430	16,120
Water Supply					
Drake Reservoir	9,300	9,300	9,300	9,300	9,300
West Water Project	4,500	4,500	4,500	4,500	4,500
Wells	0	300	1000	1800	2500
Total	13,800	14,100	14,800	15,600	16,300
Surplus or Deficit	760	120	90	170	180

***Potable water not used due to use of reclaimed water.**

Water Supply and Demand Comparison (AFY) during normal years without proposed subdivision

Water Demands	2000	2005	2010	2015	2020
Potable Water	13,040	13,680	14,310	14,930	15,540
Reclaimed Reduction	0	0	100	200	280
Total	13,040	13,680	14,410	15,130	15,820
Water Supply					
Total	13,800	14,100	14,800	15,600	16,300
Surplus or Deficit	760	420	390	470	480

Water Supply and Demand Comparison (AFY) during single and multiple dry years with proposed subdivison

2025 Supply & Demand	Normal	Single dry	Multiple 2	Multiple 3	Multiple 4
Supply totals					
Demand totals					
Difference					

Water Supply and Demand Comparison (AFY) during single and multiple dry years without proposed subdivision

2025 Supply & Demand	Normal	Single dry	Multiple 2	Multiple 3	Multiple 4
Supply totals					
Demand totals					
Difference					

Section 15 - Code citations If the projected supply is determined to be insufficient

Government Code section 66473.7

(b) (3) If the written verification provided by the applicable public water system indicates that the public water system is unable to provide a sufficient water supply that will meet the projected demand associated with the proposed subdivision, then the local agency may make a finding, after consideration of the written verification by the applicable public water system, that additional water supplies not accounted for by the public water system are, or will be, available prior to completion of the subdivision that will satisfy the requirements of this section. This finding shall be made on the record and supported by substantial evidence.

(d) When the written verification pursuant to subdivision (b) relies on projected water supplies that are not currently available to the public water system, to provide a sufficient water supply to the subdivision, the written verification as to those projected water supplies shall be based on all of the following elements, to the extent each is applicable:

(1) Written contracts or other proof of valid rights to the identified water supply that identify the terms and conditions under which the water will be available to serve the proposed subdivision.

(2) Copies of a capital outlay program for financing the delivery of a sufficient water supply that has been adopted by the applicable governing body.

(3) Securing of applicable federal, state, and local permits for construction of necessary infrastructure associated with supplying a sufficient water supply.

(4) Any necessary regulatory approvals that are required in order to be able to convey or deliver a sufficient water supply to the subdivision.

(f) In making any findings or determinations under this section, a local agency, or designated advisory agency, may work in conjunction with the project applicant and the public water system to secure water supplies sufficient to satisfy the demands of the proposed subdivision. If the local agency secures water supplies pursuant to this subdivision, which supplies are acceptable to and approved by the governing body of the public water system as suitable for delivery to customers, it shall work in conjunction with the public water system to implement a plan to deliver that water supply to satisfy the long-term demands of the proposed subdivision.

Section 15 If the projected supply is determined to be insufficient

Agency Action

If the written verification provided by the water supplier, or by the agency, indicates that the water supply is insufficient to meet the projected demand associated with the proposed subdivision, then the agency may make a finding, after consideration of the written verification, that additional water supplies not accounted for in the verification are, or will be, available prior to completion of the subdivision that will meet the demands of the subdivision. This finding must be made on the record and supported by substantial evidence. Generally, if an agency identifies a supply that was not accounted for in the verification it will be a supply that is not currently available or not currently being used. In this situation, the substantial evidence supporting the finding should comply with Government Code 66473.7(d).

That means that the agency would have to provide information relating to:

(1) Written contracts or other proof of valid rights to the identified water supply which identify the terms and conditions under which the water will be available to serve the proposed subdivision.
(2) Copies of a capital outlay program for financing the delivery of a sufficient water supply that has been adopted by the applicable governing body.
(3) Securing of applicable federal, state, and local permits for construction of necessary infrastructure associated with supplying a sufficient water supply.
(4) Any necessary regulatory approvals that are required in order to be able to convey or deliver a sufficient water supply to the subdivision.

Project Applicants, Local Agencies and Public Water Suppliers Working Together to Secure Additional Water Supplies

Section 66473.7 (f) creates the potential for a unique partnership between water suppliers, project applicants and local agencies. The intent of the statute is to encourage close cooperation in acquiring additional water supplies. Although the statute specifically authorizes a local agency to identify and acquire the projected water supplies under several specified circumstances, the statute also clearly states that the water agency will have the final say on the suitability of any such water supplies for delivery. In order for a local agency to successfully secure needed supplies, it is imperative that local agencies, project applicants, and water suppliers work in collaboration, maintaining close communication during the planning process. To this end, any of these agencies are empowered to negotiate for water supplies. Issues to consider include water quality, delivery logistics, cost, and reliability over different water year types.

Section 16 - Code citations Final SB 221 verification actions by agency

Government Code section 66473.7

(b) (1) The legislative body of a city or county or the advisory agency, to the extent that it is authorized by local ordinance to approve, conditionally approve, or disapprove the tentative map, shall include as a condition in any tentative map that includes a subdivision a requirement that a sufficient water supply shall be available. Proof of the availability of a sufficient water supply shall be requested by the subdivision applicant or local agency, at the discretion of the local agency, and shall be based on written verification from the applicable public water system within 90 days of a request.

(2) If the public water system fails to deliver the written verification as required by this section, the local agency or any other interested party may seek a writ of mandamus to compel the public water system to comply.

(4) If the written verification is not provided by the public water system, notwithstanding the local agency or other interested party securing a writ of mandamus to compel compliance with this section, then the local agency may make a finding that sufficient water supplies are, or will be, available prior to completion of the subdivision that will satisfy the requirements of this section. This finding shall be made on the record and supported by substantial evidence.

(e) If there is no public water system, the local agency shall make a written finding of sufficient water supply based on the evidentiary requirements of subdivisions (c) and (d) and identify the mechanism for providing water to the subdivision.

(j) The determinations made pursuant to this section shall be consistent with the obligation of a public water system to grant a priority for the provision of available and future water resources or services to proposed housing developments that help meet the city's or county's share of the regional housing needs for lower income households, pursuant to Section 65589.7.

Section 16 Final SB 221 verification actions by agency

A written verification, supported by substantial evidence, must be provided before a final subdivision map may be approved. This verification may be requested by the local agency or by the applicant at the discretion of the local agency. It must show that there is sufficient water to meet the water demands of the proposed subdivision and existing and planned future uses for the next 20 years.

A verification may be requested at any time and an applicant may wish to secure and include it when a tentative subdivision map is submitted for approval to the city or county decision making body.

If the verification determines the water supply is sufficient, use of the water for the proposed subdivision must be determined to be consistent with the obligation of the water supplier to grant a priority for the provision of available and future water resources or services to proposed housing developments that help meet the city's or county's share of the regional housing needs for lower income households, pursuant to Government Code § 65589.7.
If the verification finds that the water supplier will be unable to provide a sufficient water supply, and the local agency is unable to find that sufficient additional supplies will be available prior to the completion of the subdivision, then the tentative map condition will not be met and the subdivision cannot receive final approval.

Although the water supply verification required by Government Code § 66473.7(b)(1) may be requested at any time, it may be advisable to seek it before a tentative map application is completed. The project proponent should know the parameters of available water supplies before committing to a project of a specific size and configuration.

Any challenge to the verification must be initiated within 90 days of the agency action.

Summary:
1. The Subdivision Map Act now requires local governments to impose on all tentative subdivision maps which are subject to the provisions of SB 221 the condition that there be sufficient water for the project, along with existing and planned uses.
2. This condition is met by a verification showing the specific items listed in the Government Code, depending on whether or not new water supplies will be required.
3. The verification must in any event be supported by substantial evidence.
4. A final map may not be filed if the condition has not been met.

Section 17 - Code citations Special circumstances

SB 610
Water Code section 10915

The County of San Diego is deemed to comply with this part if the Office of Planning and Research determines that all of the following conditions have been met:

(a) Proposition C, as approved by the voters of the County of San Diego in November 1988, requires the development of a regional growth management plan and directs the establishment of a regional planning and growth management review board.

(b) The County of San Diego and the cities in the county, by agreement, designate the San Diego Association of Governments as that review board.

(c) A regional growth management strategy that provides for a comprehensive regional strategy and a coordinated economic development and growth management program has been developed pursuant to Proposition C.

(d) The regional growth management strategy includes a water element to coordinate planning for water that is consistent with the requirements of this part.

(e) The San Diego County Water Authority, by agreement with the San Diego Association of Governments in its capacity as the review board, uses the association's most recent regional growth forecasts for planning purposes and to implement the water element of the strategy.

(f) The procedures established by the review board for the development and approval of the regional growth management strategy, including the water element and any certification process established to ensure that a project is consistent with that element, comply with the requirements of this part.

(g) The environmental documents for a project located in the County of San Diego include information that accomplishes the same purposes as a water assessment that is prepared pursuant to Section 10910.

SB 221
Government Code section 66473.7

(k) The County of San Diego shall be deemed to comply with this section if the Office of Planning and Research determines that all of the following conditions have been met:

(1) A regional growth management strategy that provides for a comprehensive regional strategy and a coordinated economic development and growth management program has been developed pursuant to Proposition C as approved by the voters of the County of San Diego in November 1988, which required the development of a regional growth management plan and directed the establishment of a regional planning and growth management review board.

(2) Each public water system, as defined in Section 10912 of the Water Code, within the County of San Diego has adopted an urban water management plan pursuant to Part 2.6 (commencing with Section 10610) of the Water Code.

(3) The approval or conditional approval of tentative maps for subdivisions, as defined in this section, by the County of San Diego and the cities within the county requires written communications to be made by the public water system to the city or county, in a format and with content that is substantially similar to the requirements contained in this section, with regard to the availability of a sufficient water supply, or the reliance on projected water supplies to provide a sufficient water supply, for a proposed subdivision.

Section 17 Special circumstances

Lead agencies and water suppliers within the County of San Diego are deemed to comply with **SB 610** if the Governor's Office of Planning and Research determines that certain conditions have been met. If such a determination is made, lead agencies and water suppliers within the County of San Diego must still include information that accomplishes the same purposes as a water assessment prepared pursuant to Water Code § 10910. Until such a determination is made, agencies and water suppliers within the County of San Diego are subject to all statutory requirements.

Agencies and water suppliers within the County of San Diego are deemed to comply with **SB 221** if the Governor's Office of Planning and Research determines that conditions have been met. If such a determination is made, agencies and water suppliers within the County of San Diego must still provide written communications to be made by the public water system to the city or county, in a format and with content that is substantially similar to the requirements contained in Government Code § 66473.7, with regard to the availability of a sufficient water supply, or the reliance on projected water supplies to provide a sufficient water supply, for a proposed subdivision. Until such a determination is made, agencies and water suppliers within the County of San Diego are subject to all statutory requirements.

Appendix A

Chapter 643, Statutes of 2001 (Senate Bill 610)

Chapter 643, Statutes of 2001 (Senate Bill 610)

An act to amend Section 21151.9 of the Public Resources Code, and to amend Sections 10631, 10656, 10910, 10911, 10912, and 10915 of, to repeal Section 10913 of, and to add and repeal Section 10657 of, the Water Code, relating to water. Approved by Governor October 9, 2001. Filed with Secretary of State October 9, 2001.

The people of the State of California do enact as follows:

SECTION 1. (a) The Legislature finds and declares all of the following:
(1) The length and severity of droughts in California cannot be predicted with any accuracy.

(2) There are various factors that affect the ability to ensure that adequate water supplies are available to meet all of California's water demands, now and in the future.

(3) Because of these factors, it is not possible to guarantee a permanent water supply for all water users in California in the amounts requested.

(4) Therefore, it is critical that California's water agencies carefully assess the reliability of their water supply and delivery systems.

(5) Furthermore, California's overall water delivery system has become less reliable over the last 20 years because demand for water has continued to grow while new supplies have not been developed in amounts sufficient to meet the increased demand.

(6) There are a variety of measures for developing new water supplies including water reclamation, water conservation, conjunctive use, water transfers, seawater desalination, and surface water and groundwater storage.

(7) With increasing frequency, California's water agencies are required to impose water rationing on their residential and business customers during this state's frequent and severe periods of drought.

(8) The identification and development of water supplies needed during multiple-year droughts is vital to California's business climate, as well as to the health of the agricultural industry, environment, rural communities, and residents who continue to face the possibility of severe water cutbacks during water shortage periods.

(9) A recent study indicates that the water supply and land use planning linkage, established by Part 2.10 (commencing with Section 10910) of Division 6 of the Water Code, has not been implemented in a manner that ensures the appropriate level of communication between water agencies and planning agencies, and this act is intended to remedy that deficiency in communication.

(b) It is the intent of the Legislature to strengthen the process pursuant to which local agencies determine the adequacy of existing and planned future water supplies to meet existing and planned future demands on those water supplies.

SEC. 2. Section 21151.9 of the Public Resources Code is amended to read:
21151.9. Whenever a city or county determines that a project, as defined in Section 10912 of the Water Code, is subject to this division, it shall comply with Part 2.10 (commencing with Section 10910) of Division 6 of the Water Code.

SEC. 3. Section 10631 of the Water Code is amended to read:
10631. A plan shall be adopted in accordance with this chapter and shall do all of the following:

(a) Describe the service area of the supplier, including current and projected population, climate, and other demographic factors affecting the supplier's water management planning. The projected population estimates shall be

based upon data from the state, regional, or local service agency population projections within the service area of the urban water supplier and shall be in five-year increments to 20 years or as far as data is available.

(b) Identify and quantify, to the extent practicable, the existing and planned sources of water available to the supplier over the same five-year increments as described in subdivision (a). If groundwater is identified as an existing or planned source of water available to the supplier, all of the following information shall be included in the plan:

(1) A copy of any groundwater management plan adopted by the urban water supplier, including plans adopted pursuant to Part 2.75 (commencing with Section 10750), or any other specific authorization for groundwater management.

(2) A description of any groundwater basin or basins from which the urban water supplier pumps groundwater. For those basins for which a court or the board has adjudicated the rights to pump groundwater, a copy of the order or decree adopted by the court or the board and a description of the amount of groundwater the urban water supplier has the legal right to pump under the order or decree. For basins that have not been adjudicated, information as to whether the department has identified the basin or basins as overdrafted or has projected that the basin will become overdrafted if present management conditions continue, in the most current official departmental bulletin that characterizes the condition of the groundwater basin, and a detailed description of the efforts being undertaken by the urban water supplier to eliminate the long-term overdraft condition.

(3) A detailed description and analysis of the amount and location of groundwater pumped by the urban water supplier for the past five years. The description and analysis shall be based on information that is reasonably available, including, but not limited to, historic use records.

(4) A detailed description and analysis of the location, amount, and sufficiency of groundwater that is projected to be pumped by the urban water supplier. The description and analysis shall be based on information that is reasonably available, including, but not limited to, historic use records.

(c) Describe the reliability of the water supply and vulnerability to seasonal or climatic shortage, to the extent practicable, and provide data for each of the following:

(1) An average water year.
(2) A single dry water year.
(3) Multiple dry water years.

For any water source that may not be available at a consistent level of use, given specific legal, environmental, water quality, or climatic factors, describe plans to replace that source with alternative sources or water demand management measures, to the extent practicable.

(d) Describe the opportunities for exchanges or transfers of water on a short-term or long-term basis.

(e) (1) Quantify, to the extent records are available, past and current water use, over the same five-year increments described in subdivision (a), and projected water use, identifying the uses among water use sectors, including, but not necessarily limited to, all of the following uses:

(A) Single-family residential.
(B) Multifamily.
(C) Commercial
(D) Industrial.
(E) Institutional and governmental.
(F) Landscape.
(G) Sales to other agencies.
(H) Saline water intrusion barriers, groundwater recharge, or conjunctive use, or any combination thereof.
(I) Agricultural.

(2) The water use projections shall be in the same five-year increments as described in subdivision (a). (f) Provide a description of the supplier's water demand management measures. This description shall include all of the following:

(1) A description of each water demand management measure that is currently being implemented, or scheduled for implementation, including the steps necessary to implement any proposed measures, including, but not limited to, all of the following:

(A) Water survey programs for single-family residential and multifamily residential customers.
(B) Residential plumbing retrofit.
(C) System water audits, leak detection, and repair.
(D) Metering with commodity rates for all new connections and retrofit of existing connections.
(E) Large landscape conservation programs and incentives.
(F) High-efficiency washing machine rebate programs.
(G) Public information programs.
(H) School education programs.
(I) Conservation programs for commercial, industrial, and institutional accounts.
(J) Wholesale agency programs.
(K) Conservation pricing.
(L) Water conservation coordinator.
(M) Water waste prohibition.
(N) Residential ultra-low-flush toilet replacement programs.

(2) A schedule of implementation for all water demand management measures proposed or described in the plan.

(3) A description of the methods, if any, that the supplier will use to evaluate the effectiveness of water demand management measures implemented or described under the plan.

(4) An estimate, if available, of existing conservation savings on water use within the supplier's service area, and the effect of such savings on the supplier's ability to further reduce demand.

(g) An evaluation of each water demand management measure listed in paragraph (1) of subdivision (f) that is not currently being implemented or scheduled for implementation. In the course of the evaluation, first consideration shall be given to water demand management measures, or combination of measures, that offer lower incremental costs than expanded or additional water supplies. This evaluation shall do all of the following:

(1) Take into account economic and non-economic factors, including environmental, social, health, customer impact, and technological factors.

(2) Include a cost-benefit analysis, identifying total benefits and total costs.

(3) Include a description of funding available to implement any planned water supply project that would provide water at a higher unit cost.

(4) Include a description of the water supplier's legal authority to implement the measure and efforts to work with other relevant agencies to ensure the implementation of the measure and to share the cost of implementation.

(h) Include a description of all water supply projects and water supply programs that may be undertaken by the urban water supplier to meet the total projected water use as established pursuant to subdivision (a) of Section 10635. The urban water supplier shall include a detailed description of expected future projects and programs, other than the demand management programs identified pursuant to paragraph (1) of subdivision (f), that the urban water supplier may implement to increase the amount of the water supply available to the urban water supplier in average, single dry, and multiple dry water years. The description shall identify specific projects and include a description of the increase

in water supply that is expected to be available from each project. The description shall include an estimate with regard to the implementation timeline for each project or program.

(i) Urban water suppliers that are members of the California Urban Water Conservation Council and submit annual reports to that council in accordance with the "Memorandum of Understanding Regarding Urban Water Conservation in California," dated September 1991, may submit the annual reports identifying water demand management measures currently being implemented, or scheduled for implementation, to satisfy the requirements of subdivisions (f) and (g).

SEC. 3.5. Section 10631 of the Water Code is amended to read:
10631. A plan shall be adopted in accordance with this chapter and shall do all of the following:

(a) Describe the service area of the supplier, including current and projected population, climate, and other demographic factors affecting the supplier's water management planning. The projected population estimates shall be based upon data from the state, regional, or local service agency population projections within the service area of the urban water supplier and shall be in five-year increments to 20 years or as far as data is available.

(b) Identify and quantify, to the extent practicable, the existing and planned sources of water available to the supplier over the same five-year increments as described in subdivision (a). If groundwater is identified as an existing or planned source of water available to the supplier, all of the following information shall be included in the plan:

(1) A copy of any groundwater management plan adopted by the urban water supplier, including plans adopted pursuant to Part 2.75 (commencing with Section 10750), or any other specific authorization for groundwater management.

(2) A description of any groundwater basin or basins from which the urban water supplier pumps groundwater. For those basins for which a court or the board has adjudicated the rights to pump groundwater, a copy of the order or decree adopted by the court or the board and a description of the amount of groundwater the urban water supplier has the legal right to pump under the order or decree. For basins that have not been adjudicated, information as to whether the department has identified the basin or basins as overdrafted or has projected that the basin will become overdrafted if present management conditions continue, in the most current official departmental bulletin that characterizes the condition of the groundwater basin, and a detailed description of the efforts being undertaken by the urban water supplier to eliminate the long-term overdraft condition.

(3) A detailed description and analysis of the location, amount, and sufficiency of groundwater pumped by the urban water supplier for the past five years. The description and analysis shall be based on information that is reasonably available, including, but not limited to, historic use records.

(4) A detailed description and analysis of the amount and location of groundwater that is projected to be pumped by the urban water supplier. The description and analysis shall be based on information that is reasonably available, including, but not limited to, historic use records.

(c) Describe the reliability of the water supply and vulnerability to seasonal or climatic shortage, to the extent practicable, and provide data for each of the following:

(1) An average water year.

(2) A single dry water year.

(3) Multiple dry water years. For any water source that may not be available at a consistent level of use, given specific legal, environmental, water quality, or climatic factors, describe plans to supplement or replace that source with alternative sources or water demand management measures, to the extent practicable.

(d) Describe the opportunities for exchanges or transfers of water on a short-term or long-term basis.

(e) (1) Quantify, to the extent records are available, past and current water use, over the same five-year increments described in subdivision (a), and projected water use, identifying the uses among water use sectors, including, but not necessarily limited to, all of the following uses:

(A) Single-family residential.
(B) Multifamily.
(C) Commercial.
(D) Industrial
(E) Institutional and governmental.
(F) Landscape.
(G) Sales to other agencies.
(H) Saline water intrusion barriers, groundwater recharge, or conjunctive use, or any combination thereof.
(I) Agricultural.

(2) The water use projections shall be in the same five-year increments as described in subdivision (a).

(f) Provide a description of the supplier's water demand management measures. This description shall include all of the following:

(1) A description of each water demand management measure that is currently being implemented, or scheduled for implementation, including the steps necessary to implement any proposed measures, including, but not limited to, all of the following:

(A) Water survey programs for single-family residential and multifamily residential customers.
(B) Residential plumbing retrofit.
(C) System water audits, leak detection, and repair.
(D) Metering with commodity rates for all new connections and retrofit of existing connections.
(E) Large landscape conservation programs and incentives.
(F) High-efficiency washing machine rebate programs.
(G) Public information programs.
(H) School education programs.
(I) Conservation programs for commercial, industrial, and institutional accounts.
(J) Wholesale agency programs.
(K) Conservation pricing.
(L) Water conservation coordinator.
(M) Water waste prohibition.
(N) Residential ultra-low-flush toilet replacement programs.

(2) A schedule of implementation for all water demand management measures proposed or described in the plan.

(3) A description of the methods, if any, that the supplier will use to evaluate the effectiveness of water demand management measures implemented or described under the plan.

(4) An estimate, if available, of existing conservation savings on water use within the supplier's service area, and the effect of the savings on the supplier's ability to further reduce demand.

(g) An evaluation of each water demand management measure listed in paragraph (1) of subdivision (f) that is not currently being implemented or scheduled for implementation. In the course of the evaluation, first consideration shall be given to water demand management measures, or combination of measures, that offer lower incremental costs than expanded or additional water supplies. This evaluation shall do all of the following:

(1) Take into account economic and noneconomic factors, including environmental, social, health, customer impact, and technological factors.

(2) Include a cost-benefit analysis, identifying total benefits and total costs.

(3) Include a description of funding available to implement any planned water supply project that would provide water at a higher unit cost.

(4) Include a description of the water supplier's legal authority to implement the measure and efforts to work with other relevant agencies to ensure the implementation of the measure and to share the cost of implementation.

(h) Include a description of all water supply projects and water supply programs that may be undertaken by the urban water supplier to meet the total projected water use as established pursuant to subdivision (a) of Section 10635. The urban water supplier shall include a detailed description of expected future projects and programs, other than the demand management programs identified pursuant to paragraph (1) of subdivision (f), that the urban water supplier may implement to increase the amount of the water supply available to the urban water supplier in average, single dry, and multiple dry water years. The description shall identify specific projects and include a description of the increase in water supply that is expected to be available from each project. The description shall include an estimate with regard to the implementation timeline for each project or program.

(i) Urban water suppliers that are members of the California Urban Water Conservation Council and submit annual reports to that council in accordance with the "Memorandum of Understanding Regarding Urban Water Conservation in California," dated September 1991, may submit the annual reports identifying water demand management measures currently being implemented, or scheduled for implementation, to satisfy the requirements of subdivisions (f) and (g).
SEC. 4. Section 10656 of the Water Code is amended to read:
10656. An urban water supplier that does not prepare, adopt, and submit its urban water management plan to the department in accordance with this part, is ineligible to receive funding pursuant to Division 24 (commencing with Section 78500) or Division 26 (commencing with Section 79000), or receive drought assistance from the state until the urban water management plan is submitted pursuant to this article.

SEC. 4.3. Section 10657 is added to the Water Code, to read:
10657. (a) The department shall take into consideration whether the urban water supplier has submitted an updated urban water management plan that is consistent with Section 10631, as amended by the act that adds this section, in determining whether the urban water supplier is eligible for funds made available pursuant to any program administered by the department.

(b) This section shall remain in effect only until January 1, 2006, and as of that date is repealed, unless a later enacted statute, that is enacted before January 1, 2006, deletes or extends that date.

SEC. 4.5. Section 10910 of the Water Code is amended to read:
10910. (a) Any city or county that determines that a project, as defined in Section 10912, is subject to the California Environmental Quality Act (Division 13 (commencing with Section 21000) of the Public Resources Code) under Section 21080 of the Public Resources Code shall comply with this part.

(b) The city or county, at the time that it determines whether an environmental impact report, a negative declaration, or a mitigated negative declaration is required for any project subject to the California Environmental Quality Act pursuant to Section 21080.1 of the Public Resources Code, shall identify any water system that is, or may become as a result of supplying water to the project identified pursuant to this subdivision, a public water system, as defined in Section 10912, that may supply water for the project. If the city or county is not able to identify any public water system that may supply water for the project, the city or county shall prepare the water assessment required by this part after consulting with any entity serving domestic water supplies whose service area includes the project site, the local agency formation commission, and any public water system adjacent to the project site.

(c) (1) The city or county, at the time it makes the determination required under Section 21080.1 of the Public Resources Code, shall request each public water system identified pursuant to subdivision (b) to determine whether the projected water demand associated with a proposed project was included as part of the most recently adopted urban water management plan adopted pursuant to Part 2.6 (commencing with Section 10610).

(2) If the projected water demand associated with the proposed project was accounted for in the most recently adopted urban water management plan, the public water system may incorporate the requested information from the urban water management plan in preparing the elements of the assessment required to comply with subdivisions (d), (e), (f), and (g).

(3) If the projected water demand associated with the proposed project was not accounted for in the most recently adopted urban water management plan, or the public water system has no urban water management plan, the water supply assessment for the project shall include a discussion with regard to whether the public water system's total projected water supplies available during normal, single dry, and multiple dry water years during a 20-year projection will meet the projected water demand associated with the proposed project, in addition to the public water system's existing and planned future uses, including agricultural and manufacturing uses.

(4) If the city or county is required to comply with this part pursuant to subdivision (b), the water supply assessment for the project shall include a discussion with regard to whether the total projected water supplies, determined to be available by the city or county for the project during normal, single dry, and multiple dry water years during a 20-year projection, will meet the projected water demand associated with the proposed project, in addition to existing and planned future uses, including agricultural and manufacturing uses.

(d) (1) The assessment required by this section shall include an identification of any existing water supply entitlements, water rights, or water service contracts relevant to the identified water supply for the proposed project, and a description of the quantities of water received in prior years by the public water system, or the city or county if either is required to comply with this part pursuant to subdivision (b), under the existing water supply entitlements, water rights, or water service contracts.

(2) An identification of existing water supply entitlements, water rights, or water service contracts held by the public water system, or the city or county if either is required to comply with this part pursuant to subdivision (b), shall be demonstrated by providing information related to all of the following:

(A) Written contracts or other proof of entitlement to an identified water supply.

(B) Copies of a capital outlay program for financing the delivery of a water supply that has been adopted by the public water system.

(C) Federal, state, and local permits for construction of necessary infrastructure associated with delivering the water supply.

(D) Any necessary regulatory approvals that are required in order to be able to convey or deliver the water supply.

(e) If no water has been received in prior years by the public water system, or the city or county if either is required to comply with this part pursuant to subdivision (b), under the existing water supply entitlements, water rights, or water service contracts, the public water system, or the city or county if either is required to comply with this part pursuant to subdivision (b), shall also include in its water supply assessment pursuant to subdivision (c), an identification of the other public water systems or water service contract-holders that receive a water supply or have existing water supply entitlements, water rights, or water service contracts, to the same source of water as the public water system, or the city or county if either is required to comply with this part pursuant to subdivision (b), has identified as a source of water supply within its water supply assessments.

(f) If a water supply for a proposed project includes groundwater, the following additional information shall be included in the water supply assessment:

(1) A review of any information contained in the urban water management plan relevant to the identified water supply for the proposed project.

(2) A description of any groundwater basin or basins from which the proposed project will be supplied. For those basins for which a court or the board has adjudicated the rights to pump groundwater, a copy of the order or decree adopted by the court or the board and a description of the amount of groundwater the public water system, or the city or county if either is required to comply with this part pursuant to subdivision (b), has the legal right to pump under the order or decree. For basins that have not been adjudicated, information as to whether the department has identified the basin or basins as overdrafted or has projected that the basin will become overdrafted if present management conditions continue, in the most current bulletin of the department that characterizes the condition of the groundwater basin, and a detailed description by the public water system, or the city or county if either is required to comply with this part pursuant to subdivision (b), of the efforts being undertaken in the basin or basins to eliminate the long-term overdraft condition.

(3) A detailed description and analysis of the amount and location of groundwater pumped by the public water system, or the city or county if either is required to comply with this part pursuant to subdivision (b), for the past five years from any groundwater basin from which the proposed project will be supplied. The description and analysis shall be based on information that is reasonably available, including, but not limited to, historic use records.

(4) A detailed description and analysis of the amount and location of groundwater that is projected to be pumped by the public water system, or the city or county if either is required to comply with this part pursuant to subdivision (b), from any basin from which the proposed project will be supplied. The description and analysis shall be based on information that is reasonably available, including, but not limited to, historic use records.

(5) An analysis of the sufficiency of the groundwater from the basin or basins from which the proposed project will be supplied to meet the projected water demand associated with the proposed project. A water supply assessment shall not be required to include the information required by this paragraph if the public water system determines, as part of the review required by paragraph (1), that the sufficiency of groundwater necessary to meet the initial and projected water demand associated with the project was addressed in the description and analysis required by paragraph (4) of subdivision (b) of Section 10631.

(g) (1) Subject to paragraph (2), the governing body of each public water system shall submit the assessment to the city or county not later than 90 days from the date on which the request was received. The governing body of each public water system, or the city or county if either is required to comply with this act pursuant to subdivision (b), shall approve the assessment prepared pursuant to this section at a regular or special meeting.

(2) Prior to the expiration of the 90-day period, if the public water system intends to request an extension of time to prepare and adopt the assessment, the public water system shall meet with the city or county to request an extension of time, which shall not exceed 30 days, to prepare and adopt the assessment.

(3) If the public water system fails to request an extension of time, or fails to submit the assessment notwithstanding the extension of time granted pursuant to paragraph (2), the city or county may seek a writ of mandamus to compel the governing body of the public water system to comply with the requirements of this part relating to the submission of the water supply assessment.

(h) Notwithstanding any other provision of this part, if a project has been the subject of a water supply assessment that complies with the requirements of this part, no additional water supply assessment shall be required for subsequent projects that were part of a larger project for which a water supply assessment was completed and that has complied with the requirements of this part and for which the public water system, or the city or county if either is required to comply with this part pursuant to subdivision (b), has concluded that its water supplies are sufficient to meet the projected water demand associated with the proposed project, in addition to the existing and planned future uses, including, but not limited to, agricultural and industrial uses, unless one or more of the following changes occurs:

(1) Changes in the project that result in a substantial increase in water demand for the project.

(2) Changes in the circumstances or conditions substantially affecting the ability of the public water system, or the city or county if either is required to comply with this part pursuant to subdivision (b), to provide a sufficient supply of water for the project.

(3) Significant new information becomes available which was not known and could not have been known at the time when the assessment was prepared.

SEC. 5. Section 10911 of the Water Code is amended to read:
10911. (a) If, as a result of its assessment, the public water system concludes that its water supplies are, or will be, insufficient, the public water system shall provide to the city or county its plans for acquiring additional water supplies, setting forth the measures that are being undertaken to acquire and develop those water supplies. If the city or county, if either is required to comply with this part pursuant to subdivision (b), concludes as a result of its assessment, that water supplies are, or will be, insufficient, the city or county shall include in its water supply assessment its plans for acquiring additional water supplies, setting forth the measures that are being undertaken to acquire and develop those water supplies. Those plans may include, but are not limited to, information concerning all of the following:

(1) The estimated total costs, and the proposed method of financing the costs, associated with acquiring the additional water supplies.

(2) All federal, state, and local permits, approvals, or entitlements that are anticipated to be required in order to acquire and develop the additional water supplies.

(3) Based on the considerations set forth in paragraphs (1) and (2), the estimated timeframes within which the public water system, or the city or county if either is required to comply with this part pursuant to subdivision (b), expects to be able to acquire additional water supplies.

(b) The city or county shall include the water supply assessment provided pursuant to Section 10910, and any information provided pursuant to subdivision (a), in any environmental document prepared for the project pursuant to Division 13 (commencing with Section 21000) of the Public Resources Code.

(c) The city or county may include in any environmental document an evaluation of any information included in that environmental document provided pursuant to subdivision (b). The city or county shall determine, based on the entire record, whether projected water supplies will be sufficient to satisfy the demands of the project, in addition to existing and planned future uses. If the city or county determines that water supplies will not be sufficient, the city or county shall include that determination in its findings for the project.

SEC. 6. Section 10912 of the Water Code is amended to read:
10912. For the purposes of this part, the following terms have the following meanings:

(a) "Project" means any of the following:

(1) A proposed residential development of more than 500 dwelling units.

(2) A proposed shopping center or business establishment employing more than 1,000 persons or having more than 500,000 square feet of floor space.

(3) A proposed commercial office building employing more than 1,000 persons or having more than 250,000 square feet of floor space.

(4) A proposed hotel or motel, or both, having more than 500 rooms.

(5) A proposed industrial, manufacturing, or processing plant, or industrial park planned to house more than 1,000 persons, occupying more than 40 acres of land, or having more than 650,000 square feet of floor area.

(6) A mixed-use project that includes one or more of the projects specified in this subdivision.

(7) A project that would demand an amount of water equivalent to, or greater than, the amount of water required by a 500 dwelling unit project.

(b) If a public water system has fewer than 5,000 service connections, then "project" means any proposed residential, business, commercial, hotel or motel, or industrial development that would account for an increase of 10 percent or more in the number of the public water system's existing service connections, or a mixed-use project that would demand an amount of water equivalent to, or greater than, the amount of water required by residential development that would represent an increase of 10 percent or more in the number of the public water system's existing service connections.

(c) "Public water system" means a system for the provision of piped water to the public for human consumption that has 3000 or more service connections. A public water system includes all of the following:

(1) Any collection, treatment, storage, and distribution facility under control of the operator of the system which is used primarily in connection with the system.

(2) Any collection or pretreatment storage facility not under the control of the operator that is used primarily in connection with the system.

(3) Any person who treats water on behalf of one or more public water systems for the purpose of rendering it safe for human consumption.

SEC. 7. Section 10913 of the Water Code is repealed.

SEC. 8. Section 10915 of the Water Code is amended to read:
10915. The County of San Diego is deemed to comply with this part if the Office of Planning and Research determines that all of the following conditions have been met:

(a) Proposition C, as approved by the voters of the County of San Diego in November 1988, requires the development of a regional growth management plan and directs the establishment of a regional planning and growth management review board.

(b) The County of San Diego and the cities in the county, by agreement, designate the San Diego Association of Governments as that review board.

(c) A regional growth management strategy that provides for a comprehensive regional strategy and a coordinated economic development and growth management program has been developed pursuant to Proposition C.

(d) The regional growth management strategy includes a water element to coordinate planning for water that is consistent with the requirements of this part.

(e) The San Diego County Water Authority, by agreement with the San Diego Association of Governments in its capacity as the review board, uses the association's most recent regional growth forecasts for planning purposes and to implement the water element of the strategy.

(f) The procedures established by the review board for the development and approval of the regional growth management strategy, including the water element and any certification process established to ensure that a project is consistent with that element, comply with the requirements of this part.

(g) The environmental documents for a project located in the County of San Diego include information that accomplishes the same purposes as a water supply assessment that is prepared pursuant to Section 10910.

SEC. 9.
Section 3.5 of this bill incorporates amendments to Section 10631 of the Water Code proposed by both this bill and AB 901. It shall only become operative if (1) both bills are enacted and become effective on or before January 1, 2002, (2) each bill amends Section 10631 of the Water Code, and (3) this bill is enacted after AB 901, in which case Section 3 of this bill shall not become operative.

SEC. 10.
No reimbursement is required by this act pursuant to Section 6 of Article XIII B of the California Constitution because a local agency or school district has the authority to levy service charges, fees, or assessments sufficient to pay for the program or level of service mandated by this act, within the meaning of Section 17556 of the Government Code.

Appendix B

Chapter 642, Statutes of 2001 (Senate Bill No. 221)

Chapter 642, Statutes of 2001 (Senate Bill No. 221)

An act to amend Section 11010 of the Business and Professions Code, and to amend Section 65867.5 of, and to add Sections 66455.3 and 66473. 7 to, the Government Code, relating to land use. Approved by Governor October 9, 2001. Filed with Secretary of State October 9, 2001.

The people of the State of California do enact as follows:

SECTION 1. Section 11010 of the Business and Professions Code is amended to read:
11010. (a) Except as otherwise provided pursuant to subdivision (c) or elsewhere in this chapter, any person who intends to offer subdivided lands within this state for sale or lease shall file with the Department of Real Estate an application for a public report consisting of a notice of intention and a completed questionnaire on a form prepared by the department.

(b) The notice of intention shall contain the following information about the subdivided lands and the proposed offering:

(1) The name and address of the owner.
(2) The name and address of the subdivider.
(3) The legal description and area of lands.
(4) A true statement of the condition of the title to the land, particularly including all encumbrances thereon.

(5) A true statement of the terms and conditions on which it is intended to dispose of the land, together with copies of any contracts intended to be used.

(6) A true statement of the provisions, if any, that have been made for public utilities in the proposed subdivision, including water, electricity, gas, telephone, and sewerage facilities. For subdivided lands that were subject to the imposition of a condition pursuant to subdivision (b) of Section 66473.7 of the Government Code, the true statement of the provisions made for water shall be satisfied by submitting a copy of the written verification of the available water supply obtained pursuant to Section 66473.7 of the Government Code.

(7) A true statement of the use or uses for which the proposed subdivision will be offered.

(8) A true statement of the provisions, if any, limiting the use or occupancy of the parcels in the subdivision.

(9) A true statement of the amount of indebtedness that is a lien upon the subdivision or any part thereof, and that was incurred to pay for the construction of any onsite or offsite improvement, or any community or recreational facility.

(10) A true statement or reasonable estimate, if applicable, of the amount of any indebtedness which has been or is proposed to be incurred by an existing or proposed special district, entity, taxing area, assessment district, or community facilities district within the boundaries of which, the subdivision, or any part thereof, is located, and that is to pay for the construction or installation of any improvement or to furnish community or recreational facilities to that subdivision, and which amounts are to be obtained by ad valorem tax or assessment, or by a special assessment or tax upon the subdivision, or any part thereof.

(11) (A) As to each school district serving the subdivision, a statement from the appropriate district that indicates the location of each high school, junior high school, and elementary school serving the subdivision, or documentation that a statement to that effect has been requested from the appropriate school district.

(B) In the event that, as of the date the notice of intention and application for issuance of a public report are otherwise deemed to be qualitatively and substantially complete pursuant to Section 11010.2, the statement described in subparagraph (A) has not been provided by any school district serving the subdivision, the person who filed the notice

of intention and application for issuance of a public report immediately shall provide the department with the name, address, and telephone number of that district.

(12) The location of all existing airports, and of all proposed airports shown on the general plan of any city or county, located within two statute miles of the subdivision.

(13) A true statement, if applicable, referencing any soils or geologic report or soils and geologic reports that have been prepared specifically for the subdivision.

(14) A true statement of whether or not fill is used, or is proposed to be used in the subdivision and a statement giving the name and the location of the public agency where information concerning soil conditions in the subdivision is available.

(15) Any other information that the owner, his or her agent, or the subdivider may desire to present.

(c) The commissioner may, by regulation, or on the basis of the particular circumstances of a proposed offering, waive the requirement of the submission of a completed questionnaire if the commissioner determines that prospective purchasers or lessees of the subdivision interests to be offered will be adequately protected through the issuance of a public report based solely upon information contained in the notice of intention.

SEC. 2. Section 65867.5 of the Government Code is amended to read:
65867. 5. (a) A development agreement is a legislative act that shall be approved by ordinance and is subject to referendum.

(b) A development agreement shall not be approved unless the legislative body finds that the provisions of the agreement are consistent with the general plan and any applicable specific plan.

(c) A development agreement that includes a subdivision, as defined in Section 66473.7, shall not be approved unless the agreement provides that any tentative map prepared for the subdivision will comply with the provisions of Section 66473.7.

SEC. 3. Section 66455.3 is added to the Government Code, to read:
66455. 3. Not later than five days after a city or county has determined that a tentative map application for a proposed subdivision, as defined in Section 66473.7, is complete pursuant to Section 65943, the local agency shall send a copy of the application to any water supplier that is, or may become, a public water system, as defined in Section 10912 of the Water Code, that may supply water for the subdivision.

SEC. 4. Section 66473.7 is added to the Government Code, to read:
66473. 7. (a) For the purposes of this section, the following definitions apply:
(1) "Subdivision" means a proposed residential development of more than 500 dwelling units, except that for a public water system that has fewer than 5,000 service connections, "subdivision" means any proposed residential development that would account for an increase of 10 percent or more in the number of the public water system's existing service connections.

(2) "Sufficient water supply" means the total water supplies available during normal, single-dry, and multiple-dry years within a 20- year projection that will meet the projected demand associated with the proposed subdivision, in addition to existing and planned future uses, including, but not limited to, agricultural and industrial uses. In determining "sufficient water supply," all of the following factors shall be considered:

(A) The availability of water supplies over a historical record of at least 20 years.

(B) The applicability of an urban water shortage contingency analysis prepared pursuant to Section 10632 of the Water Code that includes actions to be undertaken by the public water system in response to water supply shortages.

(C) The reduction in water supply allocated to a specific water use sector pursuant to a resolution or ordinance adopted, or a contract entered into, by the public water system, as long as that resolution, ordinance, or contract does not conflict with Section 354 of the Water Code.

(D) The amount of water that the water supplier can reasonably rely on receiving from other water supply projects, such as conjunctive use, reclaimed water, water conservation, and water transfer, including programs identified under federal, state, and local water initiatives such as CALFED and Colorado River tentative agreements, to the extent that these water supplies meet the criteria of subdivision (d).

(3) "Public water system" means the water supplier that is, or may become as a result of servicing the subdivision included in a tentative map pursuant to subdivision (b), a public water system, as defined in Section 10912 of the Water Code, that may supply water for a subdivision.

(b) (1) The legislative body of a city or county or the advisory agency, to the extent that it is authorized by local ordinance to approve, conditionally approve, or disapprove the tentative map, shall include as a condition in any tentative map that includes a subdivision a requirement that a sufficient water supply shall be available. Proof of the availability of a sufficient water supply shall be requested by the subdivision applicant or local agency, at the discretion of the local agency, and shall be based on written verification from the applicable public water system within 90 days of a request.

(2) If the public water system fails to deliver the written verification as required by this section, the local agency or any other interested party may seek a writ of mandamus to compel the public water system to comply.

(3) If the written verification provided by the applicable public water system indicates that the public water system is unable to provide a sufficient water supply that will meet the projected demand associated with the proposed subdivision, then the local agency may make a finding, after consideration of the written verification by the applicable public water system, that additional water supplies not accounted for by the public water system are, or will be, available prior to completion of the subdivision that will satisfy the requirements of this section. This finding shall be made on the record and supported by substantial evidence.

(4) If the written verification is not provided by the public water system, notwithstanding the local agency or other interested party securing a writ of mandamus to compel compliance with this section, then the local agency may make a finding that sufficient water supplies are, or will be, available prior to completion of the subdivision that will satisfy the requirements of this section. This finding shall be made on the record and supported by substantial evidence.

(c) The applicable public water system's written verification of its ability or inability to provide a sufficient water supply that will meet the projected demand associated with the proposed subdivision as required by subdivision (b) shall be supported by substantial evidence. The substantial evidence may include, but is not limited to, any of the following:

(1) The public water system's most recently adopted urban water management plan adopted pursuant to Part 2.6 (commencing with Section 10610) of Division 6 of the Water Code.

(2) A water supply assessment that was completed pursuant to Part 2. 10 (commencing with Section 10910) of Division 6 of the Water Code.

(3) Other information relating to the sufficiency of the water supply that contains analytical information that is substantially similar to the assessment required by Section 10635 of the Water Code.

(d) When the written verification pursuant to subdivision (b) relies on projected water supplies that are not currently available to the public water system, to provide a sufficient water supply to the subdivision, the written verification as to those projected water supplies shall be based on all of the following elements, to the extent each is applicable:

(1) Written contracts or other proof of valid rights to the identified water supply that identify the terms and conditions under which the water will be available to serve the proposed subdivision.

(2) Copies of a capital outlay program for financing the delivery of a sufficient water supply that has been adopted by the applicable governing body.

(3) Securing of applicable federal, state, and local permits for construction of necessary infrastructure associated with supplying a sufficient water supply.

(4) Any necessary regulatory approvals that are required in order to be able to convey or deliver a sufficient water supply to the subdivision.

(e) If there is no public water system, the local agency shall make a written finding of sufficient water supply based on the evidentiary requirements of subdivisions (c) and (d) and identify the mechanism for providing water to the subdivision.

(f) In making any findings or determinations under this section, a local agency, or designated advisory agency, may work in conjunction with the project applicant and the public water system to secure water supplies sufficient to satisfy the demands of the proposed subdivision. If the local agency secures water supplies pursuant to this subdivision, which supplies are acceptable to and approved by the governing body of the public water system as suitable for delivery to customers, it shall work in conjunction with the public water system to implement a plan to deliver that water supply to satisfy the long-term demands of the proposed subdivision.

(g) The written verification prepared under this section shall also include a description, to the extent that data is reasonably available based on published records maintained by federal and state agencies, and public records of local agencies, of the reasonably foreseeable impacts of the proposed subdivision on the availability of water resources for agricultural and industrial uses within the public water system's service area that are not currently receiving water from the public water system but are utilizing the same sources of water. To the extent that those reasonably foreseeable impacts have previously been evaluated in a document prepared pursuant to the California Environmental Quality Act (Division 13 (commencing with Section 21000) of the Public Resources Code) or the National Environmental Policy Act (Public Law 91- 190) for the proposed subdivision, the public water system may utilize that information in preparing the written verification.

(h) Where a water supply for a proposed subdivision includes groundwater, the public water system serving the proposed subdivision shall evaluate, based on substantial evidence, the extent to which it or the landowner has the right to extract the additional groundwater needed to supply the proposed subdivision. Nothing in this subdivision is intended to modify state law with regard to groundwater rights.

(i) This section shall not apply to any residential project proposed for a site that is within an urbanized area and has been previously developed for urban uses, or where the immediate contiguous properties surrounding the residential project site are, or previously have been, developed for urban uses, or housing projects that are exclusively for very low and low-income households.

(j) The determinations made pursuant to this section shall be consistent with the obligation of a public water system to grant a priority for the provision of available and future water resources or services to proposed housing developments that help meet the city's or county's share of the regional housing needs for lower income households, pursuant to Section 65589.7.

(k) The County of San Diego shall be deemed to comply with this section if the Office of Planning and Research determines that all of the following conditions have been met:

(1) A regional growth management strategy that provides for a comprehensive regional strategy and a coordinated economic development and growth management program has been developed pursuant to Proposition C as approved

by the voters of the County of San Diego in November 1988, which required the development of a regional growth management plan and directed the establishment of a regional planning and growth management review board.

(2) Each public water system, as defined in Section 10912 of the Water Code, within the County of San Diego has adopted an urban water management plan pursuant to Part 2.6 (commencing with Section 10610) of the Water Code.

(3) The approval or conditional approval of tentative maps for subdivisions, as defined in this section, by the County of San Diego and the cities within the county requires written communications to be made by the public water system to the city or county, in a format and with content that is substantially similar to the requirements contained in this section, with regard to the availability of a sufficient water supply, or the reliance on projected water supplies to provide a sufficient water supply, for a proposed subdivision.

(l) Nothing in this section shall preclude the legislative body of a city or county, or the designated advisory agency, at the request of the applicant, from making the determinations required in this section earlier than required pursuant to subdivision (a).

(m) Nothing in this section shall be construed to create a right or entitlement to water service or any specific level of water service.

(n) Nothing in this section is intended to change existing law concerning a public water system's obligation to provide water service to its existing customers or to any potential future customers.

(o) Any action challenging the sufficiency of the public water system's written verification of a sufficient water supply shall be governed by Section 66499.37.

SEC. 5.
No reimbursement is required by this act pursuant to Section 6 of Article XIII B of the California Constitution because a local agency or school district has the authority to levy service charges, fees, or assessments sufficient to pay for the program or level of service mandated by this act, within the meaning of Section 17556 of the Government Code.

Appendix C

Urban Water Management Plan – sample groundwater section

Established: AB 797, Klehs, 1983
Amended: AB 2661, Klehs, 1990
AB 11X, Filante, 1991
AB 1869, Speier, 1991
AB 892, Frazee, 1993
SB 1017, McCorquodale, 1994
AB 2853, Cortese, 1994
AB 1845, Cortese, 1995
SB 1011, Polanco, 1995
AB 2552, Bates, 2000
SB 553, Kelley, 2000
SB 610, Costa, 2001
AB 901, Daucher, 2001
SB 672, Machado, 2001
SB 1348, Brulte, 2002
SB 1384 Costa, 2002
SB 1518 Torlakson, 2002

CALIFORNIA WATER CODE DIVISION 6
PART 2.6. URBAN WATER MANAGEMENT PLANNING
CHAPTER 1. GENERAL DECLARATION AND POLICY

10610. This part shall be known and may be cited as the "Urban Water Management Planning Act."

10610.2. (a) The Legislature finds and declares all of the following:
(1) The waters of the state are a limited and renewable resource subject to ever-increasing demands.
(2) The conservation and efficient use of urban water supplies are of statewide concern; however, the planning for that use and the implementation of those plans can best be accomplished at the local level.
(3) A long-term, reliable supply of water is essential to protect the productivity of California's businesses and economic climate.
(4) As part of its long-range planning activities, every urban water supplier should make every effort to ensure the appropriate level of reliability in its water service sufficient to meet the needs of its various categories of customers during normal, dry, and multiple dry water years.
(5) Public health issues have been raised over a number of contaminants that have been identified in certain local and imported water supplies.
(6) Implementing effective water management strategies, including groundwater storage projects and recycled water projects, may require specific water quality and salinity targets for meeting groundwater basins water quality objectives and promoting beneficial use of recycled water.
(7) Water quality regulations are becoming an increasingly important factor in water agencies' selection of raw water sources, treatment alternatives, and modifications to existing treatment facilities.
(8) Changes in drinking water quality standards may also impact the usefulness of water supplies and may ultimately impact supply reliability.
(9) The quality of source supplies can have a significant impact on water management strategies and supply reliability.
(b) This part is intended to provide assistance to water agencies in carrying out their long-term resource planning responsibilities to ensure adequate water supplies to meet existing and future demands for water.
10610.4. The Legislature finds and declares that it is the policy of the state as follows:
(a) The management of urban water demands and efficient use of water shall be actively pursued to protect both the people of the state and their water resources.

(b) The management of urban water demands and efficient use of urban water supplies shall be a guiding criterion in public decisions.
(c) Urban water suppliers shall be required to develop water management plans to actively pursue the efficient use of available supplies.

CHAPTER 2. DEFINITIONS

10611. Unless the context otherwise requires, the definitions of this chapter govern the construction of this part.
10611.5. "Demand management" means those water conservation measures, programs, and incentives that prevent the waste of water and promote the reasonable and efficient use and reuse of available supplies.
10612. "Customer" means a purchaser of water from a water supplier who uses the water for municipal purposes, including residential, commercial, governmental, and industrial uses.
10613. "Efficient use" means those management measures that result in the most effective use of water so as to prevent its waste or unreasonable use or unreasonable method of use.
10614. "Person" means any individual, firm, association, organization, partnership, business, trust, corporation, company, public agency, or any agency of such an entity.
10615. "Plan" means an urban water management plan prepared pursuant to this part. A plan shall describe and evaluate sources of supply, reasonable and practical efficient uses, reclamation and demand management activities. The components of the plan may vary according to an individual community or area's characteristics and its capabilities to efficiently use and conserve water. The plan shall address measures for residential, commercial, governmental, and industrial water demand management as set forth in Article 2 (commencing with Section 10630) of Chapter 3. In addition, a strategy and time schedule for implementation shall be included in the plan.
10616. "Public agency" means any board, commission, county, city and county, city, regional agency, district, or other public entity.
10616.5. "Recycled water" means the reclamation and reuse of wastewater for beneficial use.
10617. "Urban water supplier" means a supplier, either publicly or privately owned, providing water for municipal purposes either directly or indirectly to more than 3,000 customers or supplying more than 3,000 acre-feet of water annually. An urban water supplier includes a supplier or contractor for water, regardless of the basis of right, which distributes or sells for ultimate resale to customers. This part applies only to water supplied from public water systems subject to Chapter 4 (commencing with Section 116275) of Part 12 of Division 104 of the Health and Safety Code.

CHAPTER 3. URBAN WATER MANAGEMENT PLANS

Article 1. General Provisions

10620.
(a) Every urban water supplier shall prepare and adopt an urban water management plan in the manner set forth in Article 3 (commencing with Section 10640).
(b) Every person that becomes an urban water supplier shall adopt an urban water management plan within one year after it has become an urban water supplier.
(c) An urban water supplier indirectly providing water shall not include planning elements in its water management plan as provided in Article 2 (commencing with Section 10630) that would be applicable to urban water suppliers or public agencies directly providing water, or to their customers, without the consent of those suppliers or public agencies.
(d)
(1) An urban water supplier may satisfy the requirements of this part by participation in areawide, regional, watershed, or basinwide urban water management planning where those plans will reduce preparation costs and contribute to the achievement of conservation and efficient water use.

(2) Each urban water supplier shall coordinate the preparation of its plan with other appropriate agencies in the area, including other water suppliers that share a common source, water management agencies, and relevant public agencies, to the extent practicable.

(e) The urban water supplier may prepare the plan with its own staff, by contract, or in cooperation with other governmental agencies.

(f) An urban water supplier shall describe in the plan water management tools and options used by that entity that will maximize resources and minimize the need to import water from other regions.

10621.

(a) Each urban water supplier shall update its plan at least once every five years on or before December 31, in years ending in five and zero.

(b) Every urban water supplier required to prepare a plan pursuant to this part shall notify any city or county within which the supplier provides water supplies that the urban water supplier will be reviewing the plan and considering amendments or changes to the plan. The urban water supplier may consult with, and obtain comments from, any city or county that receives notice pursuant to this subdivision.

(c) The amendments to, or changes in, the plan shall be adopted and filed in the manner set forth in Article 3 (commencing with Section 10640).

Article 2. Contents of Plans

10630. It is the intention of the Legislature, in enacting this part, to permit levels of water management planning commensurate with the numbers of customers served and the volume of water supplied.

10631. A plan shall be adopted in accordance with this chapter and shall do all of the following:

(a) Describe the service area of the supplier, including current and projected population, climate, and other demographic factors affecting the supplier's water management planning. The projected population estimates shall be based upon data from the state, regional, or local service agency population projections within the service area of the urban water supplier and shall be in five-year increments to 20 years or as far as data is available.

(b) Identify and quantify, to the extent practicable, the existing and planned sources of water available to the supplier over the same five-year increments described in subdivision (a). If groundwater is identified as an existing or planned source of water available to the supplier, all of the following information shall be included in the plan:

(1) A copy of any groundwater management plan adopted by the urban water supplier, including plans adopted pursuant to Part 2.75 (commencing with Section 10750), or any other specific authorization for groundwater management.

(2) A description of any groundwater basin or basins from which the urban water supplier pumps groundwater. For those basins for which a court or the board has adjudicated the rights to pump groundwater, a copy of the order or decree adopted by the court or the board and a description of the amount of groundwater the urban water supplier has the legal right to pump under the order or decree. For basins that have not been adjudicated, information as to whether the department has identified the basin or basins as overdrafted or has projected that the basin will become overdrafted if present management conditions continue, in the most current official departmental bulletin that characterizes the condition of the groundwater basin, and a detailed description of the efforts being undertaken by the urban water supplier to eliminate the long-term overdraft condition.

(3) A detailed description and analysis of the location, amount, and sufficiency of groundwater pumped by the urban water supplier for the past five years. The description and analysis shall be based on information that is reasonably available, including, but not limited to, historic use records.

(4) A detailed description and analysis of the amount and location of groundwater that is projected to be pumped by the urban water supplier. The description and analysis shall be based on information that is reasonably available, including, but not limited to, historic use records.

(c) Describe the reliability of the water supply and vulnerability to seasonal or climatic shortage, to the extent practicable, and provide data for each of the following:

(1) An average water year.

(2) A single dry water year.
(3) Multiple dry water years.
For any water source that may not be available at a consistent level of use, given specific legal, environmental, water quality, or climatic factors, describe plans to supplement or replace that source with alternative sources or water demand management measures, to the extent practicable.
(d) Describe the opportunities for exchanges or transfers of water on a short-term or long-term basis.
(e)
(1) Quantify, to the extent records are available, past and current water use, over the same five-year increments described in subdivision (a), and projected water use, identifying the uses among water use sectors including, but not necessarily limited to, all of the following uses:
(A) Single-family residential.
(B) Multifamily.
(C) Commercial.
(D) Industrial.
(E) Institutional and governmental.
(F) Landscape.
(G) Sales to other agencies.
(H) Saline water intrusion barriers, groundwater recharge, or conjunctive use, or any combination thereof.
(I) Agricultural.
(2) The water use projections shall be in the same five-year increments described in subdivision (a).
(f) Provide a description of the supplier's water demand management measures. This description shall include all of the following:
(1) A description of each water demand management measure that is currently being implemented, or scheduled for implementation, including the steps necessary to implement any proposed measures, including, but not limited to, all of the following:
(A) Water survey programs for single-family residential and multifamily residential customers.
(B) Residential plumbing retrofit.
(C) System water audits, leak detection, and repair.
(D) Metering with commodity rates for all new connections and retrofit of existing connections.
(E) Large landscape conservation programs and incentives.
(F) High-efficiency washing machine rebate programs.
(G) Public information programs.
(H) School education programs.
(I) Conservation programs for commercial, industrial, and institutional accounts.
(J) Wholesale agency programs.
(K) Conservation pricing.
(L) Water conservation coordinator.
(M) Water waste prohibition.
(N) Residential ultra-low-flush toilet replacement programs.
(2) A schedule of implementation for all water demand management measures proposed or described in the plan.
(3) A description of the methods, if any, that the supplier will use to evaluate the effectiveness of water demand management measures implemented or described under the plan.
(4) An estimate, if available, of existing conservation savings on water use within the supplier's service area, and the effect of the savings on the supplier's ability to further reduce demand.
(g) An evaluation of each water demand management measure listed in paragraph (1) of subdivision (f) that is not currently being implemented or scheduled for implementation. In the course of the evaluation, first consideration shall be given to water demand management measures, or combination of measures, that offer lower incremental costs than expanded or additional water supplies. This evaluation shall do all of the following:

(1) Take into account economic and noneconomic factors, including environmental, social, health, customer impact, and technological factors.
(2) Include a cost-benefit analysis, identifying total benefits and total costs.
(3) Include a description of funding available to implement any planned water supply project that would provide water at a higher unit cost.
(4) Include a description of the water supplier's legal authority to implement the measure and efforts to work with other relevant agencies to ensure the implementation of the measure and to share the cost of implementation.

(h) Include a description of all water supply projects and water supply programs that may be undertaken by the urban water supplier to meet the total projected water use as established pursuant to subdivision (a) of Section 10635. The urban water supplier shall include a detailed description of expected future projects and programs, other than the demand management programs identified pursuant to paragraph (1) of subdivision (f), that the urban water supplier may implement to increase the amount of the water supply available to the urban water supplier in average, single-dry, and multiple-dry water years. The description shall identify specific projects and include a description of the increase in water supply that is expected to be available from each project. The description shall include an estimate with regard to the implementation timeline for each project or program.

(i) Urban water suppliers that are members of the California Urban Water Conservation Council and submit annual reports to that council in accordance with the "Memorandum of Understanding Regarding Urban Water Conservation in California," dated September 1991, may submit the annual reports identifying water demand management measures currently being implemented, or scheduled for implementation, to satisfy the requirements of subdivisions (f) and (g).

(j) Urban water suppliers that rely upon a wholesale agency for a source of water, shall provide the wholesale agency with water use projections from that agency for that source of water in five-year increments to 20 years or as far as data is available. The wholesale agency shall provide information to the urban water supplier for inclusion in the urban water supplier's plan that identifies and quantifies, to the extent practicable, the existing and planned sources of water as required by subdivision (b), available from the wholesale agency to the urban water supplier over the same five-year increments, and during various water-year types in accordance with subdivision (c). An urban water supplier may rely upon water supply information provided by the wholesale agency in fulfilling the plan informational requirements of subdivisions (b) and (c).

10631.5. The department shall take into consideration whether the urban water supplier is implementing or scheduled for implementation, the water demand management activities that the urban water supplier identified in its urban water management plan, pursuant to Section 10631, in evaluating applications for grants and loans made available pursuant to Section 79163. The urban water supplier may submit to the department copies of its annual reports and other relevant documents to assist the department in determining whether the urban water supplier is implementing or scheduling the implementation of water demand management activities.

10632. The plan shall provide an urban water shortage contingency analysis which includes each of the following elements which are within the authority of the urban water supplier:

(a) Stages of action to be undertaken by the urban water supplier in response to water supply shortages, including up to a 50 percent reduction in water supply, and an outline of specific water supply conditions which are applicable to each stage.

(b) An estimate of the minimum water supply available during each of the next three water years based on the driest three-year historic sequence for the agency's water supply.

(c) Actions to be undertaken by the urban water supplier to prepare for, and implement during, a catastrophic interruption of water supplies including, but not limited to, a regional power outage, an earthquake, or other disaster.

(d) Additional, mandatory prohibitions against specific water use practices during water shortages, including, but not limited to, prohibiting the use of potable water for street cleaning.

(e) Consumption reduction methods in the most restrictive stages. Each urban water supplier may use any type of consumption reduction methods in its water shortage contingency analysis that would reduce water use, are appropriate for its area, and have the ability to achieve a water use reduction consistent with up to a 50 percent reduction in water supply.
(f) Penalties or charges for excessive use, where applicable.
(g) An analysis of the impacts of each of the actions and conditions described in subdivisions (a) to (f), inclusive, on the revenues and expenditures of the urban water supplier, and proposed measures to overcome those impacts, such as the development of reserves and rate adjustments.
(h) A draft water shortage contingency resolution or ordinance.
(i) A mechanism for determining actual reductions in water use pursuant to the urban water shortage contingency analysis.
10633. The plan shall provide, to the extent available, information on recycled water and its potential for use as a water source in the service area of the urban water supplier. The preparation of the plan shall be coordinated with local water, wastewater, groundwater, and planning agencies that operate within the supplier's service area, and shall include all of the following:
(a) A description of the wastewater collection and treatment systems in the supplier's service area, including a quantification of the amount of wastewater collected and treated and the methods of wastewater disposal.
(b) A description of the recycled water currently being used in the supplier's service area, including, but not limited to, the type, place, and quantity of use.
(c) A description and quantification of the potential uses of recycled water, including, but not limited to, agricultural irrigation, landscape irrigation, wildlife habitat enhancement, wetlands, industrial reuse, groundwater recharge, and other appropriate uses, and a determination with regard to the technical and economic feasibility of serving those uses.
(d) The projected use of recycled water within the supplier's service area at the end of 5, 10, 15, and 20 years, and a description of the actual use of recycled water in comparison to uses previously projected pursuant to this subdivision.
(e) A description of actions, including financial incentives, which may be taken to encourage the use of recycled water, and the projected results of these actions in terms of acre-feet of recycled water used per year.
(f) A plan for optimizing the use of recycled water in the supplier's service area, including actions to facilitate the installation of dual distribution systems, to promote recirculating uses, to facilitate the increased use of treated wastewater that meets recycled water standards, and to overcome any obstacles to achieving that increased use.
10634. The plan shall include information, to the extent practicable, relating to the quality of existing sources of water available to the supplier over the same five-year increments as described in subdivision (a) of Section 10631, and the manner in which water quality affects water management strategies and supply reliability.

Article 2.5 Water Service Reliability

10635.
(a) Every urban water supplier shall include, as part of its urban water management plan, an assessment of the reliability of its water service to its customers during normal, dry, and multiple dry water years. This water supply and demand assessment shall compare the total water supply sources available to the water supplier with the total projected water use over the next 20 years, in five-year increments, for a normal water year, a single dry water year, and multiple dry water years. The water service reliability assessment shall be based upon the information compiled pursuant to Section 10631, including available data from state, regional, or local agency population projections within the service area of the urban water supplier.
(b) The urban water supplier shall provide that portion of its urban water management plan prepared pursuant to this article to any city or county within which it provides water supplies no later than 60 days after the submission of its urban water management plan.

(c) Nothing in this article is intended to create a right or entitlement to water service or any specific level of water service.
(d) Nothing in this article is intended to change existing law concerning an urban water supplier's obligation to provide water service to its existing customers or to any potential future customers.

Articl 3. Adoption and Implementation of Plans

10640. Every urban water supplier required to prepare a plan pursuant to this part shall prepare its plan pursuant to Article 2 (commencing with Section 10630). The supplier shall likewise periodically review the plan as required by Section 10621, and any amendments or changes required as a result of that review shall be adopted pursuant to this article.

10641. An urban water supplier required to prepare a plan may consult with, and obtain comments from, any public agency or state agency or any person who has special expertise with respect to water demand management methods and techniques.

10642. Each urban water supplier shall encourage the active involvement of diverse social, cultural, and economic elements of the population within the service area prior to and during the preparation of the plan. Prior to adopting a plan, the urban water supplier shall make the plan available for public inspection and shall hold a public hearing thereon. Prior to the hearing, notice of the time and place of hearing shall be published within the jurisdiction of the publicly owned water supplier pursuant to Section 6066 of the Government Code. The urban water supplier shall provide notice of the time and place of hearing to any city or county within which the supplier provides water supplies. A privately owned water supplier shall provide an equivalent notice within its service area. After the hearing, the plan shall be adopted as prepared or as modified after the hearing.

10643. An urban water supplier shall implement its plan adopted pursuant to this chapter in accordance with the schedule set forth in its plan.

10644.

(a) An urban water supplier shall file with the department and any city or county within which the supplier provides water supplies a copy of its plan no later than 30 days after adoption. Copies of amendments or changes to the plans shall be filed with the department and any city or county within which the supplier provides water supplies within 30 days after adoption.

(b) The department shall prepare and submit to the Legislature, on or before December 31, in the years ending in six and one, a report summarizing the status of the plans adopted pursuant to this part. The report prepared by the department shall identify the outstanding elements of the individual plans. The department shall provide a copy of the report to each urban water supplier that has filed its plan with the department. The department shall also prepare reports and provide data for any legislative hearings designed to consider the effectiveness of plans submitted pursuant to this part.

10645. Not later than 30 days after filing a copy of its plan with the department, the urban water supplier and the department shall make the plan available for public review during normal business hours.

CHAPTER 4. MISCELLANEOUS PROVISIONS

10650. Any actions or proceedings to attack, review, set aside, void, or annul the acts or decisions of an urban water supplier on the grounds of noncompliance with this part shall be commenced as follows:

(a) An action or proceeding alleging failure to adopt a plan shall be commenced within 18 months after that adoption is required by this part.

(b) Any action or proceeding alleging that a plan, or action taken pursuant to the plan, does not comply with this part shall be commenced within 90 days after filing of the plan or amendment thereto pursuant to Section 10644 or the taking of that action.

10651. In any action or proceeding to attack, review, set aside, void, or annul a plan, or an action taken pursuant to the plan by an urban water supplier on the grounds of noncompliance with this part, the inquiry shall extend only to whether there was a prejudicial abuse of discretion. Abuse of discretion is established if the supplier has not proceeded in a manner required by law or if the action by the water supplier is not supported by substantial evidence.

10652. The California Environmental Quality Act (Division 13 (commencing with Section 21000) of the Public Resources Code) does not apply to the preparation and adoption of plans pursuant to this part or to the implementation of actions taken pursuant to Section 10632. Nothing in this part shall be interpreted as exempting from the California Environmental Quality Act any project that would significantly affect water supplies for fish and wildlife, or any project for implementation of the plan, other than projects implementing Section 10632, or any project for expanded or additional water supplies.

10653. The adoption of a plan shall satisfy any requirements of state law, regulation, or order, including those of the State Water Resources Control Board and the Public Utilities Commission, for the preparation of water management plans or conservation plans; provided, that if the State Water Resources Control Board or the Public Utilities Commission requires additional information concerning water conservation to implement its existing authority, nothing in this part shall be deemed to limit the board or the commission in obtaining that information. The requirements of this part shall be satisfied by any urban water demand management plan prepared to meet federal laws or regulations after the effective date of this part, and which substantially meets the requirements of this part, or by any existing urban water management plan which includes the contents of a plan required under this part.

10654. An urban water supplier may recover in its rates the costs incurred in preparing its plan and implementing the reasonable water conservation measures included in the plan. Any best water management practice that is included in the plan that is identified in the "Memorandum of Understanding Regarding Urban Water Conservation in California" is deemed to be reasonable for the purposes of this section.

10655. If any provision of this part or the application thereof to any person or circumstances is held invalid, that invalidity shall not affect other provisions or applications of this part which can be given effect without the invalid provision or application thereof, and to this end the provisions of this part are severable.

10656. An urban water supplier that does not prepare, adopt, and submit its urban water management plan to the department in accordance with this part, is ineligible to receive funding pursuant to Division 24 (commencing with Section 78500) or Division 26 (commencing with Section 79000), or receive drought assistance from the state until the urban water management plan is submitted pursuant to this article.

10657.

(a) The department shall take into consideration whether the urban water supplier has submitted an updated urban water management plan that is consistent with Section 10631, as amended by the act that adds this section, in determining whether the urban water supplier is eligible for funds made available pursuant to any program administered by the department.

(b) This section shall remain in effect only until January 1, 2006, and as of that date is repealed, unless a later enacted statute, that is enacted before January 1, 2006, deletes or extends that date.

Appendix D
Other Resources

- California Environmental Quality Act - http://ceres.ca.gov/ceqa/
- Governor's Office of Planning and Research Planning, Zoning and Development Laws 2000 - http://www.opr.ca.gov/publications/PublicationsIndex.shtml#pubs-P
- California Land Use Planning Information Network - http://ceres.ca.gov/planning/
- The Governor's Office of Planning and Research - http://www.opr.ca.gov/
- US Bureau of Reclamation Lower Colorado Regional Office - http://www.usbr.gov/lc/region/
- US Bureau of Reclamation Mid-Pacific Region - http://www.usbr.gov/mp/
- California Department of Water Resources-Bay Delta Office State Water Project Delivery Reliabilty Report - http://swpdelivery.water.ca.gov/
- Metropolitan Water District of Southern California - http://www.mwdh2o.com/
- California Department of Water Resources Division of Planning and Local Assistance-Groundwater Management in California - http://wwwdpla.water.ca.gov/cgi-bin/supply/gw/management/hq/main.pl
- Governors Office of Planning and Research General Plan Guidelines - http://www.opr.ca.gov/

Original Notice of Preparation and Initial Study

NOTICE OF PREPARATION

TO: State Clearinghouse
Office of Planning Research
P.O. Box 3044
Sacramento, CA 95812-3044

FROM: City of Santa Clarita
23920 Valencia Blvd., Suite 300
Santa Clarita, CA 91355

SUBJECT: **Notice of Preparation of Draft Environmental Impact Report**

The City of Santa Clarita will be the lead agency and will prepare an Environmental Impact Report for the project identified below. We need to know the views of your agency as to the scope and content of the environmental information which is germane to your agency's statutory responsibilities in connection with the proposed project. Your agency will need to use the EIR prepared by our agency when considering your permit or other approval for the project.

The project description, location, and the probable environmental effects are contained in the attached materials. A copy of the Initial Study is attached.

Due to the time limits mandated by State law, your response must be sent at the earliest possible date, but not later than 30 days after receipt of this notice.

Please send your written response to Jeff Hogan, Associate Planner or Wendy Deats, Assistant Planner II at the address shown above. We would appreciate the name of a contact person in your agency.

Project Title: Riverpark (Panhandle); Tentative Tract Map 53425

Project Applicant: Newhall Land and Farming Company

Date: September 16, 2002 WDeats

Title: Wendy Deats, Assistant Planner II

Telephone: (661) 255-4330

Reference: California Administrative Code, Title 14, Sections 15082(a), 15103, 15375.

s:\pbs\current\!2002\02-175\nop

NOTICE OF COMPLETION

Mail to: State Clearinghouse, 1400 Tenth Street, Sacramento, CA 95814 916/445-0613

See NOTE below
SCH #

Project Title: Riverpark
Lead Agency: City of Santa Clarita Contact Person: Jeff Hogan/Wendy Deats
Street Address: 23920 Valencia Boulevard, Suite 300 Phone: (661) 255-4330
City: Santa Clarita Zip: 91355 County: Los Angeles

Project Location
County: Los Angeles City/Nearest Community: Santa Clarita
Cross Streets: East of Bouquet Canyon, north of Soledad Canyon Road
Total Acres: 664.3
Assessor's Parcel No. Section: Twp. Range: Base:
Within 2 Miles: State Hwy #: Waterways:
Airports: Railways: Schools: Bridgeport Elementary is located to the west, Emblem Elementary is located to the northwest, Continuation High School, Academy of the Canyon High School and Passport High School are located to the southeast of the project site.

Document Type

CEQA:		NEPA:	
X NOP	___ Supplement/Subsequent	___ NOI	___ Joint Document
___ Early Cons	___ EIR (Prior SCH No.)	___ EA	___ Final Document
___ Neg Dec	___ Other	___ Draft EIS	___ Other
___ Draft EIR		___ FONSI	

Local Action Type

___ General Plan Update	___ Specific Plan	X Rezone	___ Annexation
X General Plan Amendment	___ Master Plan	___ Prezone	___ Redevelopment
___ General Plan Element	___ Planned Unit Develop.	X Use Permit	___ Coastal Permit
___ Community Plan	___ Site Plan	X Land Division (Subdiv., Parcel Map, Tract Map, etc.)	X Other Oak Tree Permit and Hillside Review

Development Type

X Residential:	*Units* 1152 *Acres* 335	___ Water Facilities:	*Type* *MGD*
___ Office:	*Sq.ft.* *Acres* *Employees*	___ Transportation:	*Type*
___ Commercial:	*Sq.ft.* *Acres* *Employees*	___ Mining:	*Mineral*
___ Industrial:	*Sq.ft.* *Acres* *Employees*	___ Power:	*Type* *Watts*
___ Educational		___ Waste Treatment:	*Type*
___ Recreational		___ Hazardous Waste:	*Type*
		___ Other:	

Project Issues Discussed in Document

X Aesthetic/Visual	X Flood Plain/Flooding	X Schools/Universities	X Water Quality
___ Agricultural Land	X Forest Land/Fire Haz	___ Septic Systems	X Water Supply/Grndwtr
X Air Quality	X Geologic/Seismic	X Sewer Capacity	X Wetland/Riparian
X Archaeolog/Historical	X Minerals	X Soil Erosion/Cmp/Grdg	X Wildlife
___ Coastal Zone	X Noise	X Solid Waste	X Growth Inducing
X Drainage/Absorption	___ Pop/Housing Balance	X Toxic/Hazardous	X Land Use
___ Economic/Jobs	X Public Serv/Facilities	X Traffic/Circulation	X Cumulative Effects
___ Fiscal	X Recreation/Parks	X Vegetation	___ Other

Present Land Use/Zoning/General Plan Use: The current zoning of the project site is industrial Commercial (IC), Commercial Office Planned Development (CO PD), Community Commercial Planned Development (CC PD), and Mobile Home Park (MHP). The General Plan Land Use for the site is General Plan Valley Center Concept.

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Project Description: The project proposal includes the development of 590 apartments, 84 townhouses and ~~478~~ single-family dwellings. A 29-acre park is also proposed along the Santa Clara River. Approximately 300-acres of river area located within the project boundary will remain in a natural state with the exception of the future construction of Newhall Ranch Road and bank stabilization work. Development of the site will require 5.5 million cubic yards of grading which will be balanced onsite. The grading is required for the construction of the project as well as the future Newhall Ranch Road and Golden Valley Road Bridge project.

NOTE: Clearinghouse will assign identification numbers for all new projects. If a SCH number already exists for a project (e.g., from a Notice of Preparation or previous draft document), please fill it in.

Reviewing Agencies Checklist

KEY
S = Document sent by lead agency
X = Document sent by SCH
3 = Suggested distribution

___**Resources Agency**
___Boating & Waterways
___Coastal Commission
___Coastal Conservancy
___Colorado River Board
___Conservation
___Fish & Game
___Forestry
___Office of Historic Preservation
___Parks & Recreation
___Reclamation
___S.F. Bay Conservation & Development Commission
___Water Resources (DWR)

Business, Transportation & Housing
___Aeronautics
___California Highway Patrol
___Caltrans District #_____
___Department of Transportation Planning (headquarters)
___Housing & Community Development
___Food & Agriculture

Health & Welfare
___Health Services _____

State & Consumer Services
___General Services
___OLA (Schools)

Environmental Affairs
___Air Resources Board
___APCD/AQMD
___California Waste Management Board
___SWRCB: Clean Water Grants
___SWRCB: Delta Unit
___SWRCB: Water Quality
___SWRCB: Water Rights
___Regional WQCB #_____

Youth & Adult Corrections
___Corrections

Independent Commissions & Offices
___Energy Commission
___Native American Heritage Commission
___Public Utilities Commission
___Santa Monica Mountains Conservancy
___State Lands Commission
___Tahoe Regional Planning Agency

___Other _____

Public Review Period (to be filled in by lead agency)

Starting Date September 18, 2002 Ending Date October 18, 2002

Signature _____ Date 9.16.02

Lead Agency (Complete if applicable):	**For SCH Use Only:**
Consulting Firm: Impact Sciences Address: 30343 Canwood Street City/State/Zip: Agoura Hills, CA. 91301 Contact: Susan Tebo Phone: (818) 879-1100	Date Received at SCH _____ Date Review Starts _____ Date to Agencies _____ Date to SCH _____ Clearance Date _____
Applicant: The Newhall Land and Farming Company/Glenn Adamick Address: 23823 Valencia Boulevard City/State/Zip: Valencia, CA 91355-2194 Phone: ( ) (661) 255-4003	***Notes:***

INITIAL STUDY
CITY OF SANTA CLARITA

Lead Agency:

City of Santa Clarita
23920 Valencia Boulevard, Suite 300
Santa Clarita, California 91355

Contact Person & Phone Number:

Jeff Hogan, Associate Planner
Wendy Deats, Assistant Planner II
City of Santa Clarita
Department of Planning and Building Services
23920 Valencia Boulevard
Santa Clarita, California 93155
(661) 255-4330

Master Case:

MC 02-175; Tentative Tract Map 53425; General Plan Amendment 02-002; Zone Change 02-002; Conditional Use Permit 02-009; Hillside Review 02-003; and Oak Tree Permit 02-025

Project Introduction:

The applicant, The Newhall Land and Farming Company, proposes the future development of a 664.3-acre site at the terminus of Newhall Ranch Road, east of Bouquet Canyon Road between the Castaic Lake Water Agency property and the Santa Clara River, north of Soledad Canyon Road. The proposal is titled Riverpark is located within the General Plan Valley Center Concept (VCC) overlay area and includes the development of 590 apartments, 84 townhouses and ~~478~~ 425 single-family dwellings. A 29-acre park is also proposed along the Santa Clara River and approximately 300 acres of river area will remain in a natural state with the exception of the future construction of Newhall Ranch Road and the bank stabilization work. The current zoning of the project site is: 21.3 acres of Industrial Commercial (IC); 201 acres of Commercial Office Planned Development (CO PD); 131.6 acres of Community Commercial Planned Development (CC PD) and 38.3 acres of Mobile Home Park (MHP). The remaining 272.1 acres is within the Residential Medium zone. The applicant is proposing to change the zoning of the site to Residential Medium (RM) with a Planned Development (PD) overlay and Open Space (OS). The site will require 5.5 million cubic yards of grading which will be balanced on-site. The grading is required for construction of the project, as well as, the future Newhall Ranch Road and Golden Valley Road Bridge. A separate EIR is being prepared by the City of Santa Clarita for these roadways.

Bank stabilization will be constructed along the Santa Clara River for approximately 1,500 linear feet for the east-west extension of Newhall Ranch Road and approximately 4,150 linear feet for the project development.

Project Description:

The applicant proposes to develop six parcels of land totaling 664.3 acres of land for single- and multi-family uses. A tentative tract map is required to subdivide the six lots into ~~478~~ 425 single-family lots, 15 multi-family lots and other lots for utilities and open space. A General Plan Amendment will change the land use designations of

the project site to Residential Medium and Open Space. A zone change will change the zoning designations of the site to Residential Medium with a Planned Development overlay (RM PD) and Open Space (OS). Residential Medium will permit a density up to 11 dwellings per acre. A conditional use permit is required to permit cluster development and the hillside development review is for development on slopes with an average cross slope of greater than 10%. The oak tree permit is required for the removal of 25 of the 87 oak trees on site.

Project Location:

The Riverpark area is 664.3 acres in area and is located at the terminus of Newhall Ranch Road, east of Bouquet Canyon Road, north of Soledad Canyon Road, adjacent to the Santa Clara River.

General Plan/Zoning Designation:

The General Plan designations of the subject sites are Residential Medium, Industrial Commercial, Community Commercial, Commercial Office and Mobile Home Park. In addition, the site is located within the Valley Center Concept (VCC) overlay. The zoning of the project sites include Industrial Commercial (IC), Residential Medium (RM), Commercial Office with a Planned Development overlay (CO PD), Community Commercial with a Planned Development overlay (CC PD) and Mobile Home Park (MHP). The applicant is proposing to change the zoning to Residential Medium Planned Development (RM PD) and Open Space (OS).

Project Applicant:

Newhall Land and Farming Company
23823 Valencia Boulevard
Valencia, California 91355
Attn: Glenn Adamick (661) 255-4003

Surrounding Land Uses and Setting:

The Riverpark site incorporates approximately 664.3 acres of land east of Bouquet Canyon, north of Soledad Canyon Road along the Santa Clara River. Both Bouquet Canyon Road and Soledad Canyon Road are major arterials though the center of the City. Open space borders the site to the north, the Santa Clara River borders the site to the south, vacant land borders to the site to the east and commercial uses border the site to the west. The site is located in the center of the City with community of Saugus to the north and west, the community of Canyon Country to the east and the Porta Bella Specific Plan to the south across Soledad Canyon Road.

Other public agencies whose approval is required (e.g. permits, financing approval, or participation agreement):

Army Corps of Engineers, U.S. Fish and Wildlife Services, California Department of Transportation, California Department of Fish & Game, Castaic Lake Water Agency, Metropolitan Transportation Authority

ENVIRONMENTAL FACTORS POTENTIALLY AFFECTED

The environmental factors checked below would be affected by this project, involving at least one impact that is a **"Potentially Significant Impact"** or **"Potentially Significant Impacts Unless Mitigation Measures Incorporated"** as indicated by the checklist on the following pages.

[X]	Land Use and Planning	[X]	Transportation/ Circulation	[X]	Public Services
[X]	Population and Housing	[X]	Biological Resources	[X]	Recreation
[X]	Geological Problems	[X]	Noise	[X]	Aesthetics
[X]	Water	[X]	Hazards	[X]	Cultural Resources
[X]	Stormwater Management & Recycling	[X]	Mandatory Tests of Significance	[X]	Utilities and Service System
[X]	Air Quality	[X]	Energy and Mineral Resources		

DETERMINATION:

On the basis of this initial evaluation:

[ ] I find that the proposed project COULD NOT have a significant effect on the environment, and a NEGATIVE DECLARATION will be prepared.

[ ] I find that although the proposed project could have a significant effect on the environment, there will not be a significant effect in this case because the mitigation measures described on an attached sheet have been added to the project. A NEGATIVE DECLARATION will be prepared.

[X] I find that the proposed project MAY have a significant impact on the environment, and an ENVIRONMENTAL IMPACT REPORT is required.

[ ] I find that the proposed project MAY have a significant effect(s) on the environment, but at least one effect 1) has been mitigated adequately in an earlier document pursuant to applicable legal standards, and 2) has been addressed by mitigation measures based on the earlier analysis as described on attached sheets, if the effect is a "potentially significant impact" or "potentially significant unless mitigated." An ENVIRONMENTAL IMPACT REPORT, but it must analyze only the effects that remain to be addressed.

[ ] I find that although the proposed project could have a significant effect on the environment, there WILL NOT be a significant effect in this case because all potentially significant effects (a) have been analyzed adequately in an earlier EIR pursuant to applicable standards, and (b) have been avoided or mitigated pursuant to that earlier EIR, including revisions or mitigation measures that are imposed upon the proposed project.

Prepared By:

(Signature)	Wendy Deats Assistant Planner II	(Date)

Approved By:

(Signature)	Jeff Hogan Associate Planner	(Date)

ENVIRONMENTAL IMPACTS:

		Potentially Significant Impact	Potentially Significant Impact Unless Mitigation Incorporated	Less than Significant Impact	No Impact
I.	**LAND USE AND PLANNING. Would the proposal:**				
a)	Conflict with General Plan designation or zoning?	[X]	[ ]	[ ]	[ ]
b)	Conflict with applicable environmental plans or policies adopted by agencies with jurisdiction over the project?	[ ]	[X]	[ ]	[ ]
c)	Be incompatible with existing land use in the city?	[ ]	[X]	[ ]	[ ]
d)	Disrupt or divide the physical arrangement of an established community (including a low-income or minority community)?	[ ]	[ ]	[ ]	[X]
e)	Affect a Significant Ecological Area (SEA)?	[X]	[ ]	[ ]	[ ]
f)	Other_____	[ ]	[ ]	[ ]	[ ]
II.	**POPULATION AND HOUSING. Would the proposal:**				
a)	Cumulatively exceed official regional or local population projections?	[ ]	[ ]	[X]	[ ]
b)	Create a net loss of jobs?	[ ]	[ ]	[X]	[ ]
c)	Displace existing housing, especially affordable housing?	[ ]	[ ]	[ ]	[X]
d)	Other_____	[ ]	[ ]	[ ]	[ ]
III.	**GEOLOGIC PROBLEMS. Will the proposal result in:**				
a)	Unstable earth conditions or in changes in geologic substructures?	[X]	[ ]	[ ]	[ ]
b)	Disruptions, displacements, compaction or overcovering of the soil?	[X]	[ ]	[ ]	[ ]

		Potentially Significant Impact	Potentially Significant Impact Unless Mitigation Incorporated	Less than Significant Impact	No Impact
c)	Change in topography or ground surface relief features?	[X]	[ ]	[ ]	[ ]
d)	The destruction, covering or modification of any unique geologic or physical features?	[ ]	[ ]	[X]	[ ]
e)	Any increase in wind or water erosion of soils, either on or off the site?	[X]	[ ]	[ ]	[ ]
f)	Exposure of people or property to geologic hazards such as earthquakes, landslides, mudslides, ground failure, or similar hazards?	[X]	[ ]	[ ]	[ ]
g)	Changes in deposition, erosion or siltation?	[X]	[ ]	[ ]	[ ]
h)	Other modification of a wash, channel, creek, or river?	[X]	[ ]	[ ]	[ ]
i)	Earth movement (cut and/or fill) of 10,000 cubic yards or more?	[X]	[ ]	[ ]	[ ]
j)	Development and/or grading on a slope greater than 25% natural grade?	[X]	[ ]	[ ]	[ ]
k)	Development within the Alquist-Priolo Special Studies Zone?	[ ]	[ ]	[ ]	[X]
l)	Other_____	[ ]	[ ]	[ ]	[ ]
IV.	**WATER. Would the proposal result in:**				
a)	Changes in absorption rates, drainage patterns, or the rate and amount of surface runoff?	[X]	[ ]	[ ]	[ ]
b)	Exposure of people or property to water related hazards such as flooding?	[X]	[ ]	[ ]	[ ]
c)	Discharge into surface waters or other alteration of surface water quality (e.g. temperature, dissolved oxygen, or	[X]	[ ]	[ ]	[ ]

		Potentially Significant Impact	Potentially Significant Impact Unless Mitigation Incorporated	Less than Significant Impact	No Impact
	turbidity)				
d)	Changes in the amount of surface water in any water body?	[X]	[ ]	[ ]	[ ]
e)	Changes in currents, or the course of direction of water movements?	[X]	[ ]	[ ]	[ ]
f)	Changes in the quantity of ground waters, either through direct additions or withdrawals, or through interception of an aquifer by cuts or excavations or through substantial loss of groundwater recharge capability?	[X]	[ ]	[ ]	[ ]
g)	Altered direction or rate of flow of groundwater?	[X]	[ ]	[ ]	[ ]
h)	Impacts to groundwater quality?	[X]	[ ]	[ ]	[ ]
i)	Substantial reduction in the amount of groundwater otherwise available for public water supplies?	[X]	[ ]	[ ]	[ ]
j)	Other_____	[ ]	[ ]	[ ]	[ ]
V.	**STORMWATER MANAGEMENT AND RECYCLING.** **Would the proposal result in:**				
a)	Would the proposed project result in storm water system discharges from areas for materials storage, vehicle or equipment fueling, vehicle or equipment maintenance (including washing), waste handling, hazardous materials handling or storage, delivery areas or loading docks, or other outdoor work areas?	[ ]	[X]	[ ]	[ ]
b)	Would the proposed project result in a significant environmentally harmful increase in the flow rate or volume of the project site or surrounding areas?	[ ]	[X]	[ ]	[ ]
c)	Would the proposed project result in storm water discharges that would significantly impair the beneficial uses of receiving waters or areas that provide	[X]	[ ]	[ ]	[ ]

		Potentially Significant Impact	Potentially Significant Impact Unless Mitigation Incorporated	Less than Significant Impact	No Impact
	water quality benefits (e.g., riparian corridors, wetlands, etc.)?				
d)	Would the proposed project cause harm to the biological integrity of drainage systems and water bodies?	[X]	[ ]	[ ]	[ ]
e)	Does the proposed project include provisions for the separation and reuse of materials?	[ ]	[ ]	[ ]	[X]
VI.	**AIR QUALITY. Would the proposal:**				
a)	Violate any air quality standard or contribute to an existing or projected air quality violation?	[X]	[ ]	[ ]	[ ]
b)	Expose sensitive receptors to pollutants?	[ ]	[X]	[ ]	[ ]
c)	Create objectionable odors?	[ ]	[X]	[ ]	[ ]
d)	Other_____	[ ]	[ ]	[ ]	[ ]
VII.	**TRANSPORTATION/CIRCULATION. Would the proposal result in:**				
a)	Increased vehicle trips or traffic congestion?	[X]	[ ]	[ ]	[ ]
b)	Hazards to safety from design features (e.g. sharp curves or dangerous intersections) or incompatible uses?	[ ]	[ ]	[ ]	[X]
c)	Inadequate emergency access or access to nearby uses?	[ ]	[X]	[ ]	[ ]
d)	Insufficient parking capacity onsite or offsite?	[ ]	[ ]	[ ]	[X]
e)	Hazards or barriers for pedestrians or bicyclists?	[ ]	[ ]	[ ]	[X]
f)	Conflicts with adopted policies supporting alternative transportation (e.g. bus stops, bicycle racks)?	[ ]	[ ]	[ ]	[X]
g)	Disjointed pattern of roadway	[ ]	[ ]	[X]	[ ]

		Potentially Significant Impact	Potentially Significant Impact Unless Mitigation Incorporated	Less than Significant Impact	No Impact
	improvements				
h)	Other_____	[ ]	[ ]	[ ]	[ ]
VIII.	**BIOLOGICAL RESOURCES. Would the proposal result in impacts to:**				
a)	Endangered, threatened or rare species or their habitats (including but not limited to plants, fish, insects, animals, and birds)?	[X]	[ ]	[ ]	[ ]
b)	Oak trees?	[X]	[ ]	[ ]	[ ]
c)	Wetland habitat or blueline stream?	[X]	[ ]	[ ]	[ ]
d)	Wildlife dispersal or migration corridors?	[X]	[ ]	[ ]	[ ]
e)	Other: Bank Stabilization	[X]	[ ]	[ ]	[ ]
IX.	**ENERGY AND MINERAL RESOURCES. Would the proposal:**				
a)	Conflict with adopted energy conservation plans?	[ ]	[X]	[ ]	[ ]
b)	Use nonrenewable resources in a wasteful and inefficient manner?	[ ]	[ ]	[ ]	[X]
c)	Result in the loss of availability of a known mineral resource that would be of future value to the region and the residents of the State?	[ ]	[X]	[ ]	[ ]
d)	Other_____	[ ]	[ ]	[ ]	[ ]
X.	**HAZARDS. Would the proposal involve:**				
a)	A risk of accidental explosion or release of hazardous substances (including but not limited to oil, pesticides, chemicals, or radiation)?	[ ]	[X]	[ ]	[ ]
b)	Possible interference with an emergency response plan or	[ ]	[X]	[ ]	[ ]

		Potentially Significant Impact	Potentially Significant Impact Unless Mitigation Incorporated	Less than Significant Impact	No Impact
	emergency evacuation plan?				
c)	The creation of any health hazard or potential health hazard?	[ ]	[ ]	[ ]	[X]
d)	Exposure of people to existing sources of potential health hazards (e.g. electrical transmission lines, gas lines, oil pipelines)?	[X]	[ ]	[ ]	[ ]
e)	Increased fire hazard in areas with flammable brush, grass, or trees?	[ ]	[X]	[ ]	[ ]
f)	Other_____	[ ]	[ ]	[ ]	[ ]
XI.	NOISE. Would the proposal result in:				
a)	Increases in existing noise levels?	[X]	[ ]	[ ]	[ ]
b)	Exposure of people to severe noise levels or vibration?	[ ]	[X]	[ ]	[ ]
c)	Other_____	[ ]	[ ]	[ ]	[ ]
XII.	**PUBLIC SERVICES. Would the proposal have an effect on, or result in a need for new or altered government services in any of the following areas:**				
a)	Fire protection?	[X]	[ ]	[ ]	[ ]
b)	Police protection?	[X]	[ ]	[ ]	[ ]
c)	Schools?	[X]	[ ]	[ ]	[ ]
d)	Maintenance of pubic facilities, including roads?	[X]	[ ]	[ ]	[ ]
e)	Other government services?	[X]	[ ]	[ ]	[ ]
XIII.	**UTILITIES.**				
Would the proposal result in a need for new systems or supplies, or substantial alterations to the following utilities:					
a)	Power or natural gas?	[X]	[ ]	[ ]	[ ]

		Potentially Significant Impact	Potentially Significant Impact Unless Mitigation Incorporated	Less than Significant Impact	No Impact
b)	Communications systems?	[X]	[ ]	[ ]	[ ]
c)	Local or regional water treatment or distribution facilities?	[X]	[ ]	[ ]	[ ]
d)	Sewer or septic tanks?	[X]	[ ]	[ ]	[ ]
e)	Storm water drainage?	[X]	[ ]	[ ]	[ ]
f)	Solid waste disposal?	[X]	[ ]	[ ]	[ ]
g)	Local or regional water supplies?	[X]	[ ]	[ ]	[ ]
h)	Other_____	[ ]	[ ]	[ ]	[ ]
XIV. AESTHETICS. Would the proposal:					
a)	Affect a scenic vista open to public view?	[X]	[ ]	[ ]	[ ]
b)	Have a negative aesthetic effect?	[X]	[ ]	[ ]	[ ]
c)	Create light or glare?	[X]	[ ]	[ ]	[ ]
d)	Other_____	[ ]	[ ]	[ ]	[ ]
XV. CULTURAL RESOURCES. Would the proposal:					
a)	Disturb paleontological or archaeological resources?	[X]	[ ]	[ ]	[ ]
b)	Have the potential to cause a physical change which would affect unique ethnic cultural values?	[ ]	[X]	[ ]	[ ]
c)	Restrict existing religious or sacred uses within the potential impact area?	[ ]	[ ]	[ ]	[X]
d)	Affect a recognized historical site?	[X]	[ ]	[ ]	[ ]
e)	Other_____	[ ]	[ ]	[ ]	[ ]
XVI. RECREATION					
a)	Will the proposal result in an impact upon the quality or quantity of existing	[X]	[ ]	[ ]	[ ]

		Potentially Significant Impact	Potentially Significant Impact Unless Mitigation Incorporated	Less than Significant Impact	No Impact
recreation opportunities?					
XVII. MANDATORY FINDINGS OF SIGNIFICANCE					
a)	Does the project have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?	[X]	[ ]	[ ]	[ ]
b)	Does the project have the potential to achieve short-term, to the disadvantage of long-term, environmental goals? (A short-term impact on the environment is one which occurs in a relatively brief, definitive period of time while long-term impacts will endure well into the future.)	[ ]	[ ]	[ ]	[X]
c)	Does the project have impacts which are individually limited but cumulatively considerable? (A project may impact on two or more separate resources where the impact on each resource is relatively small, but where the effect of the total of those impacts on the environment is significant.)	[ ]	[X]	[ ]	[ ]
d)	Does the project have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?	[X]	[ ]	[ ]	[ ]
XVIII. DEPARTMENT OF FISH AND GAME 'DE MINUMUS' FINDING					
a)	Will the project have an adverse effect either individually or cumulatively, on fish and wildlife resources? Wildlife shall be defined for the purpose of this question as "all wild animals, birds, plants, fish, amphibians, and related ecological communities, including the habitat upon which the wildlife depends for its continued viability."	[X]	[ ]	[ ]	[ ]

IXX. DISCUSSION OF ENVIRONMENTAL IMPACTS AND/OR EARLIER ANALYSIS:

Section and Subsections	Evaluation of Impact
I. LAND USE AND PLANNING	a) The proposed development of this site is for single- and multi-family residences will require a General Plan Amendment and a Zone Change. The site consists of six lots totaling 664.3 acres. The site is currently zoned Industrial Commercial (IC), Community Commercial Planned Development (CC PD), Commercial Office (CO PD), Residential Medium (RM) and Mobile Home Park (MHP) and is located within the Valley Center Concept (VCC) area. The zoning of the subject site is consistent with the General Plan designations. The applicant is proposing to change the General Plan designation to Residential Medium and Open Space and the zoning to Residential Medium with a Planned Development overlay and Open Space for the entire site and develop 590 apartment units, 84 townhouse units and 425 ~~478~~ single-family units along with a 29-acre park. Further analysis is needed to evaluate the land use modifications. The Industrial Commercial (IC) zone permits a limited, low patronage range of commercial use, quasi industrial and light industrial activities; encourages the provision of employee recreation opportunities; and acts as a transitional zone" (UDC Section 17.11.020.O). The Community Commercial (CC) zone "is intended for retailing and service uses of a community-wide nature that attract people from beyond the immediate neighborhood. The zone will typically include at least one or two major users and shall not be construed to be an allowance for a proliferation of small, multi-tenant convenience commercial centers located on corners and in strip commercial fashion along the City's streets" (UDC Section 17.11.020.J). The Commercial Office (CO) "is intended primarily for offices and professional services. Retail and services uses may be considered on the ground floor of such development; however, this shall not be construed to permit commercial centers or large single-tenant retail stores. Commercial office developments are generally located in centers or as individual buildings along major and secondary highways" (UDC Section 17.11.020.L). The proposed Residential Medium (RM) zone corresponds to small groupings of attached dwellings such as duplexes, triplexes, and fourplexes with a density up to 11.0 dwelling units per acre. This zone is consistent with typical densities for mobile home parks. Additional uses are permitted that are complimentary to, and can exist in harmony with, a residential neighborhood" (UDC Section 17.11.020.F). The Planned Development overlay is intended to accomplish more creative designs for development, economical and efficient use of land that is harmonious with the environment, and ensure development is consistent with approved applications. The applicant is also requesting to cluster the residential units, which requires the approval of a Conditional Use Permit. The conditional use permit procedure provides flexibility in the Unified Development Code (UDC) use regulations to account for the widely varying needs of certain uses. Because of their unusual characteristics, and in order to achieve the special purposes in certain districts, conditional uses require special consideration. In order to achieve these purposes, the Planning Commission and City Council are empowered to grant and deny applications for conditional use permits and impose reasonable conditions upon granting conditional use permits. The purpose of cluster development is to "minimize the disruption of natural resources and major physiographic feature and preserve land as permanent

Section and Subsections	Evaluation of Impact
	open space by encouraging innovative development alternatives" (Section 17.17.080). The applicant is requesting a hillside review to develop on slopes of greater than 10%. The intent of the hillside ordinance is to "regulate the development and alteration of hillside areas and ridgelines, to minimize the adverse effects of hillside development and to provide for the safety and welfare of the City of Santa Clarita while allowing for the reasonable development of hillside areas." b) The proposed project is located within the Valley Center Concept (VCC) overlay area. This overlay designates the central portion of the City in order to create a focal point for the City. The purpose of this overlay is to permit and encourage master planning providing a wide range of Valley-wide activities. The concept is intended to develop a central core that would include higher intensity and density for residential and commercial land uses. The project would provide residential and recreational activities, however, no commercial or any other land uses are proposed and therefore, may not consistent with the goals of the Valley Center Concept (VCC) overlay. c) Completion of the proposed project will provide ~~1,152~~ residential single- and multi-family units with access from the future Newhall Ranch Road and other future local streets. Located north of the project site is the Castaic Lake Water Agency (CLWA) property used for administrative offices and a treatment facility, east of the site is vacant land, south of the site is the Santa Clara River and west of the site, along Bouquet Canyon Road are existing commercial uses. Impacts may occur to the existing land uses because the site is predominantly vacant due to traffic, noise, light and glare. 1,099 d) The project is located in a predominantly vacant area. On the subject site there are several buildings utilized for a business, which currently operates on site, the LA Aqueduct, a water tank. In addition, there may other utility structures on site. No communities are established in this area. Therefore, construction of the project will not divide or disrupt any existing community. The proposal will establish a new community within the center of the City. Therefore, no impact is anticipated. e) The project is located within and adjacent to a Significant Ecological Area (SEA). The SEA is a category used to designate areas of importance to the community for preservation and protection. Development within these SEA areas is limited and appropriate environmental studies are required to ensure the protection of this area. The Santa Clara River will be maintained predominantly in a natural state and in accordance with the Natural River Management Plan. All development is outside of the SEA boundaries with exception of the bank stabilization and a portion of the Newhall Ranch Road and Golden Valley Road Bridge (reviewed under a separate EIR). Potential impacts exist to the Santa Clara River and require technical studies to demonstrate that the Santa Clara River and any habitat and other resources will be preserved. f) Other: No additional impacts are identified at this time for land use and planning. Potential impacts may result from this proposal and will be evaluated within the Environmental Impact Report. Any mitigation measures to reduce impacts to less than significant will be listed in the DEIR Mitigation Monitoring and Reporting Program.

Section and Subsections	Evaluation of Impact
II. POPULATION AND HOUSING	a) This project proposes to build ~~1,152~~ 1,099 residential units, including both single- and multi-family. This will add approximately 3,398 persons to the population based on 2.9 persons per household. The estimated population for the City of Santa Clarita is 224,500 by 2020. Therefore, it can be expected that the project will not induce substantial population growth exceeding official regional or local population projections. b) The Santa Clarita Valley is considered housing rich and jobs poor. The proposal does not include any commercial, office or industrial type uses and therefore, will create a significant amount of jobs. The proposal will displace an existing business on the site, however, the jobs may be relocated within the Valley. The site is used by this business primarily for storage and it is not anticipated that this project will result in a substantial decrease in jobs. However, additional analysis is required to determine the net loss of any jobs. c) The proposed project will not displace any existing housing because the land is predominantly vacant. No significant impacts would occur. d) Other: No additional impacts with regards to population and housing are identified at this time. Potential impacts may result from this proposal and will be evaluated within the Environmental Impact Report. Any mitigation measures to reduce impacts to less than significant will be listed in the DEIR Mitigation Monitoring and Reporting Program.
III. GEOLOGIC PROBLEMS	a) The project requires 5.5 million cubic yards of grading to develop the site as proposed. The proposed project will require fill to level areas around the hillsides to create building pads on the site for development. Further analysis is required to determine if any geologic substructures will be impacted as a result of this project. There may be significant impacts to the earth conditions because substantial grading will occur and further analysis is required. b)The approval of the proposed project would result in disruption, displacement, compaction and over-covering of soil. The majority of the site will require grading activities for proposed project development causing potentially significant impacts to the existing conditions and further analysis is required. c) The project site has moderate to severe slopes, which require substantial topographical modifications. Therefore, there may be significant impacts as a result and further analysis is needed in the EIR. d) The project site is predominantly vacant and does not contain any known unique geologic or topographic features. Further review and analysis will confirm any features and then significance will be determined. e) Construction activity associated with the proposed improvements may result in a short-term wind and water driven erosion of soils. The proposed improvements will require extensive grading, which will expose soils to wind and rain. This impact is generally considered short term in nature, however, due to the size of the project, further analysis is required. Development activity would remove a majority of the natural vegetation on the site and replace the land with building pads for residential units. This is also considered a potential impact and requires additional analysis. f) The proposed project is located in hillside areas in addition to relatively level ground. The modification of the hillside could possibly expose people or property to geologic hazards such as landslides, mudslides, ground failure, or any similar type hazards. All of Southern California is located in an earthquake prone region. The project may result potentially significant

Section and Subsections	Evaluation of Impact
	impacts to geologic hazards and requires further analyzed in the EIR. g) As discussed above, the majority of the site will be graded. Consequently the project will create changes in soil deposition, erosion, and siltation. The project will be subject to the National Pollutant Discharge Elimination System (NPDES) General Permit, which will require mechanisms that will minimize soil deposition, erosion or siltation, however, the extent of the impact will require additional analysis in the EIR. h) The site is bounded to the south by the Santa Clara River, however, other than bank stabilization and the construction of a portion of Newhall Ranch Road, the Santa Clara River will remain is a natural state. In addition to the river, a blue line stream may traverse the property and will require evaluation. Therefore, potentially significant impacts may result to these resources and further analysis in the EIR is required. i) The proposed project will result in earth movement of approximately 5.5 million cubic yards. This may result in a potentially significant impact to the existing conditions on site and will be further evaluated in the EIR. j) The project area has significant slopes of greater than 25 percent, which will result in extensive grading. These impacts will be evaluated within the EIR. k) Although, the proposed project is not located within an Alquist-Priolo Special Studies Zone it is in close proximity to the site. l) Other: No additional impacts with regard to geologic problems are identified at this time. Potential impacts may result from this proposal and will be evaluated within the Environmental Impact Report. Any mitigation measures to reduce impacts to less than significant will be listed in the DEIR Mitigation Monitoring and Reporting Program.
IV. WATER	a) Development of the proposed project would include 590 apartments, 84 townhouses and ~~478~~ 425 single-family units. Development of this magnitude will significantly increase impermeable or impervious features. Increased runoff from impermeable surfaces would increase total site runoff. This impact requires further analysis in the EIR. b) The proposed project may expose people or property to water related hazards, such as flooding. However, as development of the site occurs, the appropriate storm drain system will be installed to accommodate flows from a capital storm. Bank stabilization will be constructed in conjunction with the proposal, which will provide further protection from water hazards. In addition there may be water tanks on site that could potentially expose people to water hazards. The impacts to hazards related to water issues will be further analyzed in detail within the EIR. c) As development occurs, the project area would be subject to urban contaminants such as motor oils, gasoline, etc. Development of the site would create additional contaminants generated by the residential uses. Runoff on the future streets will be directed into the gutters and channeled toward catch basins, which will filter out many of the solid pollutants from the runoff. Construction activities associated with the proposed project will not discharge into surface waters or alter surface water quality because the project will be required to incorporate National Pollutant Discharge Elimination System (NPDES) General Permit mechanisms designed to reduce and eliminate such discharges. However, potentially significant impacts may still result from a development of this magnitude and therefore, water-related issues require further analysis in the EIR. d) The proposed development may substantially increase the amount of surface

Section and Subsections	Evaluation of Impact
	water in nearby water bodies, due to an increase in hardscape on the project site. This issue requires further analysis in the EIR. e) Development of the proposed project may also create a change in currents or the course of the direction of water due to the amount of water runoff generated to alter these resources. This requires further analysis in the EIR. f) Construction of the project may change the quantity of ground waters, either through direct additions or withdrawals, or through interception of an aquifer by cuts or excavations, or through substantial loss of groundwater recharge capability because the new amount of proposed hardscape necessary to construct the project is substantial and further analysis is required in the EIR. g) Construction of the project may require major cuts in the soil surface that will disturb groundwater flows thereby altering the direction or flow of groundwater, which requires further analysis in the EIR. h) The project may have impacts to groundwater quality and will be analyzed within the EIR. i) Water will be needed during construction activities for watering of exposed soil to minimize airborne dust and dirt and may significantly increase the demand on public water supplies. Although this impact is potentially significant, it would be short-term, however once the residences are occupied, there would be a long-term increase in the demand for public water. This will be further analyzed in the EIR. j) Other: No additional issues related to water are identified at this time. Potential impacts may result from this proposal and will be evaluated within the Environmental Impact Report. Any mitigation measures to reduce impacts to less than significant will be listed in the DEIR Mitigation Monitoring and Reporting Program.
V. STORMWATER MANAGEMENT & RECYCLING	a)The project may result in substantial stormwater discharges during construction activities. A new drainage system will be required to be incorporated into the project. However, due to the magnitude of the project further analysis is required in the EIR. b) The project may result in a potentially significant environmentally harmful increase in the flow rate or volume of the project site or surrounding areas. This impact requires further analysis in the EIR. c) The project may have a substantial increase in stormwater discharges from the site and may impair the beneficial uses of receiving waters or areas that provide water quality benefits. This will be analyzed in the EIR. d) A project of this magnitude may result in a significant increase in stormwater discharges and may cause harm to the biological integrity of drainage systems and water bodies and requires further analysis in the EIR. e) Waste materials expected to be generated are typical construction debris, including concrete and asphalt. Although impacts may be significant, they are short term in nature. Furthermore, the addition of residences may significantly increase the solid waste disposal at landfills and other waste disposal facilities. This significance of this impact will be further analyzed in the EIR. f) Other: No additional issues related to stormwater management and recycling have been identified at this time. Potential impacts may result from this proposal and will be evaluated within the Environmental Impact Report. Any mitigation measures to reduce impacts to less than significant will be listed in the DEIR Mitigation Monitoring and Reporting Program.

Section and Subsections	Evaluation of Impact
VI. AIR QUALITY	a) Development of the proposed project would generate exhaust emissions from construction equipment and vehicles traveling to and from the site. All construction-generated impacts are short term and will be mitigated with appropriate building and engineering requirements. In addition, this project will result in the construction of a new roadway and additional traffic on the existing roadways. The impact to the air quality will be significant and further analysis is required. b) The project includes development of residential uses. These uses are typically identified as sensitive receptors. No commercial or industrial uses are proposed with the project. Future development adjacent to the project site will evaluate the impacts to the residential uses. Therefore, at this time it is not anticipated that there may be potentially significant impacts to any sensitive receptors. c) Construction activities would involve the use of a variety of gasoline or diesel-powered equipment that will emit exhaust fumes. These impacts may be potentially significant, however short term in nature. Upon occupancy of the residences, vehicle traffic would increase significantly and may have a significant impact to air quality. These impacts require further analysis. d) Other: No additional issues related to air quality have been identified at this time. Potential impacts may result from this proposal and will be evaluated within the Environmental Impact Report. Any mitigation measures to reduce impacts to less than significant will be listed in the DEIR Mitigation Monitoring and Reporting Program.

Section and Subsections	Evaluation of Impact
VII. TRANSPORTATION/ CIRCULATION	a) The proposed project will result in a significant increase in vehicle trips in this area. Currently, the site is vacant with the exception of one contractor business that operates at the site. The project includes the development of 84 townhouses which would result in approximately 487 trips per day, 590 apartments which would result in 3,894 vehicle trips per day and ~~478~~ 425 single-family residences which would result in 4,541 trips per day. This would total approximately 8,922 trips per day. The addition of this many trips per day may create additional traffic congestion on other roadways, including but not limited to Bouquet Canyon Road, Soledad Canyon Road and Golden Valley Road. In addition, the project is located in the center of the city and three General Plan roadways cross the site. The project will require the construction of two major arterials, Newhall Ranch Road and Golden Valley Road and bridge on the site. Newhall Ranch Road, also known as the Cross Valley Connector, will be constructed as a result of this project, this roadway will eventually connect to State Route 14 to Interstate 5. Furthermore, Santa Clarita Parkway is another north - south General Plan major arterial that is presently shown on the City's Circulation map. The City of Santa Clarita is currently preparing an EIR for these roadways. A traffic study should be prepared and further analyses are required to analyze these impacts to the City's transportation system. b) The project will not be constructed with any roadways that do not comply with City standards for roadways, therefore, it is not anticipated to have any impacts from design features. c) Construction and operation of the project may result in inadequate emergency services to this area. This may create the necessity for emergency services to expand in order to have access to this area and be able to respond in an appropriate amount of time. This requires further analysis in the EIR. d) No parking currently exists on the site. The project will be designed to accommodate all parking for residential uses. Therefore, the impacts are anticipated to be less than significant. e) Construction of the site will cause periodic activity that would result in the temporary presence of hazards and barriers, such as construction equipment, open trenches, demolition debris, and stockpiled material at the project site. No bike trails exist at this time and therefore, will not be impacted. Once completed, the project will provide a River trails system and bike trails along the some of the roadways. Further analysis is required to mitigate the impacts during construction. f) The project will result in many roadways throughout the site. All roadway improvements will be designed and constructed meet the City standards. Therefore, the impacts are anticipated to be less than significant. g) The proposed project will not result in a disjointed pattern of roadway improvements. The project and any associated roadway constructed will be designed and developed in compliance with the City's standards. h) Other: No additional traffic and circulation impacts have been identified at this time. Potential impacts may result from this proposal and will be evaluated within the Environmental Impact Report. Any mitigation measures to reduce impacts to less than significant will be listed in the DEIR Mitigation Monitoring and Reporting Program.

Section and Subsections	Evaluation of Impact
VIII. BIOLOGICAL RESOURCES	a) The proposed development is adjacent to the Santa Clara River and may potentially impact endangered, rare or threatened species or plants. The California Department of Fish and Game has the California Natural Diversity Database which should be utilized for determining the potential for species and plants on the site. Surveys and other research should also be conducted in accordance with the procedures set forth by Fish and Game to whether or not potential habitat exists on site. Although approximately 300 acres of natural river area will remain undisturbed there is still the potential impacts to the biological resources of the Santa Clara River. Further studies and analysis is required in the EIR. b) Several oak trees protected by the City's Oak Tree Ordinance exist on the site. Therefore, an oak tree report shall be prepared analyzing the impacts to the oaks. The oak tree report shall be included in the EIR and will provide mitigation for any impacted oaks in accordance with the City's Ordinance. c) The proposed project site may impact any federally protected wetlands through direct removal, filling, hydrological interruption, or other means. The California Department of Fish and Game and the Army Corps of Engineers will determine the boundaries to wetlands and will have jurisdiction. Further analysis is required in the EIR. d) The proposed project may impact a wildlife corridor. Further analysis is required to determine if there is a migration corridor on site that will be impacted by the proposal. e) Other: Bank stabilization will be constructed in conjunction with the Natural River Management Plan. The bank stabilization will be analyzed within the EIR for this project and within the EIR for the future Newhall Ranch Road and the Golden Valley Road bridge. The bank stabilization in conjunction with this project will result in about 4,500 linear feet. Further analysis is required to determine the impact to the biological resources. Potential impacts may result from this proposal and will be evaluated within the Environmental Impact Report. Any mitigation measures to reduce impacts to less than significant will be listed in the DEIR Mitigation Monitoring and Reporting Program.
IX. ENERGY AND MINERAL RESOURCES	a) The proposed project is not anticipated to conflict with adopted energy conservation plans, however, this should issue be further reviewed and determined to have no impact. b) The project may result in the use of nonrenewable resources and requires further analysis in the EIR. c) The proposed project is not known at this time to have a mineral resource and further analysis is required in the EIR. d) Other: No additional issues related to energy and mineral resources have been identified at this time. Potential impacts may result from this proposal and will be evaluated within the Environmental Impact Report. Any mitigation measures to reduce impacts to less than significant will be listed in the DEIR Mitigation Monitoring and Reporting Program.

Section and Subsections	Evaluation of Impact
X. HAZARDS	a) Residential uses do not typically generate hazardous materials, and consequently, development on the project site would not create a significant risk of accidental explosion or release of hazardous substance. b) The proposed project will result in additional roadways, which will increase the ease of emergency evacuation and/or emergency response. Further analysis needs to be provided in the EIR. c) No significant hazards to human health are expected to occur with the construction and operation of the project. d) Development is proposed in close proximity to high-pressure gas mains, water lines and possibly other utility lines which is common within California. California Public Utility Commission has mandated safety requirements and the applicant will be required to comply with those requirements. The site is also in close proximity to Southern California Edison electrical transmission lines traverse portions of the project site. Any potential impacts will be further analyzed in the EIR. e) The project site is not located within an area that is heavily vegetated with flammable brush, grass or trees. The project includes approximately 300 acres of natural vegetation that would be at risk of fire hazard. Therefore, further analysis is required. g) Other: No additional issues related to hazards have been identified at this time. Potential impacts may result from this proposal and will be evaluated within the Environmental Impact Report. Any mitigation measures to reduce impacts to less than significant will be listed in the DEIR Mitigation Monitoring and Reporting Program.
XI. NOISE	a) The project site is located in an undeveloped area with minimal noise. The project would result in increased noise generated from the residential uses and the new roadways that will be constructed. Further analysis is required in the EIR. b) The project site will have added noise levels and vibrations and require further analysis in the EIR. c) Other: No additional issues regarding noise have been identified at this time. Potential impacts may result from this proposal and will be evaluated within the Environmental Impact Report. Any mitigation measures to reduce impacts to less than significant will be listed in the DEIR Mitigation Monitoring and Reporting Program. 1,099
XII. PUBLIC SERVICES	a) The proposed project includes approximately ~~1,152~~ new residences that would require fire services. This would result in a potentially significant impact to the current fire services. Additional fire stations and personnel may be required as a result of this proposal. Further analysis is required. b) As the residential population increases, there may be an impact to police services. Additional services will be required to serve the new residences. Further analysis is required to determine the impact. c) As the population increases, additional need for school facilities may be required. This impact requires further analysis in the EIR. d) The project will require the construction of a new major arterial through the project site. The City of Santa Clarita is in the process of preparing an EIR for this new roadway. The new roadway will require street maintenance, including but not limited to, street sweeping, landscaping maintenance, street light maintenance and will be added to the capital improvement projects that occur annually. This will result in a significant impact to these services. e) The proposal will result in an increase to the permanent resident population,

Section and Subsections	Evaluation of Impact
	and as such would result in an increased need for libraries, community centers, or related government services. Thus, further analysis is required to address these issues. f) Other: No additional issues related to public services have been identified at this time. Potential impacts may result from this proposal and will be evaluated within the Environmental Impact Report. Any mitigation measures to reduce impacts to less than significant will be listed in the DEIR Mitigation Monitoring and Reporting Program.
XIII. UTILITIES	a) The proposal will includes the expansion of the existing utility system throughout the project site. This includes requiring the services of Southern California Edison, Southern California Gas Company, and Pacific Bell telephone company, in addition to cable companies and telecommunication companies. This impact is potentially significant and further analysis is required to address this issue. b) Pacific Bell will provide telephone service to the area. Telephone facilities will be located within the public rights-of-way. No overhead telephone facilities will be permitted. However, new telephone lines are not existing in the area and will be required to be extended to service this new community. This will result in a potentially significant impact and further analysis is required in the EIR. c) The proposed project will result in the addition of approximately 1,099 ~~1,752~~ new residences that will substantially increase the demand for wastewater treatment resulting in a significant impact on local and regional water treatment and distribution facilities. Additional facilities may be required to accommodate the new community. Therefore, further analysis is required. d) The proposed project will result in a potentially significant increase to the amount of sewage generated. Therefore, potentially significant impacts related to sewers or septic tanks require further analysis. e) The proposed project will require the construction of new storm water drainage facilities or expansion of existing facilities. Expansion of the system will be required to accommodate the proposed housing units. This will result in a potentially significant impact and requires further analysis. f) The project, once occupied by residents will generate a significant amount of solid waste that will need to be picked up and transported to appropriate waste facilities. At this time, the City of Santa Clarita exports virtually all its wastes except for those wastes that can be recycled, to the Chiquita Canyon Landfill. Further analysis is required in the EIR to determine the impact to solid waste and recycling facilities g) The proposed project may create a need for local or regional water supplies. Further analysis is required in the EIR. h) Other: No additional issues related to utilities have been identified at this time. Potential impacts may result from this proposal and will be evaluated within the Environmental Impact Report. Any mitigation measures to reduce impacts to less than significant will be listed in the DEIR Mitigation Monitoring and Reporting Program.

Section and Subsections	Evaluation of Impact
XIV. AESTHETICS	a) The project will significantly modify the appearance of the hillside as viewed along Soledad Canyon Road, between Bouquet Canyon Road and the future Golden Valley Road. In addition, the appearance from Bouquet Canyon Road and San Fernando Road will also be affected. The appearance of this site will be potentially significantly changed and further analysis, including photo simulations is required in the EIR. b) The overall project could potentially impact the aesthetics of the area. Special care needs to be given to the project site due to its high visibility. The site is highly visible from three major arterials and is currently in a natural state. Development may potentially impact the views as seen from these roadways. Further analysis is required to mitigate the impacts to the aesthetics. c) The site is currently vacant with no lighting. Development of the residences will include street lighting along with light generated by each residential unit. This will have a potential impact on the light and glare that will be generated and seen by adjacent roadways and residential uses. Further analysis is required in the EIR. d) Other: No additional issues related to aesthetics have been identified at this time. Potential impacts may result from this proposal and will be evaluated within the Environmental Impact Report. Any mitigation measures to reduce impacts to less than significant will be listed in the DEIR Mitigation Monitoring and Reporting Program.
XV. CULTURAL RESOURCES	a) The proposed site is predominantly undeveloped and vacant. The site has two village sites, which will be addressed within the EIR. Any discovery of other paleontological or archaeological resources will be evaluated. b) The proposed project has the potential to cause a physical change which would affect unique ethnic cultural values because the site has two village sites which may have potentially significant impacts to cultural resources. Further analysis is required in the EIR. c) The proposed project would not restrict existing religious or sacred uses within the project area. d) Two village sites have been identified on the project site and therefore, development may significantly impact these historical sites. e) Other: No additional issues related to cultural resources need to be addressed. Potential impacts may result from this proposal and will be evaluated within the Environmental Impact Report. Any mitigation measures to reduce impacts to less than significant will be listed in the DEIR Mitigation Monitoring and Reporting Program.
XVI. RECREATION	a) The proposed project will create in ~~1,152~~ 1,099 new households. This will result in increased usage of the City's recreational services, thereby causing a need to provide additional recreational opportunities for the community. The proposed project will have 300 acres of river area, in addition to a 29-acre passive park on the site which will contribute to the recreation provided to the community. Dedication or improvement of recreation facilities is based upon

Section and Subsections	Evaluation of Impact
	the generation of a residential population. The potential impacts to recreational services will be further evaluated within the EIR. b) Other: No additional issues related to recreation need to be addressed. Potential impacts may result from this proposal and will be evaluated within the Environmental Impact Report. Any mitigation measures to reduce impacts to less than significant will be listed in the DEIR Mitigation Monitoring and Reporting Program.
XVII. MANDATORY FINDINGS OF SIGNIFICANCE	a) – d) The analysis of the issues raised by the checklist questions indicates that project impacts are generally considered to be potentially significant impacts that require further analysis within an Environmental Impact Report. These areas include land use and planning; population & housing; air quality; hazards; biological resources; energy and mineral resources; cultural resources; public services; utilities and service system; aesthetics; and recreation. These areas may require technical studies, photo simulations and other research to provide appropriate environmental documentation for this project.
XVIII. DEPARTMENT OF FISH AND GAME 'DE MINIMUS' FINDING	a) There is evidence that this proposed project may have the potential for an adverse effect, either individually or cumulatively on wildlife resources as defined by Fish and Game Code Section 711.2. Therefore, the proposed project will require biological studies to determine and address the impacts.

Letters from Agencies in Response to Original Notice of Preparation

STATE OF CALIFORNIA

Governor's Office of Planning and Research

State Clearinghouse

Gray Davis
Governor

Tal Finney
Interim Director

Notice of Preparation

RECEIVED
PLANNING DIVISION

SEP 26 2002

PLANNING AND BUILDING SERVICES
CITY OF SANTA CLARITA

September 18, 2002

To: Reviewing Agencies

Re: Riverpark
SCH# 2002091081

Attached for your review and comment is the Notice of Preparation (NOP) for the Riverpark draft Environmental Impact Report (EIR).

Responsible agencies must transmit their comments on the scope and content of the NOP, focusing on specific information related to their own statutory responsibility, within 30 days of receipt of the NOP from the Lead Agency. This is a courtesy notice provided by the State Clearinghouse with a reminder for you to comment in a timely manner. We encourage other agencies to also respond to this notice and express their concerns early in the environmental review process.

Please direct your comments to:

Jeff Hogan/Wendy Deats
City of Santa Clarita
23920 Valencia Boulevard, Suite 300
Santa Clarita, CA 91355

with a copy to the State Clearinghouse in the Office of Planning and Research. Please refer to the SCH number noted above in all correspondence concerning this project.

If you have any questions about the environmental document review process, please call the State Clearinghouse at (916) 445-0613.

Sincerely,

Becky Frank

Becky Frank
Project Analyst, State Clearinghouse

Attachments
cc: Lead Agency

1400 TENTH STREET P.O. BOX 3044 SACRAMENTO, CALIFORNIA 95812-3044
(916)445-0613 FAX(916)323-3018 www.opr.ca.gov

Document Details Report
State Clearinghouse Data Base

SCH# 2002091081
Project Title Riverpark
Lead Agency Santa Clarita, City of

Type NOP Notice of Preparation

Description The project proposal includes the development of 590 apartments, 84 townhouses and 478 single-family dwellings. A 29-acre park is also proposed along the Santa Clara River. Approximately 300-acres of river area located within the project boundary will remain in a natural state with the exception of the future construction of Newhall Ranch Road and bank stabilization work. Development of the site will require 5.5 million cubic yards of grading which will be balanced onsite. The grading is required for the construction of the project as well as the future Newhall Ranch Road and Golden Valley Road Bridge project.

Lead Agency Contact

Name Jeff Hogan/Wendy Deats
Agency City of Santa Clarita
Phone 661-255-4330 **Fax**
email
Address 23920 Valencia Boulevard, Suite 300
City Santa Clarita **State** CA **Zip** 91355

Project Location

County Los Angeles
City Santa Clarita
Region
Cross Streets East of Bouquet Canyon, norht of Soledad Canyon Road
Parcel No.
Township **Range** **Section** **Base**

Proximity to:

Highways
Airports
Railways
Waterways
Schools
Land Use The current zoning of the project site is industrial Commercial (IC), Commercial Office Planned Development (CO PD), Community Commercial Planned Development (CC PD), and Mobile Home Park (MHP). The General Plan Land Use for the site is General Plan Valley Center Concept.

Project Issues Aesthetic/Visual; Air Quality; Archaeologic-Historic; Drainage/Absorption; Flood Plain/Flooding; Forest Land/Fire Hazard; Geologic/Seismic; Minerals; Noise; Public Services; Recreation/Parks; Schools/Universities; Sewer Capacity; Soil Erosion/Compaction/Grading; Solid Waste; Toxic/Hazardous; Traffic/Circulation; Vegetation; Water Quality; Water Supply; Wetland/Riparian; Wildlife; Growth Inducing; Landuse; Cumulative Effects

Reviewing Agencies Resources Agency; Department of Conservation; Office of Historic Preservation; Department of Parks and Recreation; Department of Water Resources; Department of Fish and Game, Region 5; Native American Heritage Commission; State Lands Commission; Office of Emergency Services; Caltrans, District 7; Department of Housing and Community Development; Air Resources Board, Transportation Projects; State Water Resources Control Board, Division of Water Rights; Regional Water Quality Control Board, Region 4; Department of Toxic Substances Control

Date Received 09/18/2002 **Start of Review** 09/18/2002 **End of Review** 10/17/2002

Note: Blanks in data fields result from insufficient information provided by lead agency.

OP Distribution List

County: Los Angeles SCH# 200209

Resources Agency

- [x] **Resources Agency**
  Nadell Gayou
- [ ] **Dept. of Boating & Waterways**
  Bill Curry
- [ ] **California Coastal Commission**
  Elizabeth A. Fuchs
- [x] **Dept. of Conservation**
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  B. Noah Tilghman
  Environmental Stewardship Section
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  Steve McAdam
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  Dept. of Health/Drinking Water

Food & Agriculture

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  Steve Shaffer
  Dept. of Food and Agriculture

Fish and Game

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  Scott Flint
  Environmental Services Division
- [ ] **Dept. of Fish & Game 1**
  Donald Koch
  Region 1
- [ ] **Dept. of Fish & Game 2**
  Banky Curtis
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  Robert Floerke
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- [ ] **Dept. of Fish & Game 4**
  William Laudermilk
  Region 4
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  Don Chadwick
  Region 5, Habitat Conservation Program
- [ ] **Dept. of Fish & Game 6**
  Gabrina Gatchel
  Region 6, Habitat Conservation Program
- [ ] **Dept. of Fish & Game 6 I/M**
  Tammy Allen
  Region 6, Inyo/Mono, Habitat Conservation Program
- [ ] **Dept. of Fish & Game M**
  Tom Napoli
  Marine Region

Independent Commissions

- [ ] **California Energy Commission**
  Environmental Office
- [x] **Native American Heritage Comm.**
  Debbie Treadway
- [ ] **Public Utilities Commission**
  Ken Lewis
- [x] **State Lands Commission**
  Betty Silva
- [ ] **Governor's Office of Planning & Research**
  State Clearinghouse Planner

- [ ] **Colorado River Board**
  Gerald R. Zimmerman
- [ ] **Tahoe Regional Planning Agency (TRPA)**
  Lyn Barnett
- [x] **Office of Emergency Services**
  John Rowden, Manager
- [ ] **Delta Protection Commission**
  Debby Eddy
- [ ] **Santa Monica Mountains Conservancy**
  Paul Edelman

Dept. of Transportation

- [ ] **Dept. of Transportation 1**
  Mike Eagan
  District 1
- [ ] **Dept. of Transportation 2**
  Don Anderson
  District 2
- [ ] **Dept. of Transportation 3**
  Jeff Pulverman
  District 3
- [ ] **Dept. of Transportation 4**
  Jean Finney
  District 4
- [ ] **Dept. of Transportation 5**
  David Murray
  District 5
- [ ] **Dept. of Transportation 6**
  Marc Birnbaum
  District 6
- [x] **Dept. of Transportation 7**
  Stephen J. Buswell
  District 7
- [ ] **Dept. of Transportation 8**
  Linda Grimes,
  District 8
- [ ] **Dept. of Transportation 9**
  Katy Walton
  District 9
- [ ] **Dept. of Transportation 10**
  Tom Dumas
  District 10
- [ ] **Dept. of Transportation 11**
  Bill Figge
  District 11
- [ ] **Dept. of Transportation 12**
  Bob Joseph
  District 12

Business, Trans & Housing

- [x] **Housing & Community Development**
  Cathy Creswell
  Housing Policy Division
- [ ] **Caltrans - Division of Aeronautics**
  Sandy Hesnard
- [ ] **California Highway Patrol**
  Lt. Julie Page
  Office of Special Projects
- [ ] **Dept. of Transportation**
  Ron Helgeson
  Caltrans - Planning
- [ ] **Dept. of General Services**
  Robert Sleppy
  Environmental Services Section

Air Resources Board

- [ ] Airport Projects
  Jim Lerner
- [x] Transportation Projects
  Kurt Karperos
- [ ] Industrial Projects
  Mike Tollstrup

- [ ] **California Integrated Waste Management Board**
  Sue O'Leary
- [ ] **State Water Resources Control Board**
  Diane Edwards
  Division of Clean Water Programs

- [ ] **State Water Resources Control Board**
  Greg Frantz
  Division of Water Quality
- [x] **State Water Resouces Control Board**
  Mike Falkenstein
  Division of Water Rights
- [x] **Dept. of Toxic Substances Control**
  CEQA Tracking Center

Regional Water Quality Control Board (RWQCB)

- [ ] **RWQCB 1**
  Cathleen Hudson
  North Coast Region (1)
- [ ] **RWQCB 2**
  Environmental Document Coordinator
  San Francisco Bay Region (2)
- [ ] **RWQCB 3**
  Central Coast Region (3)
- [x] **RWQCB 4**
  Jonathan Bishop
  Los Angeles Region (4)
- [ ] **RWQCB 5S**
  Central Valley Region (5)
  - [ ] **RWQCB 5F**
    Central Valley Region (5)
    Fresno Branch Office
  - [ ] **RWQCB 5R**
    Central Valley Region (5)
    Redding Branch Office
- [ ] **RWQCB 6**
  Lahontan Region (6)
  - [ ] **RWQCB 6V**
    Lahontan Region (6)
    Victorville Branch Office
- [ ] **RWQCB 7**
  Colorado River Basin Region (7)
- [ ] **RWQCB 8**
  Santa Ana Region (8)
- [ ] **RWQCB 9**
  San Diego Region (9)

Winston H. Hickox
Secretary for Environmental Protection

California Regional Water Quality Control Board

Los Angeles Region

Over 50 Years Serving Coastal Los Angeles and Ventura Counties
Recipient of the 2001 *Environmental Leadership Award* from Keep California Beautiful

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Gray Davis
Governor

RECEIVED
PLANNING DIVISION
JAN 23 2003
PLANNING AND BUILDING SERVICES
CITY OF SANTA CLARITA

January 21, 2003

City of Santa Clarita
23920 Valencia Blvd., Suite 300
Santa Clarita, CA 91355

RE: CEQA Documentation for Project in the Santa Clara River Watershed
SUBJECT: Riverpark

We appreciate the opportunity to comment on the CEQA documentation for the above-mentioned project. For your information a list of permitting requirements and Regional Board Contacts is provided in Attachment A hereto.

The project site lies in the Santa Clara watershed that was listed as being impaired pursuant to Section 303 (d) of the Clean Water Act. Impairments listed in reaches downstream from the proposed project include nutrients and their effects, salts, coliform bacteria, and historic pesticides. The Los Angeles Regional Water Quality Control Board will be developing Total Maximum Daily Loads (TMDLs) for the watershed, but the proposed project is expected to proceed before applicable TMDLs are adopted. In the interim, the Regional Board must carefully evaluate the potential impacts of new projects that may discharge to impaired waterbodies.

Our review of your documentation shows that it does not include information on how this project will change the loading of these pollutants into the watershed. Please provide the following additional information for both the construction and operational phases of the project.

- For each constituent listed above, please provide an estimate of the concentration (ppb) and load (lbs/day) from non-point and point source discharges.
- Estimates of the amount of additional runoff generated by the project during wet and dry seasons.
- Estimate of the amount of increased or decreased percolation due to the project.

- Estimates of the net change in cubic feet per second of groundwater and surface water contributions under historic drought conditions (as compiled by local water purveyors, the Department of Water Resources, and others) and 10-year, 50-year and 100-year flood conditions.

If you have any questions please call me at (213) 576-6683.

Sincerely,

Theresa Rodgers

for Elizabeth Erickson
Associated Geologist, TMDL Unit

EE
Attachments

Cc: file
State Clearinghouse- (2002091081)

ATTACHMENT A

✓ If the proposed project will result in a **discharge of dredge or fill into a surface water** (including a dry streambed), and is subject to a **federal license or permit**, the project may require a *Section 401 Water Quality Certification*, or waiver of Waste Discharge Requirements. For further information, please contact:

Jason Lambert, Nonpoint Source Unit at (213) 576-5733.

✓ If the project involves **inland disposal of nonhazardous contaminated soils and materials**, the proposed project may be subject to *Waste Discharge Requirements*. For further information, please contact:

Rodney Nelson, Landfills Unit, at (213) 620-6119

****

✓ If the overall project area is **larger than five acres**, the proposed project may be subject to the State *Board's General Construction Activity Storm Water Permit*. For further information, please contact:

Tracy Woods, Statewide General Construction Activity Storm Water Permits at (213) 620-2095.

✓ If the project involves a facility that is proposing to discharge storm water associated with **industrial activity** (e.g., manufacturing, recycling and transportation facilities, etc.), the facility may be subject to the State Board's *General Industrial Activities Storm Water Permit*. For further information, please contact:

Kristie Chung, Statewide General Industrial Storm Water Permits at (213) 620-2283.

✓ If the proposed project involves requirements for new development and construction pertaining to **municipal storm water programs**, please contact:

Dan Radulescu, Municipal Storm Water Permits, Los Angeles County at (213) 620-2038;
Matt Yeager, Municipal Storm Water Permits, Ventura County at (213) 620-2097.

✓ The proposed project also shall comply with the local regulations associated with the applicable **Regional Board stormwater permit**:

Los Angeles County and Co-permittees:
NPDES No. CAS614001
Waste Discharge Requirements Order No. 96-054.

Long Beach County and Co-permittees:
NPDES CAS004003
Waste Discharge Requirements Order No. 99-060.

Ventura County and Co-permittees:
NPDES No. CAS004002
Waste Discharge Requirements Order No. 00-108.

****

✓ If the proposed project involves any construction and/or groundwater **dewatering to be discharged to surface waters**, the project may be subject to *NPDES/Waste Discharge Requirements*. For further information, please contact:

Augustine Anijielo, General Permitting and Special Projects Unit at (213) 576-6657(All Region 4 Watersheds).

✓ If the proposed project involves any construction and/or groundwater **dewatering to be discharged to land or groundwater**, the project may be subject to *Waste Discharge Requirements*. For further information, please contact:

Kwang-il Lee, Non-Chapter 15 Unit, at (213) 620-2269 (All Region 4 Watersheds).

RECEIVED
PLANNING DIVISION
OCT 18 2002
PLANNING AND BUILDING SERVICES
CITY OF SANTA CLARITA

October 17, 2002

Jeff Hogan/Wendy Deats
Planning Department
City of Santa Clarita
23920 Valencia Boulevard, Suite 300
Santa Clarita, CA 91355

Re: Notice of Preparation of Draft Environmental Impact Report, "Riverpark (Panhandle);"
Tentative Tract Map 53425

Dear Mr. Hogan/Ms. Deats:

By this letter the Castaic Lake Water Agency informs you that the above-mentioned project may be subject to the terms of various sections of the California Water Code and Government Code, also known as "SB 221" and "SB 610." These two laws were chaptered in 2001 and took effect January 1, 2002.

SB 221 and SB 610 are companion measures that seek to promote more collaborative planning between local water suppliers and cities and counties. Both statutes require detailed information regarding water availability to be provided to city and county decision makers prior to approval of large development projects. Both statutes also require this information to be included in the administrative record that serves as the evidentiary basis for an approval action by the city or county on such projects.

Under SB 610, water assessments must be furnished to local governments for inclusion in any environmental documentation for certain projects (defined in Water Code section 10912 (a)) subject to the California Environmental Quality Act. Under SB 221, approval by a city or county of certain residential subdivisions requires an affirmative verification of sufficient water supply.

A guidebook for implementation of these two laws has been produced by the California Department of Water Resources, and is available at

www.owue.water.ca.gov/urbanplan/docs/DraftGuidebook.pdf

If you have any questions or comments, please call me or Mary Lou Cotton, Assistant to the General Manager, at 661/297-1600.

Sincerely,

Dan Masnada
General Manager

cc: Glenn Adamick, The Newhall Land and Farming Company

CASTAIC LAKE WATER AGENCY

DIRECTORS
E.G. "JERRY" GLADBACH
DONALD R. FROELICH
DEAN D. EFSTATHIOU
WILLIAM C. COOPER
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THOMAS P. CAMPBELL

GENERAL MANAGER
DAN MASNADA

ATTORNEY
ROBERT H. CLARK

SECRETARY
LINDA J. FLEMING

From: <Bigbadmean@aol.com>
To: <wdeats@santa-clarita.com>
Date: 11/27/02 2:35PM
Subject: Riverpark comments Center for Biological Diversity

Center for Biological Diversity

Re: Riverpark Project

11/27/02

Attn: Jeff Hogan/Wendy Deats
City of Santa Clarita
23920 Valencia Blvd.
Santa Clarita, Ca. 91355

Re: Notice of Preparation, River Park Project

Dear Planning Department,

The Center of Biological Diversity is opposed to the Riverpark Project. We believe that cumulative impacts to sensitive, threatened and endangered species has not been addressed in regards to Newhall Land and Farming's projects along the Santa Clara River.

Further, Newhall Land and Farming requires that biologists that survey the areas sign confidentiality agreements. We have had knowledge of this for a long time now. This does not allow lead agencies to property address impacts to wildlife.

Newhall Land and Farming has a pattern of deceptive actions along the Santa Clara River. This includes apparently concealing the presence of the endangered arroyo toad, harassing migratory songbirds for a number of years, and out and out destruction of an endangered plant the San Fernando Spineflower.

The unarmored threespined stickleback has been impacted by multiple approved projects along the Santa Clara River and its tributaries. Some of these by out and out destruction of habitat, in addition the City and or Newhall have been unable to monitor mitigation. This has resulted in destruction of wetlands that were not addressed in the Natural River Management Plan, such as adjacent streambeds to San Francisquito Creek where native fish occurred last year. The die off of approximately 80% mitigated cottonwoods in the Santa Clara River have died. Off road vehicle use continues to destroy the sticklebacks breeding pools, these motorized vehicles are driving right through ponded water, again the City of Santa Clarita and Newhall has been unable to address this negative impact. Further development along the Santa Clara River has caused urban run-off of Diazinon known to be extremely toxic to native fish and bird species. People with their pets are now harassing our native wildlife and dog feces can be found all along the Santa Clara River and its triubtaries.

In short the City has failed to protect the resources of the Santa Clara River by multiple direct impacts and massive indirect impacts.

This project will be devastating for migrating wildlife. From the proposed TMC Mining Project to I-5 the Santa Clara River and its tributaries have lost nearly 100% of uplands to housing, commercial, roads, etc. This area along the river serves as an important area for foraging wildlife. It's the only upland left along the river in Santa Clarita Valley. San Diego Black Tailed Jack rabbits (California Species of Special Concern), Western Spadefoot Toads (California Species of Special Concern) are in two locations within this project, mule deer, White Tailed Kite (California Fully Protected), Coopers Hawk (California Species of Special Concern), Sharshin Hawk (Californis Species of Special Concern), coyotes, bobcats, native fox and many other species have been observed in the project area. We have not conducted any surveys these are simply species observed by individuals in the last few years in the project area. It's essential to recognized that nearly all animals that utilize the Santa Clara River for migration must be able to access uplands to escape predators, floods and for foraging.

We have many concerns on the impacts to wildlife including threatened and endangered species. We believe that this project will further degrade the Santa Clara River. We are adamantly opposed to this project!

Regards,
Peter Galvin
California and Pacific Director
Center for Biological Diversity
Post Office Box 40090
Berkeley, California 94704
Ph. (510) 841-0812
Fax (510) 841-0187

COUNTY OF LOS ANGELES

DEPARTMENT OF PUBLIC WORKS

900 SOUTH FREMONT AVENUE
ALHAMBRA, CALIFORNIA 91803-1331
Telephone: (626) 458-5100
www.ladpw.org

JAMES A. NOYES, Director

ADDRESS ALL CORRESPONDENCE TO:
P.O. BOX 1460
ALHAMBRA, CALIFORNIA 91802-1460

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OCT 30 2002

PLANNING AND BUILDING SERVICES
CITY OF SANTA CLARITA

October 22, 2002

IN REPLY PLEASE REFER TO FILE: WM-4

Mr. Jeff Hogan
City of Santa Clarita
23920 Valencia Boulevard, Suite 300
Santa Clarita, CA 91355

Dear Mr. Hogan:

RESPONSE TO A NOTICE OF PREPARATION
RIVERPARK PROJECT
TENTATIVE TRACT NO. 53425
CITY OF SANTA CLARITA

Thank you for the opportunity to provide comments on the Notice of Preparation for the proposed Tentative Tract No. 53425 Riverpark Project. This project is to develop 664 acres of land for single and multi-family uses and open space. The project is located at the terminus of Newhall Ranch Road, east of Bouquet Canyon Road, north of Soledad Canyon Road, adjacent to the Santa Clara River. We have reviewed the submittal and offer the following comments:

Environmental Programs

The document needs to address and discuss the project's impact on solid waste disposal and include these requirements. As projected in the Los Angeles Countywide Siting Element, which was approved by a majority of the cities in the County of Los Angeles in late 1997 and by the County Board of Supervisors in January 1998, a shortfall in permitted daily landfill capacity may be experienced in the County within the next few years. The construction activities and postdevelopment operation associated with the proposed development will increase the generation of solid waste and negatively impact solid waste management infrastructure in the County.

The proposed document must identify what specific measures the project proponent plans to implement to mitigate the impact. Mitigation measures may include, but are not limited to, implementation of waste reduction and recycling programs to divert the solid waste, including construction and demolition waste, from the landfills. The California Solid Waste Reuse and Recycling Access Act, as amended, requires each development project to

provide an adequate storage area for collection and removal of recyclable materials. The document should include standards to provide adequate storage areas for collection of recyclable and green waste materials for this project.

Our Environmental Programs Division must be contacted for required approvals and operating permits if the project includes the construction/installation, modification, or removal of underground storage tanks, industrial waste treatment or disposal facilities, or stormwater treatment facilities.

If you have any questions, please contact Mr. Wilson Fong at (626) 458-3581.

Geotechnical and Materials Engineering

The EIR shall address the geotechnical issues identified in the Notice of Preparation/Initial Study.

Description of the project and the associated grading, i.e., existing and proposed grades, etc., must be shown on a topographic map. Also, all geotechnical hazards must be identified and any mitigation measures discussed in detail. The requested information shall be included in the appropriate documents, as requested by others.

The project is located within a mapped potentially liquefiable area, per the State of California Seismic Hazard Zone Map, Newhall Quadrangle. However, a liquefaction analysis is not warranted at this time. Detailed liquefaction analyses, conforming to the requirements of the State of California Division of Mines and Geology Special Publication 117, must be conducted at the tentative map and/or grading/building plan stages.

If you have any questions, please contact Mr. Amir Alam at (626) 458-4972.

Land Development (Grading and Drainage)

We recommend that the applicant prepare a drainage concept/SUSMP report showing the extent of drainage impacts to County jurisdiction and facilities in the area, and if necessary, provide mitigation acceptable to the County. We recommend that a copy of the drainage concept/SUSMP report, once approved, be included in the EIR and other environmental documents.

In addition, pursuant to recent legislation related to SB221 and SB610, the environmental document shall address the adequacy of the water supply to ensure availability of water for the new development without adversely effecting existing users. The document shall provide for review the water supply assessment and water verification from water purveyors of this project.

Land Development (Transportation Planning)

As requested, we have reviewed the subject document and have no comments.

If you have any questions, please contact Mr. Hubert Seto at (626) 458-4349.

Traffic and Lighting

The proposed project has a potential to significantly impact the intersections and roadways in the area. A traffic study should be prepared to identify the traffic impact and to ensure the appropriate mitigations are proposed. The County's methodology should be used when evaluating the County and/or County/City intersections. The study should also address the cumulative impacts generated by this, and nearby developments, and include the level of service analysis for the affected intersections. If traffic signals or other mitigation measures are warranted at the affected intersections, the developer should determine his proportionate share of traffic signal or other mitigation costs and submit this information to Public Works for review and approval. A copy of our Traffic Impact Analysis Report Guidelines is enclosed.

We recommend that the State of California Department of Transportation review this document for significant impacts/mitigations within its jurisdiction.

If you have any questions, please contact Mr. Patrick Arakawa of our Traffic Studies Section at (626) 300-4867.

Watershed Management (Santa Clara River/Antelope Valley and Dominguez)

We encourage the applicant to use the Riverpark Project as a model for sustainable development by integrating watershed management Best Management Practices as part of the design. Some opportunities include:

- Considering onsite stormwater recycling. Large-scale stormwater recycling serves the dual purpose of mitigating the increased storm runoff resulting from increased hardscape as well as offsetting increased water demand resulting from increased population. An example - store storm runoff in underground cisterns for irrigation.

- Integrating stormwater runoff and pollution control BMPs in the design to eliminate pollution discharge from the proposed project.
- Landscaping with native, drought tolerant plants to reduce water demand.
- Evaluating the feasibility of using solar power and other alternative energy sources in common areas to offset dependence on nonrenewable energy sources.

If you have any questions regarding the above comments, please contact Mr. Suk Chong at (626) 458-4341.

The proposed project should include investigation of watershed management opportunities to maximize capture of local rainfall on the project site, eliminate incremental increase in flows to the storm drain system, and provide filtering of flows to capture contaminants originating from the project site.

If you have any questions regarding the above comments or the environmental review process of Public Works, please contact Ms. Massie Munroe at the address on the first page or at (626) 458-4359.

Very truly yours,

JAMES A. NOYES
Director of Public Works

ROD H. KUBOMOTO
Assistant Deputy Director
Watershed Management Division

MM:ro
C:\eirriverpark.wpd

Enc.

Traffic Impact Analysis Report Guidelines

January 1, 1997

Prepared by the County of Los Angeles
Department of Public Works

James A. Noyes
Director of Public Works

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IV.	Traffic Impact Analysis Report Check List	Exhibit A

JHC:ce
T-2/ACCESS2
(01/22/98)

I. Introduction

The County of Los Angeles Department of Public Works has established the following Guidelines for the preparation of Traffic Impact Analysis (TIA) reports. The purpose of these Guidelines is to establish procedures to ensure consistency of analysis and the adequacy of information presented and timely review by County staff. It is strongly recommended that the applicant's traffic engineer consult with County staff before beginning the study to establish the scope and basic assumptions of the study and any deviations from these Guidelines to avoid unnecessary delays or revisions. For assistance in the TIA scoping process, the Traffic and Lighting Division, Traffic Studies Unit, can be contacted at (626) 458-5909.

II. Requirements

Generally, the Department staff is concerned with adverse impacts on traffic if:

1. Traffic generated by a project considered alone or cumulatively with other related projects, when added to existing traffic volumes, exceeds certain capacity thresholds of an intersection or roadway, contributes to an unacceptable level of service (LOS), or exacerbates an existing congested condition.

2. Project generated traffic interferes with the existing traffic flow (e.g., due to the location of access roads, driveways, and parking facilities).

3. Proposed access locations do not provide for adequate safety (e.g., due to limited visibility on curving roadways).

4. Nonresidential uses generate commuter or truck traffic through a residential area.

5. Project generated traffic significantly increases on a residential street and alters its residential character.

A traffic report must be prepared by a registered Civil or Traffic Engineer. A traffic report is generally needed if a project generates over 500 trips per day or where other possible adverse impacts as discussed in the Analysis and Impact Section (see page 4) of these Guidelines are identified. Before a full review is conducted, the County staff will check the completeness of the TIA report using the attached check list (Exhibit A). If the report is missing any of the check list items, it will be returned for revision.

III. TIA Report Contents

A. Project Description

The following information is required:

1. A description of the project, including those factors which quantify traffic generators, e.g., dwelling units, square feet of office space, persons to be employed, restaurant seats, acres of raw land, etc. For residential developments, the description should indicate the type of residence, (e.g., one level or townhouse condominiums, and if its use is for families, adults or retirees).

2. A plot plan showing proposed driveways, streets, internal circulation, and any new parking facilities on the project site.

3. A vicinity map showing the site location and the study area relative to other transportation systems.

4. A brief history of the projects that are part of the phased Master Plan or a parent tract/parcel map.

B. Transportation Circulation Setting

The following information is required:

1. **Existing and Proposed Site Uses**

   A description of the permitted and/or proposed uses of the project site in terms of the various zoning and land use categories of the County, and the status and the usage of any facilities currently existing on the site.

2. **Existing and Proposed Roadways and Intersections**

   A description of existing streets and roadways, both within the project site (if any) and in the surrounding area. Include information on the roadway classifications (per the Highway Plan), the number of lanes and roadway widths, signalized intersections, separate turn lanes, and the signal phases for turning movements.

Existing daily directional and peak-hour through and turning traffic volumes on the roadways surrounding and/or logically associated with the project site, including Secondary and Major highways and freeways. Local streets affected by the project should also be shown. Each report shall include appendices providing count data used in the preparation of the report. The source and date of the traffic volume information shall be indicated. Count data should not be over one year old. Since peak volumes vary considerably, a ten percent daily variation is not uncommon, especially on recreational routes or roadways near shopping centers; therefore, representative peak-hour volumes are to be chosen carefully.

All assumed roadways and intersections or any other transportation circulation improvements must be identified and discussed. The discussion should include the scope and the status of the assumed improvements including the construction schedule and financing plan. It should be noted that all assumed roadways and intersections or any other transportation circulation improvements will be made a condition of approval for the project to be in place prior to the issuance of building permits. If assumed improvements do not get built on time due to an unforeseeable condition, traffic conditions for a different assumed highway network or other mitigation measures will be considered if a traffic study is submitted with a different assumed network or other measures are recommended to mitigate the traffic impact in question.

C. Analysis and Impact

The following information is required:

1. Trip Generation Analysis

Tabulate the estimated number of daily trips and a.m. and p.m. peak-hour trips generated by the proposed project entering and exiting the site. Trip generation factors and source are to be included. The trip generation rates contained in the latest edition of the Institute of Transportation Engineers Trip Generation manual should generally be used, except in the case of condominiums/townhomes when the following rates should be used per unit:

	ADT	A.M.-Peak	P.M.-Peak
		Outgoing/Incoming	Outgoing/Incoming
Condominiums/ Townhomes	8.0	0.48/0.06	0.26/0.47

There may be a trip reduction due to internal and/or pass-by trips. Internal trip reduction can only be applied for mixed-use types of developments and pass-by trip reduction for retail/commercial types of developments. Internal or pass-by trip reduction assumptions will require analytical support based on verifiable actual similar developments to demonstrate how the figures were derived and will require approval by the County.

2. Trip Distribution

Diagrams showing the percentages and volumes of the project and nearby project's a.m. and p.m. peak-hour trips logically distributed on the roadway system must be provided. The Regional Daily Trip Distribution Factors (Exhibit D-3) contained in the Congestion Management Program (CMP) Land Use Analysis Guidelines shall be referenced for regional trip distribution assumptions. If it is assumed that new routes will alter traffic patterns, adequate backup including traffic distribution maps must be provided showing how and why these routes will alter traffic patterns.

The study area should include arterial highways, freeways, and intersections generally within a one-mile radius of the project site.

Note: This distance may be greater than one-mile for rural areas depending on the proximity to nearby signalized intersections and the availability of master plan access routes.

3. Related Projects List

A list of related projects that are approximately within a one-and-a-half mile radius of the project site and would reasonably be expected to be in place by the project's build out year must be included in the report. Related projects shall include all pending, approved, recorded, or constructed projects that are not occupied at the time of the existing traffic counts.

The County of Los Angeles Department of Regional Planning (DRP) and other public agencies (if necessary) should be contacted to obtain the latest listings. A table and a map showing the status, project/zone change/conditional use permit/parcel map/tract number, and the location of each project must be provided. For a computer printout of the listing of all filed projects within the County, Land Development Management Section of the DRP, at (213) 974-6481 can be contacted.

4. LOS Analysis

If it appears that the project's generated traffic alone or together with other projects in the area could worsen the LOS of an intersection or roadway, a "before" and "after" LOS analysis is necessary. The Intersection Capacity Utilization (ICU) or Critical Movement Analysis are two methods often used to assess existing and future LOS at intersections.

If the ICU planning method is used, a maximum of 1,600 vehicles per hour per lane should be used (2,880 vehicles per hour should be used for dual left-turn lanes) and a ten percent yellow clearance cycle should be included. Intersection LOS analysis and calculation work sheets, as well as diagrams showing turning volumes shall be included in the report for the following traffic conditions.

(a) Existing traffic;
(b) Existing traffic plus ambient growth to the year the project will be completed (preproject);
(c) Traffic in (b) plus project traffic;
(d) Traffic in (c) with the proposed mitigation measures (if necessary);
(e) Traffic in (c) plus the cumulative traffic of other known developments; and
(f) Traffic in (e) with the proposed mitigation measures (if necessary).

The project's impact on two-lane roadways should also be analyzed for all of the above traffic conditions if those two-lane roadways are used for access. LOS service analysis contained in the Highway Capacity Analysis, Chapter 8, Two-Lane Highways, should be used to evaluate the project's impact. For simplified analysis, use the established significant impact thresholds for two-lane roadways as shown on page 7.

5. Significant Impact Threshold

For intersections, the impact is considered significant if the project related increase in the volume to capacity (v/c) ratio equals or exceeds the threshold shown below.

INTERSECTIONS		
Preproject		Project /C Increase
LOS	V/C	
C	0.71 to 0.80	0.04 or more
D	0.81 to 0.90	0.02 or more
E/F	0.91 or more	0.01 or more

The project is deemed to have a significant impact on two-lane roadways when it adds the following percentages based on LOS of the preproject conditions.

TWO-LANE ROADWAYS				
		Percentages Increase in Passenger Car Per Hour (PCPH) by Project		
		Preproject LOS		
Directional Split	Total Capacity (PCPH)	C	D	E/F
50/50	2,800	4	2	1
60/40	2,650	4	2	1
70/30	2,500	4	2	1
80/20	2,300	4	2	1
90/10	2,100	4	2	1
100/0	2,000	4	2	1

6. Analysis Discussion

Discuss conclusions regarding the adverse impacts caused by the proposed project on the roadway system. If the cumulative traffic impact of this and other projects require mitigation measures, such as traffic signals, then estimate the percent share using the project percent share formula given in the Section III D of the TIA Guidelines. When the proposed project and other nearby developments are expected to significantly impact adjacent roadways, the developer may be required to enter into a secured agreement to contribute to a benefit district to fund major roadway and bridge improvements in the region. Also, for all recommendations to increase the number of travel lanes on a street or at an intersection as a mitigation measure, the report must clearly identify the impacts associated with such a change such as whether or not additional right of way will be required and whether it is feasible to acquire the right of way based on the level of development of the adjacent land and buildings (if any).

Discuss other possible adverse impacts on traffic. Examples of these are: (1) the limited visibility of access points on curved roadways; (2) the need for pavement widening to provide left-turn and right-turn lanes at access points into the proposed project; (3) the impact of increased traffic volumes on local residential streets; and (4) the need for road realignment to improve sight distance.

Projects which propose to amend the County's General Plan Land Use and substantially increase potential traffic generation must provide an analysis of the project at current planned land use versus proposed land use in the build out condition for the project area. The purpose of such analysis is to provide decision makers with the understanding of the planned circulation network's ability to accommodate additional traffic generation caused by the proposed General Plan Land Use amendments.

D. Traffic Models and Model Generated TIA's

Computerized traffic models are planning tools used to develop future traffic projections based on development growth patterns. The Department currently operates two traffic models, one for the Santa Clarita Valley and another for the Ventura Corridor area. The Department can test proposed development project traffic impacts for the public in these areas for a fee. For assistance in the traffic modeling, the Planning Division, Transportation Planning/Assessments Section, can be contacted at (626) 458-4351.

For TIA's prepared using data from outside traffic modeling, the following information is required:

1. The type of modeling software used to generate the traffic analysis report data (i.e., TRANPLAN, EMME/2, etc.).

2. The list of land use assumptions by traffic analysis zones (TAZ's) and their sources used in the traffic model in lieu of a related projects list.

3. A copy of the computerized roadway network assumed to be in place at the time of the project. Streets should be color-coded by street type. Also, TAZ's and their corresponding centroidal connectors, as well as number of lanes should be displayed.

4. The list of trip generation rates used in the traffic model and their sources.

5. Model runs (plots) identifying both the with and without project scenarios. The volumes displayed on the plots should be in 100's for Average Daily Vehicle Trips (ADT) and 10's for peak-hour plots.

E. Traffic Signals

The following information is required:

Traffic signal warrant analysis using the State of California Department of Transportation (Caltrans) Peak-Hour (Figures 9-8 and 9-9 of Caltrans Traffic Manual) and Estimated Average Daily (Figure 9-4 of Caltrans Traffic Manual) Traffic Warrant Analysis should be provided. If the installation of signals is warranted with the addition of the project's traffic, then the installation will be the sole responsibility of the project. If it is warranted with cumulative traffic of the project and other related projects, the following formula should be used to calculate the project percent share.

$$\textbf{Project Percentage Share} = \frac{\text{Project Traffic}}{\text{Project+Other Related Projects Traffic}}$$

The project percent share should be based on the peak-hour volumes that warrant signals. If both peak hours satisfy the installation of signals, the average of the two peak-hour volumes should be used in the percent share analysis.

F. Mitigation Measures

The following information is required.

Identify feasible mitigation measures which would mitigate the project and/or other related projects' significant impacts to a level of insignificance. Also, identify those mitigation measures which will be implemented by others. Those mitigation measures that are assumed to be implemented by others will be made a condition of approval for the project to be in place prior to issuance of building permits. Mitigation measures may include, but are not limited to, the following:

1. Traffic Engineering Techniques.

a. Locate access points to optimize visibility and reduce potential conflict.
b. Design parking facilities to avoid queuing into public streets during peak arrival periods.
c. Provide additional off-street parking.
d. Dedicate visibility easements to assure adequate sight distance at intersections and driveways.
e. Signalize or modify traffic signals at intersections.
f. Install left-turn phasing and/or multiple turning lanes to accommodate particularly heavy turning movements.
g. Widen the pavement to provide left- or right-turn lanes to lessen the interference with the traffic flow.[1]
h. Widen intersection approaches to provide additional capacity.
I. Prohibit left turns to and from the proposed development.
j. Restrict on-street parking during peak hours to increase street capacity.[1]

2. Contribute to a benefit district to fund major capital improvements

---

1 Physical roadway improvements to improve capacity should be considered before considering parking restrictions.

a. Construct a grade separation.
b. Improve or construct alternate routes.
c. Complete proposed routes shown on the Los Angeles Highway Plan.
d. Improve freeway interchanges (bridge, widening, modifications, and etc.).

3. **Transportation System Management (TSM) Techniques**[2]

a. Establish flexible working hours.
b. Encourage employee use of carpools and public transportation (specific measures must be indicated).
c. Establish preferential parking for carpools.
d. Restrict truck deliveries to Major and Secondary highways and encourage deliveries during the off-peak hours.
e. Establish a monitoring program to ensure that project traffic volumes do not exceed projected traffic demand.

Note: When it appears that other jurisdictions will be impacted by a development, the Department will request that the involved jurisdiction also review the TIA. A written response from that jurisdiction should be provided with appropriate follow-up to the lead County agency.

G. CMP Guidelines

The following information is required:

Where the project meets the criteria established in the County of Los Angeles' CMP Land Use Analysis Guidelines, a CMP analysis must be provided. A copy of the latest Guidelines will be available upon request. A CMP TIA is required for all projects required to prepare an Environmental Assessment based on local determination or projects requiring a traffic study.

---

2 Contributions to a benefit district and/or TSM techniques may not be used to lower LOS in the capacity calculations.

The geographic area examined in the TIA must include the following, at a minimum.

- All CMP arterial monitoring intersections (see Exhibit B of the Guidelines), including freeway on- or off-ramp intersections, where the proposed project will add 50 or more trips during either the a.m. or p.m. peak hours.

- Main line freeway monitoring locations (see Exhibit C of the Guidelines) where the project will add 150 or more trips, in either direction, during the a.m. or p.m. weekday peak hours.

- Caltrans must also be consulted to identify other specific locations to be analyzed on the State highway system.

If, based on these criteria, the TIA identifies no facilities for study, no further traffic analysis is required.

JHC:ce
T-2/ACCESS
(01/07/99)

Attach.

EXHIBIT A
TRAFFIC IMPACT ANALYSIS REPORT CONTENTS CHECK LIST

Note: Before a full review is conducted, PW's staff will check the completeness of the Traffic Impact Analysis Report. If the Report is missing any of the items listed below, it will be returned for revision.

CONTENT	YES/ NO	COMMENT
Site Plan • Access locations • Interior circulation		
Trip Generation Rates • Institute of Transportation Engineers (ITE) trip generation rates • Documentation for alternate rates		
Trip Distribution • Regional • Local project (am/pm) • Local related projects(am/pm)		
Traffic Counts • Taken within one year • Date/Time		
Discounting • Internal trip discounts for mixed use developments • Pass-by trip discounts for commercial/retail developments • Backup		
Level of Service Calculations • Intersection Capacity Utilization (ICU) or Criteria Movement Analysis • 10 percent yellow clearance for ICU planning method • 1,600 vehicles per lane (vpl); 2,880 vpl for dual left-turn lanes for ICU planning method • Calculation sheets • Scenarios as required per Guidelines • Existing/Future lane configurations		
Signal Warrant Analysis • Peak-hour/Average Daily Traffic per the State of California Department of Transportation standards		
Mitigation Measures • Project impacts • Cumulative developments impacts • Projects percent share of the cost to mitigate cumulative development impacts		
Congestion Management Program Analysis		

JHC:ce
T-2/ACCESS3
02/22/99

COUNTY OF LOS ANGELES
FIRE DEPARTMENT

5823 Rickenbacker Road
Commerce, California 90040

CITY OF SANTA CLARITA MASTER CASE # 02-175

CONDITIONS OF APPROVAL FOR SUBDIVISIONS - INCORPORATED

Subdivision No: 53425 Map Date September 12, 2002

C.U.P. City Santa Clarita

☒ **FIRE DEPARTMENT HOLD** on the tentative map shall remain until verification from the Los Angeles County Fire Dept. Planning Section is received, stating adequacy of service. Contact (323) 881–2404.

☒ Access shall comply with Section 902 of the Fire Code, which requires all weather access. All weather access may require paving.

☒ Fire Department Access shall be extended to within 150 feet distance of any exterior portion of all structures.

☒ Where driveways extend further than 300 feet and are of single access design, turnarounds suitable for fire protection equipment use shall be provided and shown on the final map. Turnarounds shall be designed, constructed and maintained to insure there integrity for Fire Department use. Where topography dictates, turnarounds shall be provided for driveways that extend over 150 feet in length.

☒ Private driveways shall be indicated on the final map as "Private Driveway and Firelane" with the widths clearly depicted and shall be maintained in accordance with the Fire Code. All required fire hydrants shall be installed, tested and accepted prior to construction.

☒ Vehicular access must be provided and maintained serviceable throughout construction to all required fire hydrants. All required fire hydrants shall be installed, tested and accepted prior to construction.

☒ This property is located within the area described by the Fire Department as "Very High Fire Hazard Severity Zone" (formerly Fire Zone 4). A "Fuel Modification Plan" shall be submitted and approved prior to final map clearance. (Contact Fuel Modification Unit, Fire Station #32, 605 North Angeleno Avenue, Azusa, CA 91702-2904, Phone (626) 969-5205, for details).

☒ Provide Fire Department or City approved street signs and building access numbers prior to occupancy.

☐ Additional fire protection systems shall be installed in lieu of suitable access and/or fire protection water.

☐ The final concept map, which has been submitted to this department for review, has fulfilled the conditions of approval recommended by this department for access only.

☐ These conditions shall be secured by a C.U.P. and/or Covenant and Agreement approved by the County of Los Angeles Fire Department prior to final map clearance.

☐ The Fire Department has no additional requirements for this division of land.

Comments: **FIRE DEPARTMENT HOLD FOR SECOND MEANS OF ACCESS. A second means of access is required prior to the construction of the 301st dwelling unit. The number of dwelling units includes all single family homes, and all the units within the apartments and town-homes. Please refer to page 3 for additional conditions for access.**

RECEIVED
PLANNING DIVISION
OCT 25 2002

INSPECTOR Wally Collins WC DATE October 24, 2002

Land Development Unit – Fire Prevention Division – (323) 890-4243, Fax (323) 890-9783

Form 266 9/01

PLANNING AND BUILDING SERVICES
CITY OF SANTA CLARITA

COUNTY OF LOS ANGELES
FIRE DEPARTMENT

5823 Rickenbacker Road
Commerce, California 90040

WATER SYSTEM REQUIREMENTS – INCORPORATED

Subdivision No: **53425** Map Date **September 12, 2002**

C.U.P. _____ City **Santa Clarita**

☒ Provide water mains, fire hydrants and fire flows as required by the County of Los Angeles Fire Department, for all land shown on map which shall be recorded.

☒ The required fire flow for public fire hydrants at this location is **1250** gallons per minute at 20 psi for a duration of **2** hours, over and above maximum daily domestic demand. **1** Hydrant(s) flowing simultaneously may be used to achieve the required fire flow.

☐ The required fire flow for private on-site hydrants is ____ gallons per minute at 20 psi. Each private on-site hydrant must be capable of flowing ____ gallons per minute at 20 psi with two hydrants flowing simultaneously, one of which must be the furthest from the public water source.

☒ Fire hydrant requirements are as follows:

Install **73** public fire hydrant(s). Upgrade / Verify ____ existing Public fire hydrant(s).
Install ____ private on-site fire hydrant(s).

☒ All hydrants shall measure 6"x 4"x 2-1/2" brass or bronze, conforming to current AWWA standard C503 or approved equal. All on-site hydrants shall be installed a minimum of 25' feet from a structure or protected by a two (2) hour rated firewall.

☒ Location: As per map on file with the office.
☒ Other location: **Please refer to the attached Tentative Tract Map for hydrant locations.**

☒ All required fire hydrants shall be installed, tested and accepted or bonded for prior to Final Map approval. Vehicular access must be provided and maintained serviceable throughout construction.

☐ The County of Los Angeles Fire Department is not setting requirements for water mains, fire hydrants and fire flows as a condition of approval for this division of land as presently zoned and/or submitted.

☐ Additional water system requirements will be required when this land is further subdivided and/or during the building permit process.

☐ Hydrants and fire flows are adequate to meet current Fire Department requirements.

☐ Upgrade not necessary, if existing hydrant(s) meet(s) fire flow requirements.

SUBMIT COMPLETED (ORIGINAL ONLY) FIRE FLOW AVAILABILITY FORM TO THIS OFFICE FOR REVIEW.

COMMENTS: **Additional fire hydrants and increased fire flow will be required for the apartments and the town-homes.**

All hydrants shall be installed in conformance with Title 20, County of Los Angeles Government Code and County of Los Angeles Fire Code, or appropriate City regulations. This shall include minimum six-inch diameter mains. Arrangements to meet these requirements must be made with the water purveyor serving the area.

By Inspector **Wally Collins** (W) C Date **October 24, 2002**

COUNTY OF LOS ANGELES
FIRE DEPARTMENT

5823 Rickenbacker Road
Commerce, California 90040

SUBDIVISION, WATER AND ACCESS REQUIREMENTS

ADDITIONAL PAGE

SUBDIVISION NO. 53425 **PAGE NO. 3**

ADDITIONAL ACCESS REQUIREMENTS:

1 Temporary turn-arounds are required for the end of Newhall Ranch Road and end of Santa Clarita Parkway. The turn-arounds shall be either a cul-de-sac bulb with a 32-foot center line or a hammer-head design, which would be posted and red curbbed "NO PARKING - FIRE LANE".

2 Provide the purpose and width of the private street located in Area C. Additional street width and a turn-around may be required.

3 All streets with center medians shall have a minimum paved width of 20 feet on each side of the median, with street posted and red curbbed "NO PARKING - FIRE LANE".

4 If gates are installed, provide 4 sets of gate detail plans to the Department's Land Development Unit prior to any approvals for this Tract Map, and the construction of any dwelling unit. Gates shall conform to the Department's Regulation #5.

5 Additional access requirements will be needed for the apartments and town-homes.

6 Any form of traffic calming measure (bulb-outs, traffic-circles, etc.) to be used in this project shall be submitted to the Department's Land Development Unit prior to approval of this Tract Map, and the construction of any dwelling unit.

7 All street widths shall be measured from the curb flow line to curb flow line. Street widths for this project shall conform to the widths indicated on the cross-sections on this Tract Map.

By Inspector: Wally Collins WC Date: October 24, 2002

WATER RECLAMATION
SOLID WASTE MANAGEMENT

COUNTY SANITATION DISTRICTS
OF LOS ANGELES COUNTY

1955 Workman Mill Road, Whittier, CA 90601-1400
Mailing Address: P.O. Box 4998, Whittier, CA 90607-4998
Telephone: (562) 699-7411, FAX: (562) 699-5422
www.lacsd.org

JAMES F. STAHL
Chief Engineer and General Manager

October 1, 2002

RECEIVED
PLANNING DIVISION
OCT 0 2 2002
PLANNING AND BUILDING SERVICES
CITY OF SANTA CLARITA

File No: 26-00.04-00

Mr. Jeff Hogan, Associate Planner
City of Santa Clarita
23920 Valencia Boulevard, Suite 300
Santa Clarita, CA 91355

Dear Mr. Hogan:

Tentative Tract Map No. 53425, Riverpark (Panhandle)

The County Sanitation Districts of Los Angeles County (Districts) received a Notice of Preparation of a Draft Environmental Impact Report for the subject project on September 19, 2002. The proposed development is located within the jurisdictional boundaries of District No. 26. We offer the following comments regarding sewerage service:

1. Because of the project's location, the flow originating from the proposed project would have to be transported to the Districts' trunk sewer by local sewers which are not maintained by the Districts. If no local sewer lines currently exist, it is the responsibility of the developer to convey any wastewater generated by the project to the nearest local sewer and/or Districts' trunk sewer. Local sewers west of the project area convey wastewater to the Districts' Bouquet Canyon Relief Trunk Sewer, located in Bouquet Canyon Road at Espuella Drive and Newhall Ranch Road. This 24-inch diameter trunk sewer has a design capacity of 11.6 million gallons per day (mgd) and conveyed a peak flow of 5.2 mgd when last measured in 2001.

2. The Districts operate two water reclamation plants (WRPs), the Saugus WRP and the Valencia WRP in order to provide wastewater treatment in the Santa Clarita Valley. These facilities are interconnected to form a regional treatment system known as the Santa Clarita Valley Joint Sewerage System (SCVJSS) which has a permitted treatment capacity of 19.1 mgd. A two phase expansion of the Valencia WRP has been currently approved which will increase the treatment capacity of the SCVJSS by 15 mgd. The first phase, scheduled to be completed by mid 2003, will consist of a 9 mgd expansion and is expected to meet the Regional Growth Management Plan forecasted demand through 2010. The second phase, scheduled to be completed by early 2010, will consist of an additional 6 mgd expansion and will increase the SCVJSS treatment capacity to 34.1 mgd which will be sufficient to meet the demand until 2015. The SCVJSS currently processes an average flow of 17.3 mgd.

3. The expected average wastewater flow from the project site is 238,323 gallons per day. A copy of the Districts' average wastewater generation factors is enclosed for your information.

4. The Districts are empowered by the California Health and Safety Code to charge a fee for the privilege of connecting (directly or indirectly) to the Districts' Sewerage System or **increasing the existing strength and/or quantity of wastewater attributable to a particular parcel or operation already connected**. This connection fee is required to construct an incremental expansion of the Sewerage System to accommodate the proposed project which will mitigate the impact of this project on the present Sewerage System. Payment of a connection fee will be required before a permit to connect to the sewer is issued. A copy of the Connection Fee Information Sheet is enclosed for your convenience. For more specific information regarding the connection fee application procedure and fees, please contact the Connection Fee Counter at extension 2727.

5. In order for the Districts to conform with the requirements of the Federal Clean Air Act (CAA), the design capacities of the Districts' wastewater treatment facilities are based on the regional growth forecast adopted by the Southern California Association of Governments (SCAG). Specific policies included in the development of the SCAG regional growth forecast are incorporated into the Air Quality Management Plan, which is prepared by the South Coast Air Quality Management District in order to improve air quality in the South Coast Air Basin as mandated by the CAA. All expansions of Districts' facilities must be sized and service phased in a manner which will be consistent with the SCAG regional growth forecast for the counties of Los Angeles, Orange, San Bernardino, Riverside, Ventura, and Imperial. The available capacity of the Districts' treatment facilities will, therefore, be limited to levels associated with the approved growth identified by SCAG. As such, this letter does not constitute a guarantee of wastewater service, but is to advise you that the Districts intend to provide this service up to the levels which are legally permitted and to inform you of the currently existing capacity and any proposed expansion of the Districts' facilities.

If you have any questions, please contact the undersigned at (562) 699-7411, extension 2717.

Very truly yours,

James F. Stahl

Ruth I. Frazen

Ruth I. Frazen
Engineering Technician
Planning & Property Management Section

RIF:eg

Enclosures

TABLE 1
LOADINGS FOR EACH CLASS OF LAND USE

DESCRIPTION	UNIT OF MEASURE	FLOW (Gallons per Day)	COD (Pounds per Day)	SUSPENDED SOLIDS (Pounds per Day)
RESIDENTIAL				
Single Family Home	Parcel	260	1.22	0.59
Duplex	Parcel	312	1.46	0.70
Triplex	Parcel	468	2.19	1.05
Fourplex	Parcel	624	2.92	1.40
Condominiums	Parcel	195	0.92	0.44
Single Family Home (reduced rate)	Parcel	156	0.73	0.35
Five Units or More	No. of Dwlg. Units	156	0.73	0.35
Mobile Home Parks	No. of Spaces	156	0.73	0.35
COMMERCIAL				
Hotel/Motel/Rooming House	Room	125	0.54	0.28
Store	1000 ft^2	100	0.43	0.23
Supermarket	1000 ft^2	150	2.00	1.00
Shopping Center	1000 ft^2	325	3.00	1.17
Regional Mall	1000 ft^2	150	2.10	0.77
Office Building	1000 ft^2	200	0.86	0.45
Professional Building	1000 ft^2	300	1.29	0.68
Restaurant	1000 ft^2	1,000	16.68	5.00
Indoor Theatre	1000 ft^2	125	0.54	0.28
Car Wash				
Tunnel - No Recycling	1000 ft^2	3,700	15.86	8.33
Tunnel - Recycling	1000 ft^2	2,700	11.74	6.16
Wand	1000 ft^2	700	3.00	1.58
Financial Institution	1000 ft^2	100	0.43	0.23
Service Shop	1000 ft^2	100	0.43	0.23
Animal Kennels	1000 ft^2	100	0.43	0.23
Service Station	1000 ft^2	100	0.43	0.23
Auto Sales/Repair	1000 ft^2	100	0.43	0.23
Wholesale Outlet	1000 ft^2	100	0.43	0.23
Nursery/Greenhouse	1000 ft^2	25	0.11	0.06
Manufacturing	1000 ft^2	200	1.86	0.70
Dry Manufacturing	1000 ft^2	25	0.23	0.09
Lumber Yard	1000 ft^2	25	0.23	0.09
Warehousing	1000 ft^2	25	0.23	0.09
Open Storage	1000 ft^2	25	0.23	0.09
Drive-in Theatre	1000 ft^2	20	0.09	0.05

INFORMATION SHEET FOR APPLICANTS
PROPOSING TO CONNECT OR INCREASE THEIR DISCHARGE TO
THE COUNTY SANITATION DISTRICTS OF LOS ANGELES COUNTY SEWERAGE SYSTEM

THE PROGRAM

The County Sanitation Districts of Los Angeles County are empowered by the California Health and Safety Code to charge a fee for the privilege of connecting to a Sanitation District's sewerage system. Your connection to a City or County sewer constitutes a connection to a Sanitation District's sewerage system as these sewers flow into a Sanitation District's system. The County Sanitation Districts of Los Angeles County provide for the conveyance, treatment, and disposal of your wastewater. **PAYMENT OF A CONNECTION FEE TO THE COUNTY SANITATION DISTRICTS OF LOS ANGELES COUNTY WILL BE REQUIRED BEFORE A CITY OR THE COUNTY WILL ISSUE YOU A PERMIT TO CONNECT TO THE SEWER.**

I. WHO IS REQUIRED TO PAY A CONNECTION FEE?

(1) Anyone connecting to the sewerage system for the first time any structure located on a parcel(s) of land within a County Sanitation District of Los Angeles County.

(2) Anyone increasing the quantity of wastewater discharged due to the construction of additional dwelling units on or a change in land usage of a parcel already connected to the sewerage system.

(3) Anyone increasing the improvement square footage of a commercial or institutional parcel by more than 25 percent.

(4) Anyone increasing the quantity and/or strength of wastewater from an industrial parcel.

(5) If you qualify for an Ad Valorem Tax or Demolition Credit, connection fee will be adjusted accordingly.

II. HOW ARE THE CONNECTION FEES USED?

The connection fees are used to provide additional conveyance, treatment, and disposal facilities (capital facilities) which are made necessary by new users connecting to a Sanitation District's sewerage system or by existing users who significantly increase the quantity or strength of their wastewater discharge. The Connection Fee Program insures that all users pay their fair share for any necessary expansion of the system.

III. HOW MUCH IS MY CONNECTION FEE?

Your connection fee can be determined from the Connection Fee Schedule specific to the Sanitation District in which your parcel(s) to be connected is located. A Sanitation District boundary map is attached to each corresponding Sanitation District Connection Fee Schedule. Your City or County sewer permitting office has copies of the Connection Fee Schedule(s) and Sanitation District boundary map(s) for your parcel(s). If you require verification of the Sanitation District in which your parcel is located, please call the Sanitation Districts' information number listed under Item IX below.

IV. WHAT FORMS ARE REQUIRED*?

The Connection Fee application package consists of the following:

MWD
METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA

Executive Office

October 15, 2002

Jeff Hogan, Associate Planner
City of Santa Clarita
23920 Valencia Boulevard, Suite 300
Santa Clarita, CA 91355

Dear Mr. Hogan:

Initial Study and Notice of Preparation for the
Draft Environmental Impact Report for the Riverpark Project (Tentative Tract Map 53425)

The Metropolitan Water District of Southern California (Metropolitan) has received the Initial Study and Notice of Preparation for a Draft Environmental Impact Report for the Riverpark Project (Tentative Tract Map 53425) in the city of Santa Clarita (City). The proposed project includes the development of six parcels of land totaling 664.3 acres for single- and multi-family uses. A tentative tract map is required to subdivide the six lots into 478 single-family lots, 15 multi-family lots, and other lots for utilities and open space. The proposed project is located at the terminus of Newhall Ranch Road, east of Bouquet Canyon Road, and north of Soledad Canyon Road. The comments herein represent Metropolitan's response to the Initial Study as a potentially affected public agency.

Our review of the Initial Study indicates that Metropolitan owns and operates a facility adjacent to the proposed project area. Metropolitan's Foothill Feeder pipeline is adjacent to the southwest corner of the proposed Riverpark development. The pipeline, which is located in property owned by Metropolitan, extends in a generally northwest-southeast direction in the proposed project area. The pipeline is located within a tunnel right-of-way southeast of Bouquet Canyon Road.

Based on review of the Initial Study, the document does not identify Metropolitan's pipeline as being in the vicinity of the project area. Metropolitan is concerned with potential impacts to this facility associated with future excavation and new construction as a result of the proposed project. Metropolitan requests that the City take Metropolitan's facilities into consideration in its project planning. Metropolitan also requests that the City identify whether any protection or relocation of Metropolitan's facilities would be required.

In order to avoid potential conflicts with Metropolitan's rights-of-way, we request that any design plans for any activity in the area of Metropolitan's pipelines or structures be submitted for our review and written approval. The applicant may obtain detailed prints of drawings of Metropolitan's pipelines and rights-of-way by calling Metropolitan's Substructures Information Line at (213) 217-6564. To assist the applicant in preparing plans that are compatible with Metropolitan's facilities and easements, we have enclosed a copy of the "Guidelines for Developments in the Area of Facilities, Fee Properties, and/or Easements of The Metropolitan Water District of Southern California." Please note that all submitted designs or plans must clearly identify Metropolitan's facilities and rights-of-way.

Metropolitan must be allowed to maintain its right-of-way and access to its facilities at all times in order to repair and maintain the current condition of those facilities.

The Initial Study indicates that bank stabilization will be constructed along the Santa Clara River as part of the proposed project. Bank stabilization will be constructed for approximately 1,500 linear feet for the east-west extension of Newhall Ranch Road and approximately 4,150 linear feet for the project development. Metropolitan is concerned with the impacts that bank stabilization could have on Metropolitan's property north of Bouquet Canyon Road in the vicinity of the Santa Clara River. Metropolitan requests that the City consider the effect of bank stabilization on the flow of the Santa Clara River and its potential impact to Metropolitan's property. If impacts to Metropolitan's property are identified, corrective measures or additional maintenance activities required on Metropolitan property must be identified and discussed in the EIR by the project proponent.

Additionally, the Initial Study also acknowledges that further analysis of water issues, such as increased runoff into the Santa Clara River caused by the proposed increase in impermeable or impervious features, is required in the Draft EIR. Metropolitan is concerned with the increased runoff and how it may impact Metropolitan's property in the proposed project area. Metropolitan requests that the City analyze the impacts of increased runoff to the Santa Clara River and its potential impact to Metropolitan's property. If impacts to Metropolitan's property are identified, corrective measures or additional maintenance activities required on Metropolitan property must be identified and discussed in the EIR by the project proponent.

Metropolitan encourages projects to include water conservation measures. Water conservation, reclaimed water use, and groundwater recharge programs are integral components to regional water supply planning. Metropolitan supports mitigation measures such as using water efficient fixtures, drought-tolerant landscaping, and reclaimed water to offset any increase in water use associated with the proposed project.

We appreciate the opportunity to provide input to your planning process and we look forward to receiving future environmental documentation on this project. If we can be of further assistance, please contact William Fong of the Environmental Planning Team at (213) 217-6066.

Very truly yours,

Laura J. Simonek

Laura J. Simonek
Manager, Asset Management
and Facilities Planning Unit

JAH: rdl
(Public Folders/EPT/Letters/15-OCT-02.doc – Jeff Hogan)

Enclosures: Planning Guidelines

SCOPE
Santa Clarita Organization for Planning and the Environment
TO PROMOTE, PROTECT AND PRESERVE THE ENVIRONMENT, ECOLOGY AND QUALITY OF LIFE IN THE SANTA CLARITA VALLEY
POST OFFICE BOX 1182, SANTA CLARITA, CA 91386

11-27-02

Attn: Jeff Hogan[redacted]
City of Santa Clarita
23920 Valencia Blvd.
Santa Clarita, Ca. 91355

Re: Notice of Preparation, River Park Project

Thank-you for the opportunity to comment on issues that should be disclosed in the upcoming EIR. We agree with the categories you have checked on the first page of the NOP and the potentially affected environmental factors indicated on page 3, but believe that the fiscal impact of this proposal and the jobs/housing balance should also be discussed. We concur with your determination that an EIR must be provided. We request that we receive that document for review when it becomes available.

We generally agree with the areas you have found to be of potentially significant impact except on page 12 Item XVII b. and c. Both these items should be check "Potentially significant " Degrading critical habitat for endangered species, loss of water recharge areas, adding additional water users before an adequate water supply is identified, and reducing the flood plain of the Santa Clara River are all impacts that will produce long-term negative and unmitigatable impacts to the water shed. The cumulative impacts of this project when considered with all the other projects along the Santa Clara River and its tributaries are severe.

When evaluating biological impacts, we request that the City hire an independent biologist to do species surveys including surveys for the Arroyo Toad and endangered bird and plant species. Newhall Land did not produce complete and accurate in the past, nor was survey protocol correctly followed. Hazing machines were used to scare of endangered birds during their nesting seasons and a siting of the arroyo toad and finding of the slender-horned spine flower colonies were either not reported or inadequately reported. Brush grading of habitat areas has already occurred on site. We question why such brushing should have occurred PRIOR to the preparation of an Environmental Impact Report in a sensitive habitat area. Since normally brushing permits are required, we wonder why the City would have issued such a permit with full knowledge that a project requiring the preparation of an EIR was being proposed. We ask that these issues be addressed in the EIR. Also, when discussing biological impacts, we request that historical information PRIOR to brush grading, be used as the habitat baseline and that historical surveys prior to bush grading be included in the EIR.

Impacts to wildlife movement should be discussed. Comments from all conservation agencies engaged in ensuring viability of wildlife should be solicited, including the Santa Monica Mountains Conservancy.

Cumulative analysis of impacts to the watershed must address loss of recharge areas and surface flows, impacts to water supply, increased flood flows and water velocities and cumulative losses to species and habitats. Cumulative analysis should be prepared with an eye to the parameters and goals enumerated in the recent Appellate Court decision Communities for a Better Environment v. California Resources Agency (Oct. 28, 2002). The case has no official citation yet, but the Third District Docket # is C038844.

The City should be aware that this area is in the Valencia Water Co. service area. The Valencia Water Co. is the wholly owned subsidiary of Newhall Land and Farming and as a private water company, is governed by the Public Utilities Commission. Since the water company is owned by the developer of the proposed project, water supply information may be structured to support the approval of the parent company's proposal. Therefore, independent analysis should be obtained to accurately asses water availability. Further, the Public Utilities Commission is now acting under new regulations. All new projects within the Valencia Water Service Area will have to provide Public Advise letters and go though a public comment process prior to receiving PUC authority to provide water service. In addition to the requirements of SB221 and SB610, water service may not be permitted if the PUC determines that water supply is not adequate.

This project contains several working water supply wells. Proper closure of these wells and impacts to new well sites should be addressed in the EIR. Also, financial costs to Valencia Water Co. rate payers should be disclosed.

Evaluation of water supply impacts by ammonium perchlorate should be analyzed. Variability of State Water project supplies should be disclosed. The City should not rely on the CLWA Urban Water Management Plan to properly disclose water supply as this document is currently being litigated and may be set aside, causing a domino effect on this project approval.

This project is located in a floodway and liquefaction hazard area as determined by the State Depart of Conservation, Division of Mines and Geology. These hazards must be thoroughly disclosed in the EIR so that future residents are aware of potential health and safety factors.

This project will require permits from Regional Water Quality Control Board, Dept. of Fish and Game, Army Corps of Engineers and others. Attention should be given to ensure that the project will comply with regulations of all other permitting agencies. This could best be accomplished by applying to those agencies concurrently so that any required changes can be incorporated early in the planning process.

Thank-you for your time and attention to our comments. We look forward to receiving a copy of the DEIR for review.

Sincerely,

Lynne Plambeck
President

SIERRA CLUB
FOUNDED 1892

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November 19, 2002

RECEIVED
PLANNING DIVISION
NOV 19 2002
PLANNING AND BUILDING SERVICES
CITY OF SANTA CLARITA

ATTN: Jeff Hogan/Wendy Deats
City of Santa Clarita
Department of Planning and Building Services
23920 Valencia Blvd.
Santa Clarita, CA 91355

Dear Planning Department of the City of Santa Clarita,

This letter is in regard to what you call the "River Park Project" proposed by Newhall Land and Farming for the Panhandle area of Saugus. The potential impacts that I can see on the community that this proposal entails and for which I would like the EIR to respond to are as follows:

- At this point, as I understand it, the plan is for two entrances onto Bouquet Canyon Road. One behind the shopping center and another road designed to skirt Central Park and go beyond the dividing hill on the south side of the park. Bouquet Canyon Road is already overly congested. How are you going to "mitigate" the incredible traffic gridlock that will be added to the gridlock that already exists on Bouquet Canyon Road during the rush hours? How are you going to "mitigate" the additional health problems from the pollution that the added traffic will cause?
- How can you prove where the drinkable water for this development will come from? Do you plan on using that farce that CLWA put out that includes the water from contaminated wells as part of "available" water? (CLWA has been clear that "available" does not have to mean "drinkable".) Will you make a request of them to give you an accurate estimate of drinkable water available? (This would not unrealistically report that 100 percent of state water is available, because it never is.)
- Will you find the accurate amount of drinkable water available for existing homes and developments which have already been approved before risking any more development?
- How are you going to mitigate the threats to the sensitive species of the area including those that are state or federally endangered or threatened species, also those species that are listed by the California Dept. of Fish and Game as species of special concern, those listed by California Department of Forestry and Fire Protection as sensitive, California Fully Protected Species, Audubon Society Watchlist, Bureau of Land Management sensitive species, Forest Service sensitive, Partners in Flight watchlist, or those listed by the California Fish and Game as warranting CEQA consideration for project impacts in this area? Can you protect their last bastions of habitat in this area? This is probably the last uplands available for species to escape to when the river floods. Uplands are needed so these species don't drown in time of flood. How will you mitigate the deaths of animals drowned by floods because of lack of uplands? How can you preserve the natural habitat that exists in the uplands and the corridor from the river to those uplands? How do you mitigate the death of an entire species?
- What are you going to do with the heritage oaks on this property? How will you "mitigate" the 25 oaks that you wish to remove?

- How will you make up for the percolation of water to our aquifer that won't occur because of the encroachment on the river and the paving on the project?
- Can you ensure the same amount of water recharge area will be present if this proposed development actually occurs?
- How will you protect the 500 year flood plain of the river in this area?
- How can you justify more destruction of the ridgeline when the amount of destruction that has already happened to the ridgeline should not have occurred? How does this comply with the city's ridgeline ordinance? Why can you not tell us how much ridgeline you are going to attempt to remove? Why do you set a deadline for comments before we are given accurate knowledge of this proposed project?
- How do you "mitigate the ruination of the views of nature that the existing residents will have imposed on them? (Note, my back yard is much higher than the rest of those that face the back end of the Bouquet Shopping Center. I used to look at nature where the shopping center is and now I see those intrusive ugly cement walls. In addition, I am awakened every week by the garbage trucks that pick up the garbage cans inconsiderately placed right next to the back fences of the neighboring houses. Those garbage cans stink and attract crows. I used to have my phone lines covered with song birds until those crows came and scared them away. It was the county that approved the stupid planning on that shopping center. May I strongly suggest that you keep all garbage cans away from the existing neighborhood and demonstrate much more considerate planning than that fiasco was.) Where does this project propose to actually place the apartments in area D? How high are they going to be? Can you guarantee that I will not be looking at even more ugly cement if those things go in?
- How will you "mitigate" the health problems that will occur as a result of the massive amounts of dirt being moved? If you say they'll water the land as they go along, please know that adequate watering has been an unfulfilled promise for a number of past developments leaving many skeptics. What penalties can be inflicted if proper watering is not done? How will you determine what proper watering is?
- How will you determine a baseline for existing health problems, such as Asthma, lung problems and Valley Fever and then determine whether indeed, the amount of dirt removal creates more incidents of these maladies--as local doctors believe. Then how will you compensate the victims of these diseases most of which are caused by the particulate matter from dirt moving?
- How will you ensure the privacy of the existing neighborhood will not be assailed? (Note, a few weeks ago, I stopped three teen age boys that were cutting through my back yard going from Bouquet Shopping Center to the Boys Club at Emblem and thinking the cut across would be quicker. How would you stop the additonal youths in the proposed apartment complex from further infringing on my privacy?
- How will you mitigate severe overcrowding to Emblem School and to Espuella--Emblem's approach road from this development?

At one time, if I recall correctly, the city wanted to build a true river park in this area. It is my humble request that you investigate all possible grants available to make that happen. Thank you for your attention to these concerns.

Sincerely,

Karen Pearson

Karen Pearson
Chair, Open Space Committee, Santa Clarita Valley Sierra Club

South Coast
Air Quality Management District
21865 E. Copley Drive, Diamond Bar, CA 91765-4182
(909) 396-2000 • http://www.aqmd.gov

RECEIVED
PLANNING DIVISION
SEP 3 0 2002
PLANNING AND BUILDING SERVICES
CITY OF SANTA CLARITA

September 27, 2002

Mr. Jeff Hogan
City of Santa Clarita
23920 Valencia Blvd., Suite 300
Santa Clarita, CA 91355

Dear Mr. Hogan:

Notice of Preparation of an Environmental Impact Report for Riverpark

The South Coast Air Quality Management District (AQMD) appreciates the opportunity to comment on the above-mentioned document. The AQMD's comments are recommendations regarding the analysis of potential air quality impacts from the proposed project that should be included in the Draft Environmental Impact Report (EIR).

Air Quality Analysis

The AQMD adopted its California Environmental Quality Act (CEQA) Air Quality Handbook in 1993 to assist other public agencies with the preparation of air quality analyses. The AQMD recommends that the Lead Agency use this Handbook as guidance when preparing its air quality analysis. Copies of the Handbook are available from the AQMD's Subscription Services Department by calling (909) 396-3720.

The Lead Agency should identify any potential adverse air quality impacts that could occur from all phases of the project and all air pollutant sources related to the project. Air quality impacts from both construction and operations should be considered. Construction-related air quality impacts typically include, but are not limited to, emissions from the use of heavy-duty equipment from grading, earth-loading/unloading, paving, architectural coatings, off-road mobile sources (e.g., heavy-duty construction equipment) and on-road mobile sources (e.g., construction worker vehicle trips, material transport trips). Operation-related air quality impacts may include, but are not limited to, emissions from stationary sources (e.g., boilers), area sources (e.g., solvents and coatings), and vehicular trips (e.g., on- and off-road tailpipe emissions and entrained dust). Air quality impacts from indirect sources, that is, sources that generate or attract vehicular trips should be included in the evaluation. An analysis of all toxic air contaminant impacts due to the decommissioning or use of equipment potentially generating such air pollutants should also be included.

Mitigation Measures

In the event that the project generates significant adverse air quality impacts, CEQA requires that all feasible mitigation measures be utilized during project construction and operation to minimize or eliminate significant adverse air quality impacts. To assist the Lead Agency with identifying possible mitigation measures for the project, please refer to Chapter 11 of the AQMD CEQA Air Quality Handbook for sample air quality mitigation measures. Additionally, AQMD's Rule 403 – Fugitive Dust, and the Implementation Handbook contain numerous measures for controlling construction-related emissions that should be considered for use as CEQA mitigation if not otherwise required. Pursuant to state CEQA Guidelines §15126.4 (a)(1)(D), any impacts resulting from mitigation measures must also be discussed.

Data Sources

AQMD rules and relevant air quality reports and data are available by calling the AQMD's Public Information Center at (909) 396-2039. Much of the information available through the Public Information Center is also available via the AQMD's World Wide Web Homepage (http://www.aqmd.gov).

The AQMD is willing to work with the Lead Agency to ensure that project-related emissions are accurately identified, categorized, and evaluated. Please call Dr. Charles Blankson, Transportation Specialist, CEQA Section, at (909) 396-3304 if you have any questions regarding this letter.

Sincerely,

Steve Smith

Steve Smith, Ph.D.
Program Supervisor, CEQA Section
Planning, Rule Development and Area Sources

SS:CB:li

RVC020920-01LI
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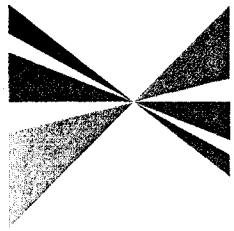

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Riverside County: Bob Buster, Riverside County • Ron Loveridge, Riverside • Greg Pettis, Cathedral City • Ron Roberts, Temecula • Jan Rudman, Corona • Charles White, Moreno Valley

San Bernardino County: Jon Mikels, San Bernardino County • Bill Alexander, Rancho Cucamonga • Lawrence Dale, Barstow • Lee Ann Garcia, Grand Terrace • Susan Lien, San Bernardino • Gary Ovitt, Ontario • Deborah Robertson, Rialto

Ventura County: Judy Mikels, Ventura County • Glen Becerra, Simi Valley • Carl Morehouse, San Buenaventura • Toni Young, Port Hueneme

Riverside County Transportation Commission: Robin Lowe, Hemet

Ventura County Transportation Commission: Bill Davis, Simi Valley

October 16, 2002

Ms. Wendy Deats
Assistant Planner II
City of Santa Clarita
Department of Planning and Building Services
23920 Valencia Boulevard
Santa Clarita, CA 93155

RE: **Comments on the Notice of Preparation for a Draft Environmental Impact Report for the Riverpark (Panhandle) Project – SCAG No. I 20020494**

Dear Ms. Deats:

Thank you for submitting the **Notice of Preparation for a Draft Environmental Impact Report for the Riverpark (Panhandle) Project** to SCAG for review and comment. As areawide clearinghouse for regionally significant projects, SCAG reviews the consistency of local plans, projects, and programs with regional plans. This activity is based on SCAG's responsibilities as a regional planning organization pursuant to state and federal laws and regulations. Guidance provided by these reviews is intended to assist local agencies and project sponsors to take actions that contribute to the attainment of regional goals and policies.

We have reviewed the **Notice of Preparation**, and have determined that **the proposed Project is regionally significant per California Environmental Quality Act (CEQA) Guidelines (Section 15206).** The proposed Project considers the construction of more than 500 dwelling units. CEQA requires that EIRs discuss any inconsistencies between the proposed project and the applicable general plans and **regional plans (Section 15125 [d])**. If there are inconsistencies, an explanation and rationalization for such inconsistencies should be provided.

Policies of SCAG's Regional Comprehensive Plan and Guide and Regional Transportation Plan, which may be applicable to your project, are outlined in the attachment. **We expect the DEIR to specifically cite the appropriate SCAG policies and address the manner in which the Project is consistent with applicable core policies or supportive of applicable ancillary policies. Please use our policy numbers to refer to them in your DEIR. Also, we would encourage you to use a side-by-side comparison of SCAG policies with a discussion of the consistency or support of the policy with the Proposed Project.**

Please provide a minimum of 45 days for SCAG to review the DEIR when this document is available. If you have any questions regarding the attached comments, please contact me at (213) 236-1867. Thank you.

Sincerely,

JEFFREY M. SMITH, AICP
Senior Regional Planner
Intergovernmental Review

COMMENTS ON THE PROPOSAL TO DEVELOP A DRAFT ENVIRONMENTAL IMPACT REPORT FOR THE RIVERPARK (PANHANDLE) PROJECT SCAG NO. I 20020494

PROJECT DESCRIPTION

The proposed Project considers a Tentative Tract Map, Zone Change and General Plan Amendment, Conditional Use Permit, Review and Oak Tree Permit for the development of approximately 1,152 dwelling units. The proposed Project will be developed on approximately 664-acres, and is located east of Bouquet Canyon Road and north of Soledad Canyon Road in the City of Santa Clarita.

CONSISTENCY WITH REGIONAL COMPREHENSIVE PLAN AND GUIDE POLICIES

The **Growth Management Chapter (GMC)** of the Regional Comprehensive Plan and Guide (RCPG) contains the following policies that are particularly applicable and should be addressed in the Draft EIR for the Riverpark (Panhandle) Project.

3.01 The population, housing, and jobs forecasts, which are adopted by SCAG's Regional Council and that reflect local plans and policies, shall be used by SCAG in all phases of implementation and review.

Regional Growth Forecasts

The Draft EIR should reflect the most current SCAG forecasts which are the 2001 RTP (April 2001) Population, Household and Employment forecasts for the North Los Angeles County Council of Governments (NLACOG) subregion and the City of Santa Clarita. These forecasts are as follows:

NLACOG Subregion	2000	2005	2010	2015	2020	2025
Population	576,478	658,450	786,419	912,257	1,083,020	1,259,354
Household	174,293	211,038	264,936	319,701	378,169	442,773
Employment	187,780	218,429	250,111	268,842	285,963	304,163

City of S. Clarita	2000	2005	2010	2015	2020	2025
Population	146,415	151,226	166,822	182,158	202,970	224,460
Household	48,571	54,372	60,227	66,197	72,555	79,581
Employment	48,971	50,783	52,846	54,064	55,179	56,366

3.03 The timing, financing, and location of public facilities, utility systems, and transportation systems shall be used by SCAG to implement the region's growth policies.

The **Regional Transportation Plan (RTP)** also has goals, objectives, policies and actions pertinent to this proposed project. This RTP links the goal of sustaining mobility with the goals of fostering economic development, enhancing the environment, reducing energy consumption, promoting transportation-friendly development patterns, and encouraging fair and equitable access to residents affected by socio-economic, geographic and commercial limitations. Among the relevant goals, objectives, policies and actions of the RTP are the following:

Core Regional Transportation Plan Policies

4.01 Transportation investments shall be based on SCAG's adopted Regional Performance Indicators:

Mobility - Transportation Systems should meet the public need for improved access, and for safe, comfortable, convenient, faster and economical movements of people and goods.

- *Average Work Trip Travel Time in Minutes – 25 minutes (Auto)*
- *PM Peak Freeway Travel Speed – 45 minutes (Transit)*
- *PM Peak Non-Freeway Travel Speed*
- *Percent of PM Peak Travel in Delay (Fwy)*
- *Percent of PM Peak Travel in Delay (Non-Fwy)*

Accessibility - Transportation system should ensure the ease with which opportunities are reached. Transportation and land use measures should be employed to ensure minimal time and cost.

- *Work Opportunities within 45 Minutes door to door travel time (Mode Neutral)*
- *Average transit access time*

Environment - Transportation system should sustain development and preservation of the existing system and the environment. (All Trips)

- *CO, ROG, NOx, PM10, PM2.5 – Meet the applicable SIP Emission Budget and the Transportation Conformity requirements*

Reliability – Transportation system should have reasonable and dependable levels of service by mode. (All Trips)
- *Transit – 63%*
- *Highway – 76%*

Safety - Transportation systems should provide minimal accident, death and injury. (All Trips)
- *Fatalities Per Million Passenger Miles – 0*
- *Injury Accidents – 0*

Equity/Environmental Justice - The benefits of transportation investments should be equitably distributed among all ethnic, age and income groups. (All trips)
- *By Income Groups Share of Net Benefits – Equitable Distribution of Benefits among all Income Quintiles*

Cost-Effectiveness - Maximize return on transportation investment (All Trips). Air Quality, Mobility, Accessibility and Safety
- *Return on Total Investment – Optimize return on Transportation Investments*

4.02 Transportation investments shall mitigate environmental impacts to an acceptable level.

4.04 Transportation Control Measures shall be a priority.

4.16 Maintaining and operating the existing transportation system will be a priority over expanding capacity.

GMC POLICIES RELATED TO THE RCPG GOAL TO IMPROVE THE REGIONAL STANDARD OF LIVING

The Growth Management goals to develop urban forms that enable individuals to spend less income on housing cost, that minimize public and private development costs, and that enable firms to be more competitive, strengthen the regional strategic goal to stimulate the regional economy. The evaluation of the proposed project in relation to the following policies would be intended to guide efforts toward achievement of such goals and does not infer regional interference with local land use powers.

3.05 Encourage patterns of urban development and land use, which reduce costs on

infrastructure construction and make better use of existing facilities.

3.09 Support local jurisdictions' efforts to minimize the cost of infrastructure and public service delivery, and efforts to seek new sources of funding for development and the provision of services.

3.10 Support local jurisdictions' actions to minimize red tape and expedite the permitting process to maintain economic vitality and competitiveness.

GMC POLICIES RELATED TO THE RCPG GOAL TO IMPROVE THE REGIONAL QUALITY OF LIFE

The Growth Management goals to attain mobility and clean air goals and to develop urban forms that enhance quality of life, that accommodate a diversity of life styles, that preserve open space and natural resources, and that are aesthetically pleasing and preserve the character of communities, enhance the regional strategic goal of maintaining the regional quality of life. The evaluation of the proposed project in relation to the following policies would be intended to provide direction for plan implementation, and does not allude to regional mandates.

3.12 Encourage existing or proposed local jurisdictions' programs aimed at designing land uses which encourage the use of transit and thus reduce the need for roadway expansion, reduce the number of auto trips and vehicle miles traveled, and create opportunities for residents to walk and bike.

3.14 Support local plans to increase density of future development located at strategic points along the regional commuter rail, transit systems, and activity centers.

3.17 Support and encourage settlement patterns, which contain a range of urban densities

3.18 Encourage planned development in locations least likely to cause environmental impact.

3.19 SCAG shall support policies and actions that preserve open space areas identified in local, state and federal plans.

3.20 Support the protection of vital resources such as wetlands, groundwater recharge areas, woodlands, production lands, and land containing unique and endangered plants and animals.

3.21 Encourage the implementation of measures aimed at the preservation and protection of recorded and unrecorded cultural resources and archaeological sites.

3.22 Discourage development, or encourage the use of special design requirements, in areas with steep slopes, high fire, flood, and seismic hazards.

3.23 Encourage mitigation measures that reduce noise in certain locations, measures aimed at preservation of biological and ecological resources, measures that would reduce exposure to seismic hazards, minimize earthquake damage, and to develop emergency response and recovery plans.

GMC POLICIES RELATED TO THE RCPG GOAL TO PROVIDE SOCIAL, POLITICAL, AND CULTURAL EQUITY

The Growth Management Goal to develop urban forms that avoid economic and social polarization promotes the regional strategic goal of minimizing social and geographic disparities and of reaching equity among all segments of society. The evaluation of the proposed project in relation to the policy stated below is intended guide direction for the accomplishment of this goal, and does not infer regional mandates and interference with local land use powers.

3.24 Encourage efforts of local jurisdictions in the implementation of programs that increase the supply and quality of housing and provide affordable housing as evaluated in the Regional Housing Needs Assessment.

3.27 Support local jurisdictions and other service providers in their efforts to develop sustainable communities and provide, equally to all members of society, accessible and effective services such as: public education, housing, health care, social services, recreational facilities, law enforcement, and fire protection.

AIR QUALITY CHAPTER CORE ACTIONS

The **Air Quality Chapter** core actions related to the proposed project includes:

5.07 Determine specific programs and associated actions needed (e.g., indirect source rules, enhanced use of telecommunications, provision of community based shuttle services, provision of demand management based programs, or vehicle-miles-traveled/emission fees) so that options to command and control regulations can be assessed.

5.11 Through the environmental document review process, ensure that plans at all

levels of government (regional, air basin, county, subregional and local) consider air quality, land use, transportation and economic relationships to ensure consistency and minimize conflicts.

WATER QUALITY CHAPTER RECOMMENDATIONS AND POLICY OPTIONS

The **Water Quality Chapter** core recommendations and policy options relate to the two water quality goals: to restore and maintain the chemical, physical and biological integrity of the nation's water; and, to achieve and maintain water quality objectives that are necessary to protect all beneficial uses of all waters.

11.07 Encourage water reclamation throughout the region where it is cost-effective, feasible, and appropriate to reduce reliance on imported water and wastewater discharges. Current administrative impediments to increased use of wastewater should be addressed.

OPEN SPACE CHAPTER ANCILLARY GOALS

Outdoor Recreation

9.01 Provide adequate land resources to meet the outdoor recreation needs of the present and future residents in the region and to promote tourism in the region.

9.02 Increase the accessibility to open space lands for outdoor recreation.

9.03 Promote self-sustaining regional recreation resources and facilities.

Public Health and Safety

9.04 Maintain open space for adequate protection of lives and properties against natural and man-made hazards.

9.05 Minimize potentially hazardous developments in hillsides, canyons, areas susceptible to flooding, earthquakes, wildfire and other known hazards, and areas with limited access for emergency equipment.

Resource Production

9.07 Maintain adequate viable resource production land, particularly lands devoted to commercial agriculture and mining operations.

Resource Protection

9.08 Develop well-managed viable ecosystems or known habitats of rare, threatened and endangered species, including wetlands.

CONCLUSIONS

All feasible measures needed to mitigate any potentially negative regional impacts associated with the proposed project should be implemented and monitored, as required by CEQA.

SOUTHERN CALIFORNIA ASSOCIATION OF GOVERNMENTS

Roles and Authorities

THE SOUTHERN CALIFORNIA ASSOCIATION OF GOVERNMENTS (SCAG) is a ***Joint Powers Agency*** established under California Government Code Section 6502 et seq. Under federal and state law, SCAG is designated as a Council of Governments (COG), a Regional Transportation Planning Agency (RTPA), and a Metropolitan Planning Organization (MPO). SCAG's mandated roles and responsibilities include the following:

SCAG is designated by the federal government as the Region's ***Metropolitan Planning Organization*** and mandated to maintain a continuing, cooperative, and comprehensive transportation planning process resulting in a Regional Transportation Plan and a Regional Transportation Improvement Program pursuant to 23 U.S.C. '134, 49 U.S.C. '5301 et seq., 23 C.F.R. '450, and 49 C.F.R. '613. SCAG is also the designated ***Regional Transportation Planning Agency***, and as such is responsible for both preparation of the Regional Transportation Plan (RTP) and Regional Transportation Improvement Program (RTIP) under California Government Code Section 65080 and 65082 respectively.

SCAG is responsible for developing the demographic projections and the integrated land use, housing, employment, and transportation programs, measures, and strategies portions of the ***South Coast Air Quality Management Plan***, pursuant to California Health and Safety Code Section 40460(b)-(c). SCAG is also designated under 42 U.S.C. '7504(a) as a ***Co-Lead Agency*** for air quality planning for the Central Coast and Southeast Desert Air Basin District.

SCAG is responsible under the Federal Clean Air Act for determining ***Conformity*** of Projects, Plans and Programs to the State Implementation Plan, pursuant to 42 U.S.C. '7506.

Pursuant to California Government Code Section 65089.2, SCAG is responsible for ***reviewing all Congestion Management Plans (CMPs) for consistency with regional transportation plans*** required by Section 65080 of the Government Code. SCAG must also evaluate the consistency and compatibility of such programs within the region.

SCAG is the authorized regional agency for ***Inter-Governmental Review*** of Programs proposed for federal financial assistance and direct development activities, pursuant to Presidential Executive Order 12,372 (replacing A-95 Review).

SCAG reviews, pursuant to Public Resources Code Sections 21083 and 21087, Environmental Impacts Reports of projects of regional significance for consistency with regional plans [California Environmental Quality Act Guidelines Sections 15206 and 15125(b)].

Pursuant to 33 U.S.C. '1288(a)(2) (Section 208 of the Federal Water Pollution Control Act), SCAG is the authorized ***Areawide Waste Treatment Management Planning Agency.***

SCAG is responsible for preparation of the ***Regional Housing Needs Assessment***, pursuant to California Government Code Section 65584(a).

SCAG is responsible (with the Association of Bay Area Governments, the Sacramento Area Council of Governments, and the Association of Monterey Bay Area Governments) for preparing the ***Southern California Hazardous Waste Management Plan*** pursuant to California Health and Safety Code Section 25135.3.

Revised July 2001

Department of Toxic Substances Control

Edwin F. Lowry, Director
1011 N. Grandview Avenue
Glendale, California 91201

Winston H. Hickox
Agency Secretary
California Environmental
Protection Agency

Gray Davis
Governor

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PLANNING DIVISION

OCT 18 2002

PLANNING AND BUILDING SERVICES
CITY OF SANTA CLARITA

October 15, 2002

Mr. Jeff Hogan
Associate Planner
City of Santa Clarita
23920 Valencia Boulevard, Suite 300
Santa Clarita, California 91355

NOTICE OF PREPARATION OF DRAFT ENVIRONMENTAL IMPACT REPORT FOR THE RIVERPARK, SCH NO. 2002091081

Dear Mr. Hogan:

The Department of Toxic Substances Control (DTSC) has received your Notice of Preparation of a draft Environmental Impact Report (EIR) for the project mentioned above.

Based on the review of the document, DTSC comments are as follows:

1. The draft EIR needs to identify and determine whether current or historic uses at the Project site have resulted in any release of hazardous wastes/substances at the Project area.

2. The draft EIR needs to identify any known or potentially contaminated site within the Project area. For all identified sites, the draft EIR needs to evaluate whether conditions at the site pose a threat to human health or the environment.

3. The draft EIR should identify the mechanism to initiate any required investigation and/or remediation for any site that may require remediation, and which government agency will provide appropriate regulatory oversight.

4. If during construction of the project, soil contamination is suspected, construction in the area should stop, and appropriate health and safety procedures should be implemented. If it is determined that contaminated soils exists, the draft EIR

The energy challenge facing California is real. Every Californian needs to take immediate action to reduce energy consumption. For a list of simple ways you can reduce demand and cut your energy costs, see our Web-site at www.dtsc.ca.gov.

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should identify how any required investigation and/or remediation will be conducted, and which government agency will provide regulatory oversight.

DTSC provides guidance for Preliminary Endangerment Assessment preparation and cleanup oversight through the Voluntary Cleanup Program (VCP). For additional information on the VCP please visit DTSC's web site at www.dtsc.ca.gov. If you would like to meet and discuss this matter further, please contact Mr. Alberto Valmidiano, Project Manager, at (818) 551-2870 or me, at (818) 551-2877.

Sincerely,

Harlan R. Jeche

Harlan R. Jeche
Unit Chief
Southern California Cleanup Operations Branch – Glendale Office

Enclosure

cc: Governor's Office of Planning and Research
State Clearinghouse
P.O. Box 3044
Sacramento, California 95812-3044

Mr. Guenther W. Moskat, Chief
Planning and Environmental Analysis Section
CEQA Tracking Center
Department of Toxic Substances Control
P.O. Box 806
Sacramento, California 95812-0806

RECEIVED
PLANNING DIVISION
OCT 14 2002
PLANNING AND
CITY OF
SERVICES

LEROY D. BACA, SHERIFF

County of Los Angeles
Sheriff's Department Headquarters
4700 Ramona Boulevard
Monterey Park, California 91754-2169
(661) 255-1121

October 8, 2002

Mr. Jeff Hogan, Associate Planner
City of Santa Clarita
23920 Valencia Boulevard
Santa Clarita, California 91355

Dear Mr. Hogan:

RIVERPARK DEVELOPMENT
ENVIRONMENTAL IMPACT REPORT
MC 02-175; TENTATIVE TRACT NO. 53425

The proposed project consisting of 1,152 residential units is within the jurisdiction of the Los Angeles County Sheriff's Department, Santa Clarita Valley Station, 23740 Magic Mountain Parkway, Valencia, California. The station is located approximately 2.5 miles from the project site.

It is anticipated that the routine response time to a request for service would be approximately 20-25 minutes. The immediate response time would be approximately 5-12 minutes and an emergent response, approximately 2-5 minutes. All response times are approximations, only, and would be dependent on both the deployment of area radio cars and traffic conditions.

This station serves an area of 656 square miles, which is made up of the City of Santa Clarita and unincorporated County area between the Los Angeles City Limits to the South, to Kern County Line to the North and involving all area between the Ventura County Line to the West and the township of Aqua Dulce to the East. The population served by our station is approximately 200,000 residents.

Our ideal officer to population ratio is one deputy per 1,000 residents and with our current staffing of 178 sworn deputies currently assigned, our ratio is at one deputy per every 1,179 residents. Assuming a residential density of 3.01 persons per dwelling unit, this proposed project will generate a population increase of 3,467. Based on the above, this project and other projects in the Santa Clarita Valley could require additional deputies to the station compliment.

Our primary concern is our ability to provide an adequate level of protection and service to all areas we police. Due to the rapidly expanding population of the Santa Clarita Valley and its record-setting home building, it is difficult to project the impact of this project on law enforcement.

Adding this project and other projects in progress, either proposed, approved or committed, it is certain they will all significantly strain our resources to the breaking point. Additionally, the increase in required field personnel will necessitate a concomitant increase in support resources such as detectives, complaint desk officers, vehicles and portable radios. While not directly a builder's matter, our ability to provide a sufficient level of law enforcement services must be considered when applications for new projects such as these are considered.

It is also suggested, for the security and safety of the students, that the builder apply defensible space concepts in its construction designs, and the following crime prevention measures be implemented during site and building layout design:

- Provide adequate lighting in open areas and parking lots;
- Assure visibility of doors and windows and between buildings;
- Provide adequate parking spaces in the parking lots to accommodate students, employees and visitors;
- Insure the required building address numbers be lighted and/or large enough to be readily apparent from the street for emergency response agencies.

Should you have further questions, please feel free to call me at (661) 255-1121 ext. 5101, or Deputy Patrick Rissler at ext. 5159.

Sincerely,

LEROY D. BACA, SHERIFF

Donald A. Rodriguez, Captain
Santa Clarita Valley Station

DAR:par

Department of Toxic Substances Control

Edwin F. Lowry, Director
1001 "I" Street, 25th Floor
P.O. Box 806
Sacramento, California 95812-0806

Winston H. Hickox
Agency Secretary
California Environmental
Protection Agency

Gray Davis
Governor

MEMORANDUM

DEPARTMENT OF TOXIC SUBSTANCES CONTROL
SOUTHERN CALIFORNIA SITE MITIGATION BRANCH
SEP 27 2002
RECEIVED

TO: Sayareh Amirebrahimi, Branch Chief
Site Mitigation Program, Region 3

FROM: Guenther W. Moskat, Chief
Planning and Environmental Analysis Section

DATE: September 24, 2002

SUBJECT: TRANSMITTAL AND REVIEW OF LEAD AGENCY ENVIRONMENTAL DOCUMENTS FOR RiverPark - 2002091081

The Department has received the project listed above. The project is being referred to you as a:

- ☑ Non-Essential/Information Item Only
- ☐ Sensitive Land Use Project
- ☐ Non-Sensitive land Use Project

A Courtesy Copy of the Notice of Completion Transmittal Form has also been sent to:

- ☑ Permitting Branch (document not included)

The Department is encouraged to review this project and if applicable make comments pertaining to the project as it relates to hazardous waste and/or any activities which may fall within the Department's jurisdiction. Please have your staff: 1) conduct its review of the attached document prior to the end of the comment period; 2) complete the applicable items below' stating whether the department made comments or that no comments were necessary for the document; and 3) return this original transmittal sheet and a copy of any response letter from your office to:

Planning & Environmental Analysis Section (PEAS)
CEQA Tracking Center
1001 I Street, 22nd Floor
P.O. Box 806
Sacramento, California 95812-0806
Fax (916) 323-3215

Date Comment Period Began: 09/18/2002
Comments due to OPR: 10/17/2002

Reviewed by: ALBERTO T. VALMIDIANO Date: 10/08/02

COMMENTS have been prepared and a copy has been provided to PEAS via:

- ☑ Attached Copy
- ☐ FAX (916) 323-3215

NO COMMENTS NECESSARY because;

- ☐ All Department concerns have been adequately addressed; **OR**
- ☐ Project does not fall within the Department's areas of responsibility

Thank you for your assistance with this project. If you have any questions, please contact Ken Tipon, CEQA Tracking Center, at (916) 322-5266.

The energy challenge facing California is real. Every Californian needs to take immediate action to reduce energy consumption. For a list of simple ways you can reduce demand and cut your energy costs, see our Web-site at www.dtsc.ca.gov.

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DEPARTMENT OF TRANSPORTATION
DISTRICT 7, REGIONAL PLANNING
IGR/CEQA BRANCH
120 SO. SPRING ST.
LOS ANGELES, CA 90012
PHONE (213) 897-6536
FAX (213) 897-1337

SEP 24 2002

PLANNING AND BUILDING SERVICES
CITY OF SANTA CLARITA

Flex your power!
Be energy efficient!

Mr. Jeff Hogan, Associate Planner
City of Santa Clarita
23920 Valencia Blvd., Suite 300
Santa Clarita, CA. 91355

RE: IGR/CEQA# 020954NY
Notice of Preparation
Riverpark (Panhandle); Tentative Tract Map 53425

LA/14/35

September 19, 2002

Dear Mr. Hogan:

Thank you for including the California Department of Transportation (Caltrans) in the environmental review process for Riverpark (Panhandle) project.

Based on the information received, and to assist us in our efforts to completely evaluate and assess the impacts of this project on the State transportation system, a traffic study in advance of the DEIR should be prepared to analyze the following information:

Please reference the Department's **Traffic Impact Study Guideline** on the Internet at http://www.dot.ca.gov/hq/traffops/developserv/operationalsystems/reports/tisguide.pdf

1. Presentations of assumptions and methods used to develop trip generation, trip distribution, choice of travel mode, and assignments of trips to Route 14 and 5.
2. Consistency of project travel modeling with other regional and local modeling forecasts and with travel data. The IGR/CEQA office may use indices to check results. Differences or inconsistencies must be thoroughly explained.
3. Analysis of ADT, AM, and PM peak-hour volumes for both existing and future conditions in the affected area. This should include freeways, interchanges, and intersections, and all HOV facilities. Interchange Level of Service should be specified (HCM2000 method requested). Utilization of transit lines and vehicles, and of all facilities, should be realistically estimated. Future conditions would include build-out of all projects (see next item) and any plan-horizon years.

4. Inclusion of all appropriate traffic volumes. Analysis should include traffic from the project, cumulative traffic generated from all specific approved developments in the area, and traffic growth other than from the project and developments. That is, include: existing + project + other projects + other growth.

5. Discussion of mitigation measures appropriate to alleviate anticipated traffic impacts. These mitigation discussions should include, but not be limited to, the following:

- description of transportation infrastructure improvements
- financial costs, funding sources and financing
- sequence and scheduling considerations
- implementation responsibilities, controls and monitoring

Any mitigation involving transit, HOV, or TDM must be rigorously justified and its effects conservatively estimated. Improvements involving dedication of land or physical construction may be favorably considered.

6. Specification of developer's percent share of the cost, as well as a plan of realistic mitigation measures under the control of the developer. The ratio should be estimated, of additional traffic due to the project, to that amount of increase in traffic for which real mitigation must be provided (see Traffic Impact Study Guidelines). We note for purposes of determining project share of costs, the number of trips from the project on each traveling segment or element is estimated in the context of forecasted traffic volumes which include build-out of all approved and not yet approved projects, and other sources of growth. Analytical methods such as select-link travel forecast modeling might be used.

We look forward to reviewing the DEIR. We expect to receive a copy from the State Clearinghouse. However, to expedite the review process, you may send two copies in advance to the undersigned at the following address:

Stephen Buswell
IGR/CEQA Branch Chief
Caltrans District 07
Regional Transportation Planning Office
120 S. Spring St., Los Angeles, CA 90012

If you have any questions regarding this response, please call the Project Engineer/Coordinator Mr. Yerjanian at (213) 897-6536 and refer to IGR/CEQA # 020954NY.

Sincerely,

STEPHEN J. BUSWELL
IGR/CEQA Branch Chief
Transportation Planning Office

The Gas Company®

A Sempra Energy® utility

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PLANNING DIVISION

SEP 26 2002

PLANNING AND BUILDING SERVICES
CITY OF SANTA CLARITA

Southern California
Gas Company
9400 Oakdale Avenue
Chatsworth, CA 91311

September 23, 2002

Jeff Hogan, Associate Planner
City of Santa Clarita
23920 Valencia Blvd. #300
Santa Clarita, CA 91355

Re: Notice of Preparation of Draft Environmental Impact Report
Riverpark (Panhandle); Tentative Tract Map 53425
(Gas Co. Atlas C2056N – Plan File V2-036)

This letter is in response to your Notice of Preparation, which was received on September 19, 2002. The Southern California Gas Company maintains the following pipelines in the area of your project:

1) 6" medium pressure gas main in Newhall Ranch Rd.
2) 3" medium pressure gas main in Bouquet Canyon Rd.
3) 6" high pressure gas supply line in Bouquet Canyon Rd.

Should the new project require transporting natural gas to some or all of the 590 apartments, 84 townhouses and 478 single-family dwellings, there will be a need for construction of a new pipeline system, which would be an extension of the existing pipeline system. Depending on the load requirements of the development, the alterations of the existing pipeline system may include the necessity of building one or more new pressure regulator stations to maintain the system pressure within the area. I have attached a copy of the Gas Company atlas showing the facilities mentioned above. If you have any questions regarding this reply, please contact me at 818-701-3228.

Sincerely Yours,

Jack Russo
Planning Associate

The Gas Company®

A Sempra Energy® utility

Jack Russo
Planning Associate
Distribution Operations - Northern Region
Technical - Chatsworth

9400 Oakdale Ave., SC9331, Chatsworth, CA 91311-6511
Tel: 818.701.3228 Fax: 818.701.3380 Pager: 818.202.1835
JRusso@SempraUtilities.com

RETAIL SPACE #1

BLDG. C

PM. 241 / 54-60

BLDG. D

BLDG. E

BLDG. B

BLDG. A

BLDG. G

BLDG. F

PARKING

RANCH

CANYON

ESPUELLA

GAVILAN

BALERNA DR.

DR.

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L. S. 27 - 32

P.M. 6

6" MEDIUM PRESSURE

3" MEDIUM PRESSURE

6" HIGH PRESSURE

FRANCISCO

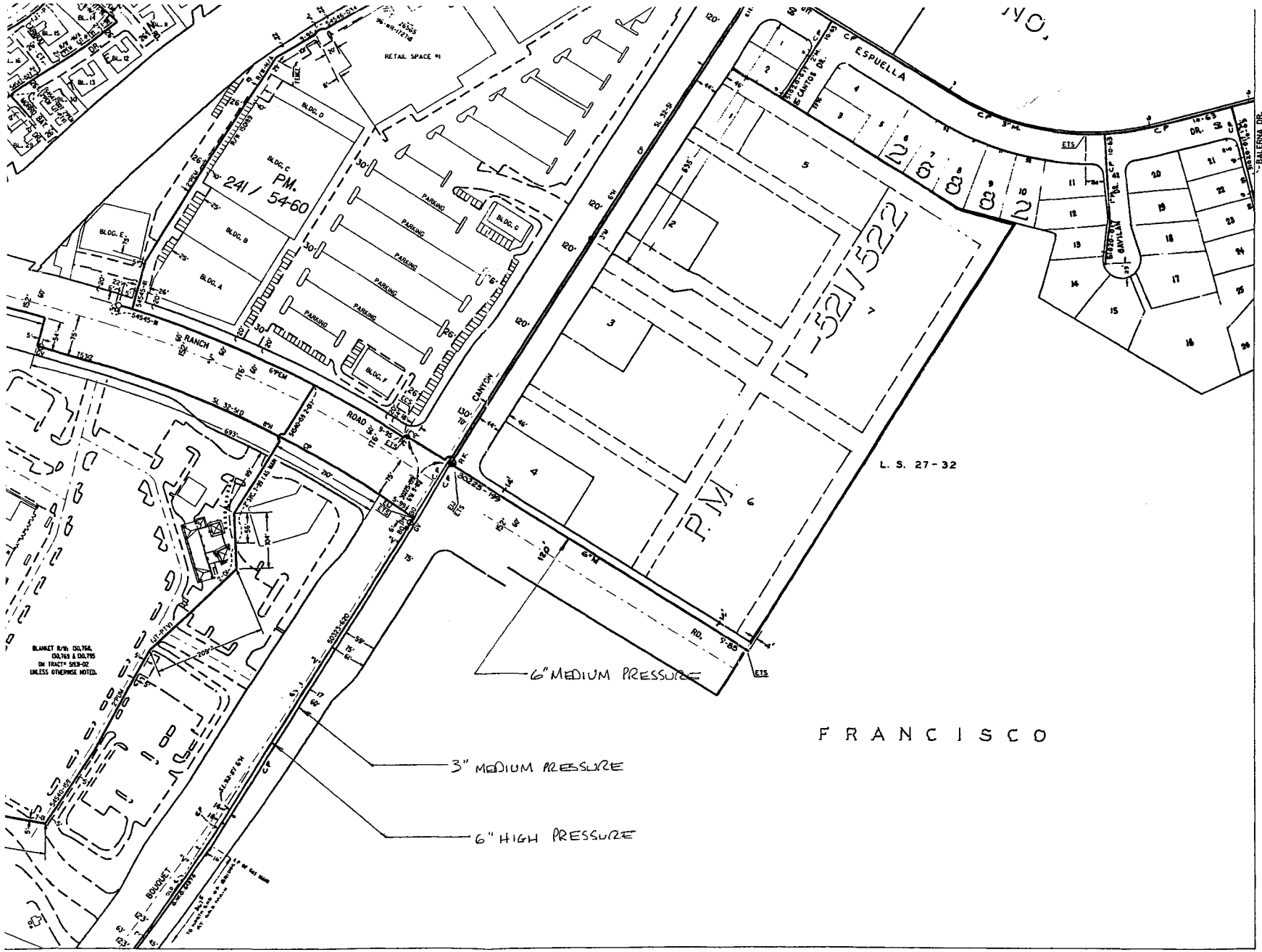
BLANKET R/W: 130,768, 130,769 & 130,795 ON TRACT® 5933-02 UNLESS OTHERWISE NOTED.

BOUQUET

C 2096 N

VECTOR FILE: c2056n.45
RASTER FILE: c2056n.clt
ATLAS REF CHK: 1-16-97 fmg

REVISED BY: AYK 8/9/02
VECTOR CREATED BY: rg 1-4-96


ESPUELLA
RETAIL SPACE #1
BLDG. A
BLDG. B
BLDG. C
BLDG. D
BLDG. E
BLDG. F
BLDG. G
PARKING
RANCH
CANYON
ROAD 3-95
BOUQUET
PM 241/54-60
PM 522/522
L. S. 27-32
6" MEDIUM PRESSURE
3" MEDIUM PRESSURE
6" HIGH PRESSURE
FRANCISCO
C 2096 N
C-2024-N
VECTOR FILE: c2056n.45
RASTER FILE: c2056n.cit
ATLAS REF CNK: 1-16-97 fmg
REVISED BY: AYK 8/9/02
VECTOR CREATED BY: rg 1-4-96

To: Wendy Deatsch & Jeff Hogen
Please include for SCOPING COMMENTS

PETITION TO SAVE THE PANHANDLE and ITS RIVER CORRIDOR

To the City of Santa Clarita Planning Department, the Planning Commission and City Council:

We the undersigned request that you use every means to find the money to create a true River Park out of the panhandle area and that the zoning not be changed to facilitate the proposed "River Park" development in the panhandle because of the following concerns: Encroachment on the flood plain of the Santa Clara River. Loss of 25 magnificent oaks. Excess traffic that will be generated from over 1000 units adding to gridlock on Bouquet Canyon Road and to air pollution which creates a danger to the health of existing residents. Severe health threats (such as that from lung problems, rats, and Valley Fever) from the massive amounts of dirt moving that has been proposed. Severe overcrowding to Emblem School and excessive traffic problems on Espuella as a result. The carnage to habitat needed by the wildlife that exist there, some of which are already suffering from extreme species diminishment due to development. The generation of excessive noise, loss of view-shed, loss of privacy and diminishment in home values of the homeowners in the Emblem Tract. Further, we are concerned about the diminishment of the water recharge area that this proposal threatens. We also feel it is irresponsible to bother with a new proposed development, when there is no proven supply of drinkable water for existing homes plus already approved of developments. This is for use in the SCOPING process as well as for any City Planning Commission or City Council meetings. Please notify of all hearing/meetings.

Name	Address: (Street, City and Zip Code)	Phone Number
Print FRANCISCO G. NOGALES Signature Francisco G Nogales	26614 Javelin Saugus, Ca 91350	661 297 2496 E-mail For contact re. meetings (optional)
Print ANITA NOGALES Signature Anita Nogales	〃	661 297 2496 E-mail For contact re. meetings (optional)
Print Lori Anne Nogales Signature Lori Anne Nogales	22919 Oat St Apt 8 Newhall, Ca 91321	(661) 287-1671 E-mail For contact re. meetings (optional) Loriannen@aol.com
Print Martin S. Nogales Signature Martin S Nogales	〃	(661) 287-1671 E-mail For contact re. meetings (optional)
Print Jennifer Peralta Signature Jen Peralta	26614 Javelin Dr Saugus Ca 91350	Jper3540@aol.com E-mail For contact re. meetings (optional)
Print Charles Peralta Signature Charles Peralta	〃	CCPeralta@aol.com E-mail For contact re. meetings (optional)

Prepared by the Santa Clarita Valley Sierra Club, 21827 Parvin Dr., Santa Clarita, CA 91350

Gloria N. Peralta 〃 661 254-4640
Gloria N. Peralta

PETITION TO SAVE THE PANHANDLE and ITS RIVER CORRIDOR

To the City of Santa Clarita Planning Department, the Planning Commission and City Council:

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Name	Address: (Street, City and Zip Code)	Phone Number
LINDA KATHRYN SPRING		297-3121
Print Linda K. Spring	26607 GAVILAN DR, SAUGUS 91350	
Signature	E-mail For contact re. meetings (optional)	
WILLIAM K. SPRING		297-3121
Print William K. Spring	26607 GAVILAN DR, SAUGUS 91350	
Signature	E-mail For contact re. meetings (optional)	
DORIS H SCHONERT		296-2660
Print Doris H. Schonert	26603 GAVILAN DR. SAUGUS, CA 91350	
Signature	E-mail For contact re. meetings (optional)	
Kenneth G Schonert		296-2660
Print Kenneth G Schonert	26603 Gavilan Dr Saugus 91350	
Signature	E-mail For contact re. meetings (optional)	
Maureen J Wade	20103 Alejandro Dr, Canyon Country 91351	
Print Maureen J Wade	[redacted]	
Signature	E-mail For contact re. meetings (optional)	
Print		
Signature	E-mail For contact re. meetings (optional)	
Print		
Signature	E-mail For contact re. meetings (optional)	

Prepared by the Santa Clarita Valley Sierra Club, 21827 Parvin Dr., Santa Clarita, CA 91350

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Name	Address: (Street, City and Zip Code)	Phone Number
HENRY BALSZ	26620 GAVILAN DR 91350	297-1981
Print Henry Balsz		
Signature	E-mail For contact re. meetings (optional)	
DONA L. BALSZ	26620 GAVILAN Dr 91350	2971981
Print Dona L Balsz		
Signature	E-mail For contact re. meetings (optional)	
Patti L. Palominos	22142 Alamogordo Rd. Saugus 91350	661 297-1991
Print Patti Palominos		
Signature	E-mail For contact re. meetings (optional)	
PATRICK J. MORGAN	22142 ALAMOGORDO Rd. Saugus 91350	661-297-1991
Print Patrick J. Morgan		
Signature	E-mail For contact re. meetings (optional)	
Leslie E. Morgan	22142 Alamogordo Rd. Saugus 91350	661-297-1991
Print Leslie E. Morgan		
Signature	E-mail For contact re. meetings (optional)	
Print		
Signature	E-mail For contact re. meetings (optional)	

Prepared by the Santa Clarita Valley Sierra Club, 21827 Parvin Dr., Santa Clarita, CA 91350

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Name	Address: (Street, City and Zip Code)	Phone Number
Teresa Tovar	22503 Espuella Dr. Saugus 91350	661-297-1993
Signature	E-mail For contact re. meetings (optional)	
Print		
Jodeane R. Boing	22509 Espuella Dr. Saugus 91350	661-298-5271
Signature	E-mail For contact re. meetings (optional)	
Print Jodeane R. Boing		
Rita Mendoza	22512 Espuella Dr. Saugus 91350	(661)2969254 ritam-cri-corp.com
Signature	E-mail For contact re. meetings (optional)	
Print		
Manuel Mendez	22506 Espuella Dr. Saugus 91350	
Signature	E-mail For contact re. meetings (optional)	
Print		
LAWRENCE KANNER	25242 AVE DORENA NEWHALL 91321	
Signature	E-mail For contact re. meetings (optional) LARRYKANNER@PRODIGY.NET	
Print TERESA SAVAIKIE	26734 Mocha Dr. Saugus Ca 91350	
Signature	E-mail For contact re. meetings (optional)	

Prepared by the Santa Clarita Valley Sierra Club, 21827 Parvin Dr., Santa Clarita, CA 91350

PETITION TO SAVE THE PANHANDLE and ITS RIVER CORRIDOR

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Name	Address: (Street, City and Zip Code)	Phone Number
Print MICHELLE HOFFMAN	25634 FALCON RD VALENCIA 91355	661 255 7411
Signature	E-mail For contact re. meetings (optional)	stitchndbitch@thevine.net
Print Loren Vallin-Flores		291-1085
Signature Loren Vallin-Flores	22315 Paraguay Dr Saugus CA 91350	
	E-mail For contact re. meetings (optional)	Xvixen11BX@hotmail.com
Print Judith McClure		r-j_mcclure@msn.com
Signature Judith McClure	E-mail For contact re. meetings (optional)	29111 Lotusgarden Dr 91387
Print RAY LEE		15628 ROSE HAVEN LN 91387
Signature	E-mail For contact re. meetings (optional)	rrlee@JPS.NET
Print SYDELL STOKES		
Signature Sydell Stokes 11/14/02	E-mail For contact re. meetings (optional)	sydey@earthlink.net
Print David Morrow	24448 Valencia Blvd #8316 Valencia 91355	DLRCHMORROW@JUNO.COM
Signature	E-mail For contact re. meetings (optional)	

Prepared by the Santa Clarita Valley Sierra Club, 21827 Parvin Dr., Santa Clarita, CA 91350

PETITION TO SAVE THE PANHANDLE and ITS RIVER CORRIDOR

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Name	Address: (Street, City and Zip Code)	Phone Number
Karen Pearson	26617 Gavilan Dr	
Print Karen Pearson	Santa Clarita, CA 91350	
Signature	E-mail For contact re. meetings (optional)	
Ray Lorme	28125 Caraway Lane	
Print Ray Lorme	Santa Clarita, Ca 91350	
Signature	E-mail For contact re. meetings (optional)	
John F. Wilkin		
Print JOHN F. WILKIN	24078 AVE. CRESCENTA, VALENCIA, CA 91355	
Signature	E-mail For contact re. meetings (optional)	
KENNETH KERNER	16943 HIGHFALLS DR, CANYON COUNTRY 91387	
Print Kenneth Kerner		
Signature	E-mail For contact re. meetings (optional)	
Edward J. Benison	23621 Mesa Ct. Valencia 91355	
Print EDWARD J. BENISON		
Signature	E-mail For contact re. meetings (optional)	
Melinda Arredondo		
Print MELINDA ARREDONDO		
Signature	E-mail For contact re. meetings (optional)	

PETITION TO SAVE THE PANHANDLE and ITS RIVER CORRIDOR

To the City of Santa Clarita Planning Department, the Planning Commission and City Council:

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Name	Address: (Street, City and Zip Code)	Phone Number
Isaac Lieberman	27517 Wellsley, Valencia 91354	661.296-3904
Print Isaac Lieb		
Signature	E-mail For contact re. meetings (optional)	
Cheryl Bunt	24724 Valley Chipmunk 39 qNET	
Print Cheryl Bunt		290_N
Signature	E-mail For contact re. meetings (optional)	
~~Sarah Sunshine~~	deplicated on another sheet	
Print ~~Sarah Sunshine~~	~~StarySunshine1@yahoo.com~~	
Signature	E-mail For contact re. meetings (optional)	
Jerry Murphy		
Print Jerry Murphy	Jerry@Murphys-Home.org	
Signature	E-mail For contact re. meetings (optional)	
Linda D Cirezini		
Print L D Cirezini	Linda f @ fox.com	
Signature	E-mail For contact re. meetings (optional)	
Violeta Vallin	22315 Paraguay Dr.	296-1085
Print Violeta Vallin - Saugus		ricky 711
Signature	E-mail For contact re. meetings (optional)	

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Name	**Address: (Street, City and Zip Code)**	**Phone Number** (optional)
GEORGE ROBIDEAUX	22375 ESPUELLA DR.	
Print		
Signature		E-mail For contact re. meetings (optional)
Print		
Signature		E-mail For contact re. meetings (optional)
MICHELE STONE	7354 Verdugo Crest Dr.	
Print Michèle Stone	TUJUNGA	
Signature		E-mail For contact re. meetings (optional)
Kris Ohlenkamp		
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JUNE CUSCHIERI	19223 DRYCLIFF ST	661 252 2438
Print ALFRED CUSCHIERI		
Signature		E-mail For contact re. meetings (optional)
Alfred Cusch	19223 DRYCLIFF ST	252 2438.
Print MARCEL CUSCHIERI	" "	661-799 3743
Signature		E-mail For contact re. meetings (optional)

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Print Kang Wang Cho	Santa clarita.	
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J. C. Ige	9872 Sunland BL, Sunland CA 91040	
Print J. C. Ige	ige@attbi.com	
Signature	E-mail For contact re. meetings (optional)	

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KEVIN RASMUSSEN	22558 LOS TIGRES DR. 91350	297-3354
Print K. Patrick R		
Signature	E-mail For contact re. meetings (optional)	
RACHEL SALINAS		
Print Rachel Salinas	22554 Los Tigres Dr.	
Signature	E-mail For contact re. meetings (optional)	
Gary E. Smith	22548 Los Tigres Dr	
Print Gary E Smith		
Signature	E-mail For contact re. meetings (optional)	
Michelle Bejarano	22542 Los Tigres Dr.	
Print Michelle Bejarano		
Signature	E-mail For contact re. meetings (optional)	
OSCAR A BEJARANO	22542 Los Tigres Dr.	
Print Oscar A Bejarano		
Signature	E-mail For contact re. meetings (optional)	

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ARLEEN FRANSEN	26035 BOUQUET CYN. #216, SANTA CLARITA, CA 91350	
Print Arleen Fransen		
Signature	E-mail For contact re. meetings (optional)	
Flo Frech		
Print F/O FRECH	26051 B.C. Rd Santa Clarita 91350	
Signature	E-mail For contact re. meetings (optional)	
Sherry Haukka	22530 Los Tigres, Saugus 91350	
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Kim Maynard	22536 Los Tigres Dr. Saugus, CA 91350	
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Prepared by the Santa Clarita Valley Sierra Club, 21827 Parvin Dr., Santa Clarita, CA 91350

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Karen Moulton	Newhall CA 91321	
Signature	E-mail For contact re. meetings (optional)	
Kathy Marin	25634 Salceda	
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	Valencia Ca	
Signature	E-mail For contact re. meetings (optional)	
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Signature	E-mail For contact re. meetings (optional)	
Print		
Signature	E-mail For contact re. meetings (optional)	
Print		
Signature	E-mail For contact re. meetings (optional)	
Print		
Signature	E-mail For contact re. meetings (optional)	

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Lester Reed	22372 Los Tigres Dr	
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Signature	E-mail For contact re. meetings (optional)	
RANDY Reed	22372 Los Tigres	
Print Randy Reed	SAUGUS CA 91350	
Signature	E-mail For contact re. meetings (optional)	
TRAVIS PHILLIPS	25943 Stafford Cyn. Rd 'D'	
Print Travis Phillips	Stevenson Ranch CA 91381	
Signature	E-mail For contact re. meetings (optional)	
Alisha Wilder	24815 Alcon Dr.	
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Signature	E-mail For contact re. meetings (optional)	
SHERRI PARAON	22369 ESPUELLA DR (661) 296-6870	
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Signature	E-mail For contact re. meetings (optional)	
ALYSSA PARAON	22369 ESPUELLA DR (661) 296-1487	
Print Alyssa Paraon		
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PAT BROWN	22357 Espuella Dr	91350
Print P.L. BROWN		
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Signature		E-mail For contact re. meetings (optional)
Jewel L Reed	22372 Los Tigres Dr.	Saugus 91350
Print JEWEL L. REED		661-297-4437
Signature		E-mail For contact re. meetings (optional)

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Signature	E-mail For contact re. meetings (optional)	
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Jerry L. JACKSON	22327 Espuella Dr. Saugus, Ca 91350	
Print Jerry L Jackson		
Signature	E-mail For contact re. meetings (optional)	
DOUGLAS HAMILTON		
Print Doug Hamilton	22310 Espuella Dr Saugus 91350	
Print Colleen E. Hamilton	22310-Espuella Dr Saugus 91350	
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Signature	E-mail For contact re. meetings (optional)	
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Signature Don Harback	E-mail For contact re. meetings (optional)	

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Signature	661 297 0428	E-mail For contact re. meetings (optional)
Print Jose Labrador	27933 Crown Court Circle Valencia Ca 91354	
Signature		E-mail For contact re. meetings (optional)
Print Cecilia Labrador	27933 Crown Court Circle Valencia Ca 91354	
Signature		E-mail For contact re. meetings (optional)
Print Steven Miller	22350 Los Tigres Dr. Santa Clarita, CA. 91350	
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Print Patricia Espinosa	22338 Los Tigres dr Saugus CA 91350	
Signature		E-mail For contact re. meetings (optional)
Print Deirdre Kuchler	22332 Los Tigres Saugus	
Signature		E-mail For contact re. meetings (optional)

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DUANE WILLIAMS	20922 ALAMITOS DR	
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Name	Address: (Street, City and Zip Code)	Phone Number
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Signature	E-mail For contact re. meetings (optional)	
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Print Peggy Effertz		
Signature	E-mail For contact re. meetings (optional)	
STEVIE HELLER-NEIDITCH		
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Signature	E-mail For contact re. meetings (optional)	
Linda L Bennett		
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Signature	E-mail For contact re. meetings (optional)	
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Signature	E-mail For contact re. meetings (optional)	
MARILYN ELO		
Print Marilyn Elo		
Signature	E-mail For contact re. meetings (optional)	

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NENE Z. ROSARIO	22309 ESPUELLA DR.	
Print Nene Z. Rosario	SAUGUS, CA 91350	
Signature	E-mail For contact re. meetings (optional)	
JERRY ROSARIO	22309 ESPUELLA DR.	
Print	SAUGUS, CA 91350	
Signature	E-mail For contact re. meetings (optional)	
Manuel Santana	22321 Espuella Dr.	
Print Manuel Santana		
Signature	E-mail For contact re. meetings (optional)	
Print JOHN R. MORGAN	JODEGA@EARTHLINK.NET	
Signature	E-mail For contact re. meetings (optional)	
Print MIKE OROZCO	MOROZCO@SJM.com	
Signature	E-mail For contact re. meetings (optional)	
Print Veronica Avila	VAVILA@SBCGLA.com	
Signature Veronica Avila	E-mail For contact re. meetings (optional)	

(6)

PETITION TO SAVE THE PANHANDLE and ITS RIVER CORRIDOR

To the City of Santa Clarita Planning Department, the Planning Commission and City Council:

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Name	Address: (Street, City and Zip Code)	Phone Number
Print Ron Ayres	26656 Diane Dr	292-3858
Signature Ron Ayres	Saugus Ca	E-mail For contact re. meetings (optional)
Print Kathryn A. Stromberg	22338 Espuella Dr	297-7809
Signature Kathryn A. Stromberg	Saugus, CA	E-mail For contact re. meetings (optional)
Print DANIEL STROMBERG	22338 ESPUELLA DR.	
Signature Daniel Stromberg	SAUGUS, CA	E-mail For contact re. meetings (optional)
Print David Stromberg	22338 Espuella Dr	
Signature David Stromberg	Saugus, CA	E-mail For contact re. meetings (optional)
Print Adria Faulconer	22324 Espuella Dr	
Signature Adria Faulconer	Saugus Ca 91350	E-mail For contact re. meetings (optional)
Print JAMIE FAULKONER	22324 ESPUELLA DR. SAUGUS CA 91350	
Signature		E-mail For contact re. meetings (optional)

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Name	Address: (Street, City and Zip Code)	Phone Number
Print MERRILL FILLMORE		661-573-8799 ~~550-8119~~
Signature Merrill Fillmore	E-mail For contact re. meetings (optional)	MMFIII@ATTBI.COM
Print JUNE R. LARSON		661-297-7904
Signature June R. Larson	E-mail For contact re. meetings (optional)	
Print Ellen Floyd	26705 Bouquet Canyon	
Signature Ellen Floyd	E-mail For contact re. meetings (optional)	
Print FRIEDA CHARTRAND	26705 Bouquet Canyon	
Signature Frieda Chartrand	E-mail For contact re. meetings (optional)	#1040
Print Kimberly Holbrook	23235 Sherwood Pl. Saugus CA 91350	
Signature	E-mail For contact re. meetings (optional)	
Print Phyllis White	22924 LAS Manan.tas DR 91354	
Signature Phyllis J. White	E-mail For contact re. meetings (optional)	

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Name	Address: (Street, City and Zip Code)	Phone Number
María Ignacia Santana	22321- Espuella Dr	
Print: María Ignacia Santana		
Signature	E-mail For contact re. meetings (optional)	
Denise Morgan	22345 Espuella Dr.	661-297-7015
Print: Denise L Morgan		
Signature	E-mail For contact re. meetings (optional)	
Carolyn Grijalva		661-299-5950
Print: Carolyn Grijalva		
Signature	E-mail For contact re. meetings (optional)	
Print: Rey Manzano		661-299-4575
Signature	E-mail For contact re. meetings (optional)	
Rocio Sandoval		661-259-5935
Print		
Signature	E-mail For contact re. meetings (optional)	
David White		
Print: David White		661-296-2339
Signature	E-mail For contact re. meetings (optional)	

Prepared by the Santa Clarita Valley Sierra Club, 21827 Parvin Dr., Santa Clarita, CA 91350

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Name	Address: (Street, City and Zip Code)	Phone Number
EFFIE J. BIRD	24877 WALNUT ST #209	661-254-7732
Print Effie J. Bird	NEWHALL CA 91321	
Signature	E-mail For contact re. meetings (optional)	
Lois Pellerin	32943 No. Ridge Rt. Rd.,	
Print Lois Pellerin	Castaic, Ca. 91384	
Signature	E-mail For contact re. meetings (optional)	
H. MAXINE Murphy	21844 Pebblecom Dr. Saugus	
Print		
Signature	E-mail For contact re. meetings (optional)	
Donna M. Brockway	21317 Simpson Way	661-254-5256
Print DONNA M. BROCKWAY	Cyn Cty, CA 91351	
Signature	E-mail For contact re. meetings (optional)	
Print JEAN ERICKSON	20862 BENZ RD SAUGUS 91350	
Signature Jean C. Erickson	E-mail For contact re. meetings (optional)	
Print Sharon L. Prince	45534 12th W Lancaster	
Signature Sharon L Prince	E-mail For contact re. meetings (optional)	

Prepared by the Santa Clarita Valley Sierra Club, 21827 Parvin Dr., Santa Clarita, CA 91350

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Name	Address: (Street, City and Zip Code)	Phone Number
Juan Paraon	22369 Espuella Dr. Saugus CA	
Print Juan Paraon		
Signature	E-mail For contact re. meetings (optional)	
NORMA WILDER	26815 ALCON DR SAUGUS CA	
Print Norma Wilder		
Signature	E-mail For contact re. meetings (optional)	
Jeff White	22924 LAS MANANITAS DR.	
Print		
Signature	E-mail For contact re. meetings (optional)	
Rafaela Celedon	23007 Soledad Cyn Rd Saugus, CA 91350	
Print Rafaela Celedon		
Signature	E-mail For contact re. meetings (optional)	
Vanessa Gonzalez	29263 Abelia Rd Canyon Country CA. 91387	
Print Vanessa Gonzalez		
Signature	E-mail For contact re. meetings (optional)	
Maggie Gonzalez	23007 Soledad Cyn Rd Saugus, Ca. 91350	
Print Maggie Gonzalez		
Signature	E-mail For contact re. meetings (optional)	

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Name	Address: (Street, City and Zip Code)	Phone Number
BETTY MOUSEL	27850 GLASSER AVE, SANTA CLARITA, 91351	(661) 251-1817
Print Betty Mousel Signature	E-mail For contact re. meetings (optional)	
Print Louis Robbins Signature Louis Robbins	25832 Browning Pl., Stevenson Ranch 91351 E-mail For contact re. meetings (optional)	661 255 2479
Print Kay Donnelly Signature Kay Donnelly	ropinthewind@hotmail.com 22373 Los Tigres Dr. Saugus 91351 E-mail For contact re. meetings (optional)	269-2056
Print Harold J Donnelly Signature Harold J Donnelly	" E-mail For contact re. meetings (optional)	
Print THOMAS J THREW Signature Thomas J Threw	22362 LOS TIGRES E-mail For contact re. meetings (optional)	286 1171
Print LEE VUONG Signature Lee Vuong	23007 Soledad Cyn Rd. E-mail For contact re. meetings (optional)	24 7047

(6)

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Name	Address: (Street, City and Zip Code)	Phone Number
Orlando Espitia	29263 Abeliard Rd. CC. CA 91387	
Print Orlando Espitia		
Signature	E-mail For contact re. meetings (optional)	
CANDACE SINCH	27358 BRIGHTON DR. VALENCIA CA. 91354	
Print Candace Sinch		
Signature	E-mail For contact re. meetings (optional)	
Christina Jaramillo	25000 Walnut St #2	
Print Christina Jaramillo	Newhall CA 91321	
Signature	E-mail For contact re. meetings (optional)	
Charlotte Cox	26810 Palacita Dr. Val. 91354	
Print Charlotte Cox		
Signature	E-mail For contact re. meetings (optional)	
OYESUMBO JAWU	26916 TERRY DR CANYON COUNTRY 9135,	
Print S. Edwi		
Signature	E-mail For contact re. meetings (optional)	
Print Denise Whaley	29021 Bouquet Cyn. #333, SAUGUS CA 91390	
Signature	E-mail For contact re. meetings (optional)	

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Name	**Address: (Street, City and Zip Code)**	**Phone Number**
		297-0757
Print John Gonzalez	26604 Gaulan Dr Saugus 91350	
Signature		E-mail For contact re. meetings (optional)
John Gonzalez		jongon@aol.com
Print		
Signature		E-mail For contact re. meetings (optional)
Print Gloria Blumenthal	22271 Birmingham Place Saugus 91350	
Signature		E-mail For contact re. meetings (optional)
Print Harry Blumenthal	22271 Birmingham Place Saugus 91350	
Signature		E-mail For contact re. meetings (optional)
James Delaplane	26604 Gaulan dr Saugus 91350	
Print		
Signature		E-mail For contact re. meetings (optional)
Print		
Signature		E-mail For contact re. meetings (optional)

Prepared by the Santa Clarita Valley Sierra Club, 21827 Parvin Dr., Santa Clarita, CA 91350

Letters from Individuals in Response to Original Notice of Preparation

From: "Alex Gaston" <gastone@earthlink.net>
To: <mmclean@santa-clarita.com>, <lweste@santa-clarita.com>, <kpulskamp@santa-clarita.com>, <csmyth@santa-clarita.com>, <bkellar@santa-clarita.com>
Date: 12/2/02 3:40PM
Subject: Fw: Emblem Tract" Letter to Mayor"

----- Original Message -----
From: Alex Gaston
To: fferry@santa-clarita.com
Sent: Monday, December 02, 2002 3:39 PM
Subject: Emblem Tract

Hello Mayor,

My name is Alex Gaston and I live in the Emblem Tract of Saugus. I am writing to you to ask for your help in stopping the planned development of the hills above the Emblem Tract. My 1st question is why hasn't the City of Santa Clarita notified me and most of the rest of the tract about the proposed destruction of one of the last remaining hills and open areas in the valley. It is required by law. We found out from neighbors after the city council meeting on the matter was already over. Only a small handful of citizens were notified, is this because the City of Santa Clarita was trying to slip this by and hoped no one noticed? I live at the end of the cul de sac and have the hill as my backyard and enjoy the peace and do not want apartments looking into my backyard. The location is the reason I bought the house in the 1st place. This proposal does not include a school as well and their children will overcrowd Emblem Elementary School where my children attend. My 2nd concern is the impact on the roads. I have lived here for 8 years and now find the roads horribly jammed at most hours of the day, not to mention the I-5 which reached it's limit years ago. When is someone going to say stop!!!!!!!! Enough is enough. Please help restore or at least maintain the Valley at reasonable levels. Newhall Land and Farm has shown complete disregard to the people of Santa Clarita and will continue to destroy and build until we can't get down the block to take our children to another overcrowded school. My 3rd concern is where is the water going to come from?

Thank You,
Alex S. Gaston

YOUR CONSTRUCTION will cause MAJOR NOISE + AIR POLLUTION CAUSING ALLERGIES AND other HEALTH PROBLEMS.

AS USUAL, the residences you build will get only the absolute MINIMUM AMOUNT OF PROPERTY so you can crowd As many UNITS as possible on This Land MAXIMIZING your PROFITS.

This Type of building is asthetically offensive and obliterates the quality of what makes our are exceptional. SPACE!!

66

John Gayg

RESIDENT SINCE 1963

CITY OF SANTA CLARITA

RECEIVED
PLANNING DIVISION
NOV 19 2002
PLANNING AND BUILDING SERVICES
CITY OF SANTA CLARITA

Attn.: Jeff Hogan

Wendy Deats

As property owners in the Emblem track, we are very concerned about the River Park Project. The reasons are listed below and hope this will help in your decision on this matter.

- **TRAFFIC** Newhall Ranch road and Bouquet Cyn is one of worst accident areas of Santa Clarita. New homes being built in the Plum Cyn. Area is going to add even more traffic, and possible accidents. This area from Newhall Ranch road to Espuella has at least one accident a month or more. It takes me 20 –30 mins. at 6:15 a.m. to get to Lyons Ave. now. What will it be when more homes and apartments are built. Safety for the children and pedestrians should be on the top of the city councils list. I see only problems with this many homes and aptments being built with Newhall Ranch Road as the entrance and exit. Yes, our neighborhood needs Newhall Ranch Rd. No, to apartments and single family homes.

- **SCHOOLS** Emblem school is the school slated for this project. This school has been the overflow school for all new projects. When the children from Bridgeport were going there, the area was a nightmare during the 30-40 mins before and after school with traffic. The parents are rude, blocking all streets and driveways. We could not get out to go to work, and the litter was terrible on the streets. Let alone when the school has functions we are lucky to be able to get into our driveway. Our streets are very narrow and if an emergency would arrive no fire truck could get in during this time. Our streets are old who is going to do repairs to the streets, sewers etc. It should not be the homeowners of the track. We are not asking for this traffic. Air quality is very bad with the cars waiting to move to let off the children. I want to know who will pay for the upgrades to the school and the building of a new middle school and high school since our schools are already full. I did not hear anything about Newhall Land building schools. If they want to build houses they should build the schools. Not just give a piece of property to the school district. Who will pay for this the property owners. Not the tenants of the apt houses? Is this fair to the retired people to have this burden added to them? We also have the liability if the children are on our property even when we are not home. They do get on the lawns and jump off the low walls. I have had to tell them a few times to stop it

before they get hurt. I do not want to be worried about someone on my property getting hurt.

- **NOISE AND POLUTION** from building near us. Who will pay when we get sick? The groundwater is already contaminated with chemicals Now your approving even more homes and traffic.. What kind of noise barriers are going to be put up? What about cleaning our homes and yards from the dust I have a fishpond full of koi who will take responsibility if they die from the dust and dirt? Let alone anyone with allergies or asthma. Who will pay for the Dr. bills or loss of work*? I AM SURE IT WON'T BE NEWHALL LAND.*

- **WATER** Where is it coming from, Castaic Lake Water District was told that they could not store all the water they wanted to for all these projects. What of a drought, where will they get the water from? Most of our ground water here is contaminated. The study was just in on the river being polluted with chemicals from homes using pesticides. We are going to have more homes right at the river to do more damage. We are to desalt the river for Ventura county. What will it cost us to clean up the contaminates from the river? *I AM SURE IT WON'T BE NEWHALL LAND.*

- **WILDLIFE** There is a lot of wildlife in the hills adjacent to the river what happens to them? We have learned to live with them.We have them all, what happens to the deer, weasels, rabbits, endangered toads, plants and our vireo's yes we have them here. They feed at my feeder all the time. It seems that when people move into an area the wildlife suffers. What a shame. What do we do when the rats, snakes and other pests leave their homes and invade ours? Who will rid us of the pests? Or pay for the exterminators? *I AM SURE IT WON'T BE NEWHALL LAND*

- **El Nino** is upon us again a few years ago the bridge at Bouquet was closed what will happen to the homes that are going to be so close to the river? Or what if we have to evacuate the area with this many homes no one would be able to get out.

Leave the open spaces alone. **Please** we will look like the San Fernando Valley soon enough. Nothing but houses what a shame. We have more smog than the basin now crime is on the rise. Do you think it could be because we have more people? The river should be protected it's the last wild river in Calif. why ruin it with houses. Everywhere you go there is building when will you tell the builders no more. Quality does not mean quantity. Progress should not mean destroying the environment.

One last thing. The speedway is so much a part of the history of Saugus. Will the new homeowners insist that it close because of noise? Just like the dairys closed because homeowners moved in and could not stand the smell.

Bruce and Louise Hartwell

22570 Los Tigres Drive

Santa Clarita

661-263-8322

RECEIVED
PLANNING DIVISION
DEC 02 2002
PLANNING AND BUILDING SERVICES
CITY OF SANTA CLARITA

Dear Mr. Hogan: 11/26/02

It is with much distress that today I learned of yet another development being planned for the already overcrowded Santa Clarita Valley. This development is called the 'River Park Project'. I can't believe that another 1,000 homes are being considered for an already fragile river area. Animals, which depend on that area for their habitat, will be threatened with extinction again. The land there is needed to preserve the river, which in turn is needed to percolate our water into our aquifer.

We already have schools stuffed with portable classrooms just to house the students they have now. Emblem School has crowding now, let alone with many more families moving in.

The roads that all those new residents would need to use are already way overcrowded. Bouquet Canyon Road is very congested during rush hour and even at other times of the day. The weekends are impossible. All that is needed is one little accident and the road backs up into all the other main thoroughfares.

I am also very concerned about where the useable water would come from to support 1,000 new homes. During years of drought, water can become increasingly scarce. All the new developments that are being built may add up to big problems in years to come.

Please vote no on this development.

I would like to be informed of the date of the first hearing on the environmental impact report and on all other hearings.

Sincerely,

Barbara Lewin

Kerry & Barbara Lewin
27723 N. Heartwood Ct.
Valencia, CA 91354

Nov 25, 2002

Attn: Wendy Deats, Planning Dept

I would like to express my concern about the the potion of land East of Bouquet Cyn and Ranch Road, known as River Park. Until this year, that area was home to a family of 8 Red-Tailed Hawks. The devestation to that property, has broken up the hawk family. That portion of the Santa Clara River is home to a lot of wildlife, including Fox, Coyote, Deer, Quail, Owl, Cooper's Hawk, Red-shouldered Hawk, Red-tailed Hawk, Sharp-shinned Hawk, and all the wildlife they prey on.
If those river banks can be restored to what they were, it could be a beautiful place again. To be shared by families in the community (new and old), and a great place for schools to have field trips at certain times of the year. We've lost so many nice places in the area recently, we have to save something for future generations before its too late.

Jerry Murphy
Jerry@MurphysHome.org

RECEIVED
PLANNING DIVISION

NOV 26 2002

PLANNING AND BUILDING SERVICES
CITY OF SANTA CLARITA

From the desk of . . .

Karen Pearson

26617 Gavilan Dr., Santa Clarita, CA 91350-2333. Ph. & Fax 661 296 4438.

November 26, 2002

ATTN: Wendy Deats
City of Santa Clarita
Department of Planning and Building Services
23920 Valencia Blvd.
Santa Clarita, CA 91355

Dear Wendy Deats,

Enclosed please find my SCOPING comments. Also, included are approximately 157 signatures which are written on a petition regarding this panhandle housing development project--euphemistically called the River Park Project. All of these people want you to know that they have the concerns about this proposal that are delineated in the top paragraph. Those that included their addresses are expecting to be notified by your department of any forthcoming meetings regarding this project. It is my understanding as a result of our phone call that you will be happy to inform them of these future meetings. If you could also notify those that only left their e-mails and phone numbers, I am sure they would appreciate it. As a result of our phone call, I also have the understanding that you will notify anyone who leaves their name and address with you about future meetings regarding this project even if those names are given after the SCOPING deadline. This would include people who write or phone or e-mail or are included on petitions such as this and leave their name and address. It shows your interest in being responsive to the community and this, of course, is something our city strives for.

Your cooperation in extending the deadline for SCOPING comments to November 27 is also much appreciated as is your cooperation in being diligent in individually notifying all interested parties of all meetings regarding this project.

I sincerely hope you have a happy Thanksgiving.

Karen Pearson

Karen Pearson

City of Santa Clarita
Department of Planning and Building Services
23920 Valencia Boulevard, Suite 300
Santa Clarita, CA 91355

RECEIVED
PLANNING DIVISION
MAY 13 2002
PLANNING AND BUILDING SERVICES
CITY OF SANTA CLARITA

Attention: Jeff Hogan/Wendy Deats

Dear Sir or Madam:

I have lived in the Santa Clarity Valley since 1974 and I am totally opposed to the proposed River Park Project. In my opinion the city growth is completely out of control. The quality of life in our peaceful valley is rapidly becoming non-existent. It is obvious to anyone who travels anywhere in the Santa Clarity Valley that the current infrastructure system cannot handle the daily import of new families. What is to happen with the proposed site? Adding two lanes to Newhall Ranch Road will not solve the problem of the additional traffic.

And what of our environment? What of our river and natural habitat? What of our schools, already grossly overcrowded. Are these not major quality of life issues? What of water, air quality, noise, pollution?

I implore you to consider the families who are trying to co-exist with your run-away growth peacefully. If Newhall Land and Farm goes forward with this massive project, my list of demands will be long and expensive. Please do not destroy the little open space that is left.

Sincerely,

Linda Spring

Linda Spring
26607 Gavilan Drive
Saugus, CA 91350

Dear Sir or Madam:

The proposed development will significantly impact quality of life at our house. Construction noise and dust will be very noticeable. This is borne our by the face of the previous development - Bouquet Shopping Center. In addition, the site map shows a multiple story apartment near all our property. Building a sound wall across the back of all our property and undergrounding of utilities would assist in mitigating the negative impact to our lives and property as a result of the project.

Sincerely,

William K. Spring

William Spring
26607 Gavilan Drive
Saugus, CA 91350

RIVER PARK PROJECT
ENVIRONMENTAL REVIEW
COMMENT FORM

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ATTN: Jeff Hogan/Wendy Deats
City of Santa Clarita
Department of Planning and Building Services
23920 Valencia Boulevard
Suite 300
Santa Clarita, CA 91355

Please also provide your name and address so you can receive additional information on this project as the City's review progresses. Please provide your comments below:

I AM [redacted] AGAINST THE PANHANDLE PROJECT. IT IS TO CLOSE TO OUR SANTA CLARA RIVER. WE NEED THIS UPLAND AREA FOR OUR WILDLIFE. I FEEL ITS VERY IMPORTANT TO PROTECT OUR WILDLIFE. ADDING 1000 UNITS TO THIS AREA IS GOING TO MAKE AN ALREADY VERY BUSY BOUQUET CYN RD ALMOST IMPOSSIBLE TO TRAVEL ON.

Name: MELINDA ARREDONDO

Address: 27611 NUGGET DR UNIT 3
SANTA CLARITA 91387

Please attach additional sheets if necessary

RIVER PARK PROJECT
ENVIRONMENTAL REVIEW
COMMENT FORM

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City of Santa Clarita
Department of Planning and Building Services
23920 Valencia Boulevard
Suite 300
Santa Clarita, CA 91355

Please also provide your name and address so you can receive additional information on this project as the City's review progresses. Please provide your comments below:

Please make every effort to acquire funding to create a "River Park" area in the panhandle area in lieu of housing development. Development will result in a further general environmental degradation of the area, e.g. excessive traffic, some increased health problems, wildlife destruction, excessive noise, etc. etc. With no proven supply of water for development, this puts the area in jeopardy

Name: EDWARD BENISON

Address: 23621 MESA COURT
VALENCIA 91355

Please attach additional sheets if necessary

RIVER PARK PROJECT
ENVIRONMENTAL REVIEW
COMMENT FORM

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ATTN: Jeff Hogan/Wendy Deats
City of Santa Clarita
Department of Planning and Building Services
23920 Valencia Boulevard
Suite 300
Santa Clarita, CA 91355

Please also provide your name and address so you can receive additional information on this project as the City's review progresses. Please provide your comments below:

Despite the double talk I received when asking about overcrowding at EMBLEM SCHOOL The plan DID NOT include a school. THE PLAN NEEDS TO INCLUDE A SCHOOL! EMBLEM CANNOT accomadate the HUNDREDS OF KIDS That will certainly move into these residences.
TRAFFIC IS ALREADY A NIGHTMARE ESPECIALLY FOR PEOPLE WHO Commute to the VALLEY & L.A.
THE HILL IN BACK OF VONS IS A ~~SOUND~~ NOISE BARRIER FOR THE PEOPLE THAT LIVE IN THE EMBLEM TRACK; YOUR PLAN CALLS FOR LEVELING That hill.
THERE IS A LOT OF WILDLIFE THAT WILL BE DISRUPTED!

OVER →

Name: John Gonzalez

Address: 26604 Gavilan Dr
Saugus, CA 91350

Please attach additional sheets if necessary

RIVER PARK PROJECT
ENVIRONMENTAL REVIEW
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ATTN: Jeff Hogan/Wendy Deats
City of Santa Clarita
Department of Planning and Building Services
23920 Valencia Boulevard
Suite 300
Santa Clarita, CA 91355

Please also provide your name and address so you can receive additional information on this project as the City's review progresses. Please provide your comments below:

Name: _____

Address: _____
Bruce & Louise Hartwell
22570 Los Tigres Drive
Saugus, CA 91350
_____

Please attach additional sheets if necessary

RIVER PARK PROJECT
ENVIRONMENTAL REVIEW
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ATTN: Jeff Hogan/Wendy Deats
City of Santa Clarita
Department of Planning and Building Services
23920 Valencia Boulevard
Suite 300
Santa Clarita, CA 91355

Please also provide your name and address so you can receive additional information on this project as the City's review progresses. Please provide your comments below:

This is a bad project - because of the ecological impact on the river.

also, because of the close proximity to the existing residential neighborhood

Name: KENNETH KERNER

Address: 16943 NIGHFALLS DR.
CANYON COUNTRY, CA 91387

Please attach additional sheets if necessary

RECEIVED
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PLANNING AND BUILDING
CITY OF SANTA C

RIVER PARK PROJECT
ENVIRONMENTAL REVIEW
COMMENT FORM

This form is provided for your convenience to make written comments regarding potential impacts on the community you believe may result from the proposed River Park Project. Your comments will be considered by the City of Santa Clarita in determining the issues to be addressed in the Environmental Impact Report (EIR) the City will be preparing on this proposed project. You may use this form in addition to, or instead of, making oral comments at this public meeting. After filling out the form, please leave it in the designated box prior to leaving this meeting or, mail it to:

ATTN: Jeff Hogan/Wendy Deats
City of Santa Clarita
Department of Planning and Building Services
23920 Valencia Boulevard
Suite 300
Santa Clarita, CA 91355

Please also provide your name and address so you can receive additional information on this project as the City's review progresses. Please provide your comments below:

I am concerned about impacts to the Santa Clara River and the wildlife corridor along the river. Also the density of the project & traffic on Bouquet Canyon Road. There should be no native oaks taken out. Also, what happened to the City's vision of a riverfront park? I went to a few meetings a few years back & I haven't seen anything happen. I know an equestrian trail was planned from 1 side of the city all the way to the 5 Freeway.

Name: Ray Lorme

Address: 28125 Caraway Lane
Santa Clarita, Ca. 91350

Please attach additional sheets if necessary

PLANNING DIVISION
2002

RIVER PARK PROJECT
ENVIRONMENTAL REVIEW
COMMENT FORM

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ATTN: Jeff Hogan/Wendy Deats
City of Santa Clarita
Department of Planning and Building Services
23920 Valencia Boulevard
Suite 300
Santa Clarita, CA 91355

Please also provide your name and address so you can receive additional information on this project as the City's review progresses. Please provide your comments below:

(1) A more "out-of-the box" treatment of the 25 oaks slated for removal

(A) Could some of the 25 be saved by more creative planning? COULD THE HOUSING BE PLANNED AROUND THE TREES (not the other way around)?

(B) Could oaks to be removed be moved to another location ON THE PROPERTY? Oaks simply should not be chopped down. Oaks should stay within the same habitat (same dirt, etc.)

(2) Wildlife Corridor

(A) Will this development choke off this very important wildlife corridor? In this area you must address the ramifications of the construction of Newhall Ranch Road, the bank stabilization, the grading (

Name: Mr. and Mrs Roger W. McClure

Address: 29111 Lotusgarden Drive
Canyon Country, CA 91387

Please attach additional sheets if necessary

(2)(A) the Golden Valley Rd. Bridge construction, the impacts to the river itself, etc. — all these issues for this area itself, i.e., the very important + essential WILDLIFE CORRIDOR.

(B) No grading should occur during nesting season!

(3) Bank Stabilization

We urge more creative implementation. We do not want to see Concrete! Please research what else has been done or will be done in LA River and other rivers in the United States to avoid the concrete "look."

Visual impacts are very important!!!

We attended the fist meeting and had to leave a little early - but we do recall these issues being discussed. Thank you!

RIVER PARK PROJECT
ENVIRONMENTAL REVIEW
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City of Santa Clarita
Department of Planning and Building Services
23920 Valencia Boulevard
Suite 300
Santa Clarita, CA 91355

Please also provide your name and address so you can receive additional information on this project as the City's review progresses. Please provide your comments below:

How will you protect the habitat of threatened species — especially on the River's edge?
Doesn't rip rap destroy habitat?
When you move all this earth aren't you also removing the animal habitat of those who live underground?
What do you plan on doing about it?
If, as with other dirt removal projects rattlesnakes and rats are displaced how do you plan on protecting the nearby neighborhood from their arrival in their backyards?
How can you insure that just as much water will percolate to over much needed aquifers as has percolated before?

How will you insure that these last remaining uplands will be available to the animals that live on the river when flood comes?

Name: Karen Pearson

Address: 26617 Gavilan Dr
Santa Clarita, CA 91350

SCOPING COMMENTS CONT.:

Please attach additional sheets if necessary

How will you retain wide enough CORRIDORS FOR THEM TO GET TO THE UPLANDS?
How can you put apartments in area D without having a detrimental effect on existing residents.

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ATTN: Jeff Hogan/Wendy Deats
City of Santa Clarita
Department of Planning and Building Services
23920 Valencia Boulevard
Suite 300
Santa Clarita, CA 91355

Please also provide your name and address so you can receive additional information on this project as the City's review progresses. Please provide your comments below:

Bouquet Cyn. Rd. moves at the rate of a Snail. Your approval of the location of In + Out Hamburger will make more Traffic in a Congestive area and more Accidents. The River Park Project will increase This Bouquet Cyn Rd Traffic!!! You say Emblem School for 1-6, but what Jr. High and High School? Water, where is it to come from? Roads need repair now, this Additional increase in Traffic will Keep the roads from ever being repaired. Are you going to pay for more Santa Clarita Sheriff Deputies?? Crime will go up with the proposed project. There isn't enough parking for the existing buildings (Vons, Sav-On Drugs). There is a wildlife population that should be considered Newhall Land and Farm should donate this property to the City of Santa Clarita for wildlife study + park.

Name: Mary + Harry Rasmussen

Address: 25558 Los Tigres Dr.
Santa Clarita, Ca 91350

Please attach additional sheets if necessary

RECEIVED
PLANNING DIVISION
NOV 14 2001
PLANNING AND BUILDING SERVICES
CITY OF SANTA CLARITA

RIVER PARK PROJECT
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ATTN: Jeff Hogan/Wendy Deats
City of Santa Clarita
Department of Planning and Building Services
23920 Valencia Boulevard
Suite 300
Santa Clarita, CA 91355

Please also provide your name and address so you can receive additional information on this project as the City's review progresses. Please provide your comments below:

Where are the plans for the Area D. multifamily & Development?

Name: John Sloffen

Address: 22714 Triquella Dr.
So C., Ca 91350

Please attach additional sheets if necessary

RECEIVED
PLANNING DIVISION
NOV 21 2002
PLANNING AND BUILDING SERVICES
CITY OF SANTA CLARITA

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Department of Planning and Building Services
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Suite 300
Santa Clarita, CA 91355

Please also provide your name and address so you can receive additional information on this project as the City's review progresses. Please provide your comments below:

(1) This area is infested with rattlesnakes — how are you going to stop them?
(2) Will there be enough water for this project — Who will guarantee & substantiate this answer besides the builder?
(3) Will a new school be built to accomodate the residence?
(4) How will the air quality be affected?
(5) How much more traffic will result?
(6) How will the wildlife be effected
(7) How will it impact traffic in the Emblem Tract?
(8) Will the S.C. River be impacted & how?
(9) How can anyone make an intelligent assessment of this project without a definitive map?

Name: John Staffan
Address: 22714 Espuella Dr.
Saugus, Ca 91350

Please attach additional sheets if necessary

(10) How will this project impact other schools & the traffic there?

RIVER PARK PROJECT
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ATTN: Jeff Hogan/Wendy Deats
City of Santa Clarita
Department of Planning and Building Services
23920 Valencia Boulevard
Suite 300
Santa Clarita, CA 91355

Please also provide your name and address so you can receive additional information on this project as the City's review progresses. Please provide your comments below:

When the "master plan" of Santa Clarita was created there was a road capacity for the roads in our city. We have far surpassed the capacity of our roads & freeway system. How can you justify building more homes in an already severely crowded traffic area? Is it acceptable to sit on Valencia Blvd for over 30 minutes to turn onto Bouquet Cyn on your way home from work during rush hour? The people in the Emblem Elementary tract deserve better treatment that what you are proposing to impact on them - this housing development will negatively impact our quality of life and is not fair to long standing citizens of our community.

Name: Dana Lora

Address: 22327 Paraguay Dr.
Saugus Ca 91350

Please attach additional sheets if necessary

SIGN-IN

RIVER PARK
SCOPING MEETING

November 6, 2002
6:00 P.M.

Name	Address	Phone
Richard Martinez	22576 Paraguay Drive	(661) 296-2416 w(213) 345-5375
[illegible]	24 72[illegible] V. [illegible] 114	254 3223
GEO. ROBIDEAUX	2	296-1382
Jim Bonig	22509 Espuella Dr	296-5271
BLAKE BONELLI	8617 N. 49TH ST P.V. AZ	480-607-6460
MANUEL MENDEZ	22506 ESPUELLA SAUGUS	297 7024
DORA MENDEZ	" " "	"
~~Rob Derrick~~	22552 PARAGUAY DR.	
~~Teresa Tovar~~	22503 Espuella	297-1993
Rita Mendoza	22512 Espuella Dr	296 9254
John Gonzalez	26604 Gavilan Dr	297 0757
April Garland	26604 Gavilan Dr	297-0757
DWAYNE MCCLINTOCK	26600 GAVILAN DR	263-7750
Colleen Hamilton	22310-ESPUELLA DR	296-1930
Doug Hamilton	22310-ESPUELLA DR	296-1930
WILLIAM SPRING	26607 GAVILAN DR	297-3124
Bruce Hartwell	22570 Los Tigres Dr	2638323
Louise Hartwell	22570 Los Tigres Dr	2638323
Collette George	22520 Los Tigres Dr	263-7497
Kelsey George	Same as above	Same as above
Joe Sanchez	22318 Espuella DR	297-7453
HAROLD PIERCE	2855 Red Cedar PL SAUGUS	513-0965
Karen Peerson	26617 Gaelan Dr	296 4438
Linda Hubbard	22358 Espuella Drive	297-0366
Richard Cookie Martinez	22576 Paraguay Dr. Saugus	—
Mike Ballard	27361 Sierra Hwy #227	
Teresa Savaikie	26724 Mocha Dr. Saugus CA 91350	263-9624

SIGN-IN

RIVER PARK
SCOPING MEETING

November 6, 2002
6:00 P.M.

Name	Address	Phone
DAN & DANA LORA	22327 PARAGUAY DR	297-0715
Roger + Judy McClure	29111 Lotusgarden Dr.	252-6187
Jerry Wingenroth	26603 Caballeta Dr.	263-6978
BLAKE A. BONELLI	8617 N. 49TH ST. PARADISE VALLEY, AZ 85253	480-607-6460

APPENDIX 1.0
Resolution

RESOLUTION NO. 00-143

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF SANTA CLARITA, CALIFORNIA, SUPPORTING THE IMPLEMENTATION OF THE CROSS-VALLEY CONNECTOR

WHEREAS, the Cross-Valley Connector is defined as Newhall Ranch Road from the Interstate 5/Newhall Ranch Road/State Route 126 interchange to the east to the connection of Newhall Ranch Road and Golden Valley Road, and Golden Valley Road from that point east to the interchange of Golden Valley Road and State Route 14; and

WHEREAS, the Cross-Valley Connector will support the Santa Clarita Valley's commercial and industrial base and economic development by enhancing the efficient movement of goods; and

WHEREAS, the Cross-Valley Connector consists of a series of existing links both fully and partially improved, links presently under construction, and links that are not built; and

WHEREAS, the Cross-Valley Connector will provide a substantial addition to the Los Angeles County Congestion Management Program (CMP) roadway network and will directly link four CMP highways: Interstate 5, State Route 126, State Route 14, and Sierra Highway;

WHEREAS, the Cross-Valley Connector has been divided into links for the purposes of project funding and phasing. Some of the links have already successfully competed for design and construction funding through the Metropolitan Transportation Authority (MTA) Call for Projects; and

WHEREAS, the Cross-Valley Connector was previously identified by the City Council as the City's number one road priority for the purposes of the 2000 Call for Projects; and

WHEREAS, one-third of the funding for the construction of the Golden Valley Road/Soledad Canyon Road interchange was awarded to the City by the MTA through the 2000 Call for Projects; and

WHEREAS, one-half of the funding for the design of the portion of Newhall Ranch Road from Copper Hill Drive to Interstate 5 was awarded to the City by the MTA through the 2000 Call for Projects; and

WHEREAS, gaps exist between existing segments of the route. The unbuilt links have been prioritized so that "gaps" in the route can become eligible for public funding as soon as possible; and

WHEREAS, the City Council has directed through the Fiscal Year 2000/01 budget to allocate funding for the preliminary design of a portion of Newhall Ranch Road between Bouquet Canyon Road and Golden Valley Road; and

WHEREAS, the Cross-Valley Connector will provide a much-needed alternate route across the City, enhancing emergency services; and

WHEREAS, opportunities to provide east-west road capacity are severely limited within the City; and

WHEREAS, various local sources of funding such as Bridge and Thoroughfare (B&T) District fees and developer mitigation are and will be available to help leverage public financing opportunities; and

WHEREAS, the Cross-Valley Connector will provide safe and unobstructed crossing over Soledad Canyon Road and the Metrolink railroad tracks; and

WHEREAS, the completion of the Cross-Valley Connector will connect the Interstate 5 freeway at State Route 126 to the State Route 14 freeway at the Golden Valley Road interchange. This route will provide an east-west "cross-valley" connection that is expected to reduce the need for local trips to utilize the State highway system and the City's dependence on the State system for local traffic; and

WHEREAS, the Cross-Valley Connector will support a multi-modal transportation network by reducing cross-valley bus travel times, and accommodate bicycle and pedestrian travel by including Class I bike paths.

NOW, THEREFORE, THE CITY COUNCIL OF THE CITY OF SANTA CLARITA does hereby resolve as follows:

That the City will prioritize the Cross-Valley Connector as its number one priority in terms of seeking public funding and financing opportunities.

That the City will maximize the public investment in the Cross-Valley Connector, looking to all potential sources of revenue, including, but not limited to, funding opportunities through the MTA, the State of California, and the federal government.

That the City will use existing sources of local capital (e.g., B&T District Fees), as well as seek to implement strategies to raise local sources of capital and to leverage those local funds to the highest degree.

That the City will search for innovative strategies to complete the improvements in phases or as a program of improvements that seeks to balance the current transportation needs of residents with the realities of funding sources and development proposals.

RESOLUTION NO. 00-143
November 14, 2000 – Page 3

That the City will design the Golden Valley Road Bridge over the Santa Clara River in an environmentally sensitive manner.

That the City will seek to complete the funding for the unbuilt links of the Cross-Valley Connector as soon as possible.

That upon the completion of the Cross-Valley Connector, the City will submit a formal request to the MTA for the route to be included in the Los Angeles County Congestion Management Program (CMP) highway network.

PASSED, APPROVED, AND ADOPTED this 14th day of November, 2000.

MAYOR

ATTEST:

CITY CLERK

STATE OF CALIFORNIA)
COUNTY OF LOS ANGELES) ss.
CITY OF SANTA CLARITA)

I, Sharon L. Dawson, CMC, City Clerk of the City of Santa Clarita, do hereby certify that the foregoing Resolution was duly adopted by the City Council of the City of Santa Clarita at a regular meeting thereof, held on the 14th day of November, 2000, by the following vote of Council:

AYES: COUNCILMEMBERS: Ferry, Kellar, Weste, Smyth, Darcy
NOES: COUNCILMEMBERS: None
ABSENT: COUNCILMEMBERS: None

CITY CLERK

council\CVC_reso

APPENDIX 3.0

Development Monitoring System Database

SERVICE PROVIDER REPORT

Service Provider COUNTY SANITATION DISTRICT NO. 26 & 32

Development Profile	Status		
	Pending	Approved	Recorded
RESIDENTIAL			
Number of active cases	54	27	179
Total number of dwelling units	8931	14368	11999
Single Family Units (detached)	6730	6477	9129
Duplex Units			
Multiple Family Units	2201	7891	2870
Mobile Home Units			
COMMERCIAL			
Number of active cases	6	5	5
Total acreage	305.16	107.1	59.61
INDUSTRIAL			
Number of active cases	5	1	9
Total acreage	195.14	106	199.56

Explanation of Status

Pending - subdivisions filed with Regional Planning Department, not yet approved nor denied

Approved - subdivisions approved by the County, not yet recorded nor expired.

Recorded - subdivisions recorded, not yet built.

SERVICE PROVIDER REPORT

Service Provider VAL VERDE WATERWORKS DISTRICT NO. 36

Development Profile	Status: Pending	Approved	Recorded
RESIDENTIAL			
Number of active cases	13	4	8
Total number of dwelling units	480	134	413
Single Family Units (detached)	480	79	413
Duplex Units			
Multiple Family Units		55	
Mobile Home Units			
COMMERCIAL			
Number of active cases	0	0	0
Total acreage			
INDUSTRIAL			
Number of active cases	0	1	0
Total acreage		106	

Explanation of Status

Pending - subdivisions filed with Regional Planning Department, not yet approved nor denied

Approved - subdivisions approved by the County, not yet recorded nor expired.

Recorded - subdivisions recorded, not yet built.

SERVICE PROVIDER REPORT

Service Provider VALENCIA WATER COMPANY

Development Profile	Status: Pending	Approved	Recorded
RESIDENTIAL			
Number of active cases	10	6	89
Total number of dwelling units	1744	5544	6023
Single Family Units (detached)	615	1306	4982
Duplex Units			
Multiple Family Units	1129	4238	1041
Mobile Home Units			
COMMERCIAL			
Number of active cases	1	4	5
Total acreage	47.54	71.1	59.61
INDUSTRIAL			
Number of active cases	2	0	1
Total acreage	145.4		32.4

Explanation of Status

Pending - subdivisions filed with Regional Planning Department, not yet approved nor denied

Approved - subdivisions approved by the County, not yet recorded nor expired.

Recorded - subdivisions recorded, not yet built.

SERVICE PROVIDER REPORT

Service Provider SANTA CLARITA WATER COMPANY

Development Profile	Status		
	Pending	Approved	Recorded
RESIDENTIAL			
Number of active cases	21	15	56
Total number of dwelling units	2719	8417	4394
Single Family Units (detached)	2319	4819	2565
Duplex Units			
Multiple Family Units	400	3598	1829
Mobile Home Units			
COMMERCIAL			
Number of active cases	2	1	0
Total acreage	4.54	36	
INDUSTRIAL			
Number of active cases	2	0	5
Total acreage	35.24		7.03

Explanation of Status

Pending - subdivisions filed with Regional Planning Department, not yet approved nor denied

Approved - subdivisions approved by the County, not yet recorded nor expired.

Recorded - subdivisions recorded, not yet built.

SERVICE PROVIDER REPORT

Service Provider NEWHALL WATER DISTRICT

Development Profile	Status: Pending	Approved	Recorded
RESIDENTIAL			
Number of active cases	18	2	27
Total number of dwelling units	4099	273	1224
Single Family Units (detached)	3347	273	1224
Duplex Units			
Multiple Family Units	752		
Mobile Home Units			
COMMERCIAL			
Number of active cases	3	0	0
Total acreage	253.08		
INDUSTRIAL			
Number of active cases	1	0	3
Total acreage	14.5		160.13

Explanation of Status

Pending - subdivisions filed with Regional Planning Department, not yet approved nor denied

Approved - subdivisions approved by the County, not yet recorded nor expired.

Recorded - subdivisions recorded, not yet built.

SERVICE PROVIDER REPORT

Service Provider CASTAIC UNION SCHOOL DISTRICT - ELEMENTARY

Development Profile	Status		
	Pending	Approved	Recorded
RESIDENTIAL			
Number of active cases	19	7	35
Total number of dwelling units	2704	894	2338
Single Family Units (detached)	2218	299	2224
Duplex Units			
Multiple Family Units	486	595	114
Mobile Home Units			
COMMERCIAL			
Number of active cases	1	1	1
Total acreage	4	5	9.5
INDUSTRIAL			
Number of active cases	3	1	4
Total acreage	159.9	106	192.53

Explanation of Status

Pending - subdivisions filed with Regional Planning Department, not yet approved nor denied

Approved - subdivisions approved by the County, not yet recorded nor expired.

Recorded - subdivisions recorded, not yet built.

SERVICE PROVIDER REPORT

Service Provider CASTAIC UNION SCHOOL DISTRICT - JUNIOR HIGH

Development Profile	Status		
	Pending	Approved	Recorded
RESIDENTIAL			
Number of active cases	19	8	50
Total number of dwelling units	2704	1517	3347
Single Family Units (detached)	2218	299	2776
Duplex Units			
Multiple Family Units	486	1218	571
Mobile Home Units			
COMMERCIAL			
Number of active cases	1	1	3
Total acreage	4	5	54.96
INDUSTRIAL			
Number of active cases	3	1	4
Total acreage	159.9	106	192.53

Explanation of Status

Pending - subdivisions filed with Regional Planning Department, not yet approved nor denied

Approved - subdivisions approved by the County, not yet recorded nor expired.

Recorded - subdivisions recorded, not yet built.

SERVICE PROVIDER REPORT

Service Provider NEWHALL SCHOOL DISTRICT

Development Profile	Status: Pending	Approved	Recorded
RESIDENTIAL			
Number of active cases	15	3	35
Total number of dwelling units	3119	1635.72	2868
Single Family Units (detached)	1724	472.72	2262
Duplex Units			
Multiple Family Units	1395	1163	606
Mobile Home Units			
COMMERCIAL			
Number of active cases	3	1	3
Total acreage	296.62	5	50.11
INDUSTRIAL			
Number of active cases	0	0	0
Total acreage			

Explanation of Status

Pending - subdivisions filed with Regional Planning Department, not yet approved nor denied

Approved - subdivisions approved by the County, not yet recorded nor expired.

Recorded - subdivisions recorded, not yet built.

SERVICE PROVIDER REPORT

Service Provider SAUGUS UNION SCHOOL DISTRICT

Development Profile	Status		
	Pending	Approved	Recorded
RESIDENTIAL			
Number of active cases	14	11	77
Total number of dwelling units	1555	8788.28	4577
Single Family Units (detached)	1511	4276.28	3940
Duplex Units			
Multiple Family Units	44	4512	637
Mobile Home Units			
COMMERCIAL			
Number of active cases	1	4	1
Total acreage	2.04	97.1	
INDUSTRIAL			
Number of active cases	0	0	5
Total acreage			7.03

Explanation of Status

Pending - subdivisions filed with Regional Planning Department, not yet approved nor denied

Approved - subdivisions approved by the County, not yet recorded nor expired.

Recorded - subdivisions recorded, not yet built.

SERVICE PROVIDER REPORT

Service Provider SULPHUR SPRINGS UNION SCHOOL DISTRICT

Development Profile	Status: Pending	Approved	Recorded
RESIDENTIAL			
Number of active cases	15	8	41
Total number of dwelling units	1666	2567	2887
Single Family Units (detached)	1310	1429	1374
Duplex Units			
Multiple Family Units	356	1138	1513
Mobile Home Units			
COMMERCIAL			
Number of active cases	1	0	0
Total acreage	2.5		
INDUSTRIAL			
Number of active cases	2	0	0
Total acreage	35.24		

Explanation of Status

Pending - subdivisions filed with Regional Planning Department, not yet approved nor denied

Approved - subdivisions approved by the County, not yet recorded nor expired.

Recorded - subdivisions recorded, not yet built.

SERVICE PROVIDER REPORT

Service Provider WILLIAM S. HART UNION HIGH SCHOOL DISTRICT - JUNIOR HIGH

Development Profile	Status		
	Pending	Approved	Recorded
RESIDENTIAL			
Number of active cases	44	20	135
Total number of dwelling units	6340	12368	9123
Single Family Units (detached)	4545	6178	6824
Duplex Units			
Multiple Family Units	1795	6190	2299
Mobile Home Units			
COMMERCIAL			
Number of active cases	5	5	2
Total acreage	301.16	102.1	4.65
INDUSTRIAL			
Number of active cases	2	0	5
Total acreage	35.24		7.03

Explanation of Status

Pending - subdivisions filed with Regional Planning Department, not yet approved nor denied

Approved - subdivisions approved by the County, not yet recorded nor expired.

Recorded - subdivisions recorded, not yet built.

SERVICE PROVIDER REPORT

Service Provider WILLIAM S. HART UNION HIGH SCHOOL DISTRICT - HIGH SCHOOL

Development Profile	Status		
	Pending	Approved	Recorded
RESIDENTIAL			
Number of active cases	63	27	180
Total number of dwelling units	9044	14368	12054
Single Family Units (detached)	6763	6477	9184
Duplex Units			
Multiple Family Units	2281	7891	2870
Mobile Home Units			
COMMERCIAL			
Number of active cases	6	5	5
Total acreage	305.16	107.1	59.61
INDUSTRIAL			
Number of active cases	5	1	9
Total acreage	195.14	106	199.56

Explanation of Status

Pending - subdivisions filed with Regional Planning Department, not yet approved nor denied

Approved - subdivisions approved by the County, not yet recorded nor expired.

Recorded - subdivisions recorded, not yet built.

NVENTORY INFORMATION FOR LIBRARY SERVICE (Space in square feet)

LIBRARY DISTRICT	Existing Demand	Pending Demand	Approved Demand	Recorded Demand	Total Demand	Existing Supply
CANYON COUNTRY						
SPACE	12,560	2,944	6,940	2,427	24,871	5,050
BOOKS	64,408	15,098	35,591	12,447	127,544	66,790
NEWHALL						
SPACE	8,229	84	1,504	16	9,833	4,842
BOOKS	42,198	433	7,713	80	50,424	59,682
VALENCIA						
SPACE	33,948	5,118	7,409	6,638	53,112	23,966
BOOKS	174,090	26,246	37,995	34,039	272,370	211,688
SCV BOOKMOBILE						
SPACE	7,781	5,285	8,815	4,355	26,237	0
BOOKS	39,902	27,105	45,207	22,335	134,549	10,307
LAS VIRGENES						
SPACE	10,728	782	0	170	11,680	7,523
BOOKS	55,016	4,011	0	871	59,898	95,035
MALIBU						
SPACE	13,572	249	71	178	14,071	16,530
BOOKS	69,600	1,279	365	915	72,159	85,180
WESTLAKE VILLAG						
SPACE	2,996	81	0	83	3,159	6,000
BOOKS	15,362	414	0	426	16,202	44,114
LAS VIR BKMOBILE						
SPACE	1,073	0	0	19	1,092	0
BOOKS	5,500	0	0	99	5,599	7,436
LANCASTER						
SPACE	40,137	7	3,898	1,898	45,941	48,721
BOOKS	205,832	37	19,992	9,734	235,595	254,390
QUARTZ HILL						
SPACE	9,970	1,006	3,845	3,347	18,169	3,530
BOOKS	51,130	5,160	19,720	17,162	93,172	51,917
LITTLEROCK						
SPACE	4,585	1,047	0	5	5,637	1,600
BOOKS	23,514	5,370	0	25	28,909	44,409
LAKE LOS ANGELES						
SPACE	4,864	16	0	0	4,879	3,245
BOOKS	24,942	80	0	0	25,022	46,050

..BRARY DISTRICT	Existing Demand	Pending Demand	Approved Demand	Recorded Demand	Total Demand	Existing Supply
AV BOOKMOBILE						
SPACE	1,452	682	0	61	2,195	0
BOOKS	7,444	3,498	0	315	11,257	6,243
HACIENDA HEIGHTS						
SPACE	28,538	96	29	67	28,731	10,398
BOOKS	146,350	494	148	346	147,338	100,033
ROWLAND HEIGHTS						
SPACE	19,119	57	24	210	19,409	14,863
BOOKS	98,044	290	124	1,075	99,533	125,739
DIAMOND BAR						
SPACE	26,559	0	0	66	26,625	9,859
BOOKS	136,198	0	0	340	136,538	93,833

INVENTORY INFORMATION FOR SEWER SERVICES (million gallons per day)

SEWER DISTRICT	Existing Demand	Pending Demand	Approved Demand	Recorded Demand	Total Demand	Existing Supply	Future Supply	Incr. Exp. Date
S.D. NO. 26 & 32	15.04	3.22	5.19	3.01	26.46	19.10	28.10	2002
SAN.DIST. #27	0.10	0.00	0.01	0.00	0.11	0.30	0.30	N/A
LAS VIRGENES	10.80	0.31	0.00	0.13	11.24	16.10	16.10	N/A
SAN.DIST. #14	9.80	0.10	1.94	1.10	12.93	16.00	16.00	N/A
SAN.DIST. #20	7.80	0.14	0.07	0.56	8.57	15.00	15.00	N/A
S.D. NO. 15 & 21	497.00	0.09	0.02	0.10	497.21	576.00	616.00	2006

Note:

FUTURE SUPPLY reflects the next stage of incremental expansion.

INVENTORY INFORMATION FOR WATER SERVICE (acre-feet per year)

WATER COMPANY	EXISTING DEMAND	PENDING DEMAND	APPROVED DEMAND	RECORDED DEMAND	TOTAL DEMAND	DRY SUPPLY	NORMAL SUPPLY
SC VALLEY WIDE	64,350	7,044.56	9,372.36	5,983.81	86,750.73	90,600	96,000
WATERWORKS #36	654	283.20	406.40	203.55	1,547.15		
VALENCIA WC	22,735	1,332.70	4,973.30	2,895.06	31,936.05		
SANTA CLARITA WC	24,513	1,671.03	3,776.99	1,447.03	31,408.05		
NEWHALL WD	9,348	3,757.63	215.67	1,438.17	14,759.47		
OTHER-SCV	7,100	0.00	0.00	0.00	7,100.00		

Note:

DRY SUPPLY - Ranges from 90,600 to 147,500 acre-feet-per year.
Conjunctive-use and groundwater banking supplies are not included in table.

NORMAL SUPPLY - Ranges from 96,000 to 151,900 acre-feet-per year.

INVENTORY INFORMATION FOR SCHOOL SERVICE (in students)

SCHOOL DISTRICT	Enrollment	Pending Demand	Approved Demand	Recorded Demand	Total Demand	Capacity
ACTON AGUA-DULCE	480	1,050	246	286	2,062	770
ACTON AGUA-DULCE J	357	1,050	246	286	1,939	930
ACTON-AGUA DULCE	1,236	1,050	246	286	2,818	2,252
ANTELOPE VALLEY HS	16,089	489	1,371	1,053	19,002	16,156
CASTAIC UNION EL	1,135	722	206	644	2,707	1,430
CASTAIC UNION JH	1,350	380	152	452	2,334	1,800
EASTSIDE UNION	2,235	0	136	42	2,413	3,180
GORMAN	165	335	0	0	500	150
HACIENDA LP ELEM	12,498	119	25	59	12,701	12,714
HACIENDA LP HIGH	6,300	40	8	20	6,368	10,050
HACIENDA LP JH	3,347	40	8	20	3,415	5,440
HUGHES-ELIZABETH	495	0	0	0	495	660
KEPPEL UNION	3,060	855	0	7	3,922	3,780
.NCASTER	13,632	3	256	704	14,595	18,117
LAS VIRGENES EL	5,019	362	0	167	5,548	4,710
LAS VIRGENES JH	2,562	131	0	60	2,753	3,780
LAS VIRGENES SH	3,182	107	0	49	3,338	4,480
NEWHALL	6,050	824	290	901	8,065	4,687
PALMDALE ELEM	15,200	264	231	753	16,448	19,551
PALMDALE JR HIGH	3,871	61	53	172	4,157	5,148
POMONA ELEM	20,362	0	0	0	20,362	21,106
POMONA HIGH	6,207	0	0	0	6,207	7,716
POMONA JR HIGH	4,599	0	0	0	4,599	7,259
ROWLAND ELEM	10,578	15	6	67	10,666	11,866
ROWLAND HIGH	5,148	9	4	41	5,202	4,959
ROWLAND JR HIGH	2,621	7	3	32	2,663	2,828
SANTA MONICA EL	5,272	6	5	8	5,291	5,675
SANTA MONICA JH	2,643	3	2	4	2,652	2,160
SANTA MONICA SH	3,318	4	3	5	3,330	3,390

NVENTORY INFORMATION FOR SCHOOL SERVICE (in students)

SCHOOL DISTRICT	Enrollment	Pending Demand	Approved Demand	Recorded Demand	Total Demand	Capacity
SAUGUS UNION	8,979	657	3,777	940	14,353	7,579
SULPHUR SPRINGS	4,662	678	835	785	6,960	4,975
WALNUT VALLEY EL	5,121	0	0	6	5,127	6,045
WALNUT VALLEY JH	3,242	0	0	2	3,244	4,192
WALNUT VALLEY SH	4,684	0	0	3	4,687	6,138
WESTSIDE JR HIGH	2,123	110	840	321	3,394	2,610
WESTSIDE UNION E	3,984	329	2,521	964	7,798	6,750
WILSONA	2,172	8	0	0	2,180	2,936
WM.S. HART JR HI	5,217	602	1,406	650	7,875	5,174
WM.S. HART SR HI	9,903	1,575	2,811	1,680	15,969	9,512

Note:

Capacity includes permanent and temporary (portable) classrooms.

DMS SERVICE PROVIDER CASEDATA REPORT FOR
WILLIAM S. HART UNION HIGH SCHOOL DISTRICT - HIGH SCHOOL

PROJECT NO.	CASE NO.	GROSS ACRES	FINAL MAP NO.	LOT TYPE	UNITS	ACRES	ZONE DISTRICT	STATUS	EXP. DATE
	PM00-001	2.66		SF	2		CITY OF SANTA CLARITA	PENDING	
87150	PM18108	31.4		I		31.4	CASTAIC CANYON	PENDING	
88216	PM19776	34.5		SF	15		CASTAIC CANYON	PENDING	
88221	PM19784	304	PM19784-01	I		76.46	CASTAIC CANYON	RECORDED	
88221	PM19784		PM19784-02	I		78.68	CASTAIC CANYON	RECORDED	
88230	PM19939	4.2		SF	4		CASTAIC CANYON	PENDING	
89205	PM20938	5		SF	2		SOLEDAD	PENDING	
90445	PM20983	197		I		106	NEWHALL	APPROVED	11/29/2003
90445	PM20983			SF	1		NEWHALL	APPROVED	11/29/2003
	PM21110	8.4	PM21110	SF	3		CITY OF SANTA CLARITA	RECORDED	
89430	PM21497	0.6		SF	4		NEWHALL	PENDING	
91194	PM21689	10		SF	2		CASTAIC CANYON	PENDING	
90380	PM22530	5.5		SF	2		SAND CANYON	PENDING	
91290	PM22992	41.9	PM22992	C		9.5	CASTAIC CANYON	RECORDED	
91290	PM22992		PM22992	I		32.4	CASTAIC CANYON	RECORDED	
95009	PM24179	5		SF	2		CASTAIC CANYON	PENDING	
97119	PM24801	1.515		SF	2		NEWHALL	PENDING	
	PM24804			C		2.5	CITY OF SANTA CLARITA	PENDING	
	PM24804			SF	60		CITY OF SANTA CLARITA	PENDING	
97074	PM24810	4.99	PM24810	I		4.99	CASTAIC CANYON	RECORDED	
	PM25634		PM25634	SF	4		CITY OF SANTA CLARITA	RECORDED	
99153	PM25705	4.65	PM25705	C		4.65	NEWHALL	RECORDED	
	PM25740	6.1		SF	3		CITY OF SANTA CLARITA	APPROVED	
99213	PM25852	1.1		SF	4		CASTAIC CANYON	APPROVED	3/5/2004
00-13	PM25884	5.52		SF	2		SAND CANYON	PENDING	
	PM26037		PM26037	SF	1		CITY OF SANTA CLARITA	RECORDED	
	PM26125		PM26125	SF	1		CITY OF SANTA CLARITA	RECORDED	
	PM26275		PM26275	C	1		CITY OF SANTA CLARITA	RECORDED	
081	TR30562	80	TR30562	SF	55		BOUQUET CANYON	RECORDED	
86189	TR31158	277.5	TR31158	MF	180		SAND CANYON	RECORDED	
86189	TR31158		TR46269	SF	116		SAND CANYON	RECORDED	
86189	TR31158		TR46270	SF	47		SAND CANYON	RECORDED	
86237	TR31803	206		MF	54		SAND CANYON	APPROVED	4/26/2004
86237	TR31803			SF	445		SAND CANYON	APPROVED	4/26/2004
86524	TR32224	204		C		2.04	SAND CANYON	PENDING	
86524	TR32224			SF	510		SAND CANYON	PENDING	
205	TR33608	132.3	TR33608-1	MF	4	0	NEWHALL	RECORDED	
205	TR33608		TR33608-2	MF	145	0	NEWHALL	RECORDED	
86257	TR33613	690.7	TR33613	SF	314		NEWHALL	RECORDED	
86257	TR33613		TR49760	SF	146		NEWHALL	RECORDED	
86257	TR33613		TR49761	SF	425		NEWHALL	RECORDED	
	TR34466	257		SF	299		CITY OF SANTA CLARITA	APPROVED	
88422	TR35783	157	TR35783	SF	81		NEWHALL	RECORDED	
88422	TR35783		TR35783-01	SF	22		NEWHALL	RECORDED	
88422	TR35783		TR35783-02	SF	65		NEWHALL	RECORDED	
88422	TR35783		TR35783-03	SF	98		NEWHALL	RECORDED	
88422	TR35783		TR35783-04	SF	137		NEWHALL	RECORDED	
97009	TR36943	424.5	TR36943	SF	16		SOLEDAD	RECORDED	
97009	TR36943		TR36943-01	SF	46		SOLEDAD	RECORDED	
97009	TR36943		TR36943-03	SF	13		SOLEDAD	RECORDED	
97009	TR36943		TR36943-04	SF	52		SOLEDAD	RECORDED	
97009	TR36943		TR52901	SF	5	0	SOLEDAD	RECORDED	
	TR42670		TR42670-01	I		7.03	CITY OF SANTA CLARITA	RECORDED	

DMS SERVICE PROVIDER CASEDATA REPORT FOR
WILLIAM S. HART UNION HIGH SCHOOL DISTRICT - HIGH SCHOOL

PROJECT NO.	CASE NO.	GROSS ACRES	FINAL MAP NO.	LOT TYPE	UNITS	ACRES	ZONE DISTRICT	STATUS	EXP. DATE
	TR42670		TR42670-02	I			CITY OF SANTA CLARITA	RECORDED	
	TR42670		TR42670-03	I	8		CITY OF SANTA CLARITA	RECORDED	
	TR42670		TR42670-04	I	14		CITY OF SANTA CLARITA	RECORDED	
	TR42670		TR42670-05	I	19		CITY OF SANTA CLARITA	RECORDED	
85299	TR43147	40		SF	26		SAND CANYON	PENDING	
98046	TR43589	75.53		SF	90		SAND CANYON	PENDING	
86259	TR43737	9.9		MF	80		SAND CANYON	PENDING	
97204	TR43896	262.78	TR43896	SF	54		NEWHALL	RECORDED	
97204	TR43896		TR43896-02	SF	54		NEWHALL	RECORDED	
97204	TR43896		TR43896-03	SF	13		NEWHALL	RECORDED	
97204	TR43896		TR43896-06	SF	40		NEWHALL	RECORDED	
97204	TR43896		TR43896-07	SF	74		NEWHALL	RECORDED	
87318	TR44163	139.5		SF	49		CASTAIC CANYON	PENDING	
	TR44360		TR44360-3	MF	60		CITY OF SANTA CLARITA	RECORDED	
	TR44360		TR44360-4	MF			CITY OF SANTA CLARITA	RECORDED	
	TR44360		TR44360-5	MF			CITY OF SANTA CLARITA	RECORDED	
85340	TR44373	213.4	TR44373-03	SF	19		CASTAIC CANYON	RECORDED	
85340	TR44373		TR44373-04	SF	39		CASTAIC CANYON	RECORDED	
85340	TR44373		TR44373-05	SF	30		CASTAIC CANYON	RECORDED	
	TR44374		TR44374-01	SF	58		CITY OF SANTA CLARITA	RECORDED	
	TR44374		TR44374-02	MF	1		CITY OF SANTA CLARITA	RECORDED	
	TR44374		TR44374-04	MF	35		CITY OF SANTA CLARITA	RECORDED	
	TR44374		TR44374-05	MF	3		CITY OF SANTA CLARITA	RECORDED	
86201	TR44429	76.3	TR44429	SF	288		CASTAIC CANYON	RECORDED	
86255	TR44471	161.8	TR47353	SF	56		CASTAIC CANYON	RECORDED	
86255	TR44471		TR47354	SF	62		CASTAIC CANYON	RECORDED	
86255	TR44471		TR47355	SF	62		CASTAIC CANYON	RECORDED	
86255	TR44471		TR52439	SF	32		CASTAIC CANYON	RECORDED	
86255	TR44471		TR52440	SF	45		CASTAIC CANYON	RECORDED	
86255	TR44471		TR52441	SF	31		CASTAIC CANYON	RECORDED	
86255	TR44471		TR52442	SF	57		CASTAIC CANYON	RECORDED	
91332	TR44492	42.3	TR44492	MF	634		SAND CANYON	RECORDED	
86365	TR44800	189	TR44800	SF	97		NEWHALL	RECORDED	
86365	TR44800		TR44800-01	SF	139		NEWHALL	RECORDED	
86365	TR44800		TR44800-02	SF	99		NEWHALL	RECORDED	
86365	TR44800		TR44800-03	SF	59		NEWHALL	RECORDED	
	TR44831			C		19.8	CITY OF SANTA CLARITA	APPROVED	
	TR44831		TR44831	SF	21		CITY OF SANTA CLARITA	RECORDED	
	TR44831		TR44831-02	SF	4		CITY OF SANTA CLARITA	RECORDED	
87287	TR44945	140		SF	140		CASTAIC CANYON	PENDING	
86441	TR44967	360.3	TR44967	SF	63		BOUQUET CANYON	RECORDED	
86441	TR44967		TR49433	SF	75		BOUQUET CANYON	RECORDED	
86441	TR44967		TR49434	SF	62		BOUQUET CANYON	RECORDED	
86522	TR45023	46.2		MF	438		SAND CANYON	APPROVED	8/29/2004
86522	TR45023		TR45023-01	MF	304		SAND CANYON	RECORDED	
86522	TR45023		TR45023-02	MF	10	0	SAND CANYON	RECORDED	
88027	TR45084	150.4	TR45084	SF	294		CASTAIC CANYON	RECORDED	
87036	TR45123	76		SF	12		SAND CANYON	PENDING	
	TR45148	17.5	TR45148	SF	10		CITY OF SANTA CLARITA	RECORDED	
87343	TR45287	27.8	TR45287	MF	463		SAND CANYON	RECORDED	
87222	TR45433	757		C		10	NEWHALL	APPROVED	2/17/2006
87222	TR45433			MF	1563		NEWHALL	APPROVED	2/17/2006
87222	TR45433		TR45433-02	SF	202	0	NEWHALL	RECORDED	

DMS SERVICE PROVIDER CASEDATA REPORT FOR
WILLIAM S. HART UNION HIGH SCHOOL DISTRICT - HIGH SCHOOL

PROJECT NO.	CASE NO.	GROSS ACRES	FINAL MAP NO.	LOT TYPE	UNITS	ACRES	ZONE DISTRICT	STATUS	EXP. DATE
87222	TR45433	757	TR45433-04	SF	211	0	NEWHALL	RECORDED	
87222	TR45433		TR45433-05	SF	1	0	NEWHALL	RECORDED	
87222	TR45433		TR45433-06	SF	1	0	NEWHALL	RECORDED	
87222	TR45433		TR45433-07	SF	1	0	NEWHALL	RECORDED	
93179	TR45440	99.9	TR51875	SF	7		NEWHALL	RECORDED	
87303	TR45645	160	TR45645	SF	68	0	CASTAIC CANYON	RECORDED	
88139	TR45883	527.2		C		29.58	NEWHALL	PENDING	
88139	TR45883			MF	266		NEWHALL	PENDING	
88139	TR45883			SF	219		NEWHALL	PENDING	
87539	TR45958	400	TR45958	SF	66	0	CASTAIC CANYON	RECORDED	
87539	TR45958		TR48573	SF	61		CASTAIC CANYON	RECORDED	
87539	TR45958		TR48574	SF	49		CASTAIC CANYON	RECORDED	
85628	TR46018	603		C		36	SAND CANYON	APPROVED	12/12/2004
85628	TR46018			MF	2406		SAND CANYON	APPROVED	12/12/2004
85628	TR46018			SF	1511		SAND CANYON	APPROVED	12/12/2004
85628	TR46018		TR46018-1	SF	142	0	SAND CANYON	RECORDED	
85628	TR46018		TR46018-2	SF	1	0	SAND CANYON	RECORDED	
85628	TR46018		TR46018-3	SF	106	0	SAND CANYON	RECORDED	
85628	TR46018		TR46018-5	SF	32	0	SAND CANYON	RECORDED	
	TR46072	1.55	TR46072	SF	5		CITY OF SANTA CLARITA	RECORDED	
88044	TR46183	74	TR46183	SF	51		NEWHALL	RECORDED	
88044	TR46183		TR46183-02	SF	65		NEWHALL	RECORDED	
97148	TR46353	26		MF	110		SAND CANYON	APPROVED	7/20/2004
88321	TR46389	361	TR46389-14	MF	132		NEWHALL	RECORDED	
88321	TR46389		TR46389-17	MF	150		NEWHALL	RECORDED	
90433	TR46468	93.4		SF	14		SAND CANYON	PENDING	
88280	TR46564	133	TR46564	SF	45		CASTAIC CANYON	RECORDED	
88280	TR46564		TR46564-02	SF	48		CASTAIC CANYON	RECORDED	
88280	TR46564		TR46564-03	SF	38		CASTAIC CANYON	RECORDED	
88280	TR46564		TR46564-04	SF	52		CASTAIC CANYON	RECORDED	
88280	TR46564		TR46564-05	SF	47		CASTAIC CANYON	RECORDED	
	TR46626		TR46626	SF	138		CITY OF SANTA CLARITA	RECORDED	
88298	TR46648	93.2		SF	73		BOUQUET CANYON	PENDING	
88309	TR46688	9.4		SF	19		CASTAIC CANYON	PENDING	
88361	TR46775	1.1		SF	2		NEWHALL	PENDING	
88360	TR46776	2.4		SF	2		NEWHALL	PENDING	
88582	TR46777	6.1		SF	4		NEWHALL	PENDING	
89345	TR46798	36.9		MF	55		CASTAIC CANYON	APPROVED	3/12/2004
89345	TR46798			SF	1		CASTAIC CANYON	APPROVED	3/12/2004
88596	TR46908	205		SF	269		CASTAIC CANYON	APPROVED	10/25/2004
88596	TR46908		TR46908-01	SF	29		CASTAIC CANYON	RECORDED	
88596	TR46908		TR46908-02	SF	38		CASTAIC CANYON	RECORDED	
88596	TR46908		TR46908-03	SF	40		CASTAIC CANYON	RECORDED	
88596	TR46908		TR46908-04	SF	34		CASTAIC CANYON	RECORDED	
88596	TR46908		TR46908-05	SF	31		CASTAIC CANYON	RECORDED	
88596	TR46908		TR46908-06	SF	31		CASTAIC CANYON	RECORDED	
88596	TR46908		TR46908-07	SF	50		CASTAIC CANYON	RECORDED	
88596	TR46908		TR46908-08	SF	24		CASTAIC CANYON	RECORDED	
88596	TR46908		TR46908-09	SF	23		CASTAIC CANYON	RECORDED	
88596	TR46908		TR46908-10	SF	23		CASTAIC CANYON	RECORDED	
88596	TR46908		TR46908-11	SF	3		CASTAIC CANYON	RECORDED	
89469	TR47099	9.5		MF	167		SAND CANYON	PENDING	
89094	TR47200	240	TR47200	SF	2		SAND CANYON	RECORDED	

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PROJECT NO.	CASE NO.	GROSS ACRES	FINAL MAP NO.	LOT TYPE	UNITS	ACRES	ZONE DISTRICT	STATUS	EXP. DATE
92074	TR51644	1738		C		11.2	CASTAIC CANYON	APPROVED	5/18/2004
92074	TR51644			MF	1802		CASTAIC CANYON	APPROVED	5/18/2004
92074	TR51644			SF	1090		CASTAIC CANYON	APPROVED	5/18/2004
92074	TR51644		TR51644-1	SF	3	0	CASTAIC CANYON	RECORDED	
92074	TR51644		TR51644-10	SF	65	0	CASTAIC CANYON	RECORDED	
92074	TR51644		TR51644-2	SF	6	0	CASTAIC CANYON	RECORDED	
92074	TR51644		TR51644-3	SF	93	0	CASTAIC CANYON	RECORDED	
92074	TR51644		TR51644-4	SF	3	0	CASTAIC CANYON	RECORDED	
92074	TR51644		TR51644-5	SF	7	0	CASTAIC CANYON	RECORDED	
92074	TR51644		TR51644-6	SF	129	0	CASTAIC CANYON	RECORDED	
92074	TR51644		TR51644-7	SF	174	0	CASTAIC CANYON	RECORDED	
92074	TR51644		TR51644-8	SF	158	0	CASTAIC CANYON	RECORDED	
92074	TR51644		TR51644-9	SF	66	0	CASTAIC CANYON	RECORDED	
94021	TR51789	79	TR51789-01	SF	100	0	BOUQUET CANYON	RECORDED	
94021	TR51789		TR51789-02	SF	93	0	BOUQUET CANYON	RECORDED	
98047	TR51852	975		C		4	CASTAIC CANYON	PENDING	
98047	TR51852			I		14.5	CASTAIC CANYON	PENDING	
98047	TR51852			MF	486		CASTAIC CANYON	PENDING	
98047	TR51852			SF	1603		CASTAIC CANYON	PENDING	
	TR51857		TR51857	SF	37		CITY OF SANTA CLARITA	RECORDED	
	TR51931			MF	623		CITY OF SANTA CLARITA	APPROVED	
	TR51931		TR51931-01	C		2.23	CITY OF SANTA CLARITA	RECORDED	
	TR51931		TR51931-03	C		43.23	CITY OF SANTA CLARITA	RECORDED	
	TR51931		TR51931-04	SF	10		CITY OF SANTA CLARITA	RECORDED	
	TR51931		TR51931-05	MF	2		CITY OF SANTA CLARITA	RECORDED	
	TR51931		TR52985	SF	80		CITY OF SANTA CLARITA	RECORDED	
	TR51931		TR52986	SF	75		CITY OF SANTA CLARITA	RECORDED	
	TR51931		TR52987-01	SF	45		CITY OF SANTA CLARITA	RECORDED	
	TR51931		TR52987-02	SF	42		CITY OF SANTA CLARITA	RECORDED	
	TR51931		TR53130-01	MF	63		CITY OF SANTA CLARITA	RECORDED	
	TR51931		TR53130-02	SF	132		CITY OF SANTA CLARITA	RECORDED	
	TR51931		TR53147	MF	76		CITY OF SANTA CLARITA	RECORDED	
	TR51931		TR53268	MF	78		CITY OF SANTA CLARITA	RECORDED	
	TR51963		TR51963	SF	159		CITY OF SANTA CLARITA	RECORDED	
95085	TR51995	15.2	TR51995	MF	30		CASTAIC CANYON	RECORDED	
95085	TR51995		TR51995-01	MF	22		CASTAIC CANYON	RECORDED	
95085	TR51995		TR51995-02	MF	30		CASTAIC CANYON	RECORDED	
95085	TR51995		TR51995-03	MF	32		CASTAIC CANYON	RECORDED	
	TR52004	420.3	TR52004A	SF	82		CITY OF SANTA CLARITA	RECORDED	
97080	TR52192	204		SF	141		BOUQUET CANYON	PENDING	
97079	TR52193	80.7		SF	62		BOUQUET CANYON	PENDING	
97078	TR52194	176.5		SF	126		BOUQUET CANYON	PENDING	
97088	TR52302	22.39	TR52302	SF	11	0	NEWHALL	RECORDED	
	TR52354		TR52354	MF	39		CITY OF SANTA CLARITA	RECORDED	
	TR52355	34.3		SF	63		CITY OF SANTA CLARITA	PENDING	
	TR52372		TR52372	SF	3		CITY OF SANTA CLARITA	RECORDED	
	TR52385			MF	44		CITY OF SANTA CLARITA	PENDING	
	TR52414	1310		SF	866		CITY OF SANTA CLARITA	PENDING	
	TR52448	3.8	TR52448	SF	6		CITY OF SANTA CLARITA	RECORDED	
99048	TR52475	69.55		SF	63		NEWHALL	PENDING	
98071	TR52535	276		SF	80		CASTAIC CANYON	PENDING	
98034	TR52584	432		SF	216		CASTAIC CANYON	APPROVED	
	TR52606	2.3	TR52606	SF	8		CITY OF SANTA CLARITA	RECORDED	

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PROJECT NO.	CASE NO.	GROSS ACRES	FINAL MAP NO.	LOT TYPE	UNITS	ACRES	ZONE DISTRICT	STATUS	EXP. DATE
	TR52667			C		30.1	CITY OF SANTA CLARITA	APPROVED	
	TR52667			MF	250		CITY OF SANTA CLARITA	APPROVED	
	TR52667		TR52667-01	SF	10		CITY OF SANTA CLARITA	RECORDED	
	TR52673		TR52673-01	SF	11		CITY OF SANTA CLARITA	RECORDED	
	TR52673		TR52673-02	SF	21		CITY OF SANTA CLARITA	RECORDED	
	TR52673		TR52673-03	SF	27		CITY OF SANTA CLARITA	RECORDED	
03112	TR52715	83.9		SF	9		SAND CANYON	APPROVED	12/20/2003
98173	TR52729	80		SF	70		CASTAIC CANYON	PENDING	
00-187	TR52763	9.4		SF	11		SAND CANYON	PENDING	
99129	TR52785	41		SF	26		BOUQUET CANYON	PENDING	
98176	TR52790	53.3		SF	37		SAND CANYON	APPROVED	4/26/2004
98176	TR52790		TR52790-1	SF	38	0	SAND CANYON	RECORDED	
00-136	TR52796	229.6		SF	203		NEWHALL	PENDING	
99003	TR52807	5.4	TR52807	SF	5		NEWHALL	RECORDED	
99020	TR52829	75.06		SF	181		NEWHALL	APPROVED	
00-128	TR52833	602.1		MF	590		SAND CANYON	APPROVED	12/12/2003
00-128	TR52833			SF	938		SAND CANYON	APPROVED	12/12/2003
00-128	TR52833		TR52833-1	SF	93	0	SAND CANYON	RECORDED	
00-128	TR52833		TR52833-2	SF	94	0	SAND CANYON	RECORDED	
00-128	TR52833		TR52833-3	SF	82	0	SAND CANYON	RECORDED	
00-128	TR52833		TR52833-4	SF	1	4	SAND CANYON	RECORDED	
00-137	TR52908	39		SF	19		NEWHALL	PENDING	
99101	TR52938	28.2	TR52938	SF	24	0	SAND CANYON	RECORDED	
	TR52985		TR52985	SF	80		CITY OF SANTA CLARITA	RECORDED	
	TR52986		TR52986	SF	75		CITY OF SANTA CLARITA	RECORDED	
	TR52987		TR52987-01	SF	54		CITY OF SANTA CLARITA	RECORDED	
	TR52987		TR52987-02	SF	42		CITY OF SANTA CLARITA	RECORDED	
00-196	TR53108	291		C		47.54	CASTAIC CANYON	PENDING	
00-196	TR53108			MF	1129		CASTAIC CANYON	PENDING	
00-196	TR53108			SF	315		CASTAIC CANYON	PENDING	
	TR53122		TR53122	SF	93		CITY OF SANTA CLARITA	RECORDED	
	TR53130		TR53130-01	SF	13		CITY OF SANTA CLARITA	RECORDED	
	TR53130		TR53130-02	SF	155		CITY OF SANTA CLARITA	RECORDED	
00-81	TR53189	185.8		SF	60		CASTAIC CANYON	PENDING	
00-210	TR53295	114		I		114	NEWHALL	PENDING	
	TR53419			MF	109		CITY OF SANTA CLARITA	PENDING	

LOT TYPES:

C = Commercial (Acres)

DP = Duplex (Units)

I = Industrial (Acres)

MF = Multiple Family (Units)

MH = Mobile Home (Units)

SF = Single Family (Units)

PROJECT AND CASE LISTING FILED FOR THE ANTA CLARITA VALLEY SINCE 1/1/1993

PROJECT NO	CASE NO	DESCRIPTION
00-108	OT00-108	ONE OAK TREE ENCROACHMENT
00-116	CP00-116	CUP FOR REQUIREMENT OF MPD ZONE
	PM26037	(TN) 1 INDUSTRIAL LOT/(4 NC)/2.65 AC
00-123	CP00-123	BEER & WINE FOR EXISTING SERV. STATION/CONVENIENCE
00-124	CP00-124	POLE-MOUNTED WIRELESS COMMUNICATIONS ANTENNAS
00-127	CP00-127	WIRELESS TELECOMMUNICATIONS FACILITY
00-128	TR52833	(TN) 751 SF LOTS+140 NC+2 PF+26 OS+1C
	OT00-128	REMOVAL OF 2 OAKS
	CP00-128	TO ENSURE COMPLIANCE WITH SPECIFIC PLAN
00-13	CP00-13	2 SF RESIDENCES
	PM25884	(TN) 2 SF LOTS/5.52 ACRES
00-134	OT00-134	6 TREES TO BE TRIMMED
00-136	OT00-136	RELOCATE 1 TREE
	CP00-136	HM, DENSITY CONTROL DEVELOPMENT, DP ZONE
	PA00-136	SCVAP: HM TO URBAN 2 (3.4 TO 6.6 DU/AC)
	TR52796	(TN) 209 (184 SF+25 OS) LOTS ON 229.6 ACRES
	ZC00-136	ZC: A2-2 TO A1-1-DP & RA-10,000-DP
00-137	CP00-137	HILLSIDE MANAGEMENT, DENSITY CONTROL DEVELOPMENT
	TR52908	(TN) 19 SF LOTS/ 39.72 ACRES
	ZC00-137	ZC: A2-2 TO A1-1
00-139	CP00-139	BEER & WINE FOR ON-SITE CONSUMPTION
00144	CP00144	NEW PLAY AREA
00-148	OT00-148	ENCROACHMENT INTO PROTECTED ZONE OF ONE OAK TREE
	CP00-148	CONT'D. USE OF SF RESIDENCE IN C-3 ZONE
00-151	CP00-151	TO LEGALIZE EXISTING GRANNY/GUEST/MOBILEHOME GROOM
00-152	CP00-152	OFF-SITE SALE OF ALCOHOLIC BEVERAGES
00-157	OT00-157	REMOVAL OF 15 OAK TREES FOR FREEWAY INTERCHANGE
00-159	CP00-159	WIRELESS TELECOMMUNICATIONS FACILITY W 9 ANTENNAS
00-164	CP00-164	PRIVATE RECREATION CLUB FOR PAINTBALL
00-166	CP00-166	TO SUPPLY POTABLE WATER TO RESIDENTIAL PROPERTIES
00-170	PM26068	2 SF LOTS/10.02 AC
	CP00-170	2 SF LOTS (HILLSIDE MANAGEMENT)
00-171	CP00-171	CONSTRUCT A 100' TALL WIRELESS TELECOMMUNICATIONS
00-177	CP00-177	TELECOMMUNICATIONS WIRELESS CELLULAR FACILITY
00-180	PK00-180	REDUCED PARKING WITH DEVELOPMENT OF MEZZANINE
00-187	LP00-187	LP (SCV PLAN) FROM HM to U-2
	CP00-187	HILLSIDE MANAGEMENT
	ZC00-187	FROM A-2-1 to R-1-5000
	TR52763	11 SF LOTS AND 1 OS LOT/9.4 AC
00-188	CP00-188	RPD & HM FOR 65UNIT CONDO PROJECT
	TR53235	2 (1MF/65NC+1 OS LOTS
	PK00-188	RECIPROCAL PARKING FOR EACH RESIDENTIAL LOT
	ZC00-188	ZC: A-1-1 TO RPD-5,000-12U
	OT00-188	REMOVED ONE OAK TREE
00-19	CP00-19	WIRELESS TELECOMMUNICATION FACILITY
00-193	PM26125	(TN)1 INDUSTRIAL LOT (8 NC)/5.22 AC
	CP00-193	CUP FOR MPD ZONE
00-194	CP00-194	TO AMEND CUP 86312 RE: OPERATION OF LANDFILL
00-195	CP00-195	WIRELESS TELECOMMUNICATIONS FACILITY
00-196	TR53108	315SF,18MF(677NC+452APT),27C,44OS,REC,1SC,2B/291.2
00-197	CP00-197	UNMANNED TELECOMMUNICATIONS FACILITY
00-21	SM00-21	SURFACE MINING PERMIT FOR 2 LAND QUARRIES
00-210	HR00-210	REALIGNMENT OF HENRY MAYO DR
	ZC00-210	FROM A-2-5 AND M1-1/2 TO M1-1/2DP
	OT00-210	REMOVE ONE HERITAGE OAK TREE
	CP00-210	DEVELOPMENT PROGRAM/GRADING/SEA
	TR53295	(TN) 27 INDUSTRIAL LOTS/114 AC
00-211	ZC00-211	ZC: A-2-5 TO R-R-DP ON 21 AC
	LP00-211	SCV: OS TO U2 ON 21 AC
	CP00-211	MOBILE HOME PARK EXPANSION (ADD 30 SPACES)
00-213	OT00-213	REMOVAL OF 37 OAKS AND 14 ENCROACHMENTS
00-23	CP00-23	UNMANNED WIRELESS TELECOMMUNICATION
00-250	PM26185	(TN) 2 SF LOTS/13.3 AC (3.75 AC REMAINDER PARCEL)
00-252	CP00-252	SENIOR CITIZEN'S RESIDENCE
00-253	CP00-253	HOTEL: 121 SUITES (POOL, DINING FOR BREAKFAST)
00-259	OT00-259	REMOVAL OF 13 OAK TREES
00-27	CP00-27	PERMIT RESIDENTIAL IN A COMMERCIAL ZONE
	PM26016	LEASE PROJECT/2 APT BLDGS (44UNITS)/2.18 AC
00-32	CP00-32	CONTINUANCE OF RECREATIONAL VEHICLE PARK

PROJECT NO	CASE NO	DESCRIPTION
00-35	CP00-35	CARETAKER TRAILER RESIDENCE
00-36	CP00-36	SALE OF ON-SITE CONSUMPTION FOR RESTAURANT
00-38	CP00-38	EXPANSION OF ALCOHOLIC BEVERAGE SALES
00-40	CP00-40	PRE-SCHOOL/DAY CARE
00-41	CP00-41	GRANNY HOUSE/SENIORS
00-43	HR00-43	HIGHWAY REALIGNMENT
00-53	CP00-53	WIRELESS TELECOMMUNICATIONS FACILITY
00-54	VA00-54	VARIANCE FOR OVERSIZED TEMPORARY REAL ESTATE SIGN
00-55	ZC00-55	ZONE CHANGE FROM A-1-1 TO M-1-DP
	CP00-55	CP TO ALLOW BOAT STORAGE IN M-1-DP ZONE
00-56	CP00-56	TWO STORY HOME WITH ATTACHED GARAGE
00613	CP00613	BOAT STORE- RENTALS AND SALES
00-76	CP00-76	12 PANEL ANTENNAS ON THE ROOF-TOP
00-77	CP00-77	10 PANEL ANTENNAS ON PIPES ADJACENT TO WATER TANKS
00-79	CP00-79	CAMPGROUND SERVING CHRONICALLY ILL CHILDREN
00-81	CP00-81	60 SF LOTS/2 OS LOTS
	TR53189	60 SINGLE FAMILY AND 2 OPEN SPACE LOTS
00-84	CP00-84	CELLULAR TELEPHONE BROADCASTING
00-85	CP00-85	BEER & WINE TO EXISTING RESTAURANT
00-87	CP00-87	NEW MOBILEHOME PARK (EXPANSION)
00-90	SM00-90	RECLAMATION PLAN, SURFACE MINING PERMIT
00-92	CP00-92	TO MOUNT 3 SETS OF ANTENNA PANELS ONTO MONOPOLE
00-95	CP00-95	TO SELL ALCOHOL WITHIN EXISTING ON-SITE MARKET
00-96	CP00-96	BEER & WINE ON-SITE IN RESTAURANT
01-018	OT01-018	29 OAKS TO BE ENCROACHED;23 REMAIN INTACT
01-019	OT01-019	24 OAKS REMOVED; FOUR ENCROACHMENTS
01-021	CP01-021	SECOND DWELLING UNIT FOR RESIDENTIAL USE/HUD
01-023	SM01-023	RECLAMATION PLAN (SURFACE MINING, STOCKPILES)
01-032	CP01-032	TO BUILD SENIOR CITIZEN RESIDENCE
01-046	OT01-046	REMOVAL OF 1 OAK TREE
01-085	CP01-085	TRUCK/VEHICLE WASH W/ RETAIL COMMERCIAL
01-094	CP01-094	OFFSITE GRADING TO CREATE FISH & GAME RESTORATION
	OT01-094	5 OAK TREE ENCROACHMENTS
01-095	NR01-095	CONVENIENCE STORE AND OFF-SALE BEER & WINE
01-096	PM20685	MAJ REV FOR 21 INDUSTRIAL LOTS, 1 REMAINDER PARCEL
01-101	PM26363	8 LOT INDUSTRIAL SUBDIVISION
01-108	CP01-108	UNMANNED WIRELESS TELECOMMUNICATIONS FACILITY
01-129	CP01-129	WIRELESS TELECOMMUNICATION FACILITY
01-154	SM01-154	EXCAVATION AND EXPORT
01-165	PM26458	1 SF LOT/5 ACRES
01-166	CP01-166	RELIGIOUS RETREAT & CARETAKER'S RESIDENCE
01-171	CP01-171	WIRELESS "MICROCELL" FACILITY
01-172	CP01-172	
01-173	CP01-173	
01-174	CP01-174	
01-175	CP01-175	
01-176	CP01-176	
01-177	CP01-177	
01-182	CP01-182	CP/SEA FOR EQUIPMENT STORAGE
	ZC01-182	ZONE CHANGE FOR STORAGE OF EQUIPMENT
01-183	CP01-183	GUEST RANCH; RIDING ACADEMY & STABLES
01-185	CP01-185	WIRELESS TELECOMMUNICATION FACILITY
01-188	PM21894	3 SF LOTS/18 ACRES
01-191	PM26460	4 SF Lots/40 acres
01-208	OT01-208	ONE OAK TREE REMOVAL
01-216	PM26508	4 SF LOTS/4.54 AC
01-218	OT01-218	THREE OAK TREE ENCROACHMENTS
01-221	CP01-221	COMMERCIAL DEVELOPMENT ON VACANT LAND
01-238	CP01-238	ON-SITE SALE FOR BEER AND WINE
01-241	CP01-241	WINERY IN UNLIMITED COMMERCIAL ZONE
01-257	CP01-257	SECOND UNIT FOR SF RESIDENCE
01-259	CP01-259	BOAT SALES, PARTS AND ACCESSORIES, SERVICE
01-264	CP01-264	PAINTBALL BUSINESS/PRIVATE REC. CLUB
01352	SP1352	REV. EXH. A (ABOVE GROUND FUEL TANK)
0144	CP144	REVISED EX."A" CUP BUILDING EXPANSION
01455	CP1455	REV. EXH. "A"
01559	SP1559	REVISED EXHIBIT A WITH A CUP AND SPECIAL PERMIT
01631	CP01631	ADD ROOM TO EXISTING MOBILE HOME
01869	CP01869	REPLACEMENT/EXISTING 80' TOWER/EARTHQUAKE DAMAGE
01989	CP01989	REV. EXH. "A"
02-005	PM26549	(TN) 3 SF LOTS/18.05 ACRES
02-010	PM26574	(TN) 14 INDUSTRIAL LOTS (RESUBDIVISION)/11.2 ACRES
02-012	CP02-012	SALE OF ALCOHOLIC BEVERAGES FOR ALBERTSONS
02-016	OT02-016	ONE REMOVAL AND THREE OAK TREE ENCROACHMENTS
02-023	PM26478	4 SF LOTS/19.85 AC

PROJECT NO	CASE NO	DESCRIPTION
02 029	LP02-029	SP: OC TO R-3 (25)U ON 9.9 AC
	TR53795	(TN) 6 LOTS (154 NC)/9.9 AC
	CP02-029	SPECIFIC PLAN CONFORMANCE
02-030	OT02-030	REMOVAL AND RELOCATION OF TWO OAKS
02-031	HR02-031	PROPOSED LAND USE OF SCHOOL SITES
02 034	TR47718	86 SINGLE FAMILY RESIDENCE
02-039	CP02-039	WIRELESS TELECOMMUNICATIONS FACILITY
02 050	CP02-050	HILLSIDE CONDITIONAL USE PERMIT
	PM26653	VESTING MINOR LAND DIVISION, 4SF LOTS/20.15 ACRES
02 053	OT02-053	31 REMOVALS AND 7 ENCROACHMENTS
	ZC02-053	FROM A-2-1 TO M-1-DP
	CP02-053	RECREATIONAL VEHICLE AND BOAT STORAGE FACILITY
02 054	CP02-054	CONT. USE OF CHURCH AND ADDITION OF REC. HALL
02 055	TR52905	23 SF LOTS ON 39.42 AC
	OT02-055	TWO ENCROACHMENTS; FOUR REMAIN
	CP02-055	HILLSIDE MANAGEMENT, DENSITY CONTROLLED DEVELOPMEN
02 071	CP02-071	INSTALLATION OF WIRELESS TELECOMMUNICATIONS FAC.
02 072	CP02-072	INSTALL WIRELESS TELECOMMUNICATION FACILITIES
02 073	CP02-073	
02-087	CP02-087	RETAIL, RESTAURANT AND DAY CARE FACILITY
02-101	CP02-101	WIRELESS TELECOMMUNICATION FACILITY
02 108	CP02-108	MINOR MODIFICATIONS TO CP92-074; (TR51644)
02 116	CP02-116	150 SENIOR APARTMENTS IN C-3-DP ZONE
02-139	CP02-139	WIRELESS TELECOMMUNICATIONS FACILITY
02-152	CP02-152	PROPOSED PARKING LOT FOR MOTEL CUSTOMERS
02 172	TR53847	8 SF LOTS/60.34 ACRES
	CP02-172	HILLSIDE MANAGEMENT CUP
02-177	OT02-177	ONE OAK TREE STUMP REMOVED
02 178	CP02-178	CONTINUED OPERATION OF PRIVATE BOARDING SCHOOL
02-191	OT02-191	EIGHT OAK TREE ENCROACHMENTS
02-193	OT02-193	TWO OAK REMOVALS; 12 ENCROACHMENTS
02-194	CM02-194	PROPOSED CEMETERY
02 196	OT02-196	48 REMOVALS PLUS ENCROACHMENTS
	TR53822	VESTING TENT. TR. FOR 335 SF UNITS
	CP02-196	HILLSIDE MANAGEMENT
		DENSITY CONTROLLED DEVELOPMENT
02-215	PM19149	4 SF LOTS/20 AC
02 219	PM26866	PARCEL FOR 4 RESIDENTIAL LOTS
02-226	CP02-226	SEA/WIRELESS "MICROCELL" FACILITY
02-232	CP02-232	MASTER PLANNED, MIXED-USE DEVELOPMENT
	ZC02-232	A-2-5 AND A-2-10 TO "SPECIFIC PLAN"
	PL02-232	SPECIFIC PLAN FOR MASTER PLAN
	SP02-232	PLAN AMENDMENT FOR MASTER PLAN DEVELOPMENT
02-234	CP02-234	UNMANNED WIRELESS TELECOMMUNICATIONS FACILITY
02-236	CP02-236	SEA/STORAGE & EXPORT OF SPRING WATER/CARETAKER RES
02-249	CP02-249	HILLSIDE MANAGEMENT FOR 211 ACRE SITE
	TR54020	DEVELOP 211 ACRE SITE WITH 568 LOTS
	SP02-249	PLAN AMENDMENT COUNTYWIDE FOR 211 ACRE SITE
	ZC02-249	FROM A-2-1 TO SPECIFIC PLAN (211.3 ACRES)
	PL02-249	SPECIFIC PLAN FOR 211 ACRE SITE
02-251	CP02-251	HOTEL USE WITH 112 ROOMS
02-260	CP02-260	COMMERCIAL AUTO SERVICE/SALES OF NEW TRUCKS
02-279	LP02-279	CHANGE FROM N1 AND HM TO M
	CP02-279	STORAGE OF VINTAGE VEHICLES ON SUBJECT SITE
	ZC02-279	FROM A1-1 TO M1-DP
02-289	CP02-289	UNMANNED WIRELESS TELECOMMUNICATION FACILITY
02-290	OT02-290	13 OAKS REMOVED; 4 ENCROACHED
02-298	CP02-298	WIRELESS FACILITY ON NEW STREET LIGHT
02-299	CP02-299	
02-300	CP02-300	REPLACE EXISTING POLE WITH 50' UTILITY POLE
02-311	CP02-311	RECREATONAL VEHICLE RESORT/CURRENT GOLF COURS
02-320	HR02-320	PROPOSED REALIGNMENT TO REDUCE EARTHEN FILL
02-325	OT02-325	RIGHT-0F-WAY REALIGNMENT; 23 REMOVALS
02-334	OT02-334	TWO OAK TREE ENCROACHMENTS
02-341	TR54073	VESTING TENT. TR. FOR 6 SF LOTS
	CP02-341	SIX SF LOTS FOR CUP - HILLSIDE
02-343	CP02-343	OUTDOOR STORAGE OF TRACTORS, TRAILERS
02-344	PM26755	3 SF LOTS/10.01 AC
	CP02-344	SF RESIDENCE
02396	CP02396	NINE DETACHED CONDOMINIUM UNITS (TR33698)
03-010	CP03-010	PRIVATE SPORTS-RECREATIONAL FACILITY
03-014	TU03-014	EVENING FUNDRAISING MAX. OF 1,100 GUESTS EACH NGT
03-015	CP03-015	SENIOR CITIZEN RESIDENCE - 1,000 SQ. FT.
03-017	CP03-017	WATER WELL, COMMUNITY PARKING LOT
03-023	OT03-023	DECK UNDER OAK TREE; THREE ENCROACHMENTS
03-025	TR43196	22 SF LOTS/22.6 ACRES

PROJECT NO	CASE NO	DESCRIPTION
03-025	CP03-025	MODIFICATION TO ACTON CSD DEVELOPMENT STANDARDS
03-032	CP03-032	ELECTRICITY GENERATING WINDMILL; NEW HOUSING
03-033	CP03-033	SECOND RESIDENCE FOR SINGLE FAMILY
03-052	CP03-052	MINOR CUP - WIND TURBINE
03-053	OT03-053	REMOVAL OF 1 OAK TREE
	CUP03-05	HILLSIDE MANAGEMENT
	PM27079	2 COMMERCIAL LOTS ON 4 AC
03-056	TU03-056	FUNDRAISING EVENT/MAX. OF 1,100 GUESTS EACH NIGHT
03-065	CP03-065	UNMANNED WIRELESS TELECOMMUNICATIONS FACILITY
03-069	CP03-069	ON-SITE SALE OF ALCOHOLIC BEVERAGES
03-070	TR54237	SIX 5 ACRE PARCELS
03-071	OT03-071	REMOVAL OF ONE OAK TREE
03-072	PM27081	3 SF LOTS ON 8.5 AC
03-074	CP03-074	MULTIPLE FAMILY HOUSING - 534 CONDOMINIUMS
03-079	PM27121	(TN) 4 SF LOTS/28.69 ACRES
03-090	CP03-090	CHURCH GYM WITH ADJACENT CLASSROOMS/OFFICES
03-097	PM27143	2 COMMERCIAL LOTS ON 4.56 AC
03-098	CP03-098	SALE OF BEER/WINE FOR NEW RESTAURANT
03-099	OT03-099	ONE OAK TREE ENCROACHMENT
03-106	TR54337	(TN) 5 SF LOTS/ 79.22 AC
03-108	PR03-108	CASTAIC CSD
03-109	CP03-109	STORAGE, BOTTLING AND EXPORT OF WELL WATER
03-110	PM27044	(TN) 3 SF LOTS/9.8 AC (GROSS)
03112	TR52715	(TN) 9(8 SF, 1 OS) LOTS/68.23
	OT98141	REMOVE SIX OAK TREES
	CP98141	COND USE FOR RPD & HILLSIDE MANAGEMENT
03-116	CP03-116	OFF-SALE LIQUOR IN FULL SERVICE FOOD MARKET
03-117	ZC03-117	FROM R1-7,500 TO C2-DP
	CP03-117	ALCOHOL SALES FOR MINI-MART AND GAS STATION
03-119	TR53525	30 SINGLE FAMILY RESIDENCES
	CP03-119	HILLSIDE MANAGEMENT
03-141	PM27144	(TN) 2 SF LOTS/1.5 AC (GROSS)
03-145	CP03-145	SALE OF ALCOHOLIC BEVERAGES FOR OFF-SITE
03-146	TR53725	SPLIT INTO 42 SF DETACHED RESIDENTIAL LOTS
	CP03-146	HILLSIDE FOR SF DETACHED LOTS
	OT03-146	8 OAK TREE REMOVALS
03-153	CP03-153	MINOR WECS-N 80' TOWER
03-154	CP03-154	(WECS-N) WIND TOWER
03-156	CP03-156	MOBILEHOME PARK WITH SPACES FOR 113 MOBILEHOMES
03-163	PM27075	SUBDIVIDE 5 ACRE LOT INTO TWO 2 1/2 LOTS
03-169	CP03-169	CUP FOR -DP ZONE, RESIDENTIAL USE IN COMM ZONE
	TR60024	(TN) 2 MF LOTS (85 DET NC)/7.8 ACRES (GROSS)
03-172	CP03-172	6 BLDGS. OF 84,143 SQ.FT. COMMERCIAL SITE
03-174	CP03-174	CUP FOR HILLSIDE MGMT
	PM60046	(TN) 4 SF LOTS/20 ACRES
03-175	CP03-175	CUP FOR HILLSIDE MGMT
	PM60047	(TN) 4 SF LOTS/20 ACRES
03-208	CP03-208	ALLOW THE SALE OF ALCOHOL BY A CHAIN SUPERMARKET
03-215	PM27074	2 SF LOTS/ 10 AC
03-221	CP03-221	CHURCH RETREAT FACILITY
	PK03-221	5 BUS STALLS AND 32 AUTO STALLS ARE PROVIDED
03-231	PD03-231	30% REDUCTION OF REQUIRED PARKING
03-238	TR60030	(TN) 21 INDUSTRIAL LOTS/110.2 ACRES
	CP03-238	GRADING (ON-SITE & OFF-SITE TRANSPORT), -DP
03-239	CP03-239	PROPOSED SWIMMING POOL AND RECREATION FACILITY
03-240	CP03-240	ALCOHOL SALES FOR PROPOSED SHOPPING CENTER
03-246	OT03-246	OAK TREE WITH PUBLIC HEARING/29 REMOVALS
	TR60319	(TN) 1 MF LOT (36 DET NC)/5.7 ACRES
	CP03-246	RESIDENTIAL USE IN COMM ZONE, MAYBE HILLSIDE MGMT
03-248	PM27011	2 LOT MINOR LAND DIVISION FOR SINGLE HOUSING
03-249	CP03-249	GRADING AND A CLUSTER CUP
	TR060259	492 DU SUBDIVISION
03-250	CP03-250	CUP FOR HM, GRADING CLUSTERING
	TR060257	PROPOSED 257 LOT SUBDIVISON OF 244 SF DU
	ZC03-250	FROM A-1 TO A-10,000; A-1 TO CPD; TO RPD10,000-7.5
	SP03-250	FROM HM TO U1 & U2; HM,U1 TO OS; HM TO CPD
03-251	ZC03-251	FROM A-2-1 TO RPD-5,000-3.9U
	CP03-251	HILLSIDE AND RPD CLUSTER DEVELOPMENT ON 24 ACRES
	TR54372	VESTING TRACT FOR 75 SF LOTS ON 24 ACRES
03-253	OT03-253	ENCROACHED BY LOOSE SOIL WITHIN DRIPLINE
03-259	CP03-259	SOLID FILL PROJECT
03-264	TR49042	APPROVAL OF 28 LOT SF SUBDIVISION/ALONG DRAINAGE
	CP03-264	28 LOT SINGLE FAMILY SUBDIVISION
03-285	OT03-285	24 ENCROACHMENTS; 57 REMOVALS
	PM27082	4 LOT PARCEL ON 40 ACRES

PROJECT NO	CASE NO	DESCRIPTION
03 300	PM60475	2 LOT SUBDIVISION
03 301	TR60359	58 LOT TRACT
	CP03-301	DENSITY BONUS
		HILLSIDE MANAGEMENT
1165	CP1165	CONSTRUCT STORAGE BLDG. & ENLARGE RESTROOM
1404	CP1404	CONSTRUCTION OF METAL HANGAR BUILDING
1494	CP1494	AMEND THE EXH. A TO EXISTING CUP(FILMING PICTURES)
173	CP2396	ROUGH GRADED PADS
	PP173	CHANGE BLDG.PLANS ON LOTS WITHIN TRACT
2116	CP2116	REV. EXH. A FOR MINOR MODIFICATIONS/SITE PLAN
84187	CP84187	PLOT PLAN APPROVAL PURSUANT TO C.U.P. 84187
84188	CP84188	APPROVAL OF FUTURE MODEL HOME PLOT PLAN
85042	CP85042	ADDITION OF NEW HIGH DEFINITION TV ANTENNA
85533	CP85833	REVISED EXHIBIT A
86201	TR44429	(RV1) 288 SF + 10 OS LOTS ON 135.9 AC.
86257	CP86257	CHANGE HOUSE MODELS IN LOTS 181 & 182
86299	CP86299	ADD & MODIFICATION TO WIRELESS COMM FACILITY
87 036	TR45123	10 SF LOTS/40.37 ACRES & 36 ACRE REMINDER PARCEL
	CP02-164	10 SF LOTS.40.37 ACRES & 36 ACRE REMAINDER PARCEL
87222	TR45433	(RV1) 732SF,8MF/523DU,76MF/500NC,5C,ETC ON 1755 AC
87426	TR45707	(RV2) 7 SF LOTS ON 160 AC IN A2-1 & A1-1
87487	CP87487	C.U.P FOR PM19149
87539	CP87539	(RV) WATER TANK
88086	TR46217	(RV) 11 SF LOTS ON 77.5 AC
88280	TR46564	(RV)305 (303 SF, 1 OS, 1 PF) LOTS/133.0 AC
88321	TR46389	(RV2)701SF+11MF/730NC+29OS+2R+4PF+1PK+1SC+1S/361 AC
88430	TR46712	(RV) 4 SF LOTS ON 70.3 AC
88587	TR44806	(RV1) 8 COMMERCIAL LOTS ON 20.46 AC
89094	CP96174	HILLSIDE MANAGEMENT, GRADING
	TR47200	(RV1) 393 SF, 3 C, 2 SCHOOL, 1 PARK, 18 OS/ 240 AC
89153	OT89153	REMOVE/REPLACE 44 OAK TREES
89486	TR48450	(RV1) 36 (33 SF + 1 PF + 2 OS) LOTS ON 90 AC
89512	PM21618	(RV) 3 SF LOTS ON 10.0 AC IN A2-2
90011	CP90011	REVISED EXHIBIT A FOR MCDONALDS
90395	PM22372	(RV) 3 SF LOTS/7.5 AC
90445	CP90445	POSSIBLE DP
92074	TR51644	(TN) 898SF, 8MF/893NC, 1COM, 104 PF LOTS/1795 AC
	SP92074	CW AND SCV GENERAL PLAN AMEND/TR51644
	OT92074	REMOVE 34 OAKS; ENCROACH PROTECTED ZONE OF 60 OAKS
	DA92074	3,029 DWELLING UNITS,SCHOOLS,PARKS ETC..
	ZC92074	ZC: FROM A2-2 TO RPD,C2DP,R3DP,OS
92156	LP92156	SCV: N1 TO C
92240	CP92240	HILLSIDE
92705	CP92705	REVISED EXHIBIT "A"
93004	CP93004	CELLULAR TELEPHONE COMMUNICATION FACILITY
93011	CP93011	ALCOHOLIC BEVERAGE SALE
93015	CP93015	2 SIDED 8'X10',16' HIGH OFF-SITE SIGN
93021	CP93021	HM, DEN.CONTROLLED, WATER TANK FOR TR 51521
	LP93021	AV PLAN: FROM N1 TO N2 ON 201.9 AC/ TR 51521
	TR51521	(TN) 159 SF, 3 PF, 3 OS LOTS ON 229.7 AC
93040	CP93040	HILLSIDE MANAGEMENT FOR PM 22188
	PM22188	(TN) 2 SF LOTS ON 5 ACRES
93047	CP93047	DETACHED LIVING QUARTERS
93050	PM23759	4 SF LOTS ON 73.3 ACRES
93053	PM23688	2 LOTS SUBD ON 10 ACRES PROPERTY
93061	CP93061	DIRECTIONAL SIGN
93066	CP93066	4 UNITS
	PM23734	4 SINGLE-FAMILY LOTS ON 20 ACRES
93072	CP93072	BEER AND WINE SALE
	VA93072	SIMILAR USE WITHIN 500'
93076	CP93076	EXPAND EXISTING CAMPGROUND
93081	CP93081	RECREATION,GOLF COURSE W/ DRIVING RANGE AND CLUB H
93085	HR93085	HIGHWAY REALIGNMENT
93097	CP93097	RECOVERY CAMP
93098	AP93098	7 DOGS
93099	CP93099	AUTOMATED ELECTRICAL SUBSTATION
93104	CP93104	CHILDCARE CENTER
93105	CP93105	ALCOHOLIC BEVERAGE SALE IN A RESTAURANT
	VA93105	SIMILAR USE WITHIN 500' RADIUS
93114	PM23665	(TN) 3 SF LOTS/40.5 AC
93118	CP93118	MARKET W/ BEER & WINE SALE
	VA93118	SIMILAR USE W/M 500' RADIUS
93125	PM23877	2 LOT SUBDIVISIONS ON 10.2 AC
93132	CP93132	CHURCH
93134	PM23849	(TN) 2 SF LOTS ON 11.09 ACRES
93145	NR93145	MOBILEHOME PARK, 57 MH SPACES & 8 RV SPACES

PROJECT NO	CASE NO	DESCRIPTION
93147	ZC93147	CHANGE A-2-1 ZONE TO SP (SPECIFIC PLAN) ZONE
	PL93147	SPECIFIC PLAN/MOBILEHOME PARK
	CP93147	MOBILEHOME PARK - 550 UNITS
93148	CP93148	UNMANNED CELLULAR TELECOMMUNICATIONS STATION
93150	HR93150	HIGHWAY ALIGNMENT
93156	PM23916	(TN) 3 INDUSRIAL LOTS/ 23.3 AC PLUS REMAINDER OF 1
93157	TR51777	19 SINGLE FAMILY LOTS ON 190 ACRES
93169	CP93169	ON-SITE SALES ALCOHOL
93173	CP93173	MODIFY SETBACK CONDITIONS OF CP87360
93178	PM23885	SINGL FAM RESIDENCE/TO CREATE 2 SINGL FAM RESIDTL
93179	CP93179	DETACHED SFR CONDOS IN RPD ZONE
	TR45440	(RV#2) 146 SF, 244 NEW CONDOS, CHURCH, PARK ON 99.
93181	AP93181	REQUESTS PERMIT FOR KEEPING OF WILD ANIMALS
93184	TR51808	CONVERT EXISTING MOBILE HOME PARK TO CONDOMINIUMS
	VA93184	EXCEED PERMITTED DENSITY IN A1-2 ZONE
	CP93184	CONDO CONVERSION/EXPAND CONDITION OF OPERATION/APP
93202	CP93202	TO ENSURE COMPLIANCE WITH HILLSD DEVELMNT PERFORM
	PM23944	TO CREATE TWO SINGLE FAMILY LOTS ON 10.4 ACRES
93212	NR93212	CONTINUE EXISTING MOBILEHOME PARK WITH DENSITY MOD
94011	ZC94011	ZONE CHANGE FROM M1 TO C-3-DP
	CP94011	TO ALLOW MOTEL IN C-3-DP ZONE
94013	CP94013	HILLSIDE MANAGEMENT FOR TR51829
	OT94013	REMOVE 4 OAKS; ENCROACH ON 12 OAKS -TR 51829
	TR51829	(TN) 5 SF LOTS ON 12.39 AC
94016	PM23933	4 SF LOTS/30.4 ACRES
94021	ZC94021	ZC FROM A2-2 TO RPD-1-3U
	CP94021	RPD AND HM FOR TR51789
	TR51789	(TN) 194 SF LOTS/79 AC
94024	CP94024	TO ENSURE COMPLIANCE WITH M-1 DP DEVELOPMENT STAND
	ZC94024	CHANGE OF ZONE FROM A-2-1 TO M-1 DP
94030	CP94030	TO CONSTRUCT A WATER STORAGE TANK
94032	NR94032	NON-CONFORMING USE - ROOFING MATERIAL SUPPLY YARD
94033	ZC94033	TO CHANGE ZONE FROM C-3 DP TO R-2 DP
	CP94033	DEVELOPMENT PROGRAM FOR 64 RESIDENTIAL UNITS
	TR51786	TO DEVELOP 64 UNITS OF CONDOMINIUM ON 7.25 ACRES
94034	OT94034	TO PERMIT ENCROACHMENT ON DRIPLINE OF 14 OAK TREES
94035	OT94035	TO REMOVE ONE (1) OAK TREE
94041	TR51828	TO CREATE 73 INDUSTRIAL LOTS ON 277 ACRES
94042	PM20436	REACTIVATION TO CREATE 2 S.F LOTS ON 10 ACRES
94045	OT94045	OAK TREE PERMIT/GRADING IN DRIPLINE AREA
94046	CP94046	CUP FOR NEW CELLULAR REPEATER & 200' HIGH TOWER
94049	OT94049	REMOVE 12 OAK TREES
94050	CP94050	UNMANNED TELECOMMUNICATIONS MICROWAVE STATION FACI
94059	TR51852	(TN) 564SF, 27MF/556NC, 7PF, 7C, 10I, 4R, 14 OS/52
	CP94059	CUP FOR SPEC PLAN CONSISTENCY, SEWAGE TRMNT PLNT &
94067	CP94067	TO ALLOW AN OFF-SITE 2-SIDED SUBDIVISION DIRECTION
94073	CP94073	CONVENIENCE MARKET WITH OFF-SITE LICENSE FOR BEER
94087	PM24500	(TN) 30 (24 SF/C/MIXED USE, 6 OS) LOTS/11,963 AC
	SP94087	CW,SCV: NEWHALL RANCH SPECIFIC PLAN
	PL94087	CREATE NEWHALL RANCH SPECIFIC PLAN
	CP94087	HILLSIDE MANAGEMENT/SEA
	DA94087	NEWHALL RANCH DEVELOPMENT AGREEMENT
94092	OT94092	(1) ENCROACHMENT, (3) REMOVALS
	CP94092	CONTINUE EXISTG ANIMAL REFUGE & ADD MOBILEHOMES
94095	OT94095	ENCROACH WITHIN PROTECTED ZONE OF ONE OAK TREE
	CP94095	RADIO COMMUNICATIONS FOR CITY OF L.A. EMERGENCY NE
94102	CP94102	BEER & WINE SALES W/EXISTG GAS STATION & PROPOSED
94113	OT94113	OAK TREE PERMIT/LACFCD EASEMENT
94114	CP94114	C.U.P. DUE TO S.E.A. & HM FOR PM23793
	PM23793	(TN) 2 SF LOTS ON 25.38 ACRES
94117	CP94117	C.U.P. FOR SENIOR CITIZEN RESIDENCE
94123	CP94123	EXPAND TENT CAMPGRND/CONTINUE TRAVEL TRAILER/MRKT/
94128	CP94128	LANDFILL/TO AMEND CUP86312/REMOVE L.A. CITY USE RE
94129	SM94129	C.U.P. FOR S.E.A.
	CP94129	SURFACE MINING
94139	CP94139	MOBILE HOME ON PERMANENT FOUNDATION
94143	CP94143	RETAIL GAME ARCADE & BILLIARDS IN EXISTING RETAIL
94148	CP94148	RESIDENTIAL WITH ONE ADDITIONAL SENIORS RESIDENCE
94151	LP94151	1800 RESIDENTIAL SUBDIVISION/COMMERCIAL

PROJECT NO	CASE NO	DESCRIPTION
94151	TR51931	(TN) 12 MF/1800 NC+3 C+1 PF+ 17 OS LOTS ON 299 AC.
	ZC94151	1800 RESIDENTIAL SUBDIVISION/COMMERCIAL
	CP94151	RPD&SEA/CONCEPT CUP 1800 RES UNITS & COMMERCIAL
94152	OT94152	TRIM ONE (1) OAK TREE
94154	PM24150	(TN) 1 I LOT/10 IND. OFFICE CONDOS ON 1.13 AC.
94156	ZC94156	ZONE CHANGE FROM A1-10K & C3 TO CM-DP
	CP94156	DEVELOPMENT PROGRAM/ASSEMBLY OF LIGHT FIXTURES
	LP94156	LOCAL PLAN AMENDMENT FROM U1 & C TO C
94157	HR94157	HIGHWAY REALIGNMENT
94158	CP94158	OFF-SITE SALE OF BEER AND WINE
94174	CP94174	WASTE DISPOSAL FACILITY
95009	CP95009	HILLSIDE REVIEW/2-LOT LAND DIVISION
	PM24179	(TN) 2 SINGLE-FAMILY LOTS ON 5 ACRES
95010	AP95010	ANIMAL PERMIT FOR FOUR POT BELLY PIGS
95012	CP95012	C.U.P. FOR NEW RADIO REPEATER SITE
95019	PM23942	(TN) 3 SF LOTS ON 149 AC.
95029	CP95029	CONTINUE & EXPAND ADULT RESIDENTIAL FACILITY
95035	CP95035	CHURCH
95040	CP95040	MODIFY CONDITIONS FOR COVERED PARKING
95042	TR52003	(TN) 4 SF LOTS ON 30.7 AC + 12.9 AC REMAINDER
95059	CP95059	HILLSIDE FOR PM19149
95068	CP95068	RADIO TELEPHONE TRANSMISSION EQUIPMENT
95069	HR95069	HIGHWAY REALIGNMENT
95071	CP95071	NEW CELLULAR RADIO REPEATER SITE IN SEA
95075	ZC95075	ZC FROM A-2-5 TO RPD 5,000-8.6U
	VA95075	REQ TO MODIFY STDs FOR SUBDIV DIR SIGNS
	TR48202	(TN) 230 LOTS(190SF, 11MF/268NC, 3R, 26OS)/69.7AC
	CP95075	CUP FOR RPD, URB HILLSIDE, OFF-SITE GRADING
	OT95075	REMOVE 6 OAK TREES
95084	CP95084	802 CONDOMINIUM UNITS AND GRADING
	LP95084	M TO U-3 AND C
	TR52043	(TN) 8 MF LOTS/802 NEW CONDOS ON 91.1 AC.
	ZC95084	MPD TO C-3 AND RPD-5,000-24U
95085	LP95085	SCV: U-4,P,M TO U-3
	TR51995	(TN) 1 MF LOT/114 NEW CONDOS ON 15.2 AC.
	ZC95085	CHANGE OF ZONE FROM R-4 TO A-2-2, M-1DP TO R-2DP
	CP95085	114 DETACHED SFR CONDOMINIUMS
95094	CP95094	CONSTRUCTION OF CELLULAR COMMUNICATION ANTENNA FAC
95095	OT95095	REMOVE 1 TREE & ENCROACH ON DRIP LINE OF 2 TREES
95097	PM24247	(TN) 2 SF LOTS ON 10 AC.
95099	CP95099	CONT. KEEPING WILD ANIMALS & CARETAKER RESIDENCES
95105	CP95105	OFF-SALE FULL LINE LIQUOR LIC. AT NEW SUPER MARKET
95111	OT95111	O.T. PERMIT TO ENCROACH & TRIM 1 TREE
95118	TR34900	(TN) 45 SF LOTS ON 572 AC.
	ZC95118	ZC: A-2-5 TO RPD-5,000-27.5U
	LP95118	SCV: HM & M TO U-2 & U-1
	CP95118	HILLSIDE MANAGEMENT, RESIDENTIAL PLANNED DEVELOPMT
95124	ZC95124	A-2-5 TO RPD-5,000-27U
	CP95124	SEA AND HILLSIDE
	TR46029	(TN) 5 MF/1397 NC + 2 C + 2 OS LOTS ON 246.7 AC.
95128	CP95128	UNSTAFFED CELLULAR COMMUNICATIONS ANTENNA FACILITY
95129	OT95129	OAK TREE PERMIT TO ENCROACH ON 8 TREES
95137	HR95137	REALIGNMENT OF COPPERHILL DR.
95140	CP95140	SALE OF ALCOHOLIC BEVERAGES IN NEW SUPERMARKET
95141	OT95141	OT TO CONSTRUCT SFR
95142	PM24351	(TN) 4 SF LOTS ON 5 AC.
95143	OT95143	OAK TREE PERMIT CONSTRUCT SINGLE FAMILY DWELLING
95147	AP95147	HORSE ON UNDERSIZED PARCEL
95148	CP95148	MAINTAIN MOBILE HOME FOR HOUSING INVALID PARENT
95149	PK95149	LESS THAN REQUIRED PARKING
	CP95149	COMMERCIAL USES, GAS STATION W/BEER & WINE IN MPD
95155	CP95155	ALLOW USE OF MOBILEHOME AS CARETAKER'S RESIDENCE
95158	CP95158	WATER STORAGE AND DISTRIBUTION SYSTEMS
95163	CP95163	ALLOW SALE OF BEER & WINE FOR OFF-SITE CONSUMPTION
95175	CP95175	RELIGIOUS SANCTUARY/RECEPTION HALL
95178	CP95178	SHOTGUN RANGE,PICNIC AREA, CLUBHOUSE
95184	CP95184	ALLOW SALE OF ALCOHOLIC BEVERAGES IN A RESTAURANT
95185	CP95185	
95196	CP95196	CUP NEW CELLULAR RADIO REPEATER SITE
95211	CP95211	UNMANNED TELECOMMUNICATIONS SITE
	VA95211	MOD.HEIGHT LIMIT TO PERMIT 150'TALL MONOPOLE
95223	CP95223	LAND DIVISIONS IN SEA, 20 ACRE PARCELS
95229	OT95229	OAK TREE ENCROACHMENT SFR

PROJECT NO	CASE NO	DESCRIPTION
95232	CP95232	WIRELESS TELECOMMUNICATIONS FACILITY IN SEA
95233	CP95233	C.U.P. TO INSTALL A 40' MONOPOLE & CELLULAR SITE
95234	TR47573	(RV) 25 SF LOTS ON 250 AC (10 AC LOTS)
	CP95234	25 SF LOTS ON 250 ACRES(10 ACRE LOTS)
95238	CP95238	MINOR MODIFICATION
		C.U.P. TO INSTALL AN 80' CELLULAR MONOPOLE
95243	CP95243	CELLULAR SITE WITH 6 ANTENNAS ATOP 100' MONOPOLE
95244	CP95244	C.U.P. FOR PERSONAL COMMUNICATION ANTENNAS
96007	SP96007	HR,CW,SCV: AMEND, HR SEE TR51852 & TR44429
	HR96007	HR,CW/SCV AMEND.,HR SEE TR51852 & TR44429
96014	CP96014	REV CP EX "A" FOR RESIDENTIAL LOTS FOR CP96014
		HM & DENSITY CONTROLLED DEV-ASSOC. WITH TR44429
96015	CP96015	TELECOMMUNICATION FACILITY WITH A 100' MONOPOLE
96026	CP96026	30' MONOPOLE FOR WIRELESS COMMUNICATION FACILITY
96031	CP96031	CONTINUE AND EXPAND EXISTING RV PARK
96035	CP96035	COMMUNICATION FACILITY WITH A 150' MONOPOLE
96036	CP96036	COMMUNICATION FACILITY WITH A 40' MONOPOLE
96040	CP96040	ON-SITE SALE OF BEER AND WINE IN RESTAURANT
96043	CP96043	CP HILLSIDE MANAGEMENT FOR TR52155
	TR52155	(TN) 31 SF LOTS/39.77 AC
96044	SP96044	C W: R TO 1 & SCVAP: HM TO U1 ON 162 AC
	CP96044	HILLSIDE MGT AND DENSITY CONTROLLED DEVELOP
	ZC96044	ZC: FROM A-2-1 TO R-1-7,000 ETC.
	TR48086	SEE PROJECT 90115 FOR DETAILS & STATUS
	OT96044	FOUR OAKS TO BE REMOVED
96055	CP96055	UNMANNED COMMUNICATION SITE WITH TWO 20' MONOPOLES
96058	CP96058	COMMUNICATION FACILITY WITH TWO 15-FOOT MONOPOLES
96063	CP96063	COMMUNICATION FACILITY WITH 3 20-FOOT MONOPOLES
96067	CP96067	COMMUNICATION FACILITY WITH 2 20-FOOT MONOPOLES
96073	OT96073	ALLOW ENCROACHMENT OF ONE OAK TREE
96078	CP96078	SENIOR CITIZEN RESIDENCE
96080	HR96080	HIGHWAY REALIGNMENT OF MCBEAN PARKWAY
96091	CP96091	UNMANNED TELECOMMUNICATIONS FACILITY
96095	OT96095	SFR REMOVAL OF ONE OAK TREE
96097	CP96097	SALE OF ALCOHOLIC BEVERAGES OFF-SITE CONSUMPTION
96098	PM24527	(TN) 1 SF LOT + 1 SF LOT/2 DU LEASE PROJ. ON 10 AC
96099	CP96099	CHURCH & ASSOCIATED ACTIVITIES
96106	PM24540	(TN) 3 SF LOTS/7.86 AC
96108	VA96108	SIGN EXCEED HEIGHT LIMIT WITHIN AN A-2 ZONE
	CP96108	ALLOW SUBDIVISION DIRECTIONAL SIGN
96113	CP96113	SEA CUP FOR GREEN WASTE COMPOSTING FACILITY
	ZC96113	ZONE CHANGE TO M-2 DP FOR SALVAGE/RECYCLING YARD
96115	PM24567	3 SF LOTS/6.23 ACRES
96116	CP96116	HILLSIDE CUP
	PM22782	3 SF LOTS ON 19.00 ACRES
96122	VA96122	TO ALLOW FREESTANDING ADVERTISING SIGN
96126	CP96126	RESTAURANT WITH FULL BAR
96127	HR96127	HIGHWAY REALIGMENT OF THE OLD ROAD
96129	CP96129	COMMUNICATIONS SITE WITH 4 ANTENNAS ON WATER TANK
96134	CP96134	ON-SITE SALE (BEER & WINE ONLY) REST. & BREW PUB
96135	CP96135	UNMANNED TELECOMMUNICATIONS FACILITY
96136	CP96136	
96138	PM23883	SF 3 LOTS ON 15.02 ACRES
	CP96138	HILLSIDE MANAGEMENT
96140	CP96140	ON SITE SALE BEER & WINE IN RESTAURANT
96144	SM96144I	INTERIM MANAGEMENT PLAN
	SM96144	SURFACE MINING PERMIT & RECLAMATION PLAN
96146	CP96146	TRANSFER AFFORDABLE UNITS TO ANOTHER SITE
96151	CP96151	SELF-STORAGE
96155	CP96155	RECREATION (HUNT) CLUB & SKEET RANGE IN SEA
	OT96155	ENCROACHMENT WITHIN THE PROTECTED ZONE OF 7 OAKS
96160	CP96160	CHURCH FACILITY INCLUDING DAY CARE
96161	CP96161	GUEST RANCH
96174	CP96174	SPECIFIC PLAN, HILLSIDE MANAGEMENT/TR47200 (RV1)
96182	CP96182	WIRELESS TELECOMMUNICATIONS FACILITIES
96190	HR96190	HIGHWAY REALIGNMENT
96192	HR96192	
96200	CP96200	SERVICE STATION OFF-SITE SALE BEER/WINE
96201	VA96201	SIGNS IN EXCESS OF CODE
96204	SM96204	RECLAMATION PLAN FOR EXISTING MINE
97002	CP97002	GRINDING NON-METALLIC ORE
97009	TR36943	(RV1) 198 (197 SF + 1 PARK) LOTS/225 AC
	ZC97009	ZC TO R-1-5,000,R-1-40,000 & O-S
	CP97009	HILLSIDE MANAGEMENT ASSOC WITH TR36943
97013	PM24725	(TN) 2 COMMERCIAL LOTS ON 1.08 AC

PROJECT NO	CASE NO	DESCRIPTION
97018	CP97018	CELLULAR TELECOMMUNICATIONS FAC. W/85FT. MONOPOLE
97031	PM24736	(TN) 2 SF LOTS ON 4.94 AC
97035	OT97035	OAK TREE PERMIT
97038	CP97038	ARCADE & ON-SITE ALCOHOL AT RESTAURANT
97041	ZC97041	C-2 TO C-3-DP
	CP97041	CONDITIONAL USE PERMIT FOR (-DP) ZONE
97042	CP97042	WIRELESS TELECOMMUNICATIONS SITE & MICROWAVE DISH
97044	CP97044	SECOND RESIDENTIAL UNIT (GOVT. CODE 65852.2)
97052	PM24756	(TN) 4 SF LOTS/154 AC
97062	CP97062	ALCOHOL SALES FOR OFF-SITE CONSUMPTION
97064	PM24795	2 COMMERCIAL LOTS ON 1.96 ACRES
97074	PM24810	(TN) 4 INDUSTRIAL LOTS/4.99 AC
97078	CP97078	HILLSIDE MGMT & DENSITY CONTROLLED DEVELOPMENT CUP
	OT97078	REMOVE 2 OAK TREES - 21 REMAINING
	TR52194	(TN) 134 (126 SF, 7 OS, 1 PF) LOTS ON 176.5 AC
97079	OT97079	REMOVE 1 OAK TREE
	TR52193	62 SF EQUESTRIAN LOTS ON 80.7 ACRES
	CP97079	HILLSIDE MGMT. & DENSITY CONTROLLED DEV. CUP
97080	OT97080	REMOVE 48 TREES - 15 REMAIN
	TR52192	(TN) 147 (141 SF+5 OS) LOTS/203.8 AC
	CP97080	HILLSIDE MGMT. & DENSITY CONTROLLED DEV. CUP
97082	PM24798	(TN) 5 INDUSTRIAL LOTS/2.4 AC
97084	CP97084	ONSITE SALE OF ALCOHOLIC BEVERAGES
97087	CP97087	SENIOR CITIZENS RESIDENCE IN SEA
97088	CP97088	DENSITY CONTROLLED DEV. AND HM FOR TR52302
	TR52302	11 SF LOTS ON 22.39 AC
97098	CP97098	BEER AND WINE (ON-SITE) AT RESTAURANT
97109	CP97109	BEER/WINE, OFF-SITE, GAS STATION
97114	PK97114	APPEAL OF H.O. APPROVAL OF ARCADE/REST. PARK. PMT.
97119	PM24801	(TN) 2 COMM. LOTS/1.515 AC
97120	CP97120	GAS STATION/MINI MARKET IN CPD ZONE
97124	CP97124	SALE OF BEER & WINE, FOR OFF-SITE
97125	CP97125	BEER/WINE AT EXISTING RESTAURANT
97128	OT97128	REMOVE 8 OAK TREES AND 3 ENCROACHMENTS.24 REPLACED
		TEMPORARY TRAILER SALES OFFICE
97131	CP97131	139 ROOM HOTEL
97140	CP97140	CONTINUE EXISTING WATER BUSINESS/CARETAKER RESIDEN
97141	CP97141	CHURCH & SCHOOL FOR GRADES K THROUGH 8
97146	PM24913	(TN) 3 INDUSTRICAL LOTS/13.5 AC
97148	TR46353	(RV1) 2 MF LOTS/110 NC/ 65 AC
	CP98152	HM AND RPD FOR 110 NC PROJECT/TR46353
97151	CP97151	HOLLYWOOD INTERNATIONAL FILM ACADEMY - VOCATIONAL
97159	NR97159	CONTINUE EXISTING TRAILER & RV PARK
97161	VA97161	VARIANCE FROM SIGN ORDINANCE TO ALLOW CONSTRUCTION
97168	PM24917	(TN) 2 COMMERCIAL LOTS/1.86 ACRES
97171	CP97171	KEEPING AND MAINTAINING OF WILD ANIMALS
97172	CP97172	COMMERCIAL SERVICE/RETAIL BUSINESS
	ZC97172	A-1-7,000 and C3 to C3-DP
97182	CP97182	SENIOR CITIZEN RESIDENCE
97183	CP97183	BEER & WINE IN A RESTAURANT
97195	CP97195	CUP.SEA CONSTRUCTION OF FOUR-LANE BRIDGE
	OT97195	REMOVE TWO OF SIX OAK TREES
97198	CP97198	MOBILEHOME FOR CARETAKER
97200	AP97200	THREE SPIDER MONKEYS
97204	CP97204	DENSITY CONTROLLED DEVELOPMENT/HM/SEA
	OT97204	59 OAK TREES REMOVED; 25 FOR ENCROACHMENT
	TR43896	(RV2) 289 (280 SF,1 PK, 6 OS, 2 R)LOTS/247.4 AC
98002	TR34385	(RV)1 MF LOT/54 NEW SF CONDOS/5.41 AC
	CP98002	CONFORMANCE WITH DP ZONE/54 NEW SF CONDOS/5.41 AC
	OT98002	ENCROACHMENT INTO DRIPLINES OF 3 TREES
	ZC98002	ELIMINATE UNILATERAL CONTRACT
98003	CP98003	CONTINUED OPERATION OF RECREATIONAL TRAILER PARK
	TU98003	TEMPORARY USE PERMIT FOR AMUSEMENT PARK
98004	CP98004	SINGLE-FAMILY RESIDENCE IN ZONE R-R-1
98006	CP98006	BEER & WINE AT EXISTING RESTAURANT
98008	ZC98008	FROM A-2-5 TO RPD, C2-DP & OS
	PK98008	TO ALLOW OFF-SITE PARKING
	SP98008	CW & SCV: AMEND SEA & CHANGE LAND USE CATEGORIES
	CP98008	CUP FOR RPD, DP & SEA
	TR52455	(TN) 1248 SF; 1297 CONDOS/APTS, C & OS ON 966 AC
	OT98008	REMOVAL OF 13 OAK TREES
98012	CP98012	127 ROOM MOTEL

PROJECT NO	CASE NO	DESCRIPTION
98013	CP98013	HM, WASTEWATER TREATMENT PLANT FOR TR48786
	TR48786	(RV1) 66 (65 SF, 1 PF) LOTS/ 157 AC
98016	CP98016	RES IN COMM ZONE, CHILD CARE FACILITIES
	PM25058	(TN) 1 MF/23 RES BLDGS/330 APRT+ 2 COMM/20.7 AC
98023	CP98023	MPD INDUSTRIAL DEVELOPMENT/5 NC/3.3 AC (PM 25035)
	PM25035	(TN) 1 INDUSTRIAL LOT/5 NC (INDUSTRIAL)/3.29 AC
98024	OT98024	REMOVAL OF 1 OAK TREE
98026	CP98026	CARETAKER'S MOBILEHOME
98031	OT98031	ENCROACH ON DRIP LINE OF OAK TREE
98034	TR52584	(TN) 209SF, 1GOLF, 2 OS, 2 ST) LOTS/432 ACRES
	CP98034	HM, DENSITY CONTROLLED CUP FOR TR52584
	OT98034	REMOVAL OF 17 OAK TREES AND 33 ENCROACHMENTS
98037	CP98037	SENIOR CITIZEN'S RESIDENCE
98041	CP98041	HELISTOP FOR EMERGENCY ACCESS TO PACOIMA DAM
98046	CP98046	CUP FOR HILLSIDE DEVELOPMENT ON 90 SF LOTS
	TR43589	94 (91 SF+2 OS+1 PF) LOTS/75.72 ACRES
	ZC98046	ZC FOR 90 SF LOTS FOR HILLSIDE DEVELOPMENT
98047	CP98047	CONDITIONAL USE PERMIT/HILLSIDE&SPECIFIC PLAN
	TR51852	(REAC)1629(1548SF+21 MF(586 DU)+6C+7OS)LOTS/860 AC
	ZC98047	ZONE CHANGE FROM A-2-2 TO SPECIFIC PLAN
	SP98047	CW & SCV: AMEND NORTHLAKE SPECIFIC PLAN
	PL98047	AMEND NORTHLAKE SPECIFIC PLAN
98052	TR33608	(RV)140SF +126NC +567 APTS/111.6 AC
	ZC98052	ZONE CHANGE
	OT98052	TO REMOVE 36 TREES
	CP98052	RPD DEVELOPMENT
98053	CP98053	SPORTS COMPLEX OF BASEBALL FIELDS
98055	CP98055	WIRELESS TELECOMMUNICATION FACILITY (CONT'D. USE)
98057	CP98057	SENIOR CITIZEN RESIDENCE
	VA98057	EXCEED 1200 SQ.FT. FOR SEN. CITIZEN RESIDENCE
98064	NR98064	CONTINUE EXISTING MOBILEHOME PARK
98068	CP98068	PRIVATE RECREATIONAL FACILITY/PAINTBALL, ETC
98071	TR52535	(TN) 200 (199 SF+ 1 OS) Lots/434.3 ac
	CP98071	80 SFR (2 CUP'S; HILLSIDE MGMT/DENSITY CONTROLLED
98072	CP98072	TRUCK STORAGE & OFFICE SPACE IN M1-DP
98078	CP98078	WIRELESS TELECOMMUNICATION ANTENNAS
98080	CP98080	UNMANNED WIRELESS TELECOMMUNICATION FACILITY
98083	CP98083	WIRELESS TELECOMMUNICATIONS ANTENNAS
98088	TR52637	(TN) 10 SF LOTS/13.3 AC.
98092	CP98092	SENIOR CITIZEN RESIDENCE

PROJECT NO	CASE NO	DESCRIPTION
98094	OT98094	REMOVAL OF 5 OAK TREES ON LOT 9 OF TR. 33622
98095	OT98095	REMOVE ONE OAK TREE ON LOT 50 OF TR. 33622
98096	OT98096	REMOVE ONE OAK TREE ON LOT 11 OF TR. 33622
98098	CP98098	100-BED GRP HOME/DEVELOPMENTALLY DISABLED
98106	CP98106	WIRELESS TELECOMMUNICATIONS FACILITY
98109	PM25140	(TN) 4 SF LOTS/2.5 AC
98110	CP98110	CONSTRUCT AN UNMANNED REGENERATION FACILITY
98111	CP98111	SERVICE STATION WITH OFF-SITE SALE OF ALCOHOL
98113	CP98113	104 ROOM EXTENDED STAY HOTEL & RESTAURANT
98117	CP98117	WIRELESS TELECOMMUNICATIONS FACILITY
98121	CP98121	GENERAL RETREAT PURPOSES WITH DORMITORY
98123	CP98123	89 SF DWELLINGS
	OT98123	30 TREES REMOVED; 9 ENCROACHMENTS
	TR52652	(TN) 69 SFD (R1)+20 SFD (RPD) & 3 OS LOTS/58.3 AC
98132	CP98132	25' HIGH WIRELESS TELECOMMUNICATIONS FACILITY
98133	CP98133	63 SF DETACHED CONDOMINIUMS
	TR52608	(TN) 63 SF DETACHED CONDOS ON 1 LOT & 1 OPEN SPARE
98135	CP98135	ON-SITE BEER AND WINE SALES
98136	CP98136	DRUG/VARIETY CTR WITH BEVERAGE DEPT INCLD BEER/WIN
98139	CP98139	NEW BLDG FOR RELIGIOUS RETREAT
98143	SP98143	HWY PLAN: RECLASS THE OLD ROAD
98151	OT98151	ENCROACHMENT OF TWO OAK TREES
98154	PM25349	(TN) 2 COMMERCIAL LOTS ON 1.51 ACRES
98155	OT98155	OAK TREE PERMIT
	TR44471	(RV1) TENT. MAP (376 SF UNITS)
	CP98155	DENSITY CONTROL DEV & HILLSIDE MANAGEMENT
98160	CP98160	CUP FOR CARETAKER'S MOBILE HOME
98164	CP98164	TO ALLOW ZERO LOT LINES IN VALENCIA COMMERCE CNTR.
98170	CP98170	HM, SEA, RPD FOR REVISED TR47657
	TR47657	(RV1) 421 SF, 13MF/115 NC, 1 C,4OS, LOTS/163 AC
98173	ZC98173	ZONE CHANGE FOR HILLSIDE MANAGEMENT
	CP98173	CUP FOR HILLSIDE MANAGEMENT
	LP98173	LOCAL PLAN AMENDMENT FOR HILLSIDE MANAGEMENT
	TR52729	(TN) 70 SF/80 AC
98176	ZC98176	ZC: A-2-1 TO R-1-5,000
	TR52790	(TN) 75 SF LOTS/53.3 AC
	CP98176	HILLSIDE CUP FOR TR52790
	LP98176	SCV: HM AND U3 TO U1

PROJECT NO	CASE NO	DESCRIPTION
98178	VA98178	MOBILE HOME PARK
	NR98178	MOBILE HOME PARK EXPANSION
98179	CP98179	ARCHERY CENTER WITH INDOOR/OUTDOOR RANGES
98182	DA98182	DEVELOPMENT AGREEMENT FOR STEVENSON RANCH
	HR98182	HIGHWAY REALIGNMENT OF PICO CANYON ROAD
	ZC98182	Z C FROM A-2-2 & A-2-5 TO SPECIFIC PLAN
	SP98182	PLAN AMENDMENT & SPECIFIC PLAN FOR 3,532 DU'S
98190	HR98190	REALIGNMENT OF RIDGE ROUTE ROAD
99002	CP99002	CUP FOR PROPOSED TRANSMITTAL ANTENNA FOR CAMPUS
99003	TR52807	(TN) 5 SF LOTS/5.4 ACRES
	CP99003	CUP FOR HILLSIDE MANAGEMENT
99013	CP99013	MPD ZONING REQUIREMENTS FOR PM25425
	PM25425	(TN) 1 INDUS. LOT/4 NEW CONDOS/2.65 AC
99014	CP99014	HILLSIDE MANAGEMENT FOR TR 52883
	TR52883	(TN) 71 SF LOTS/148 AC
99016	CP99016	MAINTAIN EXISTING SENIOR CITIZEN'S RESIDENCE
99020	TR52829	(TN) 99 (95 SF + 1 OS+1 PARK+2 LANDSCAPE) LOTS
	ZC99020	ZC: A-2-2 TO A-2-1 & R-1-7000 ON 14.7 AC
	CP99020	HM & DEN CONTRL DEV RE: TR52829
99024	CP99024	SALE OF BEER/WINE FOR PROPOSED RESTAURANT
99027	CP99027	SENIOR CITIZEN'S RESIDENCE
99030	OT99030	1 OAK TREE; SLIGHT ENCROACHMENT IN PROTECTED ZONE
99031	CP99031	SENIOR CITIZEN RESIDENCE; 1,300 SQ. FOOT
99033	CP99033	CONT'D. USE OF EXISTING WILD ANIMAL FACILITY
99040	CP99040	TO UTILIZE PROPERTY AS A MOVIE RANCH
	ZC99040	ZONE CHANGE FROM A-1-1 TO A-2-1-U/C
99044	CP99044	TO INSTALL ROOF MOUNTED WIRELESS TELECOMMUNICATION
99045	CP99045	PRIVATE RECREATIONAL FACILITY FOR PAINTBALL
99048	CP99048	CUP FOR TENT. TR. MAP CONSISTING OF 63 LOTS
	OT99048	13 OAK TREES TO REMOVE AND 26 TO SAVE
	PA99048	COUNTYWIDE PLAN AMEND. FOR 63 LOTS
	TR52475	(TN) 46(44 SF, 2 OS) LOTS/70.4 AC
	ZC99048	ZONE CHANGE FOR TRACT MAP OF 63 LOTS
99053	CP99053	TO ALLOW A FOUR SIDED SUBDIVISION DIR. SIGN
	VA99053	VARIANCE TO ALLOW A FOUR SIDED SUBDIV. DIR. SIGN
99056	OT99056	ONE OAK TREE REMOVED
99066	PM24909	(TN) 4 SF LOTS/ 19.86 ACRES
99071	CP99071	A ROOF MOUNTED WIRELESS TELECOMMUNICATIONS FAC.
99072	OT99072	REMOVAL OF 10 OAK TREES & 6 ENCROACH
99074	TR52882	(TN) 83(81 SF, 1 PF, 1 OS) LOTS/198.7 AC
	CP99074	HILLSIDE MANAGEMENT FOR TR 52882
99084	SP99084	HWY PLAN: RECLASS CROWN VALLEY RD
99100	PM24912	(TN) 3 SF LOTS/66 AC
99101	TR52938	(TN) (194 NC+2 OS) LOTS/28.2 AC
	CP99101	TO ENSURE COMPLIANCE WITH SP 1 FOR TR 52938
99106	PM25536	(TN) 3 SF LOTS/30 AC
99116	CP99116	FIBER OPTIC REGENERATION SITE
99117	CP99117	
99119	ZC99119	A-1-40K TO M-1-DP
	CP99119	CUP FOR EQUIP. SALES & DISPLAY
99122	CP99122	GRADING PERMIT FOR REMOVAL OFORGANIC MATERIAL
99128	CP99128	TO OPERATE AND MAINTAIN MOTION PICTURE SETS
99129	OT99129	REMOVAL OF 3 OAK TREES OUT OF 50
	TR52785	(TN) 26 SF LOTS/41.4 AC
	CP99129	HILLSIDE MGMT. & DENSITY CONTROLLED DEVELOPMENT
99134	OT99134	ENCROACHMENT & PRUNING OF ONE OAK TREE IN C-3
99137	PM25485	(TN) 2 INDUSTRIAL LOTS/1.14 AC
99143	CP99143	WIRELESS TELECOMMUNICATIONS FACILITY
99144	CP99144	SALE OF ALCOHOLIC BEVERAGE FOR ON-SITE CONSUMPTION
99153	PM25705	(TN) 2 COMMERCIAL LOTS/4.65 AC
99155	CP99155	PROPOSED OFFICE/TECHNICAL/WAREHOUSE
99157	PM25697	(TN) 2 INDUSTRIAL LOTS/ 1.49 AC
99169	OT99169	ENCROACHMENT INTO ZONE OF 8 OAK TREES
99173	AP99173	PERMIT FOR 8 DOGS
99177	HR99177	NEW ALIGNMENT UTILIZES THE EXISTING TRAVELED WAY
99190	PM25687	(TN) 3 SF Lots/ 176 Acres
99204	HR99204	Highway Realignment
99206	CP99206	CELLULAR TELECOMMUNICATIONS FACILITY
99213	PM25852	(TN) 4 SF LOTS/1.1 AC
99215	TR43766	(REAC) 39 SF LOTS/79.7 AC
99224	CP99224	WIRELESS TELECOMMUNICATION FACILITY
99225	NR99225	OFF-SALE BEER & WINE FOR CONVENIENCE MARKET
	CP99225	PERMIT FOR BEER & WINE & RENEWAL OF CARETAKER'S RE
99226	TR52990	(TN) 63 SF LOTS/80 ACRES
	CP99226	63 SF LOTS/80 ACRES

PROJECT NO	CASE NO	DESCRIPTION
99229	OT99229	ELEVEN TREES FOR ENCROACHMENT
99232	OT99232	ONE OAK TREE TRIMMED
99239	CP99239	HILLSIDE MGT & DENSITY CONTROLLED DEVELOP
	OT99239	REMOVE 56 OAK TREES RE TR 53138
	TR53138	(TN)429(388SF+25 OS+14ST+1HLPAD+1SHRF)LOTS/230ACS
99245	CP99245	WIRELESS TELECOMMUNICATION FACILITY
99247	ZC99247	ZC: A-2-2 TO CPD/C-M-DP
	LP99247	SCV AP: FROM U2 TO C
99251	CP99251	SENIOR CITIZEN RESIDENCE
99252	CP99252	WIRELESS TELECOMMUNICATIION FACILITY
99265	HR99265	HIGHWAY REALIGNMENT
TU03-020	TU03-020	COUNTRY FAIR

APPENDIX 4.1
Geotechnical Report(s)

ALLAN E. SEWARD
ENGINEERING GEOLOGY, INC.
Geological And Geotechnical Consultants

GEOLOGIC AND GEOTECHNICAL REPORT

Review of Tentative Tract Map (Dated February 25, 2003)

Tentative Tract 53425

River Park

City of Santa Clarita, California

VOLUME I OF II

Prepared for:

Newhall Land
23823 West Valencia Boulevard
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Job No: 03-1571-4
Dated April 4, 2003

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ALLAN E. SEWARD
ENGINEERING GEOLOGY, INC.
Geological And Geotechnical Consultants

April 4, 2003 Job No: 03-1571-4

Newhall Land
23823 West Valencia Boulevard
Valencia, California 91355

Attention: Mr. Glenn Adamick

Subject: **GEOLOGIC AND GEOTECHNICAL REPORT**
Review of Tentative Tract Map (Dated February 25, 2003)

Project: Tentative Tract 53425
River Park
City of Santa Clarita, California

References: See at end of text

Gentlemen:

This report presents our opinions on the existing geologic and geotechnical conditions on the above-referenced tentative tract and their effects on the proposed development.

1.0 SCOPE OF INVESTIGATION

This investigation included the following:

1. Review of previous reports by this firm in the vicinity of the subject site.

2. Review of reports by others in the vicinity of the subject project (see References).

3. Review of Published reports and maps listed in the **References** section.

4. Review of the 1999 Munger Map Book, California-Alaska Oil & Gas Field.

5. Review of Alquist-Priolo Fault Rupture Hazard Zones in California (CDCDMG Special Publication 42).

6. Review of the following aerial photographs:

YEAR	PHOTO	SCALE	AGENCY
1928	C300: E-173, 212, 213,	1" = 1700'±	Fairchild
11/4/52	AXJ: 3K-95, 3K-96	1" = 1600'±	USDA
11/27/63	1, 2, 3, 23, 24	1" = 500'±	Horizon Survey
8/25/80	480-163, -164	1" = 4000'±	USDA
3/8/81	PW 11484-4 Color	1" = 2,800'±	Pacific Western Aerial Surveys
10/13/81	14, 15	1" = 1000'±	Sikand Engineering
7/3/85	WAC-85CA 16-68, 16-69	1" = 1100'±	WAC Corp
6/1/92	2, 3	1" = 900'±	Ampak Engineering
11/20/98	1-1, 1-2, 2-1, thru 2-5	1" = 770'±	Robert Lung & Assoc.

7. Coordination with the Supervising Civil Engineer, Psomas.

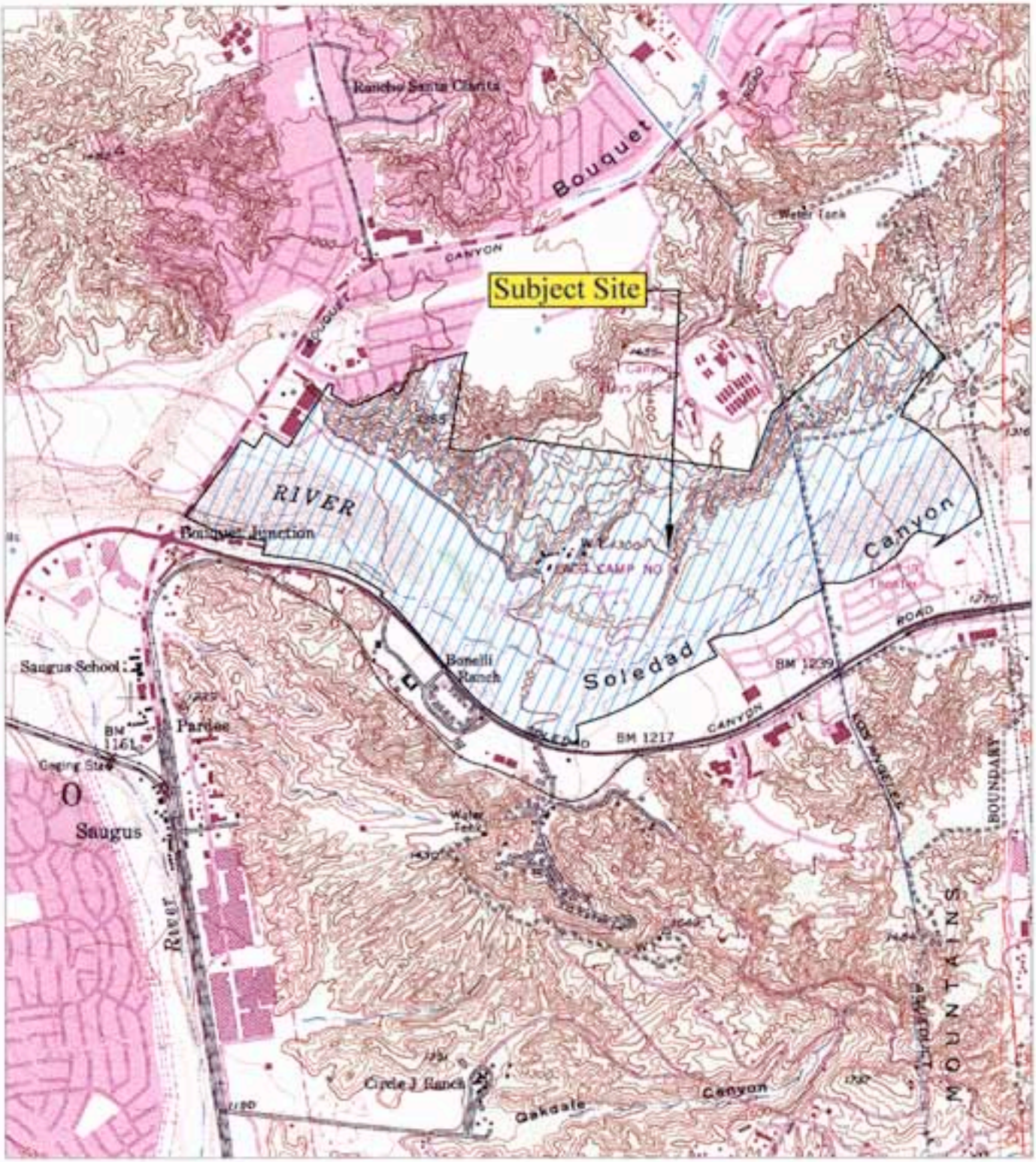
8. Review of the site topography and the vesting tentative tract map design, dated February 25, 2003, provided to our office in computerized format (AutoCAD), prepared by Psomas. This computerized map was used as the base for our 300-scale Geologic/Geotechnical Map, **Sheet 1**, and 100-scale Geologic/Geotechnical map **Sheets 2-4**). We make no representations regarding the accuracy of the base map.

9. Geologic field mapping of the site.

10. Coordination with Underground Service Alert.

11. Excavation, sampling and logging of 9 hollow-stem-auger borings drilled to a maximum depth of 55 feet, 10 rotary-wash borings drilled to a maximum depth of 51 feet, and 13 bucket-auger borings drilled to a maximum depth of 115 feet.

12. Excavation, sampling and logging of 118 backhoe trenches excavated to a maximum depth of 15 feet.



Source: U.S. Geological Survey Newhall Quadrangle, Dated 1952, Photorevised 1988

Approximate Scale: 1"=2,000'

NOTE: THIS IS NOT A SURVEY OF THE PROPERTY

N

ALLAN E. SEWARD
ENGINEERING GEOLOGY, INC.
Geological and Geotechnical Consultants

LOCATION MAP

Job No.: 03-1571-4 | *Date: 4/4/03*

13. Performed 37 Cone Penetrometer Test (CPT) soundings within the alluvial areas.

14. Laboratory testing of selected bulk and relatively undisturbed samples obtained in our subsurface investigations. Testing included dry density and moisture content of in-situ soils, percent minus #200 sieve, grain-size analysis including hydrometer, Atterberg Limits, compaction, direct shear, hydroconsolidation, expansion index, sulphates, chlorides, pH and resistivity.

15. Evaluation of potential seismic ground motions at the site utilizing computer programs by Thomas Blake in accordance with current State Guidelines.

16. Geotechnical analysis of potential liquefaction, lateral spreading and seismic settlements based on our subsurface investigations, laboratory testing and potential seismic ground motion estimates.

17. Assessment of recommended grading removal depths based on weak soils, seismic settlements and proposed fill heights above the exiting ground surface.

18. Preparation of 31 geologic cross sections illustrating anticipated conditions for the proposed cut, fill and natural slopes.

19. Stability analyses of proposed cut-slopes, fill slopes and natural slopes on the site.

20. Preparation of Geologic/Geotechnical Maps, a Geologic/Geotechnical Removal Map, Location Map, drill hole logs, trench logs and pertinent figures.

21. Preparation of this report summarizing the results of our investigations and our conclusions and recommendations for the proposed development.

2.0 BACKGROUND

Previous engineering geology and geotechnical investigations on the site include studies by Huntingdon Engineering & Environmental, Inc./Schaefer Dixon Associates and Southwestern Engineering Geology. See references at the end of text for reviewed reports. Huntingdon/Schaefer Dixon prepared reports for Kennedy/Jenks Consultants/Castaic Lake Water Agency (CLWA) and provided the geologic and geotechnical observation and testing for the grading and construction of the Rio Vista Water Treatment Facility which included

grading for the raw and treated water lines located within the Newhall Ranch Road alignment. The performed grading was also intended to accommodate the future extension of Newhall Ranch Road and the associated cut and fill slopes from approximately 600 feet east of the intersection of Newhall Ranch Road and Bouquet Canyon Road to their facility to the east in which the pipelines are located. The rough grading was performed between March 1993 and December 1994. Southwest Engineering Geology prepared a general feasibility report evaluating the site geologic conditions. Where appropriate, their data was incorporated into our evaluation.

Our investigation for the site was performed over a period of approximately 4 years.

3.0 SITE DESCRIPTION

The River Park project is located immediately northeast of Bouquet Junction in the city of Santa Clarita. The site consists of 692 acres and is bounded by Soledad Canyon Road, Tentative Tract Map 20838 and the East Greenbrier and West Greenbrier mobile home developments in the south, the Los Angeles Department of Water and Power Easement (transmission lines) on the east, Bouquet Square shopping mall, Tract No. 33948 and Bouquet Canyon Road to the west and the Castaic Lake Water Agency (CLWA) property and developed Tracts 27994 and 26882 along the north. The southern portion of the property encompasses the Santa Clara River (see **Location Map**) and includes the main channel and floodplain. The northern portion of the property includes the elevated areas characterized by southwest to southeast trending spur ridges that descend from plateaus elevated up to about 350 feet above the river. Elevations on the site range from approximately 1155 feet along the Santa Clara River to 1490 feet along the northeastern corner of the site. Slopes range from gentle to moderately steep with the steepest slopes existing in the side canyons and swale areas. Details of the site topography are illustrated on the attached **Geologic/Geotechnical Maps (Sheets 1 through 4).** Although much of the property appears to remain in a natural state, the property is traversed by a number of large utilities including the Los Angeles Aqueduct (Los Angeles Department of Water and Power), large water lines of the CLWA that lead to their facility and various water wells. Previous grading on the site include significant grading performed for the construction of the CLWA Rio Vista Water Treatment Plant including raw and treated water pipelines. Minor grading has also been performed for the various access roads that traverse the site including the stockpiling of artificial fill at various locations. A construction equipment yard including existing buildings is present within the canyon located southwesterly of the CLWA facility. The lowland areas have been

used in the past for farming. Oil exploration and production occurred at isolated areas on the site.

4.0 PROPOSED DEVELOPMENT

The Tentative Tract Map for this site includes 524 Lots for residences, recreational facilities and open space and future bridge lots including the extension of Newhall Ranch Road from Bouquet Canyon Road to Soledad Canyon Road. A portion of proposed Newhall Ranch Road traverses a portion of the CLWA property at the north central portion of the property just west of the DWP aqueduct. Bank stabilization and slope toe protection are proposed at various locations at the southerly portion of the development. It is anticipated that mass grading by cut and fill techniques will be used to create level building pads at a variety of grades between the Santa Clara River and the crest of the ascending ridges. Infrastructure for the development is anticipated to include roadways and flood control channels.

5.0 GEOLOGIC SETTING

The site is situated in the western Transverse Ranges geomorphic province in the western portion of the Soledad Basin just north of the San Gabriel fault zone. Numerous east-west trending folds and reverse faults that are the result of on-going compressional tectonics characterize this region. The Soledad Basin is roughly a rectangular-shaped southwesterly plunging synclinal structure that extends between the San Gabriel fault in the Newhall-Saugus area and the San Andreas Fault near Palmdale. A thick accumulation of Cenozoic sedimentary rocks has accumulated in this structural/depositional basin and has subsequently been faulted and folded by repeated tectonic deformation.

Much of the elevated portion of the River Park property is underlain by accumulations of ancient river channel deposits deposited on a series of successively lower benches cut in the underlying Saugus Formation bedrock by the ancestral Santa Clara River. These depositional terrace deposits exhibit crude horizontal stratification. Quaternary alluvium covers the valley floors.

The geologic structure of the Saugus Formation bedrock below much of the River Park property has been uplifted and deformed by past tectonic forces into an open anticline that trends northwest across the northeastern portion of the site. The southern limb of the anticline, the Saugus Formation bedrock dips toward the south at angles ranging from 6 to 25 degrees and dips towards the north at angles ranging from 8 to 56 degrees along the northern

limb. The structure is more complicated at the northeast corner of the site where relatively steeply north dipping bedrock has been deformed by a northwest trending fault. The San Gabriel Fault is located offsite towards the south. For more detailed discussion on the fault, please see **Section 8 (Seismic Considerations)** of this report.

The River Park property has been affected by slope movements that range in size from small debris flows and rockfalls to large, deep-seated failures. Fourteen (14) landslides have been mapped on the site.

6.0 FIELD EXPLORATIONS

6.1 Surface Mapping

For this report, surface geologic mapping in conjunction with aerial photo interpretations was undertaken by personnel from Allan E. Seward Engineering Geology Inc. (AESEGI) using the proposed 100-scale Tentative Map as the base map. We also reviewed all our previous geologic/geotechnical data and reports by others in the vicinity of the project.

6.2 Subsurface Investigations

Our subsurface explorations included CPT soundings, and logging of rotary-wash, hollow-stem-auger and bucket-auger drill holes and trenches. Valley Well Drilling performed the rotary-wash and hollow-stem-auger drill holes. Tri-Valley Drilling excavated the bucket-auger drill holes, D.E. Eddings excavated the trenches, and Holguin, Fahn and Associates performed the CPT soundings. The drill holes and trenches were logged and sampled by AESEGI personnel. Copies of all of our drill holes and trench logs are presented in **Appendix A**. The locations of the drill holes, trenches and CPTs are shown on the **Geologic/Geotechnical Maps (Sheets 1 through 4 of 4)**.

The drill hole logs included in **Appendix A** represent our interpretation of field data prepared for each boring by our geologic/engineering staff at the time of drilling, along with refinements based on inspection and laboratory test results. Unit boundaries shown in the graphic log column of our rotary-wash and hollow-stem-auger drill hole logs are approximate and may represent gradual transitions.

6.3 Sampling Procedures

California-Drive (relatively undisturbed ring samples) and Standard Penetration Test (SPT) samples were obtained in the exploratory drill holes at various depths (see logs in **Appendix A**). Recovered soil samples were sealed in plastic containers and brought to our laboratory for further classification and testing.

Bulk (disturbed) samples of the near surface soils and rock were obtained from cuttings developed during excavation of the exploratory drill holes and trenches. The bulk samples were collected for classification and testing purposes and represent a mixture of soils within the noted depths.

7.0 GENERALIZED GEOLOGIC/GEOTECHNICAL SUBSURFACE CONDITIONS AND SOIL PROPERTIES

7.1 Laboratory Program

After visual and tactile classification in the field, the soil samples were brought to our laboratory. The soil classifications were checked in accordance with the Unified Soils Classification System. The field logs were reviewed to assess which samples would be analyzed or tested further. The results of the field investigation and the laboratory tests were used as the basis for our analyses and recommendations presented in this report. Laboratory test results are presented in **Appendix B**.

7.2 Geologic Units

A general description of geologic units, including bedrock, terrace deposits, alluvium, landslides, and artificial fill are presented below. Distribution of these units is shown on the Geologic/Geotechnical maps.

7.2.1 Saugus Formation (TQs)

The bedrock encountered consists of sedimentary rocks of the late Pliocene to Pleistocene Saugus Formation. This section contains fluvial and transitional lithologies of the lower Saugus Formation, including light-gray sandstone and conglomerate, greenish-gray siltstone, silty sandstone and reddish-brown and brown sandy mudstone and mudstone. Low strength clay beds can be present within the

reddish-brown mudstone units and are generally the result of original deposition. These clay layers were encountered during our subsurface exploration for the site. The Saugus Formation is typically moderately indurated.

7.2.2 Quaternary Terrace Deposits (Qt)

Remnants of fluvial terrace deposits mantle large portions of the study area (see **Geologic/Geotechnical Maps**). These deposits consist primarily of poorly to well-bedded, light-gray to yellowish-orange sand, conglomerate and sandy silts. Large boulders occur throughout the terrace deposits but are generally concentrated at the basal contact. These deposits are typically friable to poorly indurated and are typically weathered to a depth of 8 feet.

7.2.3 Quaternary Alluvium (Qal)

Recent river-channel deposits are present in the lower elevations of the property, largely underlying the immediate modern drainage and major tributaries of the Santa Clara River (see **Geologic/Geotechnical Maps**). Based on the CPT and boring data obtained for the project, the alluvial deposits consist of interbeds of sandy, silty and clayey soils with limited inclusions of coarser soils. The surficial 20 feet of silty and clayey throughout the tract hard lenses of silty and clayey soils, apparently desiccated by the local dry climate. The conditions of the alluvial soils present in each of Planning Areas A1, A2, C and D, in the Remainder Parcel east of Area C and in the large side canyon designated as Open Space Lot No. 367 (Proposed Park Site) are summarized below.

Planning Area A1 is located south of Newhall Ranch Road, north of the Santa Clara River and west of the large side canyon of which is proposed as a park site (Lot 367). Alluvial areas of Planning Area A1 were explored by rotary wash borings RW-2, RW-3, RW-4, RW-5 and RW-7 by CPT Nos. 5, 6, 7, 8, 10, 12, 14, 15, 16, 17, 18, 19 and 20. The CPT and drive sampler penetration resistances exhibited by the alluvial soils of Area A1 were classified using the criteria set forth by NAVFAC (1982). The granular alluvial soils of Area A1 were found to predominantly range from medium to very dense with lenses of loose granular soils from the recommended removal depths to the maximum depth explored, 60 feet. Similarly, the silty and clayey alluvial soils of Area A1 were found to predominantly range from medium to hard with very soft to soft clay and silt lenses from the recommended removal depths to

the maximum depth explored, 60 feet. CPT-17 encountered material classified as organic at 26.1 feet depth.

The alluvial areas in Planning Area A1 include portions of Lot Nos. 5-57, 61-64, 84-101, 103-130, 134-138, 146-148, 150-167, 226, Recreation Lot 149, Open Space Lot Nos. 231, 233-242, the 20-foot to 35-foot wide Trail and Joint Use Easement and two Water Quality Basin Easements near CPT-20 and CPT-9, as illustrated on the **Geologic/ Geotechnical Map**. It is useful to note that a large temporary stockpile of earth fill occupied much of the alluvial area within Area A1. The borings and CPTs were typically located outside the stockpile area. To the extent that the stockpile preloaded the area that it covered, the soil conditions within the areas preloaded by the stockpile may be better than indicated by the borings and CPTs.

Planning Area A2 is located east of the proposed Park Site (Lot 367), south of Newhall Ranch Road and north and west of the Santa Clara River. The alluvial areas of Area A2 include Lot Nos. 325-352, Open Space Lot Nos. 357-362 and adjacent portions of Santa Clarita Parkway. The alluvial areas of Planning Area A2 were explored by CPT Nos. 21, 22, 23, 24, 25, 27, 28, 29 and 30 and boring RW-1. The granular alluvial soils of Area A2 below the recommended removal depths were found to predominantly range from dense to very dense with lenses of loose to medium sandy soils. The alluvial silts and clays of Area A2 below recommended removal depths were similarly evaluated and found to predominantly range from stiff to hard with lenses of very soft to medium clays and silts to the maximum depth explored, 51 feet.

Areas located easterly of the Los Angeles Aqueduct include Area C (Lots 508-510), proposed Newhall Ranch Road, future street area, bridge lot (Lot 521) and various open space lots (Lots 503-507and 521). The adjoining Remainder Parcel is not part of the tentative tract map. Alluvial areas easterly of the Los Angeles Aqueduct including the adjacent Remainder Parcel were explored by CPTs 31, 32, 33, 34, 35, 36 and 37 and borings HS-1, RW-9 and RW-10 (see **Geologic/Geotechnical Map**). The alluvial granular soils below recommended removal depths for this portion of the tract were found to range from medium to very dense. The alluvial silts and clays below the recommended removal depths for this portion of the tract were found to be very stiff to hard to the maximum depth explored, 51 feet.

Planning Area D Lots 513 and 514) and the proposed Commercial Area (518 and 519) and the associated open space lots 516 and 517 are located at the westerly portion of the site, east and south of the existing Bouquet Center commercial mall. Planning Area D was explored by CPT Nos. 13 and 26 and boring RW-6 (see **Geologic/Geotechnical Map**). The alluvial granular soils below the recommended removal depths for Area D were found to be predominantly dense to very dense with lenses of medium sands to the maximum depth explored, 51 feet. The alluvial silts and clays below the recommended removal depths were found to predominantly range from stiff to hard with a 1½-foot thick lens of very soft to medium clay layer found in CPT-26 at 35 feet depth.

The large side canyon located between Planned Area A1 and Planned Area A2 is designated as Park Site/Open Space Lot 367. The alluvial areas of this lot were explored by CPT Nos. 1 through 4 and boring RW-8. The granular alluvial soils in this portion of the tract were found to range from medium to very dense to the maximum depth explored, 51 feet. The alluvial silts and clays were found to range from soft to hard to the maximum depth explored.

7.2.4 Slopewash (Qsw)

Swales and side-canyons adjacent to the main drainage of the Santa Clara River commonly contain loose debris consisting of poorly sorted sand, silt and bedrock fragments. This material has accumulated via daily surface wash and periodic debris flows and is present above levels where they are incorporated and reworked by modern stream flow. They are generally poorly consolidated. The maximum thickness of Slopewash/colluvium encountered in our exploratory excavations was 13.5 feet. Slopewash has been noted on the Geologic logs and is indicated on the **Geologic/Geotechnical Maps** where it is estimated to be greater than 4 feet in thickness.

7.2.5 Residual Soil

Ungraded areas of the site are mantled by surface soils consisting of moderate- to yellowish-brown and yellowish gray silty sand with scattered pebbles. This unit is noted on our geologic logs, but is not shown on the Geologic Maps. Soil developed in the alluvial flats and in the relatively flat mesa areas has been disturbed by past agricultural and grading activities.

7.2.6 Artificial Fill (af) and Debris

Existing non-compacted artificial fill on the River Park property ranges from minor spill fills generated during past grading of minor roads and oil well pads to large stockpile fill areas (see Geologic/Geotechnical Maps). Fill associated with the construction of the DWP aqueduct has been placed at locations along the aqueduct. In proposed fill areas, all artificial fill impacting the proposed development will be entirely removed prior to placement of compacted/certified fill material. If artificial fill is present below proposed cut grade elevations, it should be completely removed and replaced with certified engineered fill.

Asphalt debris piles have been mapped on the CLWA property within the Newhall Ranch Road alignment as shown on the **Geologic/Geotechnical Maps (Sheet 3 of 4).** This material should be removed from the site during the grading operations.

7.2.7 Certified Engineered Fill (Cef)

Certified engineered fill has been placed on the River Park site for the construction of CLWA's Rio Vista Water Treatment Facility and the associated raw and treated water lines for the CLWA. The grading was performed between March 1, 1993 and December 30, 1994 to achieve the existing grades to accommodate the raw and treated water lines as well as portions of the future Newhall Ranch Road, which is identified as a major highway in the City's General Plans. The grading operations, including the placement of certified engineered fill, were observed by Huntingdon Engineering & Environmental, Inc./Schaefer Dixon Associates. The limits of certified engineered fill near Newhall Ranch Road that are shown on our Geologic/Geotechnical Maps are from their report on rough grading and onsite construction (See references).

7.2.8 Mass Movement Deposits

7.2.8.1 Landslides (Qls)

Landslides are present on the subject site and typically represent a translational type of failure within the Saugus Formation and terrace deposits which failed along a low strength clay bed. The landslides typically consist of highly fractured rock resting above a low strength slip surface. Voids created by dilation of the

bedrock (grabens) are commonly backfilled with rock debris and colluvial material. Landslides were identified based on examination of field exposures and suggestive geomorphic features observed on aerial photographs and on topographic base maps and confirmed via subsurface explorations. Fourteen (14) landslides have been mapped on the site (see **Geologic/Geotechnical Maps**). Recommended mitigation measures for each landslide are discussed in the **Landslide** Summary (**Table 1**) located after the references.

7.2.8.2 Surficial Failures (sf)

Shallow (5 to 13 feet in depth) surficial failures involving soil, slopewash and weathered bedrock were observed. Approximate locations and extent are shown on the **Geologic/Geotechnical Maps.** Any of the surficial failure material, which exists below proposed grade should be removed prior to the placement of certified engineered fill.

7.3 Ground Water

Ground water beneath the River Park project can be grouped into two categories: 1) ground water contained in the recent alluvium; and ground water perched above low permeability layers in the Saugus Formation and the Quaternary Terrace Deposits.

7.3.1 Alluvial Aquifer

Historic ground water levels for the alluvium were interpolated for the site based on records from ground water contours by Robson (1972) and water levels observed in exploratory excavations by this firm. These data indicate that historic ground water levels have risen to within 5 feet of the existing ground surface along the margins of the Santa Clara River.

Ground water was not encountered within our hollow-stem auger borings but was encountered in all of our rotary-wash borings. Ground water levels measured during our subsurface investigations ranged from a minimum depth of 14.25 feet within rotary-wash boring RW-1 within Open Space Lot 360 in the south central portion of the site to 34 feet depth within rotary-wash RW-10 in the eastern portion of the site at the future Newhall Ranch Road alignment just east of the proposed development.

Recommended removal depths in the alluvium may encounter ground water at the locations of CPT-5, CPT-8, CPT-10, CPT-17, CPT-20, and CPT-27. Dewatering may locally be required to complete the necessary removals. The proposed grades shown on the Tentative Map are at least 15 feet above the assumed historic high ground water depth of 5 feet. It should be noted that the ground water table will fluctuate up and down in response to natural recharge and pumping requirements.

In our liquefaction evaluation of the alluvium deposits for the site we assumed a ground water elevation of 5 feet below the existing alluvial ground surface.

7.3.2 Perched Ground Water in the Saugus Formation Bedrock and Quaternary Terrace Deposits

Perched ground water was encountered in the Saugus formation bedrock and Quaternary terrace deposits within our bucket auger borings BA-1 through BA-6, BA-8, BA-12 and BA-13 at the elevated portions of the site. Perched ground water conditions can contribute to slope instability in proposed natural and proposed cut-slopes. Where appropriate, ground water was used in our slope stability analysis for the project. All stability/buttress fills are required to have backdrains. Subdrains are required in fill areas.

7.4 Soil Compressibility and Hydroconsolidation

Based upon consolidation test data developed for this project, the **compressibility** of the subsurface soils below the recommended removals is considered to be typically low to moderate within the depths tested ranging from 4 feet to 20 feet. The relatively lightly loaded residential buildings proposed for this site are not expected to impose significant stress increases more than 10 feet below existing grade. Based upon laboratory data developed for this project, **no significant hydroconsolidation effects** due to water incursion are expected at the site after the recommended removals are completed.

Lenses of very soft to medium clays and silts were identified as deep as 50 feet below existing grade in some of the CPT's performed in Planning Area A1. Depending on the consolidation characteristics of these weak clays, the thickness of the clay lenses and the height of fill added, the clay lenses could potentially consolidation under the weight of the fill. Also, additional consolidation settlement may occur due to a possible lowering of the groundwater table after development. The actual consolidation characteristics of

the weak clay and silt lenses below the groundwater table in Planning Area A1 will be further evaluated during the Grading Plan review stage. The bridging effect of the relatively thick layers of existing native soils, removed and replaced soils, and new fill above the potentially compressible clayey lenses will help mitigate any potential settlement due to lowering of the groundwater table. A potential measure to mitigate the potential groundwater lowering settlement, if needed, is surcharging with a temporary earth fill above final grade.

7.5 Potential Expansion of Onsite Materials

Per CPT and boring data, the alluvial soils at the site are predominantly granular. The Terrace Deposits also typically have a very low to low expansion potential. Based on Expansion Index Tests (**Appendix B**), low to medium expansive Saugus Formation bedrock materials were identified at the site. The medium expansive materials typically consist of the siltstone and mudstone units.

7.6 Potential Corrosivity of Soils

7.6.1 Soils Electrical Resistivity and pH

Selected samples of on-site soils were tested for resistivity and pH. Soil electrical resistivity values of selected shallow soils suggest that on-site soils classifying (per Peabody, 1969) as moderately corrosive to ferrous metals exist at the site; pH data shows no significant acidity of tested soils. Test results are presented in **Appendix B**.

7.6.2 Soluble Sulfate and Chloride Content in Soils

Selected samples of on-site soils were collected and tested for sulphates and chloride contents. Based upon test results, concrete exposure to sulfates in shallow soils classifies as negligible (per 1997 UBC Classification). Test results are presented in **Appendix B**.

7.7 Soils Shear Strength

Direct Shear tests were performed on samples of on-site Alluvium (Qal), Terrace Deposits (Qt), Saugus Sandstone (TQs), landslide material (Qls) and landslide plane

material. Remolded samples of on-site soils were also tested for shear strength. Tests results are presented in **Appendix B.**

7.8 Rippability

The bedrock encountered at the site consists primarily of siltstone and sandstone of the Saugus Formation. This formation generally is graded using typical grading equipment and techniques. Heavy single-shank ripping may be required within the more indurated portions.

7.9 Sewage Disposal

It is our understanding that sewage disposal will be by public sanitary sewers.

7.10 Erosion Potential

The existing provisions in the Grading Ordinance for planting and irrigation of constructed slopes in conjunction with drainage recommendations provided in the section "Surface Drainage and Erosion Control," will be sufficient mitigation against potential erosion within the subject site.

7.11 Debris Flow Hazards

Review of the tentative tract map design, the topographic base map and field mapping of the site indicates that debris flow hazard exists on Lot 485 within planned Area D. Debris flow hazard is designated (dfh) **(color-coded PINK)** on the **Geologic/ Geotechnical Map, Sheet 2 of 4.** The following mitigation measures are available to mitigate the potential for debris flow hazard:

1. Remove loose surficial material
2. Construct diverter slough walls
3. Construct impact walls
4. Construct debris basins
5. Control run-off
6. Plant selective deep-rooted vegetation

Alternative debris control devices are also shown on **Figure E10** within **Appendix E.** Appropriate mitigations/options will be addressed at the Final Map stage for Tract 53425.

8.0 SEISMIC CONSIDERATIONS

8.1 Introduction

The subject property is within the Transverse Ranges Geomorphic Province of Southern California. The Transverse Ranges consist of a series of west-trending mountains and intervening valleys, which is contrary to the northwest geomorphic trend that is typical of most of California and reflects the underlying structural (geologic) trend. These ranges are largely the result of north-south compression, which has resulted in east-west-trending folds and thrust faults. Associated faults in the vicinity of the site include the San Gabriel Fault, Santa Susana, Northridge (East Oakridge) and Sierra Madre (San Fernando) reverse/thrust faults. The January 17, 1994 Northridge (M6.8) Earthquake occurred on a south-dipping thrust fault which uplifted the Santa Susana Mountains at least 40 cm.

The Southern California region is traversed by the San Andreas Fault, which is a transform boundary between the Pacific Plate and the North American Plate. The San Andreas Fault is part of the San Andreas system of northwest-striking, right-lateral faults. The faults of this system are generally historically active, as evidenced by the June 28, 1992 Landers (M7.6) Earthquake **(See Fault and Earthquake Epicenter Location Map, Figure D-1 in Appendix D).**

The Southern California region is seismically active and commonly experiences strong ground shaking resulting from earthquakes along active faults. Earthquakes along these faults are part of a continuous, naturally occurring process, which has contributed to the characteristic landscape of the region.

Three common types of geologic hazards may be produced during a seismic event (earthquake). These include:

1. Ground Rupture;
2. Ground Motion; and
3. Ground Failure

8.2 Ground Rupture

Review of the CDMG Special Publication 42 indicates that the nearest fault designated as an active fault zone under Alquist-Priolo criteria is the San Gabriel Fault located south of the site. This fault is a major structural element of Southern California. In the Newhall-Saugus area, the San Gabriel Fault is classified as active under Alquist–Priolo criteria and is included within an Alquist-Priolo Special Studies Zone by the State of California. Approximately 2.5 acres at the southwestern corner of the property is included within the Alquist-Priolo zone established for the fault. Development is not proposed within this area.

During our subsurface exploration, a minor fault zone was discovered at the northeastern corner of the site in the Saugus Formation bedrock. This fault was recognized based on a change in bedding structure (dip) from the regional, moderate northeast dips to steeply northeast dipping. Two long trenches (T-39 & T-40) (**Figures A1 & A2**) were excavated in this vicinity and only minor faulting and shearing was encountered. The observed faulting typically consists of a zone of disturbed Saugus Formation lithologies with carbonate lined fractures and minor faults. The minor faults and shears are generally trending approximately N52W to N88W and are generally dipping towards the northeast. This fault was originally mapped by Winterer and Durham (1958); however, more recently Treiman (1986) interpreted this feature to be a fold. This minor fault is not classified as active on the California Fault Map by Jennings (1994), and was not considered a seismic source in the probabilistic seismic hazard assessment for California (Peterson, et al. 1996). Review of the aerial photographs listed at the beginning of this report did not reveal any evidence of photo lineaments or obvious geomorphic expression such as aligned saddles, swales, linear drainage or other topographic features usually indicative of active faults. The faults, shears and fractures are carbonate lined. This carbonate is not present in modern or pre-Holocene alluvium. It is therefore most likely precipitated under soil climates of the past. The faults and shears are generally planar and continuous without the "flowering upward" structure so characteristic of relatively young faults. We interpret these planar faults as features that formed under high confining pressure caused by a once thick cover of sediments, now long since stripped away. Based on the corroborating evidence provided by the lack of geomorphic expression and lineaments, the presence of carbonate deposits along faults, shears and fracture planes and the lack of flowering upward structures, the last displacement of these minor faults within this small fault zone took place in pre-Holocene time and therefore a setback zone is not required. However, a Stabilization Fill has been recommended for

proposed Cut-Slope CS-19 to mitigate possible unstable, fractured conditions along the fault zone (see Cut-Slope section for details).

8.3 Ground Motion

Potential ground motions from future earthquakes on nearby faults have been evaluated utilizing the procedures outlined in the California Department of Conservation, Division of Mines and Geology (CDCMG) Guidelines described in Special Publication 117. **Appendix D** summarizes our ground motion evaluation, which utilized fault parameters from Peterson et al. (1996) and computer programs by Thomas F. Blake. Based on our probabilistic analysis, a peak horizontal acceleration of 0.71g was estimated as the design basis ground motion (10% chance of exceedance in 50 years) for use in our liquefaction assessment of the site. Our deaggregation analysis utilizing Boore, et al. (1997) indicates this acceleration would most likely be produced by a 6.5 M earthquake on the Santa Susana fault. The Average magnitude-weighted (7.5) acceleration was found to be 0.49g for the design basis earthquake (see Table D-III).

8.4 Ground Failure

Ground Failure is a general term describing seismically induced secondary permanent ground deformation caused by strong ground motion. This includes liquefaction, lateral spreading, seismic settlement of poorly consolidated materials (dynamic densification), differential materials response, slope failures, sympathetic movement on weak bedding planes or non-causative faults, shattered ridge effects and ground lurching.

Potential secondary seismic hazards to Tentative Tract 53425 are described in **Appendix D**. The potential for liquefaction and seismic settlement are evaluated in detail in **Appendix C**. The potential for adverse impacts to the proposed development from liquefaction and other secondary seismic effects is considered to be low to non-existent provided that our recommendations are incorporated into the Grading Plan and implemented during construction.

9.0 GENERAL CONCLUSIONS AND RECOMMENDATIONS

9.1 Feasibility of Development

Tentative Tract 53425 is feasible for development from the standpoint of geology/geotechnical conditions subject to the following recommendations:

9.2 Earthworks Recommendations

9.2.1 Introduction

All grading shall be accomplished under the observation and testing of the Project Soils Engineer, Engineering Geologist and/or their authorized representatives in accordance with the recommendations contained herein, the current Uniform Building Code requirements and this firm's "Recommended Earthwork Specifications" (**Appendix E**).

9.2.2 Site Preparation

The purpose of site preparation is to clear and strip the site of organics (vegetation), topsoil, roots, undocumented artificial fill, rubble, construction debris and other unsuitable materials, as applicable, and to grade the site to provide a firm base for compacted fill. All organics should be removed from the site for proper disposal. Topsoil may either be separately stockpiled for later reuse as topsoil in landscaped areas or properly disposed of offsite. On-site rubble should be disposed of as discussed in the "Debris" section below. The geotechnical engineer and/or his representatives shall observe the excavated areas prior to placing compacted fill.

9.2.3 Removals and Benching

In order to provide a uniform firm bottom prior to placing fill, all unconsolidated alluvium, slopewash, colluvial soils and severely weathered terrace deposits and bedrock should be removed from areas to receive fill. The estimated depths of removals (excluding landslides) are 5 to 23 feet as shown on the **Geologic/Geotechnical Removal Map (Plate I)**. The exact depth and extent of necessary removals will be determined in the field during the grading operations when observations and more location-specific evaluations can be performed.

Removal depths for these areas are based on our subsurface investigations and analyses (including liquefaction and cyclic settlement analyses) as well as geologic and geotechnical judgment.

All existing artificial fill (af) i.e. uncertified fill is considered unsuitable for support of proposed engineered fills and/or structures and must be removed and replaced with compacted fill. It is estimated that a maximum thickness of 35 feet of artificial fill currently exists in the vicinity of proposed Lots 39 to 52 (see Geologic/Geotechnical Map) at the site. It should be noted that the topography indicated on the tentative map at this area does not reflect actual conditions at the site due to recent and periodic removal of the artificial (stockpile) material. The recommended removals indicated on the removal map (**Plate I**) are measured from the pre-artificial fill topography. Colluvium/slopewash is present within the canyon swales and on drainage sideslopes as shown on the **Geologic/Geotechnical Maps.** Slopewash typically interfingers with the alluvium as illustrated on the **Schematic Alluvial/Slopewash Detail, Figure E1** within **Appendix E**. Colluvium/slopewash may locally be 10 to 15 feet in thickness. Anticipated removal depths for landslides range from 10 to 106 feet as shown on the **Geologic/Geotechnical Removal Map**. Removals at the locations of exploratory trenches should be extended to the bottom of the trench backfill if the adjacent removal depths are shallower than the trench (see **Geologic/Geotechnical Maps** for locations).

In areas to receive compacted fill where the surface gradient is steeper than 5:1 (H:V) the soil mantle, colluvium and unsuitable material should be removed and such areas benched horizontally into competent material prior to our in conjunction with fill placement (See **Appendix E, Fill Over Natural Slope, Figure E2**).

9.2.4 Preparation of Removal Bottom Areas

After the ground surface to receive fill has been exposed, it shall be ripped to a minimum depth of six inches, brought to optimum moisture content or above and thoroughly mixed to obtain a near uniform moisture condition and uniform blend of materials, and then compacted to the required relative compaction per the latest ASTM D 1557 laboratory maximum density.

9.2.5 Dewatering During Removals

As previously discussed, ground water may be encountered during grading removals to the recommended depths at the locations of CPT Nos. 5, 8, 10, 17, 20 and 27. The grading contractor should be prepared to implement dewatering measures as necessary, to achieve the required removals.

Where recommended removals encounter ground water, water levels will probably have to be controlled by providing an adequate excavation bottom slope and sumps for pumping water out as the excavation proceeds, or ground water may be lowered by installing shallow dewatering well points prior to grading. Partial removals of soils above the water table and soil improvement below the water table (e.g. shallow compaction grouting) may be another option. Dewatering may be needed depending on the season when the removals are performed.

9.2.6 Over-Excavation

It is recommended that a minimum 5-foot thick over-excavation be performed on all cut-lots, transitional lots (transitions between bedrock, fill, terrace deposits and alluvium) and streets. This over-excavation will provide attenuation of potential differential settlements or differential material response to seismic events and provide a uniform base for structural support of buildings. If on a cut/fill transition lot the maximum depth of fill exceeds 15 feet, then the thickness of the fill cap should be one-third of the deepest fill thickness below any proposed structure [see **Appendix E, Cut Lot and Cut Fill Lot (Transitional), Figure E3**]. If excavation of the native soils (i.e. bedrock) exposes expansive materials, then the lot over-excavation should be deepened to 8 feet.

9.2.7 Fill Materials

Onsite soils that are free of debris, over-size rocks, topsoil and organic matter may be used as sources for compacted fills. Rock or similar irreducible material with a maximum dimension greater than eight (8) inches may not be placed in the fill. Rocks or hard fragments larger than four (4) inches shall not compose more than 25 percent of the fill and/or lift. Any large rock fragments over eight (8) inches in size, may be incorporated into the fill as rockfill in windrows after being reduced to the specific maximum rock fill size (see **Figure E4, Rock Disposal**, in **Appendix E**).

Where fill depths are too shallow to allow large rock disposal, special handling or removal may be required (see **"Recommended Earthwork Specifications," Appendix E**).

9.2.8 Fill Compaction

All fill material should be placed in uniform lifts not exceeding 8 inches in its loose state and compacted to a minimum of 90 percent relative compaction as determined based on the latest ASTM Test Designation D-1557. Additional field compaction requirements are presented in **Appendix E, "Recommended Earthwork Specifications"**. **Appendix E** also includes recommended specifications for placement of trench backfill.

For fills deeper than 40 feet, the portion of fill below 40 feet depth should be compacted to a minimum of 93 percent relative compaction. To ensure compliance, these areas should be delineated at the Grading Plan stage.

9.2.9 Proposed Fill Slopes

Fill slope inclination should not be steeper than 2:1 (h:v). The fill material within approximately one equipment width (typically 15 feet) of the slope face should be constructed with cohesive material obtained from on-site soils. The finished fill-slope face shall be constructed by over-building the slope and cutting back to the compacted fill material. Stability Fills are recommended where cut-slope faces will expose fill-over bedrock, alluvium-over-bedrock or Quaternary Terrace Deposits over bedrock conditions. These fills should be constructed with a keyway at the toe of the fill slope with a minimum equipment width but not less than 15 feet, and a minimum depth of 3 feet into the firm undisturbed earth. Following completion of the keyway excavations, the project engineering geologist shall observe and approve the keyway bottom prior to backfilling with Certified Engineered Fill.

Where fill slopes are constructed above natural ground with a gradient of 5:1 (H:V) or steeper, all topsoil, colluvium, and unsuitable material should be removed and a keyway should be constructed at the toe of the fill slope with a minimum width of 15 feet, and a minimum depth of 3 feet into firm undisturbed earth (see **Appendix E, Fill Slope Over Natural Slope diagram, Figure E5**). Following completion of the keyway excavations, the project Engineering Geologist/Geotechnical Engineer or his

representative shall observe and approve the keyway bottom prior to backfilling with compacted fill.

Where fill slopes toe out on relatively level natural ground, the removals should be performed to a minimum 1:1 projection from the toe of slope to the recommended removal depth, (see **Appendix E, Fill Slope Toeing Out on Flat Alluviated Canyon, Figure E6**).

Where sliver fill-slopes are proposed, it is recommended that the slope be constructed with a minimum 15-foot width Stability Fill throughout, which is keyed in at the toe of slope (see **Appendix E, Stability/Buttress Fill and Backdrains Detail, Figure E7**).

9.2.10 Proposed Cut-Slopes

We have identified nineteen (19) proposed cut-slopes (25± feet or higher) on the subject site and designated them as CS-1 through CS-19. The slope geometry, anticipated geologic conditions and recommended mitigation, if necessary, for each slope are presented in the Cut-Slope Summary (**Table 2**) located at the end of the text. It has been conservatively assumed for the purposes of stability analysis that weak bedding planes may occur anywhere in the proposed cut-slopes. If any of the smaller proposed cut-slopes (less than 25± feet in height) have adverse geologic of grading configurations (fill over cut) they can be mitigated if necessary with a standard 15 to 20-foot wide key (depending on the proposed cut-slope height) and benching similar to a Stability Fill. A "Typical Fill above Cut-Slope" detail is shown on **Figure E8** within **Appendix E**.

All permanent cut-slopes should be constructed at a slope ratio not steeper than 2:1 (horizontal to vertical). All permanent cut-slopes exposing terrace deposits or alluvium should be constructed as a stability fill. Temporary cut slopes in competent rock may be constructed as steep as 1.5:1 (h:v). Potential unstable subsurface conditions exposed during construction, such as adverse bedding, joint planes, zones of weakness or exposed seepage, may require either flatter slopes than specified above or construction of benches. We recommend that an Engineering Geologist observe all backcuts during the grading operations and provide appropriate recommendations if necessary.

9.2.11 Natural Slopes

The natural slopes proposed on Tentative Tract 53425 have gradients ranging from 5:1 to ½:1 (h:v). All natural slopes that are relatively steep and have accumulations of soil and colluvium/slopewash which are prone to debris flow hazard. We constructed Geologic Cross Sections where natural slopes and the underlying geologic conditions either above or below the proposed building pads warranted analysis.

The south and southwest facing natural ridge slope located above planned area D in the vicinity of Lot 513 was evaluated using cross-sections 3-3,' 5-5', 6-6'and 7-7' inclusive. Subsurface exploration using backhoe trenches was performed to determine the subsurface geologic conditions. Slope stability analyses of these cross sections indicate that in order to satisfy the City of Santa Clarita's slope stability requirement, both a) grading the top of the ridge as illustrated on the tentative map and b) permanently and consistently limiting groundwater levels within the natural ridge to those assumed in our analysis are required. In order to permanently limit groundwater levels to those found to be necessary for stability of the affected slopes, it is recommended that no permanent piped water be allowed above elevation 1250 on the existing natural ridge north and northeast of Lot 513. Thus, the area of the existing natural ridge above elevation 1250 msl should be recorded as a Restricted Use Area (RUA) on the Final Map. This recommended RUA is color-coded **ORANGE** on the **Geologic/Geotechnical Map, Sheet 2 of 4**. See our slope stability analysis in **Appendix F** for details.

The northwest facing proposed natural slope descending from proposed Lots 260 through 270, 275 and 277 through 282 (see **Geologic/Geotechnical Maps)** has been evaluated. The three dimensional geometry is illustrated on cross section 21-21' which was constructed due to the steep descending natural slope. The geologic structure of the Saugus Formation bedrock is anticipated to be oriented neutral to the proposed natural slope face. It is anticipated that approximately 5 to 8 feet of Quaternary Terrace Deposits will exist above the bedrock at this location. Slope stability analysis indicated that this natural slope satisfies the City of Santa Clarita factor of safety requirement for slope stability.

The proposed southeast facing natural slope located in the vicinity of proposed Lots 388 through 398 and below portions of proposed cut-slope CS-10 is illustrated on

cross sections 16-16' through 19-19'. Slope stability analyses performed on cross sections 16-16' through 18-18' indicate that this natural slope and proposed cut-slope CS-10 satisfies the City of Santa Clarita's slope stability requirement for factor of safety. Proposed cut-slope CS-10 is recommended to be constructed as a stability fill due to Quaternary Terrace deposits anticipated to be exposed within the proposed slope face. We have recommended a 20 foot building setback from the top of proposed cut-slope CS-10 for Lots 388 through 393 due to the steep gradient of the natural slope located below the proposed cut slope. This setback is based on geologic/geotechnical judgment and will be designated on the Final Map as a Restricted Use Area. We have color coded this setback line **YELLOW** on the **Geologic/Geotechnical Map, Sheet 3 of 4**. For details see our slope stability section in **Appendix F**.

The proposed natural slope located east of lots 400 through 402 just north of proposed cut-slope CS-10 is illustrated on cross section 26-26'. Slope stability on this section indicates this slope satisfies the City of Santa Clarita's slope stability requirement for factor of safety. For details see our slope stability section in **Appendix F**.

Lots 178 though 189 and the adjacent easterly facing natural slope are located within landslide Qls-5b. Options for mitigating this landslide and the associated natural slope are presented within the Summary of Landslides Table located after the references

9.2.12 Existing Cut-Slopes

Existing cut-slopes are presented along the Newhall Ranch corridor. These cut-slopes were graded between 1993 and 1994 and are addressed in reports by Huntingdon/Schaefer Dixon Associated (see references). The current tentative map design indicates that the existing south facing cut-slopes along the north side of Newhall Ranch Road will remain. The existing cut-slopes along the south side of Newhall Ranch Road will be removed.

9.2.13 Slopes in Debris Basins

Fill slopes along planned debris basins were analyzed for slope stability under rapid drawdown conditions based on a groundwater level at maximum basin level and an empty basin. Mitigation measures for slope stability conditions due to rapid

drawdown seepage forces were included in design of grading for the respective slopes.

9.2.14 Building Setbacks

A recommended building setback from the top of proposed cut-slope CS-10 at the rear of Lots 388 through 393 located on **Sheet 3 of 4** of the **Geologic/Geotechnical Map** will be delineated on the Final Map as a Restricted Use Area. The standard setbacks from ascending and descending slopes provided in the California Code/Uniform Building Code should be followed, unless superseded by specific geologic and/or soils engineering evaluations.

9.2.15 Restricted Use Areas

The Building Setback presented within Section 9.2.14 Building Setbacks above for Lots 388 through 393 (Sheet 3 of 4) should be included on the Final Map as a Restricted Use Area.

A Restricted Use Area has been recommended northerly of Planned Area D (Lot 513) in order to permanently limit the groundwater levels to those found to be necessary for stability of the affected slopes. Within this Restricted Use Area it is recommended that no permanent piped water be allowed above elevation 1250. This recommended Restricted Use Area is color-coded **ORANGE** on the Geologic/Geotechnical Maps, Sheets 1 and 2 of 4. See Section 9.2.11 Natural Slopes and our slope stability analysis in Appendix F for details.

9.2.16 Areas Where Geologic/Geotechnical Conditions Potentially Affect Newhall Ranch Road

Due to the south dipping geologic structure of the bedrock all southerly facing proposed cut and proposed natural slopes in the vicinity of proposed Newhall Ranch Road are anticipated to expose adverse geologic conditions that may potentially affect proposed Newhall Ranch Road. Areas where potential instability to proposed Newhall Ranch Road, regardless of the proposed grading for the River Park Tentative Tract development include proposed Cut-Slopes CS-15, CS-17 and the bluff area southerly of Cut-Slope CS-15 in the vicinity of cross section 23-23'. Designed

buttresses are proposed for these three areas. See Table 1- Summary of Cut-Slopes located after the text and Appendix F –Slope Stability Analyses for details

9.2.17 Exploratory Trench and Boring Backfill

All of the exploratory trenches and borings previously excavated for this project should be over-excavated and backfilled with compacted fill in accordance with the earthworks recommendations of this report.

9.3 Oil Wells

Review of the 1999 Munger Map book indicates that four oil wells are present on the subject property. Oil well records on file with the California Department of Conservation, Division of Oil, Gas and Geothermal Resources (DOGGR) were obtained for each well. All of these wells were abandoned prior to 1971: however the DOGGR will require review of the original abandonment files relative to the proposed development and possibly require re-abandonment to the latest DOGGR requirements. We have included the abandonment records for these wells after the text. The following table provides the names and the location of the existing oil wells on the subject site.

OIL WELL	DATE DRILLED	LOCATION	COMMENTS
Union Oil Company "Bonelli No. 1"	3/58	North of Lot 485	TD 2,923 Ft. Non Producer Abandoned 4/58
Edward Lustgarten "Lucky Lusty No. 1"	2/58	North of Lot 485	TD 2,982 Ft. Producer Abandoned 2/71
Edward Lustgarten "Lucky Lusty No. 3"	11/20/57	Within Lot 485	TD 3,200 Ft. Non Producer Abandoned 5/61
Texaco NL&F "H-1"	1/63	Open Space Lot 479	TD 1,700 Ft. Non Producer Abandoned 1968

For approximate location of the oil wells, see the **Geologic/Geotechnical Maps**.

If any leaking of undocumented oil wells are encountered during grading operations, their locations should be surveyed and the current well conditions evaluated immediately.

Soils in the vicinity of oil wells sould be contaminated with petroleum products spilled during operation of the wells. Wells may have associated mud pits which could also contain materials considered to be hazardous under current environmental regulations. If potentially hazardous materials are encountered during future grading operations, they should be assessed and mitigated.

9.4 Drainage Control

Ground water and soil moisture conditions can vary seasonally or for other reasons. It must be recognized that we do not and cannot have complete knowledge of the subsurface conditions at the site. It is possible that seepage could be encountered while stripping and excavating during site preparation at some areas (e.g. in drainages or along terrace/bedrock contacts on the site). Whenever seepage is observed, the condition must be evaluated by the Engineering Geologist and Geotechnical Engineer prior to covering with fill material.

9.4.1 Surface Drainage and Erosion Control

Surface drainage control design should include provisions for positive surface gradients to ensure that surface runoff is not permitted to pond, particularly above slopes or adjacent to building foundations or slabs. Surface runoff should be directed away from slopes and foundations and collected in lined ditches or drainage swales, via non-erodible drainage devices, which should discharge to paved roadways, or existing watercourses. If these facilities discharge onto natural ground, means should be provided to control erosion and to create sheet flow.

It should be expected that, even with the construction of carefully planned and designed erosion control measures, some erosion may occur during the first few wet seasons after the project is completed. Site grading should be inspected, particularly after heavy, prolonged rainfall, to identify erosion areas at an early stage. Maintenance work should be done as soon as practical to repair these areas and prevent their enlargement.

9.4.2 Subsurface Water Control

Fill slopes and stability fills, as applicable, should be provided with subsurface drainage as necessary for stability. A typical backdrain detail is shown on **Figure E7,**

Appendix E. Also, subdrains along the bottom of canyon fills should be constructed. A typical canyon subdrain detail is presented on **Figure E9**. The existing subdrains constructed during the grading for the Rio Vista water treatment facility should be extended to daylight out of the future planned grading or connected to the future storm drains.

9.5 Shrinkage, Bulking and Subsidence

The following bulking and shrinkage factors are based on judgment and in-situ densities compared to average of 92 percent relative to the maximum dry density as determined per the ASTM D 1557 test. For the materials encountered at the site, shrinkage (decrease in volume) or bulking of those materials, when excavated, placed and compacted as controlled fill is estimated to be as follows:

MATERIAL TYPE	SHRINKAGE (%)	BULKING (%)
Artificial Fill (af)	20-25%	
Alluvium (Qal)	15-18%	
Slopewash (SW)	15-20%	
Upper Qt (0-8' depth)[1]	12-15%	
Qt (>8' depth)	3-6%	
Upper TQs (0-3' depth)*	5-8%	
TQs (>3' depth)		2-5%

In planning Area A1 subsidence in alluvial areas due to proposed fills is expected to be on the order of 1 to 2 feet. Where the stockpile of artificial fill exists the subsidence is expected to be less.

The above shrinkage, bulking and subsidence factors are only approximations. The actual volume changes from cut to fill depend on the quality or degree of compaction. The Supervising Civil Engineer should design pad grades with sufficient flexibility to accommodate a possible shortage of fill of up to 10 percent of the total yardage graded.

It should be noted that bedrock will provide the majority of the total on-site fill materials.

[1] Denotes typical upper weathered zones in Terrace Deposits (Qt) and Saugus Formation (TQs) that are prone to shrinkage

9.6 Landscaping

All final grades should be sloped away from the building foundations to allow rapid removal of surface water runoff. No ponding of water should be allowed adjacent to the foundations. Plants and other landscaped vegetation requiring excessive watering should be avoided adjacent to the building foundations. Should landscaping be constructed, an effective water-tight barrier should be provided to prevent water from affecting the building foundations.

9.7 Foundation and Settlement Considerations

No specific building foundation designs have been provided at this time. The following general foundation criteria are provided for future design and planning consideration. The proposed Tentative Tract may generally involve the following foundation support conditions:

- Foundation support within engineered fill
- Foundation support within transition zones of cut and fill

The structural design should include seismic geotechnical parameters in accordance with UBC requirements for Seismic Zone 4. These parameters will be established at the Grading Plan stage in conformance.

Shallow spread footings for foundation support of residential structures can adequately be founded on engineered fill compacted as previously recommended. Support for heavier structures, if applicable, should be addressed at the Grading Plan stage. Minimum recommended continuous (wall) foundation dimensions are 12 inches width and 12 inches depth below lowest adjacent grade for single-story residential structures. Tentatively, an allowable bearing capacity of **1,800 psf** can be used for (minimum-sized) shallow foundations constructed in certified compacted fill. This tentative allowable bearing value should be confirmed by further field and laboratory testing of the site soils before use in design. Lateral resistance of footing walls should be provided at the Grading Plan stage.

Figure E3 (Appendix E), "Cut Lot (Transitional)" and "Cut-Fill Lot (Transitional") provides a foundation grading detail for locations where foundations will straddle transition zones between cut and fill materials. If the remaining cut-fill transition is steep at depth below the building area, the geometry of the transition should be reviewed

during grading operations by the soils engineer on a site specific basis to evaluate the need for additional overexcavation removals and/or additional foundation reinforcement. As a general guideline, steep cut/fill transitions would include slope gradients steeper than 4:1 (h:v) and overall variations in fill thickness of greater than 15 feet which occur within 20 feet of final pad grade.

To minimize significant settlements, it is recommended that the upper soils in areas to receive fills be removed and replaced with compacted fill. No specific foundation design loads are available at this time. Some minor settlements will be expected due to loads from high fills (e.g. higher than 30 feet). Currently, locations of proposed high fills are: CPT-6, CPT-7, CPT-8, CPT-10, CPT-11, CPT-12, CPT-14, CPT-17, CPT-19, CPT-32 and CPT-33. Most of the settlements due to the load of added fill will occur during and shortly after rough grading is complete. However, since lenses of relatively compressible clayey soils exist below recommended removal depths, some of the fill settlements will not occur until the ground water table is lowered below the compressible clay lenses. Ground water table lowering is usually done by pumping from water wells. Alternatively, the site may be temporarily surcharged with earth fill sufficient to simulate the load increase on the compressible clay lenses due to lowering of the ground water table.

At other areas, potential settlements in alluvium will be minimized by the removals and recompaction recommended in this report. Also, potential effects from localized seismically-induced settlements will be attenuated by the recompacted upper layers and proposed additional fills (see **Appendix C**).

9.8 Excavations, Shoring and Backfill Recommendations

Excavations deeper than 3 feet should conform to **safety** requirements for excavations as set forth in the State Construction Safety Orders enforced by the State Division of Industrial Safety, CAL OSHA. Temporary excavations 12 feet or lower shall be no steeper than 1:1 (h:v). For excavations to 20 feet in height, the bottom 3.5 feet may be vertical and the upper portion between 3.5 and 20 feet should be no steeper than 1.5:1 (h:v). Excavations not complying with these requirements should be shored.
It is strongly recommended that excavation walls in sands and dry soils be kept moist, but not saturated at all times.

Parameters for design of cantilever and braced shoring will be provided at the Grading Plan stage.

The bases of excavations or trenches should be firm and unyielding prior to foundations or utility construction. On-site materials other than topsoil or soils with roots or deleterious materials may be used for backfilling excavations. Densification (compaction) by jetting may be used for on site clean sands or imported equivalent of coarser sand provided they have a Sand Equivalent greater than or equal to 30 as determined by ASTM D2419 test method. Recommended specifications for placement of trench backfill are presented in **Appendix E**.

9.9 Expansive Soils Considerations

Soil expansion has been found to be a significant consideration for design and construction of foundations and concrete slabs-on-grade. The recommendations presented in the attached **Table E1, Minimum Foundation and Slab Recommendations for Expansive Soils**, in **Appendix E**, have been found to minimize the effects of soil expansion potential in Southern California when followed during project design and construction. It is anticipated that compacted fill from the onsite materials will have a very low to medium expansion potential. The expansion potential of the site soils exposed at rough grade should be tested again after site grading is complete and the final foundation design should be based on those expansion test results.

9.10 Hydroconsolidation Considerations

Based upon our hydroconsolidation test data, existing (non-vegetative) soils do not show significant hydroconsolidation characteristics.

9.11 Corrosivity and Chemical Attack Considerations

Soil corrosivity testing was performed for this study; test results are presented in **Appendix B**. As stated previously in this report, based on resistivity test data, on-site soils classify as severely corrosive to corrosive to buried metals per County of Los Angeles classification. Sulfate concentrations were negligible per UBC (1997) classification, and pH was near-neutral (ranging from 6.0 to 8.0). Chloride concentrations were very low. Pending additional testing, either Type I or II cement may be considered for use in concrete placed in contact with the ground. Mitigating

recommendations against soil corrosivity should be revised/expanded based on additional confirmatory tests that should be performed at the Grading Plan stage. Final recommendations for concrete will be in accordance with the latest UBC requirements, and a corrosion specialist should provide mitigating recommendations for potential corrosion of metals in contact with on-site soils.

9.12 Retaining Walls and Pavement Design

Retaining wall geotechnical design parameters and pavement design(s) will be provided at the Grading Plan stage.

10.0 18.03.100F STATEMENT (CITY OF SANTA CLARITA)

In compliance with Section 18.03.100f of the City of Santa Clarita Building Code and the California Building Code, it is the finding of this firm that tentative tract map 53425 dated February 25, 2003 (River Park Development) will be safe against hazard from landslide, settlement or slippage and will not adversely affect off-site property provided all our recommendations provided in this report are followed.

11.0 GEOLOGIST/GEOTECHNICAL ENGINEER OF RECORD

This report has been prepared assuming that Allan E. Seward Engineering Geology, Inc. will refine all geology and geotechnically-related data for the Grading Plan stage of this project. If the recommendations contained in this report are to be utilized and expansion of the geology/geotechnical work is performed by others, the party performing the work must review this report and assume full responsibility for recommendations contained herein. That party would then assume the title of responsibility as "Geologist/Geotechnical Engineer of Record" for the specific work.

12.0 LIMITATIONS

This report has been prepared for the exclusive use of Newhall Land and their design consultants for the specific site discussed herein. This report should not be considered transferable. Prior to use by others, we should be notified, as additional work may be required to update this report.

In the event that any modifications in the design or location of the proposed development, as discussed herein, are planned, the conclusions and recommendations contained in this report will require a written review by this firm with respect to the planned modifications.

In performing these professional services, we have used the degree of care and skill ordinarily exercised, under similar circumstances, by reputable engineering geologists and geotechnical engineers practicing in this or similar localities.

The analyses and interpretations presented in this report have been based on the results of pertinent field and laboratory soil investigations. It should be recognized that subsurface conditions can vary in time and laterally and with depth at a given site. Our conclusions and recommendations are based on the data available and our interpretation of the data based on our experience and background. Hence, our **conclusions** and **recommendations** are **professional opinions** and are **not meant** to be a control of nature; therefore, **no warranty** is herein **expressed** or **implied**.

It should be noted that faulting is normally confined to the area immediately adjacent to a known fault, or within a few feet of the last fault movement. Regardless of what criteria is used however, absolute assurance against future fault displacement or strong ground motion cannot be obtained in tectonically active areas. New faults can form, as the orientation and magnitude of deformational forces in the earth's crust change with time. Therefore, the location of new breaks or ground motions during a seismic event cannot be located or anticipated.

This report may not be duplicated without the written consent of this firm.

This opportunity to be of service is greatly appreciated. If you have any questions regarding this report please give us a call.

Respectfully submitted,

Eric J. Seward, CEG 2110
Certified Engineering Geologist
Vice President

Baylor P. Gibson, PE 41568, RGE 2061
Principal Geotechnical Engineer

Reviewed By:

Allan E. Seward, CEG 246
Principal Engineering Geologist
President

The following attachments and appendices complete this report.

VOLUME I

Location Map following page 2
References
Summary of Landslides Table 1
Summary of Cut-Slopes Table 2
Well Abandonment Records

APPENDIX A - SUBSURFACE LOGS

- Backhoe Trenches
  - T-1 thru T-38
  - T-39 and T-40 (In pocket) Figures A1 & A2
  - T-41 thru T-118

- Bucket-Auger Borings
  BA-1 thru BA-13
  BA-3 thru BA-7[1] (3/3/00)
- Rotary-Wash Boring
  RW-1 thru RW-8, Dated 8/24/00
  RW-9 and RW-10
- Hollow-Stem-Auger Borings
  HS-1 thru HS-9
- Key to Symbols
- CPT Data

APPENDIX B - GEOTECHNICAL LABORATORY INVESTIGATION AND TEST RESULTS

APPENDIX C - LIQUEFACTION POTENTIAL ASSESSMENT AND EVALUATION OF EARTHQUAKE-INDUCED SETTLEMENTS

APPENDIX D - SEISMICITY

APPENDIX E - GENERAL SPECIFICATIONS, FIGURES

Recommended Earthwork Specifications
Recommended Specifications for Placement of Trench Backfill
Drainage and Erosion Control Recommendations
Construction Diagrams — Figures E1-E10
Minimum Foundation and Slab Recommendations for Expansive Soils — Table E1

VOLUME II

APPENDIX F - SLOPE STABILITY ANALYSES

APPENDIX G - MAPS AND CROSS SECTIONS

- **Maps** (In pockets)
  Geologic and Geotechnical Map (1"=300') — Sheet 1
  Geologic and Geotechnical Maps (1"=100') — Sheets 2 - 4
  Geologic and Geotechnical Removal Map (1"=200') — **Plate I**

[1] Bucket-auger boring logs from report dated 3/3/00, prepared for Castaic Lake Water Agency regarding Road Alignment and Development.

- **Cross Sections** (In pockets)

Geologic Cross Sections 1-1' through 8-8'	**Plate II**
Geologic Cross Sections 9-9' through 11-11'	**Plate III**
Geologic Cross Sections 12-12' through 14-14'	**Plate IV**
Geologic Cross Sections 15-15' through 22-22'	**Plate V**
Geologic Cross Sections 23-23' through 27-27'	**Plate VI**
Geologic Cross Sections 28-28' through 31-31'	**Plate VII**

Distribution: (4) Newhall Land
Attn: Glenn Adamick
(2) Psomas
1 - Attn: Jeannine Giem – Santa Clarita Office
1 - Attn: Matt Heideman – Costa Mesa Office
(3) City of Santa Clarita
(2) Castaic Lake Water Agency c/o Kennedy/Jenks Consultants
Attn: Lynn Takaichi
(1) Impact Sciences
Attn: Ms. Susan Tebo

REFERENCES

By Allan E. Seward Engineering Geology, Inc.

1) Geologic/Geotechnical Constraints Report
Preliminary Stability Evaluation of Existing Fill Buttress Above Cut-Slope, Landslide (Qls-a), and Stability of Proposed Cut-Slope CS-1, and Fault Rupture Hazard Assessment
CLWA Proposed Road Alignment and Associated Development
Valencia, California
Dated March 3, 2000 - JN: 00-1571C-1

By Others

2) Geotechnical Investigation Report
Raw and Treated Water Pipelines and
Raw Water Pump Station, for Rio Vista Water Treatment Plant,
Castaic Lake Water Agency
Santa Clarita, California
By Schaefer Dixon Associates, Inc.
Dated November 6, 1991 – JN: 9L-266

3) Preliminary Review of Geologic Conditions and Engineering Geology Constraints to Development;
"Valencia Panhandle" - ~760 Acres Northeast of Bouquet Junction;
Valencia, California
By Southwestern Engineering Geology
Dated October 17, 1994 – JN: 1-32/72-94

4) Grading and Onsite Construction
Raw and Treated Water Pipelines for
Rio Vista Water Treatment Plant
Castaic Lake Water Agency
Santa Clarita, California
Volumes I & II
By Huntington/Schaefer Dixon Associates, Inc.
Dated March 30, 1995 – JN: 9L-266PC

Published

Blake, T.F., 1998, FRISKSP - Version 4.00: A computer program for the probabilistic estimation of peak acceleration and uniform hazard spectra using 3-D faults as earthquake sources: Thomas F. Blake, Computer Services & Software.

Blake, T.F., 1999, EQSEARCH - Version 3.00: A computer program for the estimation of peak horizontal acceleration from California historical earthquake catalogs: Thomas F. Blake, Computer Services & Software.

Boore, D.M., Joyner, W.B., and Fumal, T.E., 1997, Equations for estimating horizontal response spectra and peak acceleration from western North American earthquakes: A summary of recent work: Seismological Research Letters, v. 68, no. 1, p. 128-153.

Campbell, K.W., 1997, Empirical near-source attenuation relationships for horizontal and vertical components of peak ground acceleration, peak ground velocity, and pseudo-absolute acceleration response spectra: Seismological Research Letters, v. 68, no. 1., p. 154-179.

REFERENCES

CDCDMG, 1995, Checklists for the review of geologic/seismic reports for California public schools, hospitals, and essential services buildings: CDMG Note 48, 3 p.

CDCDMG, 1997, Guidelines for evaluating and mitigating seismic hazards in California: California Department of Conservation Division of Mines and Geology Special Publication 117.

CDCDMG, 1998, Seismic Hazard Zones Map for the Newhall Quadrangle Released February 1, 1998, California

CDCDMG, 1997, Seismic Hazard Evaluation of the Newhall 7.5-Minute Quadrangle, Los Angeles County, California: Open-File Report 97-11.

Dibblee, T.W., Jr., 1996, Geologic Map of the Newhall Quadrangle, Los Angeles County, California: Dibblee Geological Foundation, Map DF-56.

Golden Software, Inc., 1998, Grapher™, Golden Software, Inc.

Hart, E.W., 1997, Fault-rupture hazard zones in California: California Division of Mines and Geology Special Publication 42, 24 p.

Jennings, C.W., 1988, Fault map of California with locations of volcanoes, thermal springs, and thermal wells: California Division of Mines and Geology, Geologic Data Map No. 1, 4th Printing.

Kew, W.S.W., 1924, Geology and oil resources of a part of Los Angeles and Ventura Counties, California: U.S. Geological Survey Bulletin 753, 202 p.

Martin, G.R., and Lew, M., 1999, Recommended procedures for implementation of DMG Special Publication 117 - Guidelines for analyzing and mitigating liquefaction hazards in California: Southern California Earthquake Center, 63p.

Morton, D.M., 1976, Reconnaissance surficial geologic maps of the Newhall, Oat Mountain, Santa Susana and Val Verde 7.5' Quadrangles, Los Angeles and Ventura Counties, southern California: U.S. Geological Survey Open File Map 76-211.

Peabody, A.W., 1969, Principles of cathodic protection, Chapter 5, NACE Corrosion Course: National Academy of Corrosion Engineers

Petersen, M.D., Bryant, W.A., Cramer, C.H., Cao, T., Reichle, M.S., Frankel, A.D., Lienkaemper, J.J., McCrory, P.A., and Schwartz, D.P., 1996, Probabilistic seismic hazard assessment for the State of California: California Department of Conservation Division of Mines and Geology Open-File Report 96-08, 33 p.

Real, C.R., Toppozada, T.R., and Parke, D.L., 1978, Earthquake epicenter map of California, showing events from 1900 through 1974 equal to or greater than magnitude 4.0 or intensity V: California Division of Mines and Geology Map Sheet 39.

Robson, S.G., 1972, Water-Resources Investigation Using Analog Model Techniques in the Saugus-Newhall Area, Los Angeles County, California.

Sadigh, K., Chang, C.Y., Egan, J.A., Makdisi, F., and Youngs, R.R., 1997, Attenuation relations for shallow crustal earthquakes based on California strong motion data: Seismological Research Letters, v. 68, no. 1, p. 180-189.

REFERENCES

Stein, R.S., and Yeats, R.S., 1989, Hidden earthquakes, Scientific American, v. 260, no. 6, p. 48-57.

Stewart, J.P. et al., 1994, Preliminary report on the principal geotechnical aspects of the January 17, 1994 Northridge Earthquake: EERC, U.C. Berkeley, Report No. UCB/EERC-94/08, 245 pages.

Treiman, J., and Saul, R., 1986, The mid-Pleistocene inception of the Santa Susana Mountains: in Ehlig, P.L. (trip leader): Neotectonics in the area between the central and western Transverse Ranges, southern California: Geological Society of America Field Trip Number 10, p. 7-12.

Uniform Building Code (UBC), 1997.

Wells, D.L., and Coppersmith, K.J., 1994, New empirical relationships among magnitude, rupture length, rupture area, and surface displacement: Bulletin of the Seismological Society of America, v. 84, no. 4, p. 974-1002.

Winterer, E.L., and Durham, D.L., 1962, Geology of southeastern Ventura Basin, Los Angeles County, California: U.S. Geological Survey Professional Paper 334-H, p. 275-366.

Youd, T.L, and Idriss, I.M., eds., 1997, Proceedings of the NCEER workshop on evaluation of liquefaction resistance of soils: National Center for Earthquake Engineering Research Technical Report NCEER-97-0022, 276 p.

Ziony, J.I., and Jones, L.M., 1989, Map showing late Quaternary faults and 1978-84 seismicity of the Los Angeles region, California: Miscellaneous Field Studies Map, MF 1964, scale 1:250,000.

SUMMARY OF LANDSLIDES

LANDSLIDE NO.	SHEET NO.	MITIGATION
1	2 of 4	It is recommended that this landslide be completely removed and reconstructed to its approximate original configuration using Certified Engineered Fill utilizing a keyway and backdrains designed by the soils engineer. The design of this keyway will be based on the configuration of the future removal. It is anticipated that the removal will range up to 35 feet. In areas to receive fill the removal bottoms should be surveyed in order to document the removal for future reference.
2 and 3	2 of 4	These landslides are located partially within existing cut-slopes and will be subject to periodic maintenance. These landslides are located in an area where they do not impact the proposed development and are safe for the use intended. At the completion of grading, these landslides will be designated as Restricted Use Areas on the Final Map.
4	2 of 4	Located in the vicinity of Lots 83 and 84 within a proposed fill area. It is recommended that this landslide be completely removed under the continuous observation of the Project Engineering Geologist. It is anticipated that the removal will range up to 25 feet. In areas to receive fill, the removal bottoms should be surveyed in order to document the removal for future reference and/or later additional grading.
5a	3 of 4	This landslide is located north of Newhall Ranch Road and was buttressed during the grading and construction of the CLWA facility and associated water line. This landslide is located in an area where it does not impact the proposed development and is safe for the use intended. At the completion of grading, this landslide will be designated as a Restricted Use Area on the Final Map.

SUMMARY OF LANDSLIDES

LANDSLIDE NO.	SHEET NO.	MITIGATION
5b	3 of 4	This large landslide is located south of Newhall Ranch Road. Stability calculations performed at Cross Section 9-9' indicate this landslide at the proposed Tentative Map grading configuration does not satisfy the City of Santa Clarita requirements for factor of safety. Due to the large size of this landslide, mitigation options are provided. Option 1 - construct a designed buttress utilizing a 150-foot wide by 45-foot deep keyway (at the toe). Option 2 – Construct a designed shear keyway located within the landslide mass. This shear keyway would be based on additional subsurface exploration and analysis. Option 3 – redesign such that proposed structures are not proposed on this landslide (avoidance). At the completion of grading, this landslide would be designated as a Restricted Use Area on the Final Map. Option 4 – completely remove the landslide and replace it with certified engineered fill. In areas to receive fill, the removal bottoms should be surveyed in order to document the removal for future reference. If complete removal is performed, it is anticipated that removals will range up to 106 feet.
6	3 of 4	This landslide is located east of Landslide Qls-5b. Stability evaluation on Cross Section 10-10' indicates that previous grading for Newhall Ranch Road is grossly stable but the landslide mass south of Newhall Ranch Road does not satisfy the City of Santa Clarita factor of safety requirement. This area will be subject to deformation and settlement in the event that the landslide moves. A park trail with grading is currently proposed. It is recommended that grading be performed such that the existing topography is only minimally altered. It is recommended that this trail not be paved and that minimal watering be performed. At the completion of grading, this landslide would be designated as a Restricted Use Area on the Final Map.
7	2 of 4	This landslide is located in the vicinity of Lot 145 in a proposed fill area. It is recommended that this landslide be completely removed under the continuous observation of the Project Engineering Geologist. The removal bottoms should be surveyed in order to document the removal for future reference and/or later additional grading. It is anticipated that the removal will range up to 24 feet.

SUMMARY OF LANDSLIDES

LANDSLIDE NO.	SHEET NO.	MITIGATION
8	3 of 4	This landslide is located beneath proposed Santa Clarita Parkway mostly within a proposed fill area. It is recommended that this landslide be completely removed under the continuous observation of the Project Engineering Geologist. The removal bottoms should be surveyed in order to document the removal for future reference and/or later additional grading. It is anticipated that the removal will range up to 24 feet.
9	3 of 4	This landslide is located in a proposed cut and proposed fill area. It is recommended that this landslide be completely removed under the continuous observation of the Project Engineering Geologist. The removal bottoms should be surveyed in order to document the removal for future reference and/or later additional grading. It is anticipated that the removal will range up to 45 feet.
10	3 of 4	This landslide is located in a proposed cut and proposed fill area. It is recommended that this landslide be completely removed under the continuous observation of the Project Engineering Geologist. The removal bottoms should be surveyed in order to document the removal for future reference and/or later additional grading. It is anticipated that the removal will range up to 35 feet.
11	3 of 4	This landslide is located in proposed cut and proposed fill areas in the vicinity of proposed cut-slopes CS-13 and CS-14. Slope stability analysis on cross section 23-23' indicates this slope/area does not satisfy the city of Santa Clarita factor of safety requirement for slope stability. A remedial buttress fill utilizing a 150 feet wide keyway is required to obtain slope stability factor of safety requirement. Prior to construction of the remedial buttress, it is recommended that this landslide be completely removed. It is anticipated that the removal will range up to 40 feet. In areas to receive fill, the removal bottoms should be surveyed in order to document the removal for future reference.
12	3 of 4	It is recommended that the portions of this landslide located beneath the proposed bike trail be completely removed during the grading operations and replaced with Certified Engineered Fill. It is anticipated that the removal will range up to 24 feet. At the completion of grading, the remaining portion of this landslide will be designated as a Restricted Use Area on the Final Map.

SUMMARY OF LANDSLIDES

LANDSLIDE NO.	SHEET NO.	MITIGATION
13	4 of 4	This landslide is located in the vicinity between proposed cut-slopes CS-16 and CS-19. A portion of this landslide is located in an area where grading is proposed. It is recommended that the portion of this landslide within the graded area be removed under the continuous observation of the Project Engineering Geologist prior to placing certified engineered fill. It is anticipated that the removal will range up to 35 feet. In areas to receive fill, the removal bottoms should be surveyed in order to document the removal for future reference and/or later additional grading.
14	4 of 4	This landslide is located in the vicinity of proposed Cut-Slope CS-19. It is recommended that this landslide be completely removed under the continuous observation of the Project Engineering Geologist. The removal bottoms should be surveyed in order to document the removal for future reference and/or later additional grading. It is anticipated that the removal will range up to 24 feet.

SUMMARY OF CUT-SLOPES

Proposed Cut-Slope CS-1

Location: Sheet 2 of 4 – Vicinity of Lot 514 within Area D

Direction Slope Faces: Semicircular facing west to southwest to south

Slope Parameters: 120± feet high with a 2:1 gradient

Cross Sections: 1-1', 2-2'

Anticipated Geologic Conditions: West facing portion - TQs bedrock anticipated to be dipping 4 - 15° towards the south which is neutral to the proposed slope face; Southwesterly facing portion – TQs bedding anticipated to be oriented such that the bedding planes are dipping out of the proposed slope face. Slope stability analysis of this slope indicates this slope has a safety factor greater than the City of Santa Clarita requirements for slope stability and therefore **grossly stable as designed.**

Mitigation Measures: **Not required**

Proposed Cut-Slope CS-2

Location: Sheet 2 of 4 – Vicinity of Lot 513 within Area D

Direction Slope Faces: Southwest

Slope Parameters: 60± feet high with a 2:1 gradient

Cross Sections: 4-4', 28-28'

Anticipated Geologic Conditions: The eastern portion of the slope is anticipated to expose landslide (Qls-1) material within the proposed cut-slope face; **grossly unstable** due to fractured and broken nature of the landslide material. The western portion of the slope is anticipated to expose Saugus Formation bedrock bedding planes dipping out of the proposed slope face. Slope stability analysis performed on Cross Sections 4-4' and 28-28' indicate this slope has a safety factor greater than the City of Santa Clarita requirements for slope stability and therefore **grossly stable as designed.**

Mitigation Measures: It is recommended that this landslide be **completely removed** from the proposed cut-slope face and replaced using Certified Engineered Fill utilizing a keyway and backdrains designed by the soils engineer. The design of this keyway will be based on the configuration of the future removal. It is anticipated that the removal depth will range up to 35 feet. In areas to receive fill the removal bottoms should be surveyed in order to document the removal for future reference. A Restricted Use Area has been recommended in order to permanently limit groundwater levels to those found to be necessary for stability. Within this Restricted Use Area, it is recommended that no permanent piped water be allowed above elevation 1250 on the existing natural ridge north of Lot 513.

SUMMARY OF CUT-SLOPES

Proposed Cut-Slope CS-3

Location: Sheet 2 of 4 - Lot 513 just westerly of the existing water tank

Direction Slope Faces: South

Slope Parameters: 55± feet high with a 2:1 gradient

Cross Sections: 29-29'

Anticipated Geologic Conditions: TQs bedding anticipated to be dipping out of the proposed slope face. Slope stability analysis indicates this slope has a safety factor greater than the City of Santa Clarita requirements for slope stability. **Grossly stable as designed.**

Mitigation Measures: **No mitigation required.**

Proposed Cut-Slope CS-4

Location: Sheet 2 of 4 - Northeast of Lot 513 just westerly of the existing water tank

Direction Slope Faces: Westerly

Slope Parameters: 35± feet high with a 2:1 gradient

Cross Sections: None

Anticipated Geologic Conditions: TQs bedrock is anticipated to be oriented neutral to the proposed cut-slope face. **Grossly stable**

Mitigation Measures: **No mitigation required.** A Restricted Use Area has been recommended in order to permanently limit groundwater levels to those found to be necessary for stability. Within this Restricted Use Area it is recommended that no permanent piped water be allowed above elevation 1250 on the existing natural ridge north of Lot 513.

Proposed Cut-Slope CS-5

Location: Sheet 2 of 4 – Vicinity of Lots 60-74 within Area A1

Direction Slope Faces: Southerly

Slope Parameters: 25± feet high with a 2:1 gradient

Cross Sections: None; see section 8-8' for cut-slope CS-6 for similar configuration

Anticipated Geologic Conditions: TQs bedrock anticipated to be dipping out of the proposed slope face. Slope stability analysis on cross section 8-8', which depicts similar geologic conditions, indicates this slope satisfies the City of Santa Clarita factor of safety requirement for slope stability. However, due to anticipated seepage from the existing adjacent CLWA pipelines, this slope may be subject to surficial instability. **Grossly stable but surficially unstable**

Mitigation Measures: **Stability fill required** utilizing a 20 feet wide keyway for the south facing portion of the slope.

SUMMARY OF CUT-SLOPES

Proposed Cut-Slope CS-6

Location: Sheet 2 of 4 – Vicinity of Lots 209-213 within Area A1

Direction Slope Faces: West and south

Slope Parameters: 30± feet high with a 2:1 gradient

Cross Sections: 8-8'

Anticipated Geologic Conditions:

- West facing portion - TQs bedrock anticipated to be oriented neutral to the proposed cut-slope face with the exception of a small portion of the slope which may expose landslide (Qls-5b) material. The portion of the slope exposing the TQs bedrock is anticipated to be **grossly stable**; the portion of the slope exposing the landslide material will be **grossly unstable**.
- South facing portion - TQs bedrock anticipated to be dipping out of the proposed slope face. Slope stability analysis indicates this slope satisfies the City of Santa Clarita factor of safety requirement for slope stability. However, due to potential seepage from the existing adjacent CLWA pipelines, this slope may be subject to surficial instability. **Grossly stable but surficially unstable**

Mitigation Measures: All landslide material exposed within the slope will require complete removal and replacement with certified engineered fill. **Stability fill required** utilizing a 20 feet wide keyway for the south-facing portion of the proposed cut-slope. See landslide summary (Table 1) for mitigation options for landslide Qls-5b.

Proposed Cut-Slope CS-7

Location: Sheet 2 of 4 – Vicinity of Lots 218-224 within Area A1

Direction Slope Faces: Southeast

Slope Parameters: 30± feet high with a 2:1 gradient

Cross Sections: 8-8', 22-22'

Anticipated Geologic Conditions: TQs bedrock anticipated to be dipping out of the proposed cut-slope face with the exception of a small portion of the slope, which may expose landslide (Qls-5b) material. Slope stability analysis indicates this slope satisfies the City of Santa Clarita factor of safety requirement for slope stability. However, due to anticipated seepage from the existing adjacent CLWA pipelines, this slope may be subject to surficial instability. **Grossly stable but surficially unstable**

Mitigation Measures: All landslide material exposed within the slope will require complete removal and replacement with certified engineered fill. **Stability fill required** utilizing a 20 feet wide keyway for the remaining portion of the proposed cut-slope exposing TQs material. See landslide summary (Table 1) for mitigation options for landslide Qls-5b.

SUMMARY OF CUT-SLOPES

Proposed Cut-Slope CS-8

Location: Sheet 2 of 4 – Vicinity of Lots 276 and 277 Area A2

Direction Slope Faces: Semicircular – south to east to northeast

Slope Parameters: 35± feet high with a 2:1 gradient

Cross Sections: 30-30'

Anticipated Geologic Conditions: Anticipated to expose Quaternary Terrace Deposits over TQs bedrock dipping up to 12 degrees out of the south to southeast facing portion of the proposed slope face and oriented neutral to the east facing portion of the proposed slope face. Quaternary Terrace Deposits are subject to surficial instability due to their friable nature. Slope stability analysis of this slope indicates this slope satisfies the City of Santa Clarita factor of safety requirement for slope stability. **Grossly stable but surficially unstable**

Mitigation Measures: **Stability fill required** utilizing a 25 feet wide keyway.

Proposed Cut-Slope CS-9

Location: Sheet 3 of 4 – Vicinity of Santa Clarita Parkway and Lot 260 Area A2

Direction Slope Faces: Westerly

Slope Parameters: 32± feet high with a 2:1 gradient

Cross Sections: None

Anticipated Geologic Conditions: Anticipated to expose crudely bedded horizontally oriented Quaternary Terrace Deposits. Quaternary Terrace Deposits are subject to surficial instability due to their friable nature. **Grossly stable but surficially unstable**

Mitigation Measures: **Stability fill required.**

Proposed Cut-Slope CS-10

Location: Sheet 3 of 4 – Lots 388 – 399 Area B

Direction Slope Faces: Southeast

Slope Parameters: 50± feet high with a 2:1 gradient

Cross Sections: 16-16', 17-17', 18-18' & 19-19'

Anticipated Geologic Conditions: Anticipated to expose Quaternary Terrace Deposits over TQs bedrock dipping neutral to 3 degrees out of the proposed slope face. Quaternary Terrace Deposits are subject to surficial instability due to their friable nature. Slope stability analysis of this slope performed on Cross Sections 16-16', 17-17' and 18-18' indicates this slope satisfies the City of Santa Clarita factor of safety requirement for slope stability. **Grossly stable but surficially unstable**

Mitigation Measures: **Stability fill required.**

SUMMARY OF CUT-SLOPES

Proposed Cut-Slope CS-11

Location: Sheet 3 of 4 – South of Lots 470 and 471 within Area B

Direction Slope Faces: Southeast

Slope Parameters: 70± feet high with a 2:1 gradient

Cross Sections: 11-11'

Anticipated Geologic Conditions: Anticipated to expose TQs bedrock dipping out of the proposed slope face. Slope stability analysis of this slope indicates this slope does not satisfy the City of Santa Clarita factor of safety requirement for slope stability. **Grossly unstable.**.

Mitigation Measures: **Buttress fill required** utilizing an 80 feet wide keyway.

Proposed Cut-Slope CS-12

Location: Sheet 3 of 4 – Vicinity of Lots 463-469 and 471-477 within Area B

Direction Slope Faces: South to southeast

Slope Parameters: 30± feet high with a 2:1 gradient

Cross Sections: 11-11', 27-27'

Anticipated Geologic Conditions: Anticipated to expose landslide (Qls-9) material within the proposed slope face in the vicinity of Lots 407-414 and TQs bedrock dipping out of the proposed slope face in the vicinity of Lots 415-420. Subsurface exploration indicates that perched ground water conditions exist in this vicinity. Slope stability analyses performed on Cross Section 11-11' indicate that this slope satisfies the City of Santa Clarita factor of safety requirement for slope stability. Thus, proposed cut-slope CS-12 is considered to be **grossly stable but surficially unstable** due to anticipated surficial instability due to the anticipated elevated ground water conditions.

Mitigation Measures: **Remove landslide Qls-9** and replace with certified engineered fill. The remaining bedrock portions will require a Stability fill utilizing a 20 feet wide keyway.

Proposed Cut-Slope CS-13

Location: Sheet 4 of 4 – Vicinity of Lots 479, 480 and 415- 421 – Area B

Direction Slope Faces: South to southeast

Slope Parameters: 50± feet high with a 2:1 to 3:1 gradient

Cross Sections: 11-11', 14-14' & 23-23'

Anticipated Geologic Conditions: Anticipated to expose TQs Bedrock dipping out of the proposed cut-slope face. Landslide Qls-11 material is anticipated to be exposed within the eastern portion of the slope. Subsurface exploration indicates perched ground water conditions exist in this vicinity. Slope stability analysis indicates the western portion of

SUMMARY OF CUT-SLOPES

this slope satisfies the City of Santa Clarita factor of safety requirement and is considered grossly stable as designed, but potentially **surficially unstable** due to expected surficial instability due to the anticipated perched ground water conditions. Slope stability analysis performed on the eastern portion of this slope indicates this portion of the slope does not satisfy the factor of safety requirement for slope stability. This portion of the slope is considered **grossly unstable** as designed.

Mitigation Measures: Remove entire landslide Qls-11. **Stability fill required** utilizing a 20 to 30 feet wide keyway is proposed for the western portion of this slope. The eastern portion requires **buttress fill** utilizing a 150 feet wide and 24 feet deep keyway constructed at the toe of proposed cut-slope CS-14 in the vicinity of the proposed bike trail. This designed keyway and backcut at the toe of proposed cut-slope CS-14 encompasses the eastern portion of cut-slope CS-13.

Proposed Cut-Slope CS-14

Location: Sheet 4 of 4 – Southeast of Lot 480 adjacent to the Pedestrian/Bike Trail easement.

Direction Slope Faces: Southeast

Slope Parameters: 25± feet high with a 2:1 gradient

Cross Sections: 23-23'

Anticipated Geologic Conditions: Anticipated to expose landslide Qls-11 material within the proposed cut-slope face. The underlying geologic structure of the Saugus Formation bedrock is dipping towards the proposed cut-slope face. Perched groundwater conditions were encountered within bucket auger boring BA-6. Slope stability analysis of this slope indicates this slope does not satisfy the City of Santa Clarita factor of safety requirement for slope stability. **Grossly unstable.**

Mitigation Measures: Remove entire landslide Qls-11 and construct a **Buttress fill** utilizing a 150 feet wide keyway starting from the toe of proposed cut-slope CS-14. This buttress fill encompasses portions of proposed cut-slope CS-13.

Proposed Cut-Slope CS-15

Location: Within the CLWA property north of Newhall Ranch Road Sheet 3 of 4

Direction Slope Faces: Southeast

Slope Parameters: 95± feet high with a 2:1 gradient

Cross Sections: 11-11', 12-12', 13-13' & 14-14'

Anticipated Geologic Conditions: Quaternary Terrace Deposits over TQs bedrock. The TQs bedrock is anticipated to be dipping out of the proposed cut-slope face. Subsurface exploration indicates perched ground water conditions exist in this vicinity. Slope

SUMMARY OF CUT-SLOPES

stability analysis of this slope indicates this slope does not satisfy the City of Santa Clarita factor of safety requirement for slope stability. **Grossly unstable**

Mitigation Measures: **Buttress fill required** utilizing a designed keyway. This keyway is proposed to be 40 feet wide along the western portion and 95 feet wide along the eastern portion of the slope.

Proposed Cut-Slope CS-16

Location: Sheet 4 of 4 – North of Lot 508 in the vicinity of the proposed debris basin within Area C.

Direction Slope Faces: Southeast

Slope Parameters: 50± feet high with a 2:1 gradient

Cross Sections: 15-15', 20-20', & 31-31'

Anticipated Geologic Conditions: An anticlinal axial trace within the Saugus Formation bedrock is anticipated to be exposed within the northern portion of the proposed cut-slope face. South of the axial trace, the TQs bedrock is anticipated to be dipping out of the proposed slope face. North of the axial trace, the TQs bedrock is anticipated to be dipping into the proposed slope face. Local deformation including faulting and fracturing may be present within the core of the anticline axis and may be subject to surficial failures. Quaternary Terrace Deposits are also anticipated to be exposed within the proposed cut-slope and are also subject to surficial failures. Slope stability analysis utilizing rapid drawdown condition indicates this slope satisfies the City of Santa Clarita factor of safety requirement for slope stability and is **grossly stable but surficially unstable.**

Mitigation Measures: **Stability fill required** utilizing a 25 feet wide keyway.

Proposed Cut-Slope CS-17

Location: Sheet 4 of 4 – South of Newhall Ranch Road within open space Lot 504

Direction Slope Faces: Southeast

Slope Parameters: 65± feet high with a 2:1 gradient

Cross Sections: 15-15'

Anticipated Geologic Conditions: Anticipated to expose TQs bedrock dipping out of the proposed slope face as well as a fill over bedrock situation. Slope stability analysis of this slope indicates this slope does not satisfy the City of Santa Clarita factor of safety requirement for slope stability. **Grossly unstable.**

Mitigation Measures: **Buttress fill required** utilizing a 30 feet wide keyway.

SUMMARY OF CUT-SLOPES

Proposed Cut-Slope CS-18

Location: Sheet 4 of 4 – Vicinity of Lot 509 within Area C.

Direction Slope Faces: South

Slope Parameters: 28± feet high with a 2:1 gradient

Cross Sections: None

Anticipated Geologic Conditions: An anticlinal axial trace within the Saugus Formation bedrock is anticipated to be exposed within the western portion of the proposed cut-slope face. South of the axial trace, the TQs bedrock is anticipated to be dipping out of the proposed slope face. North of the axial trace, the TQs bedrock is anticipated to be dipping into the proposed slope face. Local deformation including faulting and fracturing may be present within the core of the anticline axis and may be subject to surficial failures. Quaternary Terrace Deposits are also anticipated to be exposed within the upper portion of the proposed cut-slope and are also subject to surficial failures. **Grossly stable but surficially unstable.**

Mitigation Measures: **Stability fill required** utilizing a 20 feet wide keyway.

Proposed Cut-Slope CS-19

Location: Sheet 4 of 4 –Lot 510 within Area C

Direction Slope Faces: South to southeast

Slope Parameters: 30± feet high with a 2:1 gradient

Cross Sections: 24-24'

Anticipated Geologic Conditions: Anticipated to expose Quaternary Terrace Deposits over TQs bedrock dipping into the proposed slope face. Quaternary Terrace Deposits are subject to surficial instability due to their friable nature. Landslide Qls-14 anticipated to be exposed within the lower portion of the proposed cut-slope. Potential minor faults and fractures may be present due to a mapped minor fault zone located in this vicinity. Lower portion of the cut-slope **grossly unstable** due to the presence of landslide material and **surficially unstable** due to the Qt deposits and potential minor fault zone located in this vicinity.

Mitigation Measures: Remove landslide Qls-14 and construct a **Stability fill.**

FORM 159

STATE OF CALIFORNIA
DEPARTMENT OF CONSERVATION
DIVISION OF OIL AND GAS

REPORT OF WELL ABANDONMENT

Inglewood, California

February 13, 1964

Mr. O. W. Chonette
P. O. Box 3337
Ventura, California
Agent for TEXACO INC.

DEAR SIR:

Your report of abandonment of Well No. "N. L. & F." H-1, Proj. Sec. 24, T. 4 N., R. 16 W., S. B. B. & M., - - - field, Los Angeles County, dated February 4, 1964, received February 7, 1964, has been examined in conjunction with records filed in this office.

A review of the reports and records shows that the requirements of this Division, which are based on all information filed with it, have been fulfilled.

JLZ:es
cc - Mr. E. R. Murray-Aaron
Mr. R. B. Livesay
Conservation Comm.
Production Dept.
Mr. L. A. Dutton
Fire Prevention Bureau

BLANKET BOND.

E. R. MURRAY-AARON
State Oil and Gas Supervisor

By _____
Deputy Supervisor

FORM 159 (9-49)

STATE OF CALIFORNIA
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF OIL AND GAS

(1)

REPORT OF WELL ABANDONMENT

~~Inglewood~~ California

~~May 25 1961~~

Mr. ~~Edward Lustgarten~~
~~16187 Royal Oak Road~~
~~Encino California~~
Agent for ~~EDWARD LUSTGARTEN~~

DEAR SIR:

Your report of abandonment of Well No. ~~"Lucky Lusty" 3~~, Sec. ~~14~~, T. ~~4 N~~, R. ~~16 W~~, ~~S B~~ B. & M., ~~- - -~~ field, ~~Los Angeles~~ County, dated ~~May 16, 1961~~, has been examined in conjunction with records filed in this office.

A review of the reports and records shows that the requirements of this Division, which are based on all information filed with it, have been fulfilled.

MAP	MAP BOOK	CARDS			
19.18.2		150 ℓ			
5-24-61		5-25-61			

DER:es
cc Mr E H Musser
Mr Edward Lustgarten
Conservation Comm
Production Dept
Mr L A Dutton
Fire Prevention Bureau

E. H. MUSSER
State Oil and Gas Supervisor

By _____
Deputy Supervisor

37864 3-61 5M SPO

15

RESOURCES AGENCY OF CALIFORNIA
DEPARTMENT OF CONSERVATION
DIVISION OF OIL AND GAS

REPORT OF WELL ABANDONMENT

Santa Paula, California

May 12, 1981

Mr. Geo. Atha, Agent
Edward Lustgarten
2221 California Street
San Marino, CA 91108

Your report of abandonment of well "Lucky Lusty" 1
(Name and number)
A.P.I. No. 037-01116, Section 14, T. 4N, R. 16W, S.B. B. & M.,
Bouquet Canyon field, Los Angeles County,
dated Feb. 14, 1972, received Feb. 18, 1972, has been examined in conjunction with records filed in this office, and we have determined that all of the requirements of this Division have been fulfilled.

MAP	MAP BOOK	CARDS	BOND	FORMS 114	FORMS 12
OR					
Pw					

M. G. MEFFERD
State Oil and Gas Supervisor

By *John P. Hardoin*
Deputy Supervisor
John L. Hardoin

OG159 (11-76-GSR1-8M)

FORM 159 (6-49)

STATE OF CALIFORNIA
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF OIL AND GAS

REPORT OF WELL ABANDONMENT

(21)

Inglewood, California

May 14 1958

Mr. C F Bowden
P O Box 7600
Los Angeles 54 California
Agent for UNION OIL CO OF CALIFORNIA

DEAR SIR:

Your report of abandonment of Well No. "Bonelli" 1, Sec. 14, T. 4 N, R. 16 W, S B B. & M., - - - field, Los Angeles County, dated April 16, 1958, has been examined in conjunction with records filed in this office.

A review of the reports and records shows that the requirements of this Division, which are based on all information filed with it, have been fulfilled.

MAP	MAP BOOK	CARDS	BOND	FORMS 114	FORMS 121
18A RW 5-16	RJ		Blanket		

cc Mr E H Musser
Mr F R Wade
Conservation Committee
Mr L A Dutton
Fire Prevention Bureau
Prod. Dept.

es

E. H. MUSSER
State Oil and Gas Supervisor

By _____
Deputy Supervisor

30120 5-56 6M SPO

Appendix A

JOB NO. 98-1571-9

LOGGED BY CJS

Trench Log No. 1

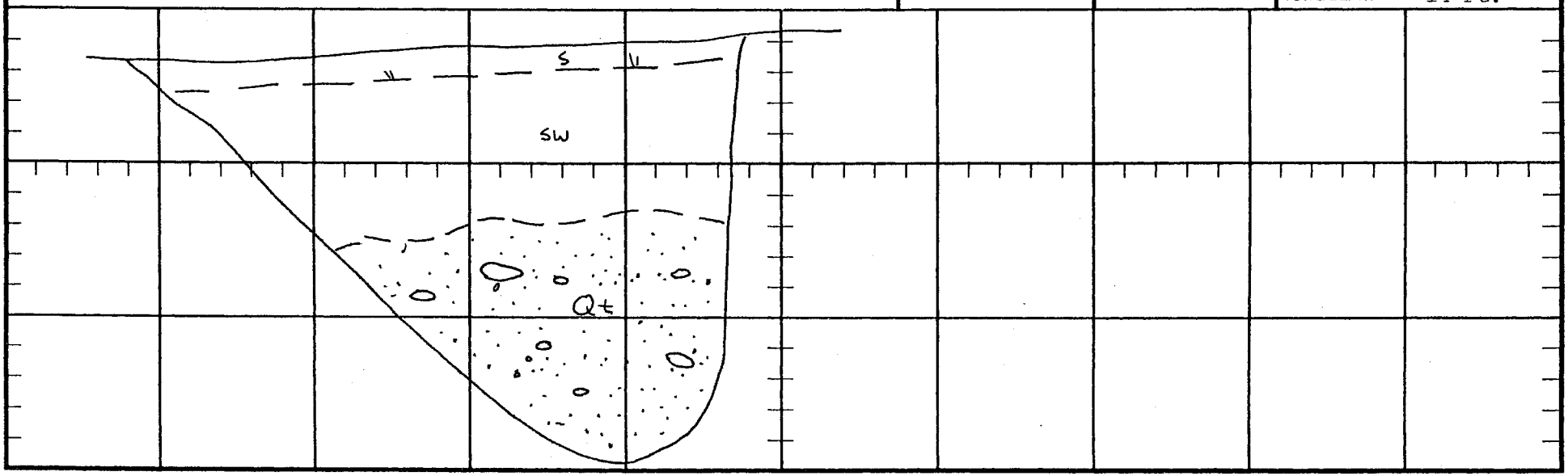
PROJECT Panhandle

DATE 4/4/03

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 10" SOIL; s, Pale brown fine-grained silty sand, loose; dry; numerous roots 10" - 6' SLOPEWASH, sw, Moderate reddish-brown to moderate yellowish-brown, very fine- to fine-grained, silty to clayey sand, dense, dry to slightly damp 6 - 14' QUATERNARY TERRACE; Qt, Moderate brown to moderate yellow-brown, medium- to very coarse-grained, gravelly sand with 10-15% sub-angular to subrounded, granitic cobbles and boulders up to ~18" maximum dimension; very friable; damp to moist			Trenches 1 thru 11 excavated on 8/6/98 using a 24" bucket on a trackmounted backhoe Caving Below 6' No Ground Water TOTAL DEPTH 14 Ft.

N 65 E

SCALE 1" = 5'



ALLAN E. SEWARD

JOB NO. 98-1571-9

PROJECT Panhandle

LOGGED BY CJS

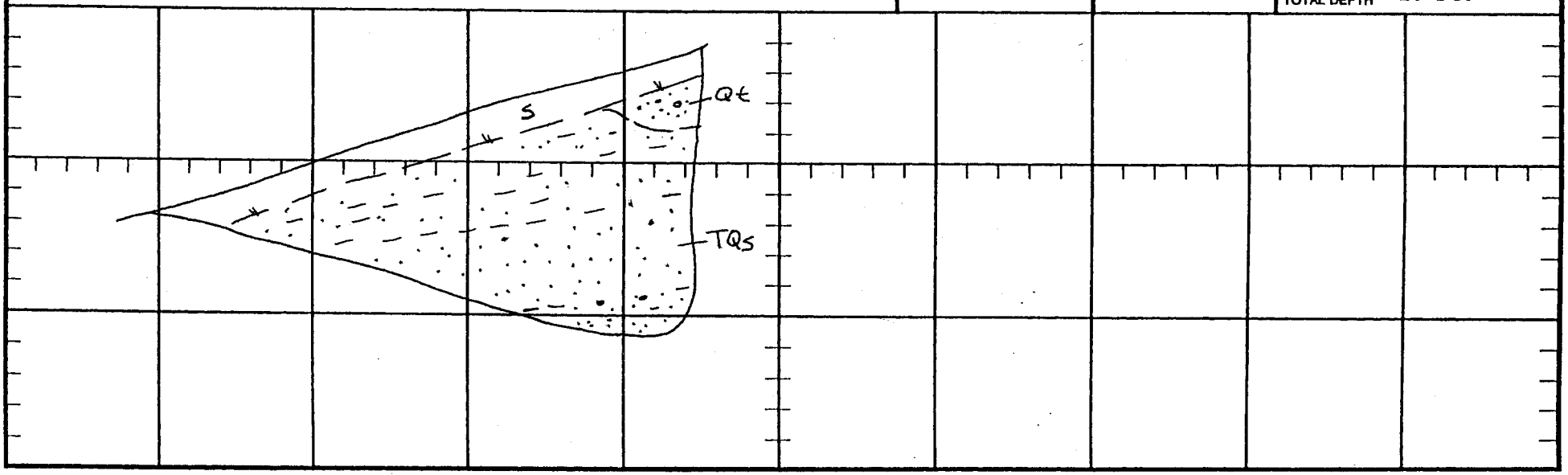
Trench Log No. 2

DATE 4/4/03

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 1' SOIL; s, Light to moderate greyish-brown, fine-grained silty sand; loose; dry 1 - 2' QUATERNARY TERRACE; Qt, Moderate reddish-brown, medium- to coarse-grained gravelly sand with cobbles and silt binder; dense; damp 2 - 10' SAUGUS FORMATION; TQs, Moderate reddish-brown clayey siltstone with sand, and moderate yellowish-gray; medium- to coarse-grained sandstone; contact very gradational and indistinct; moderately hard to hard; damp to moist	B:N40W,9SW		No Ground Water No Caving TOTAL DEPTH 10 Ft.

SCALE 1" = 5'

N 45 E



ALLAN E. SEWARD

JOB NO. 98-1571-9

LOGGED BY CJS

Trench Log No. 3

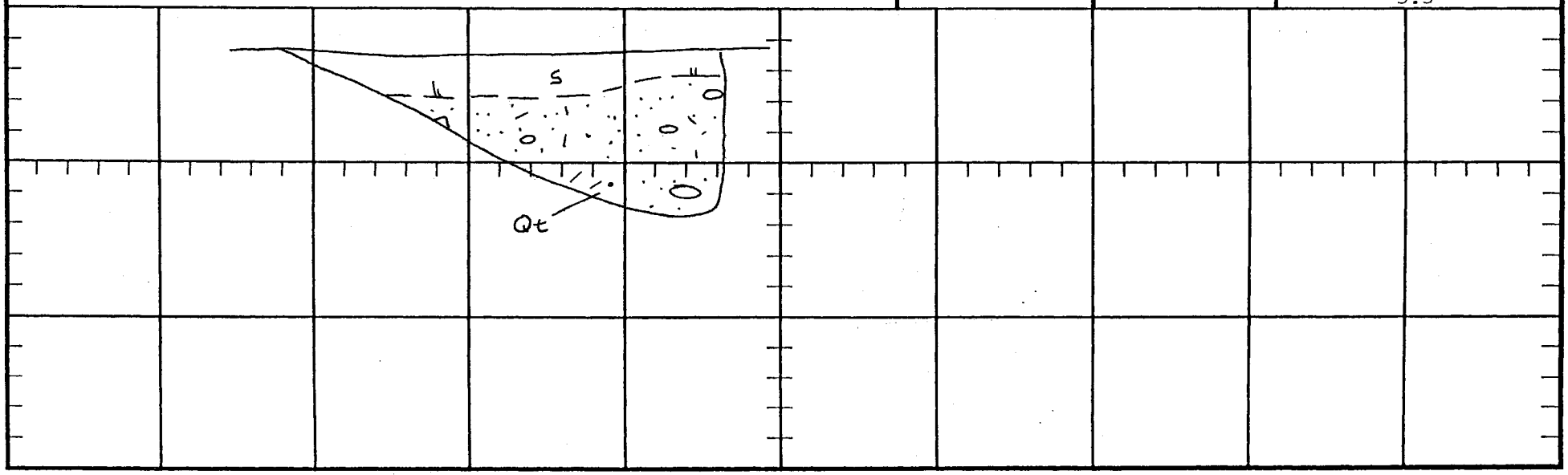
PROJECT Panhandle

DATE 4/4/03

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 18" SOIL; s, Moderate brown to moderate yellow-brown, fine-grained silty sand with pebbles; dry to slightly damp; loose; very porous; numerous roots 18" - 5.5' QUARTNERY TERRACE; Qt, Moderate to dark reddish-brown; medium- to coarse-grained silty to clayey sand with gravel and ~5% rounded granitic cobbles; very dense; damp			No Ground Water No Caving TOTAL DEPTH 5.5'

SCALE 1" = 5'

N 25 W



ALLAN E. SEWARD

JOB NO. 98-1571-9

LOGGED BY CJS

Trench Log No. 4

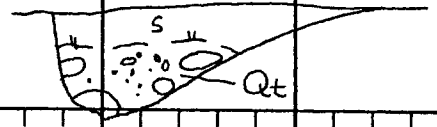
PROJECT Panhandle

DATE 4/4/03

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 1' SOIL; s, Moderate brown to moderate yellow-brown; very fine- to fine-grained, silty sand; loose; dry; numerous roots 1 - 2.5' QUATERNARY TERRACE; Qt, Moderate reddish-brown medium- to coarse-grained silty to clayey sand with gravel; boulders range up to 24" maximum dimension; dense; damp; refusal at 2 1/2 feet			Refusal on boulders at 2 1/2 ft. No Ground Water No Caving TOTAL DEPTH 2.5 Ft.

SCALE 1" = 5'

N 30 W



ALLAN E. SEWARD

JOB NO. 98-1571-9

LOGGED BY CJS

Trench Log No. 5

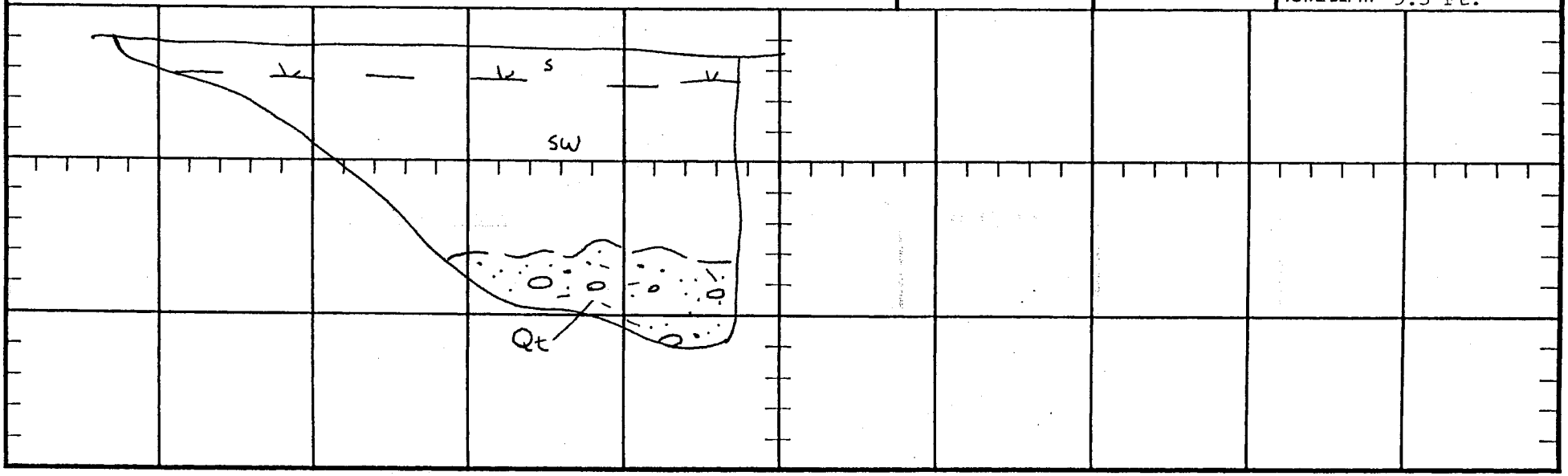
PROJECT Panhandle

DATE 4/4/03

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 12" SOIL; s, Moderate brown, very fine- to fine-grained silty sand; dry; loose 12" - 6.5' SLOPEWASH; sw, Moderate reddish-brown to moderate yellowish-brown, fine-grained silty to clayey sand; dense; damp; excavates with blocky texture 6.5 - 9.5' QUATERNARY TERRACE; Qt, Light brown to light yellow brown, medium- to very coarse-grained pebbly sand with 5-10% rounded granitic cobbles; very friable; damp; upper contact irregular			No Ground Water No Caving TOTAL DEPTH 9.5 Ft.

SCALE 1" = 5'

N 60 W



ALLAN E. SEWARD

JOB NO. 98-1571-9 PROJECT Panhandle

LOGGED BY CJS

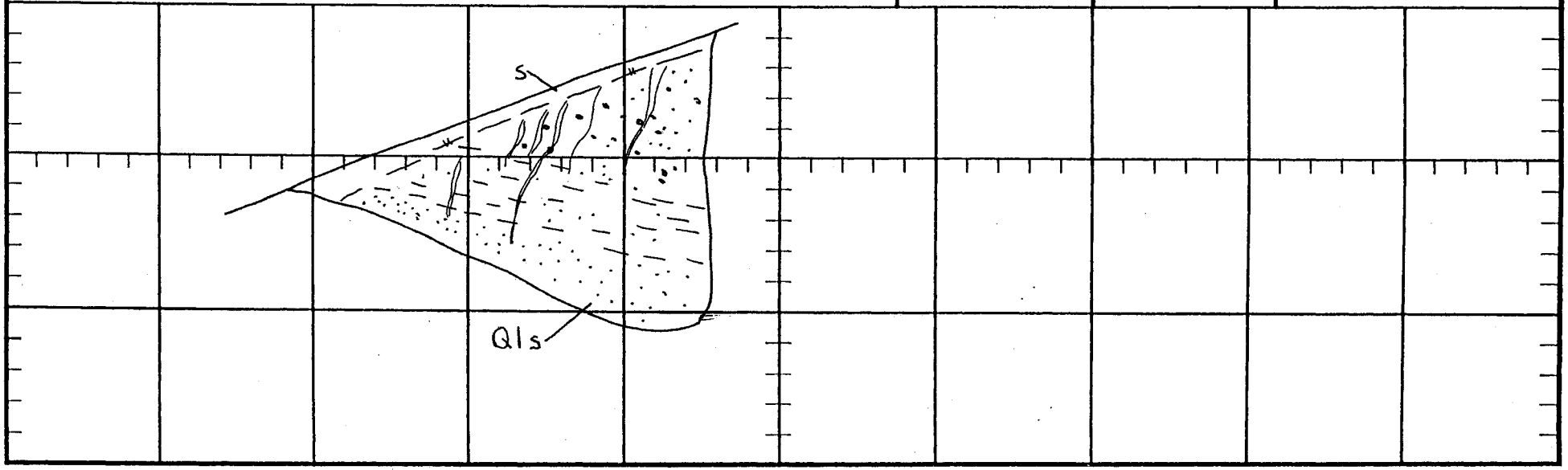
Trench Log No. 6

DATE 4/4/03

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 6" SOIL; s, Light brown, fine- to medium-grained silty sand with isolated pebbles and cobbles; loose; damp; numerous roots			
6" - 9.5' LANDSLIDE DEBRIS; Qls, Light-gray, coarse-grained, pebbly sandstone; reddish-brown mudstone and light yellowish-brown, fine- to medium-grained sandstone; slightly fractured with carbonate along fractures; overall hard and damp	B:N58W,13SW		No Ground Water No Caving TOTAL DEPTH 9.5 Ft.

SCALE 1" = 5'

N 66 E



ALLAN E. SEWARD

JOB NO. 98-1571-9

LOGGED BY CJS

PROJECT Panhandle

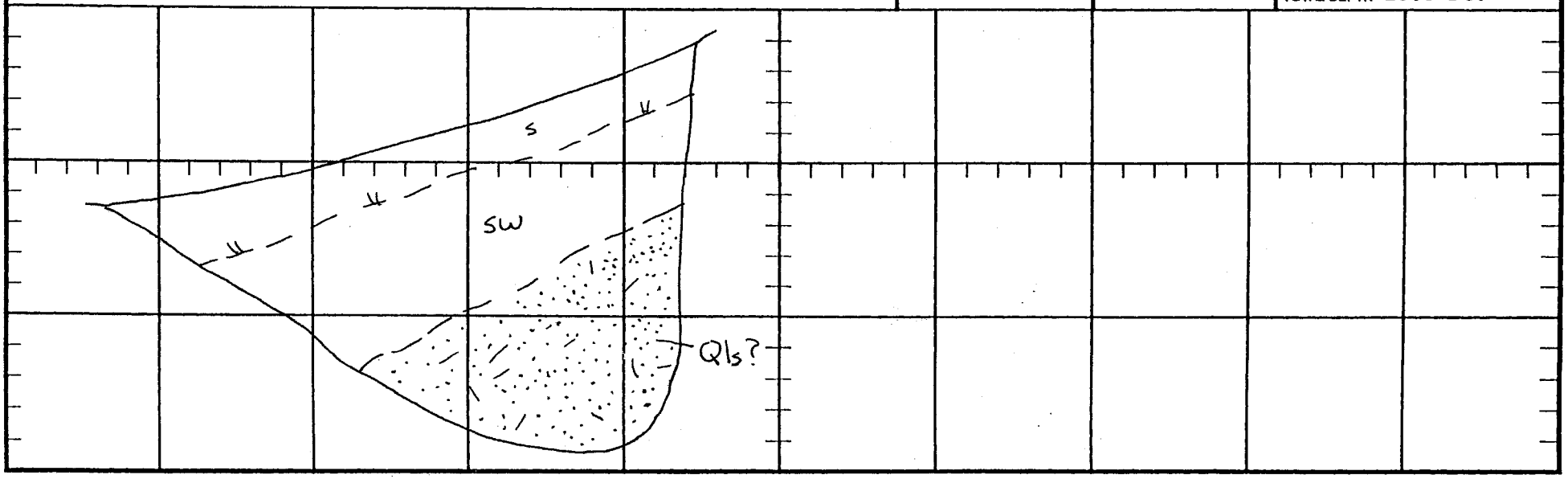
DATE 4/4/03

Trench Log No. 7

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 18" SOIL; s, Moderate brown, fine- to coarse-grained silty sand with scattered gravel and rare cobbles; loose; damp 18" - 5' SLOPEWASH; sw, Moderate brown to moderate reddish-brown, fine- to medium-grained silty sand with gravel and cobbles; moderately dense; damp to moist 5 - 13.5' LANDSLIDE GRABEN BACKFILL?; Qls, Mixture of yellowish-grey, medium-grained sandstone and pale reddish-brown, fine- to medium-grained silty sandstone; all highly weathered with carbonate stringers common; overall only moderately dense; damp to moist			No Ground Water No Caving TOTAL DEPTH 13.5 Ft.

SCALE 1" = 5'

N 10 E



ALLAN E. SEWARD

JOB NO. 98-1571-9 PROJECT Panhandle

LOGGED BY CJS

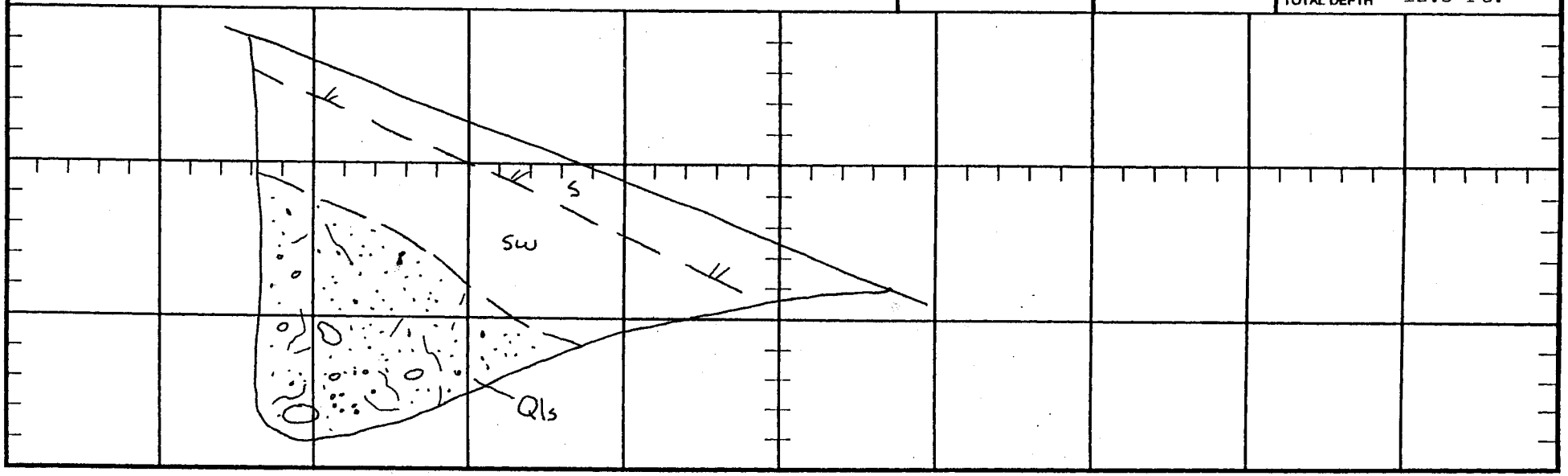
Trench Log No. 8

DATE 4/4/03

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 12" SOIL; s, Light- to moderate-brown, fine- to coarse-grained silty sand; loose; damp 12" - 4.5' SLOPEWASH; sw, Light-brown, fine- to coarse-grained silty sand with minor gravel and rare boulders (up to 12"); moderately dense; damp 4.5 - 12.5' LANDSLIDE DEBRIS; Qls, Pale reddish-brown to pale yellowish-brown; chaotic mixture of mudstone, sandstone and pebbly sandstone with isolated cobbles and boulders; no discernible structure; excavates easily; carbonate stringers pervasive			No Ground Water No Caving TOTAL DEPTH 12.5 Ft.

SCALE 1" = 5'

N 60 W



ALLAN E. SEWARD

JOB NO. 98-1571-9

LOGGED BY CJS

PROJECT Panhandle

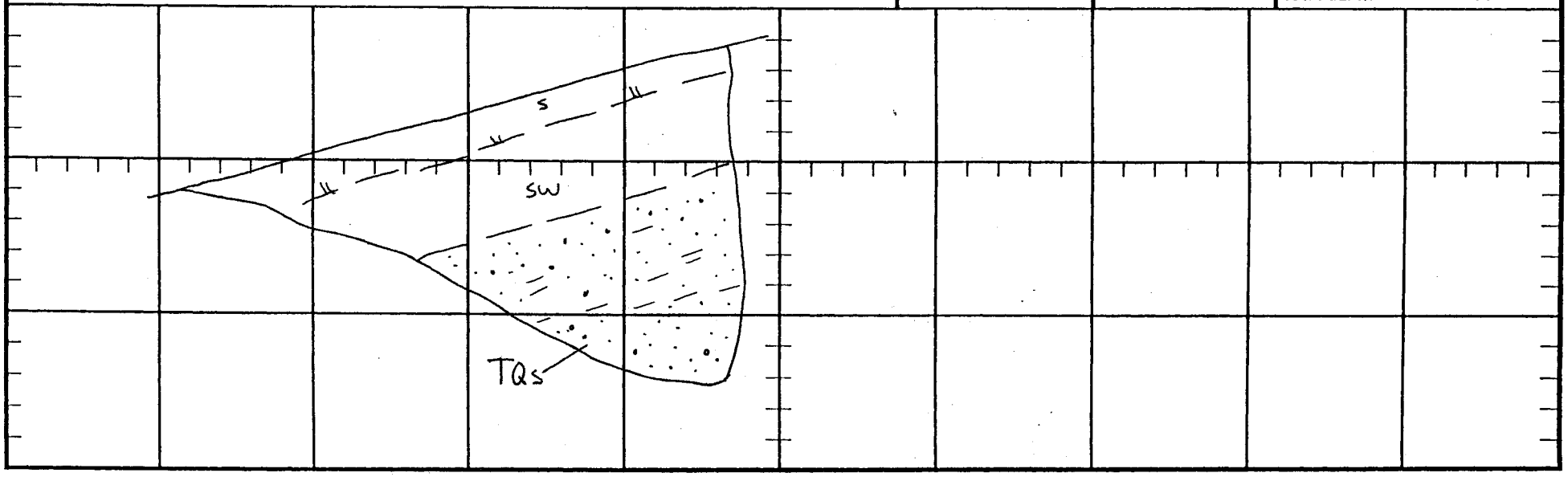
DATE 4/4/03

Trench Log No. 9

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 12" SOIL; s, Moderate-brown to moderate orange-brown; fine- to medium-grained silty sand with minor gravel; loose; dry to damp			
12" - 4' SLOPEWASH; sw, Moderate yellow-brown, fine- to medium-grained, silty sand; moderately dense; moist			
4 - 11.5' BEDROCK; TQs, Moderate yellow-brown, fine- to medium-grained, slightly silty sandstone, and yellowish-gray fine- to medium-grained, very uniform sandstone; yellow-gray sandstone is very friable, with texture, consistency and cementation similar to beach sand	N29E,5SE		Minor Caving below 6' No Ground Water TOTAL DEPTH 11.5 Ft.

SCALE 1" = 5'

N 72 W



ALLAN E. SEWARD

JOB NO. 98-1571-9

LOGGED BY CJS

Trench Log No. 10

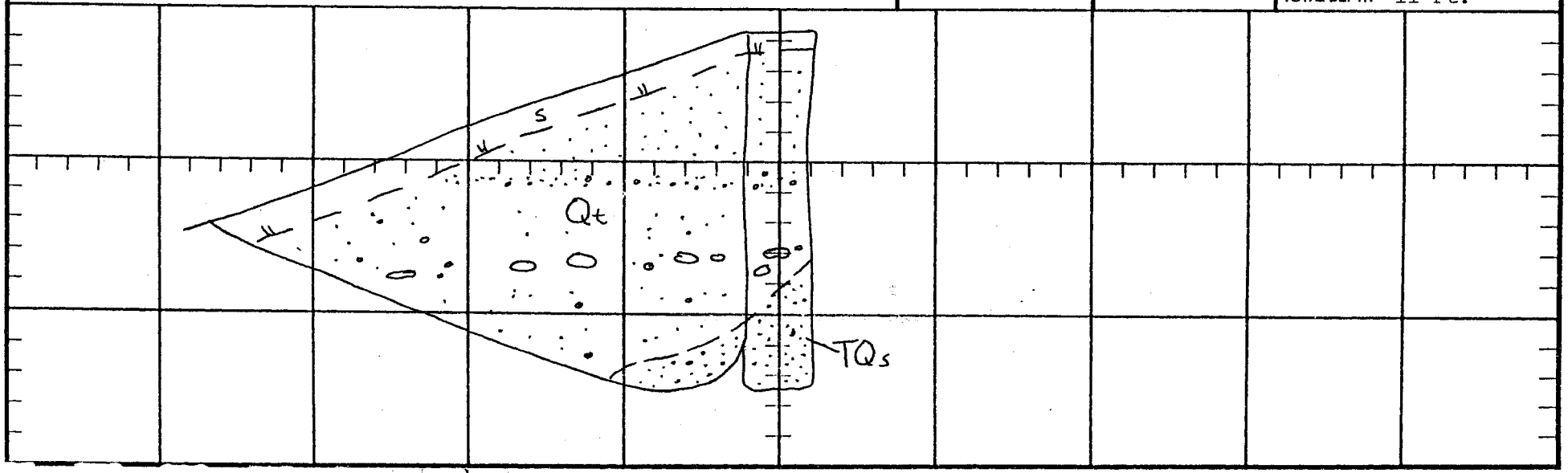
PROJECT Panhandle

DATE 4/4/03

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 6" SOIL; s, Light- to moderate grayish-brown; fine-grained, silty sand with gravel; loose; dry			
6" - 7.5' QUATERNARY TERRACE; Qt, Moderate yellow-brown, medium-grained gravelly sand with 5-10% rounded granitic cobbles and isolated boulders up to 18" maximum dimension; friable; dense; moist; lower contact sharp and inclined to the north		N82E, 48NW (contact Qt/ TQs)	
7.5 - 11' BEDROCK; TQs, Pale yellowish-gray, medium- to coarse-grained pebbly sandstone; moderately hard to hard; damp	N45E,10SE		No Ground Water No Caving TOTAL DEPTH 11 Ft.

SCALE 1" = 5'

Due West



LL/ E. S ARD

JOB NO. 98-1571-9

LOGGED BY CJS

Trench Log No. 11

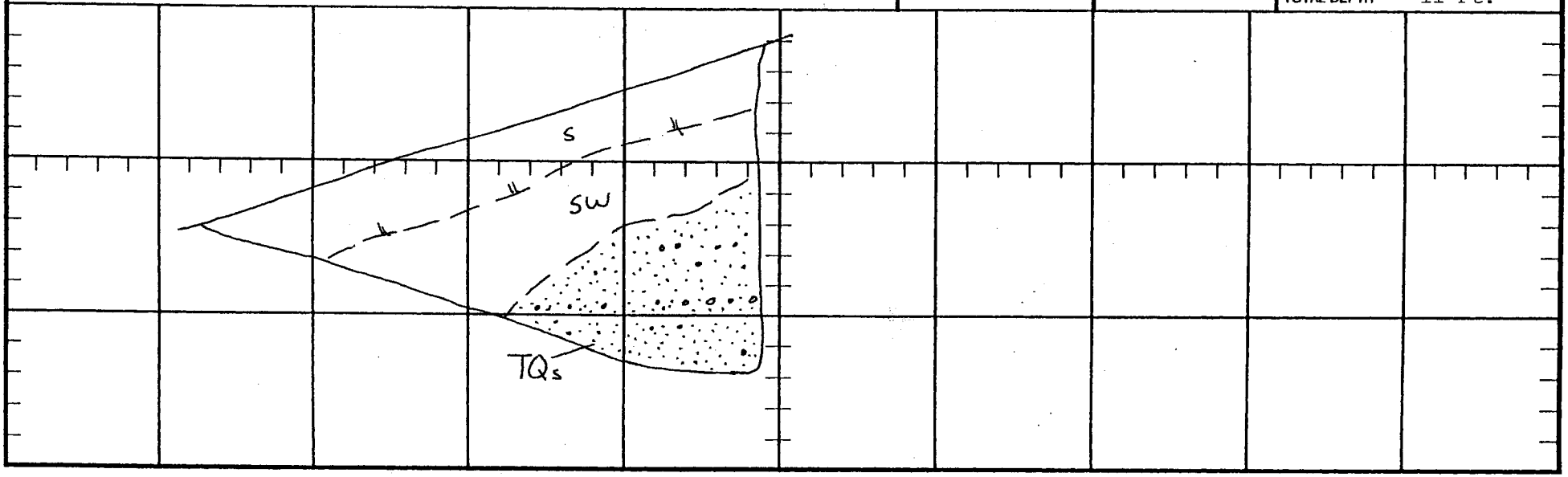
PROJECT Panhandle

DATE 4/4/03

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 2' SOIL; s, Moderate reddish-brown, fine-grained, silty to clayey sand with scattered pebbles; moderately dense; damp			
2 - 4' SLOPEWASH: sw, Moderate yellowish-brown, fine-grained, silty sand, moderately dense; moist			
4 - 11' BEDROCK; TQs, Moderate yellowish-gray, fine- to coarse-grained, pebbly sandstone; moderately hard to hard; damp	N57E, 4SE		No Ground Water No Caving TOTAL DEPTH 11 Ft.

N 10 W

SCALE 1" = 5'



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JOB NO. 98-1571-9 PROJECT Panhandle

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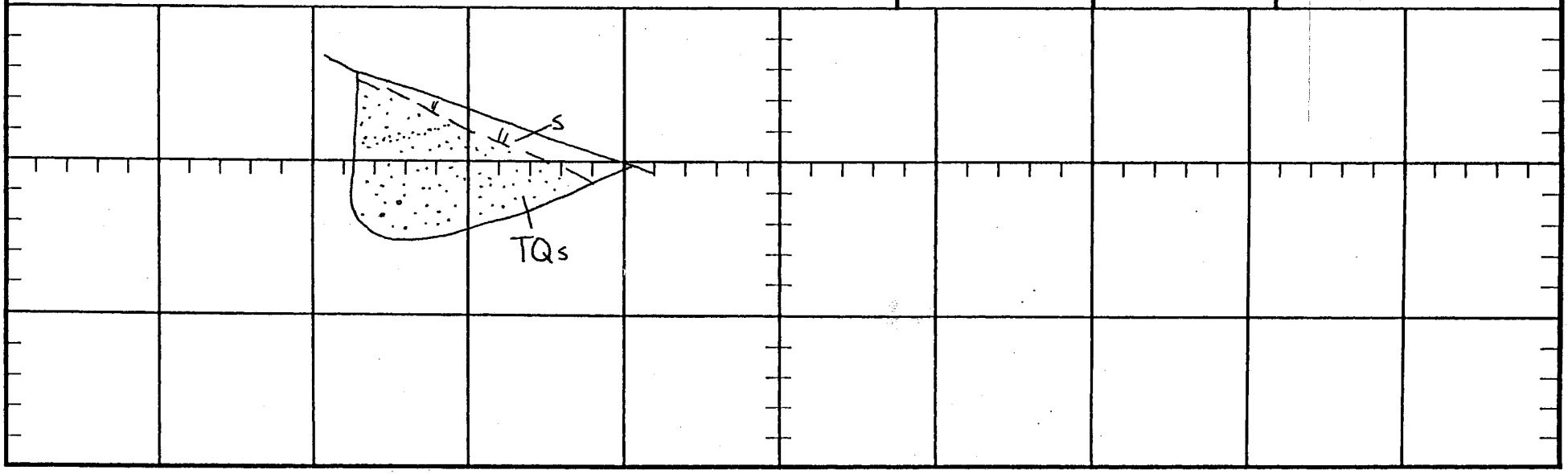
Trench Log No. 12

DATE 4/4/03

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 6" SOIL; s, Light-brown, fine- to medium-grained, silty sand; loose; dry to slightly damp 6" - 5.5' BEDROCK; TQs, Pale yellowish-gray, fine- to medium-grained sandstone; moderately hard to hard; damp; bedding defined by thin (1-2") finer-grained interbed stained with FeOx.	N52E,9NW		Trenches 12 through 27 excavated on 8/7/98 using a 24" bucket on a track-mounted backhoe No Ground Water No Caving TOTAL DEPTH 5.5 Ft.

SCALE 1" = 5'



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JOB NO. 98-1571-9

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Trench Log No. 13

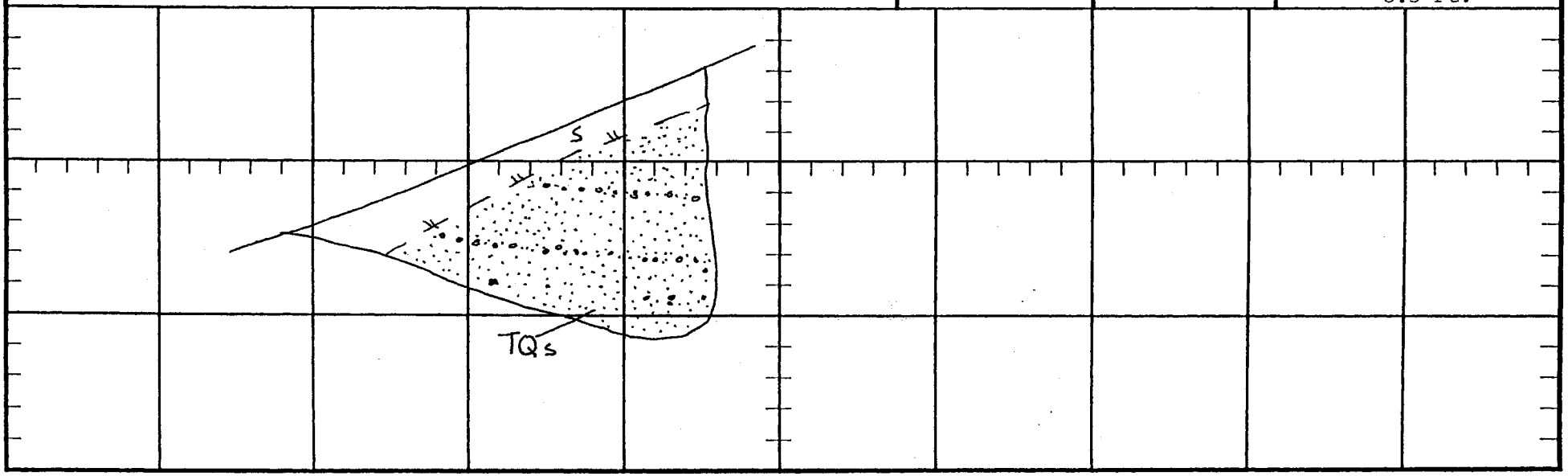
PROJECT Panhandle

DATE 4/4/03

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 12" SOIL; s, Light to moderate yellow-brown, fine-grained silty sand with minor coarse-grained fraction; loose; dry to slightly damp			
12" - 8.5' BEDROCK; TQs, Pale yellow-gray to moderate yellow-brown; medium-grained; silty sandstone with pebble lenses, moderately hard; damp	N70E,10NW		No Ground Water No Caving TOTAL DEPTH 8.5 Ft.

SCALE 1" = 5'

N 13 W



ALLAN E. SEWARD

JOB NO. 98-1571-9

LOGGED BY CJS

Trench Log No. 14

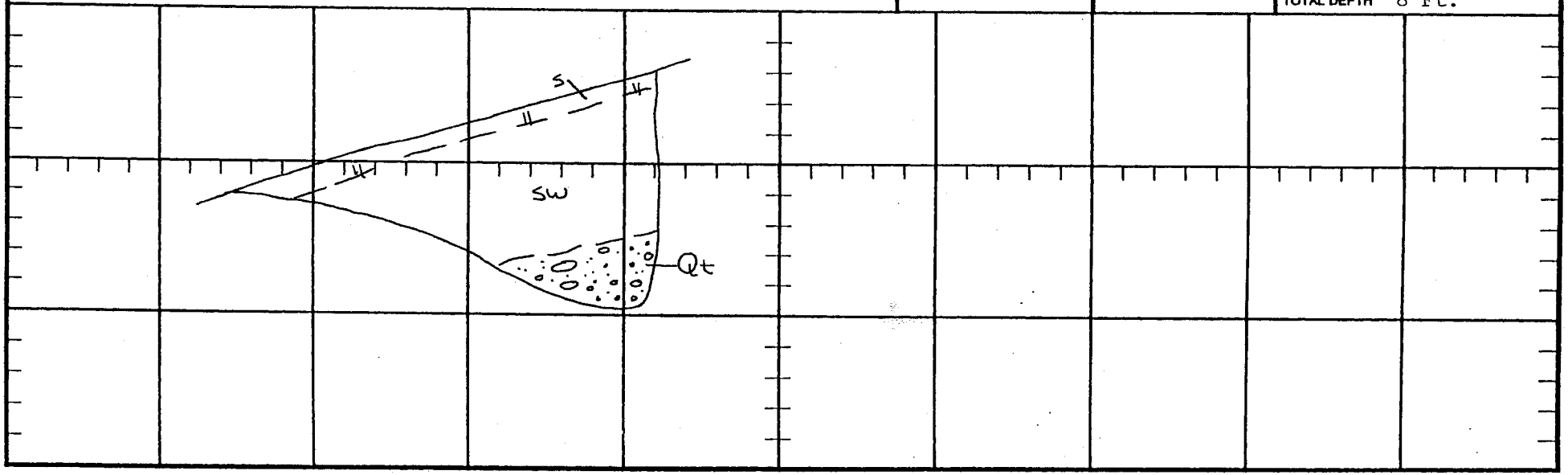
PROJECT Panhandle

DATE 4/4/03

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 6" SOIL; s, Light greyish-brown; fine- to medium-grained, silty sand with minor gravel; loose; dry 6" - 5' SLOPEWASH; sw, Moderate reddish-brown, fine-grained clayey sand to sandy clay with ~5% gravel and cobbles 5 - 8' QUATERNARY TERRACE; Qt, Moderate yellowish-brown to moderate reddish-brown, medium- to very coarse-grained, gravelly sand with 10-20% rounded granitic cobbles (cobbles range up to about 10" maximum dimension); friable; damp			No Ground Water No Caving TOTAL DEPTH 8 Ft.

SCALE 1" = 5'

N 47 W



ALLAN E. SEWARD

JOB NO. 98-1571-9

LOGGED BY CJS

Trench Log No. 15

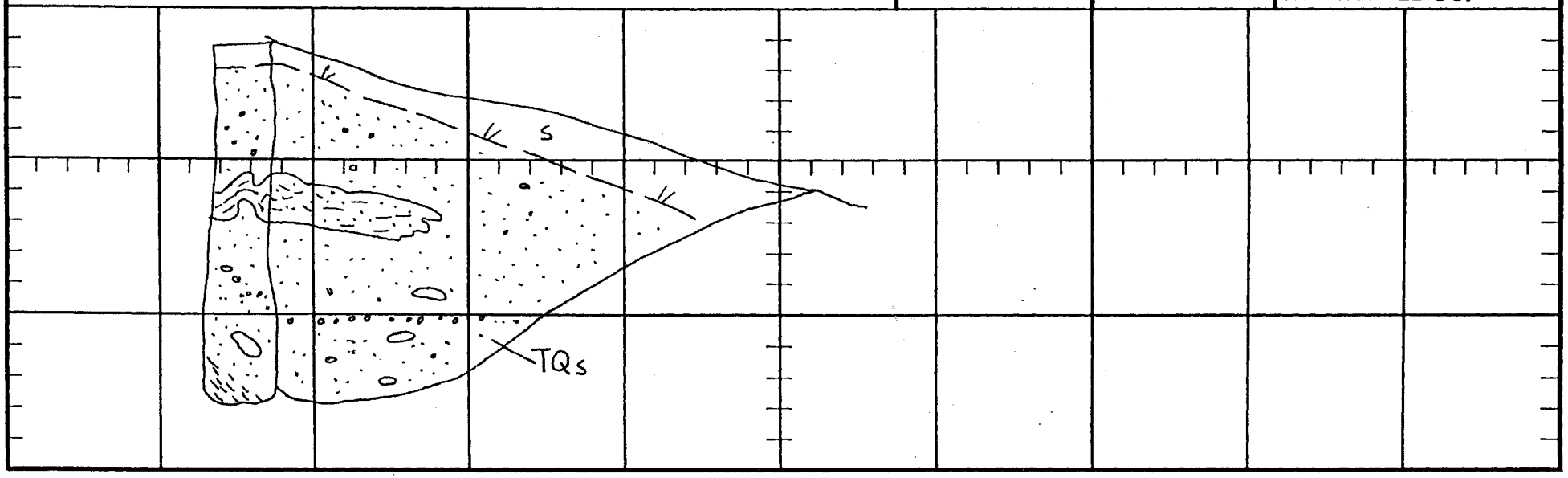
PROJECT Panhandle

DATE 4/4/03

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 12" SOIL; s, Moderate brown to moderate reddish-brown; fine- to medium-grained silty to clayey sand with minor gravel; loose; dry 12" - 12' BEDROCK; TQs, Moderate yellow-brown, medium- to coarse-grained, pebbly to cobbly sandstone and moderate reddish-brown sandy siltstone; deeply weathered; damp; bedding poorly defined	N85E,38NW		No Ground Water No Caving TOTAL DEPTH 12 Ft.

SCALE 1" = 5'

N 80 W



ALLAN E. SEWARD

JOB NO. 98-1571-9 PROJECT Panhandle

LOGGED BY CJS

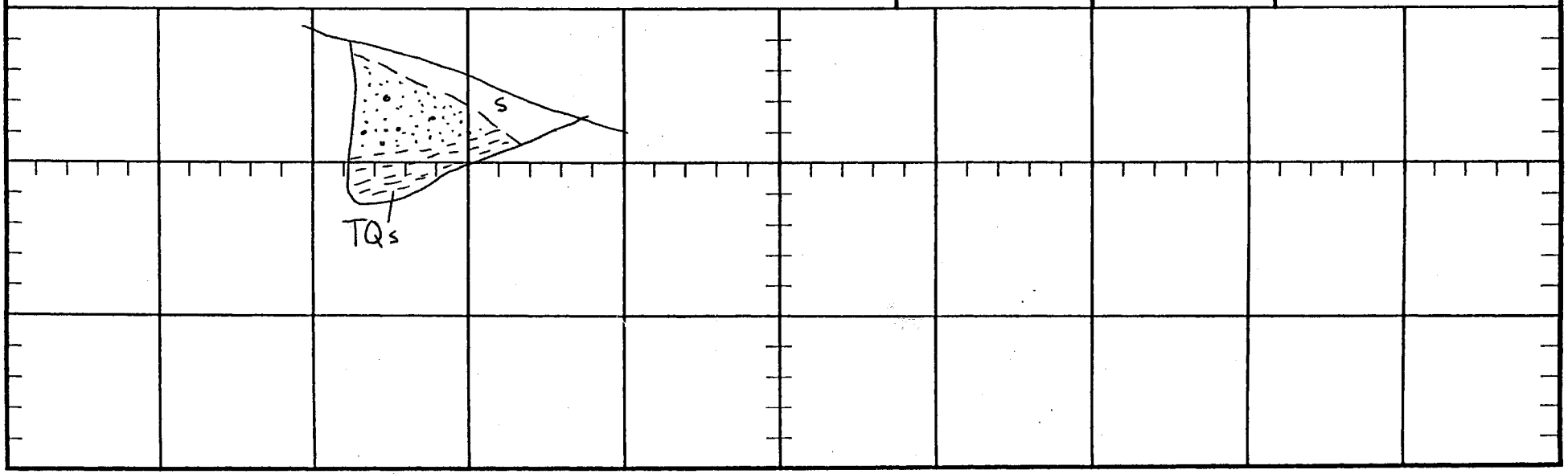
Trench Log No. 16

DATE 4/4/03

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 6" SOIL; s, Light-brown to light yellow-brown; fine- to coarse-grained silty sand with gravel; loose; dry			
6" - 5.5' BEDROCK; TQs, Light- to moderate-yellow-brown, coarse-grained, pebbly sandstone, and moderate reddish-brown, fine-grained, silty sandstone to sandy silstone; hard to very hard; damp	Due North 4° East		Refusal at 5.5' No Ground Water No Caving TOTAL DEPTH 5.5 Ft.

SCALE 1" = 5'

N 70 E



ALLAN E. SEWARD

JOB NO. 98-1571-9

PROJECT Panhandle

LOGGED BY CJS

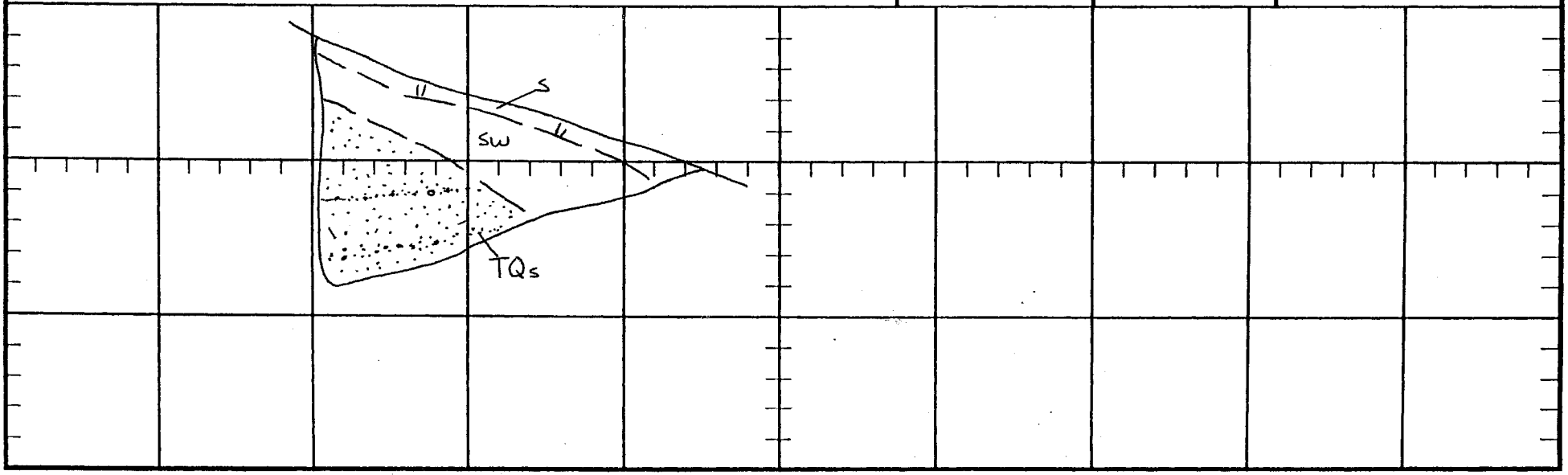
Trench Log No. 17

DATE 4/4/03

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 12" SOIL; s, Moderate brown, fine- to medium-grained, silty sand with minor gravels, loose; damp			
12" - 2.5' SLOPEWASH; sw, Moderate reddish-brown, fine- to medium-grained, silty sand with gravel; moderately dense; damp			
2.5 - 8' BEDROCK; TQs, Moderate yellow-brown to yellow, medium- to very coarse-grained, pebbly sandstone; hard; damp; bedding defined by pebble lineations	N55W, 9NE		No Ground Water No Caving TOTAL DEPTH 8 Ft.

SCALE 1" = 5'

N 37 W



ALLAN E. SEWARD

JOB NO. 98-1571-9 PROJECT Panhandle

LOGGED BY CJS

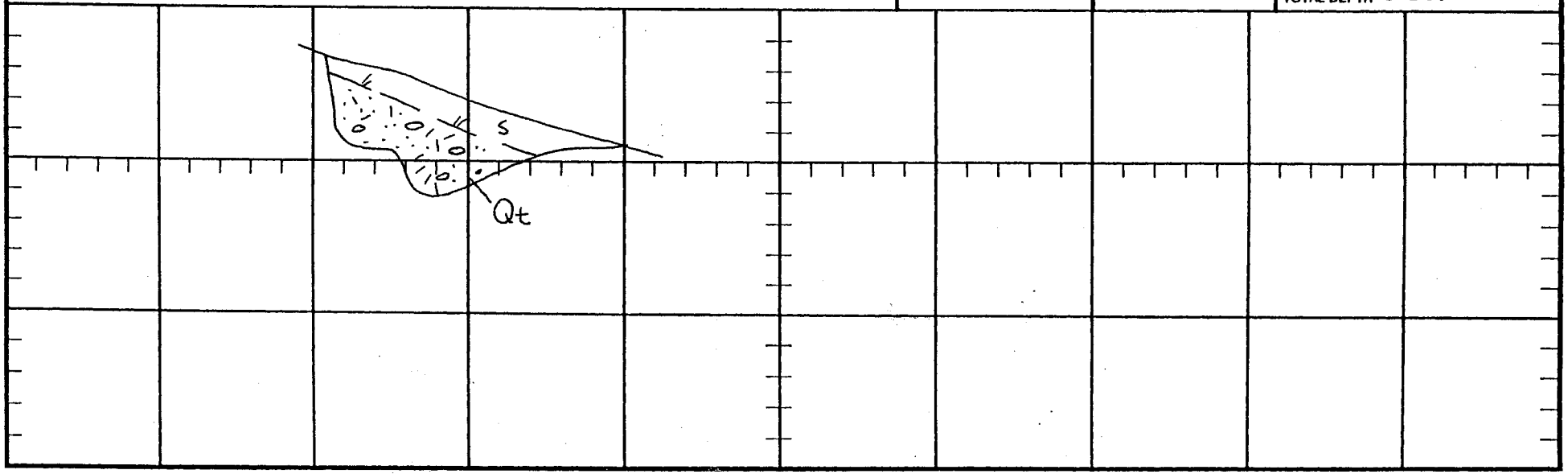
Trench Log No. 18

DATE 4/4/03

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 12" SOIL; s, Dark-brown, fine-grained, silty to clayey sand with gravel; loose; damp 12" - 5' QUATERNARY TERRACE; Qt, Moderate to dark reddish-brown, medium- to coarse-grained clayey sand with 5-10% rounded granitic and volcanic cobbles; very dense; damp			No Ground Water No Caving TOTAL DEPTH 5 Ft.

SCALE 1" = 5'

N 23 E



ALLAN E. SEWARD

JOB NO. 98-1571-9

PROJECT Panhandle

LOGGED BY CJS

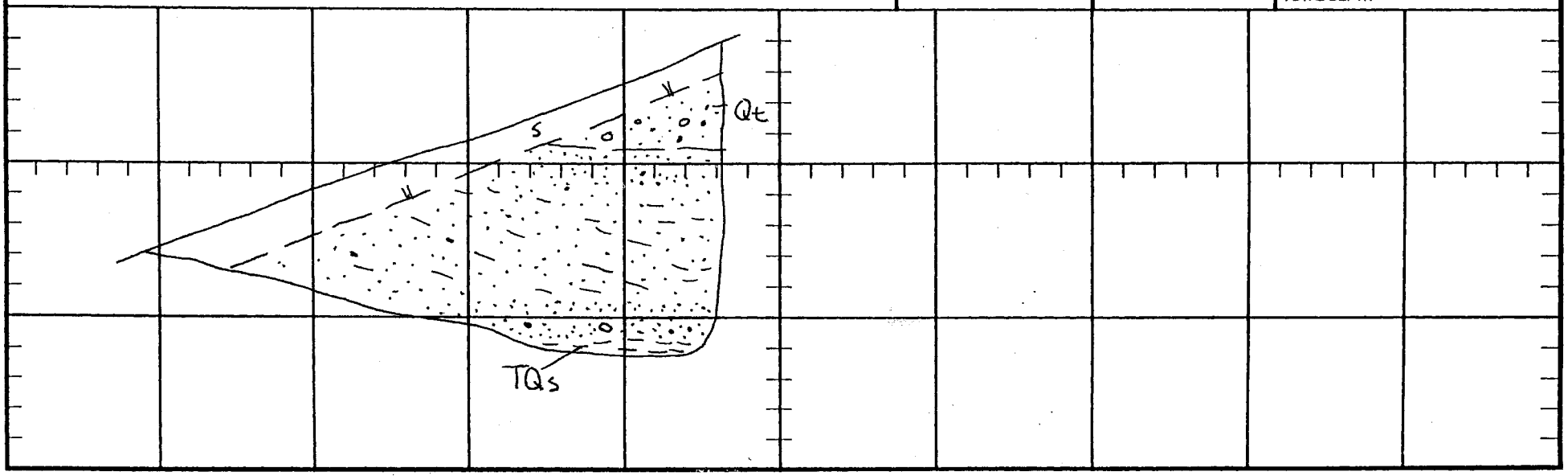
Trench Log No. 19

DATE 4/4/03

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 12" SOIL; s, Light- to moderate-brown, fine- to medium-grained, silty to clayey sand with scattered pebbles and cobbles; loose; dry to damp			
12" - 3' QUATERNARY TERRACE; Qt, Moderate-brown, fine- to coarse-grained, silty sand with 10% pebbles and cobbles; dense; damp; lower contact approximately horizontal			
3 - 10' BEDROCK; TQs, Pale greenish-gray, medium-grained, pebbly sandstone and moderate reddish-brown silty sandstone to sandy siltstone; locally clayey; moderately hard; damp	N58W,21NE		
			No Ground Water No Caving TOTAL DEPTH 10 Ft.

SCALE 1" = 5'

N 55 W



ALLAN E. SEWARD

JOB NO. 98-1571-9 PROJECT Panhandle

LOGGED BY CJS

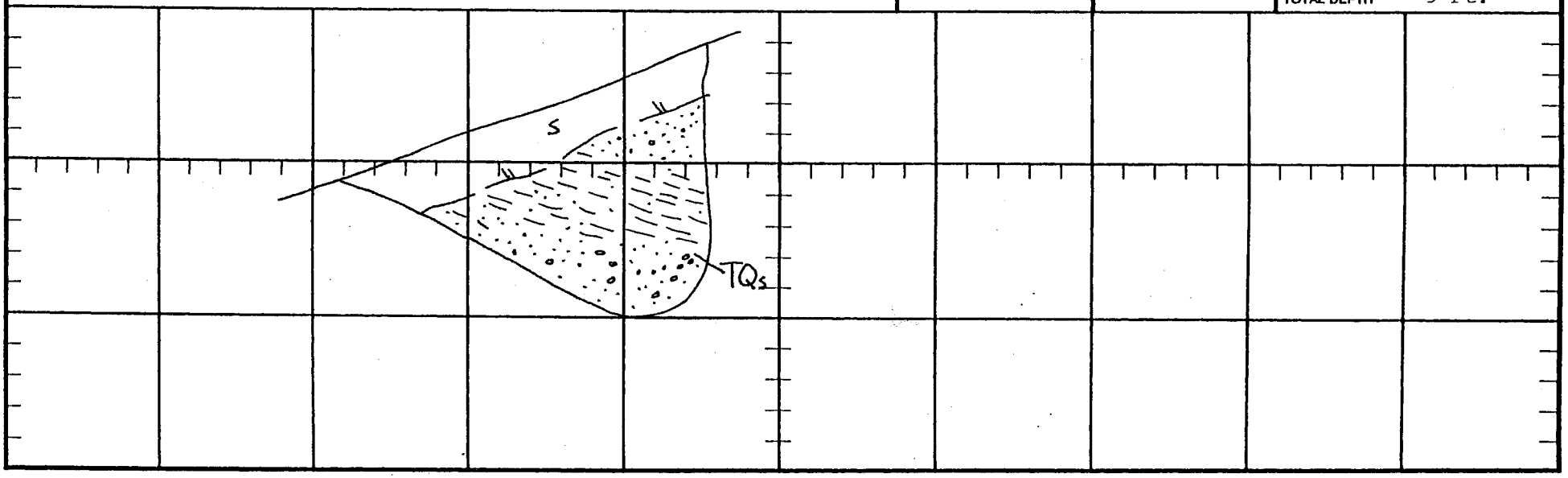
Trench Log No. 20

DATE 4/4/03

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 1.5' SOIL; s, Moderate grayish-brown, fine-grained silty sand with pebbles and cobbles; loose; dry 1.5 - 9' BEDROCK; TQs, Moderate yellow to yellowish-gray, medium- to coarse-grained, pebbly sandstone and moderate reddish-brown sandy mudstone; moderately hard; damp	N66W,18NE		No Ground Water No Caving TOTAL DEPTH 9 Ft.

SCALE 1" = 5'

N 35 W



ALLAN E. SEWARD

JOB NO. 98-1571-9

LOGGED BY CJS

Trench Log No. 21

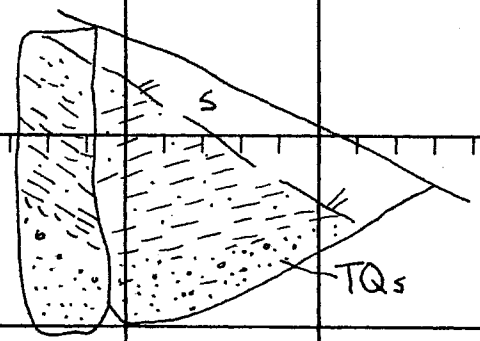
PROJECT Panhandle

DATE 4/4/03

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 6" SOIL; s, Moderate-brown, fine-grained, silty sand, loose; dry 6" - 8' BEDROCK; TQs, Moderate reddish-brown, silty sandstone and greenish-gray, fine- to medium-grained slightly pebbly sandstone; moderately hard; damp	N34W,56NE		No Ground Water No Caving TOTAL DEPTH 8 Ft.

SCALE 1" = 5'

N 32 W



ALLAN E. SEWARD

JOB NO. 98-1571-9 PROJECT Panhandle

LOGGED BY CJS

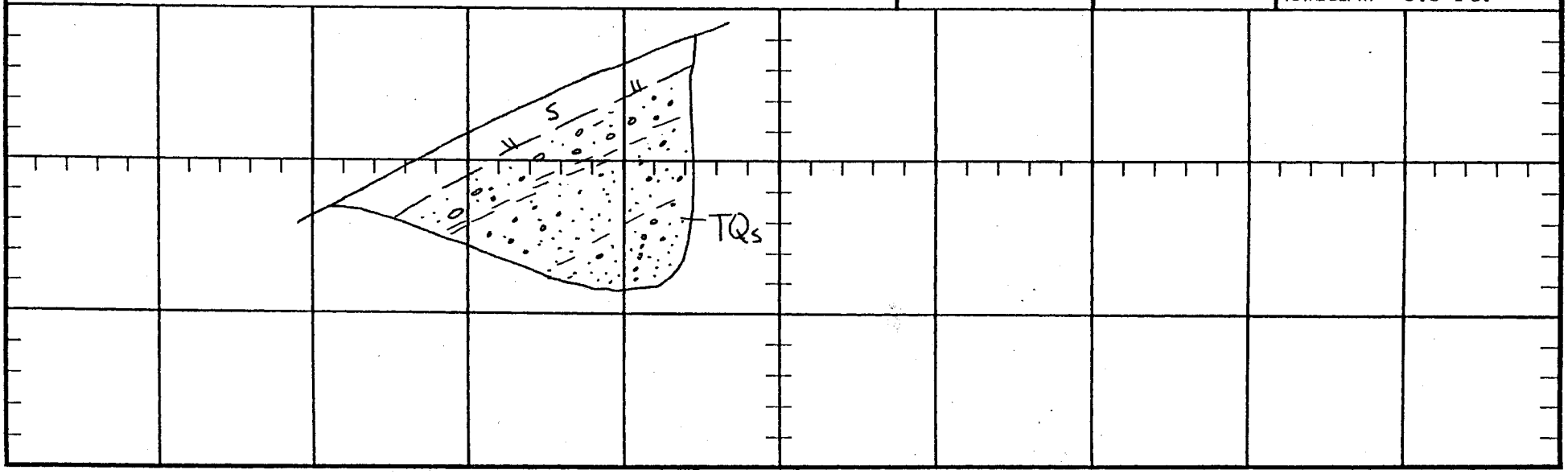
Trench Log No. 22

DATE 4/4/03

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 12" SOIL; s, Moderate brown, fine- to medium-grained, silty sand, with gravel; loose; dry			
12" - 8.5' BEDROCK; TQs, Moderate grayish-yellow, medium- to coarse-grained sandstone to pebbly sandstone; hard to very hard; damp	N63W,39NE		No Ground Water No Caving TOTAL DEPTH 8.5 Ft.

SCALE 1" = 5'

N 50 E



ALLAN E. SEWARD

JOB NO. 98-1571-9

PROJECT Panhandle

LOGGED BY CJS

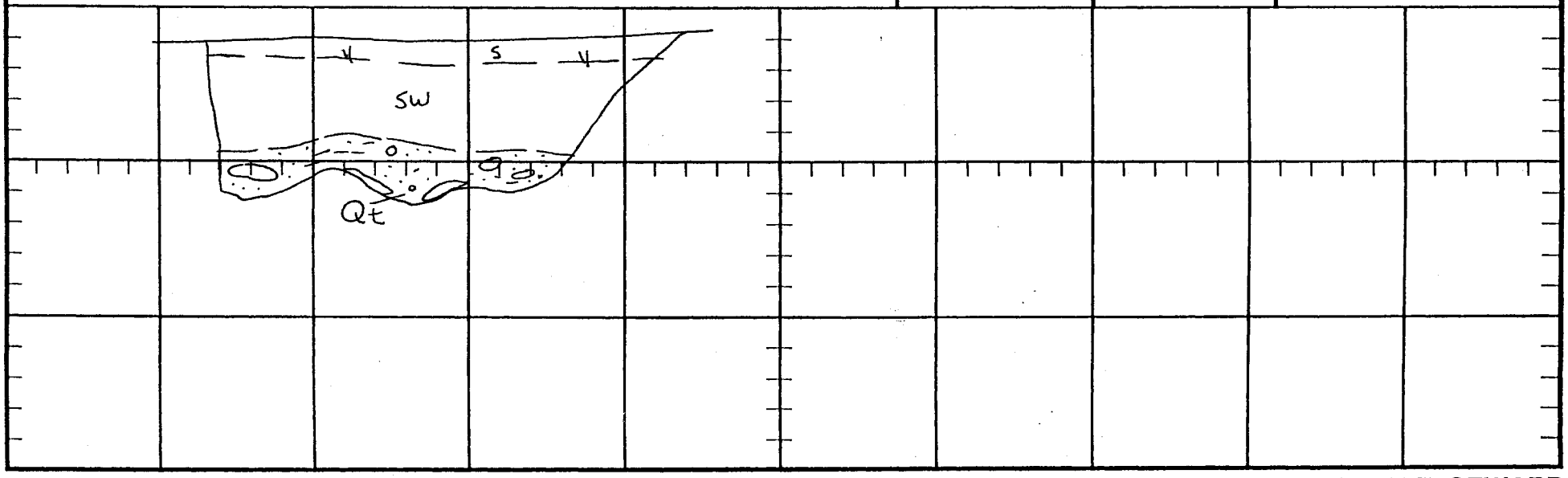
Trench Log No. 23

DATE 4/4/03

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 12" SOIL; s, Moderate greyish-brown, fine- to medium-grained, silty sand, loose; dry			
12" - 4' SLOPEWASH; sw, Moderate reddish-brown, fine- to medium-grained silty sand with minor clay and scattered cobbles; moderately dense; damp to moist			
4 - 5' QUATERNARY TERRACE; Qt, Moderate-brown, fine- to medium-grained, silty to clayey sand with cobbles and boulders; very dense; damp to moist; refusal on large boulders at 5 ft.			Possibly Qls affected Refusal on boulders at 5 ft. No Ground Water No Caving TOTAL DEPTH 5 Ft.

SCALE 1" = 5'

N 45 W



ALLAN E. SEWARD

JOB NO. 98-1571-9 PROJECT Panhandle

LOGGED BY CJS

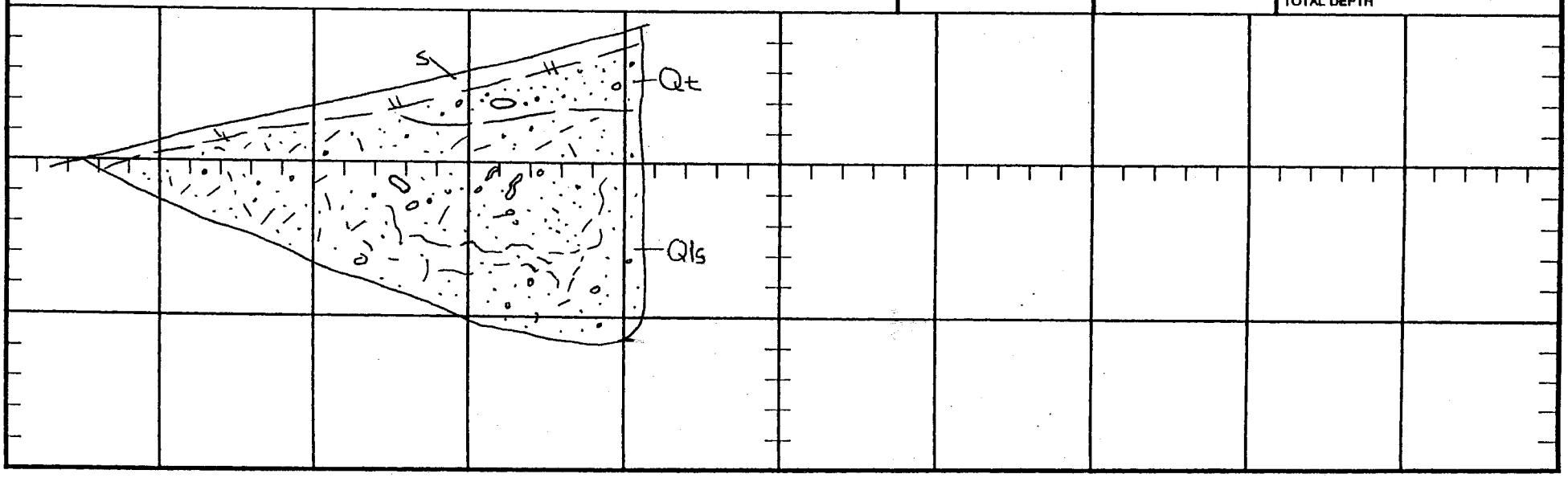
Trench Log No. 24

DATE 4/4/03

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 6" SOIL; s, Moderate greyish-brown, fine-grained, silty sand; loose; dry 6" - 2' QUATERNARY TERRACE; Qt, Moderate yellow-brown; fine-coarse-grained silty sand with pebbles and cobbles; moderately dense to dense; damp 2 - 10' LANDSLIDE DEBRIS; Qls, Pale yellow to pale yellow-brown; fine- to medium-grained silty sandstone; pebbly sandstone and reddish-brown sandy siltstone; highly fractured with mixing of lithologies common; carbonate stringers pervasive; clasts oriented randomly, overall only moderately dense; damp			No Ground Water No Caving TOTAL DEPTH 10 Ft.

SCALE 1" = 5'

N 10 W



ALLAN E. SEWARD

JOB NO. 98-1571-9

LOGGED BY CJS

PROJECT Panhandle

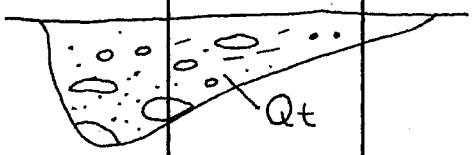
DATE 4/4/03

Trench Log No. 25

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 4' QUATERNARY TERRACE; Qt, Moderate reddish-brown, fine- to coarse-grained silty to clayey sand with 10-20% rounded granitic cobbles and boulders that range up to 24" maximum dimension; very dense; dry to slightly damp			No Ground Water No Caving TOTAL DEPTH 4 Ft.

SCALE 1" = 5'

N 20 W



ALLAN E. SEWARD

JOB NO. 98-1571-9

LOGGED BY CJS

Trench Log No. 26

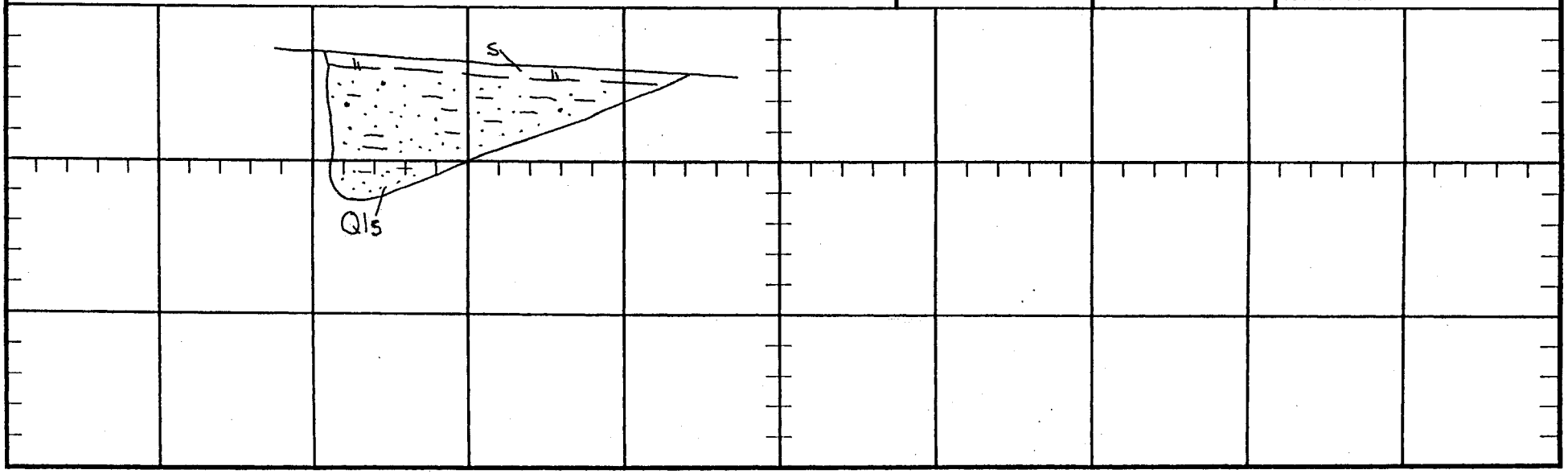
PROJECT Panhandle

DATE 4/4/03

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 6" SOIL; s, Moderate reddish-brown to moderate yellowish-brown, fine- to medium-grained, silty sand; loose; dry 6" - 4.5' LANDSLIDE DEBRIS; Qls, Moderate reddish-brown, sandy mudstone and pale yellowish-gray medium-grained sandstone; contact poorly defined-gradational over 12"; hard to very hard; damp	E-W, 15S (Poor)		No Ground Water No Caving TOTAL DEPTH 4.5 Ft.

SCALE 1" = 5'

N 35 E



ALLAN E. SEWARD

JOB NO. 98-1571-9

LOGGED BY CJS

Trench Log No. 27

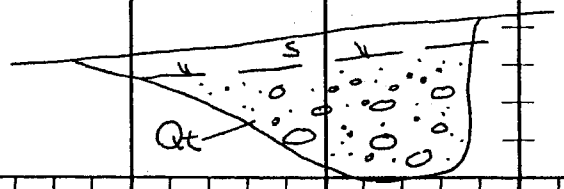
PROJECT Panhandle

DATE 4/4/03

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 12" SOIL; s, Moderate grayish-brown, fine- to medium-grained silty sand; loose; dry 12" - 4' QUATERNARY TERRACE; Qt, Moderate reddish-brown fine- to coarse-grained silty to clayey sand with 10-15% cobbles; dense to very dense; damp			Refusal on cobbles at 4 ft. No Ground Water No Caving TOTAL DEPTH 4 Ft.

SCALE 1" = 5'

N 20 W

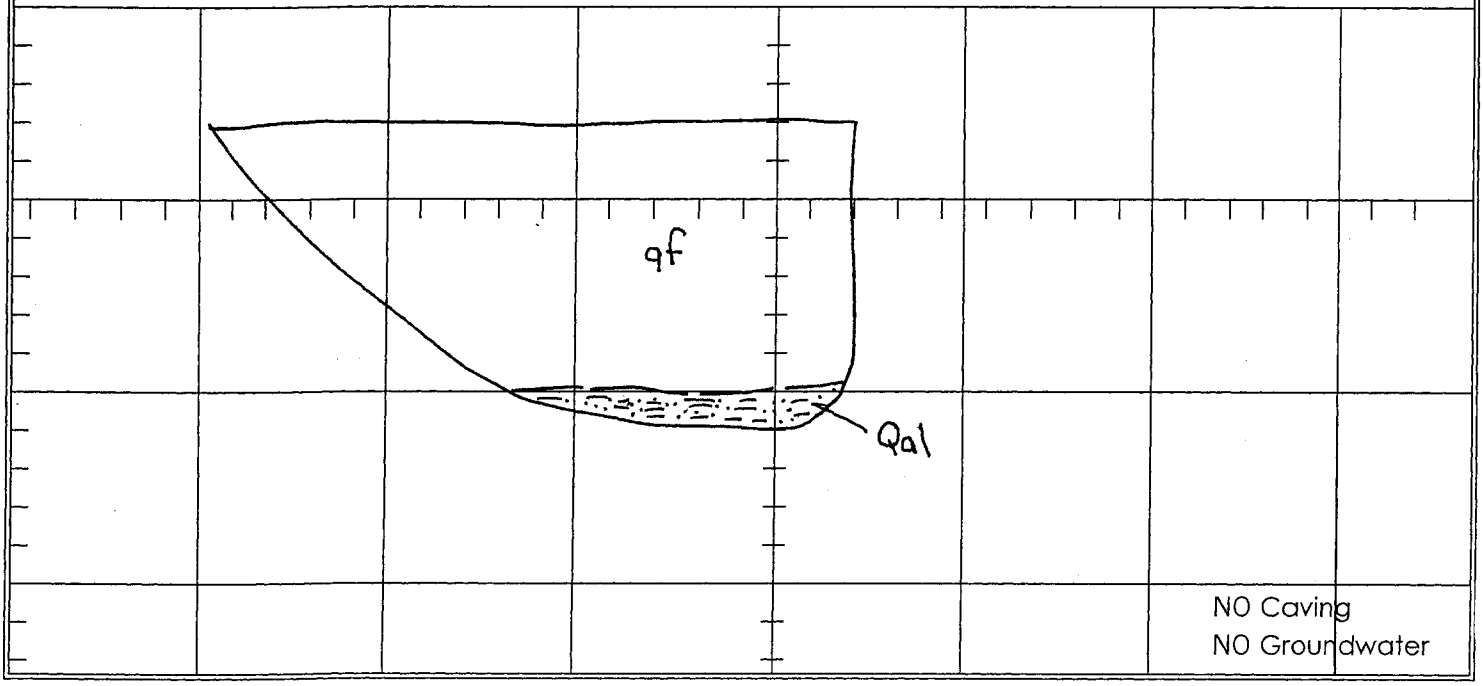


ALLAN E. SEWARD

CLIENT: Newhall Land	JOB NO: 03-1571-4	**TRENCH LOG NO. T-28**
PROJECT: Tentative Tract 53425, River Park City of Santa Clarita, California	DATE: 4/4/03	
	LOGGED BY: VCG	
	EXCAVATED: 3/20/2000	
EXCAVATION METHOD: Rubber-Tired Backhoe w/24" Bucket	ELEVATION:	

DEPTH (feet)	SAMPLE TYPE	SAMPLE NUMBER	GRAPHIC LOG	USCS SYMBOL	DESCRIPTION	ATTITUDES	LABORATORY TESTS: Moisture Content (%)	LABORATORY TESTS: Dry Density (pcf)	LABORATORY TESTS: Other Tests
0					**ARTIFICIAL FILL; af, (0-7 ft.)** @ 0' Medium to dark-brown fine- to coarse grained silty sand with minor gravel; loose; damp				
5					**QUATERNARY ALLUVIUM; Qal, (7-8 ft.)** @ 7' Light reddish-brown silty sand with scattered pebbles; contact vague and indistinct				
10									
15									
20									

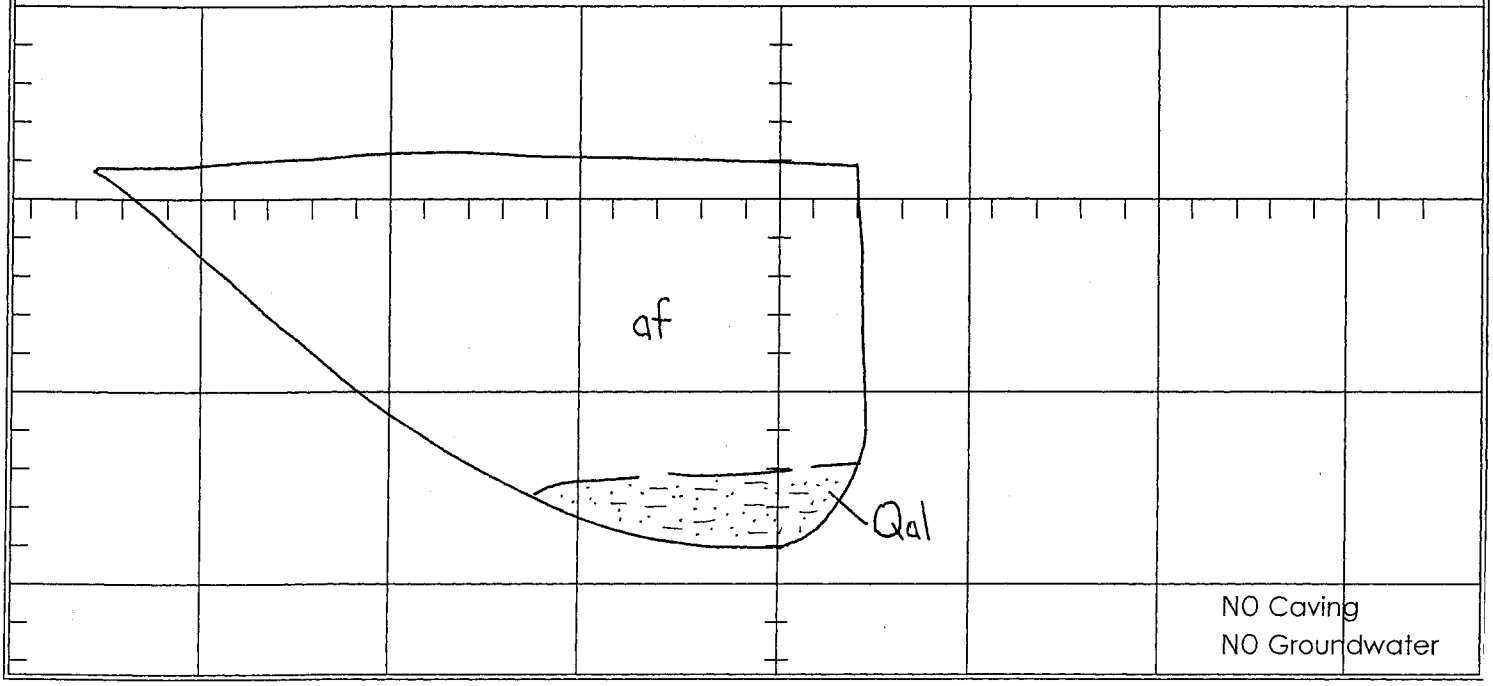
TOTAL DEPTH: 8 feet ←N34W SCALE: 1 inch = 5 feet



CLIENT: Newhall Land	JOB NO: 03-1571-4	**TRENCH LOG NO. T-29**
PROJECT: River Park Tentative Tract 53425	DATE: 4/4/03 LOGGED BY: VCG EXCAVATED: 3/20/2000	
EXCAVATION METHOD: Rubber-Tired Backhoe w/24" Bucket	ELEVATION:	

DEPTH (feet)	SAMPLE TYPE	SAMPLE NUMBER	GRAPHIC LOG	USCS SYMBOL	DESCRIPTION	ATTITUDES	LABORATORY TESTS: Moisture Content (%)	LABORATORY TESTS: Dry Density (pcf)	LABORATORY TESTS: Other Tests
0					**ARTIFICIAL FILL; af, (0-8 ft.)** @ 0' Medium reddish-brown fine- to coarse grained silty sand; loose; damp				
5									
					QUATERNARY ALLUVIUM; Qal, (8-10 ft.) @ 8' Dark gray to black to light gray sand and silty sand; loose to moderately dense; damp				
10									
15									
20									

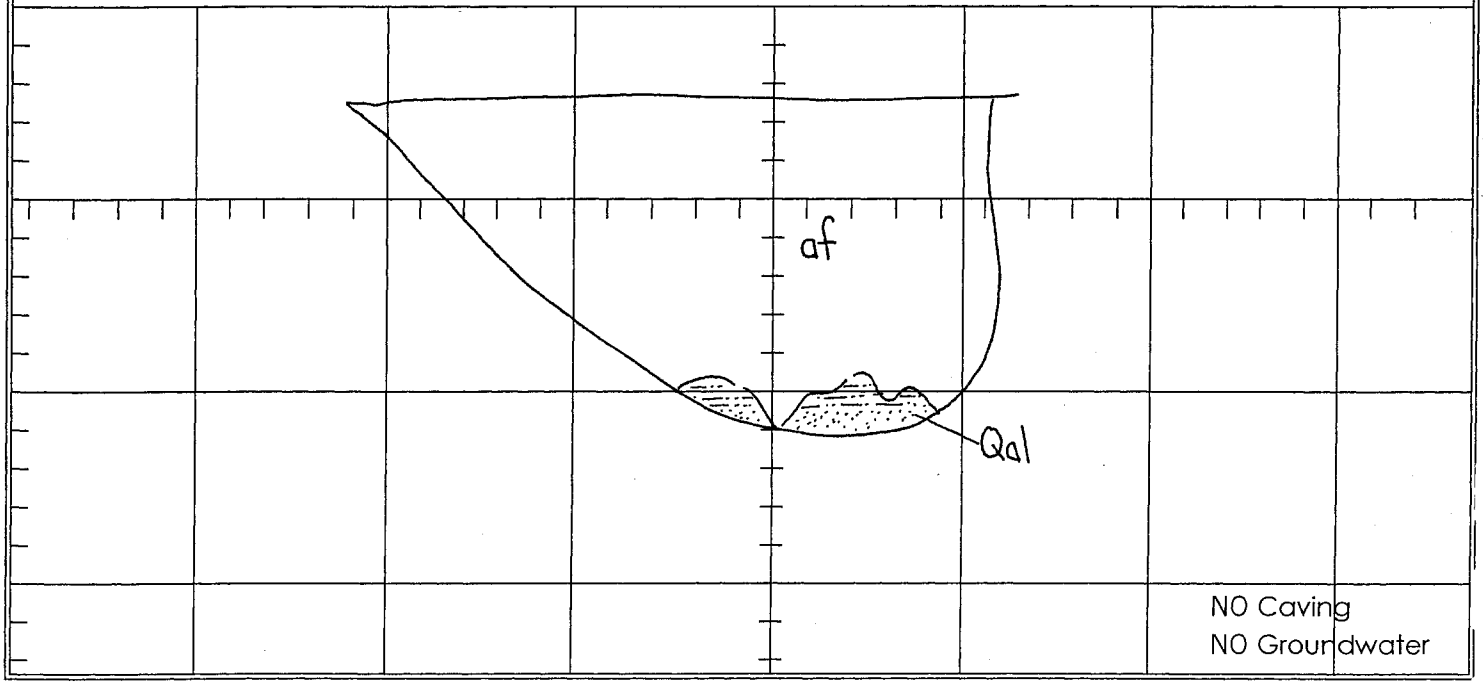
TOTAL DEPTH: 10 feet ←N80W SCALE: 1 inch = 5 feet



CLIENT: Newhall Land	JOB NO: 03-1571-4	**TRENCH LOG NO. T-30**
PROJECT: River Park Tentative Tract 53425	DATE: 4/4/03	
	LOGGED BY: VCG	
	EXCAVATED: 3/20/2000	
EXCAVATION METHOD: Rubber-Tired Backhoe w/24" Bucket	ELEVATION:	

DEPTH (feet)	SAMPLE TYPE	SAMPLE NUMBER	GRAPHIC LOG	USCS SYMBOL	DESCRIPTION	ATTITUDES	LABORATORY TESTS: Moisture Content (%)	LABORATORY TESTS: Dry Density (pcf)	LABORATORY TESTS: Other Tests
0					**ARTIFICIAL FILL; af, (0-8 ft.)** @ 0' Medium- to light reddish-brown to gray fine- to coarse-grained silty sand with scattered pebbles; loose damp				
5					**QUATERNARY ALLUVIUM; Qal, (8-9 ft.)** @ 8' Light gray and tan fine-grained sandy silt and sand; loose; damp COMMENTS: -Contact very irregular between Qal & af				
10									
15									
20									

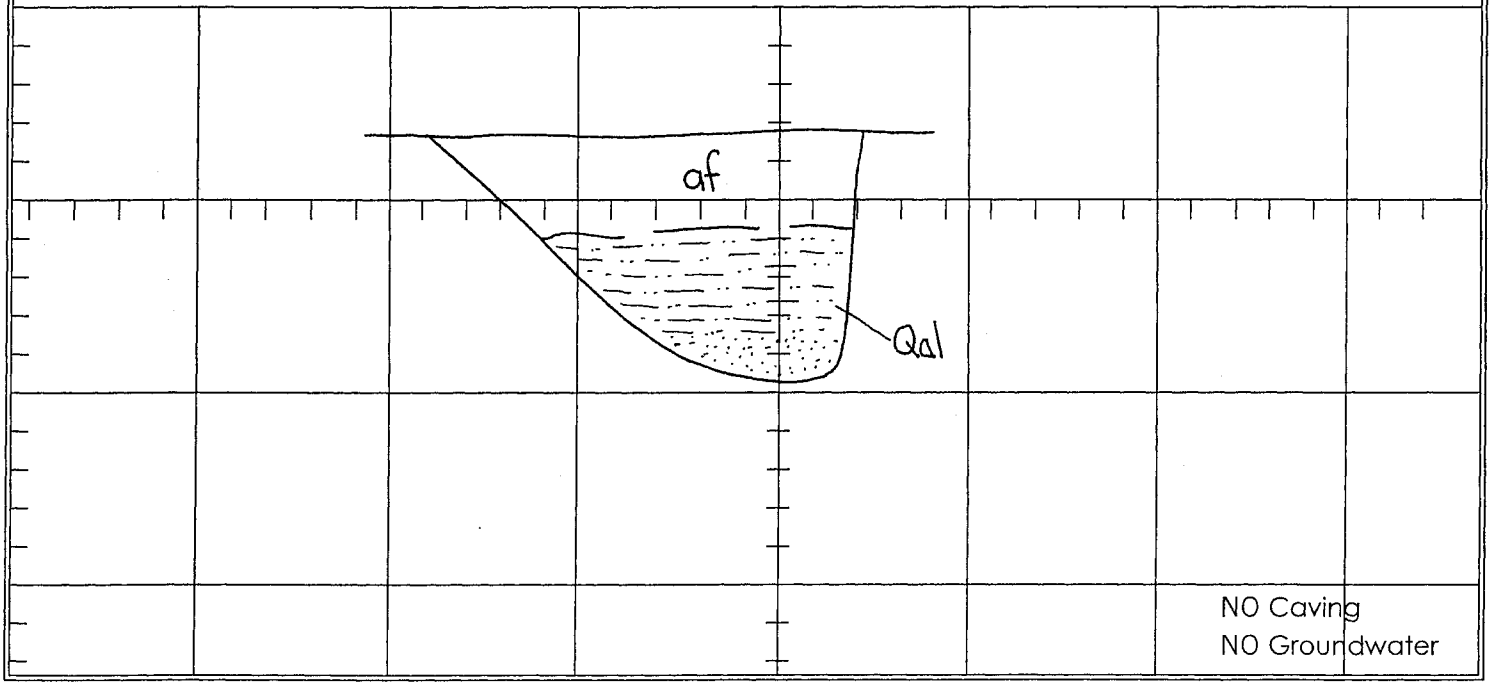
TOTAL DEPTH: 9 feet ←N73W SCALE: 1 inch = 5 feet



CLIENT: Newhall Land	JOB NO: 03-1571-4	**TRENCH LOG NO. T-31**
PROJECT: River Park Tentative Tract 53425	DATE: 4/4/03	
	LOGGED BY: VCG	
	EXCAVATED: 3/20/2000	
EXCAVATION METHOD: Rubber-Tired Backhoe w/24" Bucket	ELEVATION:	

DEPTH (feet)	SAMPLE TYPE	SAMPLE NUMBER	GRAPHIC LOG	USCS SYMBOL	DESCRIPTION	ATTITUDES	LABORATORY TESTS: Moisture Content (%)	LABORATORY TESTS: Dry Density (pcf)	LABORATORY TESTS: Other Tests
0					**ARTIFICIAL FILL; af, (0-2.5 ft.)** @ 0' Yellowish-bronw silty sand fine- to coarse-grained; loose; damp **QUATERNARY ALLUVIUM; Qal, (2.5-6 ft.)** @ 2.5' Medium-brown fine-grained sandy silt/silty sand; soft; damp @ 5' Tan medium- to coarse-grained sand; loose; damp; friable				
5									
10									
15									
20									

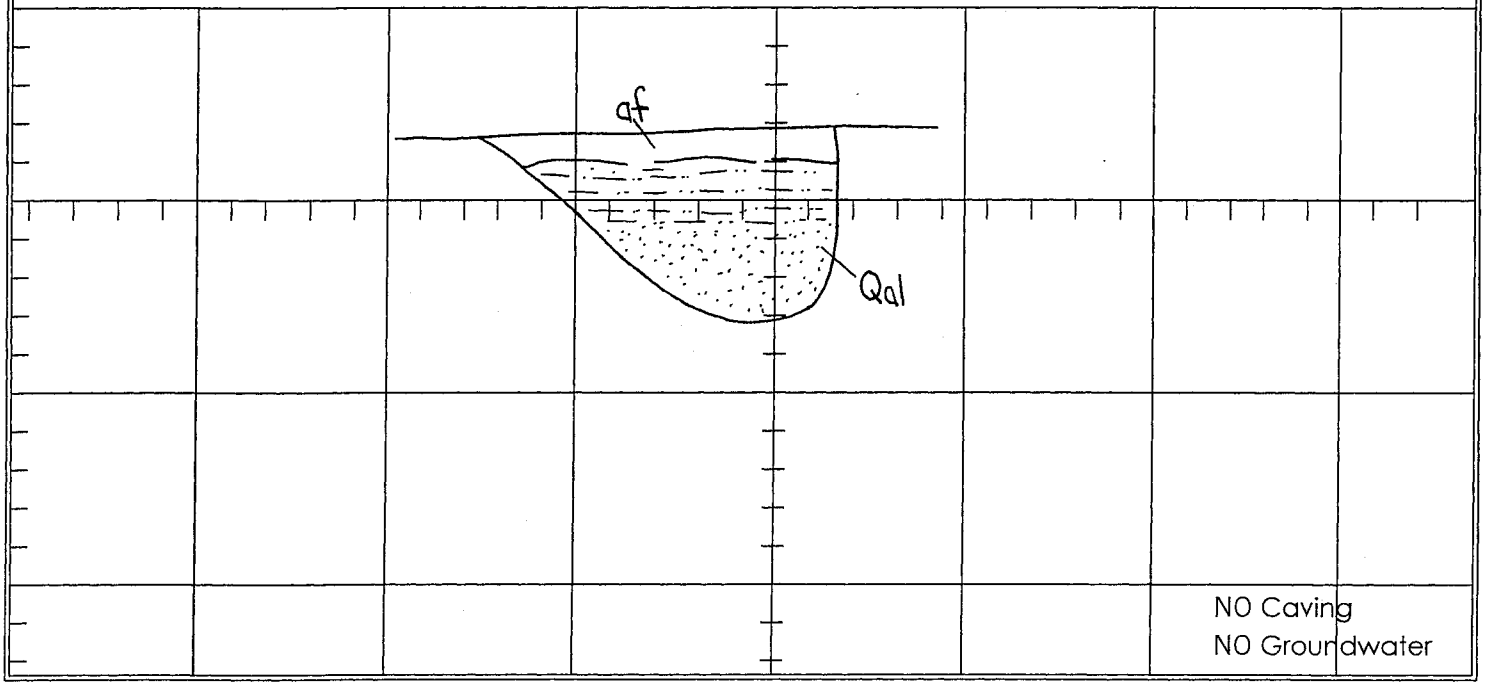
TOTAL DEPTH: 6 feet ←N75W SCALE: 1 inch = 5 feet



CLIENT: Newhall Land	JOB NO: 03-1571-4	**TRENCH LOG NO. T-32**
PROJECT: River Park Tentative Tract 53425	DATE: 4/4/03	
	LOGGED BY: VCG	
	EXCAVATED: 3/20/2000	
EXCAVATION METHOD: Rubber-Tired Backhoe w/24" Bucket	ELEVATION:	

DEPTH (feet)	SAMPLE TYPE	SAMPLE NUMBER	GRAPHIC LOG	USCS SYMBOL	DESCRIPTION	ATTITUDES	LABORATORY TESTS: Moisture Content (%)	LABORATORY TESTS: Dry Density (pcf)	LABORATORY TESTS: Other Tests
0					**ARTIFICIAL FILL; af, (0-1 ft.)** @ 0' Light reddish-brown fine-grained silty sand; loose; damp **QUATERNARY ALLUVIUM; Qal, (1-5 ft.)** @ 1' Medium- to grayish-brown fine-grained silty sand; loose; damp @ 2.5' Medium-grained sand; friable @ 3.5' - fine-grained sand				
5									
10									
15									
20									

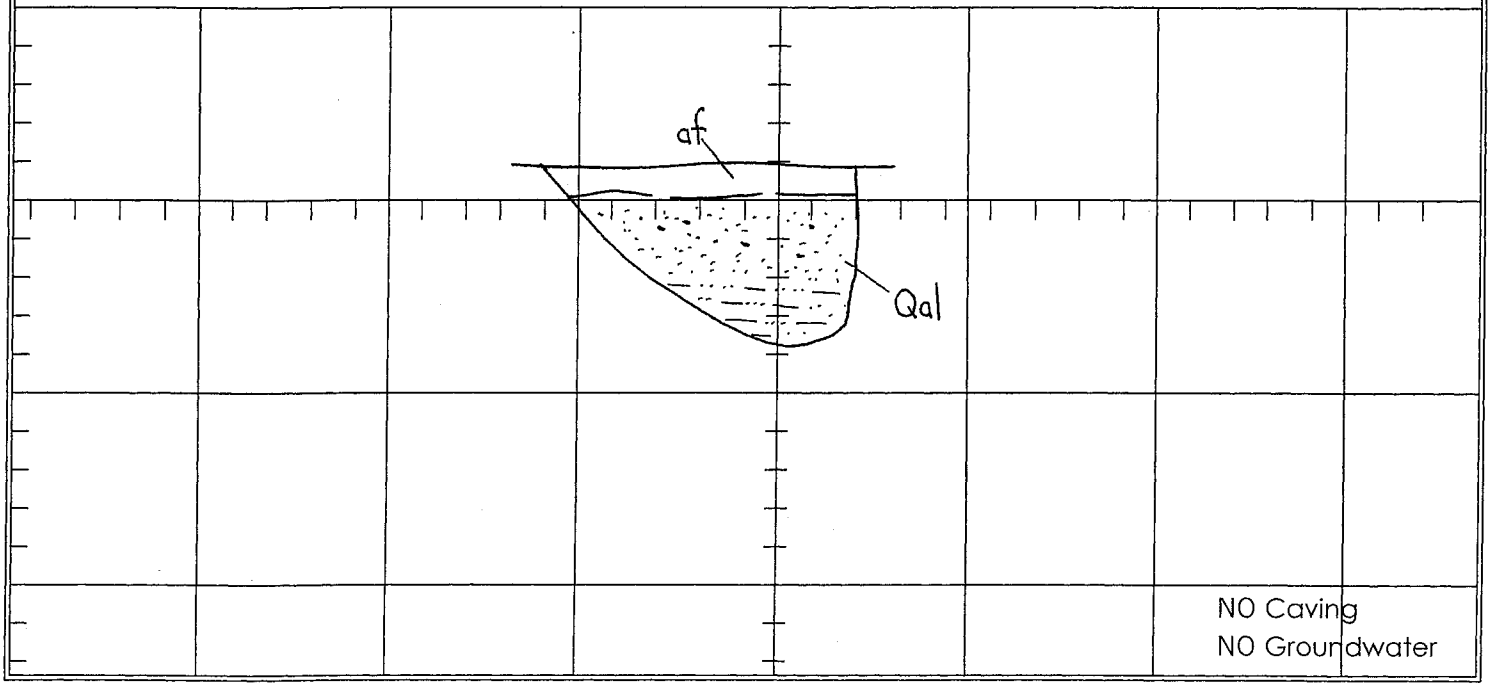
TOTAL DEPTH: 5 feet ←N45W SCALE: 1 inch = 5 feet



CLIENT: Newhall Land	JOB NO: 03-1571-4	**TRENCH LOG NO. T-33**
PROJECT: River Park Tentative Tract 53425	DATE: 4/4/03	
	LOGGED BY: VCG	
	EXCAVATED: 3/20/2000	
EXCAVATION METHOD: Rubber-Tired Backhoe w/24" Bucket	ELEVATION:	

DEPTH (feet)	SAMPLE TYPE	SAMPLE NUMBER	GRAPHIC LOG	USCS SYMBOL	DESCRIPTION	ATTITUDES	LABORATORY TESTS: Moisture Content (%)	LABORATORY TESTS: Dry Density (pcf)	LABORATORY TESTS: Other Tests
0					**ARTIFICIAL FILL; af, (0-1 ft.)** @ 0' Yellowish-brown fine- to coarse-grained silty sand with minor gravel; loose; damp **QUATERNARY ALLUVIUM; Qal, (1-4.5 ft.)** @ 1' Gray to tan medium- to coarse-grained pebbly sand with minor gravel; friable; moderately dense @ 3' Grayish-brown fine-grained silty sand				
5									
10									
15									
20									

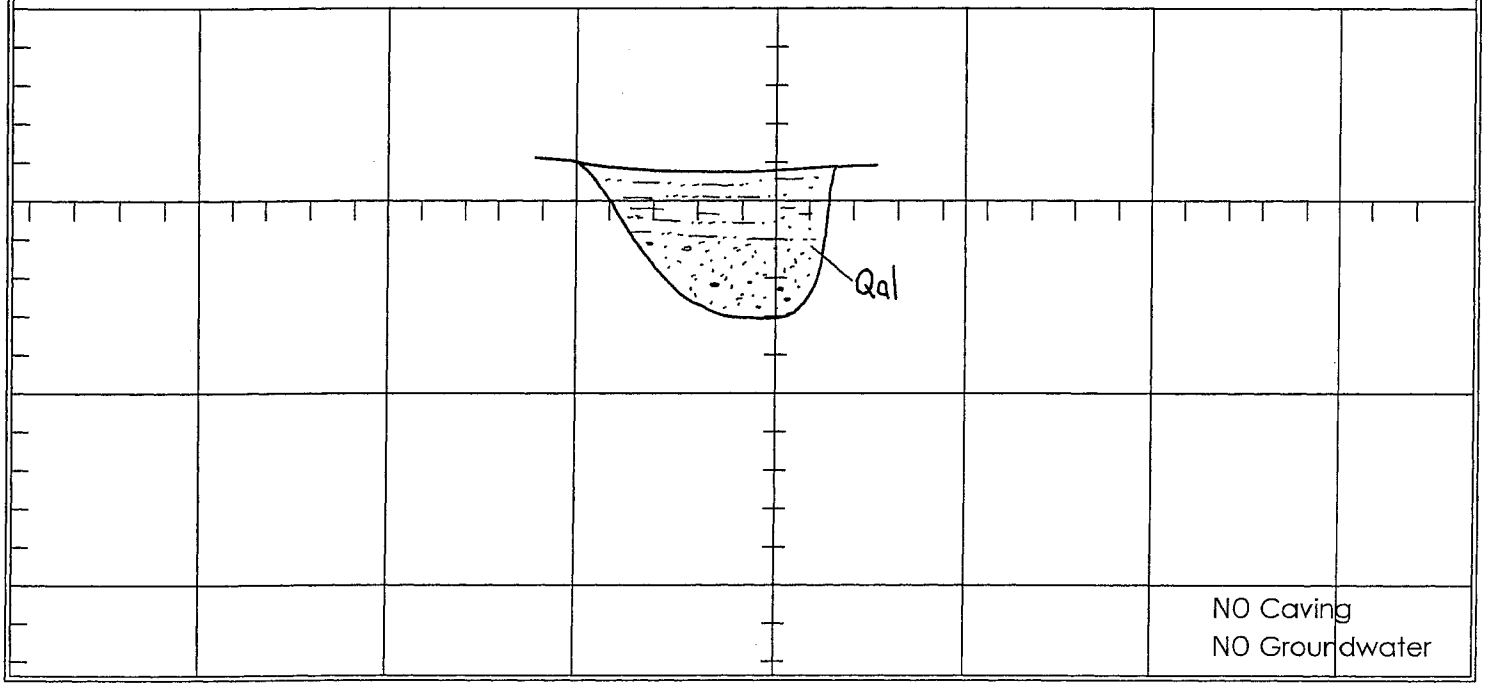
TOTAL DEPTH: 5 feet N45W→ SCALE: 1 inch = 5 feet



CLIENT: Newhall Land	JOB NO: 03-1571-4	**TRENCH LOG NO. T-34**
PROJECT: River Park Tentative Tract 53425	DATE: 4/4/03	
	LOGGED BY: VCG	
	EXCAVATED: 3/20/2000	
EXCAVATION METHOD: Rubber-Tired Backhoe w/24" Bucket	ELEVATION:	

DEPTH (feet)	SAMPLE TYPE	SAMPLE NUMBER	GRAPHIC LOG	USCS SYMBOL	DESCRIPTION	ATTITUDES	LABORATORY TESTS: Moisture Content (%)	LABORATORY TESTS: Dry Density (pcf)	LABORATORY TESTS: Other Tests
0					**QUATERNARY ALLUVIUM; Qal, (0-4 ft.)** @ 0' Light-brown fine-grained silty sand with isolated pebbles; loose; dry @ 2' Light-brown to tan medium- to coarse-grained sand and pebbly sand; friable; loose; to moderately dense; damp				
5									
10									
15									
20									

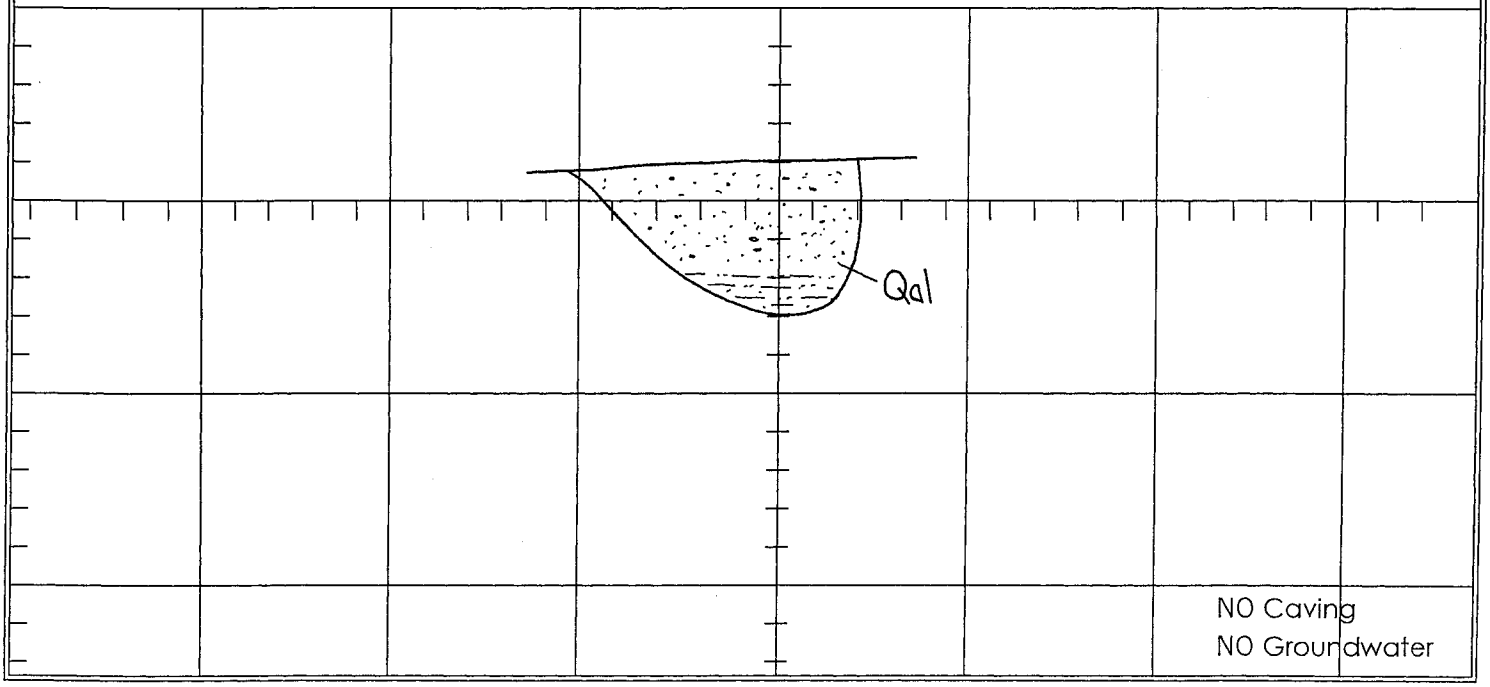
TOTAL DEPTH: 4 feet N40W→ SCALE: 1 inch = 5 feet



CLIENT: Newhall Land	JOB NO: 03-1571-4	**TRENCH LOG NO. T-35**
PROJECT: River Park Tentative Tract 53425	DATE: 4/4/03	
	LOGGED BY: VCG	
	EXCAVATED: 3/20/2000	
EXCAVATION METHOD: Rubber-Tired Backhoe w/24" Bucket	ELEVATION:	

DEPTH (feet)	SAMPLE TYPE	SAMPLE NUMBER	GRAPHIC LOG	USCS SYMBOL	DESCRIPTION	ATTITUDES	LABORATORY TESTS: Moisture Content (%)	LABORATORY TESTS: Dry Density (pcf)	LABORATORY TESTS: Other Tests
0					**QUATERNARY ALLUVIUM; Qal, (0-4 ft.)** @ 0' Light-tan to gray fine- to medium-grained sand; loose to moderately dense; friable @ 3' Fine-grained silty sand with isolated pebbles; firm; damp				
5									
10									
15									
20									

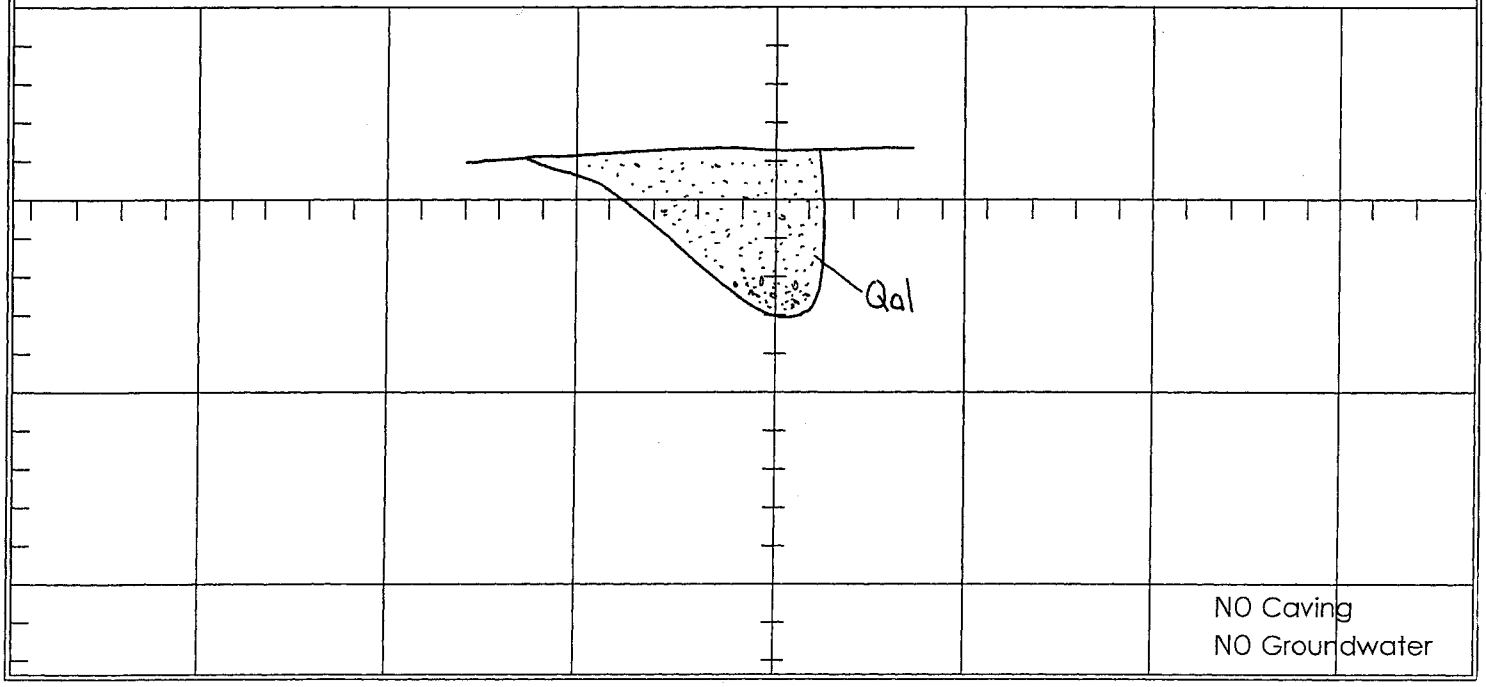
TOTAL DEPTH: 4 feet Due W→ SCALE: 1 inch = 5 feet



CLIENT: Newhall Land	JOB NO: 03-1571-4	**TRENCH LOG NO. T-36**
PROJECT: River Park Tentative Tract 53425	DATE: 4/4/03	
	LOGGED BY: VCG	
	EXCAVATED: 3/20/2000	
EXCAVATION METHOD: Rubber-Tired Backhoe w/24" Bucket	ELEVATION:	

DEPTH (feet)	SAMPLE TYPE	SAMPLE NUMBER	GRAPHIC LOG	USCS SYMBOL	DESCRIPTION	ATTITUDES	LABORATORY TESTS: Moisture Content (%)	LABORATORY TESTS: Dry Density (pcf)	LABORATORY TESTS: Other Tests
0					**QUATERNARY ALLUVIUM; Qal, (0-4 ft.)** @ 0' Tan to light brown fine-grained sand; loose to moderately dense; friable; stratified @ 3' - gravelly sand				
5									
10									
15									
20									

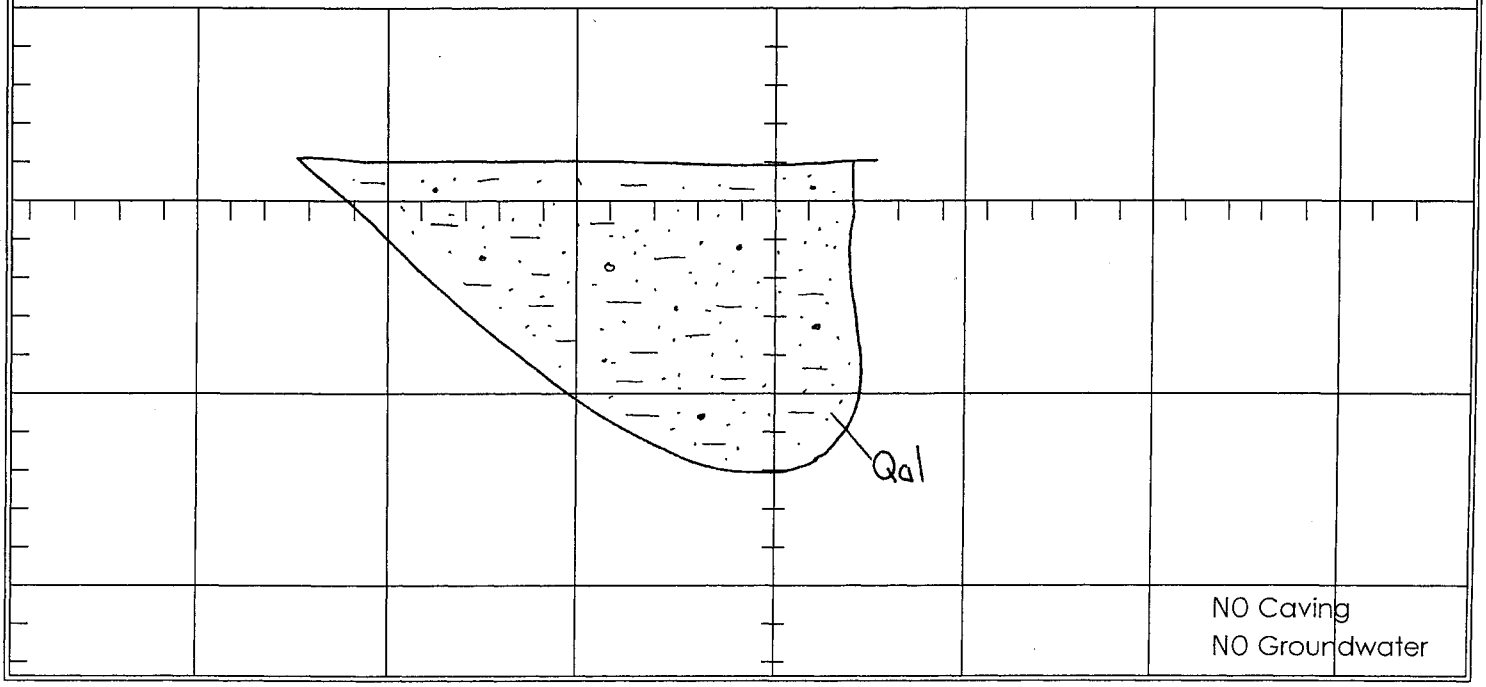
TOTAL DEPTH: 4 feet ←N33E SCALE: 1 inch = 5 feet



CLIENT: Newhall Land		JOB NO: 03-1571-4	**TRENCH LOG NO. T-37**
PROJECT: River Park Tentative Tract 53425		DATE: 4/4/03	
		LOGGED BY: VCG	
		EXCAVATED: 3/20/2000	
EXCAVATION METHOD: Rubber-Tired Backhoe w/24" Bucket		ELEVATION:	

DEPTH (feet)	SAMPLE TYPE	SAMPLE NUMBER	GRAPHIC LOG	USCS SYMBOL	DESCRIPTION	ATTITUDES	LABORATORY TESTS: Moisture Content (%)	LABORATORY TESTS: Dry Density (pcf)	LABORATORY TESTS: Other Tests
0					**QUATERNARY ALLUVIUM; Qal, (0-8 ft.)** @ 0' Dark brown silty sand with isolated pebbles; soft; damp to moist; indistinct stratification				
5									
10					COMMENTS: -Only minor stratification present				
15									
20									

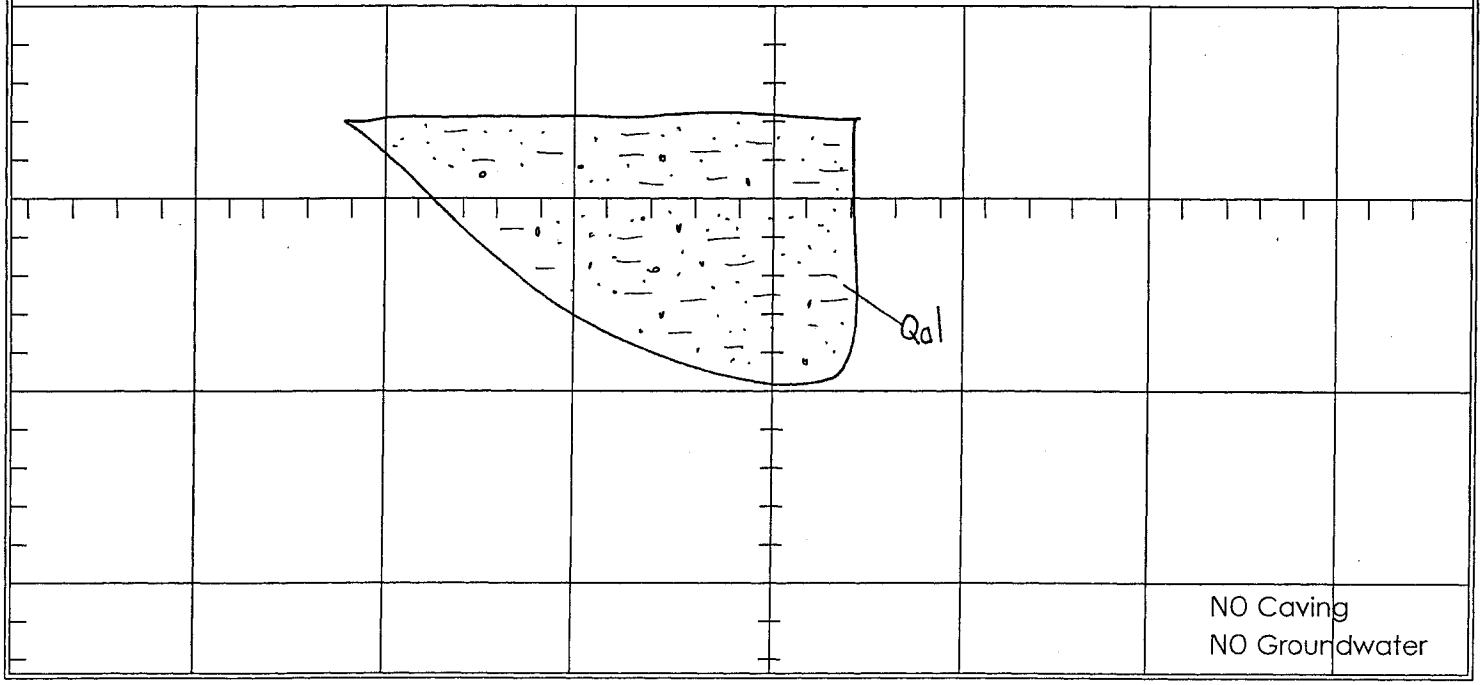
TOTAL DEPTH: 8 feet ←N3E SCALE: 1 inch = 5 feet



CLIENT: Newhall Land		JOB NO: 03-1571-4	**TRENCH LOG NO. T-38**
PROJECT: River Park Tentative Tract 53425		DATE: 4/4/03	
		LOGGED BY: VCG	
		EXCAVATED: 3/20/2000	
EXCAVATION METHOD: Rubber-Tired Backhoe w/24" Bucket		ELEVATION:	

DEPTH (feet)	SAMPLE TYPE	SAMPLE NUMBER	GRAPHIC LOG	USCS SYMBOL	DESCRIPTION	ATTITUDES	LABORATORY TESTS: Moisture Content (%)	LABORATORY TESTS: Dry Density (pcf)	LABORATORY TESTS: Other Tests
0					**QUATERNARY ALLUVIUM; Qal, (0-7 ft.)** @ 0' Medium- to yellowish-brown fine- to coarse-grained silty pebbly sand; loose; moist; voids to bottom of trench COMMENTS: -No horizontal stratification present				
5									
10									
15									
20									

TOTAL DEPTH: 7 feet ←N3E SCALE: 1 inch = 5 feet



Appendix 4.1

See Geologic/Geotechnical Maps in Map Box

(DEIR Map 17)

Appendix 4.1

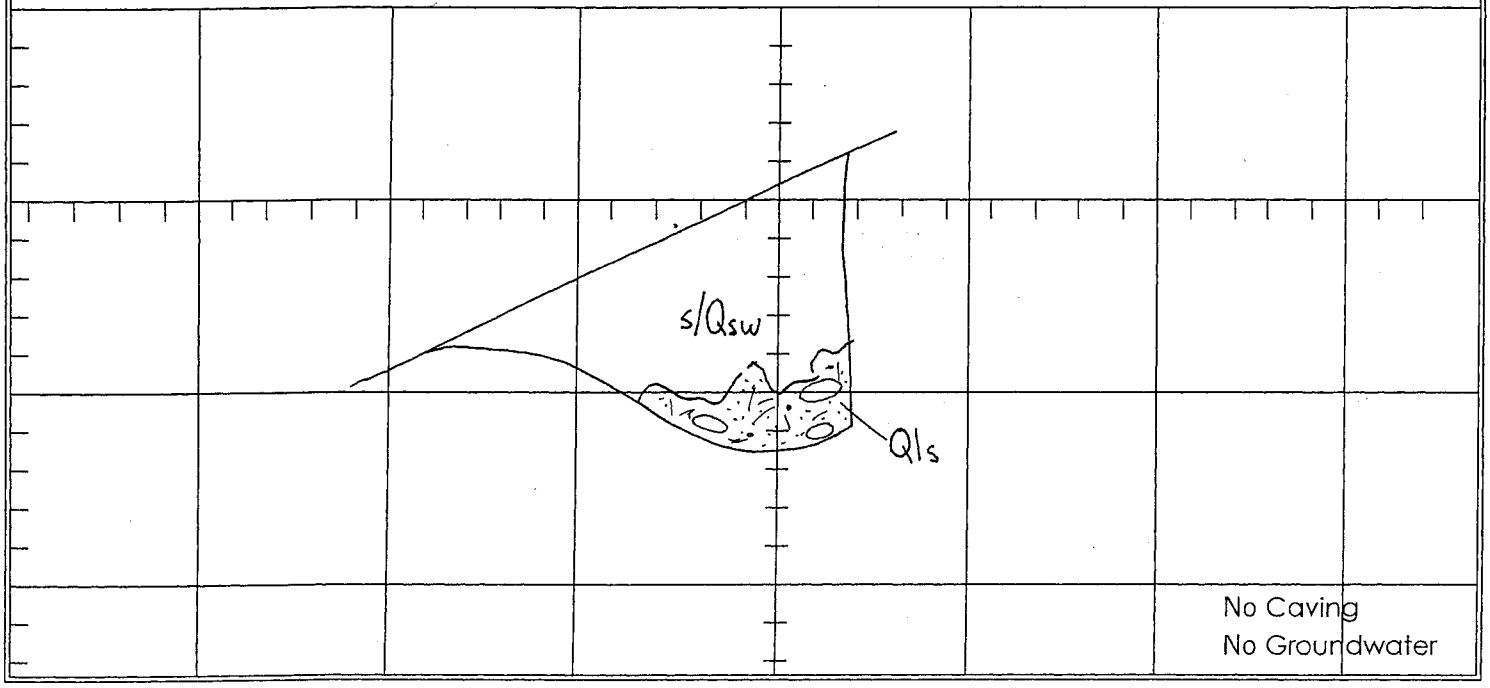
See Geologic/Geotechnical Maps in Map Box

(DEIR Map 18)

CLIENT: Newhall Land		JOB NO: 03-1571-4	**TRENCH LOG NO. T-41**
PROJECT: River Park Tentative Tract 53425		DATE: 4/4/03	
		LOGGED BY: VCG	
		EXCAVATED: 2/21/02	
EXCAVATION METHOD: Track-Mounted Backhoe w/24" Bucket		ELEVATION:	

DEPTH (feet)	SAMPLE TYPE	SAMPLE NUMBER	GRAPHIC LOG	USCS SYMBOL	DESCRIPTION	ATTITUDES	LABORATORY TESTS: Moisture Content (%)	LABORATORY TESTS: Dry Density (pcf)	LABORATORY TESTS: Other Tests
0					**SOIL/SLOPEWASH; s/Qsw, (1-5 ft.)** @ 0' Yellowish-brown fine- to coarse-grained silty sand with scattered pebbles and isolated cobbles; loose; dry to damp				
5					**LANDSLIDE DEBRIS; Qls, (5-7.5 ft.)** @ 5' Medium-brown fine- to coarse-grained pebbly silty sand with cobbles; Qt deposit derived; moderately dense locally but soft zones present; disturbed irregular appearance; cobbles to 10" approximately; voids to 1/8" diameter present				
10					COMMENTS: -Many cobbles and some boulders at the surface to the east (maximum diam. = 2')				
15									
20									

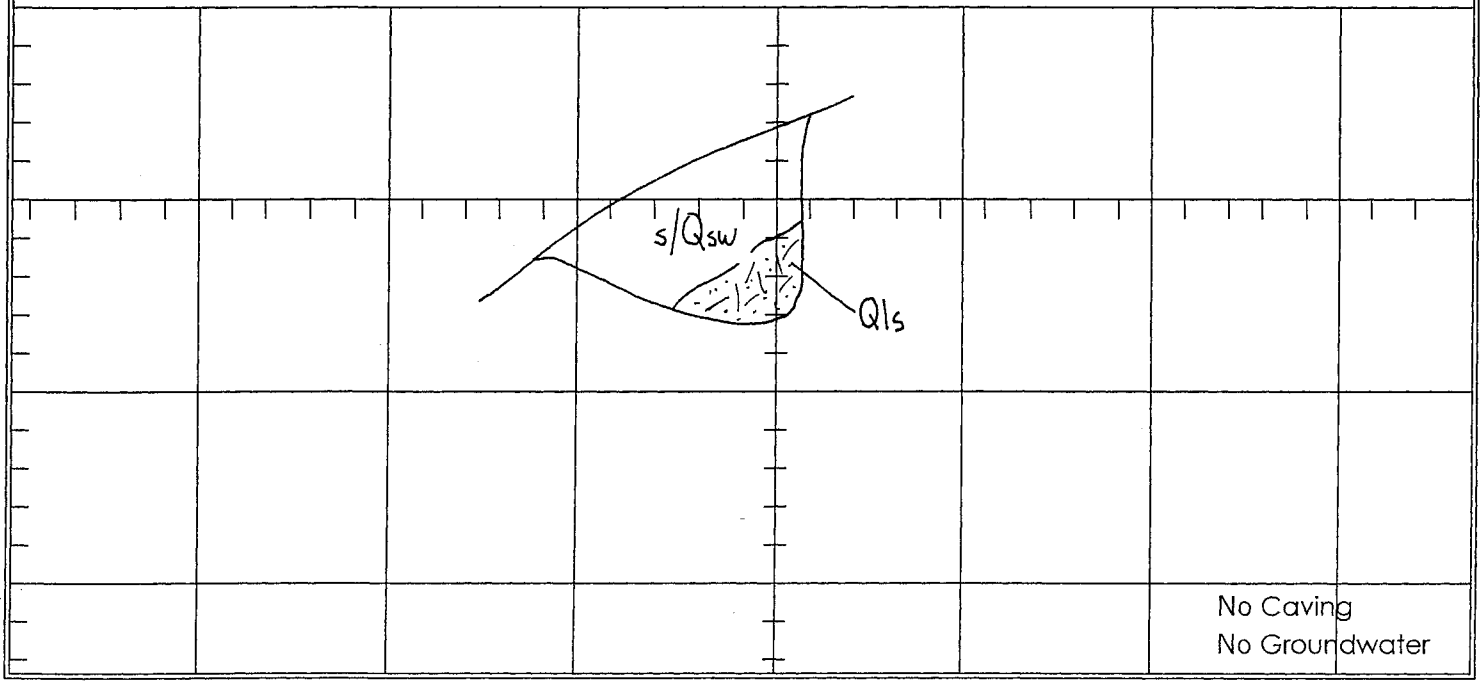
TOTAL DEPTH: 7.5 feet N13W→ SCALE: 1 inch = 5 feet



CLIENT: Newhall Land		JOB NO: 03-1571-4	**TRENCH LOG NO. T-42**
PROJECT: River Park Tentative Tract 53425		DATE: 4/4/03	
		LOGGED BY: VCG	
		EXCAVATED: 2/21/02	
EXCAVATION METHOD: Track-Mounted Backhoe w/24" Bucket		ELEVATION:	

DEPTH (feet)	SAMPLE TYPE	SAMPLE NUMBER	GRAPHIC LOG	USCS SYMBOL	DESCRIPTION	ATTITUDES	LABORATORY TESTS: Moisture Content (%)	LABORATORY TESTS: Dry Density (pcf)	LABORATORY TESTS: Other Tests
0					**SOIL/SLOPEWASH; s/Qsw, (0-3 ft.)** @ 0' Medium- to yellowish-brown fine- to medium-grained silty sand with isolated cobbles/boulders; loose; dry to damp **LANDSLIDE DEBRIS; Qls, (3-5 ft.)** @ 3' Light reddish- to yellowish-brown sandy siltstone; disturbed appearance; fractured; bedding indistinct; carbonate on fractured surface; firm; no voids observed; damp COMMENTS: -Landslide debris TQs derived -Digs easy				
5									
10									
15									
20									

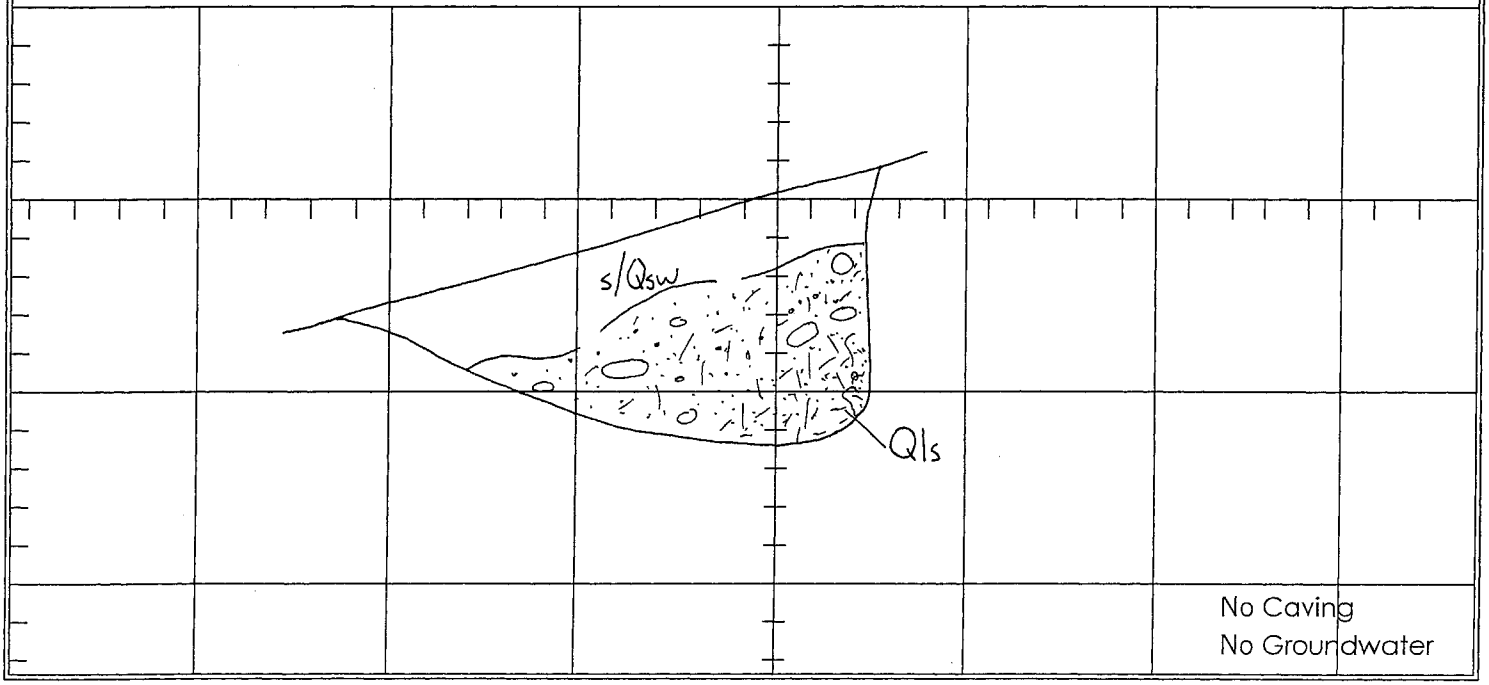
TOTAL DEPTH: 5 feet N73E→ SCALE: 1 inch = 5 feet



CLIENT: Newhall Land		JOB NO: 03-1571-4	**TRENCH LOG NO. T-43**
PROJECT: River Park Tentative Tract 53425		DATE: 4/4/03	
		LOGGED BY: VCG	
		EXCAVATED: 2/21/02	
EXCAVATION METHOD: Track-Mounted Backhoe w/24" Bucket		ELEVATION:	

DEPTH (feet)	SAMPLE TYPE	SAMPLE NUMBER	GRAPHIC LOG	USCS SYMBOL	DESCRIPTION	ATTITUDES	LABORATORY TESTS: Moisture Content (%)	LABORATORY TESTS: Dry Density (pcf)	LABORATORY TESTS: Other Tests
0					**SOIL/SLOPEWASH; s/Qsw, (0-2.5 ft.)** @ 0' Medium- to yellowish-brown fine- to coarse-grained silty pebbly sand with isolated cobbles; loose; dry; abundant roots **LANDSLIDE DEBRIS; Qls, (2.5-7 ft.)** @ 2.5' Tan to yellowish-brown fine- to coarse-grained cobbly, pebbly sandstone with silt; moderately dense; disturbed and irregular; dry to damp @ 3.5' Medium- to dark brown fractured sandy siltstone; firm to hard; damp; probably slide affected COMMENTS: -Probably all Qls				
5									
10									
15									
20									

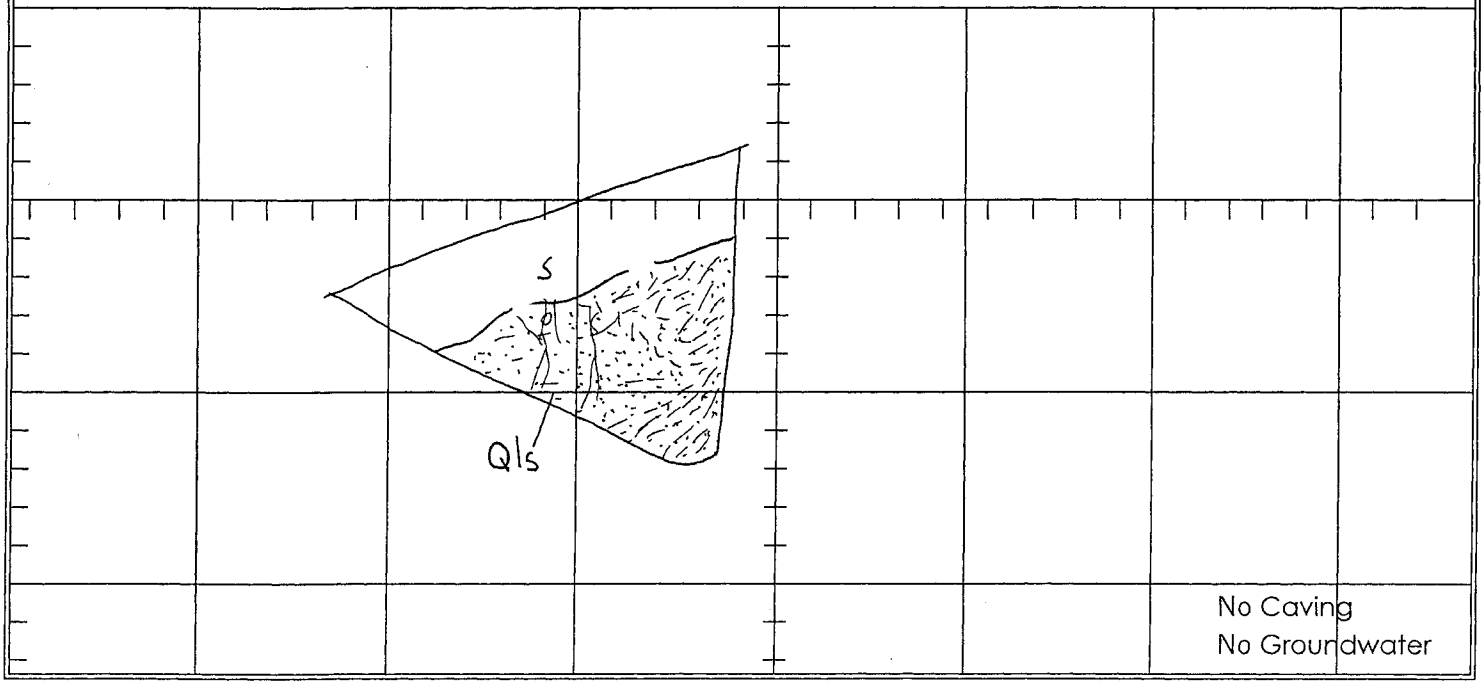
TOTAL DEPTH: 7 feet N13W→ SCALE: 1 inch = 5 feet



CLIENT: Newhall Land	JOB NO: 03-1571-4	**TRENCH LOG NO. T-44**
PROJECT: River Park, Tentative Tract 53425	DATE: 4/4/03	
	LOGGED BY: BJS	
	EXCAVATED: 2/21/02	
EXCAVATION METHOD: Track-Mounted Backhoe w/24" Bucket	ELEVATION:	

DEPTH (feet)	SAMPLE TYPE	SAMPLE NUMBER	GRAPHIC LOG	USCS SYMBOL	DESCRIPTION	ATTITUDES	LABORATORY TESTS: Moisture Content (%)	Dry Density (pcf)	Other Tests
0					**SOIL; s, (0-2.5 ft.)** @ 0' Brown to pale reddish-brown sandy mud with local pebbles and rare cobbles; very stiff; minor roots; clay rinds on clasts **LANDSLIDE; Qls, (2.5-8.5 ft.)** @ 2.5' Disturbed interbed of yellowish-gray sandstone and silty sandstone and light-brown siltstone and sandy siltstone with local pebbles; density varies from loose to moderately hard; damp; weathered fractures; local caliche; sandstone fragmented and almost entirely missing on opposite wall of trench; possible Qosw locally in upper Qls COMMENTS: -Cobbles and boulder present at surface not at depth				
5									
10									
15									
20									

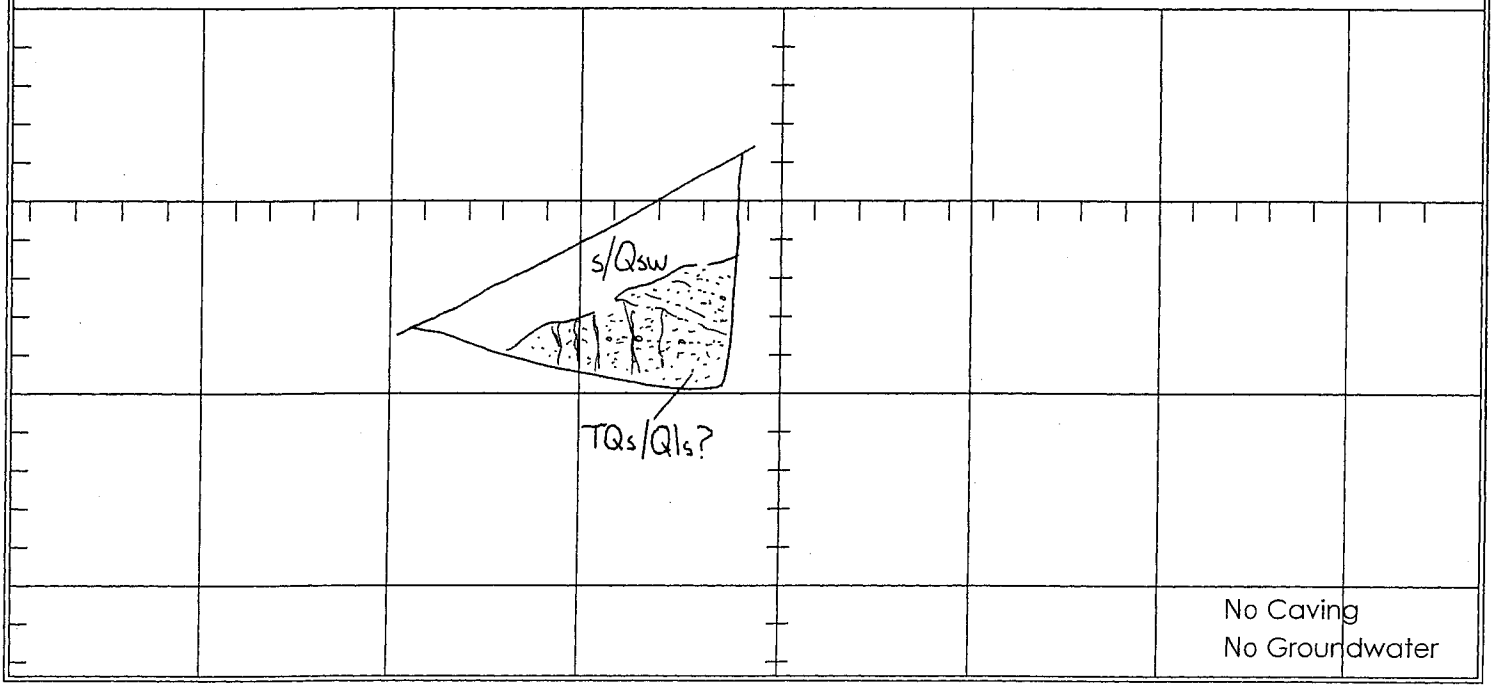
TOTAL DEPTH: 8.5 feet N15E→ SCALE: 1 inch = 5 feet



CLIENT: Newhall Land		JOB NO: 03-1571-4	**TRENCH LOG NO. T-45**
PROJECT: River Park Tentative Tract 53425		DATE: 4/4/03	
		LOGGED BY: BJS	
		EXCAVATED: 2/21/02	
EXCAVATION METHOD: Track-Mounted Backhoe w/24" Bucket		ELEVATION:	

DEPTH (feet)	SAMPLE TYPE	SAMPLE NUMBER	GRAPHIC LOG	USCS SYMBOL	DESCRIPTION	ATTITUDES	LABORATORY TESTS: Moisture Content (%)	LABORATORY TESTS: Dry Density (pcf)	LABORATORY TESTS: Other Tests
0					**SOIL/SLOPEWASH; s/Qsw, (0-3 ft.)** @ 0' Light-brown pebbly sandy silt with clay; approximately 6" of organic soil at surface; moderately dense to loose; slightly damp; minor roots **BEDROCK/LANDSLIDE?; TQs/Qls?, (3-6.5 ft.)** @ 3' Light-brown pebbly sandy siltstone overlying light yellowish-gray sandstone and pebbly sandstone; contact irregular but sandstone looks fairly intact; siltstone is moderately dense; sandstone is moderately hard; slightly damp; sandstone is well bedded; weathered fractures	B:N80E,10SE			
5									
10									
15									
20									

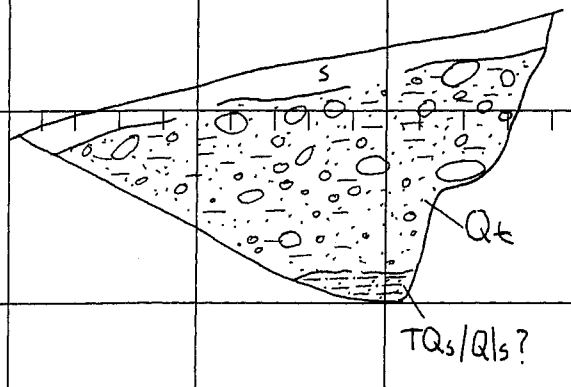
TOTAL DEPTH: 6.5 feet ←N86W SCALE: 1 inch = 5 feet



CLIENT: Newhall Land		JOB NO: 03-1571-4	**TRENCH LOG NO. T-46**
PROJECT: River Park Tentative Tract 53425		DATE: 4/4/03	
		LOGGED BY: BJS	
		EXCAVATED: 2/21/02	
EXCAVATION METHOD: Track-Mounted Backhoe w/24" Bucket		ELEVATION:	

DEPTH (feet)	SAMPLE TYPE	SAMPLE NUMBER	GRAPHIC LOG	USCS SYMBOL	DESCRIPTION	ATTITUDES	LABORATORY TESTS: Moisture Content (%)	LABORATORY TESTS: Dry Density (pcf)	LABORATORY TESTS: Other Tests
0					**SOIL; s, (0-1 ft.)** @ 0' Grayish-brown sandy silt with abundant pebbles, cobbles and small boulders; loose to firm; slightly damp **TERRACE DEPOSITS; Qt, (1-7 ft.)** @ 1' Pale reddish-brown to orangish-brown coarse pebbly sand with clay in the matrix and common cobbles and boulders; dense; hard digging; damp; clay rinds on clasts; old soil development in Qt **BEDROCK/LANDSLIDE?; TQs/Qls?, (7-7.5 ft.)** @ 7' Erosional contact with moderate yellowish-brown siltstone; moderately hard; damp; no bedding	Apx.B: Horizontal			
5									
10									
15									
20									

TOTAL DEPTH: 7.5 feet N21E→ SCALE: 1 inch = 5 feet

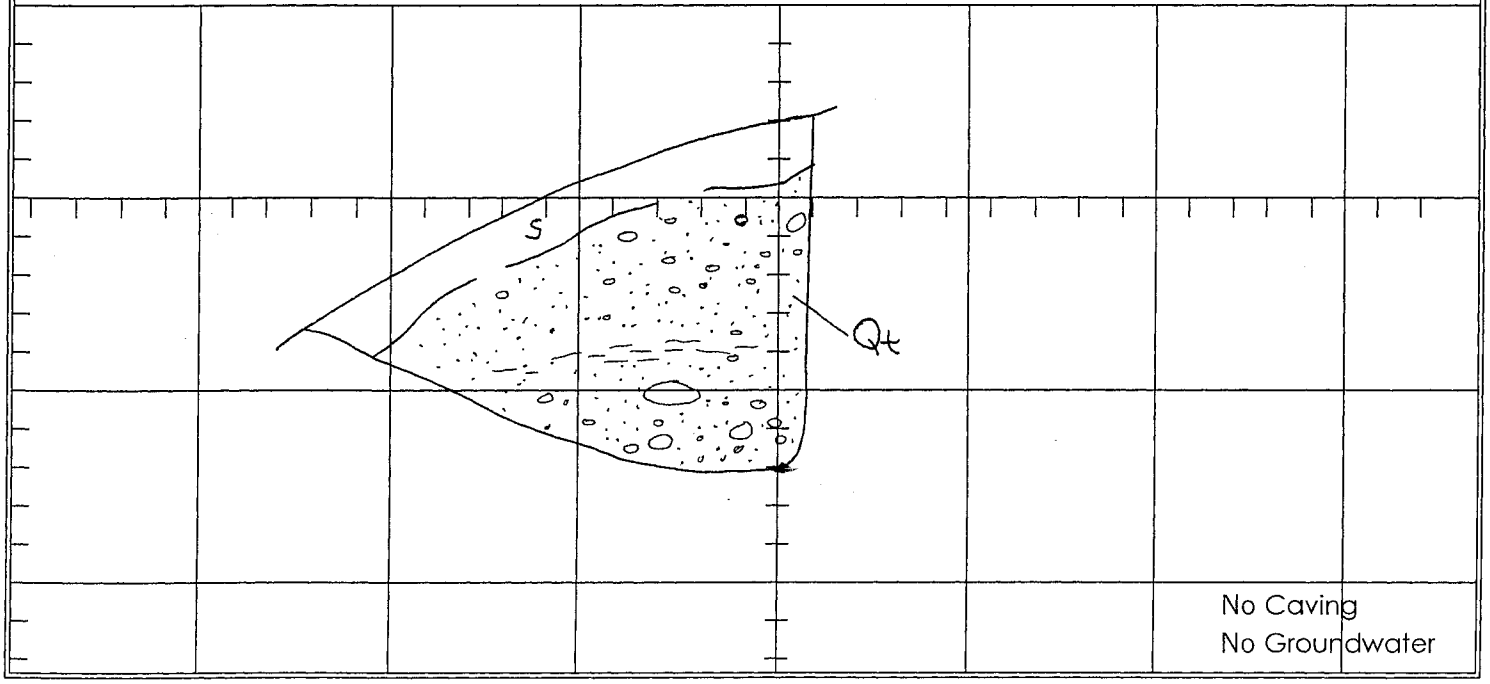


No Caving
No Groundwater

CLIENT: Newhall Land	JOB NO: 03-1571-4	**TRENCH LOG NO. T-47**
PROJECT: River Park Tentative Tract 53425	DATE: 4/4/03	
	LOGGED BY: VCG	
	EXCAVATED: 2/21/02	
EXCAVATION METHOD: Track-Mounted Backhoe w/24" Bucket	ELEVATION:	

DEPTH (feet)	SAMPLE TYPE	SAMPLE NUMBER	GRAPHIC LOG	USCS SYMBOL	DESCRIPTION	ATTITUDES	LABORATORY TESTS: Moisture Content (%)	LABORATORY TESTS: Dry Density (pcf)	LABORATORY TESTS: Other Tests
0					**SOIL; s, (0-1 ft.)** @ 0' Grayish-brown fine- to coarse-grained pebbly, cobbly sand; loose; dry to damp **TERRACE DEPOSITS; Qt, (1-9 ft.)** @ 1' Reddish-brown fine- to coarse-grained sand, pebbly sand with scattered cobbles; minor clay in the matrix; upper 3.5' has minor soil development; stratification present; lower 3' higher concentration of cobbles and friable COMMENTS:				
5									
10									
15									
20									

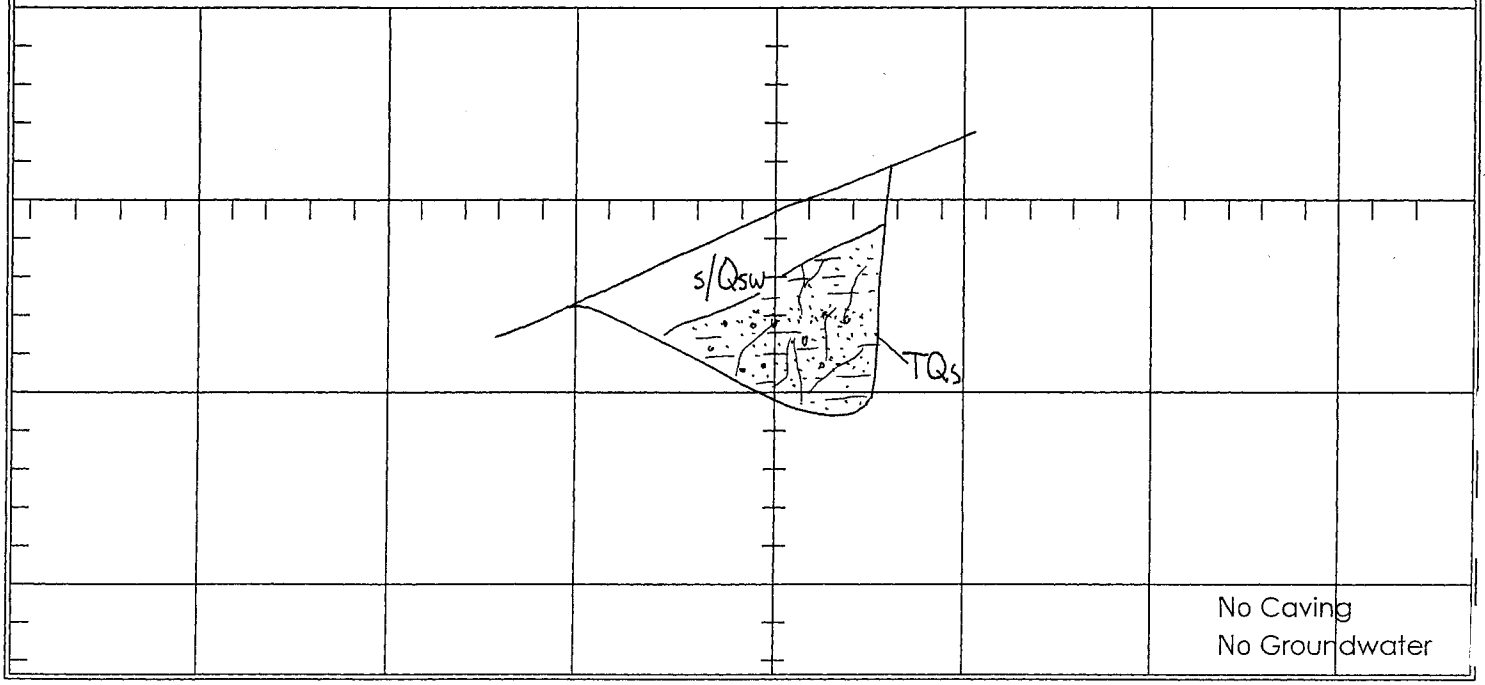
TOTAL DEPTH: 9 feet ←N81W SCALE: 1 inch = 5 feet



CLIENT: Newhall Land	JOB NO: 03-1571-4	**TRENCH LOG NO. T-48**
PROJECT: River Park Tentative Tract 53425	DATE: 4/4/03	
	LOGGED BY: VCG	
	EXCAVATED: 2/21/02	
EXCAVATION METHOD: Track-Mounted Backhoe w/24" Bucket	ELEVATION:	

DEPTH (feet)	SAMPLE TYPE	SAMPLE NUMBER	GRAPHIC LOG	USCS SYMBOL	DESCRIPTION	ATTITUDES	LABORATORY TESTS: Moisture Content (%)	LABORATORY TESTS: Dry Density (pcf)	LABORATORY TESTS: Other Tests
0					**SOIL/SLOPEWASH; s/Qsw, (0-2 ft.)** @ 0' Moderate to grayish-brown fine- to coarse-grained silty sand with pebbles; loose; dry **BEDROCK; TQs, (2-6.5 ft.)** @ 2' Light grayish-brown silty sandstone with minor coarse-grained sandstone lenses; moderately dense; dry to damp; randomly oriented fractures lined with carbonate	B:N65W,13SW			
5									
10									
15									
20									

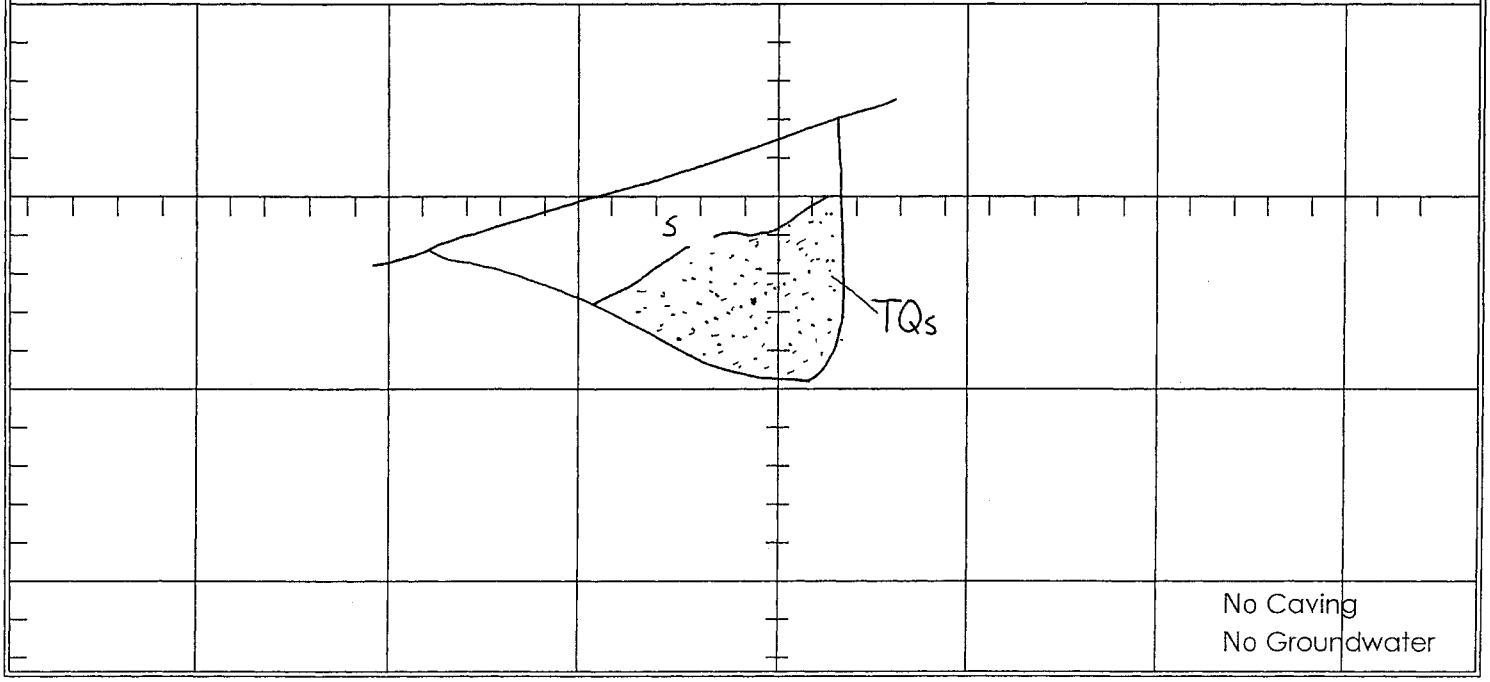
TOTAL DEPTH: 6.5 feet N85E→ SCALE: 1 inch = 5 feet



CLIENT: Newhall Land	JOB NO: 03-1571-4	**TRENCH LOG NO. T-49**
PROJECT: River Park Tentative Tract 53425	DATE: 4/4/03	
	LOGGED BY: VCG	
	EXCAVATED: 2/21/02	
EXCAVATION METHOD: Track-Mounted Backhoe w/24" Bucket	ELEVATION:	

DEPTH (feet)	SAMPLE TYPE	SAMPLE NUMBER	GRAPHIC LOG	USCS SYMBOL	DESCRIPTION	ATTITUDES	LABORATORY TESTS: Moisture Content (%)	Dry Density (pcf)	Other Tests
0					**SOIL; s, (0-2 ft.)** @ 0' Light grayish-brown fine- to coarse-grained pebbly silty sand; loose; dry **BEDROCK; TQs, (2-7 ft.)** @ 2' Cream to tan fine- to medium-grained sandstone and pebbly sandstone with minor rust staining parallel to bedding; moderately dense; dry to damp COMMENTS: -Scattered boulders to 3 ft. diameter in vicinity	B:N70W, 25SW			
5									
10									
15									
20									

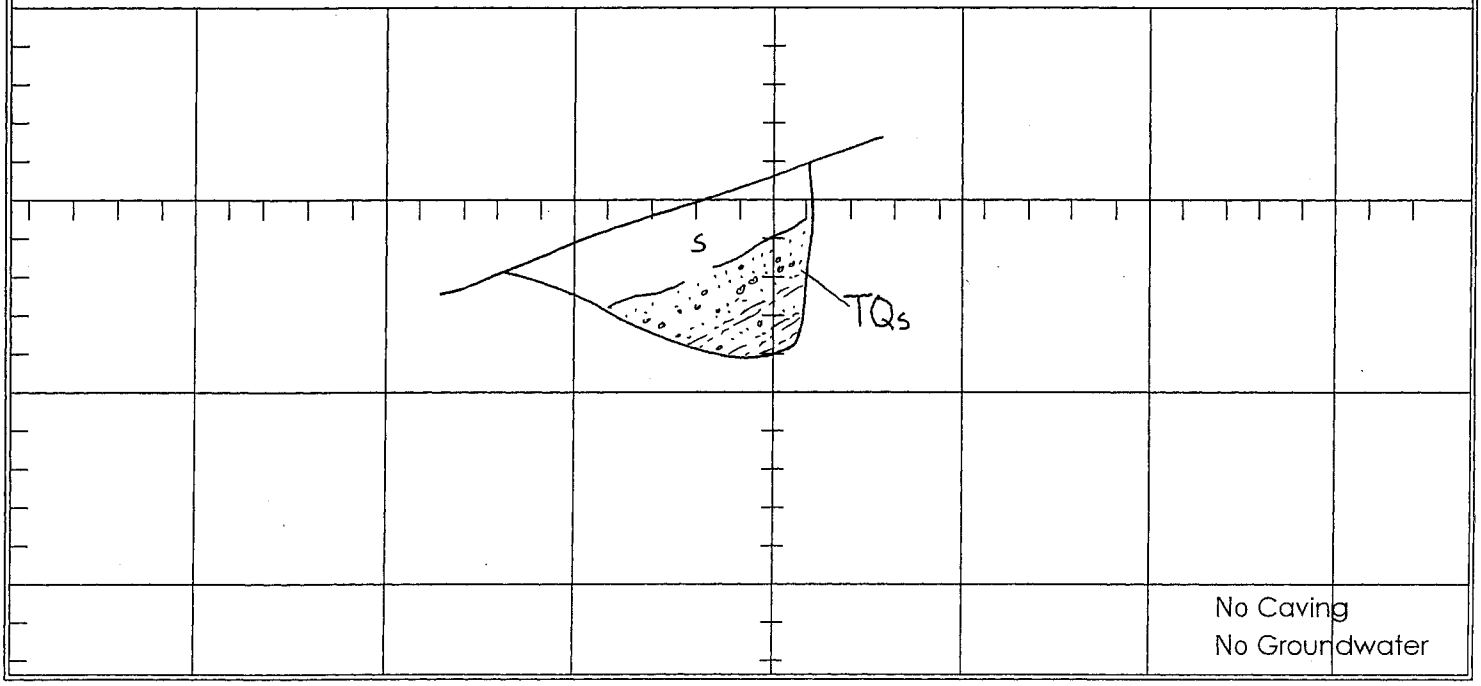
TOTAL DEPTH: 7 feet N8E→ SCALE: 1 inch = 5 feet



CLIENT: Newhall Land	JOB NO: 03-1571-4	**TRENCH LOG NO. T-50**
PROJECT: River Park Tentative Tract 53425	DATE: 4/4/03	
	LOGGED BY: VCG	
	EXCAVATED: 2/21/02	
EXCAVATION METHOD: Track-Mounted Backhoe w/24" Bucket	ELEVATION:	

DEPTH (feet)	SAMPLE TYPE	SAMPLE NUMBER	GRAPHIC LOG	USCS SYMBOL	DESCRIPTION	ATTITUDES	LABORATORY TESTS: Moisture Content (%)	LABORATORY TESTS: Dry Density (pcf)	LABORATORY TESTS: Other Tests
0					**SOIL; s, (0-1.5 ft.)** @ 0' Light grayish-brown fine- to coarse-grained pebbly silty sand; loose; dry **BEDROCK; TQs, (1.5-5 ft.)** @ 1.5' Light reddish-brown pebbly sandstone and sandy siltstone with minor fractures; moderately dense/hard; dry COMMENTS: -Scattered cobbles within soil horizon; structure different from T-9				
5									
10									
15									
20									

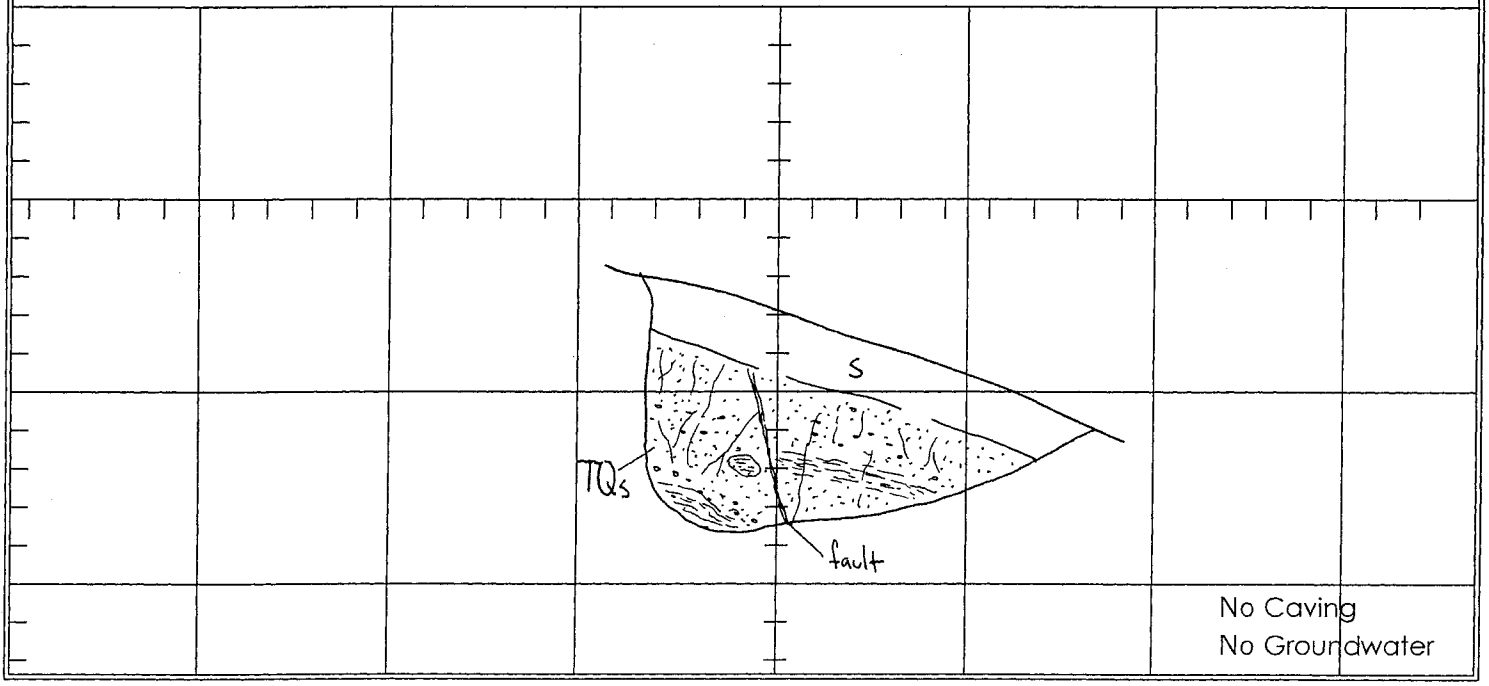
TOTAL DEPTH: 5 feet N34E→ SCALE: 1 inch = 5 feet



CLIENT: Newhall Land		JOB NO: 03-1571-4	**TRENCH LOG NO. T-51**
PROJECT: River Park Tentative Tract 53425		DATE: 4/4/03	
		LOGGED BY: VCG	
		EXCAVATED: 2/21/02	
EXCAVATION METHOD: Track-Mounted Backhoe w/24" Bucket		ELEVATION:	

DEPTH (feet)	SAMPLE TYPE	SAMPLE NUMBER	GRAPHIC LOG	USCS SYMBOL	DESCRIPTION	ATTITUDES	LABORATORY TESTS: Moisture Content (%)	LABORATORY TESTS: Dry Density (pcf)	LABORATORY TESTS: Other Tests
0					**SOIL; s, (0-1.5 ft.)** @ 0' Light grayish-brown fine- to coarse-grained pebbly silty sand; loose; dry **BEDROCK; TQs, (1.5-6.5 ft.)** @ 1.5' Tan to light yellowish-brown medium- to coarse grained sandstone and pebbly sandstone and light reddish to rusty-brown silty sandstone and siltstone; faulted (minor fault); fractured; moderately dense; dry and gouge consisting of light 1/4"-thick grayish- to reddish-brown silty clay to clayey silt COMMENTS: -Apparent separation: (13-15") South side up	Tectonic: F:N56W,73SW B:N36W,7SW Approx.			
5									
10									
15									
20									

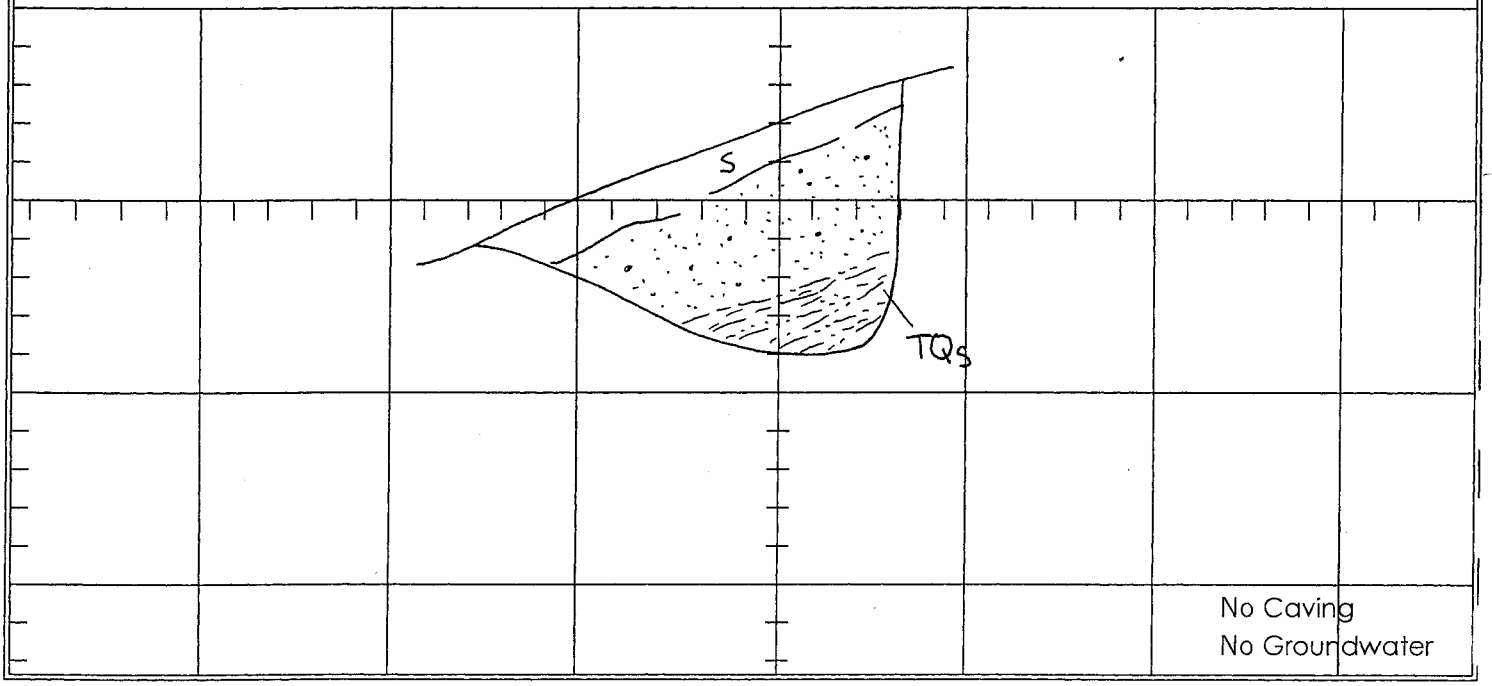
TOTAL DEPTH: 6.5 feet ←N33E SCALE: 1 inch = 5 feet



CLIENT: Newhall Land	JOB NO: 03-1571-4	**TRENCH LOG NO. T-52**
PROJECT: River Park Tentative Tract 53425	DATE: 4/4/03	
	LOGGED BY: VCG	
	EXCAVATED: 2/21/02	
EXCAVATION METHOD: Track-Mounted Backhoe w/24" Bucket	ELEVATION:	

DEPTH (feet)	SAMPLE TYPE	SAMPLE NUMBER	GRAPHIC LOG	USCS SYMBOL	DESCRIPTION	ATTITUDES	LABORATORY TESTS: Moisture Content (%)	Dry Density (pcf)	Other Tests
0					**SOIL; s, (0-1 ft.)** @ 0' Light grayish-brown fine- to coarse-grained pebbly silty sand; loose; dry **BEDROCK; TQs, (1-7 ft.)** @ 1' Tan to light yellowish-brown fine- to medium-grained sandstone with scattered pebbles and yellowish-brown sandy siltstone (red bed); moderately dense/hard; dry to damp	B:N35W,22SW B:N47W,20SW			
5									
10									
15									
20									

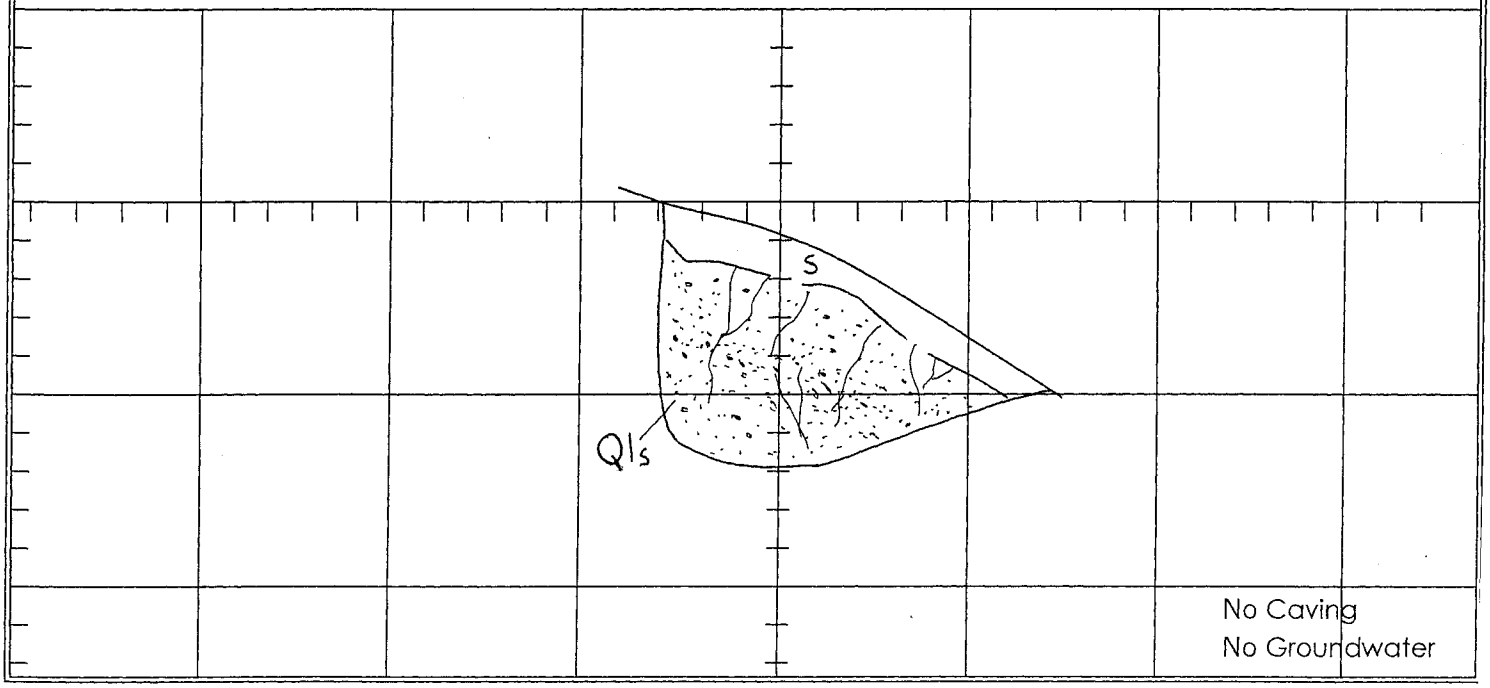
TOTAL DEPTH: 7 feet N27E→ SCALE: 1 inch = 5 feet



CLIENT: Newhall Land		JOB NO: 03-1571-4	**TRENCH LOG NO. T-53**
PROJECT: River Park Tentative Tract 53425		DATE: 4/4/03	
		LOGGED BY: VCG	
		EXCAVATED: 2/21/02	
EXCAVATION METHOD: Track-Mounted Backhoe w/24" Bucket		ELEVATION:	

DEPTH (feet)	SAMPLE TYPE	SAMPLE NUMBER	GRAPHIC LOG	USCS SYMBOL	DESCRIPTION	ATTITUDES	LABORATORY TESTS: Moisture Content (%)	LABORATORY TESTS: Dry Density (pcf)	LABORATORY TESTS: Other Tests
0					**SOIL; s, (0-1 ft.)** @ 0' Grayish-brown silty sand with scattered pebbles; loose; dry **LANDSLIDE; Qls, (1-7 ft.)** @ 1' Tan fine- to coarse-grained sandstone with scattered pebbles; moderately dense; dry; stratigraphy present; some fractures randomly oriented; possibly disturbed	B:N36W,18SW			
5									
10									
15									
20									

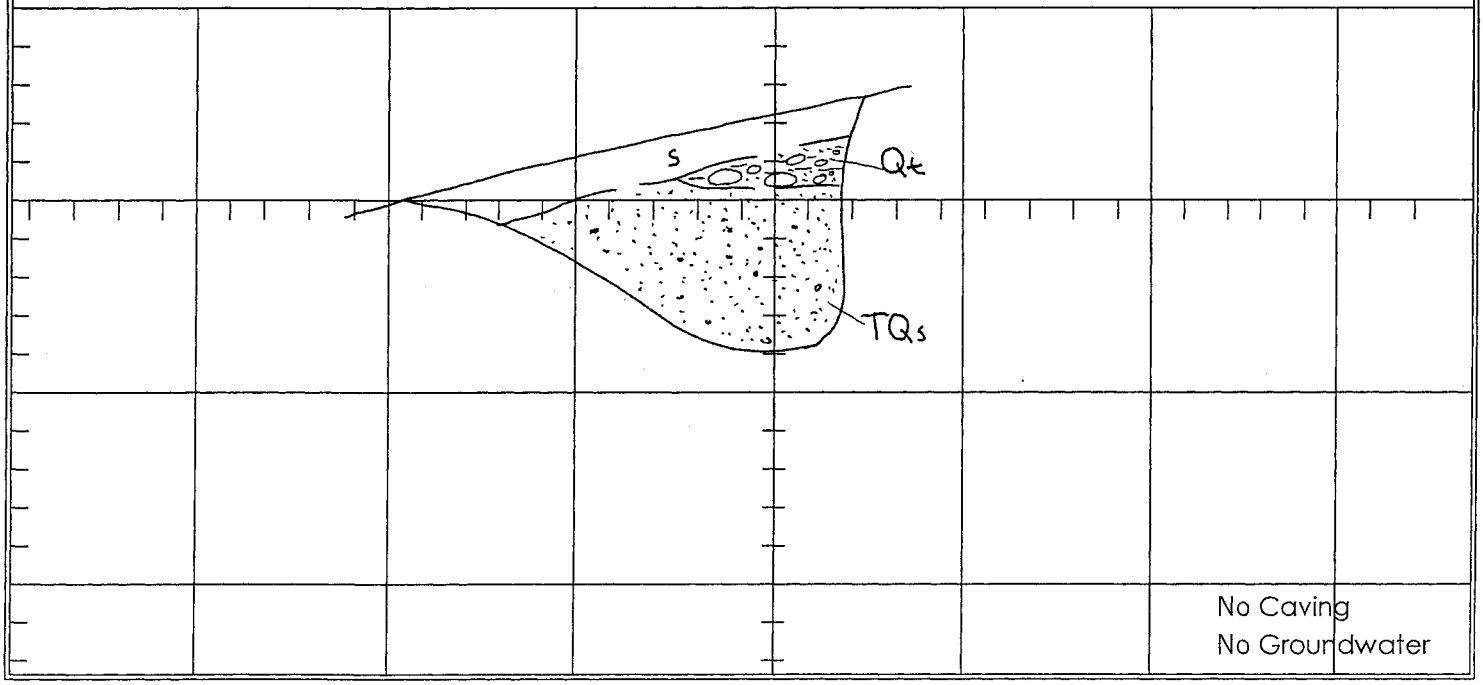
TOTAL DEPTH: 7 feet ←N17E SCALE: 1 inch = 5 feet



CLIENT: Newhall Land	JOB NO: 03-1571-4	**TRENCH LOG NO. T-54**
PROJECT: River Park Tentative Tract 53425	DATE: 4/4/03	
	LOGGED BY: VCG	
	EXCAVATED: 2/21/02	
EXCAVATION METHOD: Track-Mounted Backhoe w/24" Bucket	ELEVATION:	

DEPTH (feet)	SAMPLE TYPE	SAMPLE NUMBER	GRAPHIC LOG	USCS SYMBOL	DESCRIPTION	ATTITUDES	LABORATORY TESTS: Moisture Content (%)	LABORATORY TESTS: Dry Density (pcf)	LABORATORY TESTS: Other Tests
0					**SOIL; s, (0-1 ft.)** @ 0' Gray fine- to coarse-grained pebbly sand; loose; dry **TERRACE DEPOSITS; Qt, (1-2 ft.)** @ 1' Conglomerate with clayey sand matrix; dense; dry **BEDROCK; TQs, (2-6.5 ft.)** @ 2' Tan fine- to coarse-grained sandstone and pebbly sandstone; moderately dense; dry; bedding indistinct	Generally massive B:N53W,12SW Apx.			
5									
10					COMMENTS: -High concentration of cobbles				
15									
20									

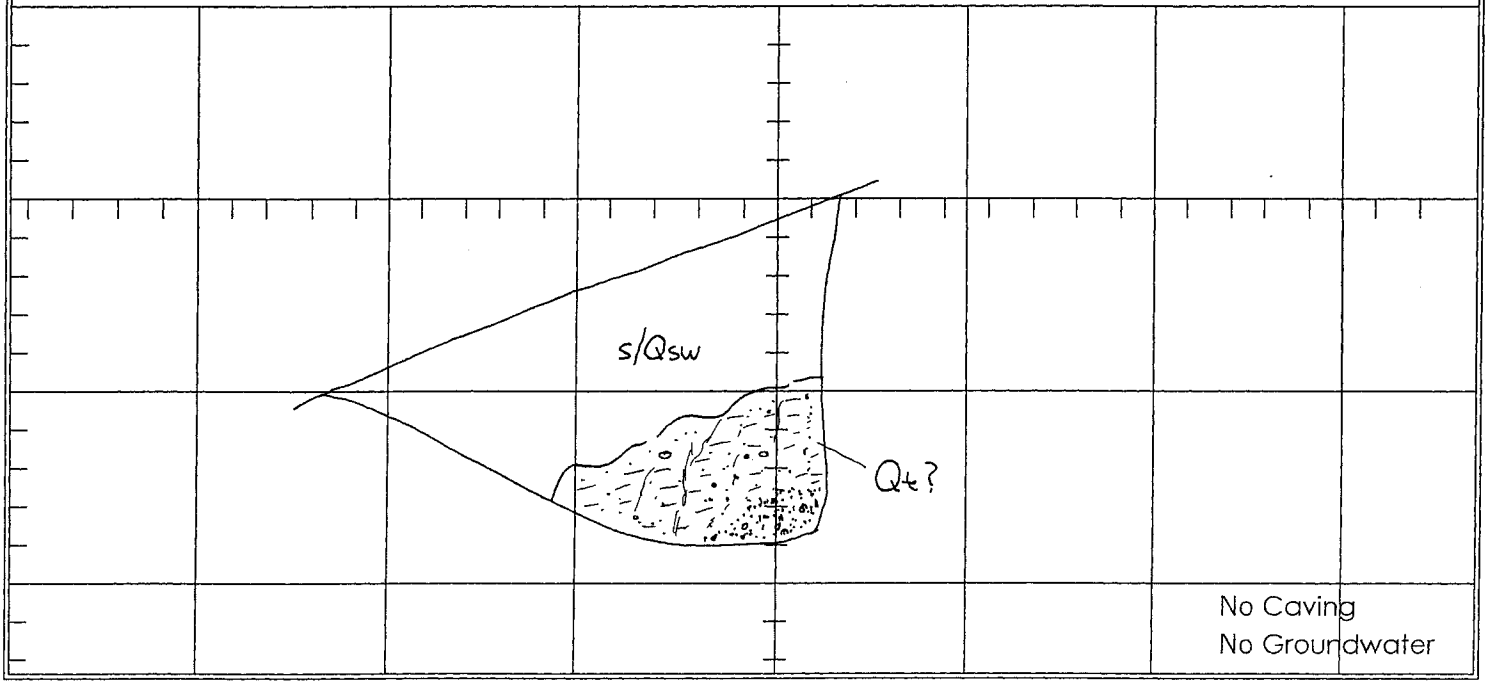
TOTAL DEPTH: 6.5 feet N21E→ SCALE: 1 inch = 5 feet



CLIENT: Newhall Land		JOB NO: 03-1571-4	**TRENCH LOG NO. T-55**
PROJECT: River Park Tentative Tract 53425		DATE: 4/4/03	
		LOGGED BY: VCG	
		EXCAVATED: 2/21/02	
EXCAVATION METHOD: Track-Mounted Backhoe w/24" Bucket		ELEVATION:	

DEPTH (feet)	SAMPLE TYPE	SAMPLE NUMBER	GRAPHIC LOG	USCS SYMBOL	DESCRIPTION	ATTITUDES	LABORATORY TESTS: Moisture Content (%)	LABORATORY TESTS: Dry Density (pcf)	LABORATORY TESTS: Other Tests
0					**SOIL/SLOPEWASH; s/Qsw, (0-4.5 ft.)** @ 0' Grayish-brown fine- to coarse-grained clayey sand with scattered pebbles and cobbles; dry to damp; grades to soft to firm				
5					**TERRACE DEPOSITS?; Qt?, (4.5-9.5 ft.)** @ 4.5' Yellowish-brown clayey sand with gravel and gravelly zone with silty clay matrix; sticky zones; firm; damp; scattered cobbles; indistinct bedding				
10									
15									
20									

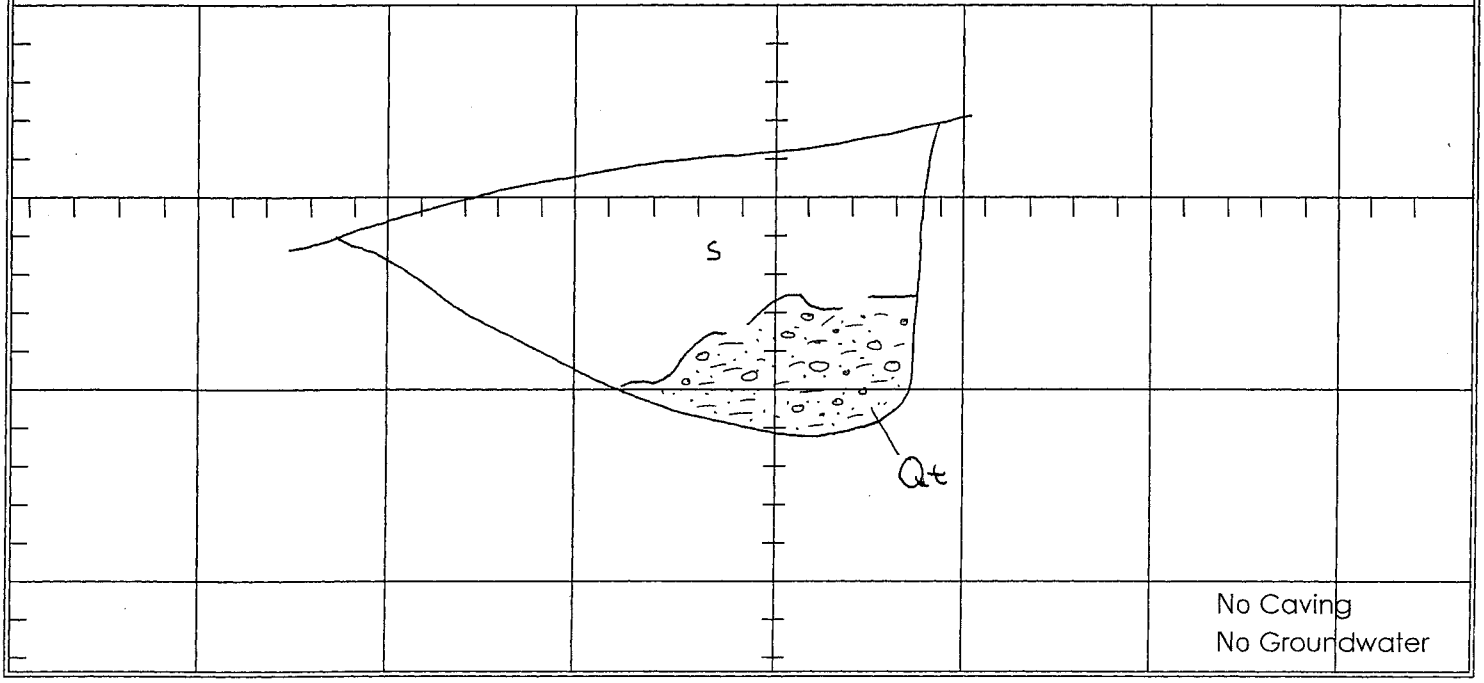
TOTAL DEPTH: 9.5 feet N28W→ SCALE: 1 inch = 5 feet



CLIENT: Newhall Land	JOB NO: 03-1571-4	**TRENCH LOG NO. T-56**
PROJECT: River Park Tentative Tract 53425	DATE: 4/4/03	
	LOGGED BY: VCG	
	EXCAVATED: 2/22/02	
EXCAVATION METHOD: Track-Mounted Backhoe w/24" Bucket	ELEVATION:	

DEPTH (feet)	SAMPLE TYPE	SAMPLE NUMBER	GRAPHIC LOG	USCS SYMBOL	DESCRIPTION	ATTITUDES	LABORATORY TESTS: Moisture Content (%)	LABORATORY TESTS: Dry Density (pcf)	LABORATORY TESTS: Other Tests
0					**SOIL/SLOPEWASH; s/Qsw, (0-5.5 ft.)** @ 0' Medium- to grayish-brown fine-grained silty sand with pebbles; loose; dry to damp				
5					**TERRACE DEPOSITS; Qt, (5.5-7 ft.)** @ 5.5' Yellowish-brown fine- to coarse-grained silty pebbly sand with abundant small cobbles and gravel; faint roughly horizontal stratification; moderately dense; damp				
10									
15									
20									

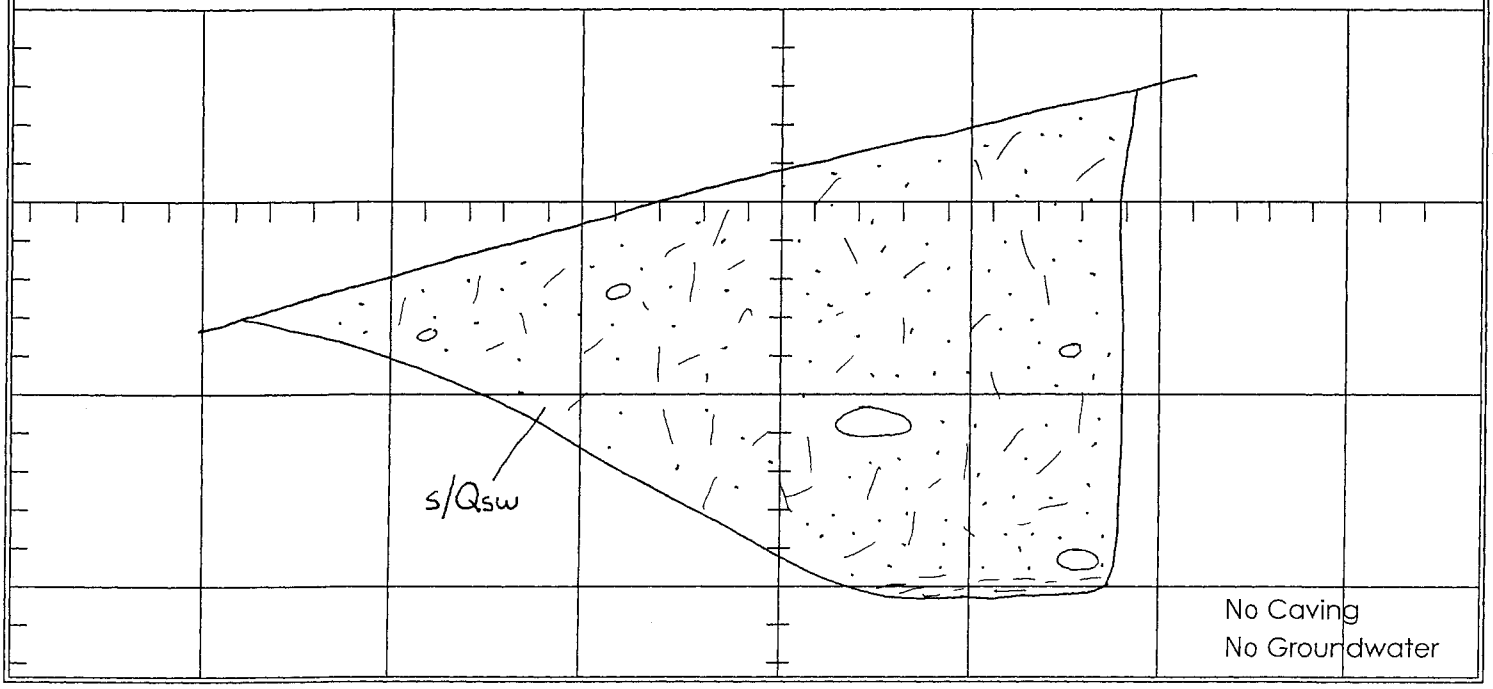
TOTAL DEPTH: 7 feet N52E→ SCALE: 1 inch = 5 feet



CLIENT: Newhall Land	JOB NO: 03-1571-4	**TRENCH LOG NO. T-57**
PROJECT: River Park Tentative Tract 53425	DATE: 4/4/03	
	LOGGED BY: VCG	
	EXCAVATED: 2/22/02	
EXCAVATION METHOD: Track-Mounted Backhoe w/24" Bucket	ELEVATION:	

DEPTH (feet)	SAMPLE TYPE	SAMPLE NUMBER	GRAPHIC LOG	USCS SYMBOL	DESCRIPTION	ATTITUDES	LABORATORY TESTS: Moisture Content (%)	LABORATORY TESTS: Dry Density (pcf)	LABORATORY TESTS: Other Tests
0					**SOIL/SLOPEWASH; s/Qsw, (0-13.5 ft.)** @ 0' Grayish- to dark brown fine- to coarse-grained silty pebbly sand with scattered small cobbles; loose; dry to damp; uniform texture and lithology; numerous voids/root tubes				
5									
10					@ 9' Grades to yellowish-brown				
15					@ 13' Fewer root tubes; possibly Qt, no stratification horizons				
20									

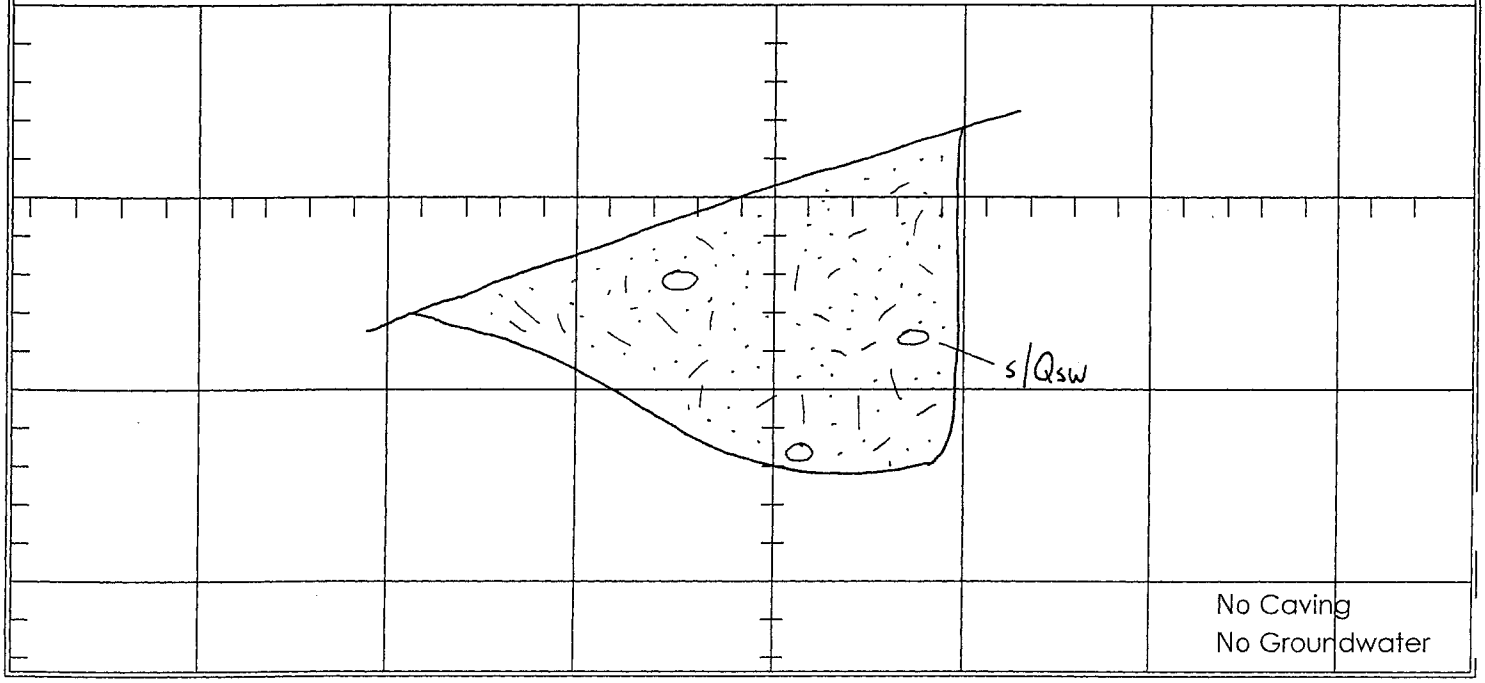
TOTAL DEPTH: 13.5 feet N23E→ SCALE: 1 inch = 5 feet



CLIENT: Newhall Land	JOB NO: 03-1571-4	**TRENCH LOG NO. T-58**
PROJECT: River Park Tentative Tract 53425	DATE: 4/4/03	
	LOGGED BY: VCG	
	EXCAVATED: 2/22/02	
EXCAVATION METHOD: Track-Mounted Backhoe w/24" Bucket	ELEVATION:	

DEPTH (feet)	SAMPLE TYPE	SAMPLE NUMBER	GRAPHIC LOG	USCS SYMBOL	DESCRIPTION	ATTITUDES	LABORATORY TESTS: Moisture Content (%)	LABORATORY TESTS: Dry Density (pcf)	LABORATORY TESTS: Other Tests
0					**SOIL/SLOPEWASH; s/Qsw, (0-9.5 ft.)** @ 0' Grayish- to reddish-yellowish-brown clayey sand and clayey sandy silt with isolated small cobbles; soft; dry to damp; slightly sticky; no stratigraphic horizons; massive; grayish- from 1.5'; reddish-brown from 1.5 to 6' and yellowish-brown to bottom of trench				
5									
10									
15									
20									

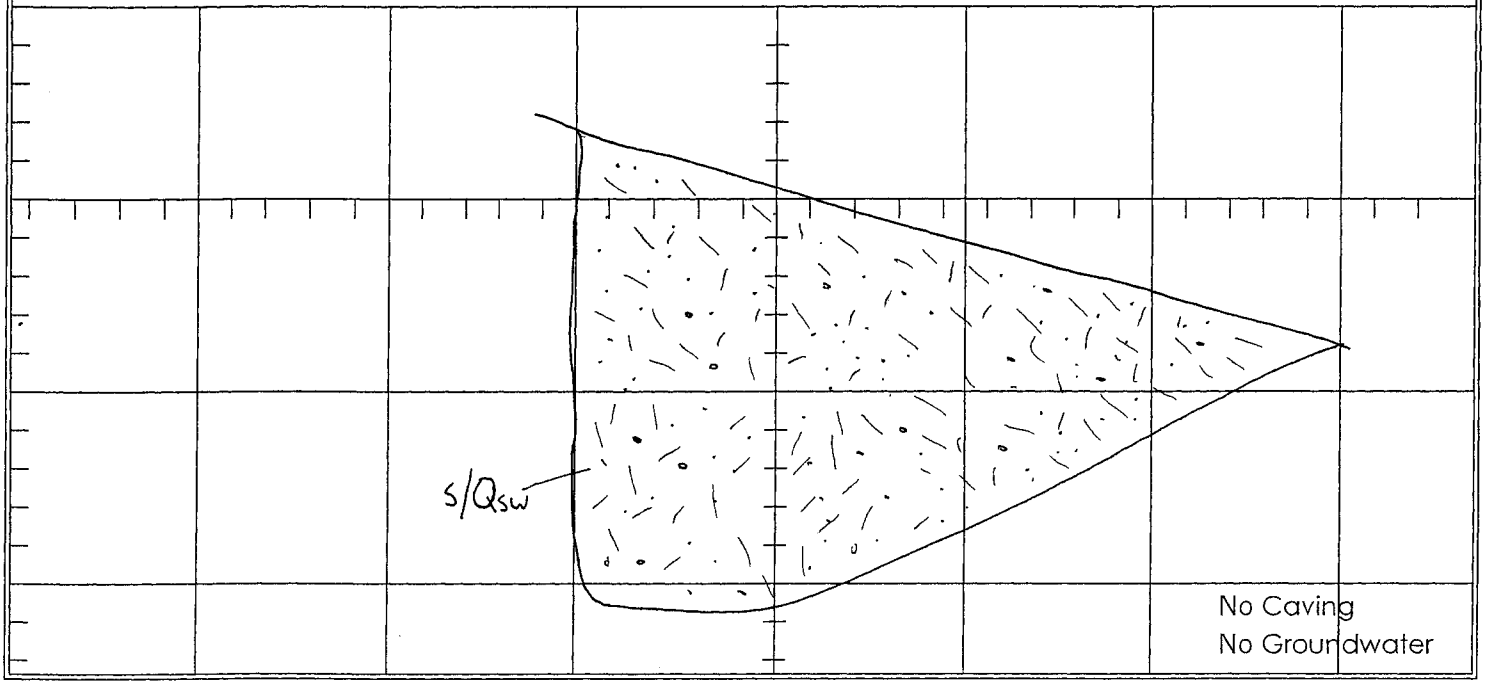
TOTAL DEPTH: 9.5 feet N17W→ SCALE: 1 inch = 5 feet



CLIENT: Newhall Land	JOB NO: 03-1571-4	**TRENCH LOG NO. T-59**
PROJECT: River Park Tentative Tract 53425	DATE: 4/4/03	
	LOGGED BY: VCG	
	EXCAVATED: 2/22/02	
EXCAVATION METHOD: Track-Mounted Backhoe w/24" Bucket	ELEVATION:	

DEPTH (feet)	SAMPLE TYPE	SAMPLE NUMBER	GRAPHIC LOG	USCS SYMBOL	DESCRIPTION	ATTITUDES	LABORATORY TESTS: Moisture Content (%)	LABORATORY TESTS: Dry Density (pcf)	LABORATORY TESTS: Other Tests
0					**SOIL/SLOPEWASH; s/Qsw, (0-13 ft.)** @ 0' Grayish-reddish-brown to moderate brown, fine- to coarse-grained pebbly, silty sand and pebbly, sandy silt; loose/ soft; dry to damp; voids to bottom of excavation; no stratification				
5									
10									
15					COMMENTS: -Digs very easily -No cobbles				
20									

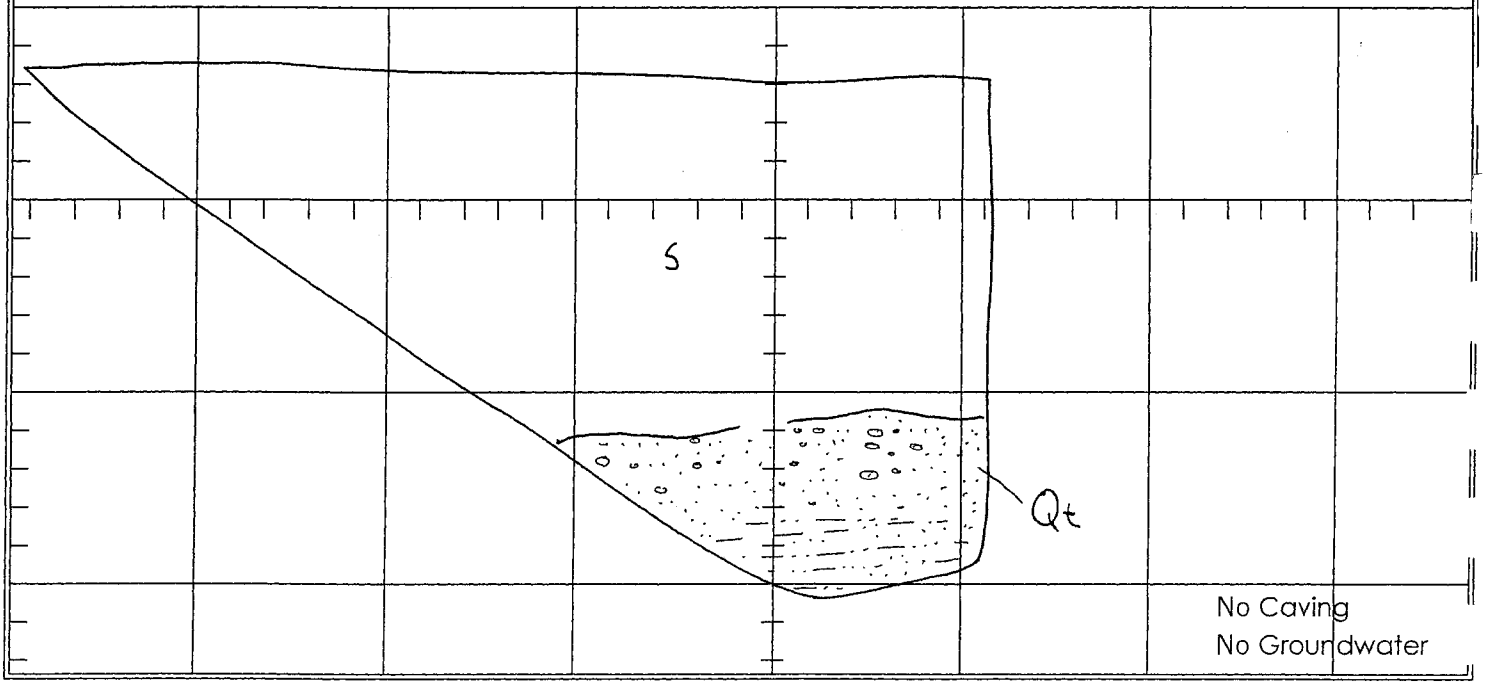
TOTAL DEPTH: 13 feet ←N2W SCALE: 1 inch = 5 feet



CLIENT: Newhall Land		JOB NO: 03-1571-4	**TRENCH LOG NO. T-60**
PROJECT: River Park Tentative Tract 53425		DATE: 4/4/03	
		LOGGED BY: VCG	
		EXCAVATED: 2/22/02	
EXCAVATION METHOD: Track-Mounted Backhoe w/24" Bucket		ELEVATION:	

DEPTH (feet)	SAMPLE TYPE	SAMPLE NUMBER	GRAPHIC LOG	USCS SYMBOL	DESCRIPTION	ATTITUDES	LABORATORY TESTS: Moisture Content (%)	LABORATORY TESTS: Dry Density (pcf)	LABORATORY TESTS: Other Tests
0					**SOIL; s, (0-9 ft.)** @ 0' Grayish-brown fine- to medium-grained silty sand with scattered pebbles and yellowish-brown clayey pebbly silt; loose/soft; dry to damp; voids to 9 ft.				
5									
10					**TERRACE DEPOSITS; Qt, (9-13 ft.)** @ 9' Yellowish-brown medium- to coarse-grained pebbly cobbly sand; moderately dense; damp; crudely stratified COMMENTS: -@ 11' Possibly TQs				
15									
20									

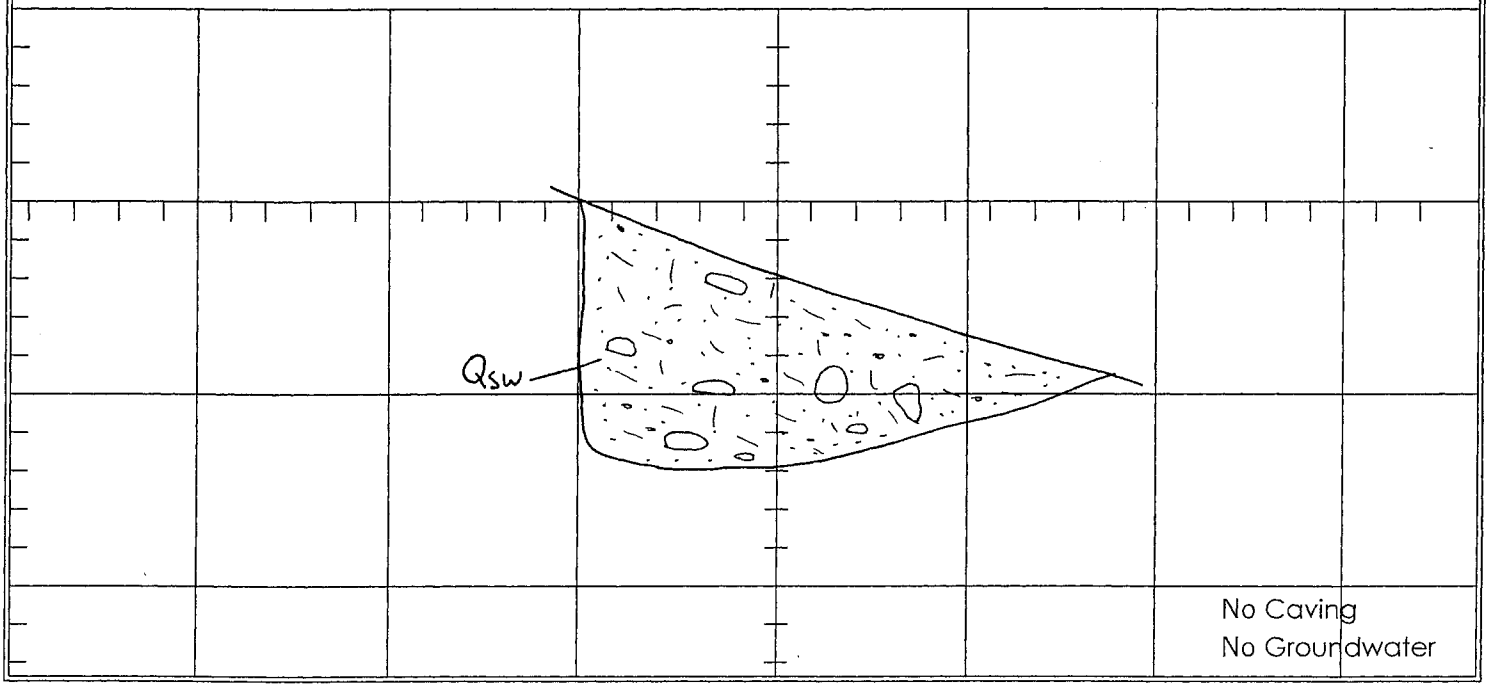
TOTAL DEPTH: 13 feet N86W→ SCALE: 1 inch = 5 feet



CLIENT: Newhall Land		JOB NO: 03-1571-4	**TRENCH LOG NO. T-61**
PROJECT: River Park Tentative Tract 53425		DATE: 4/4/03	
		LOGGED BY: VCG	
		EXCAVATED: 2/22/02	
EXCAVATION METHOD: Track-Mounted Backhoe w/24" Bucket		ELEVATION:	

DEPTH (feet)	SAMPLE TYPE	SAMPLE NUMBER	GRAPHIC LOG	USCS SYMBOL	DESCRIPTION	ATTITUDES	LABORATORY TESTS: Moisture Content (%)	LABORATORY TESTS: Dry Density (pcf)	LABORATORY TESTS: Other Tests
0					**SLOPEWASH; Qsw, (0-7 ft.)** @ 0' Light-grayish to reddish-brown fine- to coarse-grained silty pebbly sand with abundant cobbles; moderately dense dry; excavation extremely difficult due to small to medium-sized cobbles COMMENTS: -Unable to get through unit.				
5									
10									
15									
20									

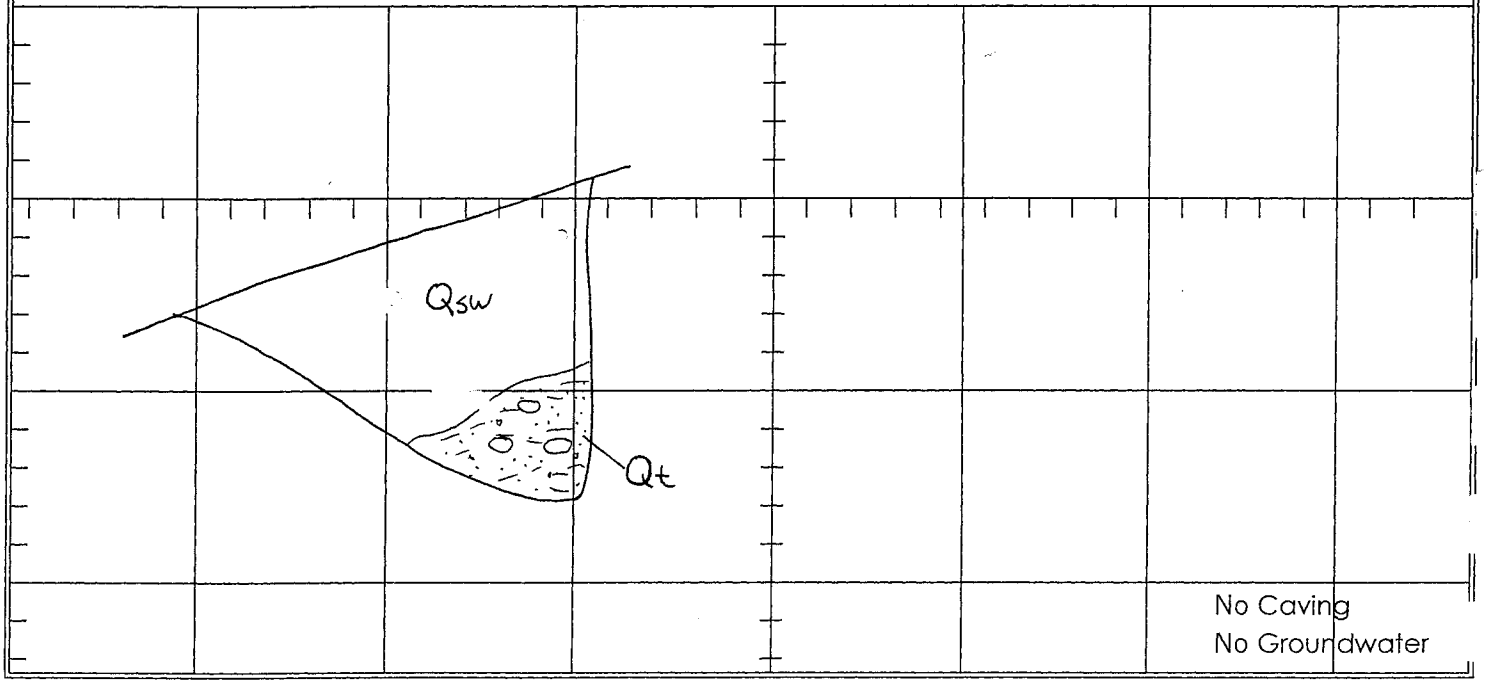
TOTAL DEPTH: 7 feet ←N51E SCALE: 1 inch = 5 feet



CLIENT: Newhall Land	JOB NO: 03-1571-4	**TRENCH LOG NO. T-62**
PROJECT: River Park Tentative Tract 53425	DATE: 4/4/03	
	LOGGED BY: VCG	
	EXCAVATED: 2/22/02	
EXCAVATION METHOD: Track-Mounted Backhoe w/24" Bucket	ELEVATION:	

DEPTH (feet)	SAMPLE TYPE	SAMPLE NUMBER	GRAPHIC LOG	USCS SYMBOL	DESCRIPTION	ATTITUDES	LABORATORY TESTS: Moisture Content (%)	LABORATORY TESTS: Dry Density (pcf)	LABORATORY TESTS: Other Tests
0					**SLOPEWASH; Qsw, (0-5 ft.)** @ 0' Light-grayish to reddish-brown fine- to coarse-grained silty pebbly sand with abundant cobbles; moderately dense dry; excavation extremely difficult due to small to medium-sized cobbles **TERRACE DEPOSITS; Qt, (5-7 ft.)** @ 5' Light yellowish-brown fine- to coarse-grained silty pebbly sand with small to medium cobbles; moderately dense; dry to damp; no visible stratification				
5									
10									
15									
20									

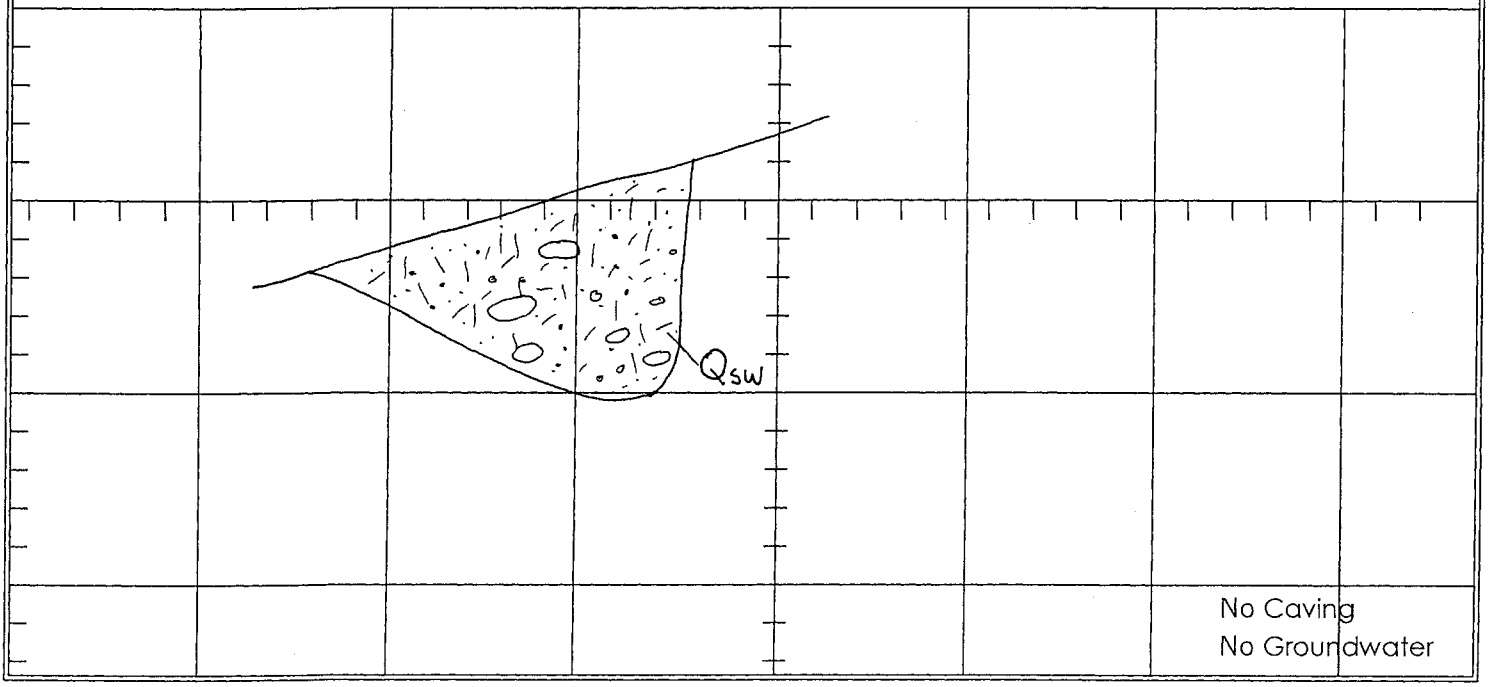
TOTAL DEPTH: 7 feet N38E→ SCALE: 1 inch = 5 feet



CLIENT: Newhall Land		JOB NO: 03-1571-4	**TRENCH LOG NO. T-63**
PROJECT: River Park Tentative Tract 53425		DATE: 4/4/03	
		LOGGED BY: VCG	
		EXCAVATED: 2/22/02	
EXCAVATION METHOD: Track-Mounted Backhoe w/24" Bucket		ELEVATION:	

DEPTH (feet)	SAMPLE TYPE	SAMPLE NUMBER	GRAPHIC LOG	USCS SYMBOL	DESCRIPTION	ATTITUDES	LABORATORY TESTS: Moisture Content (%)	LABORATORY TESTS: Dry Density (pcf)	LABORATORY TESTS: Other Tests
0					**SLOPEWASH; Qsw, (0-6 ft.)** @ 0' Grayish- to reddish-brown fine- to coarse-grained sandy silt/silty sand with scattered pebbles and cobbles; soft to moderately hard; dry; excavation very difficult due to cobbles				
5									
10									
15									
20									

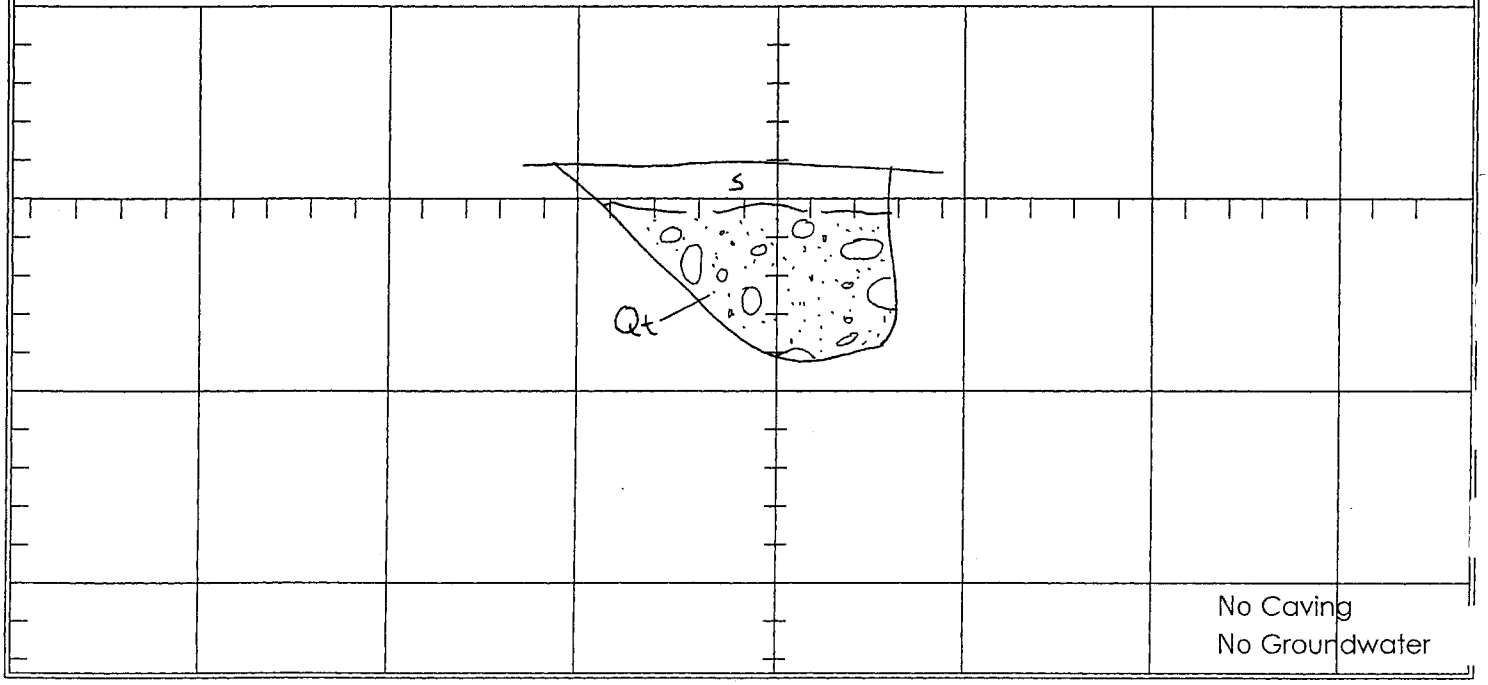
TOTAL DEPTH: 6 feet N30E→ SCALE: 1 inch = 5 feet



CLIENT: Newhall Land	JOB NO: 03-1571-4	**TRENCH LOG NO. T-64**
PROJECT: River Park Tentative Tract 53425	DATE: 4/4/03	
	LOGGED BY: VCG	
	EXCAVATED: 2/22/02	
EXCAVATION METHOD: Track-Mounted Backhoe w/24" Bucket	ELEVATION:	

DEPTH (feet)	SAMPLE TYPE	SAMPLE NUMBER	GRAPHIC LOG	USCS SYMBOL	DESCRIPTION	ATTITUDES	LABORATORY TESTS: Moisture Content (%)	LABORATORY TESTS: Dry Density (pcf)	LABORATORY TESTS: Other Tests
0					**SOIL; s, (0-1 ft.)** @ 0' Grayish-brown fine- to coarse-grained pebbly sand with silt and scattered cobbles; loose; dry; abundant roots **TERRACE DEPOSITS; Qt, (1-5 ft.)** @ 1' Reddish-brown medium- to coarse-grained pebbly cobbly sand; moderately dense; dry; no visible bedding; excavation very difficult				
5									
10									
15									
20									

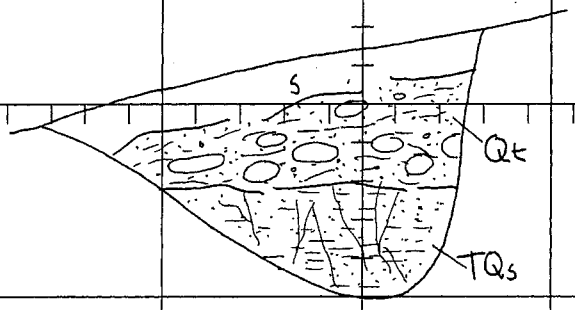
TOTAL DEPTH: 5 feet ←N6W SCALE: 1 inch = 5 feet



CLIENT: Newhall Land		JOB NO: 03-1571-4	**TRENCH LOG NO. T-65**
PROJECT: River Park Tentative Tract 53425		DATE: 4/4/03	
		LOGGED BY: VCG	
		EXCAVATED: 2/22/02	
EXCAVATION METHOD: Track-Mounted Backhoe w/24" Bucket		ELEVATION:	

DEPTH (feet)	SAMPLE TYPE	SAMPLE NUMBER	GRAPHIC LOG	USCS SYMBOL	DESCRIPTION	ATTITUDES	LABORATORY TESTS: Moisture Content (%)	LABORATORY TESTS: Dry Density (pcf)	LABORATORY TESTS: Other Tests
0					**SOIL; s, (0-1 ft.)** @ 0' Grayish-brown silty pebbly sand with cobbles; loose; dry **TERRACE DEPOSITS; Qt, (1-3.5 ft.)** @ 1' Reddish-brown clayey silty sand with abundant cobbles; moderately dense; dry **LANDSLIDE DEPOSITS; (3.5-7 ft.)** @ 3.5' Tan sandy siltstone with minor clay; moderately hard; dry to damp; massive; disturbed appearance COMMENTS: -Contact between Qls/Qt horizontal and sharp	Massive			
5									
10									
15									
20									

TOTAL DEPTH: 7 feet N48W→ SCALE: 1 inch = 5 feet

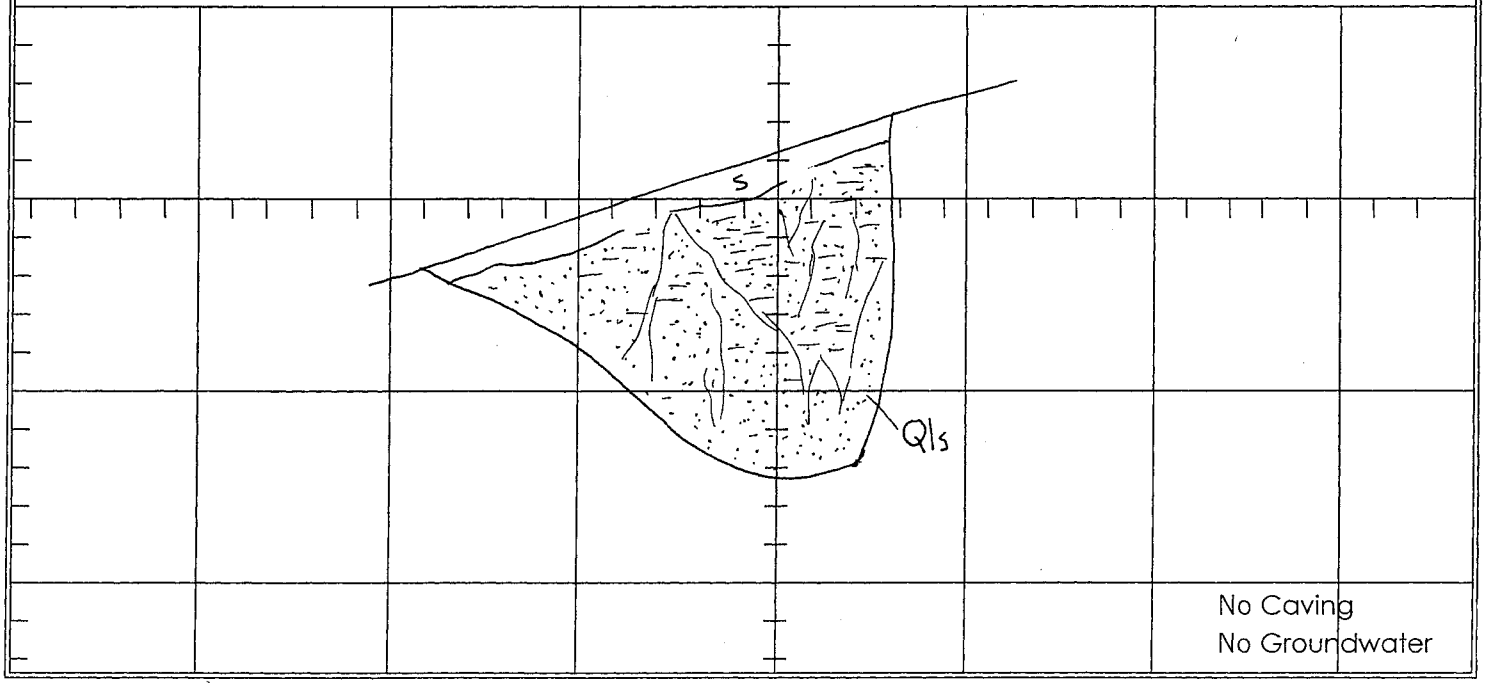


No Caving
No Groundwater

CLIENT: Newhall Land		JOB NO: 03-1571-4	**TRENCH LOG NO. T-66**
PROJECT: River Park Tentative Tract 53425		DATE: 4/4/03	
		LOGGED BY: VCG	
		EXCAVATED: 2/22/02	
EXCAVATION METHOD: Track-Mounted Backhoe w/24" Bucket		ELEVATION:	

DEPTH (feet)	SAMPLE TYPE	SAMPLE NUMBER	GRAPHIC LOG	USCS SYMBOL	DESCRIPTION	ATTITUDES	LABORATORY TESTS: Moisture Content (%)	LABORATORY TESTS: Dry Density (pcf)	LABORATORY TESTS: Other Tests
0					**SOIL; s, (0-6 in.)** @ 0' Light-reddish brown fine- to coarse-grained silty, pebbly sand; loose; dry **LANDSLIDE DEPOSITS; Qls, (6 in.-9 ft.)** @ 6" Light reddish-brown silty sandstone/sandy siltstone and light-gray to cream fine- to coarse-grained sandstone and pebbly sandstone; moderately dense; slightly fractured; dry to damp; gradational between units; digs hard COMMENTS: -Only extremely vague stratigraphy but seems discontinuous and irregular	Massive/structureless			
5									
10									
15									
20									

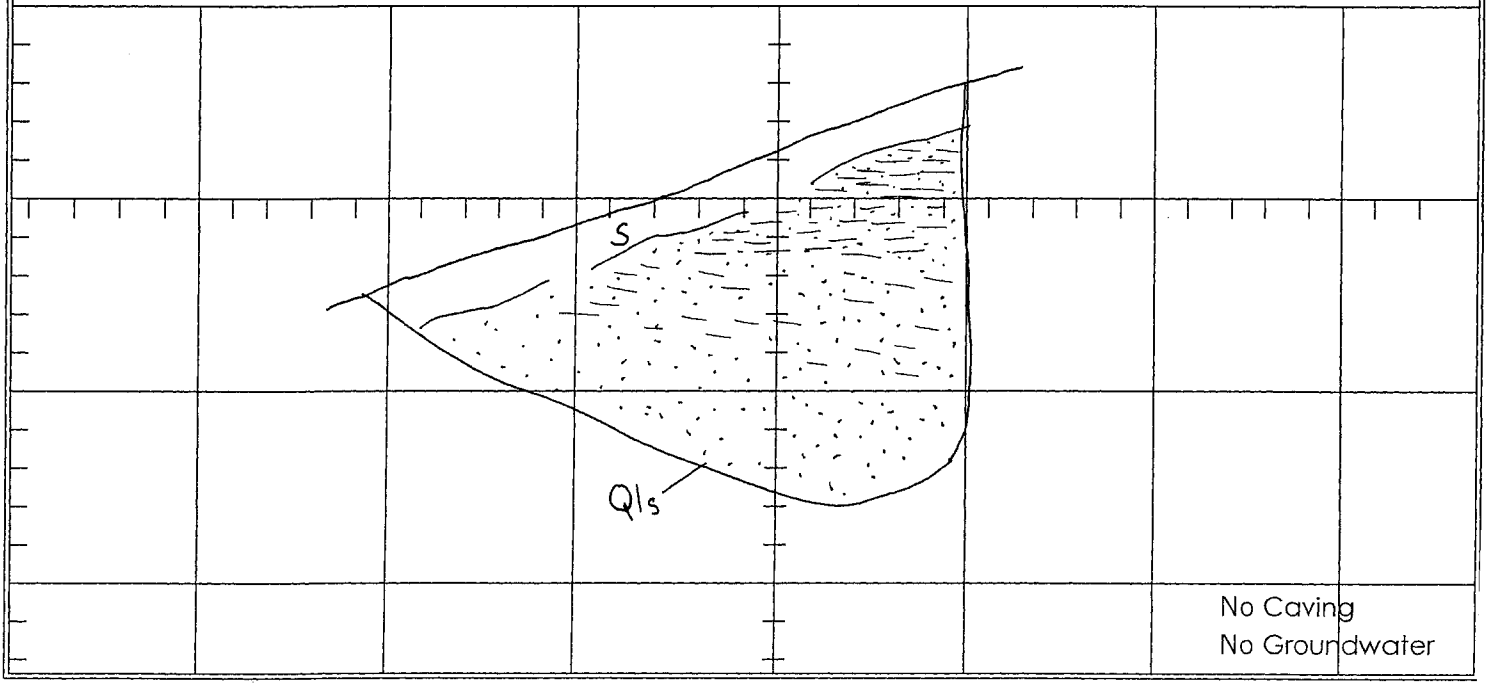
TOTAL DEPTH: 7 feet N45W→ SCALE: 1 inch = 5 feet



CLIENT: Newhall Land	JOB NO: 03-1571-4	**TRENCH LOG NO. T-67**
PROJECT: River Park Tentative Tract 53425	DATE: 4/4/03	
	LOGGED BY: VCG	
	EXCAVATED: 2/22/02	
EXCAVATION METHOD: Track-Mounted Backhoe w/24" Bucket	ELEVATION:	

DEPTH (feet)	SAMPLE TYPE	SAMPLE NUMBER	GRAPHIC LOG	USCS SYMBOL	DESCRIPTION	ATTITUDES	LABORATORY TESTS: Moisture Content (%)	LABORATORY TESTS: Dry Density (pcf)	LABORATORY TESTS: Other Tests
0					**SOIL; s, (0-1 ft.)** @ 0' Light-reddish brown fine- to coarse-grained silty, pebbly sand; loose; dry **LANDSLIDE DEPOSITS; (1-9 ft.)** @ 1' Reddish-brown siltstone and sandy siltstone; grades to light reddish-brown silty sandstone and light gray coarse-grained sandstone; moderately dense; dry; bedding extremely vague	Apx. B:N78W,10SW			
5									
10									
15									
20									

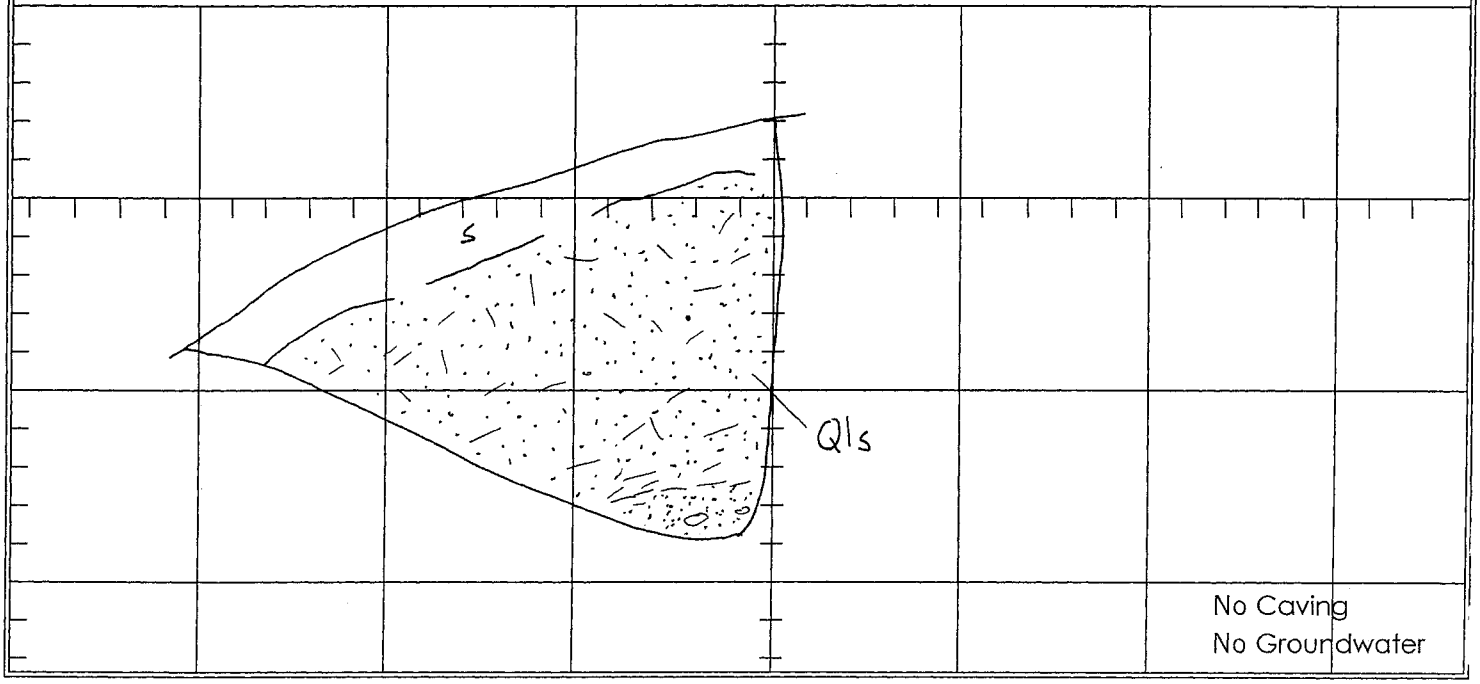
TOTAL DEPTH: 9 feet N52W→ SCALE: 1 inch = 5 feet



CLIENT: Newhall Land		JOB NO: 03-1571-4	**TRENCH LOG NO. T-68**
PROJECT: River Park Tentative Tract 53425		DATE: 4/4/03	
		LOGGED BY: VCG	
		EXCAVATED: 2/22/02	
EXCAVATION METHOD: Track-Mounted Backhoe w/24" Bucket		ELEVATION:	

DEPTH (feet)	SAMPLE TYPE	SAMPLE NUMBER	GRAPHIC LOG	USCS SYMBOL	DESCRIPTION	ATTITUDES	LABORATORY TESTS: Moisture Content (%)	LABORATORY TESTS: Dry Density (pcf)	LABORATORY TESTS: Other Tests
0					**SOIL; s, (0-1.5 ft.)** @ 0' Grayish-brown fine- to coarse-grained silty sand with pebbles; loose; dry **LANDSLIDE DEPOSITS; Qls, (1.5-11.5 ft.)** @ 1.5' Light yellowish-brown fine-grained silty sandstone and gray friable sandstone with isolated cobbles; loose; lacking sedimentary structures; excavates very easily with the backhoe and with pick COMMENTS: -Digs very easily				
5									
10									
15									
20									

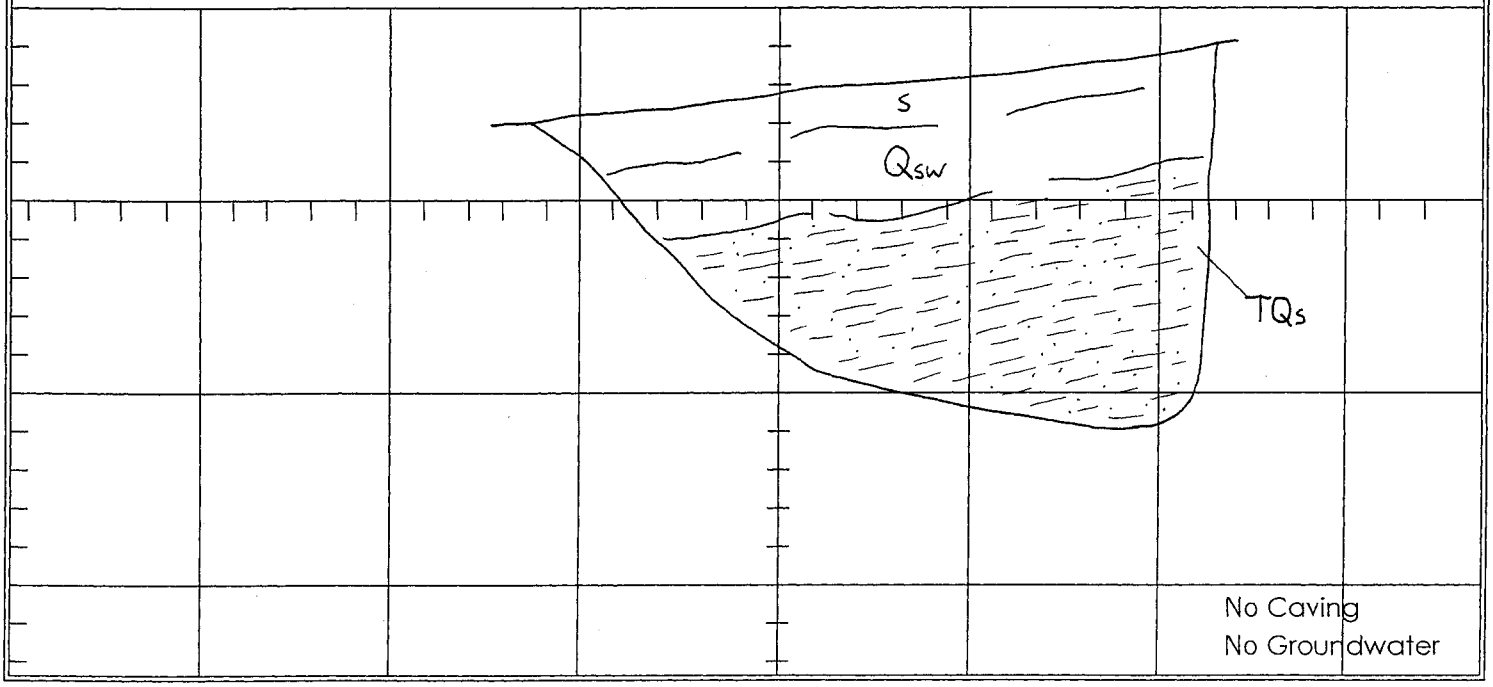
TOTAL DEPTH: 11.5 feet N23W→ SCALE: 1 inch = 5 feet



CLIENT: Newhall Land		JOB NO: 03-1571-4	**TRENCH LOG NO. T-69**
PROJECT: River Park Tentative Map Review		DATE: 4/4/03	
		LOGGED BY: CJS	
		EXCAVATED: 3/5/02	
EXCAVATION METHOD: Track-Mounted Backhoe w/24" bucket		ELEVATION: 1365	

DEPTH (feet)	SAMPLE TYPE	SAMPLE NUMBER	GRAPHIC LOG	USCS SYMBOL	DESCRIPTION	ATTITUDES	LABORATORY TESTS: Moisture Content (%)	LABORATORY TESTS: Dry Density (pcf)	LABORATORY TESTS: Other Tests
0					**SOIL; s, (0-1 ft.)** @ 0' Dark yellowish-brown, fine-grained silty to clayey sand and sandy clay; fine gravel to 1/2"; porous; damp **SLOPEWASH; Qsw, (1-3 ft.)** @ 1' Dark-brown to dark yellowish-brown sandy clay; few rounded granitic cobbles near base of unit; stiff; damp to moist **BEDROCK; TQs, (3-9.5 ft.)** @ 3' Yellowish-brown sandy mudstone; moderately hard; damp; upper 3 ft. weathered with carbonate staining along discontinuous fracture faces; massive; no significant joints or fractures				
5									
10									
15									
20									

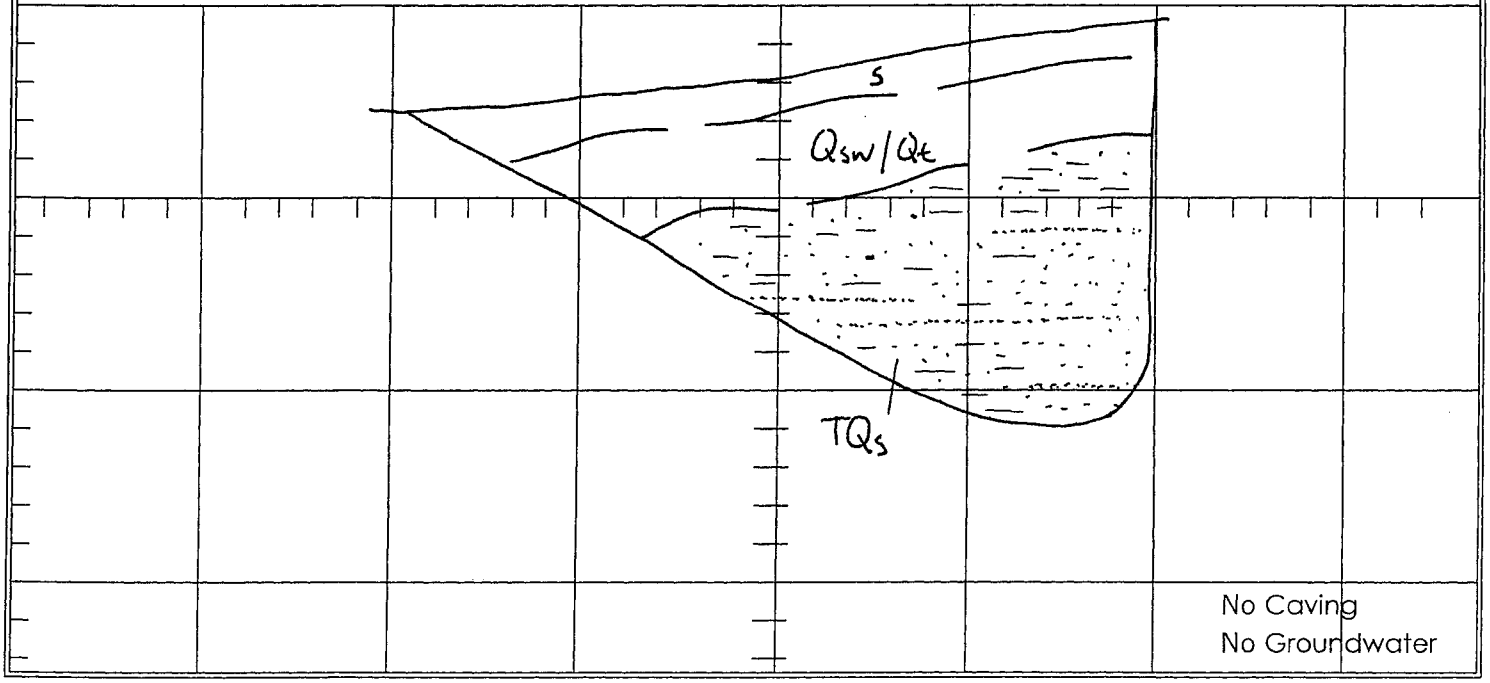
TOTAL DEPTH: 9.5 feet N45E→ SCALE: 1 inch = 5 feet



CLIENT: Newhall Land	JOB NO: 03-1571-4	**TRENCH LOG NO. T-70**
PROJECT: River Park Tentative Map Review	DATE: 4/4/03	
	LOGGED BY: CJS	
	EXCAVATED: 3/5/02	
EXCAVATION METHOD: Track-Mounted Backhoe w/24" bucket	ELEVATION: 1365	

DEPTH (feet)	SAMPLE TYPE	SAMPLE NUMBER	GRAPHIC LOG	USCS SYMBOL	DESCRIPTION	ATTITUDES	LABORATORY TESTS: Moisture Content (%)	LABORATORY TESTS: Dry Density (pcf)	LABORATORY TESTS: Other Tests
0					**SOIL; s, (0-1 ft.)** @ 0' Yellowish-brown very sandy clay; sand fraction fine- to medium-grained; rare, rounded, granitic pebbles and cobbles; abundant hair-roots; dry to damp **SLOPEWASH/TERRACE DEPOSITS; Qsw/Qt, (1-3 ft.)** @ 1' Dark yellowish-brown sandy clay to clayey sand; sand fraction fine- to coarse-grained; rounded granitic pebbles and cobbles common in lowest 12"; overall stiff to very stiff; damp **BEDROCK?; TQ?, (3-10 ft.)** @ 3' Yellowish-brown to dark yellowish-brown sandy mudstone; locally with mottling of olive brown; moderately hard; damp; vague bedding features defined by subtle variations in sand content; "bedding" features cannot be reliably traced over distances exceeding a few feet	B:N70E,11SE			
5									
10									
15									
20									

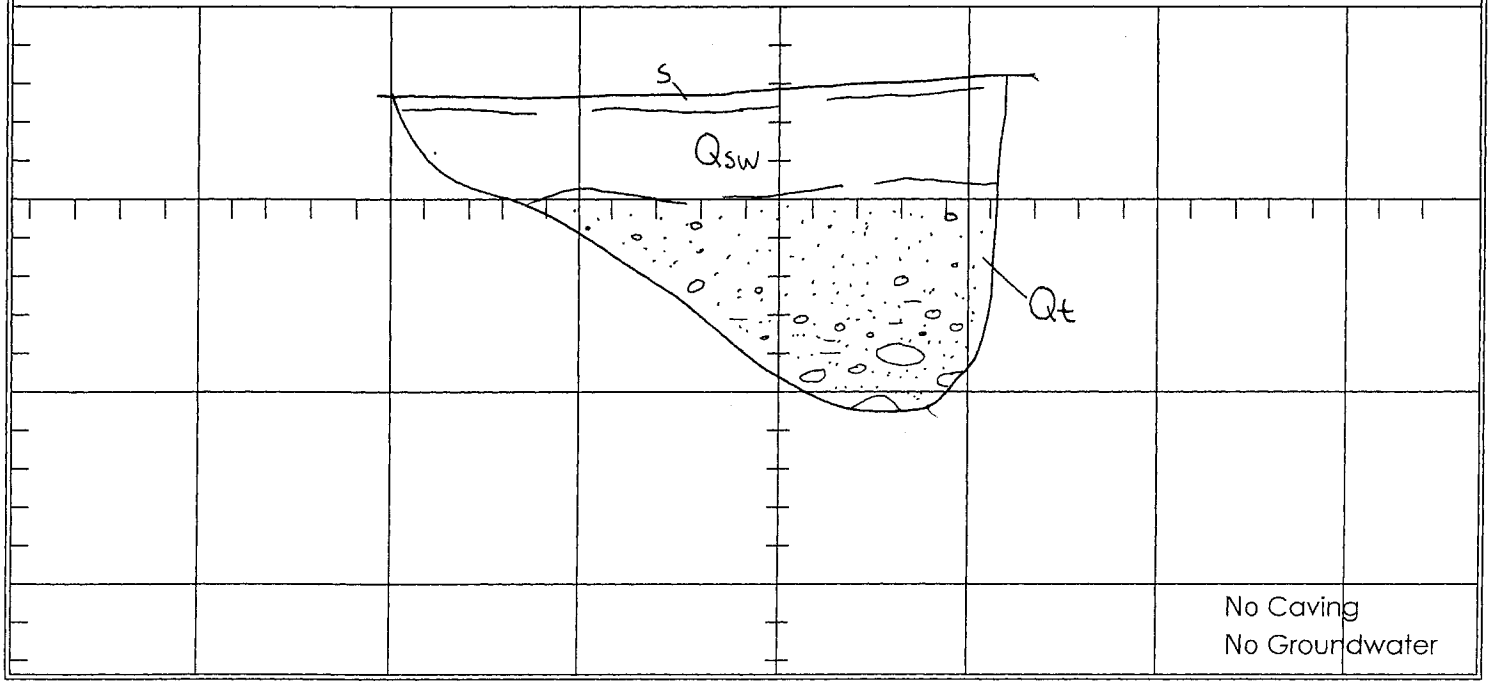
TOTAL DEPTH: 10 feet N30E→ SCALE: 1 inch = 5 feet



CLIENT: Newhall Land		JOB NO: 03-1571-4	**TRENCH LOG NO. T-71**
PROJECT: River Park Tentative Map Review		DATE: 4/4/03	
		LOGGED BY: CJS	
		EXCAVATED: 3/5/02	
EXCAVATION METHOD: Track-Mounted Backhoe w/24" bucket		ELEVATION: ~1417	

DEPTH (feet)	SAMPLE TYPE	SAMPLE NUMBER	GRAPHIC LOG	USCS SYMBOL	DESCRIPTION	ATTITUDES	LABORATORY TESTS: Moisture Content (%)	LABORATORY TESTS: Dry Density (pcf)	LABORATORY TESTS: Other Tests
0					**SOIL; s, (0-6 in.)** @ 0' Brown to grayish-brown, fine- to medium-grained silty sand; loose; dry to slightly damp; numerous hair-roots **SLOPEWASH; Qsw, (6 in.-3 ft.)** @ 6" Yellowish-brown sandy clay; stiff; damp **TERRACE DEPOSITS; Qt, (3-8.5 ft.)** @ 3' Dark brown (7.5YR 3/4) cobble and boulder conglomerate to cobbly sand; coarser-grained sections are matrix-support with rounded granitic/metamorphic clasts; clasts range 1/2" to 24"; with 2-6" size most common; matrix is fine- to coarse-grained sand with clay; overall dense; damp to moist; excavation is difficult in lower section due to increasing clast size				
5									
10									
15									
20									

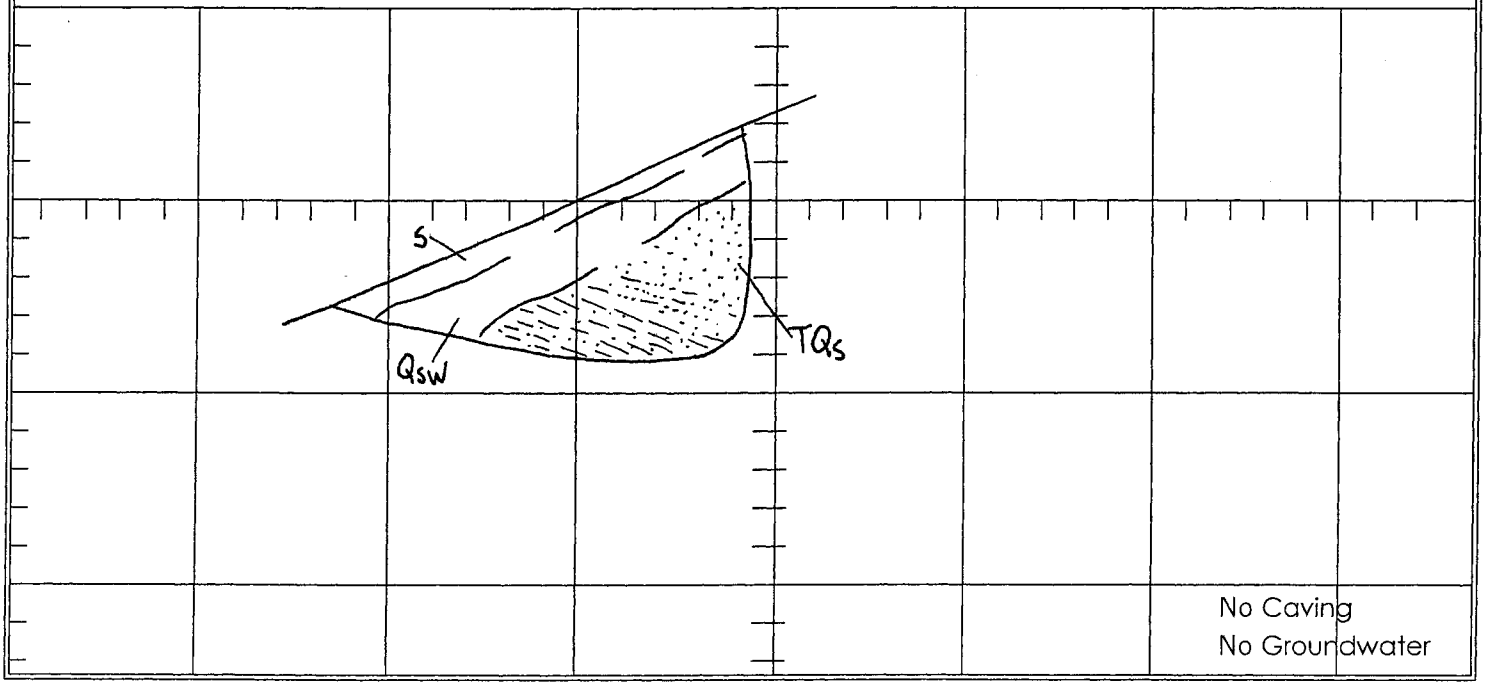
TOTAL DEPTH: 8.5 feet ←N80W SCALE: 1 inch = 5 feet



CLIENT: Newhall Land	JOB NO: 03-1571-4	**TRENCH LOG NO. T-72**
PROJECT: River Park Tentative Map Review	DATE: 4/4/03	
	LOGGED BY: CJS	
	EXCAVATED: 3/5/02	
EXCAVATION METHOD: Track-Mounted Backhoe w/24" bucket	ELEVATION: 1429	

DEPTH (feet)	SAMPLE TYPE	SAMPLE NUMBER	GRAPHIC LOG	USCS SYMBOL	DESCRIPTION	ATTITUDES	LABORATORY TESTS: Moisture Content (%)	LABORATORY TESTS: Dry Density (pcf)	LABORATORY TESTS: Other Tests
0					**SOIL; s, (0-6 in.)** @ 0' Yellowish-brown, fine- to medium-grained silty to clayey sand; loose; dry to slightly damp **SLOPEWASH; Qsw, (6 in.-1.5 ft.)** @ 6" Dark yellowish-brown clayey sand with pebbles; stiff; damp to moist **BEDROCK; TQs, (1.5-6 ft.)** @ 1.5' Grayish-yellow medium- to coarse-grained pebbly sandstone and yellowish-brown very fine-grained silty to clayey sandstone; hard; damp; bedding well-defined by change in lithology	B:N65E,12SE			
5									
10									
15									
20									

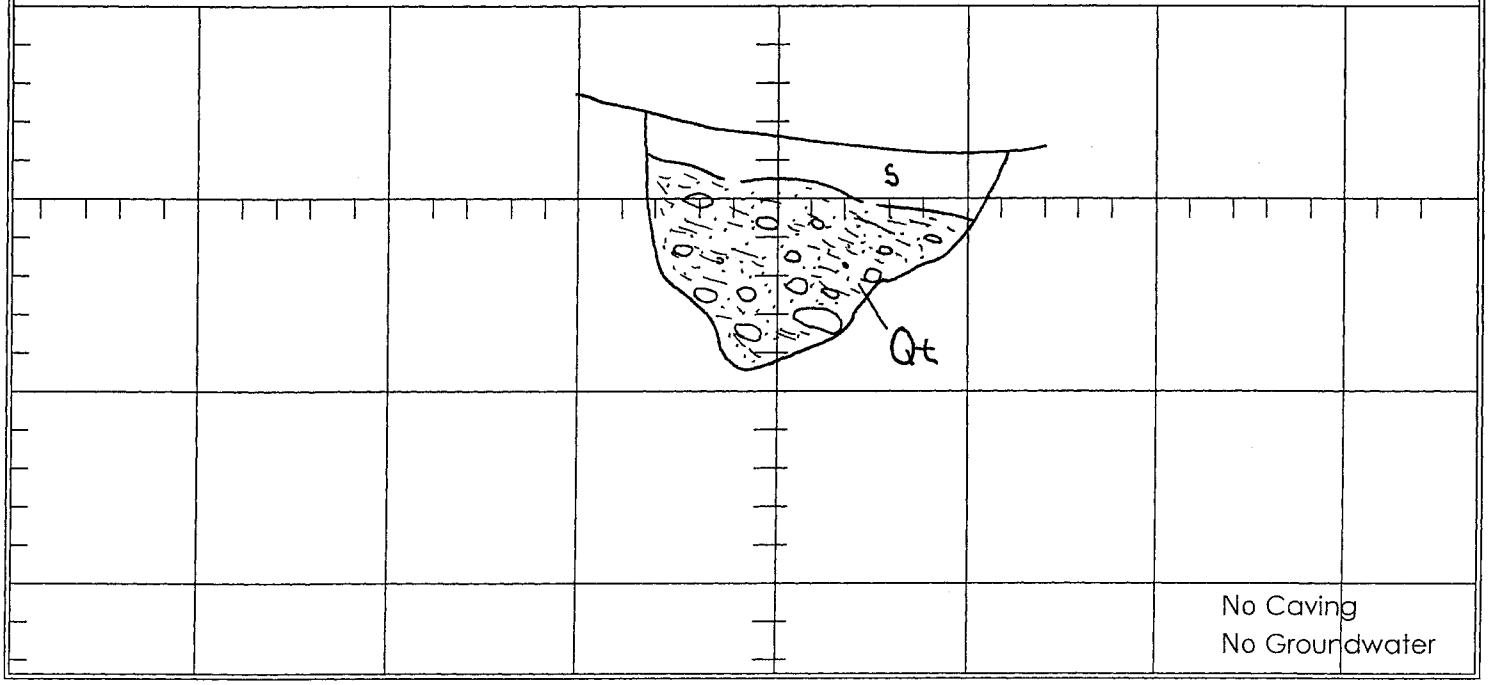
TOTAL DEPTH: 6 feet ←N60W SCALE: 1 inch = 5 feet



CLIENT: Newhall Land	JOB NO: 03-1571-4	**TRENCH LOG NO. T-73**
PROJECT: River Park Tentative Map Review	DATE: 4/4/03	
	LOGGED BY: CJS	
	EXCAVATED: 3/5/02	
EXCAVATION METHOD: Track-Mounted Backhoe w/24" bucket	ELEVATION: ~1429	

DEPTH (feet)	SAMPLE TYPE	SAMPLE NUMBER	GRAPHIC LOG	USCS SYMBOL	DESCRIPTION	ATTITUDES	LABORATORY TESTS: Moisture Content (%)	LABORATORY TESTS: Dry Density (pcf)	LABORATORY TESTS: Other Tests
0					**SOIL; s, (0-1 ft.)** @ 0' Brown fine- to medium-grained silty sand; porous; loose; dry to damp; hair-roots common **TERRACE DEPOSITS; Qt, (1-6.5 ft.)** @ 1' Dark brown (7.5YR 3/4) cobble & boulder conglomerate, rounded granitic & metamorphic cobbles and boulders supported in matrix of fine- to coarse-grained clayey sand to sandy clay; clast size ranges 1/2-24" with most between 2-6 inches; overall hard; damp				
5									
10									
15									
20									

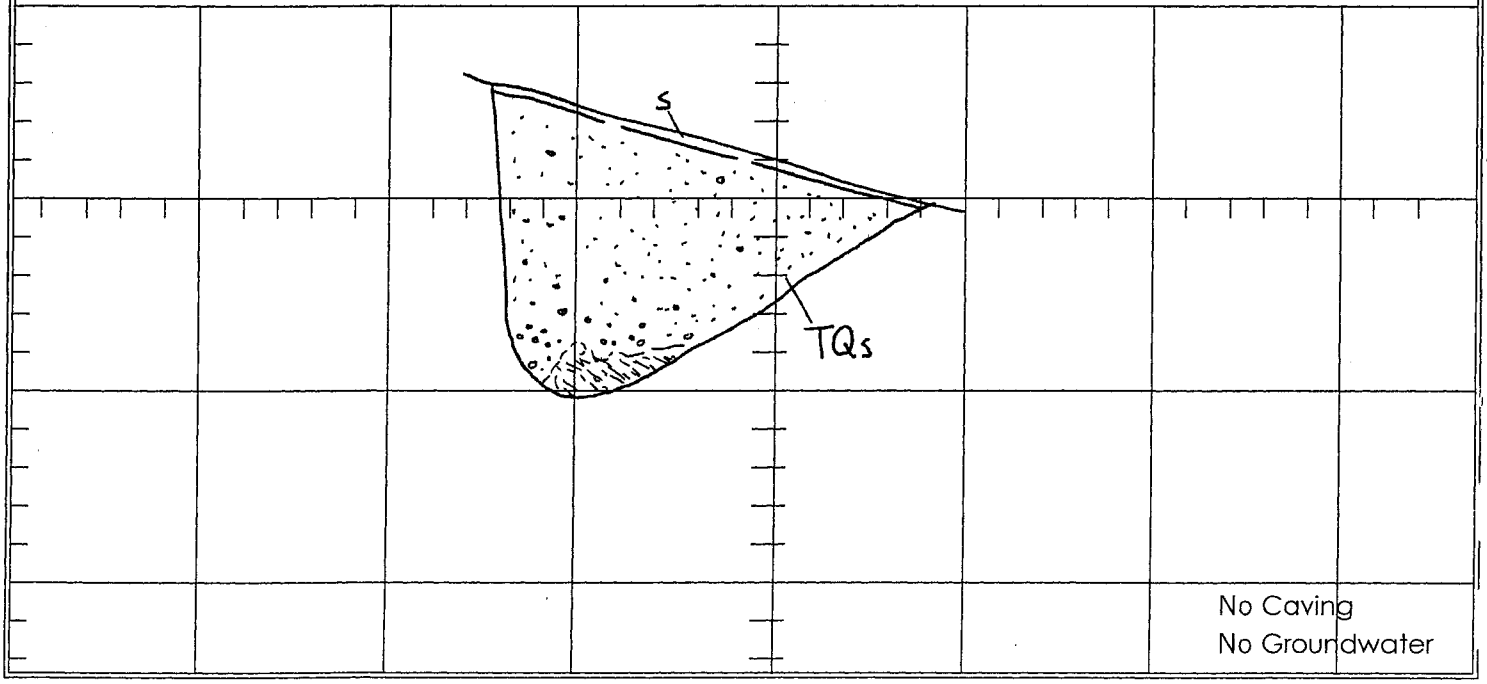
TOTAL DEPTH: 6.5 feet N75W→ SCALE: 1 inch = 5 feet



CLIENT: Newhall Land	JOB NO: 03-1571-4	**TRENCH LOG NO. T-74**
PROJECT: River Park Tentative Map Review	DATE: 4/4/03	
	LOGGED BY: CJS	
	EXCAVATED: 3/5/02	
EXCAVATION METHOD: Track-Mounted Backhoe w/24" bucket	ELEVATION: ~1335	

DEPTH (feet)	SAMPLE TYPE	SAMPLE NUMBER	GRAPHIC LOG	USCS SYMBOL	DESCRIPTION	ATTITUDES	LABORATORY TESTS: Moisture Content (%)	LABORATORY TESTS: Dry Density (pcf)	LABORATORY TESTS: Other Tests
0					**SOIL; s, (0-6 in.)** @ 0' Grayish-brown, fine- to medium-grained sand; loose; dry; abundant hair-roots **BEDROCK; TQs, (6 in.-8 ft.)** @ 6" Yellowish-gray, medium- to coarse-grained sandstone and pebbly sandstone and moderate yellowish-brown to moderate reddish-brown mudstone; mudstone contact is deeply channeled where sandstone grades to pebble conglomerate; sandstone is lightly fractured; with solid roots along fractures to a depth of six feet; bedding defined by gradational contact through pebbly sandstone to pebble conglomerate	B:N76E,8SE			
5									
10									
15									
20									

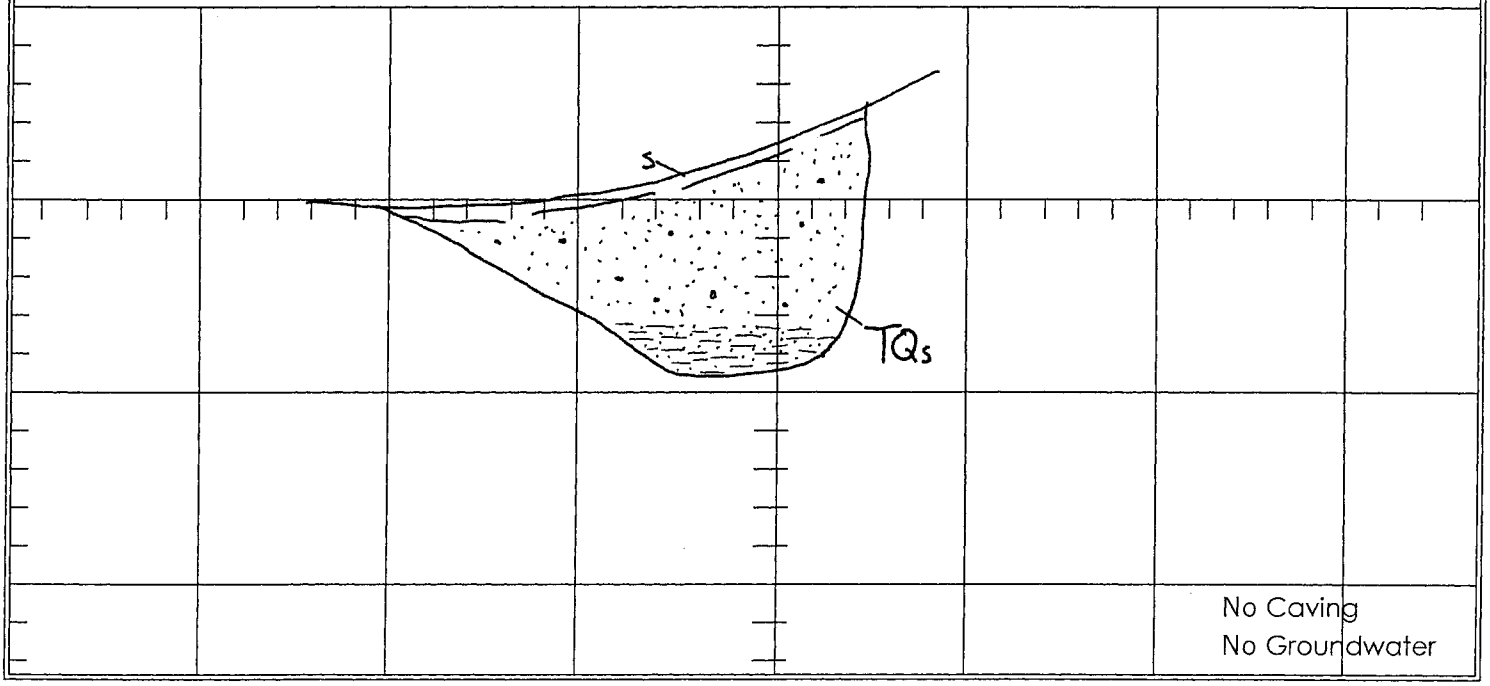
TOTAL DEPTH: 8 feet ←N14E SCALE: 1 inch = 5 feet



CLIENT: Newhall Land	JOB NO: 03-1571-4	**TRENCH LOG NO. T-75**
PROJECT: River Park Tentative Map Review	DATE: 4/4/03	
	LOGGED BY: CJS	
	EXCAVATED: 3/5/02	
EXCAVATION METHOD: Track-Mounted Backhoe w/24" bucket	ELEVATION: ~1310	

DEPTH (feet)	SAMPLE TYPE	SAMPLE NUMBER	GRAPHIC LOG	USCS SYMBOL	DESCRIPTION	ATTITUDES	LABORATORY TESTS: Moisture Content (%)	LABORATORY TESTS: Dry Density (pcf)	LABORATORY TESTS: Other Tests
0					**SOIL; s, (0-6 in.)** @ 0' Pale yellowish-gray, fine- to coarse-grained pebbly sand; loose; damp **BEDROCK; TQs, (6 in.-7 ft.)** @ 6" Yellowish-gray, fine- to coarse-grained pebbly sandstone and light yellowish-brown to grayish-brown, sandy mudstone; contact uniform and planar; moderately hard to hard; damp	B:N75W,12SW			
5									
10									
15									
20									

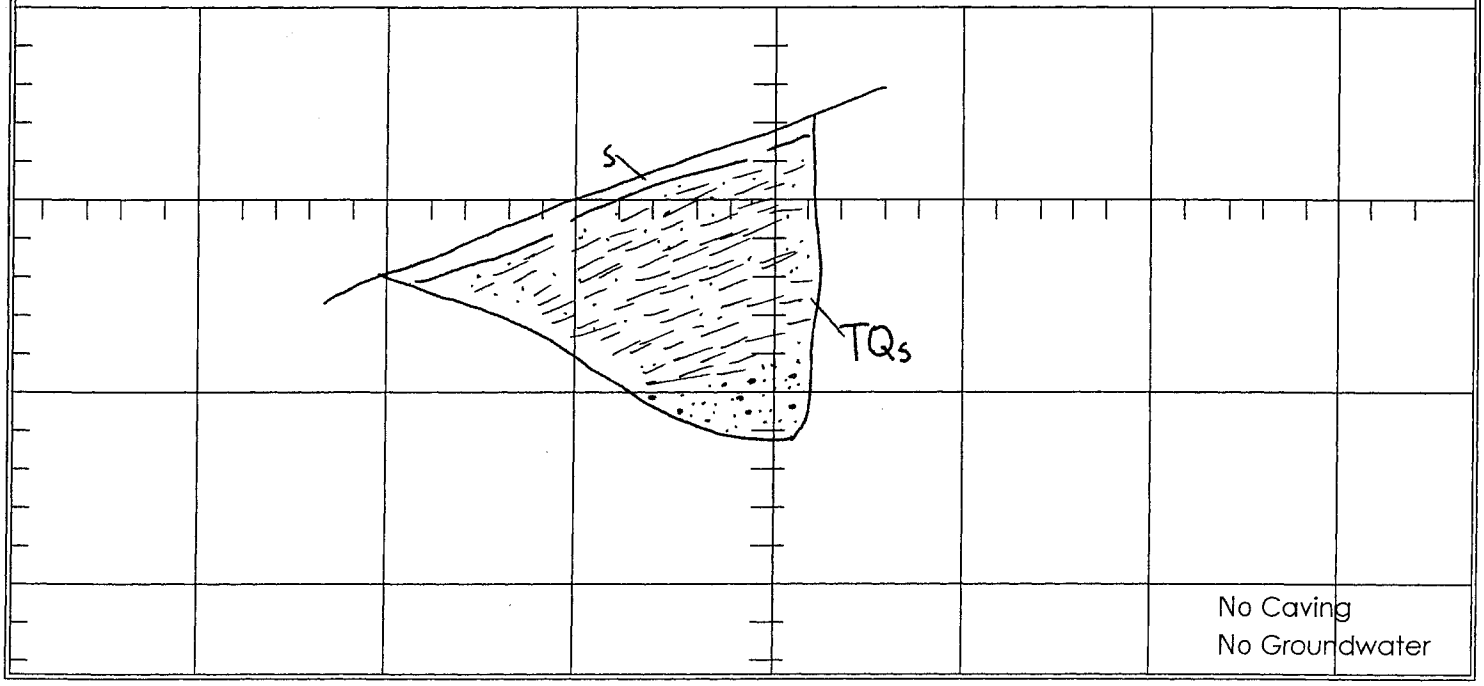
TOTAL DEPTH: 7 feet ←N15W SCALE: 1 inch = 5 feet



CLIENT: Newhall Land		JOB NO: 03-1571-4	**TRENCH LOG NO. T-76**
PROJECT: River Park Tentative Map Review		DATE: 4/4/03	
		LOGGED BY: CJS	
		EXCAVATED: 3/5/02	
EXCAVATION METHOD: Track-Mounted Backhoe w/24" bucket		ELEVATION: ~1285	

DEPTH (feet)	SAMPLE TYPE	SAMPLE NUMBER	GRAPHIC LOG	USCS SYMBOL	DESCRIPTION	ATTITUDES	LABORATORY TESTS: Moisture Content (%)	LABORATORY TESTS: Dry Density (pcf)	LABORATORY TESTS: Other Tests
0					**SOIL; s, (0-8 in.)** @ 0' Yellowish-brown, fine- to medium-grained silty sand; numerous roots; loose; damp **BEDROCK; TQs, (8-8.5 ft.)** @ 8" Moderate reddish-brown sandy mudstone and yellowish-gray fine- to coarse-grained sandstone; moderately hard to hard; damp; bedding on gravel lense at gradational contact	B:N65W,8SW			
5									
10									
15									
20									

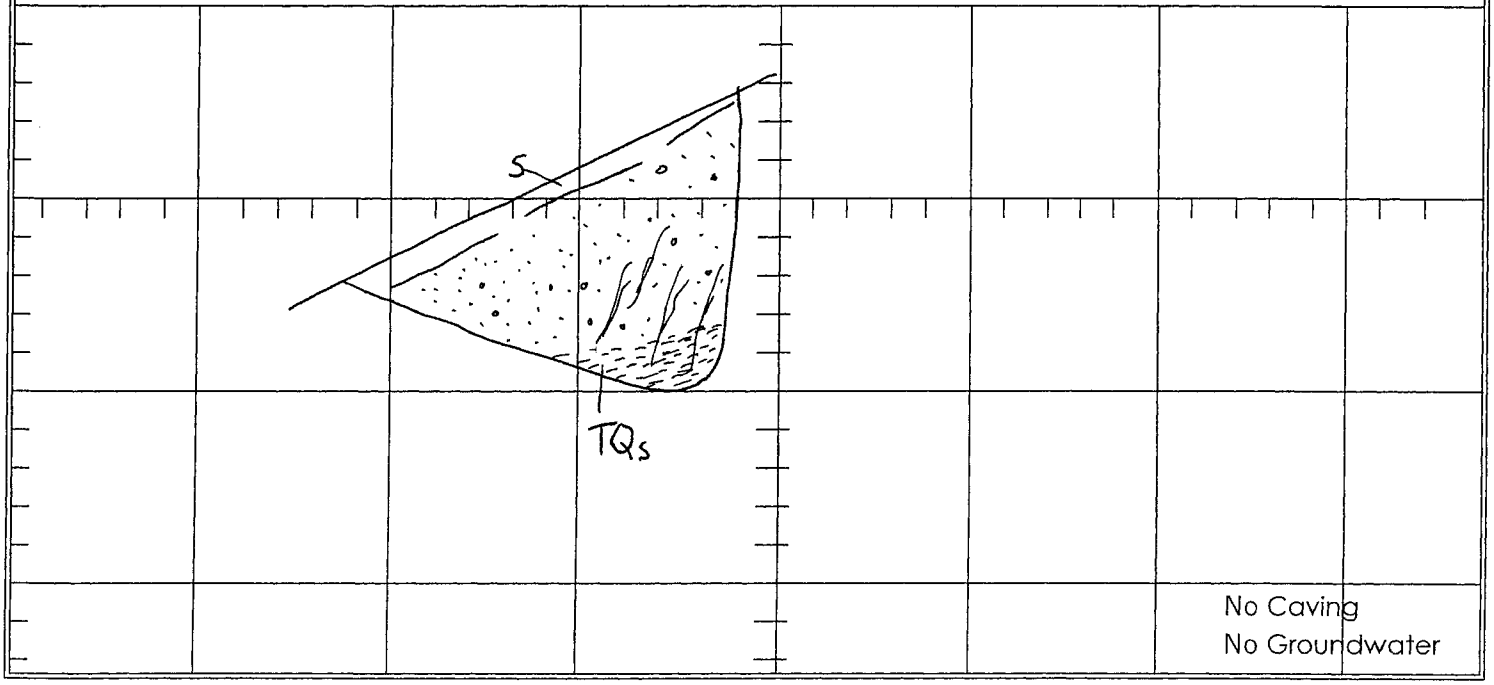
TOTAL DEPTH: 8.5 feet N15W→ SCALE: 1 inch = 5 feet



CLIENT: Newhall Land	JOB NO: 03-1571-4	**TRENCH LOG NO. T-77**
PROJECT: River Park Tentative Map Review	DATE: 4/4/03	
	LOGGED BY: CJS	
	EXCAVATED: 3/5/02	
EXCAVATION METHOD: Track-Mounted Backhoe w/24" bucket	ELEVATION: ~1315	

DEPTH (feet)	SAMPLE TYPE	SAMPLE NUMBER	GRAPHIC LOG	USCS SYMBOL	DESCRIPTION	ATTITUDES	LABORATORY TESTS: Moisture Content (%)	LABORATORY TESTS: Dry Density (pcf)	LABORATORY TESTS: Other Tests
0					**SOIL; s, (0-6 in.)** @ 0' Grayish-brown fine- to medium-grained silty sand; abundant hair-roots **BEDROCK; TQs, (6 in.-8 ft.)** @ 6" Yellowish-gray medium- to coarse-grained pebbly sandstone and yellowish-brown sandy siltstone; contact planar and continuous; moderately hard to hard; damp; several carbonate-lined fractures; fractures range up to 3/4" wide; narrower fractures taper closed in both directions; fractures cross-bedding contact without offset	B:N60W,12SW f-N78E,60SE			
5									
10									
15									
20									

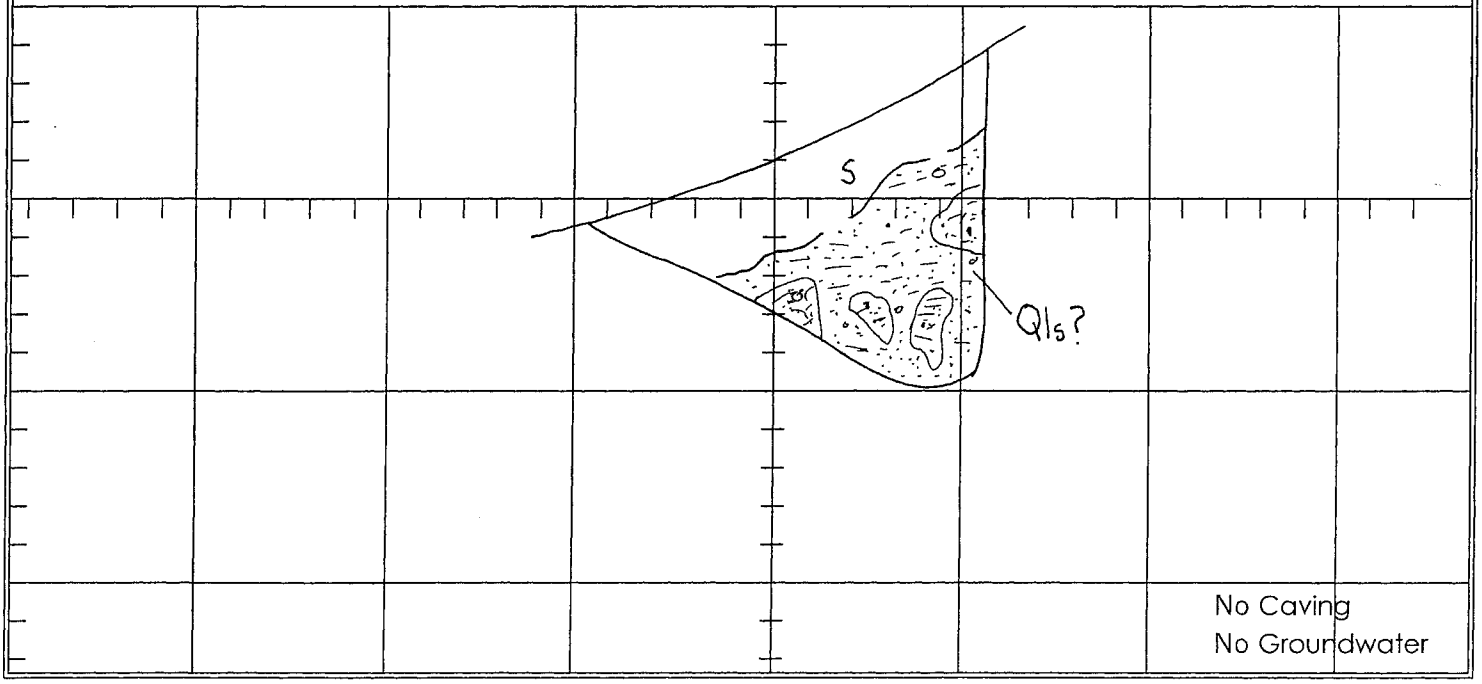
TOTAL DEPTH: 8 feet N10W→ SCALE: 1 inch = 5 feet



CLIENT: Newhall Land	JOB NO: 03-1571-4	**TRENCH LOG NO. T-78**
PROJECT: River Park Tentative Map Review	DATE: 4/4/03	
	LOGGED BY: CJS	
	EXCAVATED: 3/5/02	
EXCAVATION METHOD: Track-Mounted Backhoe w/24" bucket	ELEVATION: ~1300	

DEPTH (feet)	SAMPLE TYPE	SAMPLE NUMBER	GRAPHIC LOG	USCS SYMBOL	DESCRIPTION	ATTITUDES	LABORATORY TESTS: Moisture Content (%)	LABORATORY TESTS: Dry Density (pcf)	LABORATORY TESTS: Other Tests
0					**SOIL; s, (0-2 ft.)** @ 0' Light to moderate grayish-brown fine-grained silty sand with scattered cobbles; loose; dry to damp **LANDSLIDE DEBRIS?; Qls?, (2-9 ft.)** @ 2' Mixture of sandstone and siltstone fragments in matrix of fine- to medium-grained silty sand; pebbles and cobbles scattered throughout; carbonate occurs locally in stringers and small blebs; no observable structure				
5									
10									
15									
20									

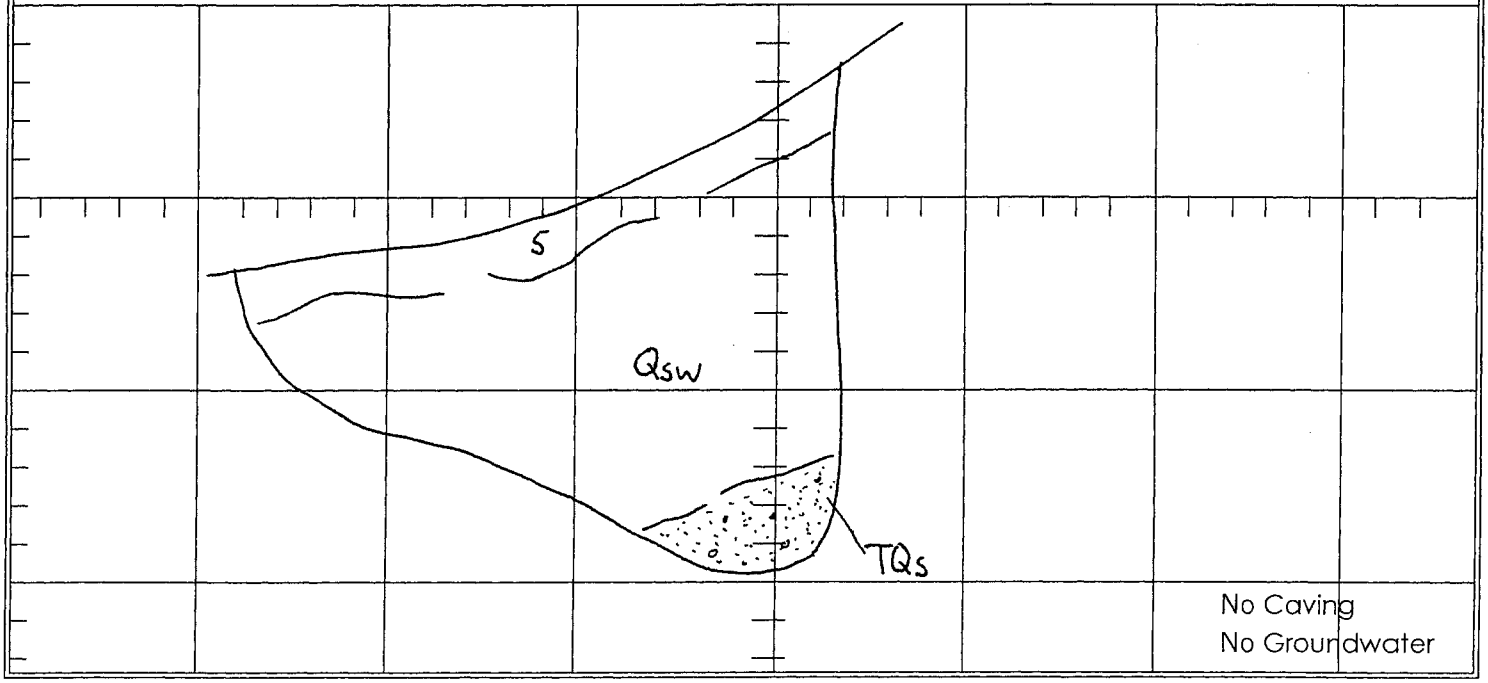
TOTAL DEPTH: 9 feet Due N→ SCALE: 1 inch = 5 feet



CLIENT: Newhall Land	JOB NO: 03-1571-4	**TRENCH LOG NO. T-79**
PROJECT: River Park Tentative Map Review	DATE: 4/4/03	
	LOGGED BY: CJS	
	EXCAVATED: 3/5/02	
EXCAVATION METHOD: Track-Mounted Backhoe w/24" bucket	ELEVATION: 1335	

DEPTH (feet)	SAMPLE TYPE	SAMPLE NUMBER	GRAPHIC LOG	USCS SYMBOL	DESCRIPTION	ATTITUDES	LABORATORY TESTS: Moisture Content (%)	LABORATORY TESTS: Dry Density (pcf)	LABORATORY TESTS: Other Tests
0					**SOIL; s, (0-1 ft.)** @ 0' Yellowish-brown, fine- to coarse-grained silty sand with pebbles; numerous roots; loose; damp; lower contact irregular **SLOPEWASH/WEATHERED BEDROCK; Qsw, (1-10 ft.)** @ 1' Pale reddish-brown to yellowish-gray, mixture of sandstone, siltstone and cobbles in matrix of fine- to coarse-grained, silty sand; loose to moderately dense; damp; no discernible structure; lower contact gradational into bedrock; appearance similar to material identified as Qls in nearby trenches				
5									
10					**BEDROCK; TQs, (10-13 ft.)** @ 10' Yellowish-gray, pebbly sandstone; hard; damp; bedding defined by subtle pebble lineaments	B:N65E,14SE apx.			
15									
20									

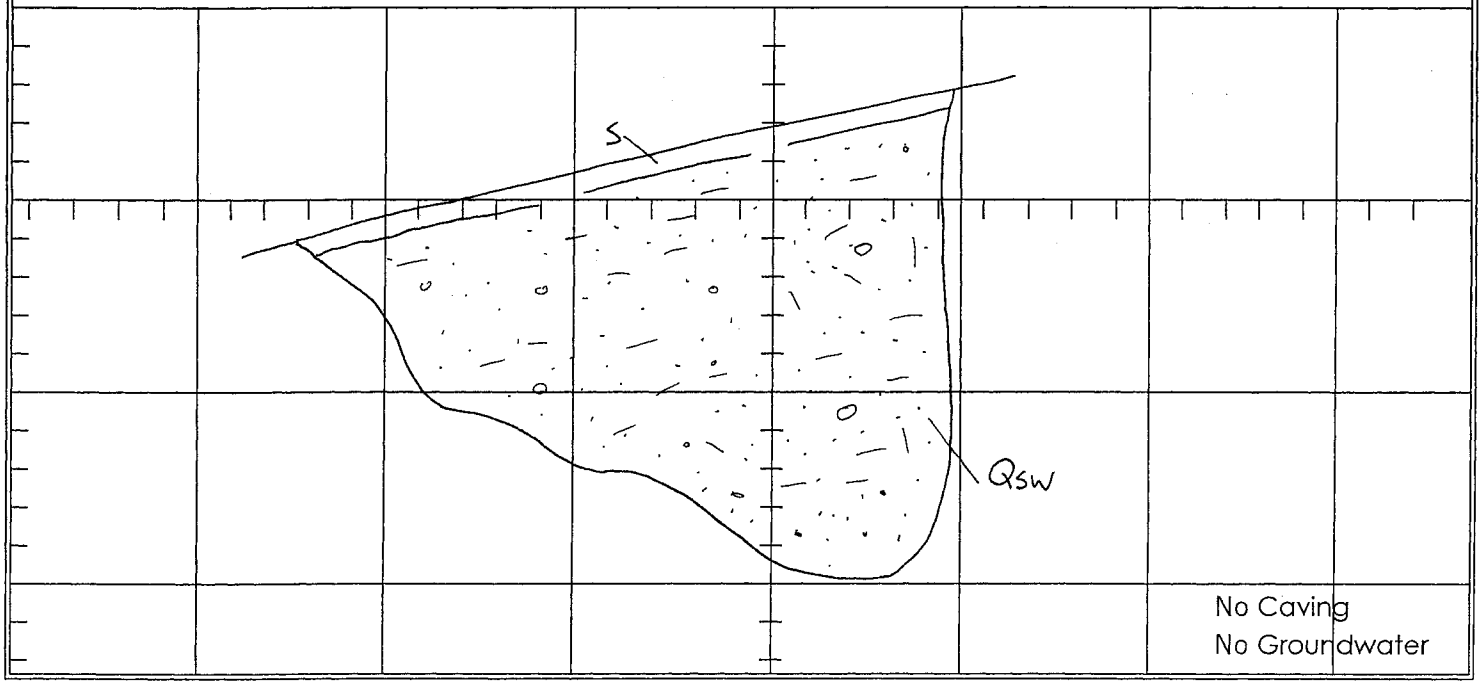
TOTAL DEPTH: 13 feet N55W→ SCALE: 1 inch = 5 feet



CLIENT: Newhall Land	JOB NO: 03-1571-4	**TRENCH LOG NO. T-80**
PROJECT: River Park Tentative Tract 53425	DATE: 4/4/03	
	LOGGED BY: CJS	
	EXCAVATED: 3/5/02	
EXCAVATION METHOD: Track-Mounted Backhoe w/24" Bucket	ELEVATION: 1280	

DEPTH (feet)	SAMPLE TYPE	SAMPLE NUMBER	GRAPHIC LOG	USCS SYMBOL	DESCRIPTION	ATTITUDES	LABORATORY TESTS: Moisture Content (%)	LABORATORY TESTS: Dry Density (pcf)	LABORATORY TESTS: Other Tests
0					**SOIL; s, (0-6 in.)** @ 0' Yellowish-brown fine- to coarse-grained clayey sand with pebbles; loose; dry to slightly damp; numerous roots **SLOPEWASH; Qsw, (6 in.-12 ft.)** @ 6" Yellow-brown to pale reddish-brown fine- to coarse-grained sand with pebbles and cobbles; locally clayey; clast sizes range from 1/2" to 10" with 1-2" most common; fragments of pelona schist common; no discernable structure; possibly weathered Qt? COMMENTS: -Possibly landslide graben or landslide debris				
5									
10									
15									
20									

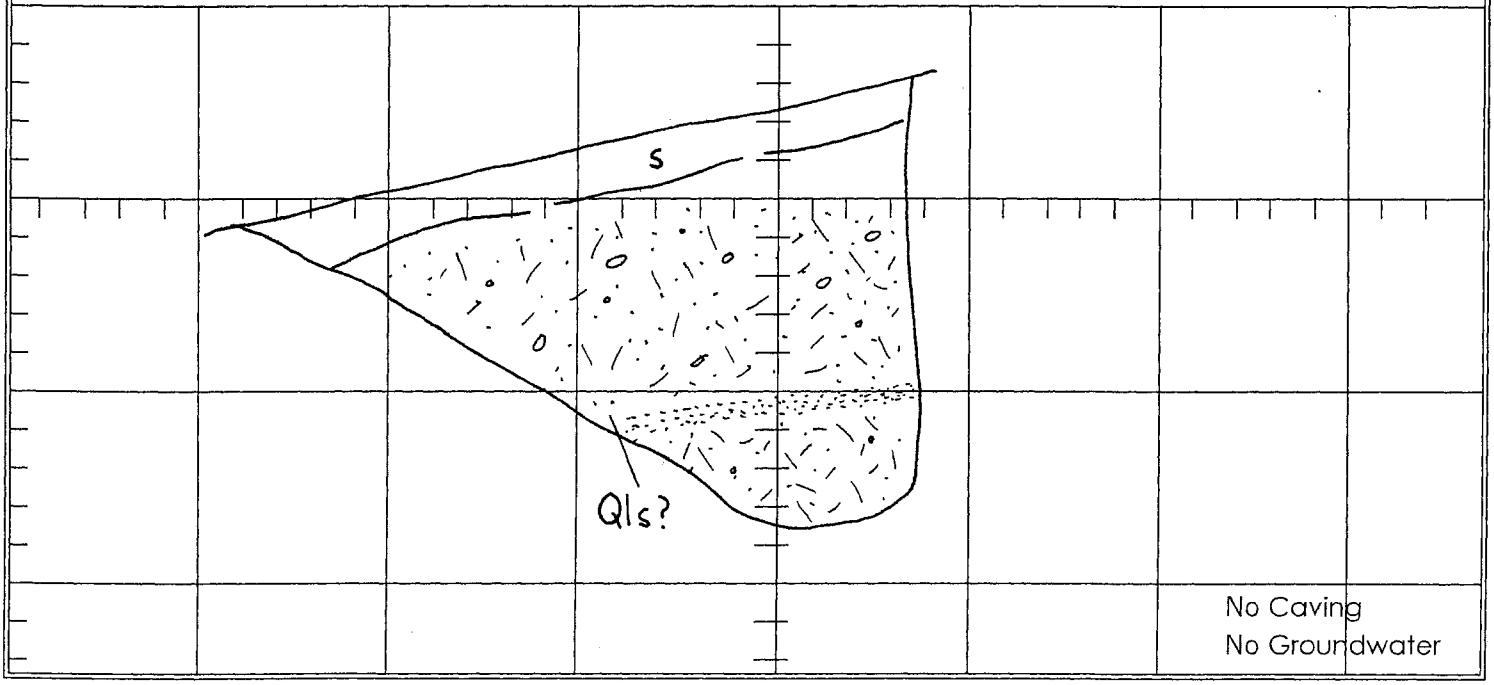
TOTAL DEPTH: 12 feet N40W→ SCALE: 1 inch = 5 feet



CLIENT: Newhall Land	JOB NO: 03-1571-4	**TRENCH LOG NO. T-81**
PROJECT: River Park Tentative Map Review	DATE: 4/4/03	
	LOGGED BY: CJS	
	EXCAVATED: 3/5/02	
EXCAVATION METHOD: Track-Mounted Backhoe w/24" bucket	ELEVATION: ~1280	

DEPTH (feet)	SAMPLE TYPE	SAMPLE NUMBER	GRAPHIC LOG	USCS SYMBOL	DESCRIPTION	ATTITUDES	LABORATORY TESTS: Moisture Content (%)	LABORATORY TESTS: Dry Density (pcf)	LABORATORY TESTS: Other Tests
0					**SOIL; s, (0-1 ft.)** @ 0' Yellow-brown, fine- to medium grained silty sand; loose; moist **LANDSLIDE DEBRIS?; Qls?, (1-11.5 ft.)** @ 1' Yellow-brown to pale reddish-brown, fine- to coarse-grained silty to clayey sand with 5-10% rounded granitic clasts and fragments of pale yellow sandstone; overall moderately dense; damp; @ 8 ft. there is a 6 8" layer of dark brown sandy clay with pebbles that is porous and contains abundant carbonate stringers and charcoal fragments, possible old soil horizon?; orientation of layer noted; material below layer is similar to material above, but contains only trace granitic clasts	C: N5E,14SE			
5									
10									
15									
20									

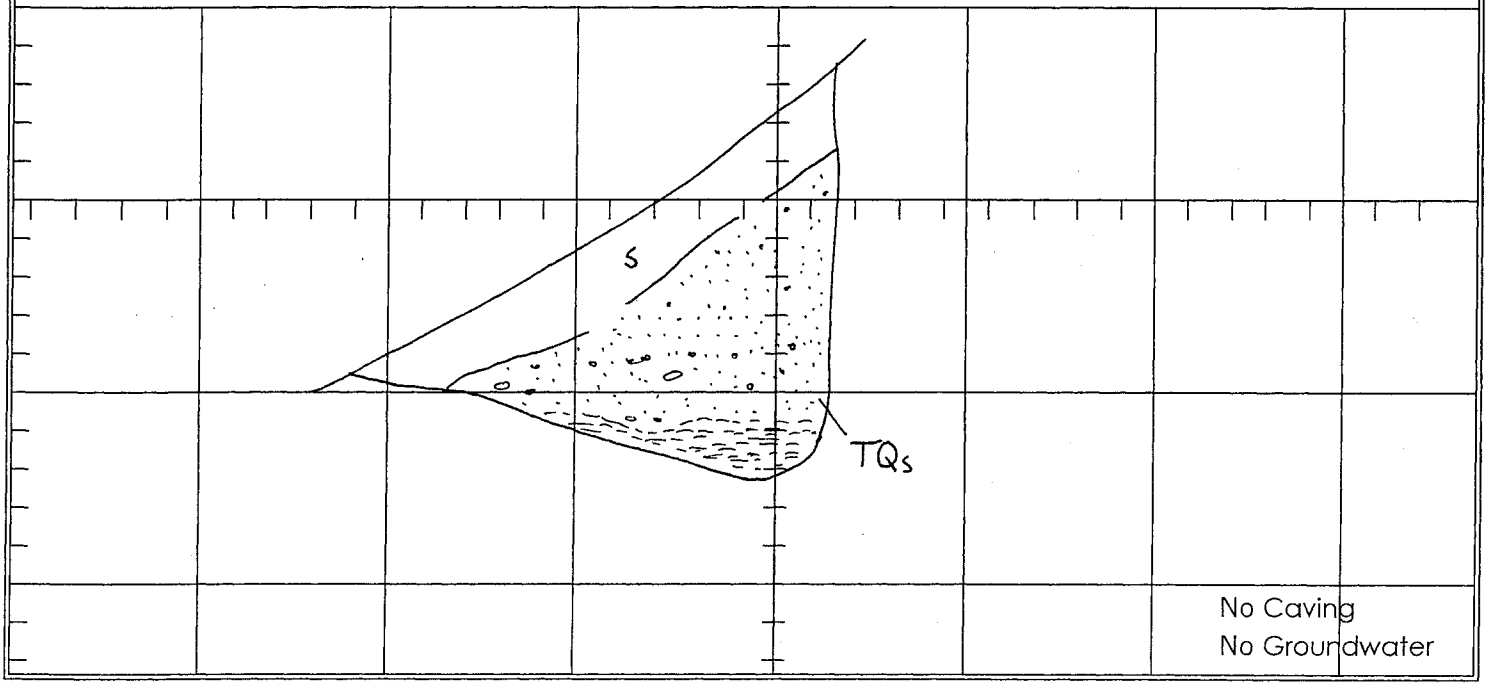
TOTAL DEPTH: 11.5 feet N10E→ SCALE: 1 inch = 5 feet



CLIENT: Newhall Land	JOB NO: 03-1571-4	**TRENCH LOG NO. T-82**
PROJECT: Tentative Tract 53425, River Park City of Santa Clarita, California	DATE: 4/4/03	
	LOGGED BY: CJS	
	EXCAVATED: 3/6/02	
EXCAVATION METHOD: Track-Mounted Backhoe w/24" Bucket	ELEVATION: 1280	

DEPTH (feet)	SAMPLE TYPE	SAMPLE NUMBER	GRAPHIC LOG	USCS SYMBOL	DESCRIPTION	ATTITUDES	LABORATORY TESTS: Moisture Content (%)	LABORATORY TESTS: Dry Density (pcf)	LABORATORY TESTS: Other Tests
0					**SOIL; s, (0-1.5 ft.)** @ 0' Moderate yellow-brown fine- to medium-grained silty sand with pebbles; loose; damp **BEDROCK; TQs, (1.5-11 ft.)** @ 1.5' Yellowish-gray, medium- to coarse-grained pebbly sandstone, light yellow-brown, very fine-grained silty sandstone and reddish-brown mudstone; sandstone lightly fractured with carbonate coatings on fracture surfaces; fractures do not extend into adjacent fine-grained units; contacts either very gradational or channelled; dip angle is very low; overall moderately hard; damp	B:N5E,8NW			
5									
10									
15									
20									

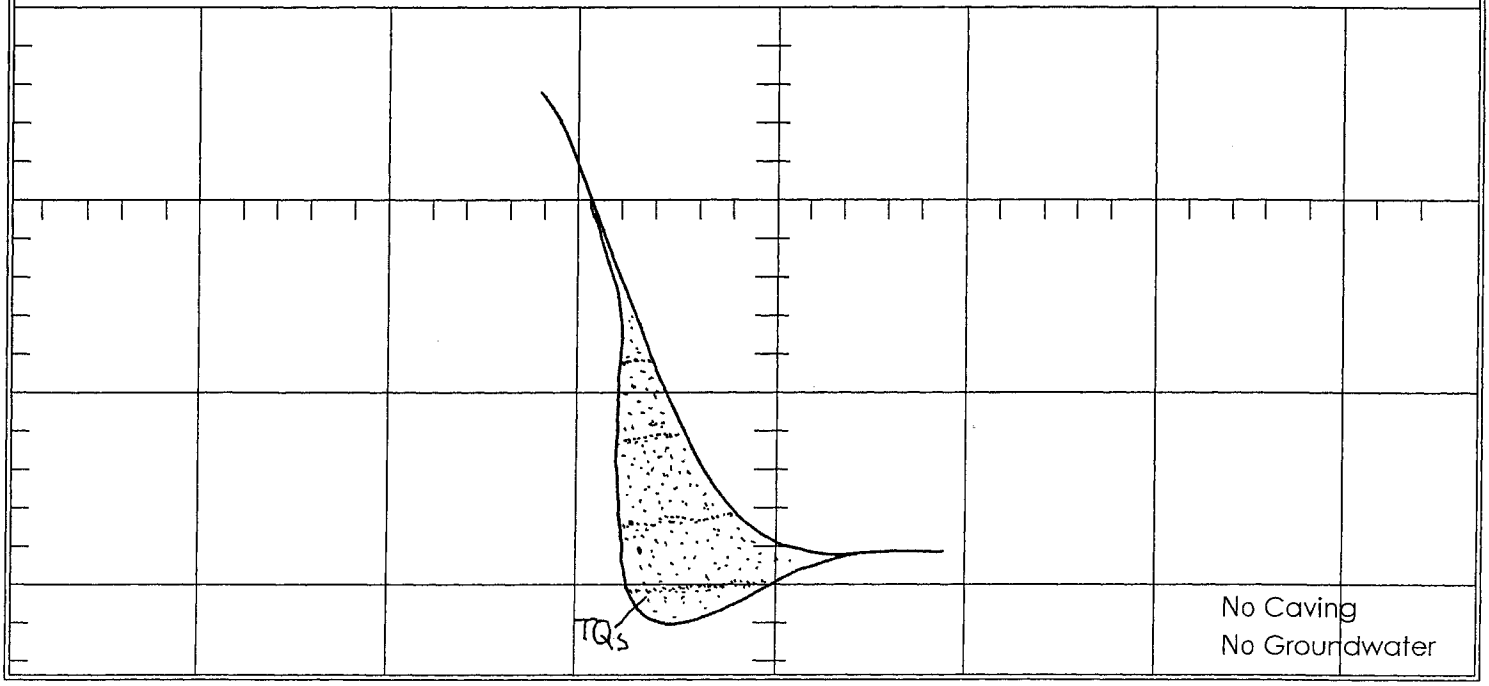
TOTAL DEPTH: 11 feet N10W→ SCALE: 1 inch = 5 feet



CLIENT: Newhall Land	JOB NO: 03-1571-4	**TRENCH LOG NO. T-83**
PROJECT: River Park Tentative Map Review	DATE: 4/4/03	
	LOGGED BY: CJS	
	EXCAVATED: 3/6/02	
EXCAVATION METHOD: Track-Mounted Backhoe w/24" bucket	ELEVATION: 1280	

DEPTH (feet)	SAMPLE TYPE	SAMPLE NUMBER	GRAPHIC LOG	USCS SYMBOL	DESCRIPTION	ATTITUDES	LABORATORY TESTS: Moisture Content (%)	LABORATORY TESTS: Dry Density (pcf)	LABORATORY TESTS: Other Tests
0					**BEDROCK; TQs, (0-8 ft.)** @ 0' Yellowish-brown, medium-grained pebbly sandstone to pebble conglomerate; hard; damp; bedding defined by vague pebble lineaments; dip angles low and variable	B:N40E,8SE			
5									
10					COMMENTS: -Base of Terrace deposits occurs ~15 ft. above stream bed; granitic clasts in Qt range up to 30 inches maximum dimension with 4-8 inches common				
15									
20									

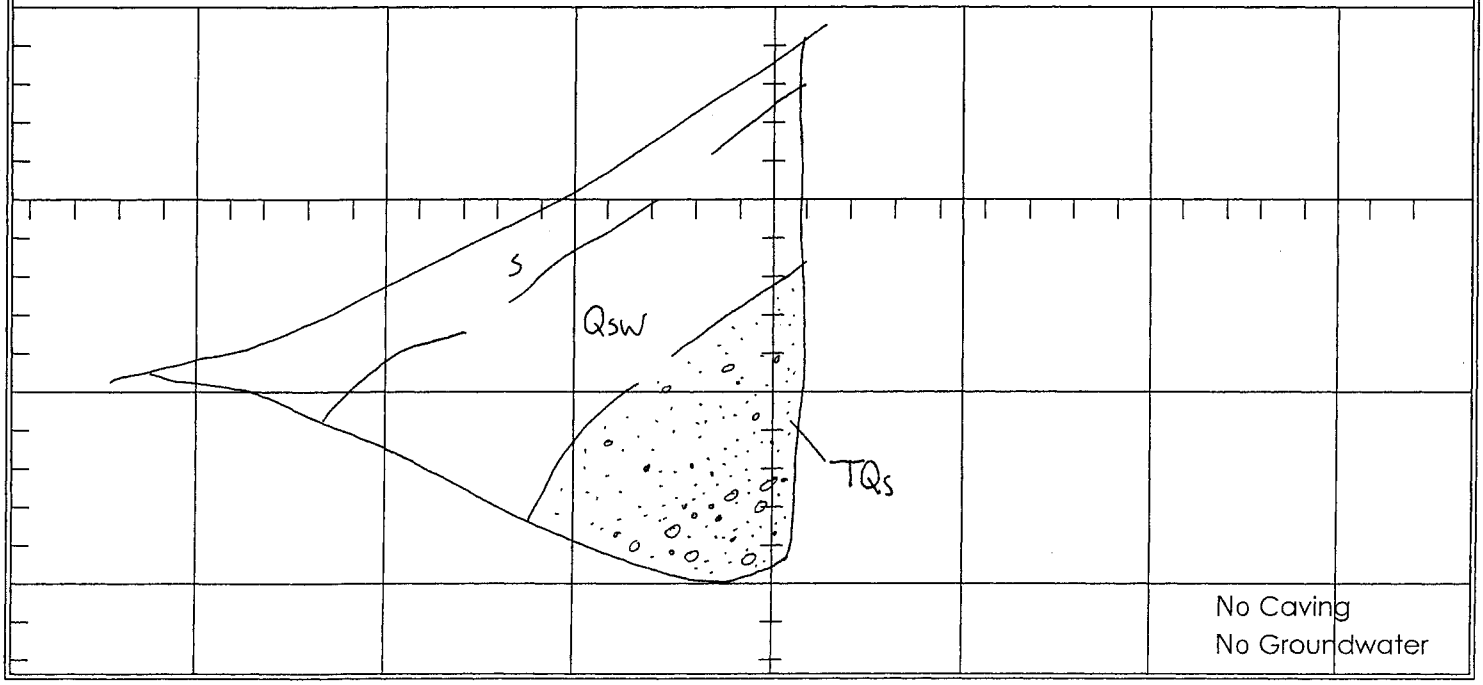
TOTAL DEPTH: 8 feet N78W→ SCALE: 1 inch = 5 feet



CLIENT: Newhall Land	JOB NO: 03-1571-4	**TRENCH LOG NO. T-84**
PROJECT: River Park Tentative Map Review	DATE: 4/4/03	
	LOGGED BY: CJS	
	EXCAVATED: 3/6/02	
EXCAVATION METHOD: Track-Mounted Backhoe w/24" bucket	ELEVATION: 1315	

DEPTH (feet)	SAMPLE TYPE	SAMPLE NUMBER	GRAPHIC LOG	USCS SYMBOL	DESCRIPTION	ATTITUDES	LABORATORY TESTS: Moisture Content (%)	LABORATORY TESTS: Dry Density (pcf)	LABORATORY TESTS: Other Tests
0					**SOIL; s, (0-1 ft.)** @ 0' Yellowish-brown to light reddish-brown fine-grained clayey sand to sandy clay; abundant roots; loose/soft; damp **SLOPEWASH; Qsw, (1-7 ft.)** @ 1' Reddish yellow-brown, medium-grained silty to clayey sand with 5-10% pebbles and cobbles; loose; damp				
5					**BEDROCK; TQs, (7-14 ft.)** @ 7' Yellowish-gray to yellowish-brown coarse-grained pebbly sandstone to cobble conglomerate; hard; damp; bedding measured along top of cobble unit; possibly channelled contact	B:N60W,24NE			
10									
15									
20									

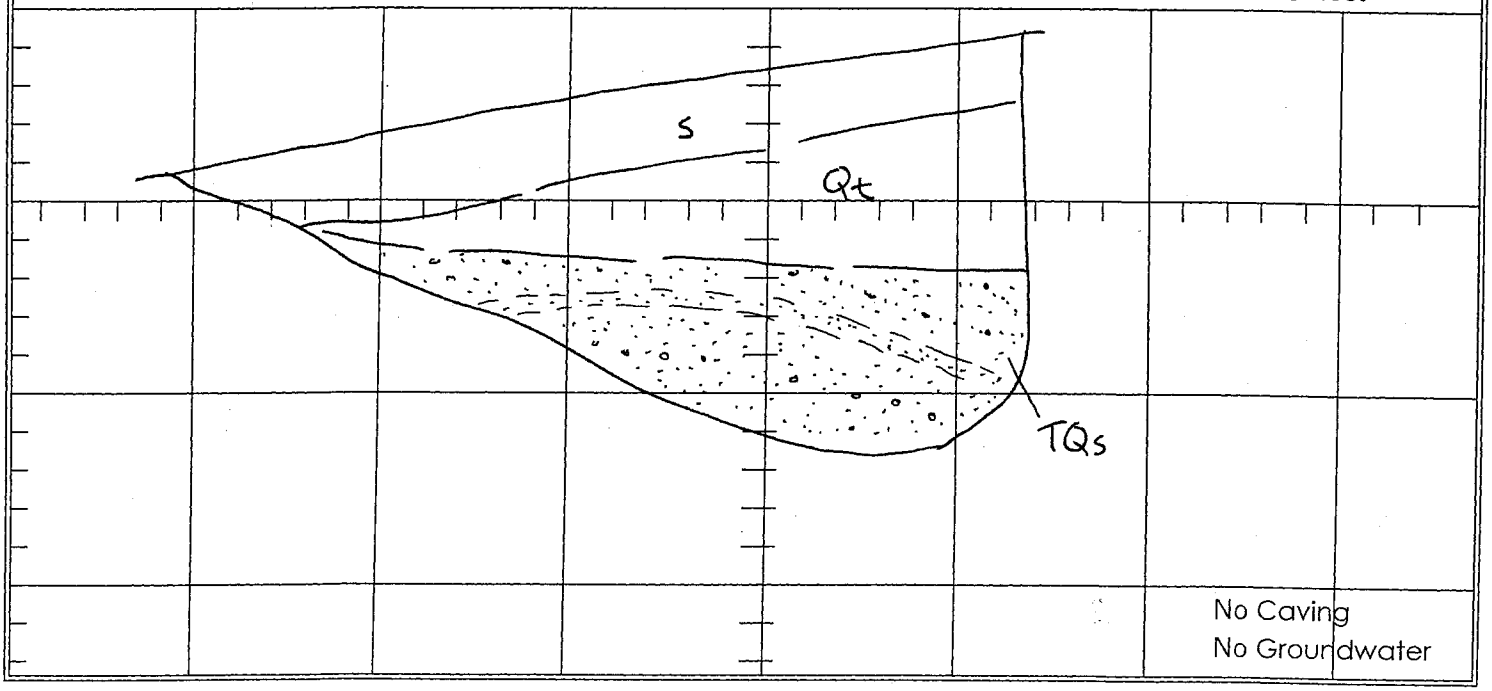
TOTAL DEPTH: 14 feet ←N15W SCALE: 1 inch = 5 feet



CLIENT: Newhall Land	JOB NO: 03-1571-4	**TRENCH LOG NO. T-85**
PROJECT: River Park Tentative Map Review	DATE: 4/4/03	
	LOGGED BY: CJS	
	EXCAVATED: 3/6/02	
EXCAVATION METHOD: Track-Mounted Backhoe w/24" bucket	ELEVATION: 1358	

DEPTH (feet)	SAMPLE TYPE	SAMPLE NUMBER	GRAPHIC LOG	USCS SYMBOL	DESCRIPTION	ATTITUDES	LABORATORY TESTS: Moisture Content (%)	LABORATORY TESTS: Dry Density (pcf)	LABORATORY TESTS: Other Tests
0					**SOIL; s, (0-1.5 ft.)** @ 0' Yellow-brown, fine- to medium-grained silty sand; loose; dry; numerous roots **TERRACE DEPOSITS; Qt, (1.5-6 ft.)** @ 1.5' Light-brown to light yellowish-brown, medium-to very coarse-grained pebbly sand with cobbles and boulders; rounded granitic clasts range up to ~18 in. maximum dimension, with 2-6" common; friable; damp; lower contact planar and inclined to northeast	C:N25W,13NE			
5					**BEDROCK; TQs, (6-10.5 ft.)** @ 6' Yellowish-gray to grayish yellow-orange, fine- to coarse-grained sandstone and pebbly sandstone; hard; damp; bedding defined by subtle variations in grain-sized; northerly dip steepens at north end of trench	B:N80W,15NE			
10									
15									
20									

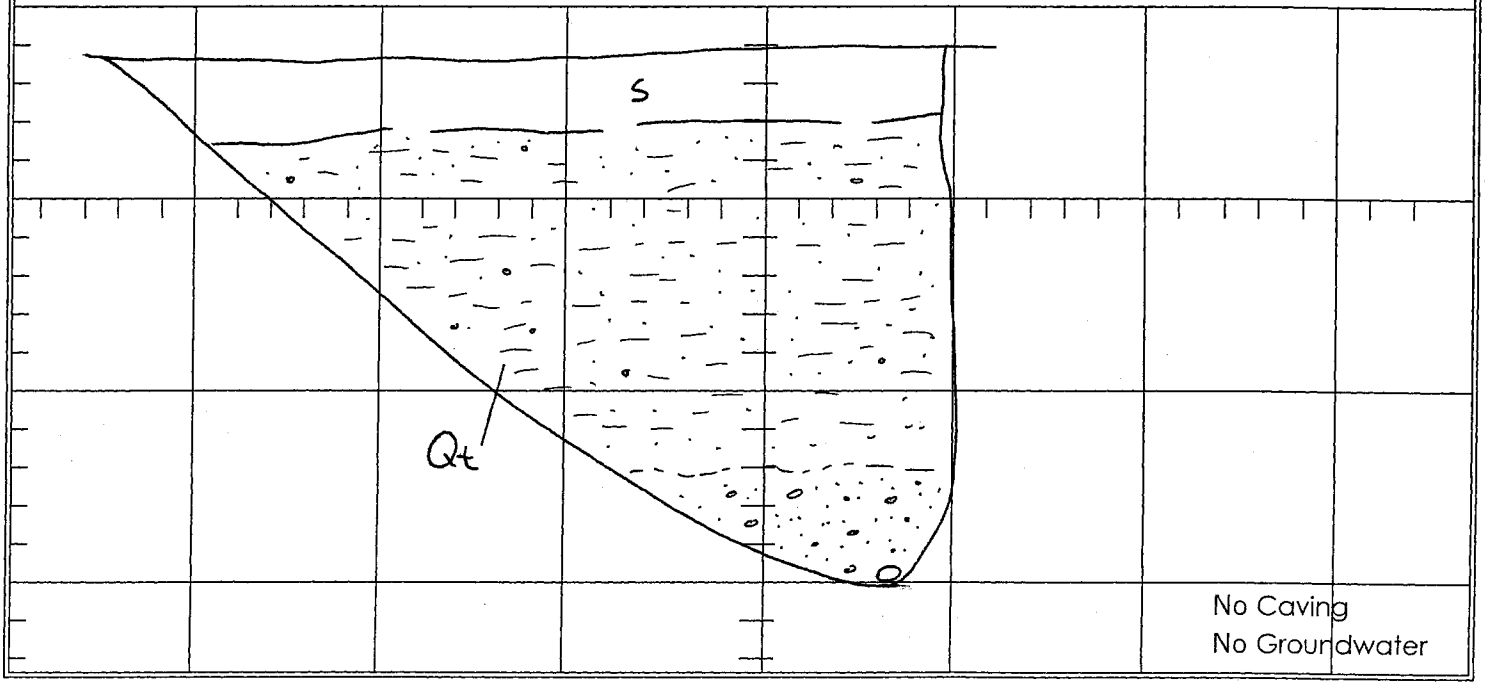
TOTAL DEPTH: 10.5 feet N10E→ SCALE: 1 inch = 5 feet



CLIENT: Newhall Land	JOB NO: 03-1571-4	**TRENCH LOG NO. T-86**
PROJECT: River Park Tentative Map Review	DATE: 4/4/03	
	LOGGED BY: CJS	
	EXCAVATED: 3/6/02	
EXCAVATION METHOD: Track-Mounted Backhoe w/24" bucket	ELEVATION: 1358	

DEPTH (feet)	SAMPLE TYPE	SAMPLE NUMBER	GRAPHIC LOG	USCS SYMBOL	DESCRIPTION	ATTITUDES	LABORATORY TESTS: Moisture Content (%)	LABORATORY TESTS: Dry Density (pcf)	LABORATORY TESTS: Other Tests
0					**SOIL; s, (0-2 ft.)** @ 0' Grayish yellow-brown fine- to medium-grained, silty sand; loose; dry to damp; numerous hair-roots **TERRACE DEPOSITS; Qt, (2-13 ft.)** @ 2' Dark yellowish-brown (10YR 3/6), fine- to coarse-grained clayey sand to sandy clay with isolated pebbles; very stiff/ dense; damp to moist; grades to much less clay and more pebbles at 10 ft.; few cobbles at 13 ft.				
5									
10									
15									
20									

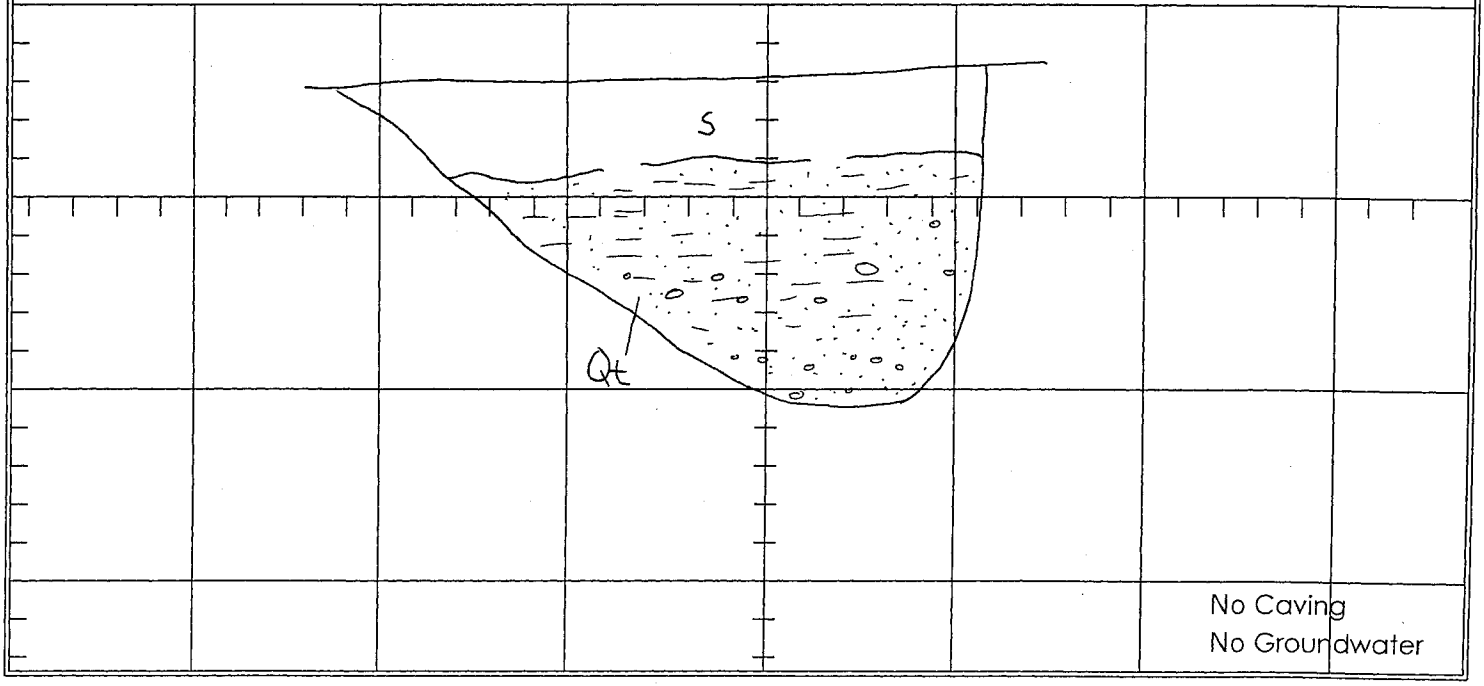
TOTAL DEPTH: 13 feet Due N→ SCALE: 1 inch = 5 feet



CLIENT: Newhall Land	JOB NO: 03-1571-4	**TRENCH LOG NO. T-87**
PROJECT: River Park Tentative Map Review	DATE: 4/4/03	
	LOGGED BY: CJS	
	EXCAVATED: 3/6/02	
EXCAVATION METHOD: Track-Mounted Backhoe w/24" bucket	ELEVATION: ~1370	

DEPTH (feet)	SAMPLE TYPE	SAMPLE NUMBER	GRAPHIC LOG	USCS SYMBOL	DESCRIPTION	ATTITUDES	LABORATORY TESTS: Moisture Content (%)	LABORATORY TESTS: Dry Density (pcf)	LABORATORY TESTS: Other Tests
0					**SOIL; s, (0-2 ft.)** @ 0' Yellow reddish-brown, fine- to medium grained silty sand; very porous; loose; dry to slightly damp **TERRACE DEPOSITS; Qt, (2-8.5 ft.)** @ 2' Dark reddish-brown (5YR 3/4) sandy clay; very stiff; damp, at 4.5 ft. grades to granitic pebbles and cobbles; most badly weathered and crushed easily; at 6 ft. grades to cobbly sand; friable; clasts range to ~6 inches				
5									
10									
15									
20									

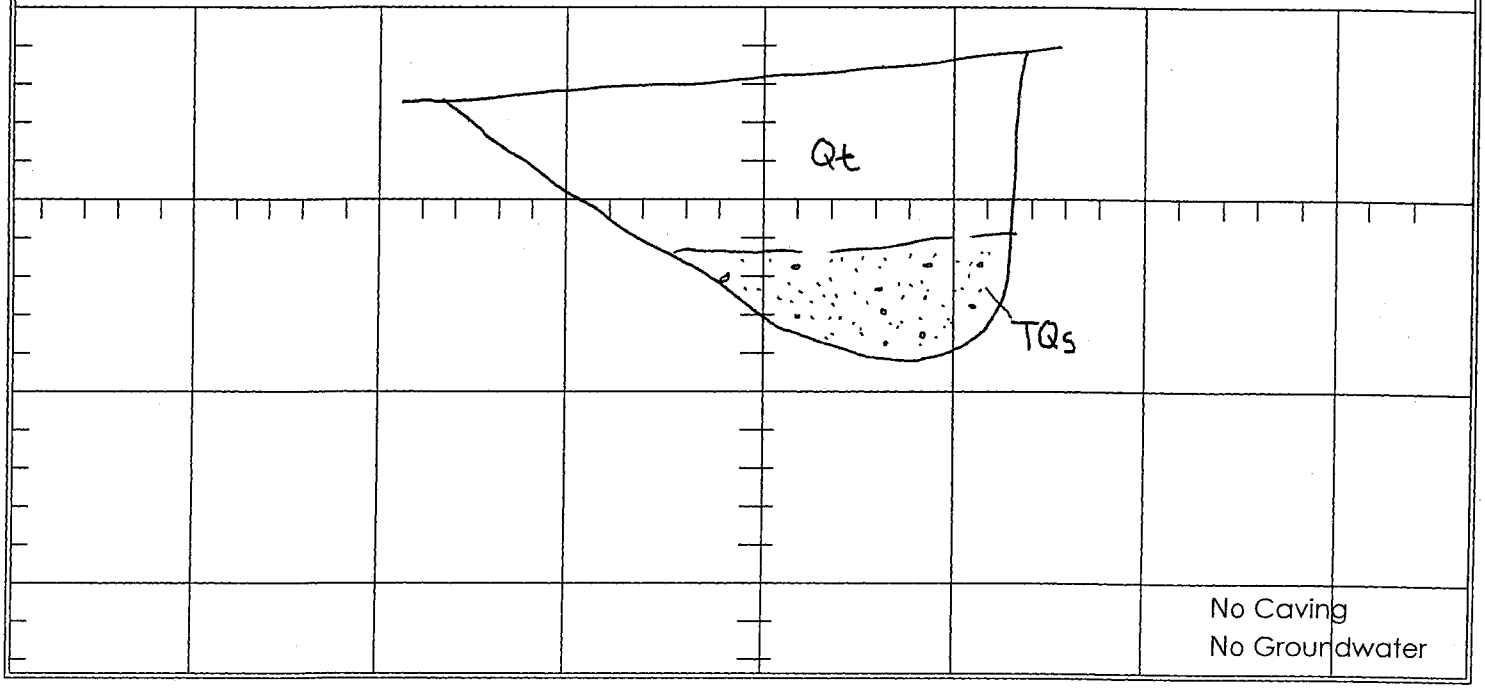
TOTAL DEPTH: 8.5 feet N20E→ SCALE: 1 inch = 5 feet



CLIENT: Newhall Land	JOB NO: 03-1571-4	**TRENCH LOG NO. T-88**
PROJECT: River Park Tentative Map Review	DATE: 4/4/03	
	LOGGED BY: CJS	
	EXCAVATED: 3/6/02	
EXCAVATION METHOD: Track-Mounted Backhoe w/24" bucket	ELEVATION: 1360	

DEPTH (feet)	SAMPLE TYPE	SAMPLE NUMBER	GRAPHIC LOG	USCS SYMBOL	DESCRIPTION	ATTITUDES	LABORATORY TESTS: Moisture Content (%)	LABORATORY TESTS: Dry Density (pcf)	LABORATORY TESTS: Other Tests
0					**TERRACE DEPOSITS; Qt, (0-4 ft.)** @ 0' Yellowish-brown to yellowish-gray, medium- to very coarse-grained pebbly sand with cobbles; friable; dry to damp; rounded granitic clasts range up to ~10" maximum dimension with clast sizes 2-6" common; lower contact planar and essentially horizontal **BEDROCK; TQs, (4-8 ft.)** @ 4' Reddish yellow-brown, fine- to coarse-grained pebbly sandstone; well-cemented; massive; hard to very hard; damp				
5									
10									
15									
20									

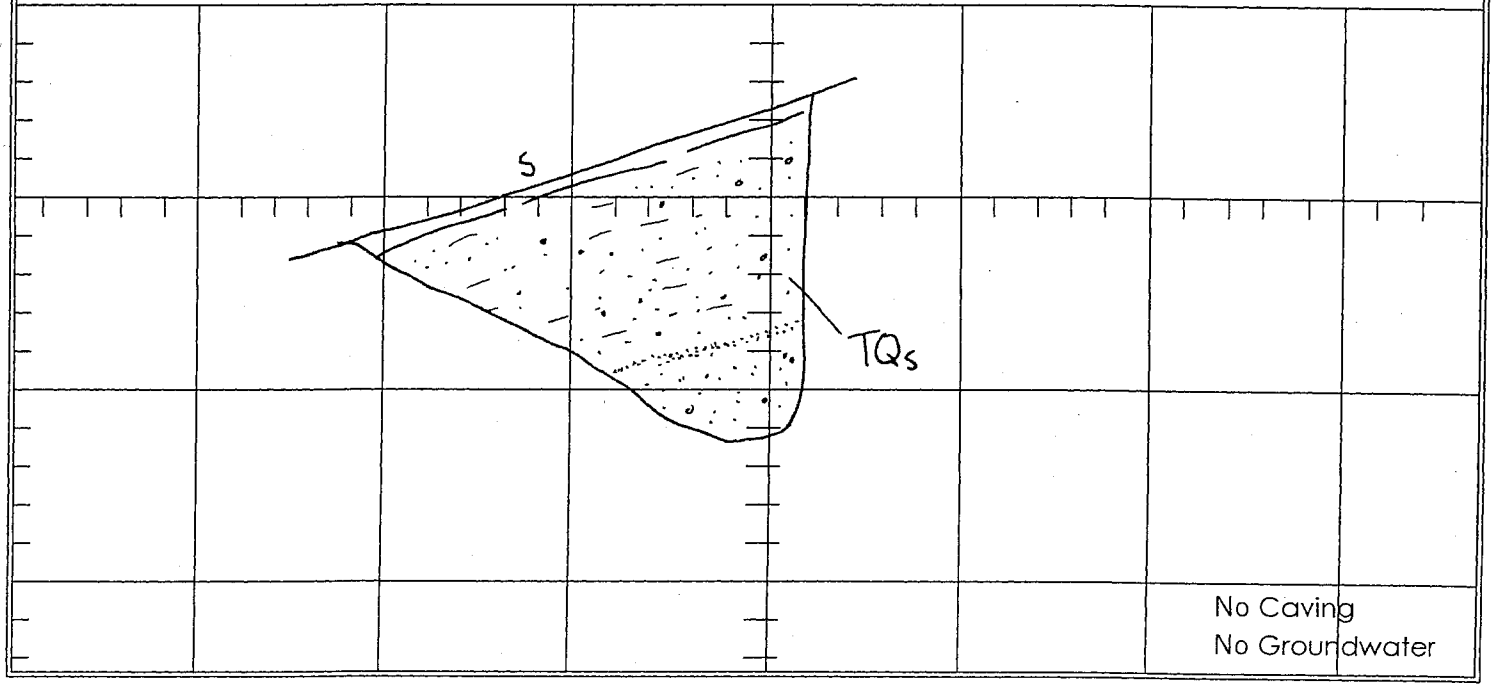
TOTAL DEPTH: 8 feet N40E→ SCALE: 1 inch = 5 feet



CLIENT: Newhall Land	JOB NO: 03-1571-4	**TRENCH LOG NO. T-89**
PROJECT: River Park Tentative Map Review	DATE: 4/4/03	
	LOGGED BY: CJS	
	EXCAVATED: 3/6/02	
EXCAVATION METHOD: Track-Mounted Backhoe w/24" bucket	ELEVATION: 1330	

DEPTH (feet)	SAMPLE TYPE	SAMPLE NUMBER	GRAPHIC LOG	USCS SYMBOL	DESCRIPTION	ATTITUDES	LABORATORY TESTS: Moisture Content (%)	LABORATORY TESTS: Dry Density (pcf)	LABORATORY TESTS: Other Tests
0					**SOIL; s, (0-6 in.)** @ 0' Yellow-brown sandy clay to clayey sand; loose; dry to damp **BEDROCK; TQs, (6 in.-8 ft.)** @ 6" Yellow-brown siltstone and yellowish-gray fine- to coarse-grained sandstone with few pebbles; hard; damp; bedding poorly defined due to gradational and channelled contacts	B:N70W,8SW			
5									
10									
15									
20									

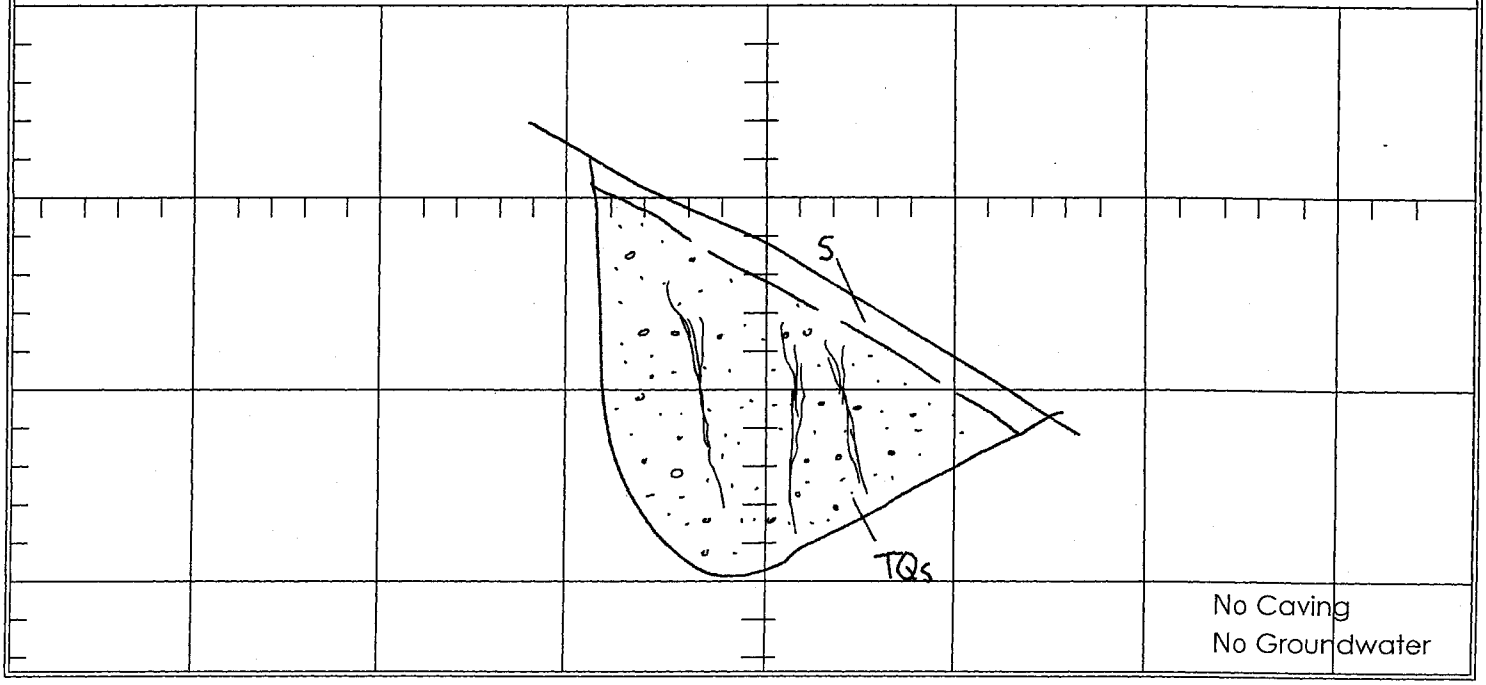
TOTAL DEPTH: 8 feet N20E→ SCALE: 1 inch = 5 feet



CLIENT: Newhall Land	JOB NO: 03-1571-4	**TRENCH LOG NO. T-90**
PROJECT: River Park Tentative Map Review	DATE: 4/4/03	
	LOGGED BY: CJS	
	EXCAVATED: 3/6/02	
EXCAVATION METHOD: Track-Mounted Backhoe w/24" bucket	ELEVATION: 1315	

DEPTH (feet)	SAMPLE TYPE	SAMPLE NUMBER	GRAPHIC LOG	USCS SYMBOL	DESCRIPTION	ATTITUDES	LABORATORY TESTS: Moisture Content (%)	LABORATORY TESTS: Dry Density (pcf)	LABORATORY TESTS: Other Tests
0					**SOIL; s, (0-8 in.)** @ 0' Yellowish-brown, fine- to medium-grained, clayey sand; loose; damp **BEDROCK; TQs, (8 in.-11 ft.)** @ 8" Yellowish-gray, medium- to coarse-grained pebbly sandstone; moderately hard; damp; several soil-filled, slope-parallel fractures extend to nearly full depth of trench; fractures up to 3/4" wide and taper downward; no obvious displacement	B: Due N, 6 E f: N20E, 85SE			
5									
10									
15									
20									

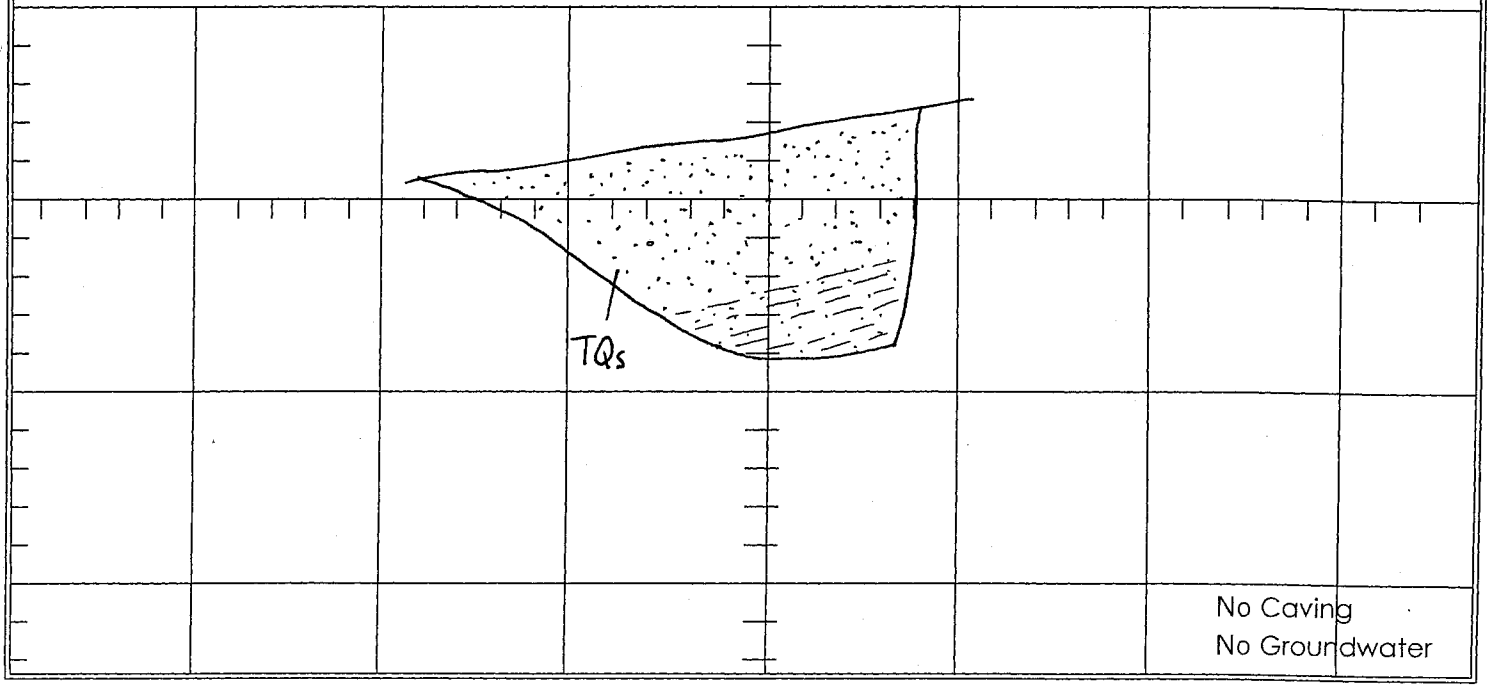
TOTAL DEPTH: 11 feet ←N60W SCALE: 1 inch = 5 feet



CLIENT: Newhall Land	JOB NO: 03-1571-4	**TRENCH LOG NO. T-91**
PROJECT: River Park Tentative Map Review	DATE: 4/4/03	
	LOGGED BY: CJS	
	EXCAVATED: 3/6/02	
EXCAVATION METHOD: Track-Mounted Backhoe w/24" bucket	ELEVATION: 1290	

DEPTH (feet)	SAMPLE TYPE	SAMPLE NUMBER	GRAPHIC LOG	USCS SYMBOL	DESCRIPTION	ATTITUDES	LABORATORY TESTS: Moisture Content (%)	LABORATORY TESTS: Dry Density (pcf)	LABORATORY TESTS: Other Tests
0					**BEDROCK; TQs, (0-6 ft.)** @ 0' Yellowish-gray to yellow-brown, medium- to coarse-grained sandstone, and yellow-reddish brown mudstone; moderately hard to hard; damp	B:N43W,5SW			
5									
10									
15									
20									

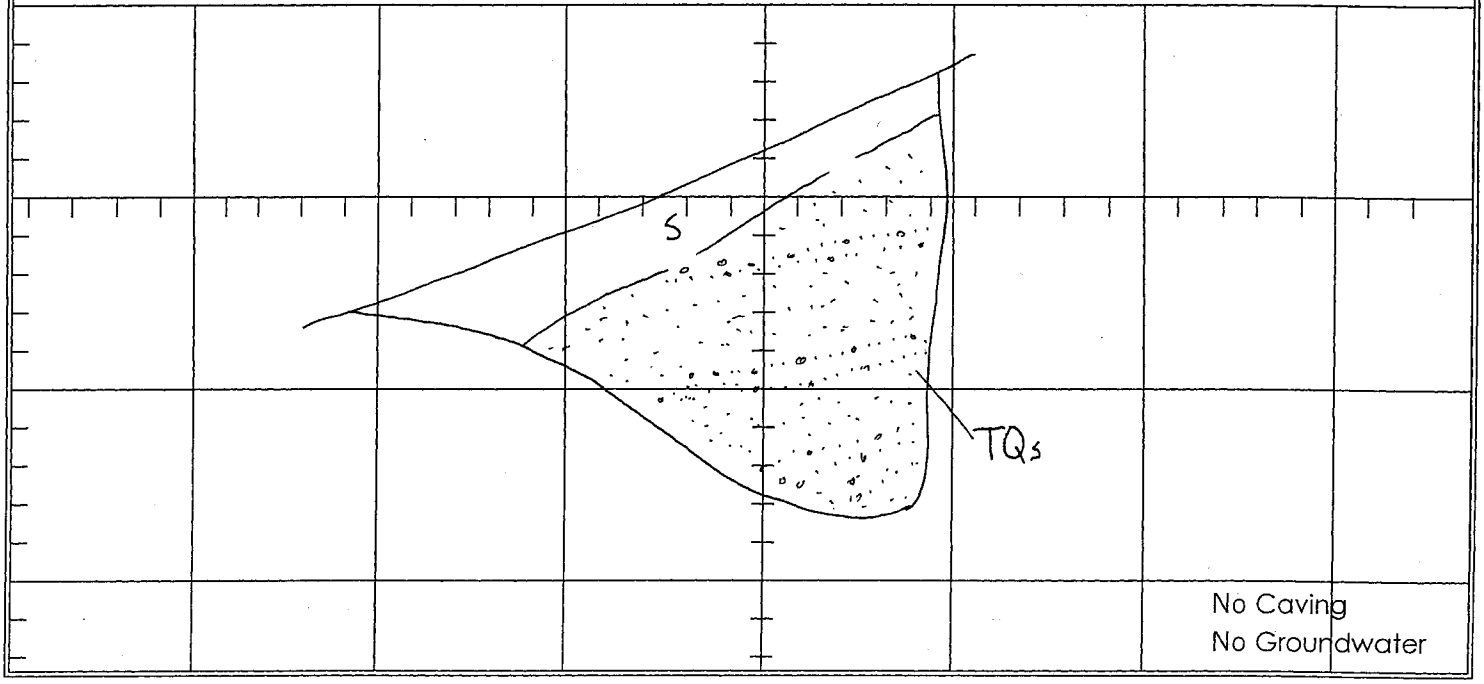
TOTAL DEPTH: 6 feet N10W→ SCALE: 1 inch = 5 feet



CLIENT: Newhall Land	JOB NO: 03-1571-4	**TRENCH LOG NO. T-92**
PROJECT: River Park Tentative Map Review	DATE: 4/4/03	
	LOGGED BY: CJS	
	EXCAVATED: 3/6/02	
EXCAVATION METHOD: Track-Mounted Backhoe w/24" bucket	ELEVATION: 1315	

DEPTH (feet)	SAMPLE TYPE	SAMPLE NUMBER	GRAPHIC LOG	USCS SYMBOL	DESCRIPTION	ATTITUDES	LABORATORY TESTS: Moisture Content (%)	LABORATORY TESTS: Dry Density (pcf)	LABORATORY TESTS: Other Tests
0					**SOIL; s, (0-1.5 ft.)** @ 0' Yellowish-brown, fine- to coarse-grained pebbly sand with minor silt and clay; loose; damp; numerous roots **BEDROCK; TQs, (1.5-11.5 ft.)** @ 1.5' Reddish yellow-brown, medium- to coarse-grained pebbly sandstone; moderately hard to hard; damp	B:N55W,13SW			
5									
10									
15									
20									

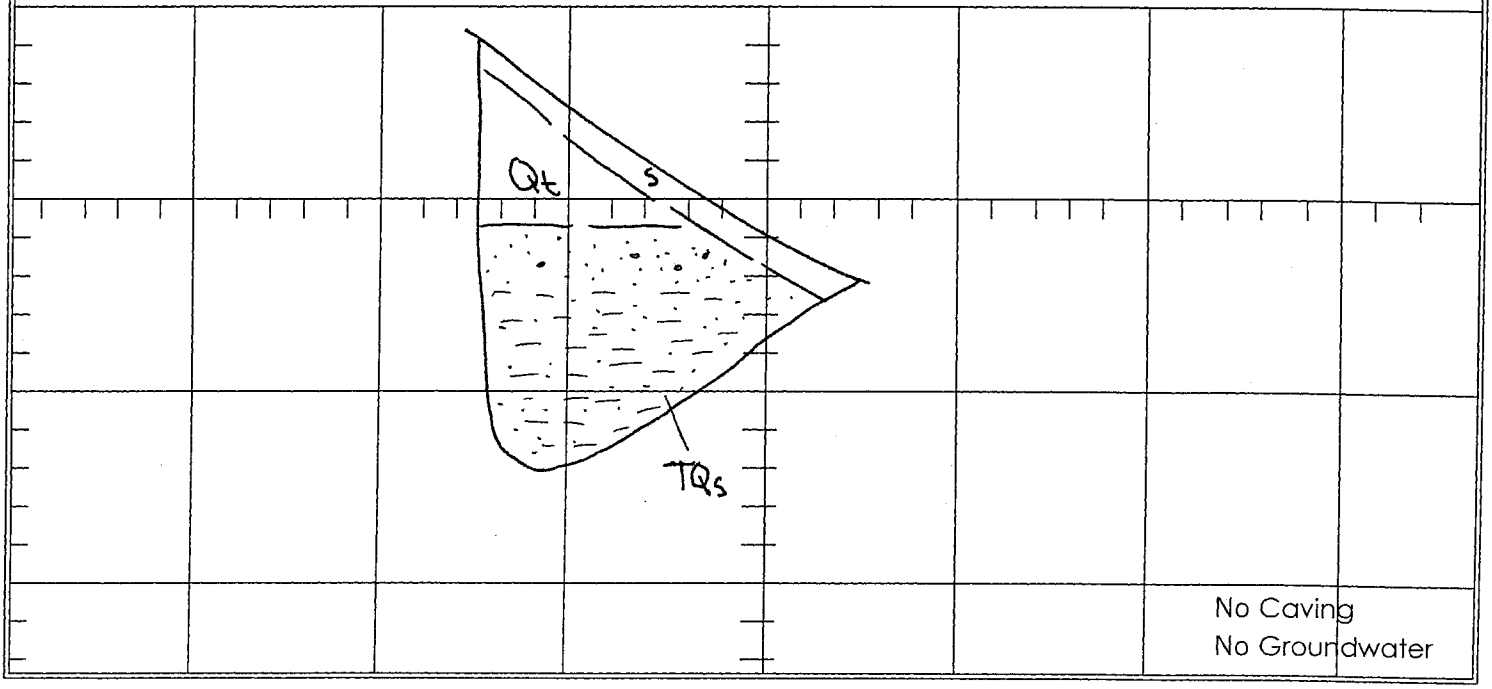
TOTAL DEPTH: 11.5 feet N40E→ SCALE: 1 inch = 5 feet



CLIENT: Newhall Land	JOB NO: 03-1571-4	**TRENCH LOG NO. T-93**
PROJECT: River Park Tentative Map Review	DATE: 4/4/03	
	LOGGED BY: CJS	
	EXCAVATED: 3/6/02	
EXCAVATION METHOD: Track-Mounted Backhoe w/24" bucket	ELEVATION: 1340	

DEPTH (feet)	SAMPLE TYPE	SAMPLE NUMBER	GRAPHIC LOG	USCS SYMBOL	DESCRIPTION	ATTITUDES	LABORATORY TESTS: Moisture Content (%)	Dry Density (pcf)	Other Tests
0					**SOIL; s, (0-1 ft.)** @ 0' Reddish-yellow-brown, fine- to coarse-grained clayey sand with pebbles; loose; damp **TERRACE DEPOSITS; Qt, (1-4 ft.)** @ 1' Dark reddish-brown, sandy clay with cobbles and boulders; stiff; damp; clasts range up to 15 inches, 2-8 inches most common **BEDROCK; TQs, (4-11 ft.)** @ 4' Yellowish-gray, pebbly sandstone and yellow-brown to reddish-brown sandy mudstone; moderately hard; damp	B:N80E,8SE			
5									
10									
15									
20									

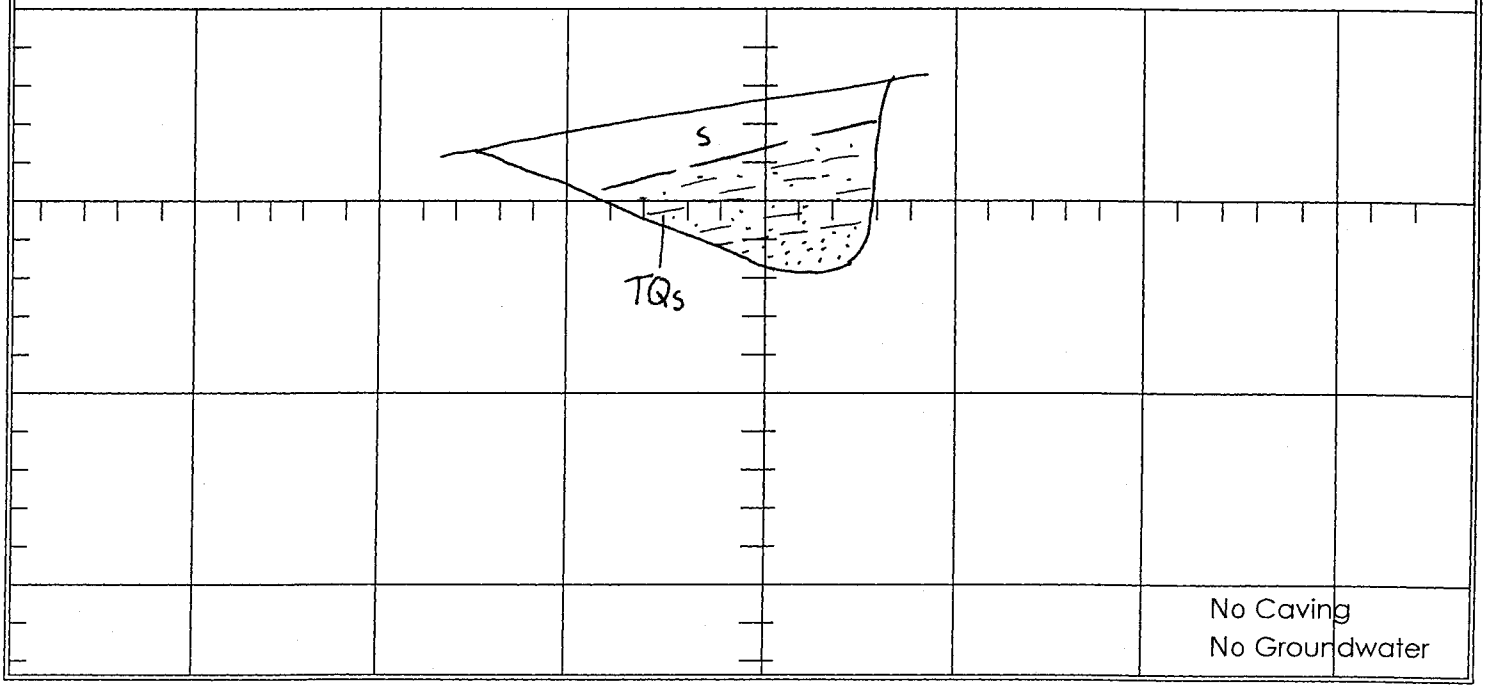
TOTAL DEPTH: 11 feet ←N5E SCALE: 1 inch = 5 feet



CLIENT: Newhall Land		JOB NO: 03-1571-4	**TRENCH LOG NO. T-94**
PROJECT: River Park Tentative Map Review		DATE: 4/4/03	
		LOGGED BY: CJS	
		EXCAVATED: 3/6/02	
EXCAVATION METHOD: Track-Mounted Backhoe w/24" bucket		ELEVATION: 1345	

DEPTH (feet)	SAMPLE TYPE	SAMPLE NUMBER	GRAPHIC LOG	USCS SYMBOL	DESCRIPTION	ATTITUDES	LABORATORY TESTS: Moisture Content (%)	LABORATORY TESTS: Dry Density (pcf)	LABORATORY TESTS: Other Tests
0					**SOIL; s, (0-1 ft.)** @ 0' Yellow-brown, medium-grained silty sand; loose; damp **BEDROCK; TQs, (1-5 ft.)** @ 1' Moderate reddish-brown sandy mudstone and yellow-gray, fine- to medium-grained sandstone; hard; damp	B:N52W,4SW			
5									
10									
15									
20									

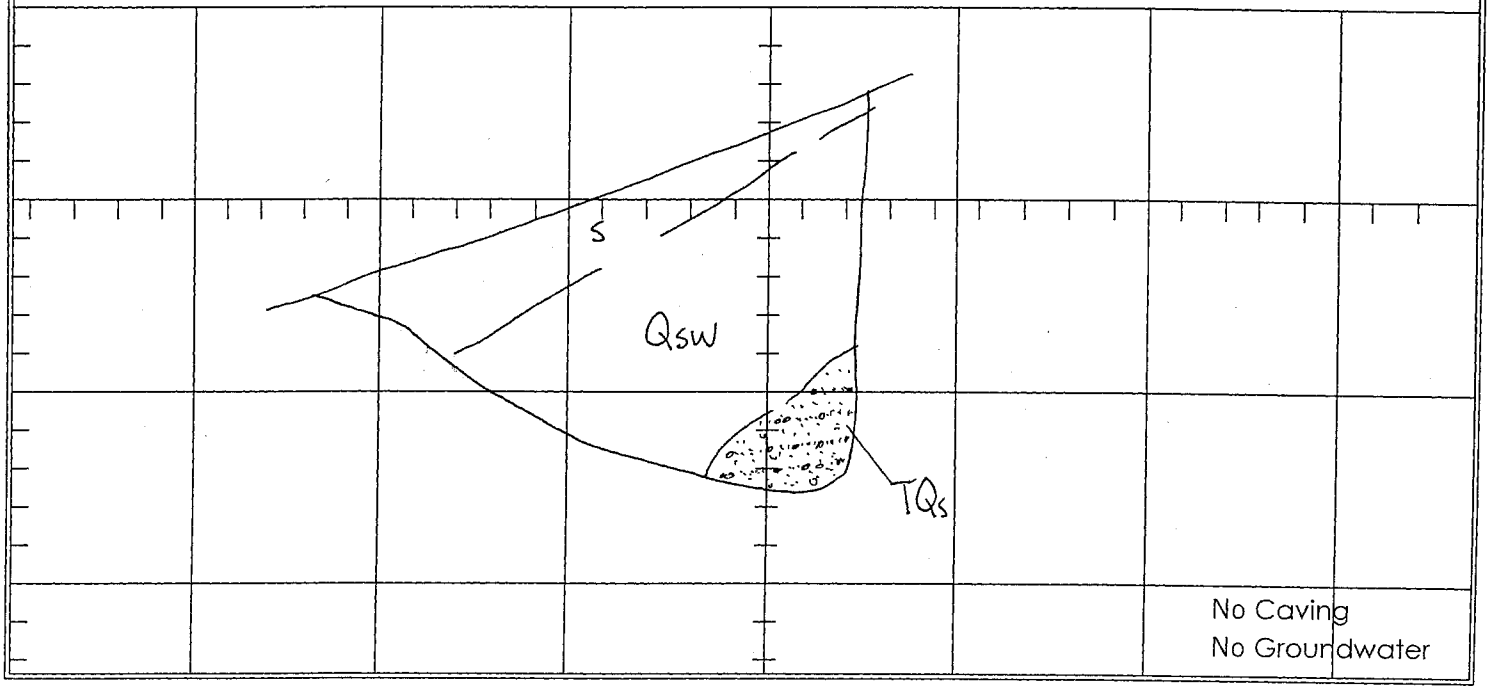
TOTAL DEPTH: 5 feet N10W→ SCALE: 1 inch = 5 feet



CLIENT: Newhall Land	JOB NO: 03-1571-4	**TRENCH LOG NO. T-95**
PROJECT: River Park Tentative Map Review	DATE: 4/4/03	
	LOGGED BY: CJS	
	EXCAVATED: 3/6/02	
EXCAVATION METHOD: Track-Mounted Backhoe w/24" bucket	ELEVATION: 1215	

DEPTH (feet)	SAMPLE TYPE	SAMPLE NUMBER	GRAPHIC LOG	USCS SYMBOL	DESCRIPTION	ATTITUDES	LABORATORY TESTS: Moisture Content (%)	LABORATORY TESTS: Dry Density (pcf)	LABORATORY TESTS: Other Tests
0					**SOIL; s, (0-1 ft.)** @ 0' Yellow-brown, fine- to coarse-grained silty sand with minor clay and trace of pebbles; porous; damp; hair-roots common **SLOPEWASH; Qsw, (1-6.5 ft.)** @ 1' Yellow reddish-brown, fine- to coarse-grained silty sand with pebbles and cobbles; clasts range up to 8", 1-3" most common; excavates easily; overall loose to moderately dense; damp; lower contact gradational into bedrock **BEDROCK; TQs, (6.5-10.5 ft.)** @ 6.5' Yellowish-brown fine- to medium-grained and coarse-grained sandstone; coarser-grained unit locally pebbly; hard to very hard; damp; single, carbonate-lined fracture	B:N60W,9SW f: N40W,58SW			
5									
10									
15									
20									

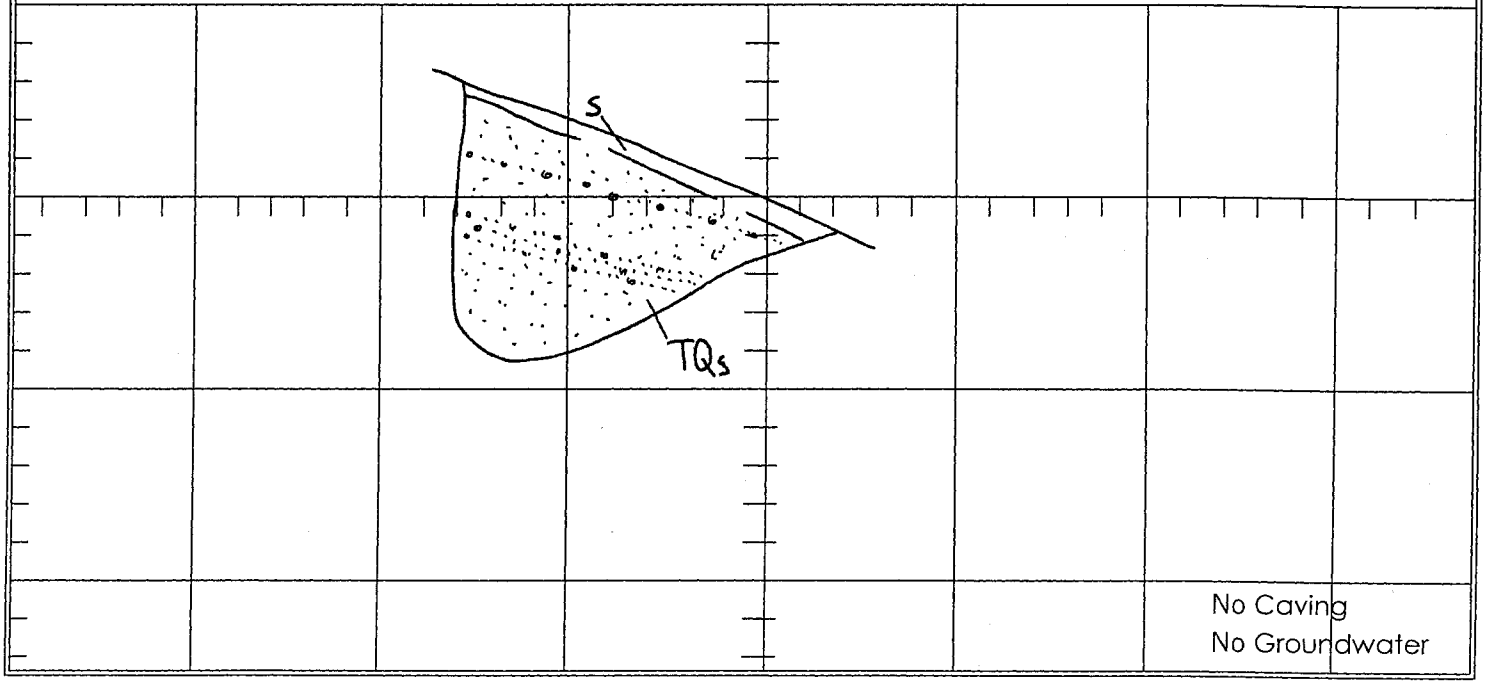
TOTAL DEPTH: 10.5 feet Due N→ SCALE: 1 inch = 5 feet



CLIENT: Newhall Land	JOB NO: 03-1571-4	**TRENCH LOG NO. T-96**
PROJECT: River Park Tentative Map Review	DATE: 4/4/03	
	LOGGED BY: CJS	
	EXCAVATED: 3/8/02	
EXCAVATION METHOD: Track-Mounted Backhoe w/24" bucket	ELEVATION: 1280	

DEPTH (feet)	SAMPLE TYPE	SAMPLE NUMBER	GRAPHIC LOG	USCS SYMBOL	DESCRIPTION	ATTITUDES	LABORATORY TESTS: Moisture Content (%)	LABORATORY TESTS: Dry Density (pcf)	LABORATORY TESTS: Other Tests
0					**SOIL; s, (0-6 in.)** @ 0' Yellow-brown, fine- to medium-grained silty sand with minor coarse-grained fraction; loose; damp **BEDROCK; TQs, (6 in.-6.5 ft.)** @ 6" Yellow-reddish-brown to pale reddish-brown, medium- to coarse-grained sandstone; locally pebbly; hard; damp	E-W, 8S			
5									
10									
15									
20									

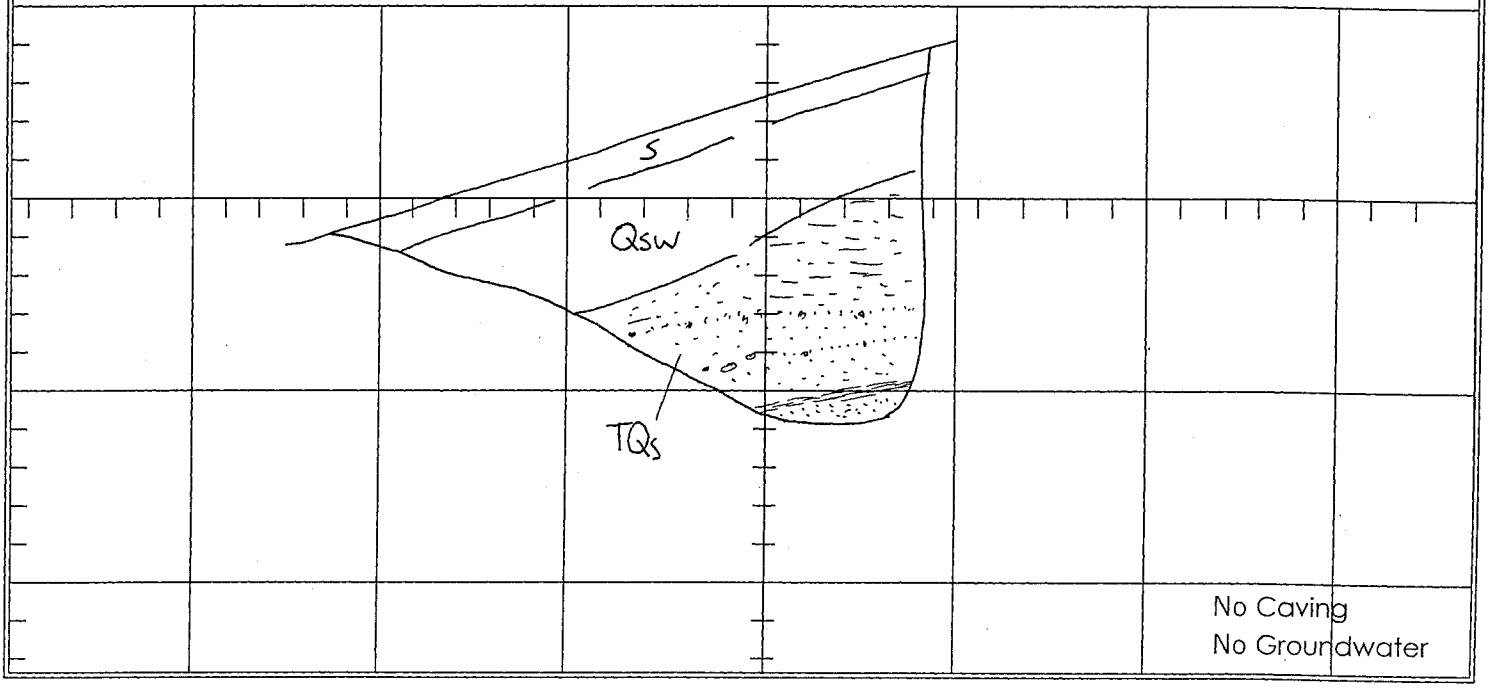
TOTAL DEPTH: 6.5 feet ←N75E SCALE: 1 inch = 5 feet



CLIENT: Newhall Land	JOB NO: 03-1571-4	**TRENCH LOG NO. T-97**
PROJECT: River Park Tentative Map Review	DATE: 4/4/03	
	LOGGED BY: CJS	
	EXCAVATED: 3/8/02	
EXCAVATION METHOD: Track-Mounted Backhoe w/24" bucket	ELEVATION: 1270	

DEPTH (feet)	SAMPLE TYPE	SAMPLE NUMBER	GRAPHIC LOG	USCS SYMBOL	DESCRIPTION	ATTITUDES	LABORATORY TESTS: Moisture Content (%)	LABORATORY TESTS: Dry Density (pcf)	LABORATORY TESTS: Other Tests
0					**SOIL; s, (0-8 in.)** @ 0' Yellow reddish-brown, fine- to medium grained silty sand; loose; damp; numerous roots **SLOPEWASH; Qsw, (8 in.-2.5 ft.)** @ 8" Yellow-reddish-brown sandy clay; soft; damp; pockets of clayey sand **BEDROCK; TQs, (2.5-9.5 ft.)** @ 2.5' Moderate reddish-brown sandy siltstone with interbeds of pale reddish-brown to yellow-brown, medium- to coarse grained sandstone; 1" seam of reddish-brown clayey siltstone at 8.5 ft.; moderately hard; damp	B:N60E, 9SE			
5									
10									
15									
20									

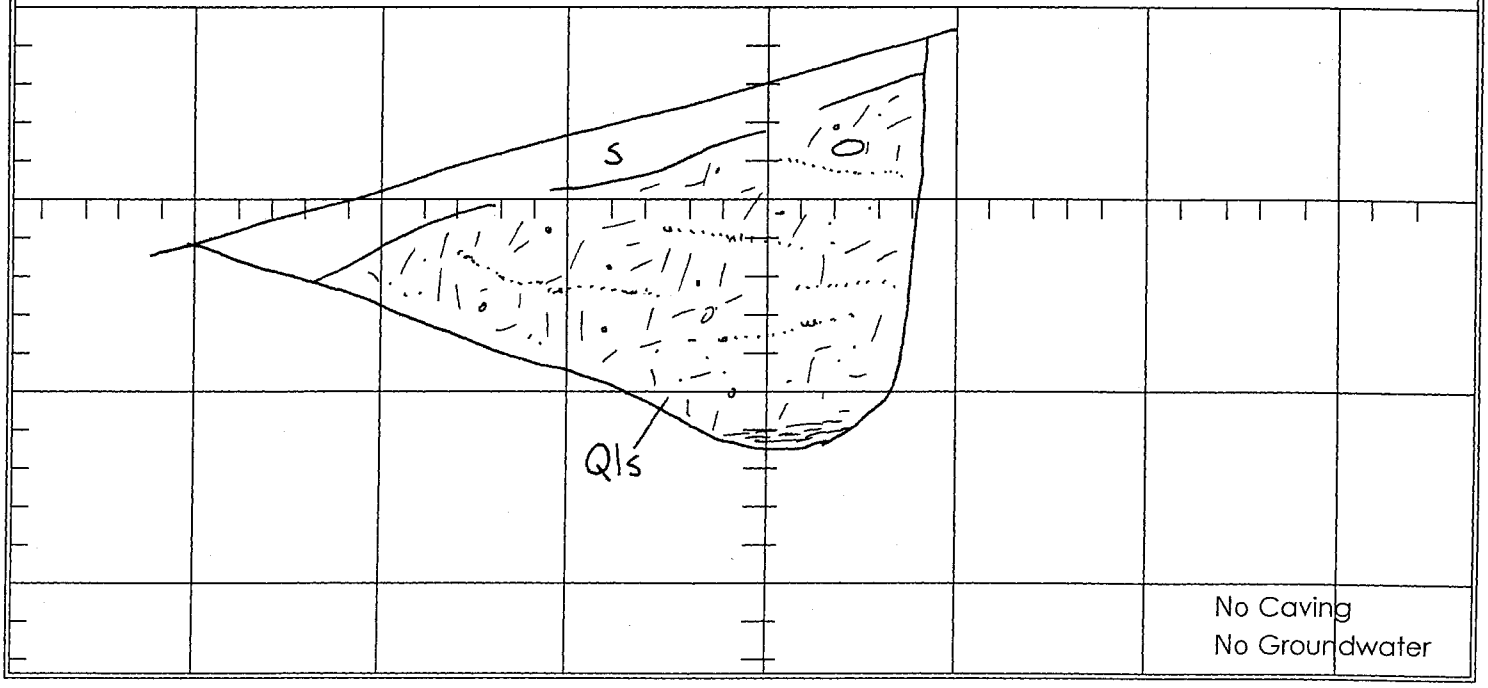
TOTAL DEPTH: 9.5 feet N15W SCALE: 1 inch = 5 feet



CLIENT: Newhall Land	JOB NO: 03-1571-4	**TRENCH LOG NO. T-98**
PROJECT: River Park Tentative Map Review	DATE: 4/4/03	
	LOGGED BY: CJS	
	EXCAVATED: 3/8/02	
EXCAVATION METHOD: Track-Mounted Backhoe w/24" bucket	ELEVATION: 1245	

DEPTH (feet)	SAMPLE TYPE	SAMPLE NUMBER	GRAPHIC LOG	USCS SYMBOL	DESCRIPTION	ATTITUDES	LABORATORY TESTS: Moisture Content (%)	LABORATORY TESTS: Dry Density (pcf)	LABORATORY TESTS: Other Tests
0					**SOIL; s, (0-1 ft.)** @ 0' Yellow-brown, fine- to medium-grained silty sand; loose; damp **LANDSLIDE DEBRIS; Qls, (1 ft.-10.5 ft.)** @ 1' Pale reddish-brown to yellow-brown, sandstone and mudstone; unit boundaries all very gradational; units lenticular and commonly truncated or rotated to orientations inconsistent with regional structure; carbonate common as fracture fillings and disseminated throughout, contributes to overall "punky" rock quality; continuous horizon of reddish-brown, silty claystone at 10 ft.; excavates with "platy" fracture pattern; planar surfaces of excavated fragments commonly striated	SP:N47E,15SE			
5									
10									
15									
20									

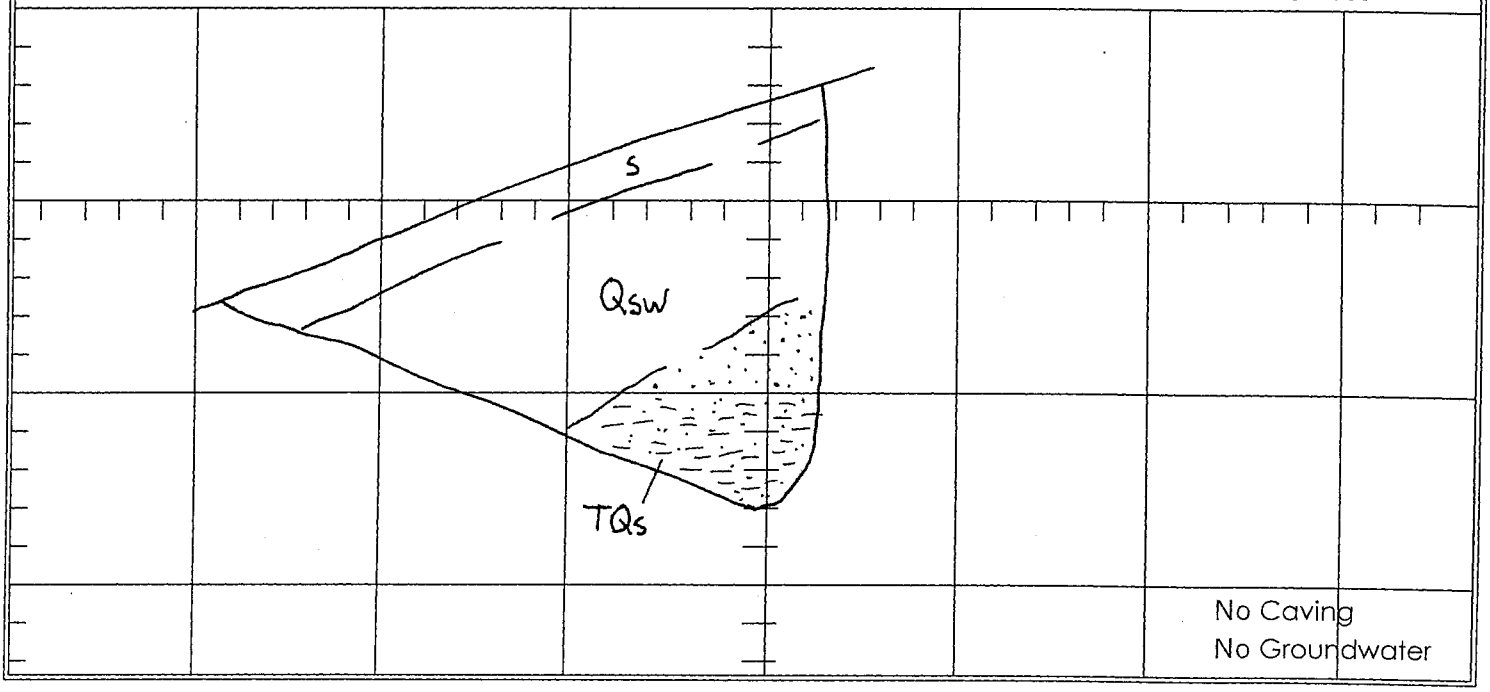
TOTAL DEPTH: 10.5 feet Due N→ SCALE: 1 inch = 5 feet



CLIENT: Newhall Land	JOB NO: 03-1571-4	**TRENCH LOG NO. T-99**
ROJECT: River Park Tentative Map Review	DATE: 4/4/03	
	LOGGED BY: CJS	
	EXCAVATED: 3/8/02	
EXCAVATION METHOD: Track-Mounted Backhoe w/24" bucket	ELEVATION: 1245	

DEPTH (feet)	SAMPLE TYPE	SAMPLE NUMBER	GRAPHIC LOG	USCS SYMBOL	DESCRIPTION	ATTITUDES	LABORATORY TESTS: Moisture Content (%)	LABORATORY TESTS: Dry Density (pcf)	LABORATORY TESTS: Other Tests
0					**SOIL; s, (0-1 ft.)** @ 0' Yellow-brown, fine- to coarse-grained silty sand with pebbles; loose; damp; hair-roots common **SLOPEWASH; Qsw, (1-5.5 ft.)** @ 1' Yellow-reddish-brown, fine- to coarse-grained silty sand with pebbles, cobbles and fragments of sandstone bedrock; moderately dense; damp **BEDROCK; TQs, (5.5-10 ft.)** @ 5.5' Pale reddish-brown, coarse-grained pebbly sandstone, and moderate reddish-brown sandy mudstone; mudstone grades greater clay content near the bottom of the trench; moderately hard; damp	B:N45E,13SE			
5									
10									
15									
20									

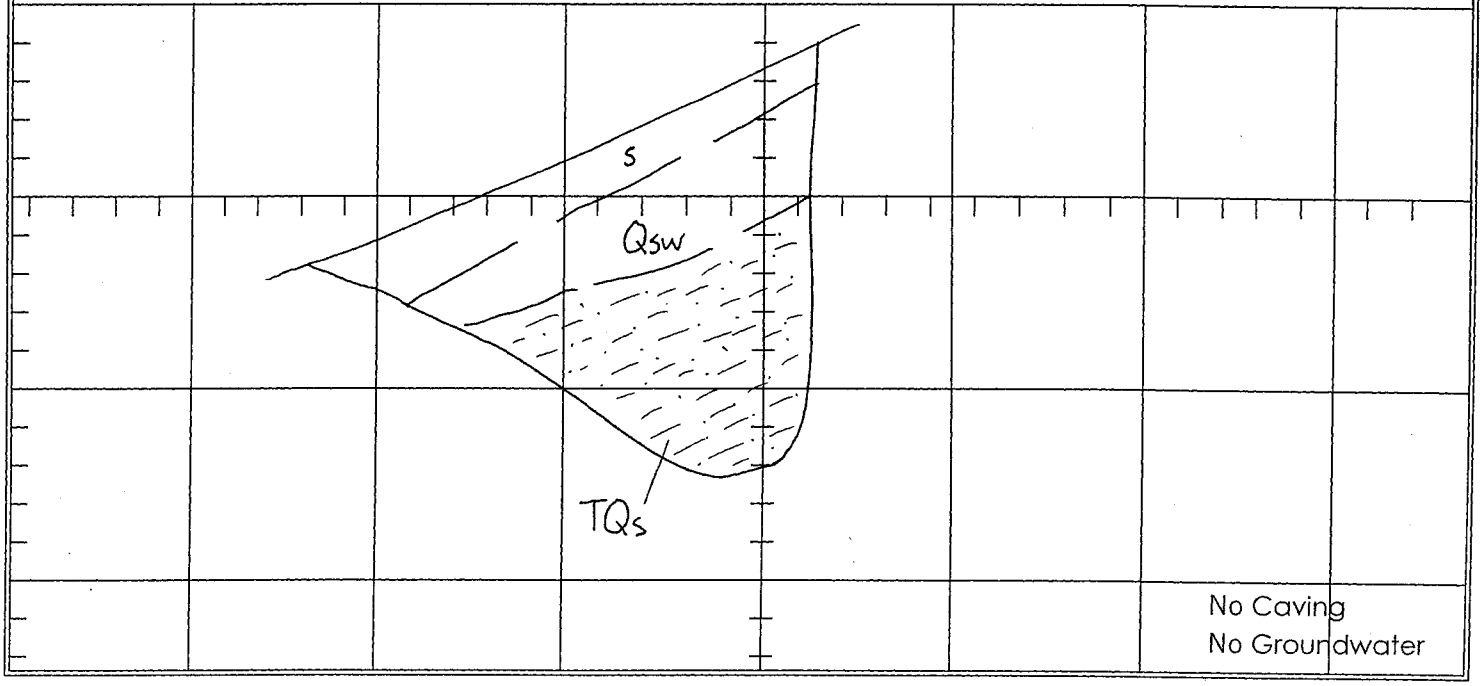
TOTAL DEPTH: 10 feet N30E→ SCALE: 1 inch = 5 feet



CLIENT: Newhall Land	JOB NO: 03-1571-4	**TRENCH LOG NO. T-100**
PROJECT: River Park Tentative Map Review	DATE: 4/4/03	
	LOGGED BY: CJS	
	EXCAVATED: 3/8/02	
EXCAVATION METHOD: Track-Mounted Backhoe w/24" bucket	ELEVATION: 1250	

DEPTH (feet)	SAMPLE TYPE	SAMPLE NUMBER	GRAPHIC LOG	USCS SYMBOL	DESCRIPTION	ATTITUDES	LABORATORY TESTS: Moisture Content (%)	LABORATORY TESTS: Dry Density (pcf)	LABORATORY TESTS: Other Tests
0					**SOIL; s, (0-1 ft.)** @ 0' Yellow-brown, fine- to coarse-grained pebbly sand; loose; damp; numerous roots **SLOPEWASH; Qsw, (1-4 ft.)** @ 1' Yellow-reddish-brown, fine- to coarse-grained silty sand with pebbles and rare cobbles; loose to moderately dense; damp; developed on deeply weathered sandstone bed **BEDROCK; TQs, (4-11.5 ft.)** @ 4' Moderate reddish-brown sandy mudstone, moderately hard to hard; damp; carbonate scattered throughout in pea-sized pods	B:N65E, 13SE			
5									
10									
15									
20									

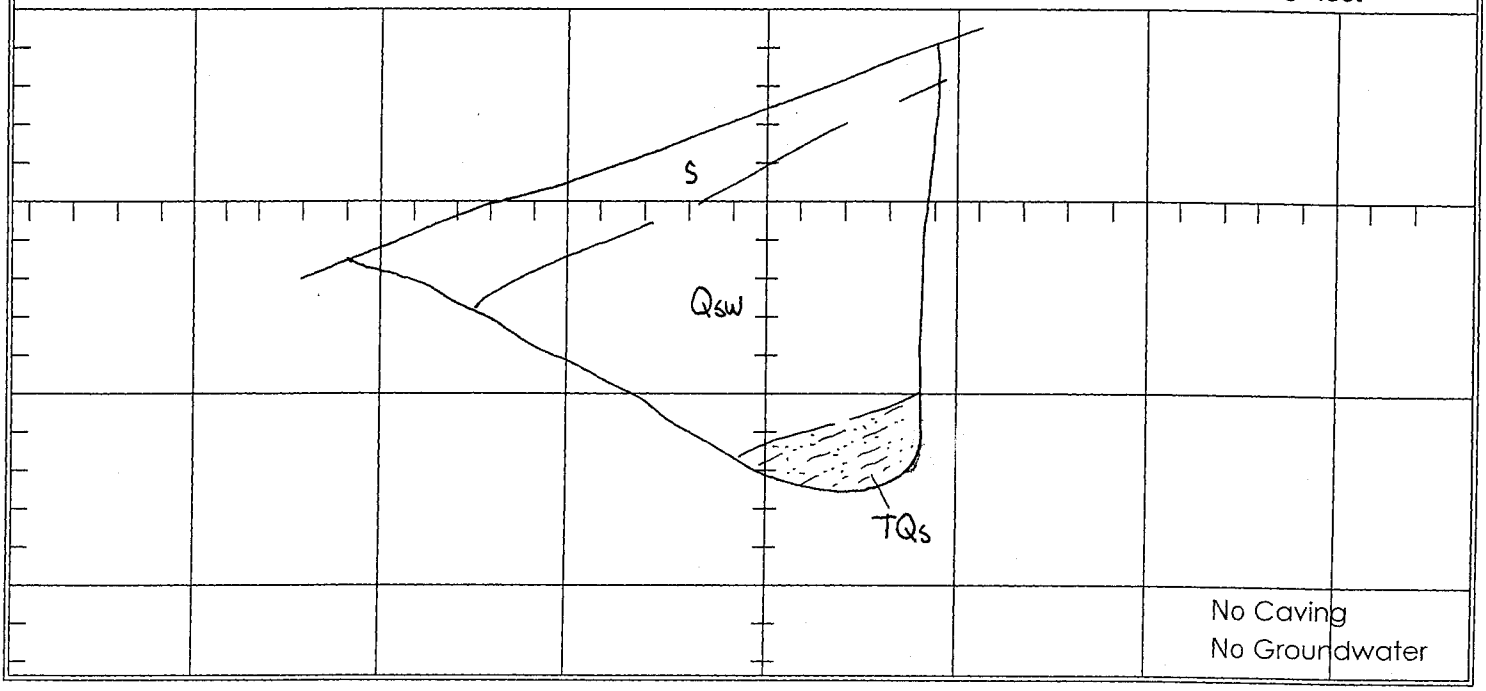
TOTAL DEPTH: 11.5 feet N80W→ SCALE: 1 inch = 5 feet



CLIENT: Newhall Land	JOB NO: 03-1571-4	**TRENCH LOG NO. T-101**
PROJECT: River Park Tentative Map Review	DATE: 1/4/03	
	LOGGED BY: CJS	
	EXCAVATED: 3/8/02	
EXCAVATION METHOD: Track-Mounted Backhoe w/24" bucket	ELEVATION: 1265	

DEPTH (feet)	SAMPLE TYPE	SAMPLE NUMBER	GRAPHIC LOG	USCS SYMBOL	DESCRIPTION	ATTITUDES	LABORATORY TESTS: Moisture Content (%)	LABORATORY TESTS: Dry Density (pcf)	LABORATORY TESTS: Other Tests
0					**SOIL; S, (0-1 ft.)** @ 0' Yellow-brown, fine- to coarse-grained, pebbly sandstone; loose; dry **SLOPEWASH; Qsw, (1-8 ft.)** @ 1' Pale reddish-brown to reddish-yellow-brown, fine to-coarse-grained silty sand with rounded granitic cobbles; moderately dense; damp **BEDROCK; TQs, (8-11 ft.)** @ 8' Moderate reddish-brown sandy siltstone; hard; damp; massive				
5									
10									
15									
20									

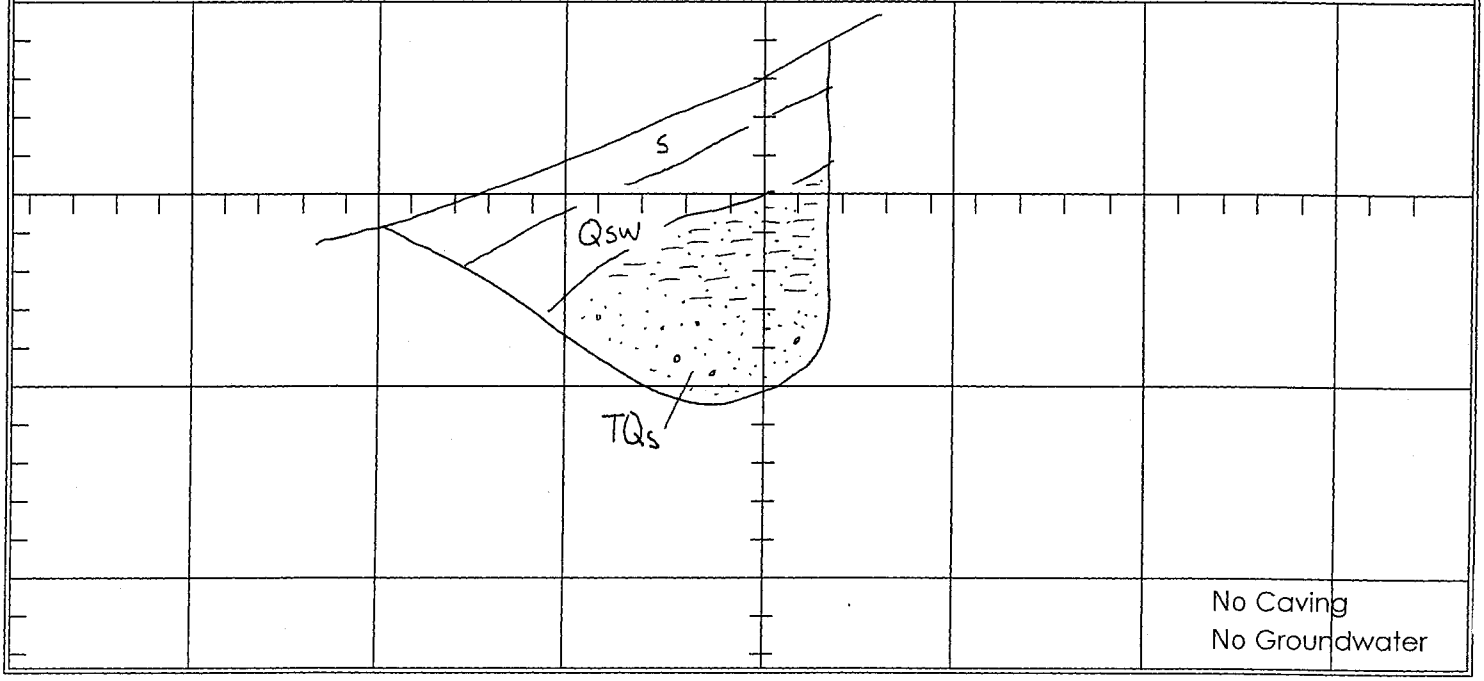
TOTAL DEPTH: 11 feet ←N70W SCALE: 1 inch = 5 feet



CLIENT: Newhall Land		JOB NO: 03-1571-4	**TRENCH LOG NO. T-102**
PROJECT: River Park Tentative Map Review		DATE: 4/4/03	
		LOGGED BY: CJS	
		EXCAVATED: 3/8/02	
EXCAVATION METHOD: Track-Mounted Backhoe w/24" bucket		ELEVATION: 1225	

DEPTH (feet)	SAMPLE TYPE	SAMPLE NUMBER	GRAPHIC LOG	USCS SYMBOL	DESCRIPTION	ATTITUDES	LABORATORY TESTS: Moisture Content (%)	LABORATORY TESTS: Dry Density (pcf)	LABORATORY TESTS: Other Tests
0					**SOIL; s, (0-1 ft.)** @ 0' Yellow-brown, fine- to medium-grained silty sand with scattered pebbles; loose; dry to damp **SLOPEWASH; Qsw, (1-2.5 ft.)** @ 1' Yellow-brown to reddish-brown, silty to clayey sand; loose; damp **BEDROCK; TQs, (2.5-9.5 ft.)** @ 2.5' Yellow-brown to moderate reddish-brown sandy siltstone, and pale reddish-brown, medium- to coarse-grained pebbly sandstone; moderately hard to hard; damp	B:N70E,13SE			
5									
10									
15									
20									

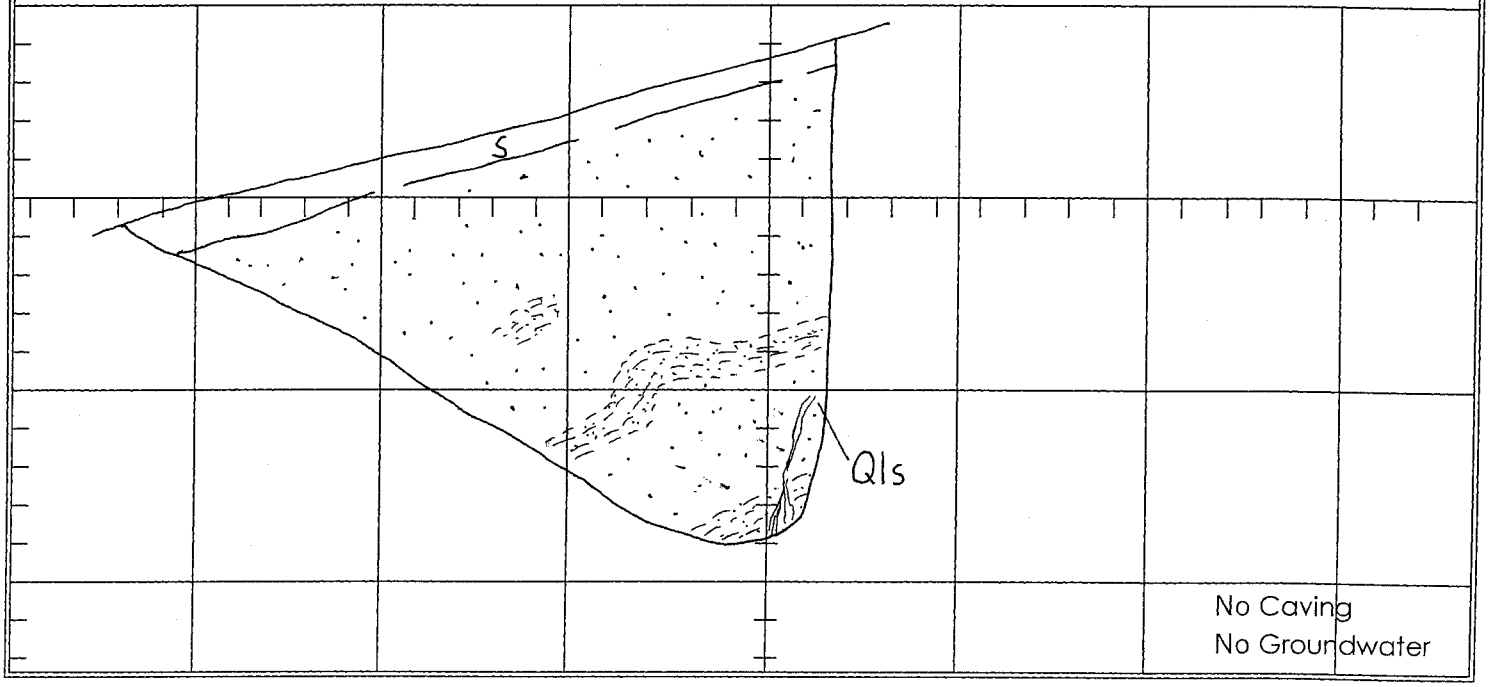
TOTAL DEPTH: 9.5 feet ←N85W SCALE: 1 inch = 5 feet



CLIENT: Newhall Land	JOB NO: 03-1571-4	**TRENCH LOG NO. T-103**
ROJECT: River Park Tentative Map Review	DATE: 4/4/03	
	LOGGED BY: CJS	
	EXCAVATED: 3/8/02	
XCAVATION METHOD: Track-Mounted Backhoe w/24" bucket	ELEVATION: 1220	

DEPTH (feet)	SAMPLE TYPE	SAMPLE NUMBER	GRAPHIC LOG	USCS SYMBOL	DESCRIPTION	ATTITUDES	LABORATORY TESTS: Moisture Content (%)	LABORATORY TESTS: Dry Density (pcf)	LABORATORY TESTS: Other Tests
0					**SOIL; s, (0-1 ft.)** @ 0' Brown, fine- to medium-grained silty sand; loose dry to damp; numerous roots **LANDSLIDE DEBRIS; Qls, (1-13 ft.)** @ 12" Fragments of light yellowish-gray, medium-to coarse grained sandstone and reddish-brown mudstone; vaguely bedded, but with truncation of beds and local mixing of lithologies; open fractures in mudstone at 13 ft.; loose to moderately dense; unsafe to enter for closer inspection				
5									
10									
15									
20									

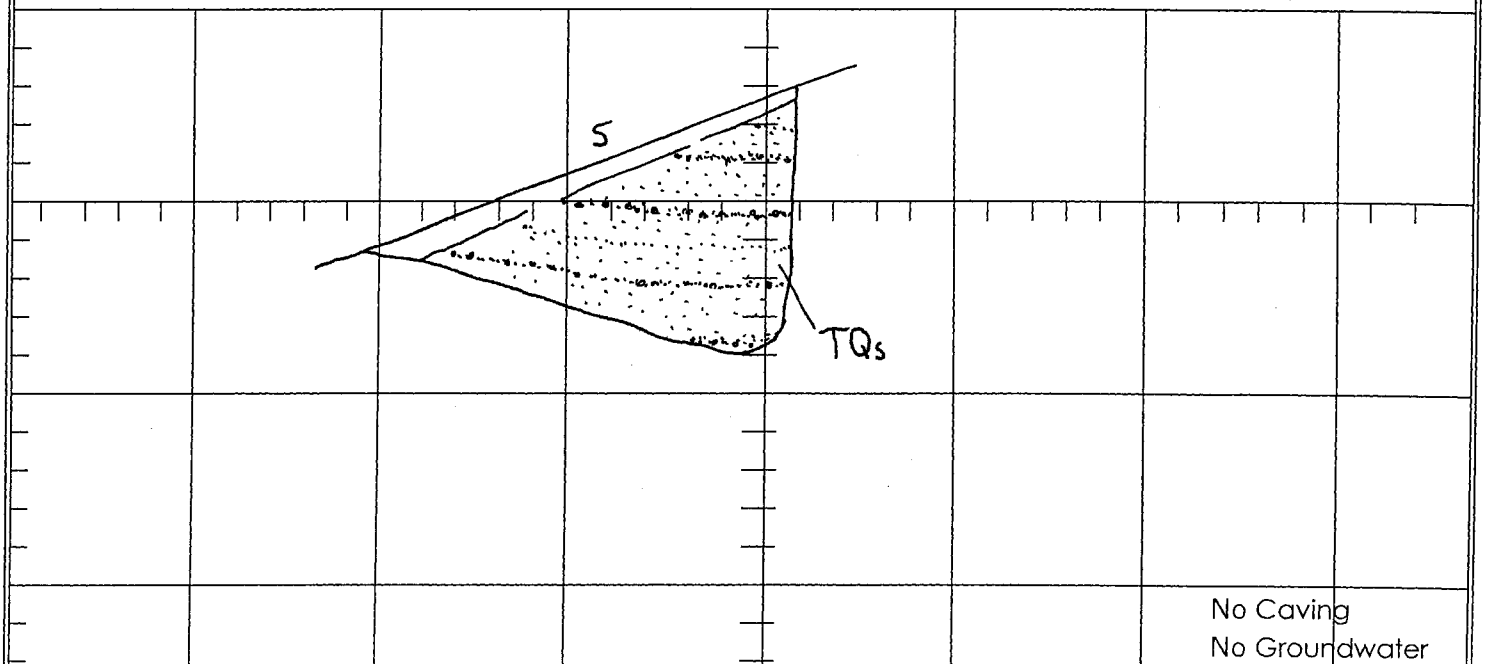
TOTAL DEPTH: 13 feet N10E→ SCALE: 1 inch = 5 feet



CLIENT: Newhall Land	JOB NO: 03-1571-4	**TRENCH LOG NO. T-104**
PROJECT: River Park Tentative Map Review	DATE: 4/4/03	
	LOGGED BY: CJS	
	EXCAVATED: 3/8/02	
EXCAVATION METHOD: Track-Mounted Backhoe w/24" bucket	ELEVATION: 1220	

DEPTH (feet)	SAMPLE TYPE	SAMPLE NUMBER	GRAPHIC LOG	USCS SYMBOL	DESCRIPTION	ATTITUDES	LABORATORY TESTS: Moisture Content (%)	LABORATORY TESTS: Dry Density (pcf)	LABORATORY TESTS: Other Tests
0					**SOIL; s, (0-10 in.)** @ 0' Yellow-brown, fine- to coarse-grained silty sand with pebbles; loose; dry; numerous roots **BEDROCK; TQs, (10 in.-7 ft.)** @ 10" Pale yellow-brown, medium- to coarse-grained pebbly sandstone; hard; damp	B:N80E,15SE			
5									
10									
15									
20									

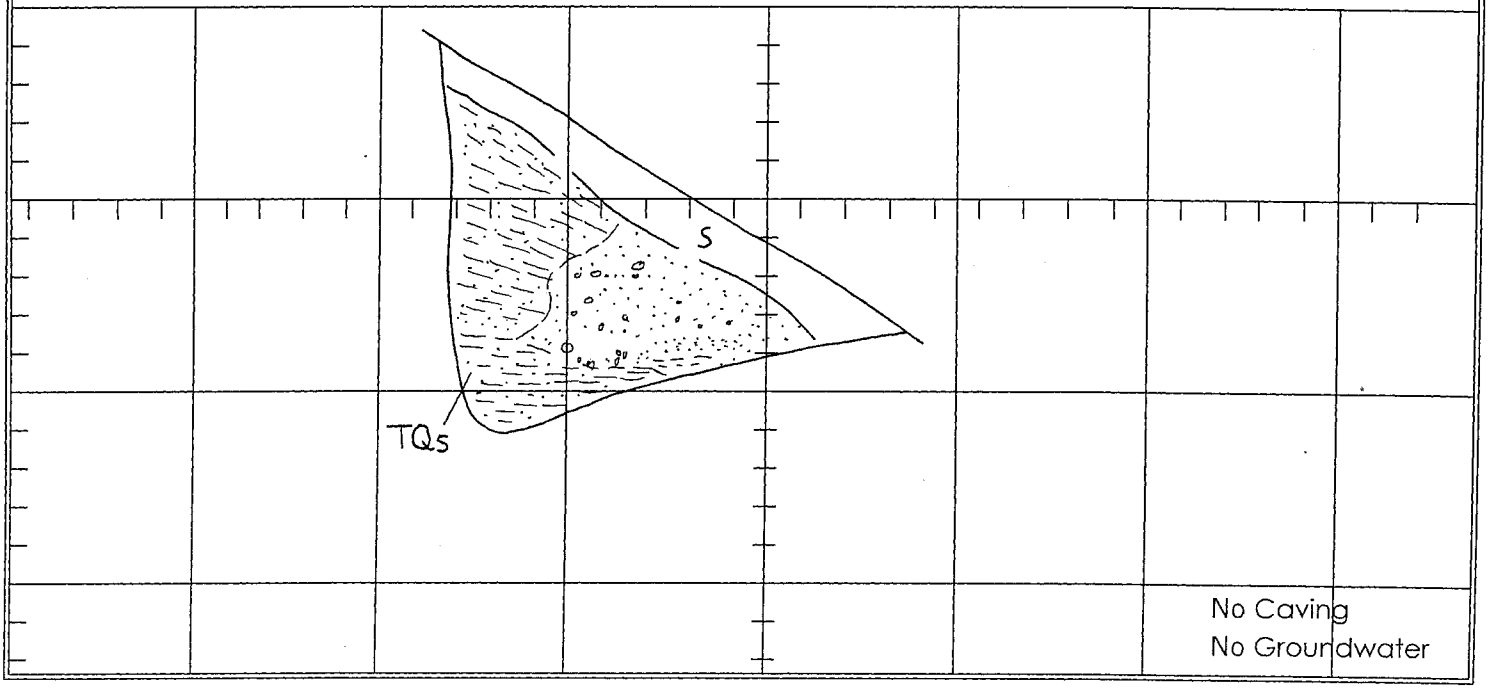
TOTAL DEPTH: 7 feet N55W→ SCALE: 1 inch = 5 feet



CLIENT: Newhall Land	JOB NO: 03-1571-4	**TRENCH LOG NO. T-105**
PROJECT: River Park Tentative Map Review	DATE: 4/4/03	
	LOGGED BY: CJS	
	EXCAVATED: 3/8/02	
EXCAVATION METHOD: Track-Mounted Backhoe w/24" bucket	ELEVATION: 1240	

DEPTH (feet)	SAMPLE TYPE	SAMPLE NUMBER	GRAPHIC LOG	USCS SYMBOL	DESCRIPTION	ATTITUDES	LABORATORY TESTS: Moisture Content (%)	LABORATORY TESTS: Dry Density (pcf)	LABORATORY TESTS: Other Tests
0					**SOIL; s, (0-1 ft.)** @ 0' Yellow-brown, fine- to medium-grained silty sand; loose; dry to damp; numerous roots **BEDROCK; TQs, (1-10 ft.)** @ 1' Moderate reddish-brown sandy mudstone and yellow-grayish-brown, medium to coarse-grained pebbly sandstone; sandstone is deeply channelled into mudstone; attitude probably not reliable; hard to very hard at bottom of trench; damp; mudstone grades clayey at bottom of trench	B:N55W,27SW			
5									
10									
15									
20									

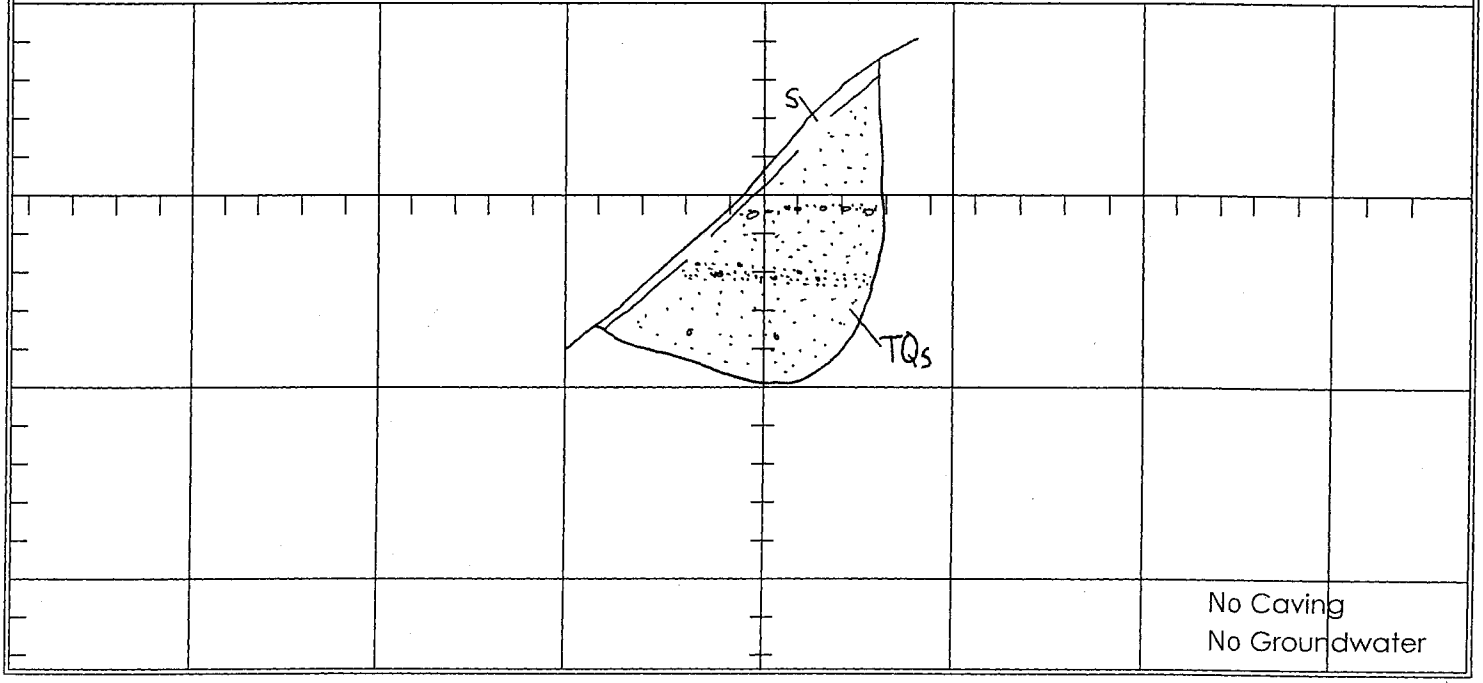
TOTAL DEPTH: 10 feet ←N70E SCALE: 1 inch = 5 feet



CLIENT: Newhall Land	JOB NO: 03-1571-4	**TRENCH LOG NO. T-106**
PROJECT: River Park Tentative Map Review	DATE: 4/4/03	
	LOGGED BY: CJS	
	EXCAVATED: 3/8/02	
EXCAVATION METHOD: Track-Mounted Backhoe w/24" bucket	ELEVATION: 1245	

DEPTH (feet)	SAMPLE TYPE	SAMPLE NUMBER	GRAPHIC LOG	USCS SYMBOL	DESCRIPTION	ATTITUDES	LABORATORY TESTS: Moisture Content (%)	LABORATORY TESTS: Dry Density (pcf)	LABORATORY TESTS: Other Tests
0					**SOIL; s, (0-1 ft.)** @ 0' Yellow-brown, fine- to coarse-grained silty sand; loose; dry to damp; root mats in upper 6" **BEDROCK; TQs, (1-8 ft.)** @ 1' Pale yellow-gray, fine-to medium-grained sandstone; local pebble lenses; hard; damp	B:N65W, 15SW			
5									
10									
15									
20									

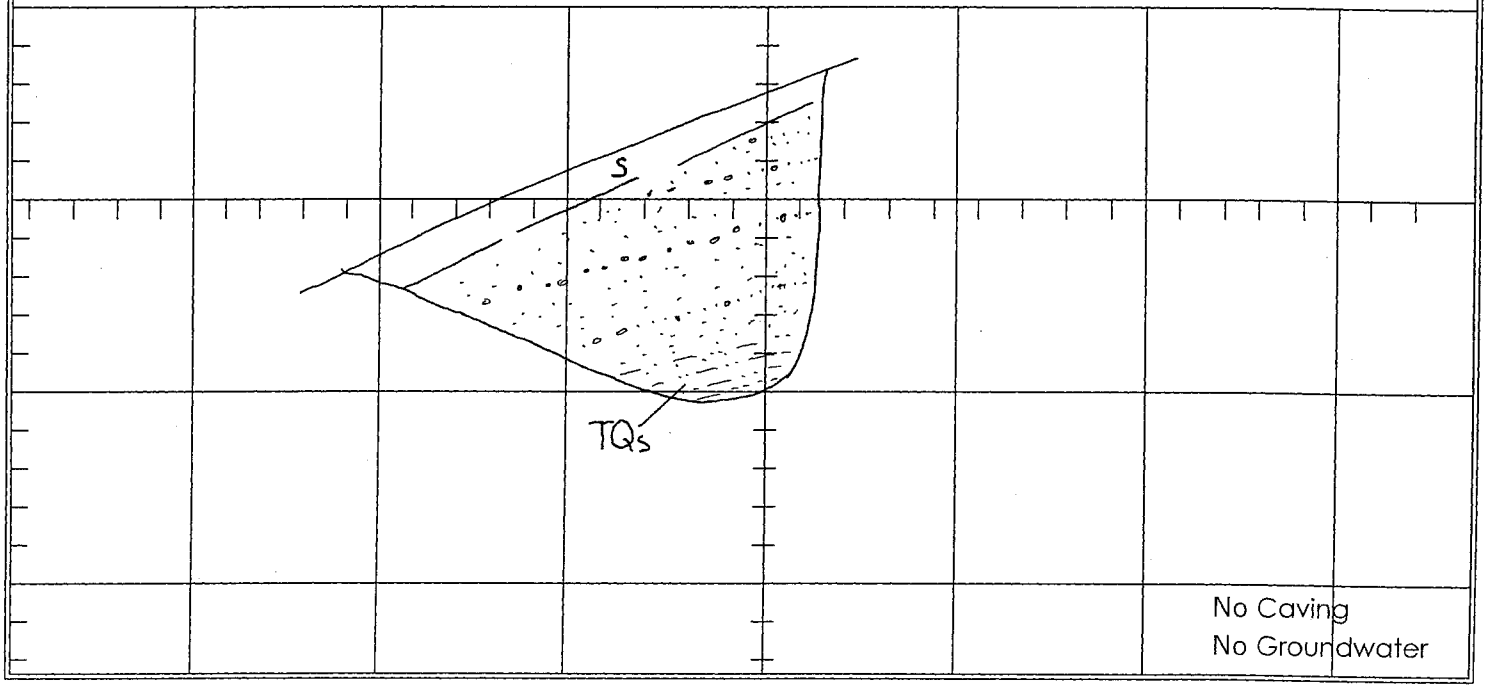
TOTAL DEPTH: 8 feet N80W→ SCALE: 1 inch = 5 feet



CLIENT: Newhall Land	JOB NO: 03-1571-4	**TRENCH LOG NO. T-107**
PROJECT: River Park Tentative Map Review	DATE: 4/4/03	
	LOGGED BY: CJS	
	EXCAVATED: 3/8/02	
EXCAVATION METHOD: Track-Mounted Backhoe w/24" bucket	ELEVATION: 1250	

DEPTH (feet)	SAMPLE TYPE	SAMPLE NUMBER	GRAPHIC LOG	USCS SYMBOL	DESCRIPTION	ATTITUDES	LABORATORY TESTS: Moisture Content (%)	LABORATORY TESTS: Dry Density (pcf)	LABORATORY TESTS: Other Tests
0					**SOIL; s, (0-1 ft.)** @ 0' Yellow-brown, fine- to medium-grained silty sand with pebbles; loose; damp; hair-roots common **BEDROCK; TQs, (1-8 ft.)** @ 1' Pale reddish-yellow-brown, medium- to coarse-grained sandstone and pebbly sandstone and moderate reddish-brown, sandy siltstone; hard; damp; strong; cross-bedding in sandstone units				
5									
10									
15									
20									

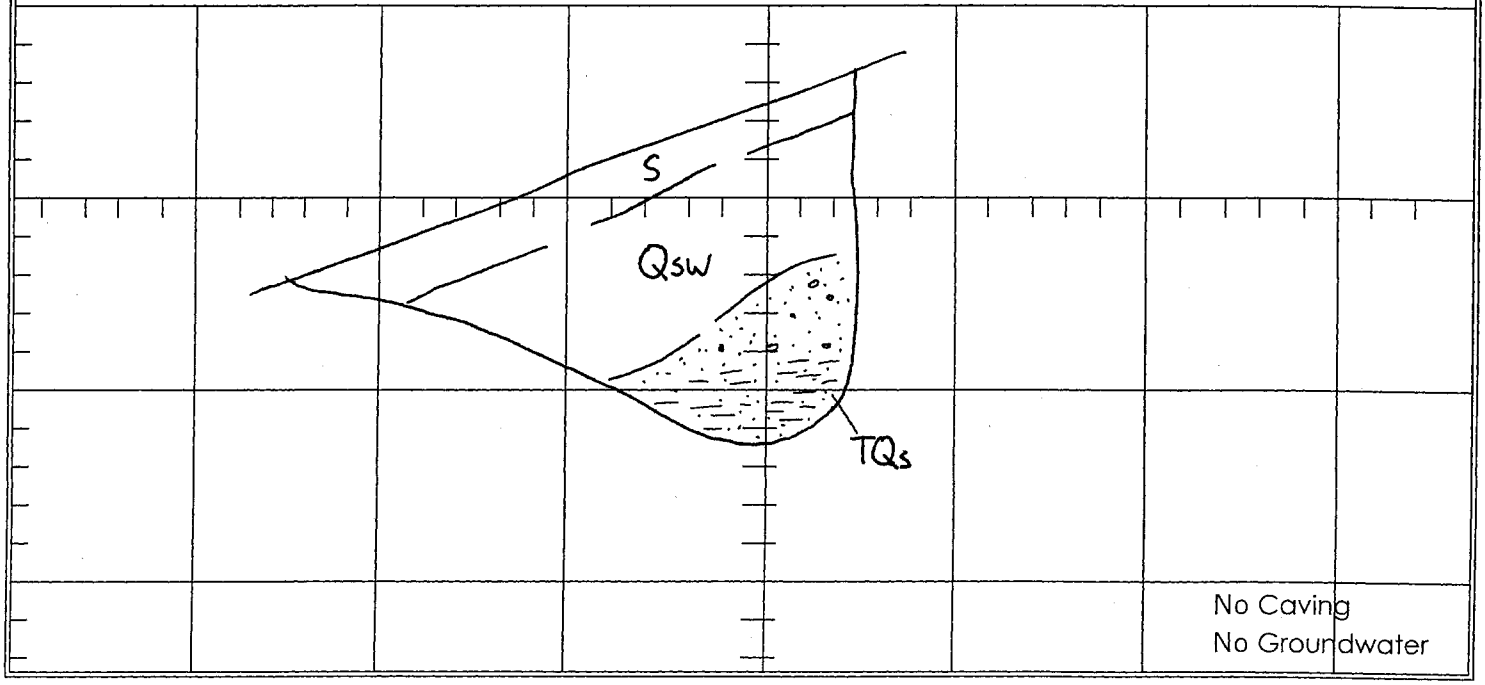
TOTAL DEPTH: 8 feet N45E→ SCALE: 1 inch = 5 feet



CLIENT: Newhall Land	JOB NO: 03-1571-4	**TRENCH LOG NO. T-108**
PROJECT: River Park Tentative Map Review	DATE: 4/4/03	
	LOGGED BY: CJS	
	EXCAVATED: 3/8/02	
EXCAVATION METHOD: Track-Mounted Backhoe w/24" bucket	ELEVATION: 1250	

DEPTH (feet)	SAMPLE TYPE	SAMPLE NUMBER	GRAPHIC LOG	USCS SYMBOL	DESCRIPTION	ATTITUDES	LABORATORY TESTS: Moisture Content (%)	LABORATORY TESTS: Dry Density (pcf)	LABORATORY TESTS: Other Tests
0					**SOIL; s, (0-1 ft.)** @ 0' Yellow-brown, fine- to medium-grained silty sand; loose; dry to damp; numerous roots **SLOPEWASH; Qsw, (1-5.5 ft.)** @ 1' Light-yellow-brown to reddish-brown, medium-grained silty sand; loose to moderately dense; damp; lower contact gradational **BEDROCK; TQs, (5.5-9.5 ft)** @ 5.5' Moderate yellow-brown, sandy siltstone with scattered pebbles and moderate reddish-brown siltstone to clayey siltstone; moderately hard; damp	B:N82E,15SE			
5									
10									
15									
20									

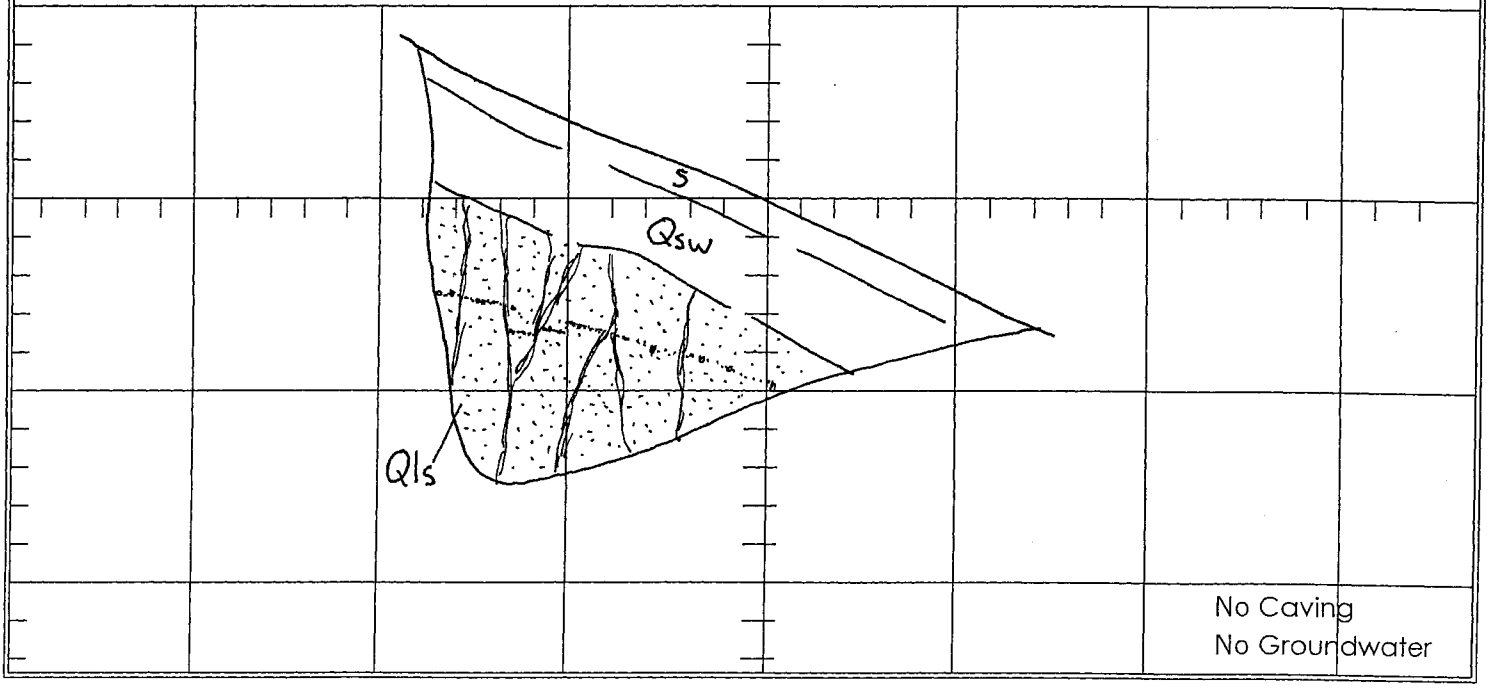
TOTAL DEPTH: 9.5 feet N60W→ SCALE: 1 inch = 5 feet



CLIENT: Newhall Land	JOB NO: 03-1571-4	**TRENCH LOG NO. T-109**
PROJECT: River Park Tentative Map Review	DATE: 4/4/03	
	LOGGED BY: CJS	
	EXCAVATED: 3/8/02	
EXCAVATION METHOD: Track-Mounted Backhoe w/24" bucket	ELEVATION: 1250	

DEPTH (feet)	SAMPLE TYPE	SAMPLE NUMBER	GRAPHIC LOG	USCS SYMBOL	DESCRIPTION	ATTITUDES	LABORATORY TESTS: Moisture Content (%)	LABORATORY TESTS: Dry Density (pcf)	LABORATORY TESTS: Other Tests
0					**SOIL; s, (0-1 ft.)** @ 0' Yellow-brown, fine- to coarse-grained, silty sand; loose; dry to damp **SLOPEWASH; Qsw, (1-2.5 ft.)** @ 1' Reddish yellow-brown, fine- to medium-grained slightly silty sand with pebbles; loose; damp **LANDSLIDE DEBRIS?; Qls?, (2.5-10 ft.)** @ 2.5' Yellowish-gray, medium- to coarse-grained sandstone and pebbly sandstone; slightly to moderately hard; damp; numerous steep-dipping, soil-filled fractures up to 2" wide extend to bottom of trench; bedding offsets up to 6" common across fractures	B:N60W, 13SW f:N10W, N10E Steep dips to east & west			
5									
10									
15									
20									

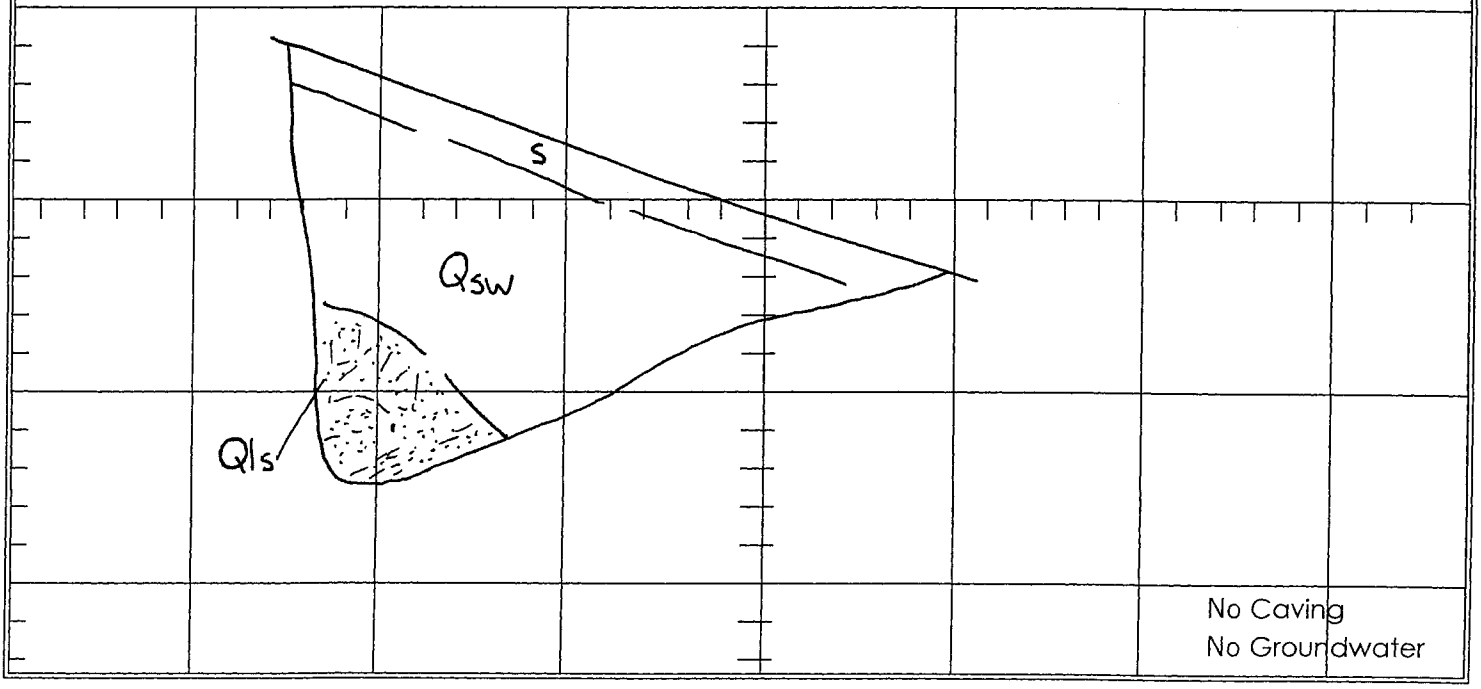
TOTAL DEPTH: 10 feet N60W→ SCALE: 1 inch = 5 feet



CLIENT: Newhall Land	JOB NO: 03-1571-4	**TRENCH LOG NO. T-110**
PROJECT: River Park Tentative Map Review	DATE: 4/4/03	
	LOGGED BY: CJS	
	EXCAVATED: 3/8/02	
EXCAVATION METHOD: Track-Mounted Backhoe w/24" bucket	ELEVATION: 1230	

DEPTH (feet)	SAMPLE TYPE	SAMPLE NUMBER	GRAPHIC LOG	USCS SYMBOL	DESCRIPTION	ATTITUDES	LABORATORY TESTS: Moisture Content (%)	LABORATORY TESTS: Dry Density (pcf)	LABORATORY TESTS: Other Tests
0					**SOIL; s, (0-1 ft.)** @ 0' Yellow-brown to dark grayish-brown, clayey sand to sandy clay; firm; dry to damp **SLOPEWASH; Qsw, (1-7 ft.)** @ 1' Reddish-yellow-brown, fine- to medium-grained sand and clayey sand with pebbles; moderately dense; damp; lower contact gradational **LANDSLIDE DEBRIS; Qls, (7-11.5 ft.)** @ 7' Yellow-reddish-brown, sandy mudstone and yellowish-gray, medium-grained sandstone; sandstone highly weathered with little remaining cementation; units discontinuous; locally juxtaposed across steep dipping zone of very soft rock; overall weak; damp				
5									
10									
15									
20									

TOTAL DEPTH: 11.5 feet N75W→ SCALE: 1 inch = 5 feet

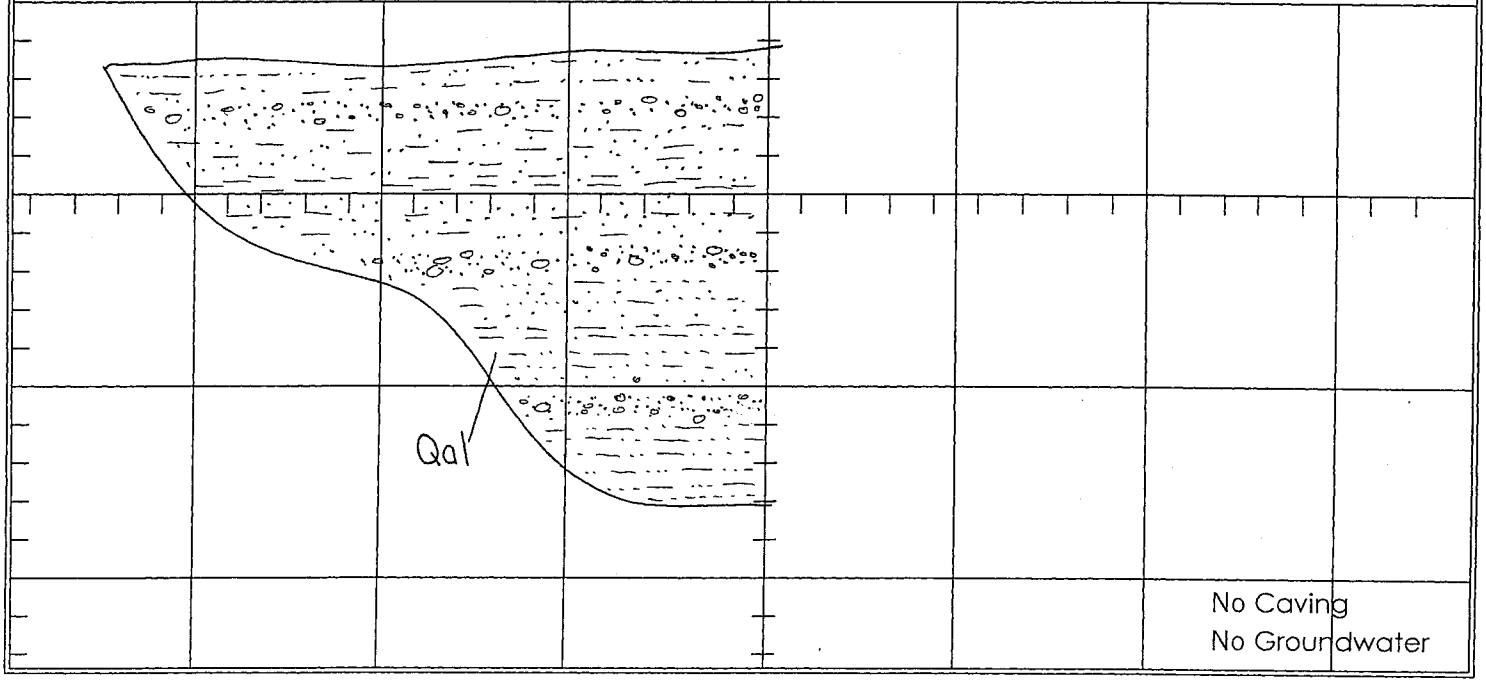


CLIENT: Newhall Land	JOB NO: 03-1571-4	**TRENCH LOG NO. T-111**
PROJECT: River Park Tentative Tract 53425	DATE: 4/4/03	
	LOGGED BY: DGG	
	EXCAVATED: 3/12/02	
EXCAVATION METHOD: Rubber-Tired Backhoe w/24" Bucket	ELEVATION:	

DEPTH (feet)	SAMPLE TYPE	SAMPLE NUMBER	GRAPHIC LOG	USCS SYMBOL	DESCRIPTION	ATTITUDES	LABORATORY TESTS: Moisture Content (%)	LABORATORY TESTS: Dry Density (pcf)	LABORATORY TESTS: Other Tests
0					**QUATERNARY ALLVUIUM; Qal, (0-12 ft.)** @ 0' Medium- to grayish- to pale orangish-brown silty sand/ sandy silt with interbedded grayish-brown fine- to coarse-grained pebbly sand with scattered pebbles and medium-brown silt; fine-grained beds are soft to stiff; sands are loose and very friable; damp; pinhole voids				
5									
10									
15									
20									

COMMENTS:
-Surface logged for depths between 6' and 12'
-Bottom 2' is silt; stiff-backhoe scraping

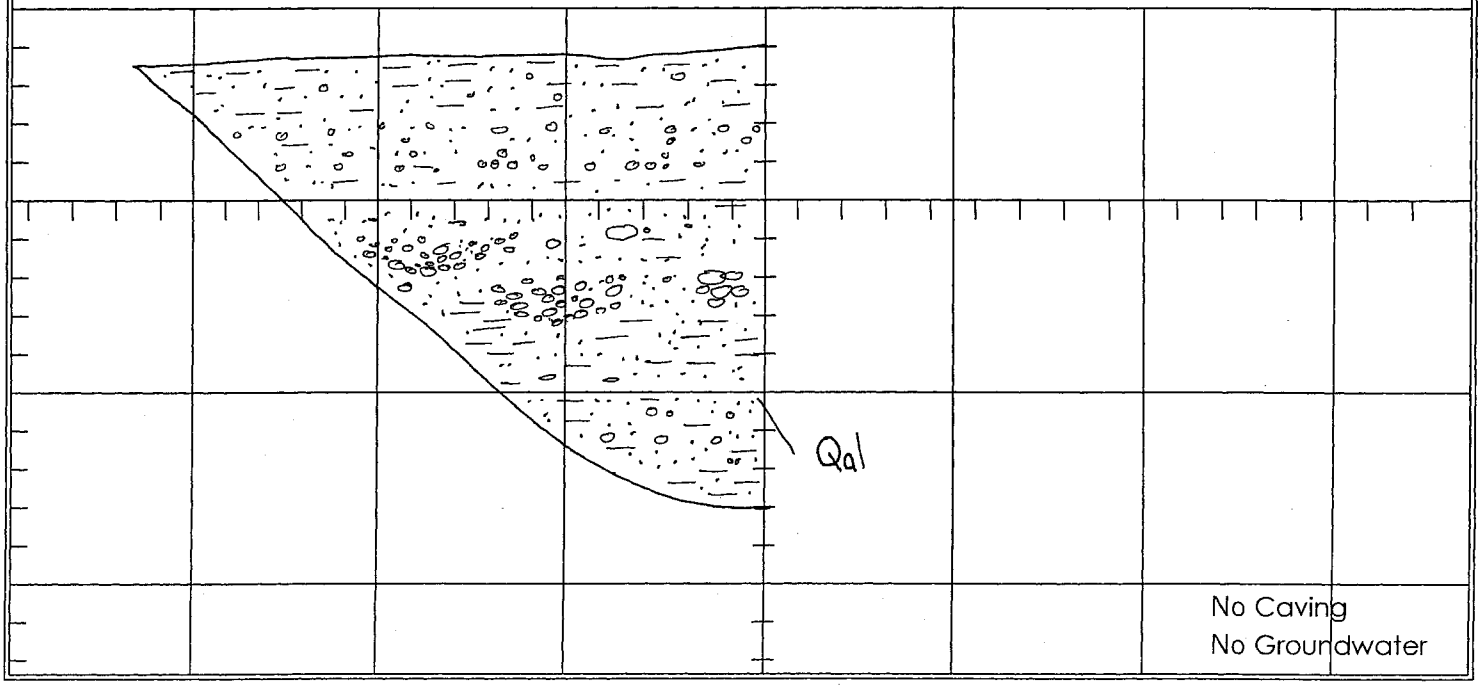
TOTAL DEPTH: 12 feet ←N28E SCALE: 1 inch = 5 feet



CLIENT: Newhall Land	JOB NO: 03-1571-4	**TRENCH LOG NO. T-112**
PROJECT: River Park Tentative Tract 53425	DATE: 4/4/03	
	LOGGED BY: DGG	
	EXCAVATED: 3/12/02	
EXCAVATION METHOD: Rubber-Tired Backhoe w/24" Bucket	ELEVATION:	

DEPTH (feet)	SAMPLE TYPE	SAMPLE NUMBER	GRAPHIC LOG	USCS SYMBOL	DESCRIPTION	ATTITUDES	LABORATORY TESTS: Moisture Content (%)	LABORATORY TESTS: Dry Density (pcf)	LABORATORY TESTS: Other Tests
0					**QUATERNARY ALLUVIUM; Qal, (0-12 ft.)** @ 0' Medium-gray to grayish-brown fine- to coarse-grained pebbly sand with scattered cobbles and medium to grayish-brown silt to silty sand/sandy silt; sands are loose and very friable; finer-grained beds are soft to firm; damp; pinhole voids				
5									
10									
15					COMMENTS: -Bottom 1.5' firm but not stiff -Surface logged 6-12 ft.				
20									

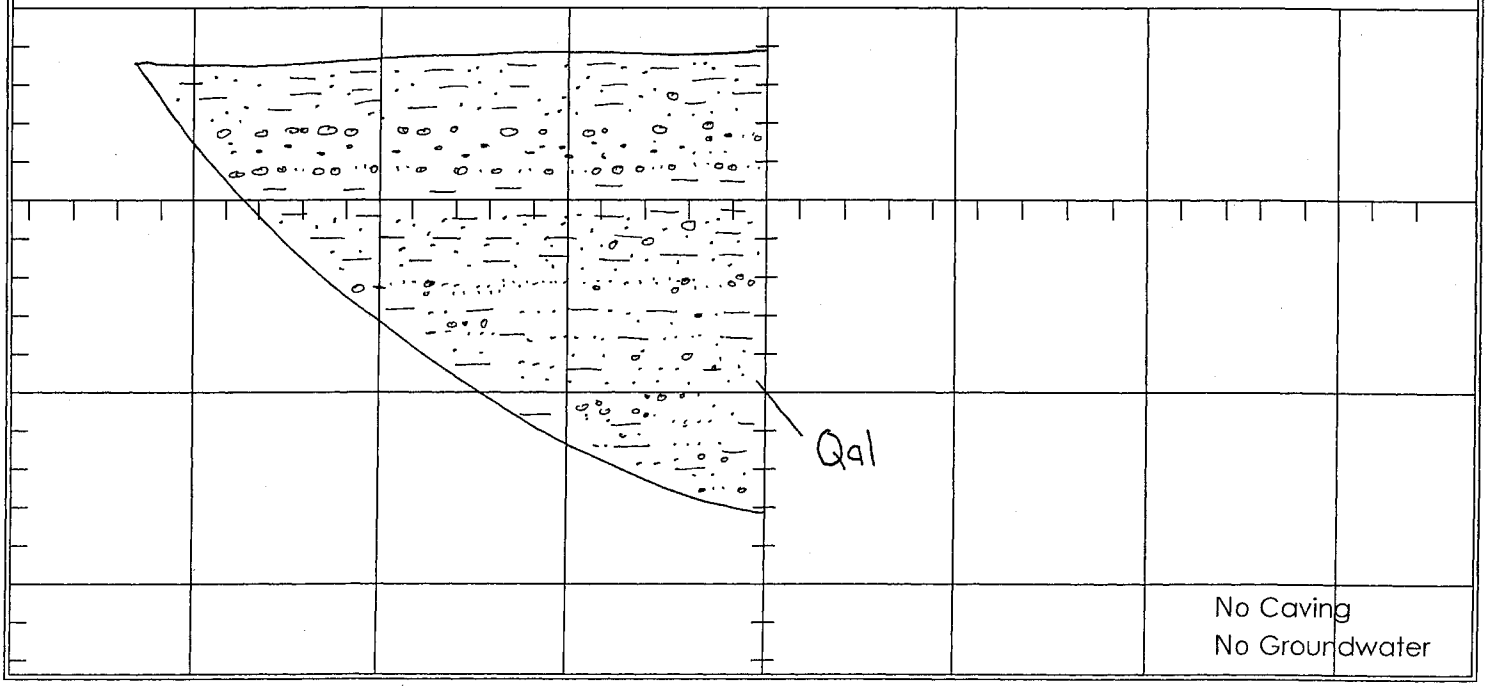
TOTAL DEPTH: 12 feet ←N26E SCALE: 1 inch = 5 feet



CLIENT: Newhall Land	JOB NO: 03-1571-4	**TRENCH LOG NO. T-113**
PROJECT: River Park Tentative Tract 53425	DATE: 4/4/03	
	LOGGED BY: DGG	
	EXCAVATED: 3/12/02	
EXCAVATION METHOD: Rubber-Tired Backhoe w/24" Bucket	ELEVATION:	

DEPTH (feet)	SAMPLE TYPE	SAMPLE NUMBER	GRAPHIC LOG	USCS SYMBOL	DESCRIPTION	ATTITUDES	LABORATORY TESTS: Moisture Content (%)	LABORATORY TESTS: Dry Density (pcf)	LABORATORY TESTS: Other Tests
0					**QUATERNARY ALLUVIUM; Qal, (0-12 ft.)** @ 0' Medium- to grayish-brown silt to sandy silt/silty sand with grayish-brown fine- to medium-grained pebbly sand with few scattered cobbles; fine-grained beds are soft to firm; sands are loose and very friable; damp; pinhole voids				
5									
10									
15					COMMENTS: -Bottom 1' firm but not stiff -Surface logged 6-12'				
20									

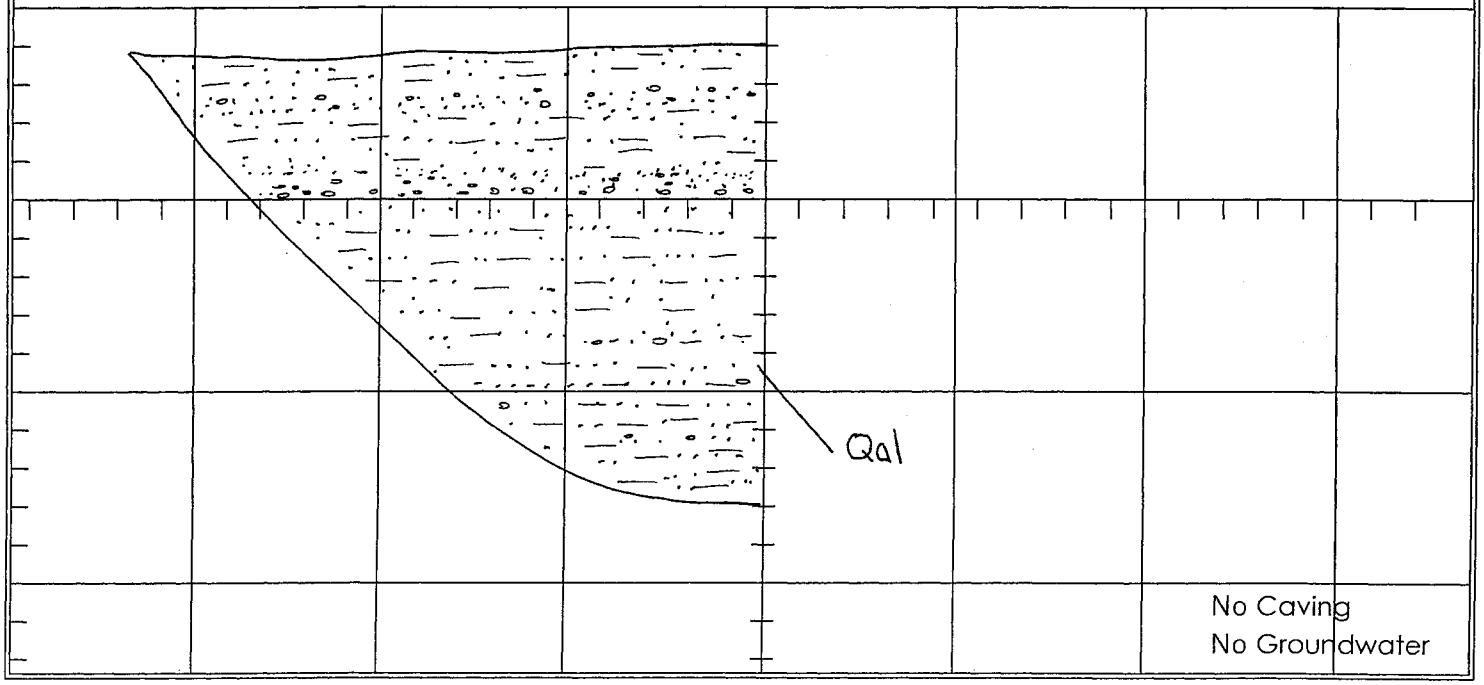
TOTAL DEPTH: 12 feet N6E→ SCALE: 1 inch = 5 feet



CLIENT: Newhall Land	JOB NO: 03-1571-4	**TRENCH LOG NO. T-114**
PROJECT: River Park Tentative Tract 53425	DATE: 4/4/03	
	LOGGED BY: DGG	
	EXCAVATED: 3/12/02	
EXCAVATION METHOD: Rubber-Tired Backhoe w/24" Bucket	ELEVATION:	

DEPTH (feet)	SAMPLE TYPE	SAMPLE NUMBER	GRAPHIC LOG	USCS SYMBOL	DESCRIPTION	ATTITUDES	LABORATORY TESTS: Moisture Content (%)	LABORATORY TESTS: Dry Density (pcf)	LABORATORY TESTS: Other Tests
0					**QUATERNARY ALLUVIUM; Qal, (0-12 ft.)** @ 0' Medium to grayish-brown silt, silty sand/sandy silt, and fine- to coarse-grained pebbly sand; sands are loose and very friable, finer-grained beds are soft to slightly stiff; damp; pinhole voids; few scattered cobbles				
5									
10									
15					COMMENTS: -Bottom 1-1.5' slightly stiff -Surface logged 6-12 ft.				
20									

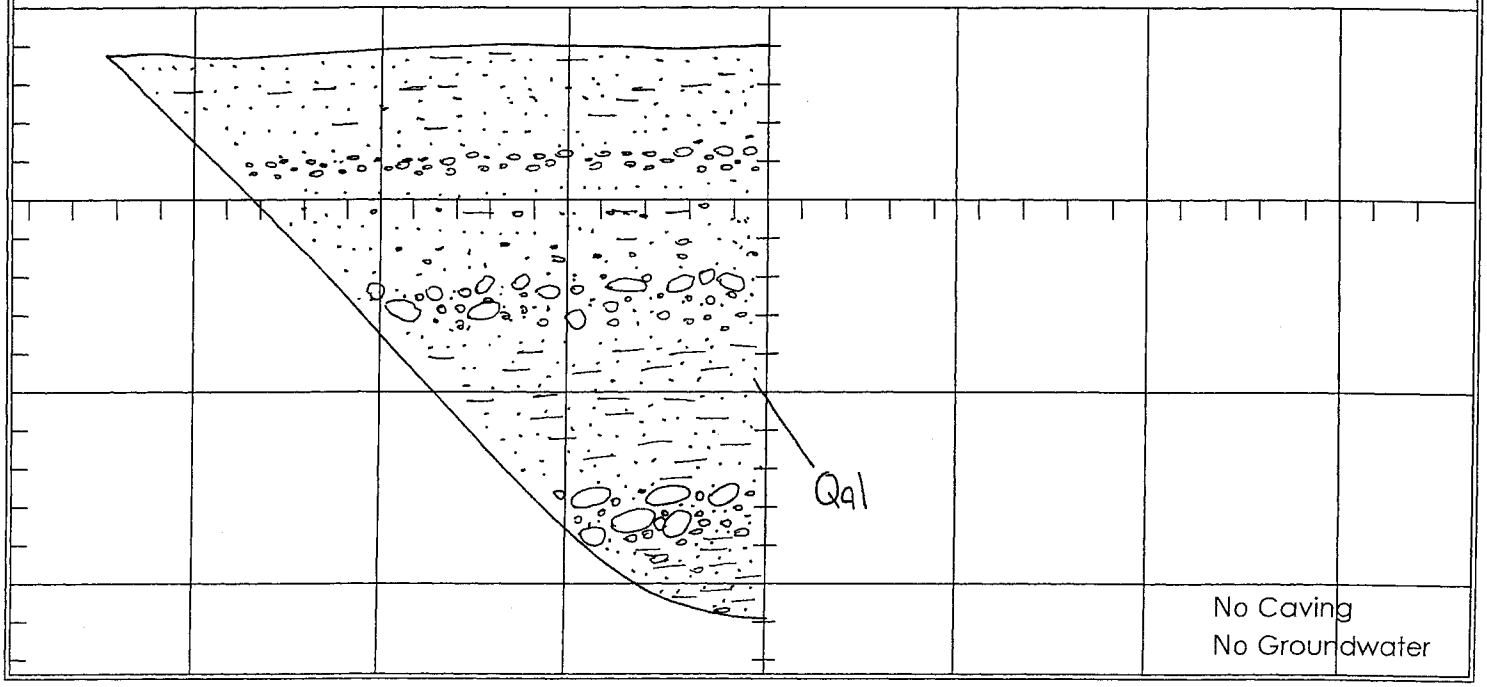
TOTAL DEPTH: 12 feet ←N30W SCALE: 1 inch = 5 feet



CLIENT: Newhall Land		JOB NO: 03-1571-4	**TRENCH LOG NO. T-115**
PROJECT: River Park Tentative Tract 53425		DATE: 4/4/03	
		LOGGED BY: DGG	
		EXCAVATED: 3/12/02	
EXCAVATION METHOD: Rubber-Tired Backhoe w/24" Bucket		ELEVATION:	

DEPTH (feet)	SAMPLE TYPE	SAMPLE NUMBER	GRAPHIC LOG	USCS SYMBOL	DESCRIPTION	ATTITUDES	LABORATORY TESTS: Moisture Content (%)	LABORATORY TESTS: Dry Density (pcf)	LABORATORY TESTS: Other Tests
0					**QUATERNARY ALLUVIUM; Qal, (0-15 ft.)** @ 0' Medium to grayish-brown silt to sandy silt/silty sand and medium to grayish-brown fine-to coarse-grained cobbly, pebbly sand with boulders; fine- grained beds are soft to firm; sands are loose to locally moderately dense; damp; voids 1/8" diameter to at least 6 ft.				
5									
10									
15					COMMENTS: -Surface logged 6-15 ft. -Bottom 1' firm to slightly stiff				
20									

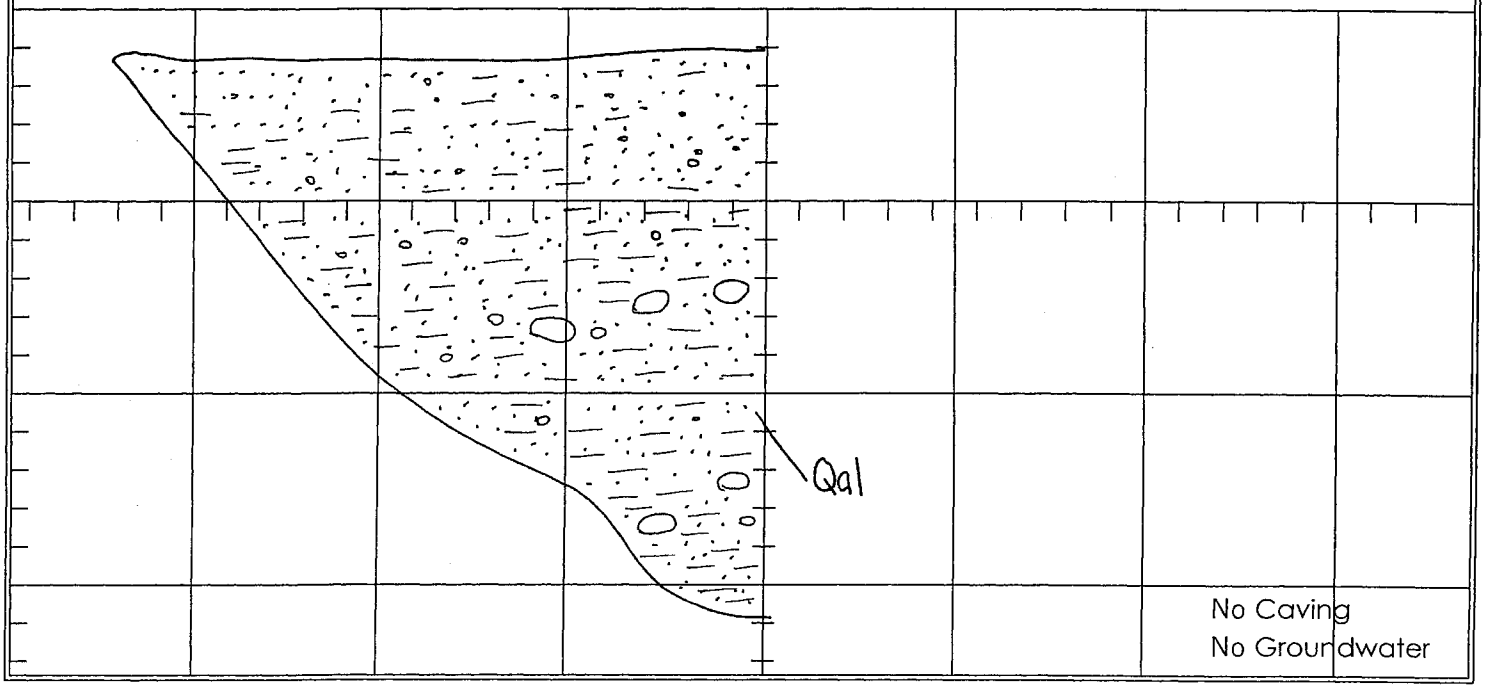
TOTAL DEPTH: 15 feet N5W→ SCALE: 1 inch = 5 feet



CLIENT: Newhall Land	JOB NO: 03-1571-4	**TRENCH LOG NO. T-116**
PROJECT: River Park Tentative Tract 53425	DATE: 4/4/03	
	LOGGED BY: DGG	
	EXCAVATED: 3/12/02	
EXCAVATION METHOD: Rubber-Tired Backhoe w/24" Bucket	ELEVATION:	

DEPTH (feet)	SAMPLE TYPE	SAMPLE NUMBER	GRAPHIC LOG	USCS SYMBOL	DESCRIPTION	ATTITUDES	LABORATORY TESTS: Moisture Content (%)	LABORATORY TESTS: Dry Density (pcf)	LABORATORY TESTS: Other Tests
0					**QUATERNARY ALLUVIUM; Qal, (0-15 ft.)** @ 0' Medium to grayish-brown silt to silty sand/sandy silt and minor fine- to medium-grained pebbly sand with scattered cobbles and few boulders; soils are loose, fine-grained beds are soft to firm; damp; pinhole voids to at least 6 ft.				
5									
10									
15					COMMENTS: -Surface logged 6-15 ft.				
20									

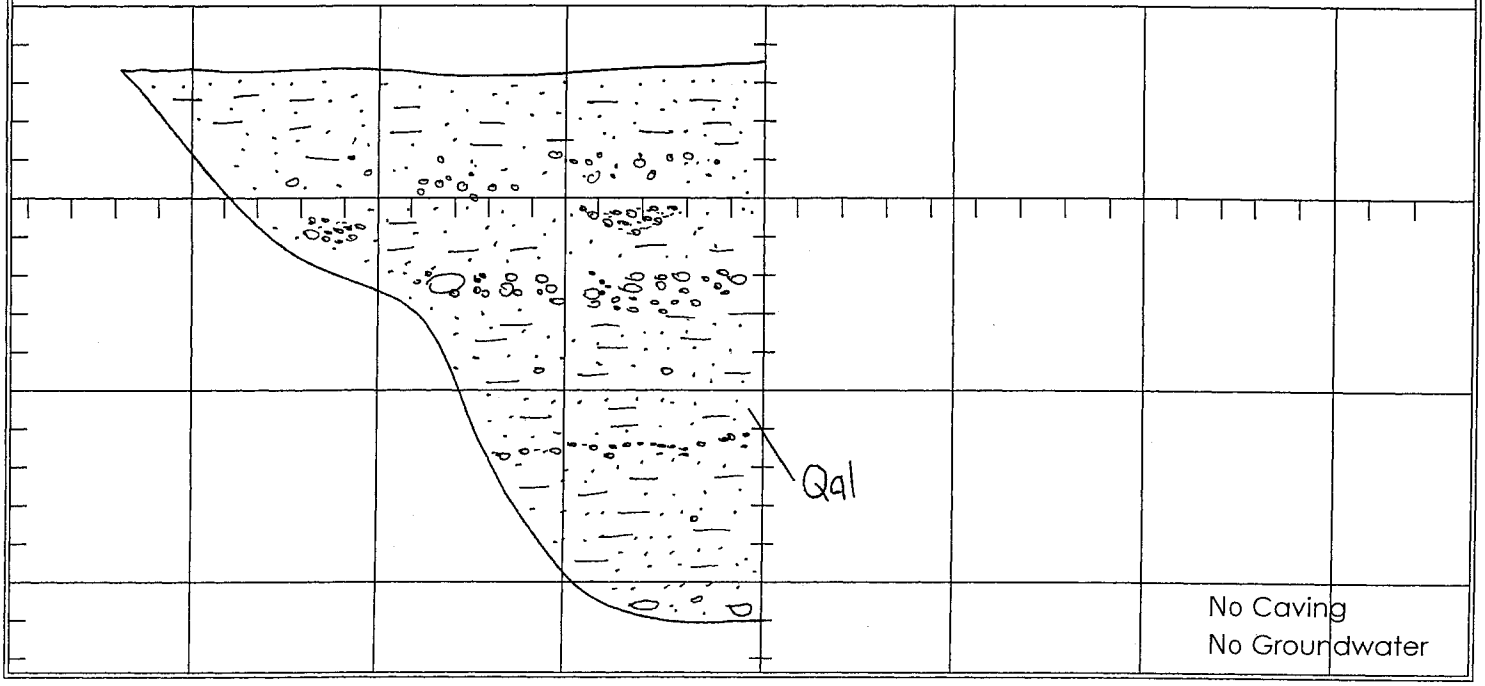
TOTAL DEPTH: 15 feet N5E→ SCALE: 1 inch = 5 feet



CLIENT: Newhall Land	JOB NO: 03-1571-4	**TRENCH LOG NO. T-117**
PROJECT: River Park Tentative Tract 53425	DATE: 4/4/03	
	LOGGED BY: DGG	
	EXCAVATED: 3/12/02	
EXCAVATION METHOD: Rubber-Tired Backhoe w/24" Bucket	ELEVATION:	

DEPTH (feet)	SAMPLE TYPE	SAMPLE NUMBER	GRAPHIC LOG	USCS SYMBOL	DESCRIPTION	ATTITUDES	LABORATORY TESTS: Moisture Content (%)	LABORATORY TESTS: Dry Density (pcf)	LABORATORY TESTS: Other Tests
0					**QUATERNARY ALLUVIUM; Qal, (0-15 ft.)** @ 0' Medium- to grayish-brown silt to sandy silt/silty sand and minor fine- to medium-grained pebbly sand with scattered cobbles and few boulders; sands are loose, fine-grained beds are soft to firm; damp; voids to 1/8" diameter to a least 6 ft.				
5									
10									
15					COMMENTS: -Surface logged 6-15 ft.				
20									

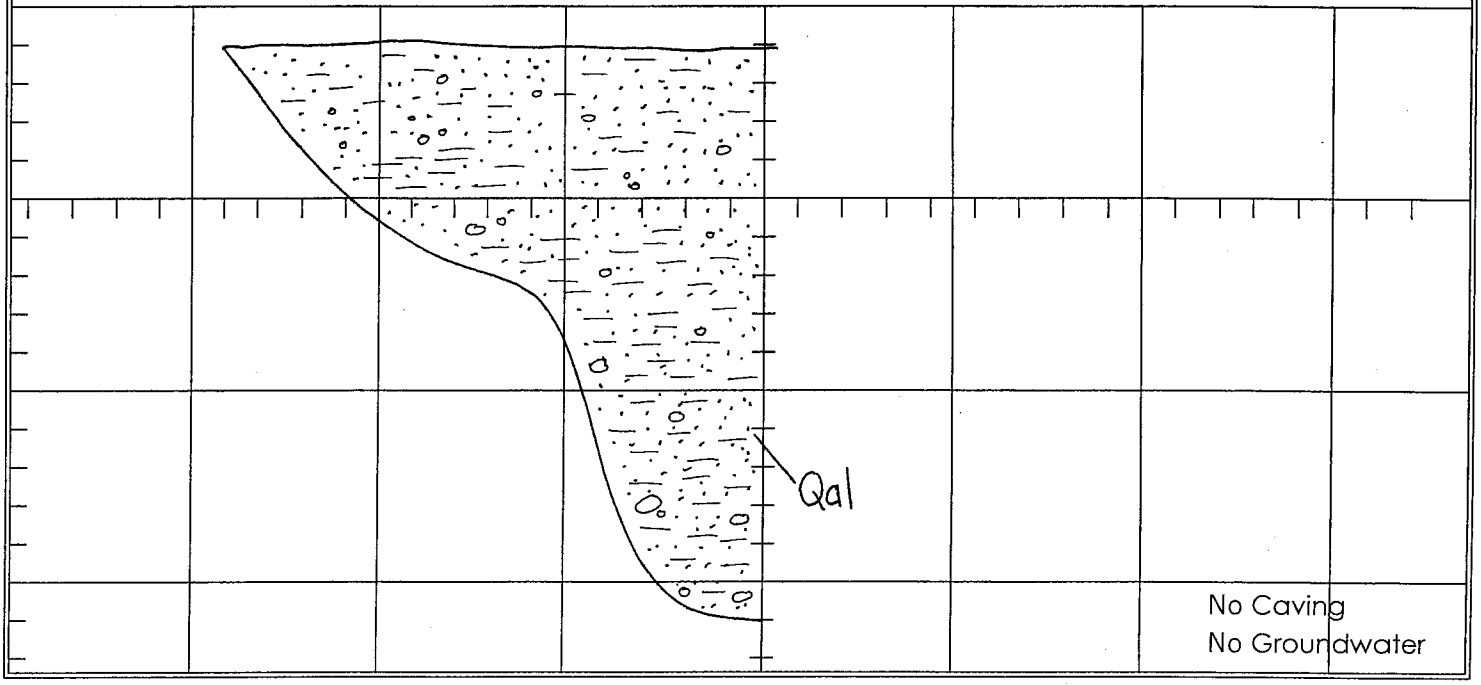
TOTAL DEPTH: 15 feet N14E→ SCALE: 1 inch = 5 feet



CLIENT: Newhall Land	JOB NO: 03-1571-4	**TRENCH LOG NO. T-118**
PROJECT: River Park Tentative Tract 53425	DATE: 4/4/03	
	LOGGED BY: DGG	
	EXCAVATED: 3/12/02	
EXCAVATION METHOD: Rubber-Tired Backhoe w/24" Bucket	ELEVATION:	

DEPTH (feet)	SAMPLE TYPE	SAMPLE NUMBER	GRAPHIC LOG	USCS SYMBOL	DESCRIPTION	ATTITUDES	LABORATORY TESTS: Moisture Content (%)	LABORATORY TESTS: Dry Density (pcf)	LABORATORY TESTS: Other Tests
0					**QUATERNARY ALLUVIUM; Qal, (0-15 ft.)** @ 0' Medium- to grayish-brown silt to sandy silt/silty sand to pebbly sand with scattered cobbles; silts are soft to firm, sands are loose; damp; pinhole voids to at least 6 ft.; few boulders COMMENTS: -Surface logged 6-15 ft.				
5									
10									
15									
20									

TOTAL DEPTH: 15 feet N14W→ SCALE: 1 inch = 5 feet



DRILL HOLE LOG

BORING NO. BA-1

PROJECT: Panhandle **JOB NO.:** 98-1571

DATE: 4/4/03

DRILLING COMPANY/DRILLER: Tri Valley Drilling

METHOD OF DRILLING/HOLE DIAMETER (in.) Bucket-Auger 24"

HAMMER TYPE: Kelly **AVERAGE DROP (in.):** 18"

DRIVING WEIGHTS: 0-30-3450, 30-60-2050, 60-90-1140

ELEVATION: 1335 **LOGGED BY:** CJS

DEPTH (feet)	SAMPLE TYPE	BLOWS / 6"	GRAPHIC LOG	ATTITUDES	USCS SYMBOL	Description Soils: description; consistency/density; moisture; color; other Bedrock: color, lithology; hardness; moisture; other	Remarks
			S/Col			SOIL/COLLUVIUM; (0 - 9 ft.) @ 0' Moderate-reddish-brown, fine- to medium grained silty sand; moderately dense; damp to moist; slightly plastic	
5						@ 6' Grades to orange-brown, less silt	
			Qt			QUATERNARY TERRACE; Qt, (9 - 22 ft.) @ 9' Pale to moderate yellow-brown, fine- to coarse- grained sand and gravel with cobbles; very little cohesion; damp; moderate to severe caving	
10						@ 13' Difficult drilling due to large cobbles and boulders	
15						@ 15' Switch to coring bucket to remove rocks	
						@ 18' Grades very moist to wet	
20						@ 20' Strong seepage	
			TQs			BEDROCK/SAUGUS FORMATION; TQs, (22 - 60 ft.) @ 23' Bottom of Steel Casing - Pale grey to pale yellowish-grey, fine- to medium-grained, slightly silty sandstone with minor gravel; moderately hard; damp	
25				B:N63W, 3SW		@ 25' Grades to light brown and more silt	
		3 5 8				@ 25.3' Interbed of gravelly sandstone - 2 inch thick	@ 27.5' Dry Density = 127pcf M/C = 11.6%
				B:N36W,13SW		@ 26' Grades from light brown to reddish-brown with minor coarse-grained fraction	
30						@ 29' 12" section of moderate reddish-brown, very silty to clayey, very fine-grained sandstone; contacts irregular and only moderately well-defined	
				B:N5E,4NW		@ 33' Grades to yellowish-grey, coarse-grained sandstone and pebbly sandstone; moist to wet with minor seepage below 35 feet	
35						@ 33.5' Uniform, 2" layer of moderate-brown silty sandstone	
				B:N60W,11SW		@ 36' Moderate reddish-brown, silty to clayey sandstone to sandy siltstone; upper contact sharp with only minor channeling	
						@ 38' 12" section very well-cemented sandstone	

DRILL HOLE LOG

BORING NO. BA-1

PROJECT: Panhandle **JOB NO.:** 98-1571

DATE: 4/4/03

DRILLING COMPANY/DRILLER: Tri Valley Drilling

METHOD OF DRILLING/HOLE DIAMETER (in.) Bucket-Auger 24"

HAMMER TYPE: Kelly **AVERAGE DROP (in.):** 18"

DRIVING WEIGHTS: 0-30-3450, 30-60-2050, 60-90-1140

ELEVATION: 1335 **LOGGED BY:** CJS

DEPTH (feet)	SAMPLE TYPE	BLOWS / 6"	GRAPHIC LOG	ATTITUDES	USCS SYMBOL	Description Soils: description; consistency/density; moisture; color; other Bedrock: color, lithology; hardness; moisture; other	Remarks
40		7 29 18				@ 39' Pale yellowish-grey, pebbly sandstone	@40' Dry Density = 127p M/C = 7.1%
						@ 41.5' Reddish-brown, medium-grained, silty sandstone, upper contact is gradational and channeled and is marked by a concretion layer about 8" thick	
45						@ 45' Grades to yellowish-grey pebbly sandstone over a distance of about 10 inches	
						@ 47.5' Thin (1-2") lense of moderate reddish-brown silty sandstone	
						@ 49' Grades very moist to wet	
50		7 24		B:N80W,11SW		@ 50' Moderate reddish-brown fine- to medium-grained silty to clayey sandstone with minor coarse-grained fraction; upper contact sharp and relatively planar.	@50' Dry Density = 129pcf M/C = 9.2%
						@ 52' 24" interbed of yellow-grey, coarse-grained gravelly sandstone; minor disruption of lower contact with numerous rip-up clasts contained within the grey sandstone	
55				B:N59W,7SW		@ 56' Grades slightly more clay	
60						TOTAL DEPTH 60 Feet Seepage in lowermost sections of most all coarse-grained units, with strong seepage at 20 feet near base of terrace Casing set between 5 and 23 feet due to severe caving in friable terrace gravels	
65							
70							
75							

DRILL HOLE LOG

BORING NO. BA-2

PROJECT: Panhandle **JOB NO.:** 98-1571

DATE: 4/4/03

DRILLING COMPANY/DRILLER: Tri Valley Drilling

METHOD OF DRILLING/HOLE DIAMETER (in.) Bucket-Auger 24"

HAMMER TYPE: Kelly **AVERAGE DROP (in.):** 18"

DRIVING WEIGHTS: 0-30-3450, 30-60-2050, 60-90-1140

ELEVATION: 1276 **LOGGED BY:** CJS

DEPTH (feet)	SAMPLE TYPE	BLOWS / 6"	GRAPHIC LOG	ATTITUDES	USCS SYMBOL	Description Soils: description; consistency/density; moisture; color; other Bedrock: color, lithology; hardness; moisture; other	Remarks
						SOIL/COLLUVIUM; (0 - 7 ft.) @ 0' Moderate-reddish-brown, fine- to medium grained silty sand with large cobbles and boulders; dense; damp	
5							
						QUATERNARY TERRACE; Qt (7 - 20 ft.) @ 7' Pale to moderate yellow-brown; fine- to coarse- grained sand and gravel with cobbles; very little cohesion; damp; moderate to severe caving; crowd required to advance through cobbles	
10							
15						@ 17' 18-24" boulders require removal by hand	
20		6 12				BEDROCK/SAUGUS FORMATION; TQs (20 - 95 ft.) Pale grey to pale yellowish-grey, fine- and medium- to coarse-grained, pebbly sandstone interbedded with moderate reddish-brown fine- to very fine-grained, silty to locally clayey sandstone; overall unit is unfractured, moderately hard to hard and damp to wet with minor seepage in the lower sections of isolated, coarse-grained sandstone units	@20' Dry Density = 134pcf M/C = 7.5%
				B:N75E,16SE			
25				B:N82E,10SE			
				B:N87E,13SE		@ 20' Bottom of Plastic Casing - yellowish-grey, medium- to coarse-grained, pebbly sandstone; bedding is defined by subtle textural variations, mineral laminations and pebble lineations.	
				PS:N71E, 22-25SE			
30		11 23				@ 22' Thin interbed of finer-grained, grey sandstone	@30' Dry Density = 128pcf M/C = 11.1%
				B:N74E,14SE		@ 25.5' 6" cemented zone underlain by uniform, fine-grained sandstone; planar contacts continuous around hole without disruption @ 27.5' Grades to moderate reddish-brown, silty to slightly clayey sandstone	
35						@ 29' Poorly defined parting surface in reddish-brown silty to clayey sandstone; surface coated with thin film of clay; no well-defined polish or striations; occurs as very thin discontinuity that can be traced in segments around the hole; no evidence of significant shearing along this surface	

DRILL HOLE LOG

BORING NO. BA-2

PROJECT: Panhandle **JOB NO.:** 98-1571

DATE: 4/4/03

DRILLING COMPANY/DRILLER: Tri Valley Drilling

METHOD OF DRILLING/HOLE DIAMETER (in.) Bucket-Auger 24"

HAMMER TYPE: Kelly **AVERAGE DROP (in.):** 18"

DRIVING WEIGHTS: 0-30-3450, 30-60-2050, 60-90-1140

ELEVATION: 1276 **LOGGED BY:** CJS

DEPTH (feet)	SAMPLE TYPE	BLOWS / 6"	GRAPHIC LOG	ATTITUDES	USCS SYMBOL	Description Soils: description; consistency/density; moisture; color; other Bedrock: color, lithology; hardness; moisture; other	Remarks
40		8 34		B:N68E,13SE		@ 32' 12" interbed of moderate brown, fine-grained sandstone. Grades to yellowish-grey, coarse-grained sandstone and pebbly sandstone; moist to wet with minor seepage below 35 feet	@40' Dry Density = 131pc M/C = 8.6%
				B:N80W,12SW		@ 34.5' Pale yellowish-grey, medium- to coarse-grained, pebbly sandstone	
45				B:N68W,15SW		@ 36' Moderate reddish-brown sandstone @ 39' Grades to pale yellowish-grey sandstone @ 39.5' 2" interbed of moderate reddish-brown sandstone	
				B:N70W,15SW		@ 42.5' Moderate reddish-brown silty sandstone; upper contact sharp with minor channeling; minor seepage just above this contact	
50		9 40		B:N74W,14SW		@ 45' Yellowish-grey pebbly sandstone @ 47.5' Upper boundary of sequence of variegated moderate reddish-brown silty sandstone and pale yellow sandstone; lithologies appear to occur as lenticular packages with all contacts gradational over several inches; upper limits marked by clayey sandstone that is fairly continuous	@50' Dry Density = 131pcf M/C = 9.9%
55						@ 49.5' Uniform reddish-brown silty sandstone with minor coarse-grained fraction; increasing seepage, but still insufficient to flow on wall of boring @ 51' Grades coarser-grained @ 53' 6" concretion; top of gradational zone similar to unit described at 47.5 feet	
60						@ 55' Moderate reddish-brown; fine- to medium-grained silty sandstone with minor coarse-grained fraction @ 58' Grades finer-grained @ 61.5' 8" horizon of slightly higher clay content; no shearing or polished surfaces	@60' Dry Density = 116pc M/C = 12.1%
				B:N83W,13SW		@ 64' Bedding defined by minor textural change	
65						@ 67' Grades to yellowish-grey sandstone	
70						@ 70' Grades pebbly	
				B:N85E,17SE		@ 72.5' 6" horizon of reddish-brown, fine- to medium-grained, silty sandstone; contact sharp; continuous around hole with minor channeling	
75						@ 74.5' 8" cemented zone	
				B:N70W,9SW		@ 77' Thin horizon of fine-grained sandstone; grades downward into pebbly sandstone; harder	

DRILL HOLE LOG

BORING NO. BA-2

PROJECT: Panhandle **JOB NO.:** 98-1571

DATE: 4/4/03

DRILLING COMPANY/DRILLER: Tri Valley Drilling

METHOD OF DRILLING/HOLE DIAMETER (in.) Bucket-Auger 24"

HAMMER TYPE: Kelly **AVERAGE DROP (in.):** 18"

DRIVING WEIGHTS: 0-30-3450, 30-60-2050, 60-90-1140

ELEVATION: 1276 **LOGGED BY:** CJS

DEPTH (feet)	SAMPLE TYPE	BLOWS / 6"	GRAPHIC LOG	ATTITUDES	USCS SYMBOL	Description Soils: description; consistency/density; moisture; color; other Bedrock: color, lithology; hardness; moisture; other	Remarks
80			TQs				
85				B:N84W,16SW		@ 85' Moderate reddish-brown, fine- to medium-grained sandstone; upper contact lightly channeled, gradational over several inches @ 87' Grades slightly clayey	
90						@ 89' Grades less clay	
95						@ 93' Light mottling of pale brown to pale bluish grey	
100						TOTAL DEPTH 95 Feet Isolated minor seepage in lower sections of some coarse-grained bedrock units Casing set bewteen surface and 20 feet due to severe caving in friable terrace gravels Refusal at 95 Feet	
105							
110							
115							

DRILL HOLE LOG

BORING NO. BA-3

PROJECT: Panhandle **JOB NO.:** 98-1571

DATE: 4/4/03

DRILLING COMPANY/DRILLER: Tri Valley Drilling

METHOD OF DRILLING/HOLE DIAMETER (in.) Bucket-Auger 24"

HAMMER TYPE: Kelly **AVERAGE DROP (in.):** 18"

DRIVING WEIGHTS: 0-30-3450, 30-60-2050, 60-90-1140

ELEVATION: 1296 **LOGGED BY:** CJS

DEPTH (feet)	SAMPLE TYPE	BLOWS / 6"	GRAPHIC LOG	ATTITUDES	USCS SYMBOL	Description Soils: description; consistency/density; moisture; color; other Bedrock: color, lithology; hardness; moisture; other	Remarks
						SOIL/COLLUVIUM; (0 - 3 ft.) @ 0' Moderate-reddish-brown, fine- to medium grained silty to clayey sand; dry to damp; loose; porous; numerous hair roots extend to depth of about 6 inches QUATERNARY TERRACE/LANDSLIDE GRABEN BACKFILL; Qt/Qls (3 - 23 ft.) Moderate reddish-brown fine- to coarse-grained, silty to clayey sand with 5 to 15% rounded granitic clasts that range up to about 12" in maximum dimension with 1/2-2 inches typical; very dense; damp @ 5' Grades coarser-grained and greater percentage of gravel @ 9' Cobble zone marks transition to moderate brown, fine- to medium-grained silty to slightly clayey sand with scattered granitic clasts up to about 2 inches maximum dimension with 1/4-1/2 inch typical @ 14' Less silt; color changes to moderate orange-brown; isolated pockets of medium-grained sand	
20		2 3		C:N84E,58SE B:Due East,14S		@ 19' "Terrace" material juxtaposed against pale yellow-brown sandstone across steep dipping fracture that extends from 19 to 23 feet LANDSLIDE DEBRIS; Qls (19 - 66 ft.) Pale grey to pale yellowish-grey, fine- and medium- to coarse-grained, pebbly sandstone interbedded with moderate reddish-brown fine- to very fine-grained, silty to locally clayey sandstone and siltstone; overall unit is lightly to moderately fractured, moderately hard to hard and damp to wet with minor seepage in fractured, coarse-grained sandstone at 56 feet	@19' Dry Density = 122pcf M/C = 13% %Fines = 35
25				B:N70E,16SE B:N70E,17SE		@ 19' Pale yellow-brown; fine- to medium-grained, pebbly sandstone; lightly fractured with fractures oriented approximately parallel to contact with overlying terrace; fractures occur up to about 1 inch wide, and are backfilled with pale brown, silty sand; fractures do not offset bedding features in sandstone @ 21.5' Pebble lineation @ 25' Light-brown to light greyish-brown, very fine- to medium-grained sandstone; upper contact is distinct and continuous around hole without offset; upper six inches excavates very easily, but is not visibly fractured @ 28' Pale yellow, medium- to coarse-grained pebbly	
30				B:N65E,18SE			
35				B:N76W,13SW			

DRILL HOLE LOG

BORING NO. BA-3

PROJECT: Panhandle **JOB NO.:** 98-1571

DATE: 4/4/03

DRILLING COMPANY/DRILLER: Tri Valley Drilling

METHOD OF DRILLING/HOLE DIAMETER (in.) Bucket-Auger 24"

HAMMER TYPE: Kelly **AVERAGE DROP (in.):** 18"

DRIVING WEIGHTS: 0-30-3450, 30-60-2050, 60-90-1140

ELEVATION: 1296 **LOGGED BY:** CJS

DEPTH (feet)	SAMPLE TYPE	BLOWS / 6"	GRAPHIC LOG	ATTITUDES	USCS SYMBOL	Description Soils: description; consistency/density; moisture; color; other Bedrock: color, lithology; hardness; moisture; other	Remarks
40						sandstone, typical clast size ranges 1/2 - 1 inch with individual clasts of Pelona Schist as large as five inches; contact is planar and continuous around boring without offset	
						@ 32' Grades through light greyish brown fine- to medium-grained, silty sandstone; uppermost contact is lightly channeled; lower 24" grades to moderate brown, very fine-grained micaceous sandstone that excavates very easily along steep-dipping fractures that can be traced only over distances of a few inches; fracture surfaces commonly are faintly striated; fractures do not offset lithologic contacts, however, rock between 35 and 37 feet has a disturbed appearance	
45				B:N72E,10SE		@ 37' Moderate reddish-brown, fine- to coarse-grained, silty to clayey sandstone with scattered gravel	
			Qls			@ 38.5' Grades to pale yellow-brown, medium- to coarse- grained, slightly pebbly sandstone	
50				B:N53W,9SW f:N43E,82NW		@ 44' Grades coarser-grained	
						@ 46' Pale yellow grey, fine- to medium-grained sandstone	
55				B:N60E,37SE		@ 49' 6-inch gravel interbed	
						@ 52' Pale yellow-brown, medium- to coarse-grained, pebbly sandstone; several steep-dipping fractures cross contact without offset, fracture tight; adjacent rock excavates easily	
				B:N85E,13SE			
60				f:N25W,83SW		@ 56' 1/4-1 1/2" thick zone of pale-brown, crushed and weathered rock; forms a continuous seam around the boring; adjacent rock within several inches of the feature is soft and excavates easily; no clay or well-developed polished, or striated surfaces; moderate seepage (sufficient just to flow on side of boring) occurs primarily from direction N60W	
				B:Due East,11S			
65				S:N80W,14SW St: S4W			
				SP:N80E,23SE St:S32E		@ 59' Moderate reddish-brown; fine- to medium-grained silty sandstone with minor coarse-grained fraction; contact sharp and planar, and continuous around boring without offset	@66' %Fines=98
				P:N86W,11SW			
				B:N86E,7SE		@ 60' Steep-dipping fractures; tight; adjacent rock excavates easily	
70			TQs			@ 62.5' 8-inch interbed of reddish-brown; clayey siltstone;	
						@ 64' 1" interbed of moderate reddish-brown; clayey siltstone; overall only slightly plastic; upper surface undulatory and unpolished, but lightly striated; fractures noted at 60 feet extend through both clayey interbeds without offset	
				B:N70W,8SW			
75						@ 65.5' 18" zone of moderate reddish-brown very fine-grained silty to clayey sandstone; numerous polished surfaces; many surfaces polished and planar, but not striated; others undulatory and poorly polished, but with clear striations; in most cases, clay occurs	

DRILL HOLE LOG

BORING NO. BA-3

PROJECT: Panhandle **JOB NO.:** 98-1571

DATE: 4/4/03

DRILLING COMPANY/DRILLER: Tri Valley Drilling

METHOD OF DRILLING/HOLE DIAMETER (in.) Bucket-Auger 24"

HAMMER TYPE: Kelly **AVERAGE DROP (in.):** 18"

DRIVING WEIGHTS: 0-30-3450, 30-60-2050, 60-90-1140

ELEVATION: 1296 **LOGGED BY:** CJS

DEPTH (feet)	SAMPLE TYPE	BLOWS / 6"	GRAPHIC LOG	ATTITUDES	USCS SYMBOL	Description Soils: description; consistency/density; moisture; color; other Bedrock: color, lithology; hardness; moisture; other	Remarks
80						as films along thin surfaces, with the exception of a 1/2-1 inch thick seam of highly plastic clay which occurs at a depth of 66 feet; clay seam sampled by driving three rings by hand and collecting a small bag sample; other clay surfaces too thin to sample BEDROCK/SAUGUS FORMATION; TQs (66 - 80 ft.) @ 67.5' Moderate reddish-brown, silty sandstone with minor coarse-grained fraction; contact is distinct and continuous around hole with no offsets; signficant improvement in rock quality @ 72' Grades into pale yellow-brown, medium- to coarse-grained pebbly sandstone; contact is gradational over about 12 inches @ 74' Moderate reddish-brown, fine- to medium-grained, silty sandstone; contact sharp and continuous around hole @ 78' Pale yellow-brown, medium- to coarse-grained sandstone	
85							
90							
95							
100							
105							
110							
115							

TOTAL DEPTH 80 Feet
Moderate seepage at 56 Feet
No Caving

DRILL HOLE LOG

BORING NO. BA-4

PROJECT: Panhandle **JOB NO.:** 98-1571

DATE: 4/4/03

DRILLING COMPANY/DRILLER: Tri Valley Drilling

METHOD OF DRILLING/HOLE DIAMETER (in.) Bucket-Auger 24"

HAMMER TYPE: Kelly **AVERAGE DROP (in.):** 18"

DRIVING WEIGHTS: 0-30-3450, 30-60-2050, 60-90-1140

ELEVATION: 1285 **LOGGED BY:** CJS

DEPTH (feet)	SAMPLE TYPE	BLOWS / 6"	GRAPHIC LOG	ATTITUDES	USCS SYMBOL	Description Soils: description; consistency/density; moisture; color; other Bedrock: color, lithology; hardness; moisture; other	Remarks
5			Qt?			SOIL/COLLUVIUM; (0 - 7 ft.) @ 0' Moderate-reddish-brown, fine- to medium grained silty to clayey sand with scattered pebbles; dry to damp; loose to moderately dense	
10				C:N45W,60SW		QUATERNARY TERRACE/LANDSLIDE GRABEN BACKFILL; Qt/Qls (7 - 23 ft.) Moderate reddish-brown to yellow orange-brown, fine- to coarse-grained, silty sand with scattered pebbles; poorly cemented; damp to moist; at lower contact, unit is juxtaposed against yellowish-grey, sandstone across steep-dipping contact (fracture?) that extends from 11 feet to 14 feet LANDSLIDE DEBRIS; Qls (11 - 106.5 ft.) Pale grey to pale yellowish-grey, fine- and medium- to coarse-grained, pebbly sandstone interbedded with moderate reddish-brown fine- to very fine-grained, silty to locally clayey sandstone and siltstone; overall unit is unfractured to moderately fractured, moderately hard to hard and damp to wet with seepage below approximately 50 feet	
15				B:N80W,14SW			
20				f:N25E,80NW			
25			Qls	B:N75W,11SW f:N8E,81SE		@ 11' Pale yellowish-grey; medium- to coarse-grained, pebbly sandstone; lightly fractured with fractures oriented approximately parallel to contact with overlying terrace; fractures occur up to about 1/2 inch wide, and are backfilled with pale brown, silty sand, fractures do not offset bedding features in sandstone @ 14' 6-inch interbed of uniform, medium- to coarse- grained sandstone @ 16' Sandstone lightly fractured; fractures backfilled with pale brown mixture of sand and carbonate; carbonate also occurs in sandstone as interstitial material in large, pod-shaped areas @ 18' Sandstone grades very pebbly @ 21' Grades downward through 6-inch interbed of light-brown sandstone into moderate reddish-brown, very fine-grained, silty to clayey sandstone and siltstone; contact is crossed by tight fracture without significant offset; fracture pinches closed at 23 feet @ 25' Grades downward into moderate brown, fine-grained, slightly micaceous, silty sandstone; very lightly fractured; fractures thin, tight and backfilled with carbonate @ 29.5' Pale yellow-brown, medium- to coarse-grained, pebbly sandstone; upper 12 to 18 inches very well-cemented and hard; upper contact irregular, however, not obviously offset	
30							
35				B:N85W,10SW			
				SP:N78W,12SW St:S70W			

DRILL HOLE LOG

BORING NO. BA-4

PROJECT: Panhandle **JOB NO.:** 98-1571

DATE: 4/4/03

DRILLING COMPANY/DRILLER: Tri Valley Drilling

METHOD OF DRILLING/HOLE DIAMETER (in.) Bucket-Auger 24"

HAMMER TYPE: Kelly **AVERAGE DROP (in.):** 18"

DRIVING WEIGHTS: 0-30-3450, 30-60-2050, 60-90-1140

ELEVATION: 1285 **LOGGED BY:** CJS

DEPTH (feet)	SAMPLE TYPE	BLOWS / 6"	GRAPHIC LOG	ATTITUDES	USCS SYMBOL	Description Soils: description; consistency/density; moisture; color; other Bedrock: color, lithology; hardness; moisture; other	Remarks
40						across fractures	
				N85W,7SW		@ 32' Grades downward into moderate-brown, very fine- grained, silty sandstone with isolated clayey interbeds 1 to 2 inches thick	
			Qls.			@ 33.5' Pale brown to pale yellow-brown, fine- to medium-grained, slightly pebbly sandstone	
45						@ 35.5' Moderate reddish-brown, very fine-grained, silty to clayey sandstone to siltstone, zone approximately 2 inches below upper contact has sheared/disturbed appearance and is underlain by a polished striated surface, unit grades downward into moderate yellow-brown, medium-coarse-grained sandstone	
						@ 40' Grades pebbly	
50						@ 41.5' 6-inch interbed of moderate yellowish-brown, uniform, medium- to coarse-grained sandstone	
				B:N82W,14SW		@ 45' 6-inch thick lense of moderate reddish-brown, silty sandstone; continuous only around 1/2 of boring	
						@ 48' Significant increase in moisture; seepage sufficient to mix with slough and form a soft paste on the side of the boring, but does not flow	
55						@ 52' 8-inch interbed of moderate-brown to moderate reddish-brown silty sandstone; fractured; rock excavates easily along fractures; fractures cannot be traced visually into underlying sandstone as distinct features, however, sandstone excavates easily along the downward projections of the fractures, and seepage from these areas is noticeably stronger	
				B:Due East,11S			
60						@ 59' Pale yellow-brown to yellow-grey, interbedded fine- to medium-grained, and medium- to coarse-grained sandstone	
						@ 60' Seepage pervasive; sufficient to flow on side of boring	
65				B:N80E,19SE f:N78W,Vert.		@ 65' Moderate reddish-brown, fine- to medium-grained silty sandstone to siltstone; minor caving along steep-dipping fracture; fracture is slightly open with substantial flow of water	
						@ 68' Grades downward into moderate-brown to moderate yellowish-brown, medium- to very coarse-grained pebbly sandstone; locally interbedded with uniform, finer-grained sandstone; fracture noted above continues through this unit, but is not as well-defined as in finer-grained units; overall very hard with bedding poorly defined; lithologies change across gradational contacts	
70							
						@ 71' Grades finer-grained	
75						@ 74' Grades more pebbles	

DRILL HOLE LOG

BORING NO. BA-4

PROJECT: Panhandle **JOB NO.:** 98-1571

DATE: 4/4/03

DRILLING COMPANY/DRILLER: Tri Valley Drilling

METHOD OF DRILLING/HOLE DIAMETER (in.) Bucket-Auger 24"

HAMMER TYPE: Kelly **AVERAGE DROP (in.):** 18"

DRIVING WEIGHTS: 0-30-3450, 30-60-2050, 60-90-1140

ELEVATION: 1285 **LOGGED BY:** CJS

DEPTH (feet)	SAMPLE TYPE	BLOWS / 6"	GRAPHIC LOG	ATTITUDES	USCS SYMBOL	Description Soils: description; consistency/density; moisture; color; other Bedrock: color, lithology; hardness; moisture; other	Remarks
80				B:Due East,11S f:N65W,Vert		@ 79' Moderate-brown to moderate reddish-brown, very fine- to fine-grained sandstone; water flow increases significantly; fracture noted above is well defined and associated with minor caving	
			Qls			@ 81' Grades to medium- to very coarse-grained sandstone and pebbly sandstone; no well-defined bedding, no observed fractures, very well cemented	
85						@ 84' 8-inch interbed of very pebbly sandstone; isolated cobbles	
						@ 85' Grades to about 10-15% clasts, clasts range up to about six inches with 1 to 3 inches common	
90							
95				N82E,13SE		@ 96.5' Bedding vaguely defined by stringers of fine-grained sandstone	
100						@ 102' Moderate reddish-brown, fine- to medium-grained, silty to clayey sandstone with isolated interbeds of greater clay content; contact is channeled	
105				B:N86E,13SE		@ 106.5' 1/2-1 inch interbed of moderate reddish-brown, plastic clay; continuous around boring; surface is polished, but without striations	@106' %Fines = 98
110							
115						TOTAL DEPTH 115 Feet Moderate to heavy seepage beginning at 52 feet Light caving along fractures Cannot log below 106.5 feet due to standing water	

DRILL HOLE LOG

BORING NO. BA-5

PROJECT: Panhandle **JOB NO.:** 98-1571

DATE: 4/4/03

DRILLING COMPANY/DRILLER: Tri Valley Drilling

METHOD OF DRILLING/HOLE DIAMETER (in.) Bucket-Auger 24"

HAMMER TYPE: Kelly **AVERAGE DROP (in.):** 18"

DRIVING WEIGHTS: 0-30-3450, 30-60-2050, 60-90-1140

ELEVATION: 1321 **LOGGED BY:** CJS

DEPTH (feet)	SAMPLE TYPE	BLOWS / 6"	GRAPHIC LOG	ATTITUDES	USCS SYMBOL	Description Soils: description; consistency/density; moisture; color; other Bedrock: color, lithology; hardness; moisture; other	Remarks
						SOIL, s (0 - 12 inches) Moderate brown fine- to medium-grained silty to clayey sand with pebbles, cobbles and boulders; clasts range 1/2" to 12" with 1" to 3" typical; damp; loose to moderately dense	
5	■	5	Qls			LANDSLIDE DEBRIS, Qls (1 - 17 ft.) Moderate yellowish-brown; fine- to medium-grained sandstone with minor coarse-grained fraction and minor clay and silt binder; interstitial carbonate common; isolated pebbles range up to about 3" maximum dimension, with 1/2" to 1" most common; no continuous bedding features; local soft zones; elongate clasts rotated to random orientations; overall moderately dense to dense and damp	@5' Dry Density = 116pcf M/C = 6.1% %Fines = 18
10							
15	■	2 2				@ 14' Mottled moderate reddish-brown and yellow-brown, very fine- to fine-grained; silty to clayey sandstone; overall chaotic structure; numerous randomly oriented, striated, planar surfaces with polish of clay films; no surfaces observed to be continuous for distances greater than about 12 inches; shearing grades stronger in lower 12 inches of unit with increasing clay content; culminates at lower contact in sheared mixture of reddish-brown clayey sand, sand and gravel; contact is irregular with no well-defined slip surface	@15' Dry Density = 112pcf M/C = 18.2% %Fines = 88
20	■	2 8				QUATERNARY TERRACE; Qt (17 - 23 ft.) Pale grey to pale yellowish-grey, fine- and medium- to coarse-grained, silty to locally clayey sandstone and siltstone; overall unit is virtually unfractured, moderately hard to hard and damp to wet with seepage below 29.5 feet	Landslide Debris, Qls (23-57')
25			Qls?			@ 23' Moderate reddish-brown, very fine- to fine-grained, silty to clayey sandstone	@25' Dry Density = 125pcf M/C = 2.6% %Fines = 2
				B?:N87E,14SE		@ 27' Light greyish yellow pebble conglomerate; virtually no matrix and no cementation; unit is entirely clast-supported with clast sizes ranging from about 1/2 to 6"; most commonly clasts range between 1 and 2 inches; upper and lower contacts appear depositional with no shearing or clay gouge; substantial flow of water entering boring primarily from the direction S65W; section of boring supported by this unit has caved to a diameter of approximately 4.5 feet	
				B?:N65W,16SW B:N70W,12SW			
30	■	6 18					@30' Dry Density = 131pcf M/C = 10.4% %Fines = 25
35				B:N83W,14SW		@ 29' Pale yellowish-brown to yellowish-grey, medium- to coarse-grained pebbly sandstone; bedding in sandstone poorly defined by pebble and rare mineral lineations; upper contact marked by 6-inch bed of pale yellowish-grey	
				B:N70E,9SE			

DRILL HOLE LOG

BORING NO. BA-5

PROJECT: Panhandle **JOB NO.:** 98-1571
DATE: 4/4/03
DRILLING COMPANY/DRILLER: Tri Valley Drilling
METHOD OF DRILLING/HOLE DIAMETER (in.) Bucket-Auger 24"
HAMMER TYPE: Kelly **AVERAGE DROP (in.):** 18"
DRIVING WEIGHTS: 0-30-3450, 30-60-2050, 60-90-1140
ELEVATION: 1321 **LOGGED BY:** CJS

DEPTH (feet)	SAMPLE TYPE	BLOWS / 6"	GRAPHIC LOG	ATTITUDES	USCS SYMBOL	Description Soils: description; consistency/density; moisture; color; other Bedrock: color, lithology; hardness; moisture; other	Remarks
40		34 46				sandstone overlying a 2-inch thick bed of moderate reddish-brown silty sandstone @ 37' Pebble lineations @ 38.5' 8-inch interbed of moderate reddish-brown silty sandstone @ 43' 12-inch interbed of uniform, fine- to medium-grained sandstone with vague mineral laminations	@40' Dry Density = 136pcf M/C = 6.8% %Fines = 28
45			Qls?	B:N80E,8SE			
50		6 13		SP:N74W,18SW St:S7W		@ 50' Moderate reddish-brown, very fine-grained silty sandstone; upper contact channeled by very coarse-grained and cobbly material contained in lower 12-18 inches of overlying unit @ 50.5' Planar parting surface with very weak polish and clear striations; adjacent rock excavates easily in some locations; no significant clay gouge or polish @ 51' Grades to yellowish-brown to yellowish-grey fine- to medium-grained sandstone @ 53' Grades pebbly @ 55' Moderate reddish-brown, very fine- to fine-grained silty sandstone with clay interbeds @ 56' 12-inch section of reddish-brown, silty sandstone with series of 1/4-1/2 inch seams of moderate reddish-brown highly plastic clay; numerous undulatory and planar polished surfaces; no clear striations	@50' Dry Density = 131pcf M/C = 10.9% %Fines = 46
55				B:N75E,9SE P:N85W,12SW			
60			TQs			BEDROCK/SAUGUS FORMATION, TQs (57 - 80 ft.) Yellowish-grey, medium- to coarse-grained pebbly sandstone interbedded with moderate reddish-brown, fine-grained silty to locally clayey sandstone and siltstone; overall moderately hard to hard and moist @ 60' Reddish-brown, silty to clayey sandstone grades to moderate yellow-brown, fine- to medium-grained silty sandstone with scattered pebbles @ 62' Grades medium- to coarse-grained and pebbly @ 65' Moderate reddish-brown, very fine- to fine-grained silty sandstone with minor coarse-grained fraction @ 69' Grades downward into moderate yellowish-brown, medium- to coarse-grained pebbly sandstone @ 73' Rising water surface	
65				B:N78E,8SE			
70							
75			NOT LOGGED				

DRILL HOLE LOG

BORING NO. BA-5

PROJECT: Panhandle — JOB NO.: 98-1571

DATE: 4/4/03

DRILLING COMPANY/DRILLER: Tri Valley Drilling

METHOD OF DRILLING/HOLE DIAMETER (in.) Bucket-Auger 24"

HAMMER TYPE: Kelly — AVERAGE DROP (in.): 18"

DRIVING WEIGHTS: 0-30-3450, 30-60-2050, 60-90-1140

ELEVATION: 1321 — LOGGED BY: CJS

DEPTH (feet)	SAMPLE TYPE	BLOWS / 6"	GRAPHIC LOG	ATTITUDES	USCS SYMBOL	Description Soils: description; consistency/density; moisture; color; other Bedrock: color, lithology; hardness; moisture; other	Remarks
80						TOTAL DEPTH 80 Feet Strong seepage beginning at 29.5 feet Severe caving over intervals 17-22 and 27-30 Casing required between 4 and 24 feet	
85							
90							
95							
100							
105							
110							
115							

CLIENT: Newhall Land	JOB NO.: 03-1571-4	**DRILL HOLE LOG**	
PROJECT: Tentative Tract 53425, River Park City of Santa Clarita, California	DATE: 4/4/03		
	LOGGED BY: CJS		
DRILLING COMPANY: Tri-Valley Drilling	DRILLED: 3/18 & 19/02		
DRILLING METHOD: Bucket-Auger (86' Rig)	HOLE DIA: 24"		
HAMMER TYPE: Telescoping Kelly Bar	AVERAGE DROP (in.): 12	**BORING NO.** BA-6	
DRIVING WEIGHTS: 0-27'=3450 lbs.,27-57'=2050 lbs.,57-87'=1140 lbs.,87-115'-1740	ELEVATION: 1416±		

DEPTH (feet)	SAMPLE TYPE	BLOWS / 6"	GRAPHIC LOG	ATTITUDES, DRY DENSITY (pcf)/ MOISTURE CONTENT (%)	USCS SYMBOL	Description Soils: description; consistency/density; moisture; color; other Bedrock: color, lithology; hardness; moisture; other	Remarks
						ARTIFICIAL FILL; af, (0-1.5 ft.) @ 0' Angular fragments of concrete in matrix of light- to medium-brown, fine- to medium-grained silty SAND; fragments range up to about 12" maximum dimension with 1/2" to 4" most common; loose; dry to damp	
		P 1 1		117/10.1			
5		3 3/5"		122/9.7 % Fines=33 Curve D 115/8.4		**TERRACE DEPOSITS; Qt, (1.5-10 ft.)** @ 1.5' Moderate to dark reddish-brown sandy clay with gravel; stiff; moist; granitic clasts range up to about 1-inch	Bulk Sample @ 5'
		2 4	Qt			@ 4' Matrix of very stiff to hard sandy clay and dense sand	Abundant gravel in sampler tip
		4				@ 7' Average clast size increases	Clasts in sampler tip
10						@ 9' Moderate yellow-brown, medium- to coarse grained gravelly sand; maximum observed clast size 24" with 2-6" most common	Changed to "rock bit" at 9:00 a.m., then to coring bucket at 9:20
				B:N66W,12SW B:N80W,13SW		**BEDROCK/SAUGUS FORMATION; TQs, (10-100 ft.)** @ 10' Moderate reddish-brown to moderate yellowish-brown sandy siltstone to silty sandstone; moderately hard; damp; no fractures; upper contact essentially horizontal	No sample attempted
15						@ 12' Several 1/4" seams of pale brown to pale reddish-brown silty clay to clayey silt; all contacts appear gradational; retrieved small bag sample @ 13' - grades more sand	
			TQs			@ 17' Pale yellow-gray, fine- to coarse-grained sandstone; locally very well cemented (limey?); locally pebbly; upper contact slightly undulatory	
20						@ 19.5' Grades coarse- to very coarse-grained	
		6 5/3"				@ 21' Moderate reddish-brown siltstone; upper 8" clayey, but without distinct clay seams; contact strongly channeled; minor seepage from the east side of the hole at upper contact	
				% Fines-33.6 LL=29 PI=6 Curve A			Bulk Sample @ 23'
25							
						@ 26' Pale yellowish-gray, sandstone and pebbly sandstone; contact undulatory and gradational; near upper contact, water "sweats" from all sides of the hole with strongest accumulation on the east side; seepage increases with depth with strong flow in the lowest one to two feet	
30							
		8 23				@ 31' Reddish-brown siltstone; upper contact very low dip and undulatory; no reliable attitude @ 32' - grades more sand	
35				B:N60W,5SW		@ 34' Grades to pale yellow-gray, medium- to coarse-grained sandstone	
						@ 36' Lens of coarse gravel	B: N50W, 5SW
						@ 37' Moderate reddish-brown siltstone; clayey in upper few inches	

CLIENT: Newhall Land		JOB NO.: 03-1571-4	**DRILL HOLE LOG**
PROJECT: Tentative Tract 53425, River Park City of Santa Clarita, California		DATE: 4/4/03	
		LOGGED BY: CJS	
DRILLING COMPANY: Tri-Valley Drilling		DRILLED: 3/18 & 19/02	
DRILLING METHOD: Bucket-Auger (86' Rig)		HOLE DIA: 24"	
HAMMER TYPE: Telescoping Kelly Bar		AVERAGE DROP (in.): 12	**BORING NO.** BA-6
DRIVING WEIGHTS: 0-27'=3450 lbs.,27-57'=2050 lbs.,57-87'=1140 lbs.,87-115'-1740		ELEVATION: 1416±	

DEPTH (feet)	SAMPLE TYPE	BLOWS / 6"	GRAPHIC LOG	ATTITUDES, DRY DENSITY (pcf)/ MOISTURE CONTENT (%)	USCS SYMBOL	Description Soils: description; consistency/density; moisture; color; other Bedrock: color, lithology; hardness; moisture; other	Remarks
40				% Fines = 69.6 Curve B		@ 39' - grades more sand	
	■	8 22					Bulk Sample @ 40'
			TQs			@ 41' Grades to pale yellow-gray, medium- to coarse-grained sandstone and pebbly sandstone	
45							
				B:N75W,10SW		@ 47' 4" interbed of medium-grained sandstone	
50							
	■	13 37/1"					
55							
60							
	■	34 37/1					
				B:N85W,14SW		@ 63' 12" interbed of fine- to medium-grained sandstone	
65							
			TQs				
70							
	■	28/3"		B:N55W, 14SW		@ 70' 2" interbed of reddish-brown silty sandstone; top contact channeled; lower contact gradational; attitude on lower contact	
75							

CLIENT: Newhall Land	JOB NO.: 03-1571-4	**DRILL HOLE LOG**	
PROJECT: Tentative Tract 53425, River Park City of Santa Clarita, California	DATE: 4/4/03		
	LOGGED BY: CJS		
DRILLING COMPANY: Tri-Valley Drilling	DRILLED: 3/18 & 19/02		
DRILLING METHOD: Bucket-Auger (86' Rig)	HOLE DIA: 24"		
HAMMER TYPE: Telescoping Kelly Bar	AVERAGE DROP (in.): 12	**BORING NO.** BA-6	
DRIVING WEIGHTS: 0-27'=3450 lbs.,27-57'=2050 lbs.,57-87'=1140 lbs.,87-115'-1740	ELEVATION: 1416±		

DEPTH (feet)	SAMPLE TYPE	BLOWS / 6"	GRAPHIC LOG	ATTITUDES, DRY DENSITY (pcf)/ MOISTURE CONTENT (%)	USCS SYMBOL	Description Soils: description; consistency/density; moisture; color; other Bedrock: color, lithology; hardness; moisture; other	Remarks
80		65		125/14.2 B:N65W,10SW % Fines=36.4		@ 77.5' 6" of reddish-brown, clayey, sandy mudstone; non-plastic; grades very sandy downward into pebbly sandstone	
85						@ 83' 6" interbed of reddish-brown, clayey siltstone; removed by channel on south side of hole @ 84' 12" rip-up clast of red mudstone	
90						@ 86' 12" interval of very well cemented sandstone	
95		21 50/3"	TQs	118/6.2 % Fines = 17.2		@ 92' Grades very gravelly with cobble-size clasts;	Changed to "rock bit"
100		9 50				Total Depth 100 ft. Minor caving in upper 10 ft. Seepage below 21 ft.	
105							
110							

CLIENT: Newhall Land		JOB NO.: 03-1571-4	**DRILL HOLE LOG**
PROJECT: Tentative Tract 53425, River Park City of Santa Clarita, California		DATE: 4/4/03	
		LOGGED BY: CJS	
DRILLING COMPANY: Tri-Valley Drilling (Dave)		DRILLED: 3/20/02	
DRILLING METHOD: Bucket-Auger (86' Rig)		HOLE DIA: 24"	
HAMMER TYPE: Telescoping Kelly Bar		AVERAGE DROP (in.): 12	**BORING NO.** BA-7
DRIVING WEIGHTS: 0-27'=3450 lbs., 27-57'=2050 lbs., 57-87'=1140 lbs., 87-115=1740		ELEVATION: 1354±	

DEPTH (feet)	SAMPLE TYPE	BLOWS / 6"	GRAPHIC LOG	ATTITUDES, DRY DENSITY (pcf)/ MOISTURE CONTENT (%)	USCS SYMBOL	Description Soils: description; consistency/density; moisture; color; other Bedrock: color, lithology; hardness; moisture; other	Remarks
						SOIL; s, (0-2.5 ft.) @ 0' Moderate yellow-brown, fine-grained, silty sand with isolated cobbles; loose; dry to damp; very porous; isolated roots **TERRACE DEPOSITS; Qt, (2.5-17 ft.)** @ 2.5' Moderate reddish-brown to dark brown, sandy clay with gravel; stiff to very stiff; dry to damp	
		2 5					
5		3 4		122/7.2			
		2 2		114/9.4 % Fines=65		@ 6' Pale yellow-brown, very fine-grained sand	Difficult drilling; changed to "rock bit" (TQs?)
		1 1	CASING	103/3.9 % Fines=11		@ 8' Poorly cemented, medium-grained sand	
10		2 4				@ 10' Coarse-grained, gravelly sand	
						@ 12' Cobbles up to 8" maximum dimension	
15						@ 15' Boulders up to 24"	
				f:Due N,58W		@ 17' Interval from 17 to 19' obscured by casing below casing steep west dipping fracture juxtaposes reddish-brown silty sandstone on east side of hole against light brown to light grayish-brown fine- to medium-grained sandstone on the west; fracture locally tight and lined with pale brown clay; wider section backfilled with coarse rock debris	
20		2 3		% Fines = 14.0 116/8.8 B:N40W,7SW B:N70W,5SW B:N40W,6SW		**BEDROCK/SAUGUS FORMATION; TQs, (17-65 ft.)** @ 17' Pale brown, fine- to medium-grained sandstone; vertical features about 1/8" wide and up to about 12" long, defined by subtle consistency and color differences suggest weathered vertical fractures between 22 and 29'	
25			TQs	(SP?):N65W,10SW B:N60W,10SW % Fines = 74.2 LL=35, PI=13 104/23.5		@ 21' Reddish-brown, silty sandstone; contact truncated by fracture that extends to 22' @ 21.5' Moderate reddish-brown, fine- to medium-grained, clayey sandstone with trace coarse-grained fraction; contact truncated @ 23.5' Grades downward to pale reddish-brown to pale brown, fine- to medium-grained sandstone and silty sandstone	
		2 3				@ 25' 2" interbed of clayey sandstone @ 26' Pale brown, very fine-grained sandstone	
30				% Fines = 97.5 LL=59, PI=36		@ 27.5' 2" interbed of brown, clayey siltstone overlies 6" interbed of well-cemented sandstone @ 28' Reddish-brown, clayey siltstone to clayey sandstone @ 29' 1/4- to 1/2" seam of moderate yellow-brown, plastic clay; continuous around hole; excavates easily along polished planar surface; no well-defined striations; underlain by clayey siltstone	
35						@ 31.5' Reddish-brown, fine- to medium-grained, silty sandstone @ 33' Grades downward into pale yellow-gray, medium-grained, slightly pebbly sandstone; no fractures; moderately hard to hard	
				B:N70W,7SW			

CLIENT: Newhall Land	JOB NO.: 03-1571-4	**DRILL HOLE LOG**	
PROJECT: Tentative Tract 53425, River Park City of Santa Clarita, California	DATE: 4/4/03		
	LOGGED BY: CJS		
DRILLING COMPANY: Tri-Valley Drilling (Dave)	DRILLED: 3/20/02		
DRILLING METHOD: Bucket-Auger (86' Rig)	HOLE DIA: 24"		
HAMMER TYPE: Telescoping Kelly Bar	AVERAGE DROP (in.): 12	**BORING NO.** BA-7	
DRIVING WEIGHTS: 0-27'=3450 lbs., 27-57'=2050 lbs., 57-87'=1140 lbs., 87-115=1740	ELEVATION: 1354±		

DEPTH (feet)	SAMPLE TYPE	BLOWS / 6"	GRAPHIC LOG	ATTITUDES, DRY DENSITY (pcf)/ MOISTURE CONTENT (%)	USCS SYMBOL	Description Soils: description; consistency/density; moisture; color; other Bedrock: color, lithology; hardness; moisture; other	Remarks
40						@ 36' 8" interbed of fine- to medium-grained sandstone @ 37' Grades coarser-grained with greater percentage of larger pebbles	
		11 32		118/8.9		@ 40.5' Moderate reddish-brown silty sandstone	
						@ 43' Grades yellowish-gray; no silt	
45			TQs			@ 45' - grades pebbly	
				B:N55W,10SW		@ 48' Moderate brown to moderate yellow-brown, very fine-grained, clayey sandstone to sandy claystone; hard; no fractures	
50		24 48/4"		129/10.7 B:N70W,8SW		@ 51' Grades to 12" interbed of yellowish-gray, pebbly sandstone	
55						@ 55' Grades medium-grained	
						@ 59' Grades reddish-brown, silty	
60		34 37/1"		113/7.5			
65						Total Depth 65 ft. Severe caving between 10 and 17 feet No Groundwater Logged downhole to 58 ft.	
70							
75							

CLIENT: Newhall Land	JOB NO.: 03-1571-4	**DRILL HOLE LOG**	
PROJECT: Tentative Tract 53425, River Park City of Santa Clarita, California	DATE: 4/4/03		
	LOGGED BY: BJS		
DRILLING COMPANY: Tri-Valley Drilling (Dave)	DRILLED: 3/20/02		
DRILLING METHOD: Bucket-Auger (86' Rig)	HOLE DIA: 24"		
HAMMER TYPE: Telescoping Kelly Bar	AVERAGE DROP (in.): 12	**BORING NO.** BA-8	
DRIVING WEIGHTS: 0-27'=3450 lbs., 27-57'=2050 lbs., 57-87'=1140 lbs., 87-115=1740	ELEVATION: 1320±		

DEPTH (feet)	SAMPLE TYPE	BLOWS / 6"	GRAPHIC LOG	ATTITUDES, DRY DENSITY (pcf)/ MOISTURE CONTENT (%)	USCS SYMBOL	Description Soils: description; consistency/density; moisture; color; other Bedrock: color, lithology; hardness; moisture; other	Remarks
			Soil	113/6.0 % Fines=38		**SOIL; s, (0-4.0 ft.)** @ 0' Yellowish-brown sandy silt with local pebbles; firm; slightly damp; approximately 2% voids @ 1.5' More clayey; very tight	Drilled on Qt3 surface
5	■	4 3 4	Qt			**TERRACE DEPOSITS; Qt, (4.0-20 ft.)** @ 4.5' Gradational contact with yellowish-gray fine silty sand; dense; slightly damp	
	■	3 3 2		130/2.2 B: Horizontal % Fines=10		@ 6' Medium- to coarse-grained sand and pebbly sand with local cobbles; dense but moderately friable; moderate bedding with local laminations	@ 7' Pebbles in sample tip
10						@ 7' Moderate caving due to friable conditions @ 9' Coarse-grained pebbly sand and gravel beds with cobbles and small boulders (matrix locally light yellowish brown silty clayey sand; no caving; lithologically distinct from he upper Qt.)	@ 10' Bucket & crowd @ 10-11.5' Apx. 25% cobbles and boulders @ 13' cobbles and boulders removed by hand
15				Apx.B: Horizontal		@ 15' Matrix slightly orangish-to reddish-brown; palesol?	
20						@ 17' More cobbles; matrix siltier; locally clast supported around cobbles @ 18' - more clay in matrix @ 18.8' 1/32 to 1/2"-thick reddish-brown clay seam; very plastic and moist; clay is irregular around clasts but roughly horizontal overall **BEDROCK; TQs, (20-100 ft.)** @ 20' Erosional contact with light yellowish-gray sandstone and pebbly sandstone; moderately hard; damp to moist; @ 22' Start of very slow seepage from coarse units	
	■	6 17		131/8.8			
25						@ 24' Erosional contact with yellowish-brown, slightly clayey, fine-grained sandy siltstone; rip-up clasts above contact @ 26.5' - grades sandier with pebbles	
30			TQs			@ 28.5' Yellowish-gray slightly silty sandstone @ 29.5' - grades to pebbly sandstone; minor seepage	
	■	15 36		126/8.0 % Fines=28.2		@ 31.5' Erosional contact with pale reddish-brown slightly sandy mudstone; damp	
35						@ 36' Grades into yellowish-gray slightly silty sandstone	

CLIENT: Newhall Land	JOB NO.: 03-1571-4	**DRILL HOLE LOG**	
PROJECT: Tentative Tract 53425, River Park City of Santa Clarita, California	DATE: 4/4/03		
	LOGGED BY: BJS		
DRILLING COMPANY: Tri-Valley Drilling (Dave)	DRILLED: 3/20/02		
DRILLING METHOD: Bucket-Auger (86' Rig)	HOLE DIA: 24"		
HAMMER TYPE: Telescoping Kelly Bar	AVERAGE DROP (in.): 12	**BORING NO.** BA-8	
DRIVING WEIGHTS: 0-27'=3450 lbs., 27-57'=2050 lbs., 57-87'=1140 lbs., 87-115=1740	ELEVATION: 1320±		

DEPTH (feet)	SAMPLE TYPE	BLOWS / 6"	GRAPHIC LOG	ATTITUDES, DRY DENSITY (pcf)/ MOISTURE CONTENT (%)	USCS SYMBOL	Description Soils: description; consistency/density; moisture; color; other Bedrock: color, lithology; hardness; moisture; other	Remarks
						@ 37.5' Yellowish-brown siltstone interbed with small concretions	
40							
		31				@ 40' Yellowish-brown siltstone interbed with small concretions	Drilled to 40' on 4/15/02
						@ 41.5' Light yellowish-gray pebbly sandstone; seepage	
				% Fines=25.8 Curve C			@ 43' Bulk sample
45						@ 44.5' Discontinuous laminations	
						@ 46' Laminations; some low angle cross bedding	
						@ 47' Pebbly sandstone	@ 47'-60' Cobbles & boulders periodically fell into hole from Qt and removed
						@ 48' Erosional contact with pale reddish-brown sandy siltstone with pebbles	
50							
		5 20				@ 50.5' Grades into pebbly sandstone; seepage	
						@ 54' Erosional contact with yellowish-brown siltstone	
55							
			Qs			@ 57' Grades to sandstone/pebbly sandstone; moderately hard to hard; seepage; bedding is typically vague	
60							
		12 40/4"				@ 60' Thin siltstone interbed	
65				B:N80W,12SW			
70							
		21 46/5"					
75						@ 73' Erosional contact with pale reddish-brown siltstone interbedded with fine-grained sandstone and siltstone and local moderate reddish-brown mudstone	

CLIENT: Newhall Land		JOB NO.: 03-1571-4	**DRILL HOLE LOG**
PROJECT: Tentative Tract 53425, River Park City of Santa Clarita, California		DATE: 4/4/03	
		LOGGED BY: BJS	
DRILLING COMPANY: Tri-Valley Drilling (Dave)		DRILLED: 3/20/02	
DRILLING METHOD: Bucket-Auger (86' Rig)		HOLE DIA: 24"	
HAMMER TYPE: Telescoping Kelly Bar		AVERAGE DROP (in.): 12	**BORING NO.** BA-8
DRIVING WEIGHTS: 0-27'=3450 lbs., 27-57'=2050 lbs., 57-87'=1140 lbs., 87-115=1740		ELEVATION: 1320±	

DEPTH (feet)	SAMPLE TYPE	BLOWS / 6"	GRAPHIC LOG	ATTITUDES, DRY DENSITY (pcf)/ MOISTURE CONTENT (%)	USCS SYMBOL	Description Soils: description; consistency/density; moisture; color; other Bedrock: color, lithology; hardness; moisture; other	Remarks
80							
	■	17 55/5"		B:N75W,9SW Sh:N83W,9SW		@ 80' Minor clay @ 82.3' 1/4- to 3/4"-thick moderate reddish-brown plastic clay; rock above and below looks undisturbed; polished surface but no distinct striations	
85						@ 84' Light-gray sandstone @ 86' Light reddish-brown siltstone	@ 87' Stemming (600 lb. stem)
90						@ 89' Light-gray, fine-grained sandstone and silty sandstone	
	■	17 55/5"	TQs			@ 91.3' Standing water; fine-grained sandstone to bottom per surface log of cuttings	
95							@ 94' Crowding, very dense
100							
	■	40				Total Depth 100 ft. (Elev. 1220 ft.) Minor Seepage starting at 22 ft. and progressively increases with depth in coarse units; standing water rose from 94.5 ft. at the completion of drilling to 91.3 ft. at the completion of downhole logging -Moderate Caving from 7 to 11.5 ft.	Backfill Tamped
105							
110							

CLIENT: Newhall Land	JOB NO.: 03-1571-4	**DRILL HOLE LOG**	
PROJECT: Tentative Tract 53425, River Park City of Santa Clarita, California	DATE: 4/4/03		
	LOGGED BY: VCG/DGG		
DRILLING COMPANY: Tri-Valley Drilling (Tony/Mario)	DRILLED: 8/5/02		
DRILLING METHOD: Bucket-Auger (4WD Rig)	HOLE DIA: 24"		
HAMMER TYPE: Telescoping Kelly Bar	AVERAGE DROP (in.): 12	**BORING NO.** BA-9	
DRIVING WEIGHTS: 0-24'=3160 lbs., 24-46'=2040 lbs., 46-72'=1120 lbs.	ELEVATION: 1405±		

DEPTH (feet)	SAMPLE TYPE	BLOWS / 6"	GRAPHIC LOG	ATTITUDES, DRY DENSITY (pcf)/ MOISTURE CONTENT (%)	USCS SYMBOL	Description Soils: description; consistency/density; moisture; color; other Bedrock: color, lithology; hardness; moisture; other	Remarks
						LANDSLIDE DEBRIS; Qls, (0-33 ft.)	Bulk Sample 0-25'
						@ 0' Casing	
						@ 3' Orangish-brown silt to sandy silt/silty sand with scattered pebbles; firm to medium-dense; damp; locally clayey; derived from Quaternary Terrace deposits	@ 3-26' Landslide affected Qt deposits @ 26-33' landslide affected TQs bedrock bedding generally present within upper 26'
5		1 1				@ 5' - soft to firm	
10		1 1 2				@ 10' - Small cobbles	
			Qls			@ 13' Sandy interbeds; friable; discontinuous; vague; irregular	
15		1 2 2					
20		1 1 1					
						@ 23' Large cobbles and 1 to 2 small boulders	@ 22' 24" bucket damaged-change to 18" bucket to continue
25						@ 26' Mottled orangish- and grayish-brown pebbly sandy siltstone/ silty sandstone; moderately hard; damp; Saugus Formation derived	
30		8 10 13				@ 31' Patches of reddish-brown siltstone	
				MF:N49W,23SW SS:N18W,30SW		@ 31.5' Minor fractures/faults lined with CaC03; no gouge	@ 31.5' fractures difficult to trace due to coarse-grained bedrock
35				B:N62W,52NE		@ 33' SLIPSURFACE; Grayish-brown silty sand/sandy silt with minor clay; soft to firm; planar 1/2" thick; unable to get parting; distinct cuts across north dipping "in place" bedrock	
			TQs			**BEDROCK; TQs, (33.1-50 ft.)** @ 33' Mottled orangish-brown pebbly sandy siltstone/silty sandstone; moderately hard; damp	

CLIENT: Newhall Land		JOB NO.: 03-1571-4	**DRILL HOLE LOG**
PROJECT: Tentative Tract 53425, River Park City of Santa Clarita, California		DATE: 4/4/03	
		LOGGED BY: VCG/DGG	
DRILLING COMPANY: Tri-Valley Drilling (Tony/Mario)		DRILLED: 8/5/02	
DRILLING METHOD: Bucket-Auger (4WD Rig)		HOLE DIA: 24"	
HAMMER TYPE: Telescoping Kelly Bar		AVERAGE DROP (in.): 12	**BORING NO.** BA-9
DRIVING WEIGHTS: 0-24'=3160 lbs., 24-46'=2040 lbs., 46-72'=1120 lbs.		ELEVATION: 1405±	

DEPTH (feet)	SAMPLE TYPE	BLOWS / 6"	GRAPHIC LOG	ATTITUDES, DRY DENSITY (pcf)/ MOISTURE CONTENT (%)	USCS SYMBOL	Description Soils: description; consistency/density; moisture; color; other Bedrock: color, lithology; hardness; moisture; other	Remarks
40							
		9 22 bounce		B:N77W,55NE B:N50W,54NE		@ 41.5' Mottled orangish- and grayish-brown siltstone, sandy siltstone and pebbly sandy siltstone; moderately hard to hard; damp	@ 42' New 24" bucket- ream to drilled depth
45			TQs	B:N73W,52NE		@ 47' Minor fault	
50		14 29 10/1"				Total Depth 50 ft. (Elev. 1355±) No Groundwater No Caving	
55							
60							
65							
70							
75							

CLIENT: Newhall Land	JOB NO.: 03-1571-4	**DRILL HOLE LOG**	
PROJECT: Tentative Tract 53425, River Park City of Santa Clarita, California	DATE: 4/4/03		
	LOGGED BY: VCG/DGG		
DRILLING COMPANY: Tri-Valley Drilling (Tony/Mario)	DRILLED: 8/6/02		
DRILLING METHOD: Bucket-Auger (4WD Rig)	HOLE DIA: 24"		
HAMMER TYPE: Telescoping Kelly Bar	AVERAGE DROP (in.): 12	**BORING NO.** BA-10	
DRIVING WEIGHTS: 0-24'=3160 lbs., 24-46'=2040 lbs., 46-72'=1120 lbs.	ELEVATION: 1371±		

DEPTH (feet)	SAMPLE TYPE	BLOWS / 6"	GRAPHIC LOG	ATTITUDES, DRY DENSITY (pcf)/ MOISTURE CONTENT (%)	USCS SYMBOL	Description Soils: description; consistency/density; moisture; color; other Bedrock: color, lithology; hardness; moisture; other	Remarks
						QUATERNARY TERRACE DEPOSITS; Qt, (0-15 ft.)	@ 0-15' Bulk Sample
						@ 0' - Casing	
				B:Horizontal		@ 3' Orangish-brown silt; stiff to very stiff; damp; grades to grayish-brown silt; stiff but locally firm; some scattered pebbles	
5		1 2 4					
			Qt	B:Horizontal		@ 8.5' Pebbly sandy interbed; loose/friable; damp; 3-6" thick @ 9' Olive- to grayish-brown silt to slightly clayey silt; stiff; damp	
10		2 3 3				@ 9.5' Orangish-to grayish-brown pebbly sand; loose/friable; damp; cross-bedded	
				B:Horizontal		@ 11.5' Olive-gray silt; firm; damp; local Fe02 staining; upper contact erosional	
						@ 12.5' Mottled deep orangish-brown, olive and grayish-brown pebbly/ cobbly silty sand/sandy silt; friable; damp	@ 13' Core bucket and crowding
15				B:Horizontal		@ 13' - Boulders	
		4 8 bounce		B:N84E,13SE		**BEDROCK; TQs, (15-50 ft.)** @ 15' Deep orange siltstone; moderately hard to hard; damp; few scattered pebbles	
						@ 16' Pebbly cobbly interbed @ 16.5' Grades to medium-gray to Fe02 stained pebbly sandy siltstone/ silty sandstone; moderately hard; damp	
20						@ 19' Grades to fine-grained sandstone	
		5 13 bounce		XB:N85W,25SW B:N84E,12SE		@ 20.5' Pebble conglomerate with silty sand matrix; some cobbles	
25						@ 24.5' Grayish-brown siltstone; moderately hard; damp	
			TQs	B:N76W,7SW		@ 26' Grades to orangish-brown with scattered pebbles	
						@ 28' Grades to grayish-brown with clayey siltstone/silty claystone interbeds; clay is moderately sticky	
30							
		5 8 8					@ 30' Bulk sample
35							
						@ 36' Orangish- to grayish-brown pebbly silty sandstone/sandy siltstone; moderately hard; damp; locally cobbly	

CLIENT: Newhall Land		JOB NO.: 03-1571-4	**DRILL HOLE LOG**
PROJECT: Tentative Tract 53425, River Park City of Santa Clarita, California		DATE: 4/4/03	
		LOGGED BY: VCG/DGG	
DRILLING COMPANY: Tri-Valley Drilling (Tony/Mario)		DRILLED: 8/6/02	
DRILLING METHOD: Bucket-Auger (4WD Rig)		HOLE DIA: 24"	
HAMMER TYPE: Telescoping Kelly Bar		AVERAGE DROP (in.): 12	**BORING NO.** BA-10
DRIVING WEIGHTS: 0-24'=3160 lbs., 24-46'=2040 lbs., 46-72'=1120 lbs.		ELEVATION: 1371±	

DEPTH (feet)	SAMPLE TYPE	BLOWS / 6"	GRAPHIC LOG	ATTITUDES, DRY DENSITY (pcf)/ MOISTURE CONTENT (%)	USCS SYMBOL	Description Soils: description; consistency/density; moisture; color; other Bedrock: color, lithology; hardness; moisture; other	Remarks
40		9 20 13/2"	TQs	B:N89E,6SE B:N77W,5SW B:N80E,6SE B:N65E,6SE B:N82W,6SW B:N64E,8SE		@ 46' Large cobbles to small boulders	Bulk Sample @ 40
50		40/5"				Total Depth 50 ft. (Elev. 1321±) No Groundwater No Caving	
55							
60							
65							
70							
75							

CLIENT: Newhall Land	JOB NO.: 03-1571-4	**DRILL HOLE LOG**	
PROJECT: Tentative Tract 53425, River Park City of Santa Clarita, California	DATE: 4/4/03		
	LOGGED BY: DGG		
DRILLING COMPANY: Tri-Valley Drilling (Dave/Abel)	DRILLED: 8/16/02		
DRILLING METHOD: Bucket-Auger (86' Rig)	HOLE DIA: 24"		
HAMMER TYPE: Telescoping Kelly Bar	AVERAGE DROP (in.): 12	**BORING NO.** BA-11	
DRIVING WEIGHTS: 0-27'=3450 lbs., 27-57'=2050 lbs., 57-87'=1140 lbs.	ELEVATION: 1245±		

DEPTH (feet)	SAMPLE TYPE	BLOWS / 6"	GRAPHIC LOG	ATTITUDES, DRY DENSITY (pcf)/ MOISTURE CONTENT (%)	USCS SYMBOL	Description Soils: description; consistency/density; moisture; color; other Bedrock: color, lithology; hardness; moisture; other	Remarks
						BEDROCK; TQs, (0-55 ft.)	Bulk Sample @ 0-20'
				B/ctc:N62E,33SE		@ 0' Orangish- to grayish-brown pebbly silty sandstone; moderately hard to hard; damp; moderately friable; very vague bedding @ 2' Grades to less pebbly @ 2.5' Orangish-brown siltstone; moderately hard to hard; damp; locally sandy; contact is erosional	
5		3 5 7				@ 5' Grades to yellowish-gray siltstone to sandy siltstone; moderately hard to hard; damp; vertical caliche-filled fractures; vague bedding	
						@ 8' Discontinuous sandy lenses grading in and out	
10		2 4 5		Apx.B: N72E,17SE		@ 11.5' Scattered pebbles	
15						@ 13.5' Discontinuous pebbly sandstone lens/interbed @ 14' Orangish-brown siltstone @ 14.5' Medium-gray pebbly silty sandstone; moderately hard; damp; moderately friable; vague bedding	
				Apx.B:N88E,22SE		@ 18' Grades coarser; erosional	
20		7 9/3" bounce				@ 19.5'-20.5 - Cobbly	@ 20' Sampler Tip Blocked @ 21' Core bucket
				Apx.B:N77E,17SE Avg.B:N85E,15SE		@ 21' Silty sandstone @ 22' Grades coarser @ 23' Orangish- to grayish-brown interbedded siltstone, sandy siltstone, and pebbly silty sandstone; moderately hard; damp; bedding is well defined	
25						@ 26' Mostly coarse-grained	
30		10 23 31		Apx.f:N20E,80SE		@ 30' Erosional contact	
						@ 31.5' Erosional contact with grayish-brown siltstone; moderately hard to hard; damp @ 32' - Locally sandy @ 33' - Orangish-brown	
35				B:N70E,17SE		@ 37' Reddish-brown clay to silty clay interbed; moderately sticky/	

CLIENT: Newhall Land		JOB NO.: 03-1571-4	**DRILL HOLE LOG**
PROJECT: Tentative Tract 53425, River Park City of Santa Clarita, California		DATE: 4/4/03	
		LOGGED BY: DGG	
DRILLING COMPANY: Tri-Valley Drilling (Dave/Abel)		DRILLED: 8/16/02	
DRILLING METHOD: Bucket-Auger (86' Rig)		HOLE DIA: 24"	
HAMMER TYPE: Telescoping Kelly Bar		AVERAGE DROP (in.): 12	**BORING NO.** BA-11
DRIVING WEIGHTS: 0-27'=3450 lbs., 27-57'=2050 lbs., 57-87'=1140 lbs.		ELEVATION: 1245±	

DEPTH (feet)	SAMPLE TYPE	BLOWS / 6"	GRAPHIC LOG	ATTITUDES, DRY DENSITY (pcf)/ MOISTURE CONTENT (%)	USCS SYMBOL	Description Soils: description; consistency/density; moisture; color; other Bedrock: color, lithology; hardness; moisture; other	Remarks
						plastic; 1-1.5"-thick; no parting/striations	
				Avg.B:N85E,15SE		@ 39' Locally sandy with scattered pebbles	
40		9 20 26					
45				Avg.B:E-W,20S		@ 44.5' Large pebble to cobble interbed; erosional	
50				Avg.B:N70W,15SW		@ 49.5' Grades to grayish-brown pebbly silty sandstone	@ 50' Crowding
		10 21 23/2"					
						@ 52' - less pebbly and sandy	
55							
						Total Depth 55 ft. No Caving No Groundwater	
60							
65							
70							
75							

CLIENT: Newhall Land	JOB NO.: 03-1571-4	**DRILL HOLE LOG**	
PROJECT: Tentative Tract 53425, River Park City of Santa Clarita, California	DATE: 4/4/03		
	LOGGED BY: DGG		
DRILLING COMPANY: Tri-Valley Drilling (Dave/Abel)	DRILLED: 8/19-22/02		
DRILLING METHOD: Bucket-Auger (86' Rig)	HOLE DIA: 24"		
HAMMER TYPE: Telescoping Kelly Bar	AVERAGE DROP (in.): 12	**BORING NO.** BA-12	
DRIVING WEIGHTS: 0-27'=3450 lbs., 27-57'=2050 lbs., 57-87'=1140 lbs.	ELEVATION: 1284		

DEPTH (feet)	SAMPLE TYPE	BLOWS / 6"	GRAPHIC LOG	ATTITUDES, DRY DENSITY (pcf)/ MOISTURE CONTENT (%)	USCS SYMBOL	Description Soils: description; consistency/density; moisture; color; other Bedrock: color, lithology; hardness; moisture; other	Remarks
						QUATERNARY TERRACE DEPOSITS; Qt, (0-29 ft.) @ 0' Orangish- to grayish-brown silt with scattered pebbles; moderatly hard; damp; open burrows	Bulk Sample @ 0-20'
5		3 4 8				@ 6' Silty sand to sand with pebbles, cobbles and boulders; very friable/loose	@ 5' Sampler Tip Blocked @ 7' Core bucket and crowding
10							@ 10' No sample, too cobbly @ 12' Core bucket and crowding
15			Qt			@ 15'-29' - logged from 15 ft.	@ 16' Core bucket and crowding
20							@ 20' No sample, too cobbly
25							@ 26' Grab bucket alternates with core bucketd
30		7 17 23/4"		B:N70W,11SW B:N68W,12SW		**BEDROCK; TQs, (29-115 ft.)** @ 29' Grayish-brown siltstone, silty sandstone and pebbly silty sandstone; moderately hard to hard; damp; local concretions; scattered cobbles	
35			TQs	B:N82W,13SW B:E-W,13S		@ 33.5' Orangish-brown siltstone to sandy siltstone with scattered pebbles; moderately hard to hard; damp @ 33.5' Grades to grayish-brown silty sandstone and coarsens to pebbly silty sandstone and pebbly sandstone with cobbles; moderately hard but friable; damp	

CLIENT: Newhall Land	JOB NO.: 03-1571-4	**DRILL HOLE LOG**	
PROJECT: Tentative Tract 53425, River Park City of Santa Clarita, California	DATE: 4/4/03		
	LOGGED BY: DGG		
DRILLING COMPANY: Tri-Valley Drilling (Dave/Abel)	DRILLED: 8/19-22/02		
DRILLING METHOD: Bucket-Auger (86' Rig)	HOLE DIA: 24"		
HAMMER TYPE: Telescoping Kelly Bar	AVERAGE DROP (in.): 12	**BORING NO.** BA-12	
DRIVING WEIGHTS: 0-27'=3450 lbs., 27-57'=2050 lbs., 57-87'=1140 lbs.	ELEVATION: 1284		

DEPTH (feet)	SAMPLE TYPE	BLOWS / 6"	GRAPHIC LOG	ATTITUDES, DRY DENSITY (pcf)/ MOISTURE CONTENT (%)	USCS SYMBOL	Description Soils: description; consistency/density; moisture; color; other Bedrock: color, lithology; hardness; moisture; other	Remarks
40		7 23 37		B/ctc:N85E,15SE		@ 39.5' Orangish- to reddish-brown siltstone to sandy siltstone with scattered pebbles; moderately hard to hard; damp	
45				B:N80E,14SE		@ 43' Grades to grayish-brown silty sandstone to pebbly silty sandstone with orangish-brown siltstone interbeds	
50				B:N70E,12SE			
55		15 38/4"		B:N77E,13SE			
60		50/6"		B:N85W,13SW			
65				ctc:N80E,24SE		@ 63' Orangish- to reddish-brown siltstone rip-ups @ 64' Orangish- to reddish-brown siltstone; erosional upper contact	
70		40 40/2"		B:N85W,15SW B:N75E,18SE		@ 68' Grades to grayish-brown siltstone, silty sandstone and pebbly silty sandstone; locally concretionary	
75				Avg.B:N75E,17SE		@ 75' Orangish-brown siltstone; moderately hard to hard; damp	

CLIENT: Newhall Land	JOB NO.: 03-1571-4	**DRILL HOLE LOG**	
PROJECT: Tentative Tract 53425, River Park City of Santa Clarita, California	DATE: 4/4/03		
	LOGGED BY: DGG		
DRILLING COMPANY: Tri-Valley Drilling (Dave/Abel)	DRILLED: 8/19-22/02		
DRILLING METHOD: Bucket-Auger (86' Rig)	HOLE DIA: 24"		
HAMMER TYPE: Telescoping Kelly Bar	AVERAGE DROP (in.): 12	**BORING NO.** BA-12	
DRIVING WEIGHTS: 0-27'=3450 lbs., 27-57'=2050 lbs., 57-87'=1140 lbs.	ELEVATION: 1284		

DEPTH (feet)	SAMPLE TYPE	BLOWS / 6"	GRAPHIC LOG	ATTITUDES, DRY DENSITY (pcf)/ MOISTURE CONTENT (%)	USCS SYMBOL	Description Soils: description; consistency/density; moisture; color; other Bedrock: color, lithology; hardness; moisture; other	Remarks
				B:N85W,12SW f:N85W,90°		@ 77.5' Grayish sandy interbed	
80				B:N77E,14SE			
	■	31 40/1"				@ 80' Grades to grayish-brown siltstone, silty sandstone and pebbly silty sandstone	
						@ 83' - moist	
85							
				B:N83W,15SW			
90							
	■	23 40/3"		B:E-W,12S		@ 90' - wet	@ 90' Seeps
95							
				B:N72E,13SE		@ 98' Orangish-brown siltstone	
100				B:N70E,24SE f:N68W,90		@ 100' Orangish- to grayish-brown siltstone to silty sandstone	
				B:N80W,14SW f:N72W,90		@ 103' Grayish-brown silty sandstone interbed	
105				B:N86W,16SW		@ 104.5' Orangish- to reddish-brown siltstone; damp	
	■	13 50					
				B:N72W,17SW			
				B:N70W,15SW		@ 107' Reddish-brown clay to silty clay interbed, sticky/plastic; 1/2-1"-thick; parting on bottom surface, no striations	
110						@ 108' Grades to grayish-brown silty sandstone; moderately hard; moist; grades coarser to bottom	
						Total Depth 115 ft.	

CLIENT: Newhall Land		JOB NO.: 03-1571-4	**DRILL HOLE LOG**
PROJECT: Tentative Tract 53425, River Park City of Santa Clarita, California		DATE: 4/4/03	
		LOGGED BY: DGG	
DRILLING COMPANY: Tri-Valley Drilling (Dave/Abel)		DRILLED: 8/19-22/02	
DRILLING METHOD: Bucket-Auger (86' Rig)		HOLE DIA: 24"	
HAMMER TYPE: Telescoping Kelly Bar		AVERAGE DROP (in.): 12	**BORING NO.** BA-12
DRIVING WEIGHTS: 0-27'=3450 lbs., 27-57'=2050 lbs., 57-87'=1140 lbs.		ELEVATION: 1284	

DEPTH (feet)	SAMPLE TYPE	BLOWS / 6"	GRAPHIC LOG	ATTITUDES, DRY DENSITY (pcf)/ MOISTURE CONTENT (%)	USCS SYMBOL	Description Soils: description; consistency/density; moisture; color; other Bedrock: color, lithology; hardness; moisture; other	Remarks
115						Seep: @ 90 ft. Caving 6-10 ft./12-29 ft. Groundwater @ 113 ft.	
	■	13 55					
120							
125							
130							
135							
140							
145							
150							

CLIENT: Newhall Land		JOB NO.: 03-1571-4	**DRILL HOLE LOG**
PROJECT: Tentative Tract 53425, River Park City of Santa Clarita, California		DATE: 4/4/03	
		LOGGED BY: DGG	
DRILLING COMPANY: Tri-Valley Drilling (Dave/Abel)		DRILLED: 8/23/02	
DRILLING METHOD: Bucket-Auger (86' Rig)		HOLE DIA: 24"	
HAMMER TYPE: Telescoping Kelly Bar		AVERAGE DROP (in.): 12	**BORING NO.** BA-13
DRIVING WEIGHTS: 0-27'=3450 lbs., 27-57'=2050 lbs., 57-87'=1140 lbs.		ELEVATION: 1278	

DEPTH (feet)	SAMPLE TYPE	BLOWS / 6"	GRAPHIC LOG	ATTITUDES, DRY DENSITY (pcf)/ MOISTURE CONTENT (%)	USCS SYMBOL	Description Soils: description; consistency/density; moisture; color; other Bedrock: color, lithology; hardness; moisture; other	Remarks
						BEDROCK; TQs, (0-50 ft.)	Bulk Sample @ 0-20'
						@ 0' Orangish-brown siltstone with scattered pebbles; hard; damp	
5		4 8 14				@ 4' Grades to grayish-brown siltstone to sandy siltstone; hard; damp	
						@ 6.5' - concretionary	
10		4 5 10				@ 10' Orangish- to grayish-brown	
15							
						@ 18.5-20.5' - concretionary	
20		8/4" bounce				@ 20' Gray silty sandstone to pebbly silty sandstone; moderately hard to hard; moderately friable; damp to moist	
							@ 23' Seeps
25				B/ctc:N60W,7SW		@ 25.5' Concretionary; contact with orangish-brown siltstone	
				B:N70W,7SW		@ 27.5' Grayish-brown pebbly cobbly interbed	
30		10 36 bounce				@ 30' Grades to silty sandstone to pebbly silty sandstone	
						@ 32-35.5' - concretionary	
35				B:N80E,8SE			@ 36' Seeps

CLIENT: Newhall Land	JOB NO.: 03-1571-4	**DRILL HOLE LOG**	
PROJECT: Tentative Tract 53425, River Park City of Santa Clarita, California	DATE: 4/4/03		
	LOGGED BY: DGG		
DRILLING COMPANY: Tri-Valley Drilling (Dave/Abel)	DRILLED: 8/23/02		
DRILLING METHOD: Bucket-Auger (86' Rig)	HOLE DIA: 24"		
HAMMER TYPE: Telescoping Kelly Bar	AVERAGE DROP (in.): 12	**BORING NO.** BA-13	
DRIVING WEIGHTS: 0-27'=3450 lbs., 27-57'=2050 lbs., 57-87'=1140 lbs.	ELEVATION: 1278		

DEPTH (feet)	SAMPLE TYPE	BLOWS / 6"	GRAPHIC LOG	ATTITUDES, DRY DENSITY (pcf)/ MOISTURE CONTENT (%)	USCS SYMBOL	Description Soils: description; consistency/density; moisture; color; other Bedrock: color, lithology; hardness; moisture; other	Remarks
				B/ctc: Horizontal		@ 37.5' Reddish- to orangish-brown siltstone	
40		6 12 19					
			TQ			@ 43' Grades to grayish- to orangish-brown	
45						@ 46' Gray silty sandstone to pebbly silty sandstone	
50		13 50				Total Depth 50 ft. Seeps @ 23', 36' Groundwater @ 47' No Caving	
55							
60							
65							
70							
75							

DRILL HOLE LOG

BORING NO. BA-3

PROJECT: Castaic Lake Water Agency — **JOB NO.:** 00-1571C-1
Road Alignment and Development — **DATE:** 3/3/00
DRILLING COMPANY/DRILLER: Tri Valley Drilling
METHOD OF DRILLING/HOLE DIAMETER (in.) Bucket Auger/24"
HAMMER TYPE: Stem — **AVERAGE DROP (in.):** 12"
DRIVING WEIGHTS: 0-28'=3450#, 28-57'=2050#, 57-87'=1140#, Stems (30'=600#)
ELEVATION: 1390 — **LOGGED BY:** VCG

DEPTH (feet)	SAMPLE TYPE	BLOWS / 6"	GRAPHIC LOG	ATTITUDES, DRY DENSITY (pcf)/ MOISTURE CONTENT (%)	USCS SYMBOL	Description Soils: description; consistency/density; moisture; color; other Bedrock: color, lithology; hardness; moisture; other	Remarks
			Qls			LANDSLIDE DEBRIS; Qls (0 - 30 Ft.) @ 0' Jumbled chaotic assemblage of Saugus Formation, Quaternary Terrace material and slopewash lithologies typically composed of fine- to coarse-grained silty pebbly sandstone with isolated cobbles; and medium reddish-brown to light-brown fine- to coarse-grained silty sandstone and sandy siltstone; fractured with downdropped slopewash material; loose to medium dense; damp	@ 4' Bulk Sample
10		1 2 3		118/12.7		@ 10' - with some clay	@ 10' % fines=36.3
						@ 13' - with some clay	@ 13' Bulk Sample % fines=37.5
20		2 2 3		121/9.0			@ 20' % fines=16.4
							@ 23' Kept 11 rings (Can "A" and Can "B")
25						@ 27.8' Seep around entire boring at the base of a pebbly sandstone unit resting upon a silty sandstone unit, very irregular contact	
		2 2 3		119/14.7			
30				SP:N84E,17SE 110/18.9 SP:N74W,9SW		@ 29.5' Seep within fracture @ 30' SLIDE PLANE; Reddish-brown sheared zone approximately 1 foot thick composed of clayey siltstone and silty clay and plastic clay; water seeping from fractured and parting surfaces	@ 30' 4 hand driven rings of the slide plane
						BEDROCK; TQs (31 - 55 Ft.)	
35			TQs			@ 31' Reddish-brown silty sandstone/sandy siltstone; medium dense to dense; damp to moist	@ 34' Bulk Sample (Small Bag)
				B:N77W,9SW		@ 35' Medium- to reddish-brown to gray fine- to coarse-grained silty sandstone and fine- to coarse-grained sandstone	

DRILL HOLE LOG

BORING NO. BA-3

PROJECT: Castaic Lake Water Agency — **JOB NO.:** 00-1571C-1
Road Alignment and Development — **DATE:** 3/3/00
DRILLING COMPANY/DRILLER: Tri Valley Drilling
METHOD OF DRILLING/HOLE DIAMETER (in.) Bucket Auger/24"
HAMMER TYPE: Stem — **AVERAGE DROP (in.):** 12"
DRIVING WEIGHTS: 0-28'=3450#, 28-57'=2050#, 57-87'=1140#, Stems (30'=600#)
ELEVATION: 1390 — **LOGGED BY:** VCG

DEPTH (feet)	SAMPLE TYPE	BLOWS / 6"	GRAPHIC LOG	ATTITUDES, DRY DENSITY (pcf)/ MOISTURE CONTENT (%)	USCS SYMBOL	Description Soils: description; consistency/density; moisture; color; other Bedrock: color, lithology; hardness; moisture; other	Remarks
40						@ 37' Reddish-brown silty sandstone/sandy siltstone; structureless; very dense	
		7 20 37					
45							
				B:N86E,9SE			@ 49' Bulk Sample
50							
55						TOTAL DEPTH 55 Ft. (Elev. 1335) No Caving Seep at 27.8 to 30 Ft. (Elev. 1362.2 - 1360) Slide Plane at 30 Ft. (Elev. 1360)	
60							
65							
70							
75							

DRILL HOLE LOG

BORING NO. BA-4

PROJECT: Castaic Lake Water Agency — **JOB NO.:** 00-1571C-1
Road Alignment and Development — **DATE:** 3/3/00
DRILLING COMPANY/DRILLER: Tri Valley Drilling
METHOD OF DRILLING/HOLE DIAMETER (in.) Bucket Auger/24"
HAMMER TYPE: Stem — **AVERAGE DROP (in.):** 12"
DRIVING WEIGHTS: 0-28'=3450#, 28-57'=2050#, 57-87'=1140#, Stems (30'=600#)
ELEVATION: 1394 — **LOGGED BY:** VCG

DEPTH (feet)	SAMPLE TYPE	BLOWS / 6"	GRAPHIC LOG	ATTITUDES, DRY DENSITY (pcf)/ MOISTURE CONTENT (%)	USCS SYMBOL	Description Soils: description; consistency/density; moisture; color; other Bedrock: color, lithology; hardness; moisture; other	Remarks
						LANDSLIDE DEBRIS; Qls (0 - 29 Ft.)	
						@ 0' Jumbled and discontinuous assemblage of Saugus Formation and Quaternary Terrace lithologies, generally non- bedded, loose to medium dense; within a matrix of fine- to coarse-grained pebbly sandstone	
5						@ 6' Yellowish-tan fine- to coarse-grained pebbly sandstone; loose	
10		2 4 6		119/12.1		@ 10' - with some clay	@ 10' % fines=30.8
15						@ 16' - with some clay	@ 16' Bulk Sample % fines=23.3
20		3 4 7		110/16.9		@ 19' Reddish-brown claystone to siltstone clasts on eastern wall of boring within fine- to coarse-grained sandstone matrix; moist	@ 20' % fines=77.9
25		3 4 8		114/18.1		@ 24' Clayey siltstone @ 24.5' Slip surface reddish-brown silty clay; plastic; 0.5 - 1.0" thick; moist @ 24.5 - 29' Moderately fractured	@ 24.5' Kept all undisturbed rings (Can "A" & Can "B")
30				SP:N25E,30SE 110/14.4 St:29,S55E		@ 29' SLIDE PLANE; Reddish-brown plastic clay; highly striated; 1/8" thick BEDROCK; TQs (29 - 50 Ft.) @ 29' Reddish-brown fine- to medium-grained silty sandstone, sandy siltstone with minor clay; moderately dense to dense; moist; seep @ 29 ft.	@ 29' 4 hand driven ring samples of slide plane LL=51 PI=28
35		10 36 15/ 1"				@ 35' Gray fine- to coarse-grained pebbly sandstone; very dense	

DRILL HOLE LOG

BORING NO. BA-5

PROJECT: Castaic Lake Water Agency — JOB NO.: 00-1571C-1
Road Alignment and Development — DATE: 3/3/00
DRILLING COMPANY/DRILLER: Tri Valley Drilling
METHOD OF DRILLING/HOLE DIAMETER (in.) Bucket Auger/24"
HAMMER TYPE: Stem — AVERAGE DROP (in.): 12"
DRIVING WEIGHTS: 0-28'=3450#, 28-57'=2050#, 57-87'=1140#, Stems (30'=600#)
ELEVATION: 1360 — LOGGED BY: VCG

DEPTH (feet)	SAMPLE TYPE	BLOWS / 6"	GRAPHIC LOG	ATTITUDES, DRY DENSITY (pcf)/ MOISTURE CONTENT (%)	USCS SYMBOL	Description Soils: description; consistency/density; moisture; color; other Bedrock: color, lithology; hardness; moisture; other	Remarks
0			S/SW			SOIL/SLOPEWASH; s/sw (0 - 5 Ft.)	Drilled and logged 9/17/99
						@ 0' Reddish- to medium brown fine- to coarse-grained silty sandstone with isolated pebbles and cobbles; loose to medium dense; dry	
5			Qls			LANDSLIDE DEBRIS; Qls (5 - 11 Ft.)	
						@ 5' Yellowish-tan mottled with reddish-brown silty sandstone/sandy siltstone; vertical fractures; generally discontinuous, jumbled and chaotic; loose to medium dense	@ 7' Bulk Sample
						@ 7' - with some clay	% fines=25.5
10		2 3 4		115/17.0		@ 10' - yellowish-brown claystone	@ 10' % fines=81.0
				Sp:N55W,7SW		@ 11' SLIDE PLANE; Reddish-brown siltstone with clay; moist; faint striations	
						BEDROCK; TQs, (11 - 49 Ft.)	
15			TQs			@ 11' Reddish-brown fine- to medium-grained sandstone and pebbly sandstone; moderately dense to dense; damp	
						@ 13' Grades to a yellowish-tan fine- to coarse-grained sandstone wtih parallel laminations and cross beds with pebble stringers	
20		6 13 20/ 4"		B:N77E,7SE 131/9.9		@ 21' Reddish-brown silty sandstone/sandy siltstone with minor clay; very dense	
				B:N62W,8SW			
25							
				B:N79W,11SW		@ 28' Grades to yellowish-tan fine- to coarse-grained sandstone and pebbly sandstone with pebble conglomerate lenses; moist; very dense	
30		10 28 40/ 4"		133/8.6			
						@ 32' Scattered cobbles	
35						@ 35' Minor seep	@ 35' Bulk Sample

DRILL HOLE LOG

BORING NO. BA-5

PROJECT: Castaic Lake Water Agency — **JOB NO.:** 00-1571C-1
Road Alignment and Development — **DATE:** 3/3/00
DRILLING COMPANY/DRILLER: Tri Valley Drilling
METHOD OF DRILLING/HOLE DIAMETER (in.) Bucket Auger/24"
HAMMER TYPE: Stem — **AVERAGE DROP (in.):** 12"
DRIVING WEIGHTS: 0-28'=3450#, 28-57'=2050#, 57-87'=1140#, Stems (30'=600#)
ELEVATION: 1360 — **LOGGED BY:** VCG

DEPTH (feet)	SAMPLE TYPE	BLOWS / 6"	GRAPHIC LOG	ATTITUDES, DRY DENSITY (pcf)/ MOISTURE CONTENT (%)	USCS SYMBOL	Description Soils: description; consistency/density; moisture; color; other Bedrock: color, lithology; hardness; moisture; other	Remarks
40						@ 41-45'Used coring bucket	
45		6 20 42		B:N68W,7SW		@ 45' Reddish-brown sandy siltstone with minor clay and silty sandstone; very dense; damp	
50						TOTAL DEPTH 49 Ft. (Elev. 1311) No Caving Seep @ 35 Ft. (Elev. 1325) Slide Plane @ 11 Ft. (Elev. 1349)	
55							
60							
65							
70							
75							

DRILL HOLE LOG

BORING NO. BA-6

PROJECT: Castaic Lake Water Agency — Road Alignment and Development
JOB NO.: 00-1571C-1
DATE: 3/3/00
DRILLING COMPANY/DRILLER: Tri Valley Drilling
METHOD OF DRILLING/HOLE DIAMETER (in.) Bucket Auger/24"
HAMMER TYPE: Stem
AVERAGE DROP (in.): 12"
DRIVING WEIGHTS: 0-28'=3450#, 28-57'=2050#, 57--87'=1140#, Stems (30'-600#)
ELEVATION: 1399
LOGGED BY: VCG

DEPTH (feet)	SAMPLE TYPE	BLOWS / 6"	GRAPHIC LOG	ATTITUDES, DRY DENSITY (pcf)/ MOISTURE CONTENT (%)	USCS SYMBOL	Description Soils: description; consistency/density; moisture; color; other Bedrock: color, lithology; hardness; moisture; other	Remarks
						BEDROCK; Qt (0 - 15 Ft.)	Surface log Started drilling at 7:00 a.m.
						@ 0' Light reddish-brown fine- to coarse-grained pebbly cobbly sandstone and conglomerate; loose to moderately dense to dense; dry to damp	Refusal at 2:00 p.m.
5						@ 6' Cobble conglomerate	
						@ 8-15' Used coring bucket and the rock pick-up buckets	@ 8-14' very difficult drilling
10							@ 13' Bulk Sample
15						TOTAL DEPTH 15 Ft. (Elev. 1384) No Ground Water Caving from 9 - 13 Ft. (Elev. 1390-1386) Refusal at 15 Ft.	
20							
25							
30							
35							

DRILL HOLE LOG

BORING NO. BA-7

PROJECT: Castaic Lake Water Agency — **JOB NO.:** 00-1571C-1
Road Alignment and Development — **DATE:** 3/3/00
DRILLING COMPANY/DRILLER: Tri Valley Drilling
METHOD OF DRILLING/HOLE DIAMETER (in.) Bucket Auger/24"
HAMMER TYPE: Stem — **AVERAGE DROP (in.):** 12"
DRIVING WEIGHTS: 0-28'=3450#, 28-57'=2050#, 57-87'=1140#, Stems (30'-600#)
ELEVATION: 1442 — **LOGGED BY:** VCG

DEPTH (feet)	SAMPLE TYPE	BLOWS / 6"	GRAPHIC LOG	ATTITUDES, DRY DENSITY (pcf)/ MOISTURE CONTENT (%)	USCS SYMBOL	Description Soils: description; consistency/density; moisture; color; other Bedrock: color, lithology; hardness; moisture; other	Remarks
						SURFACE CASING (0 - 2 Ft.)	Drilled on 9/20/99
						BEDROCK; TQs (0 - 67 Ft.)	
						@ 2' Light reddish-brown fine- to coarse-grained pebbly sandstone with minor silt; stratified, dry to damp; moderately dense to dense; steeply inclined fractures oriented down slope (parallel to topography) fractures lined with carbonate	
5						@ 6' Tan to light brown	
			TQs	B:N58E,8SE apx		@ 8' Medium- to coarse-grained pebbly sandstone	
10		4 8 11				@ 10' Fine- to coarse-grained sandstone; very dense	@ 10' Bulk Sample
						@ 13' Grades to pebble conglomerate	
15				B:N88W,9SW		@ 15' Fine- to coarse-grained sandstone and pebbly sandstone	
20		4 7 11				@ 20' Reddish-brown; very dense	
				B:N70E,9SE ex.		@ 23.5' Fine- to medium-grained silty sandsotne	
25						@ 25' Grades to light brown fine- to coarse-grained sandstone	@ 25' Bulk Sample
						@ 27' Pebbly sandstone; non-bedded	
30		7 17 33				@ 31.5' Tan to light reddish-brown pebble conglomerate and pebbly sandstone; very dense	
						@ 33.4' Fine- to medium-grained silty sandstone, erosional contact with upper pebbly sandstone unit	
35				B:N77E,7SE		@ 36' Sandstone interbed @ 38' Silty sandstone/sandy siltstone with minor clay, upper contact erosional with pebbly sandstone unit	

DRILL HOLE LOG

BORING NO. BA-7

PROJECT: Castaic Lake Water Agency — JOB NO.: 00-1571C-1
Road Alignment and Development — DATE: 3/3/00
DRILLING COMPANY/DRILLER: Tri Valley Drilling
METHOD OF DRILLING/HOLE DIAMETER (in.) Bucket Auger/24"
HAMMER TYPE: Stem — AVERAGE DROP (in.): 12"
DRIVING WEIGHTS: 0-28'=3450#, 28-57'=2050#, 57-87'=1140#, Stems (30'-600#)
ELEVATION: 1442 — LOGGED BY: VCG

DEPTH (feet)	SAMPLE TYPE	BLOWS / 6"	GRAPHIC LOG	ATTITUDES, DRY DENSITY (pcf)/ MOISTURE CONTENT (%)	USCS SYMBOL	Description Soils: description; consistency/density; moisture; color; other Bedrock: color, lithology; hardness; moisture; other	Remarks
40						@ 39' Fine- to coarse-grained sandstone and pebbly sandstone; very dense	
		4 13 19					
				B:N60E,6SE			
45						@ 45.5' Reddish-brown fine- to medium-grained sandy siltstone/silty sandstone	
						@ 46.5' Grades to light brown fine- to coarse-grained sandstone	
50						@ 49.5' Minor seep	
						@ 49.6' Grades back to sandy siltstone/silty sandstone	
				B:N52E,8SE			
		3 7 10				@ 52' - dense	@ 52' Bulk Sample
		5				@ 54' Reddish-brown plastic clay 1-1.5" thick	@ 54' Kept all undisturbed California drive rings
55		11 21		B:N79E,8SE			
						@ 57' Light reddish-brown sandstone and pebble sandstone	@ 54' 4 hand driven ring samples
60						@ 60' Fine- to medium-grained silty sandstone with minor clay, very dense	LL=50 PI=28
65		36 180		B:N61E,8SE			
70						TOTAL DEPTH 70 Ft. (Elev. 1372) Minor Seep at 49.5 Ft. (Elev. 1392.5) No Caving	
75							

DRILL HOLE LOG

BORING NO. RW-1

PROJECT: Valencia Company — JOB NO.: 00-1571-1
Panhandle — DATE: 8/24/00
DRILLING COMPANY/DRILLER: Valley Well Drilling — 4/4/03 Rev.
METHOD OF DRILLING/HOLE DIAMETER (in.) Rotary Wash Boring (6")
HAMMER TYPE: Downhole — AVERAGE DROP (in.): 30"
DRIVING WEIGHTS: 140 lbs.
ELEVATION: 1204 — LOGGED BY: JML

DEPTH (feet)	SAMPLE TYPE	BLOWS / 6"	GRAPHIC LOG	ATTITUDES, DRY DENSITY (pcf)/ MOISTURE CONTENT (%)	USCS SYMBOL	Description Soils: description; consistency/density; moisture; color; other Bedrock: color, lithology; hardness; moisture; other	Remarks
						QUATERNARY ALLUVIUM; Qal (0 - 25 Ft.)	Excavated and logged on 3/21/00
		9 16 20		103/14.9	SP	3' Poorly graded sand, medium dense, damp, brownish-gray	
5		10 18 25		117/9.0	SW	@ 5' Well-graded sand with gravel, medium dense, moist, brownish-gray	
		26 40 50/ 2"		114/14.4		@ 8' - dense	% fines=3.0
10		27 42 50/ 2"		122/12.6		@ 10' - dense	% fines=3.8
15		14 18 22			GW-GM	@ 15' Well graded sandy gravel with silt, dense, very moist, grayish-brown	% fines=6.1
20		18 35 50				@ 20' - very dense	% fines=5.7
25		25 30 32			SP	@ 25' Well graded sand with gravel, very dense, very moist, grayish-brown	% fines=10.0
						TOTAL DEPTH 25 Ft. (Elev. 1179) Ground Water @ 14'3" (Elev. 1189.8) No Caving	
30							
35							

DRILL HOLE LOG

BORING NO. RW-2

PROJECT: Valencia Company — **JOB NO.:** 00-1571-1
Panhandle — **DATE:** 8/24/00
DRILLING COMPANY/DRILLER: Valley Well Drilling — 4/4/03 Rev.
METHOD OF DRILLING/HOLE DIAMETER (in.) Rotary Wash Boring (6")
HAMMER TYPE: Downhole — **AVERAGE DROP (in.):** 30"
DRIVING WEIGHTS: 140 lbs.
ELEVATION: 1192 — **LOGGED BY:** JML

DEPTH (feet)	SAMPLE TYPE	BLOWS / 6"	GRAPHIC LOG	ATTITUDES, DRY DENSITY (pcf)/ MOISTURE CONTENT (%)	USCS SYMBOL	Description Soils: description; consistency/density; moisture; color; other Bedrock: color, lithology; hardness; moisture; other	Remarks
						QUATERNARY ALLUVIUM; Qal (0 - 50 Ft.)	Excavated and logged on 3/21/00
		5 5 3		117/12.9	SC	@ 2' Clayey sand, loose, very moist, brown	
5		5 8 10		120/12.4			
		6 7 7		120/13.3			
10		9 17 20		121/13.4	SM	@ 10' Silty sand, medium dense, very moist, brown.	% fines=27.9
15		7 7 7		107/21.4	SC	@ 15' Clayey sand, loose; very moist to wet, brown	% fines=47.6
20		5 8 14				@ 20' Clayey sand, medium dense, very moist to wet, brown	% fines=32.0
25		6 18 10				@ 25' - with gravel	% fines=30.5
30		6 11 22					% fines=30.8
35		7 16 20			SM-SC	@ 35' Clayey to silty sand, dense, very moist, brown	% fines=25.4

DRILL HOLE LOG

BORING NO. RW-2

PROJECT: Valencia Company — JOB NO.: 00-1571-1
Panhandle — DATE: 8/24/00
DRILLING COMPANY/DRILLER: Valley Well Drilling — 4/4/03 Rev.
METHOD OF DRILLING/HOLE DIAMETER (in.) Rotary Wash Boring (6")
HAMMER TYPE: Downhole — AVERAGE DROP (in.): 30"
DRIVING WEIGHTS: 140 lbs.
ELEVATION: 1192 — LOGGED BY: JML

DEPTH (feet)	SAMPLE TYPE	BLOWS / 6"	GRAPHIC LOG	ATTITUDES, DRY DENSITY (pcf)/ MOISTURE CONTENT (%)	USCS SYMBOL	Description Soils: description; consistency/density; moisture; color; other Bedrock: color, lithology; hardness; moisture; other	Remarks
40							
		12 20 35			SM	@ 40' Silty sand, very dense, very moist, light grayish-brown	% fines=22.8
45							
		18 38 44				@ 45' - light brownish gray	% fines=22.4
50							
		50/ 4"				@ 50' - light grayish-brown TOTAL DEPTH 50 Ft. (Elev. 1142) Ground Water @ 14'6" (Elev. 1177.5) No Caving	
55							
60							
65							
70							
75							

DRILL HOLE LOG

BORING NO. RW-3

PROJECT: Valencia Company — JOB NO.: 00-1571-1
Panhandle — DATE: 8/24/00
DRILLING COMPANY/DRILLER: Valley Well Drilling — 4/4/03 Rev.
METHOD OF DRILLING/HOLE DIAMETER (in.) Rotary Wash Boring (6")
HAMMER TYPE: Downhole — AVERAGE DROP (in.): 30"
DRIVING WEIGHTS: 140 lbs.
ELEVATION: 1192 — LOGGED BY: JML

DEPTH (feet)	SAMPLE TYPE	BLOWS / 6"	GRAPHIC LOG	ATTITUDES, DRY DENSITY (pcf)/ MOISTURE CONTENT (%)	USCS SYMBOL	Description Soils: description; consistency/density; moisture; color; other Bedrock: color, lithology; hardness; moisture; other	Remarks
						ARTIFICIAL FILL; Qal (0 - 7 Ft.)	Excavated and logged on 3/22/00
		22 44 50/ 2"		131/8.0	SC	@ 3' Clayey sand, very dense, moist, brown	
5		10 11 12		125/7.6		@ 5' - with some gravel, medium dense	
		10 14 20				QUATERNARY ALLUVIUM; Qal (7 - 50 Ft.) @ 7' Clayey sand with some gravel, medium dense, moist, brown	% fines=33.0
10							
		24 35 45		133/5.3	SM	@ 11' Silty sand with gravel, dense, moist, brown	% fines=14.7
15		10 11 10				@ 15' - medium dense	% fines=17.6
20		16 18 28		120/6.9			% fines=15.5
25		10 10 11					% fines=17.8
30		38 24 16				@ 30' - dense	
35		10 6 9			CL	@ 35' Sandy lean clay, stiff, very moist, reddish-brown	% fines=64.4

DRILL HOLE LOG

BORING NO. RW-3

PROJECT: Valencia Company — JOB NO.: 00-1571-1
Panhandle — DATE: 8/24/00
DRILLING COMPANY/DRILLER: Valley Well Drilling — 4/4/03 Rev.
METHOD OF DRILLING/HOLE DIAMETER (in.) Rotary Wash Boring (6")
HAMMER TYPE: Downhole — AVERAGE DROP (in.): 30"
DRIVING WEIGHTS: 140 lbs.
ELEVATION: 1192 — LOGGED BY: JML

DEPTH (feet)	SAMPLE TYPE	BLOWS / 6"	GRAPHIC LOG	ATTITUDES, DRY DENSITY (pcf)/ MOISTURE CONTENT (%)	USCS SYMBOL	Description Soils: description; consistency/density; moisture; color; other Bedrock: color, lithology; hardness; moisture; other	Remarks
40		6 12 36				@ 40' - hard	% fines=60.8
45		50/ 4"			SC	@ 45' Clayey sand with some gravel, very dense, very moist, light brown	% fines=24.4
50		50/ 3"				TOTAL DEPTH 50 Ft. (Elev. 1142) Ground Water @ 26'6" (Elev. 1165.5) No Caving	
55							
60							
65							
70							
75							

DRILL HOLE LOG

BORING NO. RW-4

PROJECT: Valencia Company — JOB NO.: 00-1571-1
Panhandle — DATE: 8/24/00
DRILLING COMPANY/DRILLER: Valley Well Drilling — 4/4/03 Rev.
METHOD OF DRILLING/HOLE DIAMETER (in.) Rotary Wash Boring (6")
HAMMER TYPE: Downhole — AVERAGE DROP (in.): 30"
DRIVING WEIGHTS: 140 lbs.
ELEVATION: 1194 — LOGGED BY: JML

DEPTH (feet)	SAMPLE TYPE	BLOWS / 6"	GRAPHIC LOG	ATTITUDES, DRY DENSITY (pcf)/ MOISTURE CONTENT (%)	USCS SYMBOL	Description Soils: description; consistency/density; moisture; color; other Bedrock: color, lithology; hardness; moisture; other	Remarks
						QUATERNARY ALLUVIUM; Qal (0 - 50 Ft.)	Excavated and logged on 3/23/00
		9 8 10		109/8.1	SM	@ 2' Silty sand of organic particle, loose, moist, very dark grayish-brown	
5		3 5 6		100/22.6	ML	@ 4' Sandy silt with organic particles, stiff, very moist, very dark grayish-brown	
		9 10 12		116/8.2	SM	@ 7' Silty sand with organic particles, medium dense, very moist, very dark grayish-brown	
10		9 10 13		110/115			
15		3 5 7		105/20.7	CL	@ 15' Lean clay, stiff, very moist, dark grayish-brown	% fines=60.4
20		5 7 10				@ 20' - with sand, very stiff	% fines=52.4
25		3 5 10				@ 25' - with sand, stiff	% fines=80.8
30		4 6 10				@ 30' - very stiff	% fines=60.0
35		5 6 9				@ 35' - More sandy and very stiff	% fines=56.4

DRILL HOLE LOG

BORING NO. RW-4

PROJECT: Valencia Company — JOB NO.: 00-1571-1
Panhandle — DATE: 8/24/00
DRILLING COMPANY/DRILLER: Valley Well Drilling — 4/4/03 Rev.
METHOD OF DRILLING/HOLE DIAMETER (in.) Rotary Wash Boring (6")
HAMMER TYPE: Downhole — AVERAGE DROP (in.): 30"
DRIVING WEIGHTS: 140 lbs.
ELEVATION: 1194 — LOGGED BY: JML

DEPTH (feet)	SAMPLE TYPE	BLOWS / 6"	GRAPHIC LOG	ATTITUDES, DRY DENSITY (pcf)/ MOISTURE CONTENT (%)	USCS SYMBOL	Description Soils: description; consistency/density; moisture; color; other Bedrock: color, lithology; hardness; moisture; other	Remarks
40							
		7 14 22			SC	@ 40' Clayey sand, medium dense, very moist, grayish-brown	% fines=25.4
45							
		7 12 16				@ 45' - with some gravel	% fines=36.8
50							
		24 28 38			SW-SM	@ 50' Well graded sand with silt and gravel, very dense, very moist, brownish-gray	% fines=24.4
						TOTAL DEPTH 50 Ft. (Elev. 1194) Ground Water @ 15 Ft. (Elev. 1179) No Caving	
55							
60							
65							
70							
75							

DRILL HOLE LOG

BORING NO. RW-5

PROJECT: Valencia Company — JOB NO.: 00-1571-1
Panhandle — DATE: 8/24/00
DRILLING COMPANY/DRILLER: Valley Well Drilling — 4/4/03 Rev.
METHOD OF DRILLING/HOLE DIAMETER (in.) Rotary Wash Boring (6")
HAMMER TYPE: Downhole — AVERAGE DROP (in.): 30"
DRIVING WEIGHTS: 140 lbs.
ELEVATION: 1187 — LOGGED BY: JML

DEPTH (feet)	SAMPLE TYPE	BLOWS / 6"	GRAPHIC LOG	ATTITUDES, DRY DENSITY (pcf)/ MOISTURE CONTENT (%)	USCS SYMBOL	Description Soils: description; consistency/density; moisture; color; other Bedrock: color, lithology; hardness; moisture; other	Remarks
						ARTIFICIAL FILL; af (0 - 8 Ft.)	Excavated and logged on 3/24/00
		19 28 30		121/9.2	SM-SC	@ 3' Clayey to silty sand with some gravel, dense, moist, brown to grayish-brown	
5		19 28 32		131/7.9	SC	@ 5' Clayey sand with some gravel, dense, moist, brown to dark grayish-brown	
		10 11 14		107/12.2	SM/ML	QUATERNARY ALLUVIUM; Qal (8 - 50 Ft.) @ 8' Silty sand to sandy silt, medium dense to very stiff, very moist, dark grayish-brown	
10		10 11 15		108/12.0			% fines=51.2
15		7 12 8					% fines= 36
20		11 13 15				@ 20' No Recovery	
		10 17 18		101/22.2		@ 22' Silty sand to sandy silt, medium dense to very stiff, very moist, dark grayish-brown ▽	
25		5 7 10				@ 25' - very stiff, very moist, dark, grayish-brown	% fines=52.8
30		32 40 42			SM	@ 30' Silty sand, very dense, very moist, dark grayish-brown	% fines=16.3
35		19 28 32			SP-SM	@ 35' Poorly graded sand with silt and gravel, very dense, very moist, brownish-gray	% fines=12.5

DRILL HOLE LOG

BORING NO. RW-5

PROJECT: Valencia Company — JOB NO.: 00-1571-1
Panhandle — DATE: 8/24/00
DRILLING COMPANY/DRILLER: Valley Well Drilling — 4/4/03 Rev.
METHOD OF DRILLING/HOLE DIAMETER (in.) Rotary Wash Boring (6")
HAMMER TYPE: Downhole — AVERAGE DROP (in.): 30"
DRIVING WEIGHTS: 140 lbs.
ELEVATION: 1187 — LOGGED BY: JML

DEPTH (feet)	SAMPLE TYPE	BLOWS / 6"	GRAPHIC LOG	ATTITUDES, DRY DENSITY (pcf)/ MOISTURE CONTENT (%)	USCS SYMBOL	Description Soils: description; consistency/density; moisture; color; other Bedrock: color, lithology; hardness; moisture; other	Remarks
40							
		32 42 46			SM	@ 40' Silty sand with gravel, very dense, very moist, brownish-gray	% fines=13.6
45							
		20 42 48			ML	@ 45' Sandy silt, very hard, very moist, grayish-brown	% fines=60.3
50							
		10 14 38				@ 50' Sandy silt, hard, very moist, grayish-brown TOTAL DEPTH 50 Ft. (Elev. 1137) Ground Water @ 23'9" (Elev. 1163.3) No Caving	
55							
60							
65							
70							
75							

DRILL HOLE LOG

BORING NO. RW-6

PROJECT: Valencia Company — JOB NO.: 00-1571-1
Panhandle — DATE: 8/24/00
DRILLING COMPANY/DRILLER: Valley Well Drilling — 4/4/03 Rev.
METHOD OF DRILLING/HOLE DIAMETER (in.) Rotary Wash Boring (6")
HAMMER TYPE: Downhole — AVERAGE DROP (in.): 30"
DRIVING WEIGHTS: 140 lbs.
ELEVATION: 1177 — LOGGED BY: DGG

DEPTH (feet)	SAMPLE TYPE	BLOWS / 6"	GRAPHIC LOG	ATTITUDES, DRY DENSITY (pcf)/ MOISTURE CONTENT (%)	USCS SYMBOL	Description Soils: description; consistency/density; moisture; color; other Bedrock: color, lithology; hardness; moisture; other	Remarks
					SM	**ARTIFICIAL FILL; af, (0-3 Ft.)** **@ 0' Silty sand; stiff; slightly damp; yellowish-brown**	Drilled on 6/23/00
		13 11 16		107.5/8.91	ML	**QUATERNARY ALLUVIUM; Qal, (3-50 Ft.)** @ 3' Silt, very stiff, slightly damp, medium grayish-brown	% fines=67.5
5							
		5 8 9			SP-SM	@ 6' Fine-grained sand to silty sand; medium-dense moist; medium gray	% fines=6.3
10		7 4 5		95.6/31.1	CL	@ 10' Sandy clay; firm; damp; medium grayish-brown	@ 10' Discontinue from material in tip
15		17 26 30			SP-SM	@ 15' Fine-grained sand to silty sand; very dense; moist; medium-gray	% fines=8.9
20		8 7 10			SM	@ 20' Silty sand; medium dense; moist; medium brown	% fines=41.9
25		17 18 20			SP-SM	@ 25' Fine sand to silty sand; dense; moist; light to medium gray	% fines=15.3
30		10 17 18				@ 30' - same	
35		16 19 18			SW-SM	@ 34' Fine- to coarse-grained sand with silty sand; dense; moist; light gray	% fines=3.4
		19			SP-	@ 38' Fine- to medium-grained sand with silty sand;	

DRILL HOLE LOG

BORING NO. RW-6

PROJECT: Valencia Company — JOB NO.: 00-1571-1
Panhandle — DATE: 8/24/00
DRILLING COMPANY/DRILLER: Valley Well Drilling — 4/4/03 Rev.
METHOD OF DRILLING/HOLE DIAMETER (in.) Rotary Wash Boring (6")
HAMMER TYPE: Downhole — AVERAGE DROP (in.): 30"
DRIVING WEIGHTS: 140 lbs.
ELEVATION: 1177 — LOGGED BY: DGG

DEPTH (feet)	SAMPLE TYPE	BLOWS / 6"	GRAPHIC LOG	ATTITUDES, DRY DENSITY (pcf)/ MOISTURE CONTENT (%)	USCS SYMBOL	Description Soils: description; consistency/density; moisture; color; other Bedrock: color, lithology; hardness; moisture; other	Remarks
40		23 25			SM	dense; moist; medium gray	
		10 50/ 5"				@ 42' Fine sand to silty sand; very dense; moist; medium to orangish-brown	% fines=19.7
45							
		24 17 25				@ 46' No Recovery	
50		10 27 22			SW- SM	@ 50' Fine- to coarse-grained sand and silty sand; dense; wet; gray	
						TOTAL DEPTH 50 Ft. (Elev. 1127) Ground Water @ 29 Ft. (Elev. 1148) No Caving	
55							
60							
65							
70							
75							

DRILL HOLE LOG

BORING NO. RW-7

PROJECT: Valencia Company — JOB NO.: 00-1571-1
Panhandle — DATE: 8/24/00
DRILLING COMPANY/DRILLER: Valley Well Drilling — 4/4/03 Rev.
METHOD OF DRILLING/HOLE DIAMETER (in.) Rotary Wash Boring (6")
HAMMER TYPE: Downhole — AVERAGE DROP (in.): 30"
DRIVING WEIGHTS: 140 lbs.
ELEVATION: 1188 — LOGGED BY: DGG

DEPTH (feet)	SAMPLE TYPE	BLOWS / 6"	GRAPHIC LOG	ATTITUDES, DRY DENSITY (pcf)/ MOISTURE CONTENT (%)	USCS SYMBOL	Description Soils: description; consistency/density; moisture; color; other Bedrock: color, lithology; hardness; moisture; other	Remarks
						QUATERNARY ALLUVIUM; Qal (0 - 50')	Drilled and logged on 6/23/00
5		10 21 23		121.2/5.14	SC	@ 5' Clayey sand; medium dense; dry; orangish-to medium-brown	% fines=21.4
10		7 10 12		121.1/12.3			% fines=27.3
15		3 5 7			CL	@ 15' Sandy clay; stiff; moist; brown	% fines=56.8
20		6 4 6		114.2/17.3			% fines=54.3
25		4 6 10				@ 25' - very stiff	
30		6 5 5		116.4/15.6		@ 30' - stiff	
35		5 4 8					% fines=61.1

DRILL HOLE LOG

BORING NO. RW-7

PROJECT: Valencia Company — JOB NO.: 00-1571-1
Panhandle — DATE: 8/24/00
DRILLING COMPANY/DRILLER: Valley Well Drilling — 4/4/03 Rev.
METHOD OF DRILLING/HOLE DIAMETER (in.) Rotary Wash Boring (6")
HAMMER TYPE: Downhole — AVERAGE DROP (in.): 30"
DRIVING WEIGHTS: 140 lbs.
ELEVATION: 1188 — LOGGED BY: DGG

DEPTH (feet)	SAMPLE TYPE	BLOWS / 6"	GRAPHIC LOG	ATTITUDES, DRY DENSITY (pcf)/ MOISTURE CONTENT (%)	USCS SYMBOL	Description Soils: description; consistency/density; moisture; color; other Bedrock: color, lithology; hardness; moisture; other	Remarks
40							
		5 15 32			SC	@ 40' Clayey sand; dense; moist; medium brown to brownish-gray	% fines=37.9
45							
		24 50				@ 45' - very dense	% fines=17.9
50							
		22 17 36				TOTAL DEPTH 50 Ft. (Elev. 1138) Ground Water @ 21 Ft. (Elev. 1167) No Caving	
55							
60							
65							
70							
75							

DRILL HOLE LOG

BORING NO. RW-8

PROJECT: Valencia Company — JOB NO.: 00-1571-1
Panhandle — DATE: 8/24/00
DRILLING COMPANY/DRILLER: Valley Well Drilling — 4/4/03 Rev.
METHOD OF DRILLING/HOLE DIAMETER (in.) Rotary Wash Boring (6")
HAMMER TYPE: Downhole — AVERAGE DROP (in.): 30"
DRIVING WEIGHTS: 140 lbs.
ELEVATION: 1203 — LOGGED BY: DGG

DEPTH (feet)	SAMPLE TYPE	BLOWS / 6"	GRAPHIC LOG	ATTITUDES, DRY DENSITY (pcf)/ MOISTURE CONTENT (%)	USCS SYMBOL	Description Soils: description; consistency/density; moisture; color; other Bedrock: color, lithology; hardness; moisture; other	Remarks
						QUATERNARY ALLUVIUM; Qal (0 - 50 Ft.)	Drilled and logged on 6/26/00
5		5 5 6		114.6/10.1	ML	@ 5' Silt; stiff; damp; medium brown	
10		7 7 8		118.5/11.7	SM	@ 10' Silty sand; loose; stiff; damp; medium brown	% fines=47.2
15		4 4 5					% fines=31.3
20		15 23 23		118.1/5.64	SP-SM	@ 20' Silty sand to fine to medium-grained sand with gravel, medium dense; damp; medium brown	% fines=7.6
25		4 8 11					% fines=17.9
30		6 8 25			GM	@ 30' Fine- to medium-grained gravel; medium dense; wet; tan to gray to brownish-gray	% fines=24
35		6 20 21			SP-SM	@ 35' Silty sand to fine- to medium-grained sand; dense; moist; grayish-brown	% fines=14.9

DRILL HOLE LOG

BORING NO. RW-8

PROJECT: Valencia Company — JOB NO.: 00-1571-1
Panhandle — DATE: 8/24/00
DRILLING COMPANY/DRILLER: Valley Well Drilling — 4/4/03 Rev.
METHOD OF DRILLING/HOLE DIAMETER (in.) Rotary Wash Boring (6")
HAMMER TYPE: Downhole — AVERAGE DROP (in.): 30"
DRIVING WEIGHTS: 140 lbs.
ELEVATION: 1203 — LOGGED BY: DGG

DEPTH (feet)	SAMPLE TYPE	BLOWS / 6"	GRAPHIC LOG	ATTITUDES, DRY DENSITY (pcf)/ MOISTURE CONTENT (%)	USCS SYMBOL	Description Soils: description; consistency/density; moisture; color; other Bedrock: color, lithology; hardness; moisture; other	Remarks
40		4 10 22			SM-ML	@ 40' Silty sand to clayey sand/sandy clay; dense; moist; medium brown	% fines=38.3
45		7 21 50/4"			SP-SM	@ 45' Silty sand to fine- to medium-grained sand; very dense; moist; grayish-brown	% fines=20.0
50		50/6"			CL	TOTAL DEPTH 50 Ft. (Elev. 1153) Ground Water @ 29 Ft. (Elev. 1174) No Caving	
55							
60							
65							
70							
75							

CLIENT: Newhall Land		JOB NO.: 03-1571-4	**DRILL HOLE LOG**
PROJECT: Tentative Tract 53425, River Park City of Santa Clarita, California		DATE: 4/4/03	
		LOGGED BY: DGG	
DRILLING COMPANY: Valley Well Drilling		DRILLED: 4/17/02	
DRILLING METHOD: Rotary Wash		HOLE DIA: (5½" O.D.)	**BORING NO.** RW-9
HAMMER TYPE: Downhole		AVERAGE DROP (in.): 30"	
DRIVING WEIGHTS: 140 lbs.		ELEVATION 1271	

DEPTH (feet)	SAMPLE TYPE	BLOWS / 6"	GRAPHIC LOG	USCS SYMBOL	DESCRIPTION	LABORATORY TESTS: Moisture Content (%)	Dry Density (pcf)	% fines	Other Tests
0					**QUATERNARY ALLUVIUM; Qal, (0-42 ft.)**				
		3 5 8		SM	@ 3' Silty SAND; loose; moist; medium-brown	5.1	110		
5		6 8 12			@ 6' - medium dense	5.8	114	28	
		11 20 30			@ 9' - medium dense	4.5	121		
10		12 21 18			@ 12' - with gravel; medium-dense; orangish- to grayish-brown	8.3	131		
15		7 9 14		SM	@ 15' - with gravel; medium-dense; orangish- to grayish-brown			19	
		8 10 17			@ 18' - medium dense; orangish- to grayish-brown				
20		8 8 25			@ 21' - dense; orangish-brown			34	
		7 14 20		SM-SC	@ 24' Silty, clayey SAND; dense; moist; medium-brown			42	
25		10 26 34		SM	@ 27' Silty SAND with gravel; very dense; moist; orangish-brown				
30		27 30 50		SP-SM	@ 30' Poorly graded SAND with silt and gravel; very dense; moist; orangish-brown				
		13 12 20			@ 33' - dense				
35		18 34 50			@ 38' - drilling slowed by boulder(?)				

CLIENT: Newhall Land		JOB NO.: 03-1571-4	**DRILL HOLE LOG**
PROJECT: Tentative Tract 53425, River Park City of Santa Clarita, California		DATE: 4/4/03	
		LOGGED BY: DGG	
DRILLING COMPANY: Valley Well Drilling		DRILLED: 4/17/02	
DRILLING METHOD: Rotary Wash		HOLE DIA: (5½" O.D.)	**BORING NO.** RW-9
HAMMER TYPE: Downhole		AVERAGE DROP (in.): 30"	
DRIVING WEIGHTS: 140 lbs.		ELEVATION 1271	

DEPTH (feet)	SAMPLE TYPE	BLOWS / 6"	GRAPHIC LOG	USCS SYMBOL	DESCRIPTION	LABORATORY TESTS: Moisture Content (%)	Dry Density (pcf)	% fines	Other Tests
40		50/3"							
		50/3"			**BEDROCK; TQs, (42-48 ft.)** @ 42' Blocked tip - small recovery; crushed cobble?				
45		50/3"			@ 45' - damp to moist; grayish- to orangish-brown				
		50/4"		SM	@ 48' Silty SAND with gravel; very dense; moist; grayish- to orange-brown				
50					Total Depth 48 ft. (Elev. 1223) Groundwater @ 32' (Caved) (Elev. 1239)				
55									
60									
65									
70									
75									

CLIENT:	Newhall Land	JOB NO.:	03-1571-4
PROJECT:	Tentative Tract 53425, River Park City of Santa Clarita, California	DATE:	4/4/03
		LOGGED BY:	DGG
DRILLING COMPANY:	Valley Well Drilling	DRILLED:	4/17/02
DRILLING METHOD:	Rotary Wash	HOLE DIA:	(5½" O.D.)
HAMMER TYPE:	Downhole	AVERAGE DROP (in.):	30"
DRIVING WEIGHTS:	140 lbs.	ELEVATION	1264

DRILL HOLE LOG

BORING NO. RW-10

DEPTH (feet)	SAMPLE TYPE	BLOWS / 6"	GRAPHIC LOG	USCS SYMBOL	DESCRIPTION	LABORATORY TESTS: Moisture Content (%)	Dry Density (pcf)	% fines	Other Tests
0					**QUATERNARY ALLUVIUM; Qal, (0-51 ft.)**				
		6 6 9		SM	@ 3' Silty SAND; loose; moist; medium-brown	8.1	117		
5		12 12 12			@ 6' - medium-dense	7.2	117	23	
		7 11 15			@ 9' - medium-dense; orangish-brown	5.8	122		
10		14 18 19		SM	@ 12' - medium-dense; orangish-brown	6.4	123	17	
15		7 8 8			@ 15' - no recovery				
		8 9 10		SC	@ 18' Clayey SAND; medium-dense; moist; orangish-brown			40	LL= 28 PI= 13
20		8 9 12		SM	@ 21' Silty SAND; medium-dense; moist; orangish-brown				
		7 8 12		SM				33	
25		6 9 15							
30		9 10 10							
		5 19 19		SM-SC	@ 33' Silty, clayey SAND; dense; moist; orangish- to grayish-brown				
35		12 16 18		SM	@ 36' Silty SAND with gravel; dense; moist; orangish- to grayish-brown			14	

CLIENT: Newhall Land		JOB NO.: 03-1571-4	**DRILL HOLE LOG**
PROJECT: Tentative Tract 53425, River Park City of Santa Clarita, California		DATE: 4/4/03	
		LOGGED BY: DGG	
DRILLING COMPANY: Valley Well Drilling		DRILLED: 4/17/02	
DRILLING METHOD: Rotary Wash		HOLE DIA: (5½" O.D.)	**BORING NO.** RW-10
HAMMER TYPE: Downhole		AVERAGE DROP (in.): 30"	
DRIVING WEIGHTS: 140 lbs.		ELEVATION 1264	

DEPTH (feet)	SAMPLE TYPE	BLOWS / 6"	GRAPHIC LOG	USCS SYMBOL	DESCRIPTION	LABORATORY TESTS: Moisture Content (%)	Dry Density (pcf)	% fines	Other Tests
40		14 12 14							
		16 31 30			@ 42' - very dense				
45		22 30 34			@ 45' - very dense; (with no gravel)				
		12 16 14			@ 48' - medium-dense; (with no gravel)				
50		10 14 18			@ 51' - (with no gravel)			37	
					Total Depth 51 ft. (Elev. 1213) Groundwater @ 34 ft. (Caved) (Elev. 1230)				
55									
60									
65									
70									
75									

CLIENT:	Newhall Land	JOB NO.:	03-1571-4
PROJECT:	Tentative Tract 53425, River Park City of Santa Clarita, California	DATE:	4/4/03
		LOGGED BY:	DGG
DRILLING COMPANY:	Valley Well Drilling	DRILLED:	4/12/02
DRILLING METHOD:	Hollow-Stem-Auger	HOLE DIA:	8"O.D., 4¼ I.D.
HAMMER TYPE:	Downhole	AVERAGE DROP (in.):	30"
DRIVING WEIGHTS:	140 lbs.	ELEVATION	1260

DRILL HOLE LOG

BORING NO. HS-1

DEPTH (feet)	SAMPLE TYPE	BLOWS / 6"	GRAPHIC LOG	USCS SYMBOL	DESCRIPTION	LABORATORY TESTS: Moisture Content (%)	Dry Density (pcf)	% fines	Other Tests
0					**<u>QUATERNARY SLOPEWASH</u>; Qsw, (0-6 ft.)**				
		9 9 10		SM	@ 3' Silty SAND, fine to coarse; medium-dense; moist; medium to orangish-brown	2.9	110		
5		10 21 23			**<u>QUATERNARY ALLUVIUM</u>; Qal, (6-32 ft.)** @ 6' Silty SAND; medium-dense; moist; medium to orangish-brown	3.7	114		
		11 15 25			@ 9' - pale orangish-brown	2.8	118		
10		11 15 20			@ 12' - pale orangish-brown	4.2	127		
15		13 20 20			@ 15' - dense				
20		23 40 30		GP-GM	@ 20' Poorly graded GRAVEL with silt and sand; very dense				
25		14 16 20		SM-SC	@ 25' Silty, clayey SAND; dense; moist; pale orangish brown				
30		13 14 20			@ 32' - medium gray			42	
					Total Depth 32' (Elev. 1228) No Groundwater				
35									

CLIENT: Newhall Land		JOB NO.: 03-1571-4	**DRILL HOLE LOG**
PROJECT: Tentative Tract 53425, River Park City of Santa Clarita, California		DATE: 4/4/03	
		LOGGED BY: DGG	
DRILLING COMPANY: Valley Well Drilling		DRILLED: 4/12/02	
DRILLING METHOD: Hollow-Stem-Auger		HOLE DIA: 8"O.D., 4¼ I.D.	**BORING NO.** HS-2
HAMMER TYPE: Downhole		AVERAGE DROP (in.): 30"	
DRIVING WEIGHTS: 140 lbs.		ELEVATION 1272	

DEPTH (feet)	SAMPLE TYPE	BLOWS / 6"	GRAPHIC LOG	USCS SYMBOL	DESCRIPTION	LABORATORY TESTS: Moisture Content (%)	Dry Density (pcf)	% fines	Other Tests
0					**QUATERNARY ALLUVIUM; Qal, (0-30 ft.)**				
		10 9 10		SM	@ 2' Silty SAND; medium-dense; damp; medium-brown	1.5	100		
5		8 10 13			@ 5' - medium to orangish-brown	4.7	115	12	Consol
		15 21 23			@ 8' - moist; medium to orangish-brown	2.9	122		
10		11 11 15		SP-SM	@ 11' Poorly graded SAND with silt; medium-dense; moist; orangish-brown	2.4	127		
15		9 10 10		SM	@ 15' Silty SAND; medium-dense; moist; orangish-brown				
20		9 10 12							
25		10 10 11			@ 25' - medium to orangish-brown			33	
30		12 14 18			@ 30' - dense				
					Total Depth 30 Ft. (Elev. 1242) No Groundwater				
35									

CLIENT: Newhall Land		JOB NO.: 03-1571-4	**DRILL HOLE LOG**
PROJECT: Tentative Tract 53425, River Park City of Santa Clarita, California		DATE: 4/4/03	
		LOGGED BY: DGG	
DRILLING COMPANY: Valley Well Drilling		DRILLED: 4/12/02	
DRILLING METHOD: Hollow-Stem-Auger		HOLE DIA: 8"O.D., 4¼ I.D.	**BORING NO.** HS-3
HAMMER TYPE: Downhole		AVERAGE DROP (in.): 30"	
DRIVING WEIGHTS: 140 lbs.		ELEVATION 1284	

DEPTH (feet)	SAMPLE TYPE	BLOWS / 6"	GRAPHIC LOG	USCS SYMBOL	DESCRIPTION	LABORATORY TESTS: Moisture Content (%)	Dry Density (pcf)	% fines	Other Tests
0					**QUATERNARY ALLUVIUM; Qal, (0-55 ft.)**				
		7 10 16		SM	@ 3' Silty SAND; medium-dense; moist; medium-brown	2.5	121		
5		19 28 22			@ 6' - light gray to orangish-brown	1.5	124		
		11 16 21		SP-SM	@ 9' Poorly graded SAND with silt; medium-dense; moist; orangish-brown	2.1	123	8	
10		15 15 17		SM	@ 12' Silty SAND; medium-dense; moist; orangish-brown	1.9	120	14	
15		11 13 18		SP-SM	@ 15' Poorly graded SAND with silt and gravel; dense; moist; orangish-brown			12	
20		10 15 26		SM	@ 20' Silty SAND; dense; moist; pale orangish-brown				
25		11 12 12			@ 25' - medium-dense				
30		15 13 15		SP-SM	@ 30' Poorly graded SAND with silt; medium-dense; pale orangish-brown				
35		12 27 25		SM	@ 35' Silty SAND; dense; moist; pale orangish-brown				

CLIENT: Newhall Land		JOB NO.: 03-1571-4	**DRILL HOLE LOG**
PROJECT: Tentative Tract 53425, River Park City of Santa Clarita, California		DATE: 4/4/03	
		LOGGED BY: DGG	
DRILLING COMPANY: Valley Well Drilling		DRILLED: 4/12/02	
DRILLING METHOD: Hollow-Stem-Auger		HOLE DIA: 8"O.D., 4¼ I.D.	**BORING NO.** HS-3
HAMMER TYPE: Downhole		AVERAGE DROP (in.): 30"	
DRIVING WEIGHTS: 140 lbs.		ELEVATION 1284	

DEPTH (feet)	SAMPLE TYPE	BLOWS / 6"	GRAPHIC LOG	USCS SYMBOL	DESCRIPTION	LABORATORY TESTS: Moisture Content (%)	Dry Density (pcf)	% fines	Other Tests
40		7 12 12			@ 40' - medium-dense				
45		8 9 10			@ 45' - medium-dense; orangish-brown @ 47' - hard drilling (47'-50')				
50		10 9 8		SP-SM	@ 50' Poorly graded SAND with silt; medium-dense; moist; orangish-brown				
55		7 12 13			Total Depth 55 Ft. (Elev. 1229) No Groundwater				
60									
65									
70									
75									

CLIENT: Newhall Land		JOB NO.: 03-1571-4	**DRILL HOLE LOG**
PROJECT: Tentative Tract 53425, River Park City of Santa Clarita, California		DATE: 4/4/03	
		LOGGED BY: DGG	
DRILLING COMPANY: Valley Well Drilling		DRILLED: 4/12/02	
DRILLING METHOD: Hollow-Stem-Auger		HOLE DIA: 8"O.D., 4¼ I.D.	**BORING NO.** HS-4
HAMMER TYPE: Downhole		AVERAGE DROP (in.): 30"	
DRIVING WEIGHTS: 140 lbs.		ELEVATION 1298	

DEPTH (feet)	SAMPLE TYPE	BLOWS / 6"	GRAPHIC LOG	USCS SYMBOL	DESCRIPTION	LABORATORY TESTS: Moisture Content (%)	Dry Density (pcf)	% fines	Other Tests
0					**QUATERNARY ALLUVIUM; Qal, (0-30 ft.)**				
		9 10 16		SM	@ 2' Silty SAND; medium-dense; damp; medium to orangish-brown	1.0	100		
5		10 12 17		SM	@ 5' - pale orangish-brown	2.8	102	19	Consol
		12 18 21			@ 8' - pale orangish-brown	2.3	117		
10		32 35 38			@ 11' - dense; pale orangish-brown	1.6	127		
15		13 18 15			@ 15' - dense; pale orangish-brown			35	
20		16 16 20		SP-SM	@ 20' Poorly graded SAND with silt and gravel; dense; damp; pale orangish-brown			7	
25		14 19 17		SM	@ 25' Silty SAND; dense; damp; orangish-brown			39	
30		23 28 25		GP-GM	@ 30' Poorly graded GRAVEL with silt and sand; very dense; damp; grayish- to orangish-brown				
					Total Depth 30 feet (Elev. 1268) No Groundwater				
35									

CLIENT:	Newhall Land	JOB NO.:	03-1571-4
PROJECT:	Tentative Tract 53425, River Park City of Santa Clarita, California	DATE:	4/4/03
		LOGGED BY:	DGG
DRILLING COMPANY:	Valley Well Drilling	DRILLED:	4/12/02
DRILLING METHOD:	Hollow-Stem-Auger	HOLE DIA:	8"O.D., 4¼ I.D.
HAMMER TYPE:	Downhole	AVERAGE DROP (in.):	30"
DRIVING WEIGHTS:	140 lbs.	ELEVATION	1311

DRILL HOLE LOG

BORING NO. HS-5

DEPTH (feet)	SAMPLE TYPE	BLOWS / 6"	GRAPHIC LOG	USCS SYMBOL	DESCRIPTION	LABORATORY TESTS: Moisture Content (%)	Dry Density (pcf)	% fines	Other Tests
0					**QUATERNARY ALLUVIUM; Qal, (0-50 ft.)**				
	■	14 24 26		SM	@ 3' Silty SAND; medium-dense; moist; medium-brown	2.6	126		
5	■	19 20 24			@ 6' - orangish- to medium-brown	6.3	109	19	Consol
	■	9 14 18			@ 9' - orangish- to medium-brown	1.9	115		
10	■	12 24 35			@ 12' - dense; orangish- to medium-brown	2.5	124		
15	◢	15 18 20			@ 15' - dense; light gray to pale orangish-brown				
20	◢	11 15 15			@ 20' - light gray to pale orangish-brown				
25	◢	13 16 26			@ 25' - with gravel; dense; light gray to pale orangish-brown				
30	◢	13 17 19			@ 30' - dense; light gray to pale orangish-brown			41	
35	◢	11 10 11			@ 35' - orangish-brown @ 37' - hard drilling				

CLIENT: Newhall Land		JOB NO.: 03-1571-4	**DRILL HOLE LOG**
PROJECT: Tentative Tract 53425, River Park City of Santa Clarita, California		DATE: 4/4/03	
		LOGGED BY: DGG	
DRILLING COMPANY: Valley Well Drilling		DRILLED: 4/12/02	
DRILLING METHOD: Hollow-Stem-Auger		HOLE DIA: 8"O.D., 4¼ I.D.	**BORING NO.** HS-5
HAMMER TYPE: Downhole		AVERAGE DROP (in.): 30"	
DRIVING WEIGHTS: 140 lbs.		ELEVATION 1311	

DEPTH (feet)	SAMPLE TYPE	BLOWS / 6"	GRAPHIC LOG	USCS SYMBOL	DESCRIPTION	LABORATORY TESTS: Moisture Content (%)	Dry Density (pcf)	% fines	Other Tests
40		10 10 15			@ 40' - orangish-brown				
45		13 17 20		SP-SM	@ 45' Poorly graded SAND with silt; dense; damp; orangish-brown				
50		25 26 30			@ 50' - with gravel; very dense Total Depth 50 Ft. (Elev. 1261) No Groundwater				
55									
60									
65									
70									
75									

CLIENT: Newhall Land		JOB NO.: 03-1571-4	**DRILL HOLE LOG**
PROJECT: Tentative Tract 53425, River Park City of Santa Clarita, California		DATE: 4/4/03	
		LOGGED BY: DGG	
DRILLING COMPANY: Valley Well Drilling		DRILLED: 7/30/02	
DRILLING METHOD: Hollow-Stem-Auger		HOLE DIA: 8"O.D., 4¼ I.D.	**BORING NO.** HS-6
HAMMER TYPE: Downhole		AVERAGE DROP (in.): 30"	
DRIVING WEIGHTS: 140 lbs.		ELEVATION 1251	

DEPTH (feet)	SAMPLE TYPE	BLOWS / 6"	GRAPHIC LOG	USCS SYMBOL	DESCRIPTION	LABORATORY TESTS: Moisture Content (%)	Dry Density (pcf)	% fines	Other Tests
0					**QUATERNARY SLOPEWASH; Qsw, (0-8 ft.)**				
	■	10 16 20		SM	@ 3' Silty SAND; medium-dense; damp; medium grayish-brown; trace of coarse sand	3.6	107		
5	■	9 11 14			@ 6' - with scattered gravel; moist			42	
					QUATERNARY ALLUVIUM; Qal, (8-30 ft.)				
	■	14 17 24		SM	@ 9' Silty SAND; medium-dense; moist; slightly grayish	4.6	116		
10	■	15 18 20		SM	@ 12' - moist; grayish- to grayish-brown	4.2	112		Consol
15	◢	13 15 18			@ 15' - dense; moist; orangish- to pinkish- to medium gray (tip blocked)			26	
20	◢	14 20 17			@ 20' - dense; moist; orangish-brown with tan to white particles (tip blocked)				
25	◢	12 20 31			@ 25' - very dense; moist; orangish-brown to medium-gray (tip blocked)				
30	◢	20 50/6"		CL	@ 30' Lean CLAY with sand; hard; moist; orangish-brown Total Depth 30 ft. No Ground Water				
35									

CLIENT: Newhall Land		JOB NO.: 03-1571-4	**DRILL HOLE LOG**
PROJECT: Tentative Tract 53425, River Park City of Santa Clarita, California		DATE: 4/4/03	
		LOGGED BY: DGG	
DRILLING COMPANY: Valley Well Drilling		DRILLED: 7/30/02	
DRILLING METHOD: Hollow-Stem-Auger		HOLE DIA: 8"O.D., 4¼ I.D.	**BORING NO.** HS-7
HAMMER TYPE: Downhole		AVERAGE DROP (in.): 30"	
DRIVING WEIGHTS: 140 lbs.		ELEVATION 1241	

DEPTH (feet)	SAMPLE TYPE	BLOWS / 6"	GRAPHIC LOG	USCS SYMBOL	DESCRIPTION	LABORATORY TESTS: Moisture Content (%)	Dry Density (pcf)	% fines	Other Tests
0					**QUATERNARY SLOPEWASH; Qsw, (0-7 ft.)**				
		9 9 9		SM	@ 2' Silty SAND; loose; moist; medium grayish-brown	6.3	99		
5		5 7 12		CL-ML	@ 5' Sandy silty CLAY; very stiff; moist; grayish-brown			66	
					QUATERNARY ALLUVIUM; Qal, (7-30 ft.)				
		16 17 18		SM	@ 8' Silty SAND; medium dense; moist; grayish-brown	9.4	115		
10		6 7 10			@ 11' - no recovery				
		5 12 18			@ 12.5' Silty SAND with gravel; medium dense; moist; grayish- to orangish-brown			19	
15		5 9 12		SC	@ 15' Clayey SAND; medium-dense; moist; grayish- to orangish-brown			38	
20		9 9 13		SC				41	LL= 29 PI= 11
25		13 17 25			@ 25' - dense; pale orangish- to orangish-brown				
30		32 50			@ 30' - very dense; pale orangish- to orangish-brown (tip blocked) Total Depth 30 ft. No Ground Water				
35									

CLIENT: Newhall Land		JOB NO.: 03-1571-4	**DRILL HOLE LOG**
PROJECT: Tentative Tract 53425, River Park City of Santa Clarita, California		DATE: 4/4/03	
		LOGGED BY: DGG	
DRILLING COMPANY: Valley Well Drilling		DRILLED: 7/30/02	
DRILLING METHOD: Hollow-Stem-Auger		HOLE DIA: 8"O.D., 4¼ I.D.	**BORING NO.** HS-8
HAMMER TYPE: Downhole		AVERAGE DROP (in.): 30"	
DRIVING WEIGHTS: 140 lbs.		ELEVATION 1252	

DEPTH (feet)	SAMPLE TYPE	BLOWS / 6"	GRAPHIC LOG	USCS SYMBOL	DESCRIPTION	LABORATORY TESTS: Moisture Content (%)	Dry Density (pcf)	% fines	Other Tests
0					**QUATERNARY SLOPEWASH; Qsw, (0-6 ft.)**				
		7 11 13		SM	@ 3' Silty SAND with scattered gravel; medium-dense; moist; orangish-brown	5.8	100		
5		8 30 30		SP-SM	**QUATERNARY ALLUVIUM; Qal, (6-30 ft.)** @ 6' Poorly graded SAND with silt and scattered gravel; dense; moist; orangish-brown	2.5	122	12	
		8 12 30		SM	@ 9' Silty SAND; medium-dense; moist; grayish- to orangish-brown	7.1	116		
10		9 12 12						35	
15		6 8 12							
20		7 9 11		SC	@ 20' Clayey SAND; medium-dense; moist; light grayish- to orangish-brown			36	LL= 31 PI= 13
25		7 10 10							
30		17 22 40		SM	@ 30' Silty SAND; very dense; moist; light grayish- to orangish-brown (tip blocked)				
35					Total Depth 30 ft. No Ground Water				

CLIENT: Newhall Land		JOB NO.: 03-1571-4	**DRILL HOLE LOG**
PROJECT: Tentative Tract 53425, River Park City of Santa Clarita, California		DATE: 4/4/03	
		LOGGED BY: DGG	
DRILLING COMPANY: Valley Well Drilling		DRILLED: 7/30/02	
DRILLING METHOD: Hollow-Stem-Auger		HOLE DIA: 8"O.D., 4¼ I.D.	**BORING NO.** HS-9
HAMMER TYPE: Downhole		AVERAGE DROP (in.): 30"	
DRIVING WEIGHTS: 140 lbs.		ELEVATION 1255	

DEPTH (feet)	SAMPLE TYPE	BLOWS / 6"	GRAPHIC LOG	USCS SYMBOL	DESCRIPTION	LABORATORY TESTS: Moisture Content (%)	Dry Density (pcf)	% fines	Other Tests
0					**QUATERNARY SLOPEWASH; Qsw, (0-8 ft.)**				
		5 5 6		SM	@ 2' Silty SAND; loose; moist; grayish-brown	4.0	107		
5		6 8 15			@ 5' - medium dense			33	
		12 14 28			**QUATERNARY ALLUVIUM; Qal, (8-30 ft.)** @ 8' - with gravel; medium-dense	2.8	120		
10		18 24 25		SP-SM	@ 11' Poorly graded SAND with silt and gravel; medium dense; moist; orangish-brown	3.2	119		
15		12 14 35		SM	@ 15' Silty SAND; dense; moist; pale orangish-brown			36	
20		14 27 40			@ 20' - very dense; grayish-brown (tip blocked)				
25		25 50/5"		ML	@ 25' Sandy SILT; hard; moist; orangish-brown				
30		18 21 35		SM	@ 30' Silty SAND; very dense; moist; orangish-brown				
					Total Depth 30 ft. No Ground Water				
35									

KEY TO SYMBOLS

Symbol	Description
Strata symbols	
	Poorly graded sand
	Well graded sand
	Well graded gravel with silt
	Clayey sand
	Silty sand
	Poorly graded clayey silty sand
	Low plasticity clay
	Silt
	Well graded sand with silt
	Poorly graded silty fine sand
	Poorly graded sand with silt
	Silty gravel
Misc. Symbols	
	Water table during drilling
	Depth to caving

Symbol	Description
Soil Samplers	
	California sampler
	No recovery
	Standard penetration test

Notes:

1. These logs are subject to the limitations, conclusions, and recommendations in this report.

2. Results of tests conducted on samples recovered are reported on the logs.

KEY TO SYMBOLS

Symbol	Description
	EXTRA: medium closely-spaced dots (6)
	EXTRA: narrow-spaced horizontal dashed lines (-)
	EXTRA: random dot pattern (1)
	EXTRA: regularly spaced "V"'s (<)
	EXTRA: very narrow cross-hatching (!)
	EXTRA: dashed lines with 3 dots above each dash (.)
	EXTRA: large widely-spaced dots (*)
	EXTRA: small filled triangles ([)
	EXTRA: semi-random triangle pattern (')
	EXTRA: zigzag lines (#)
	EXTRA: grass pattern ({)
	EXTRA: tilde sign (})
	EXTRA: randomly arranged square boxes (;)

Symbol	Description
Misc. Symbols	
	Water table at boring completion (LWATER)
	Water table during drilling (WATER)
Soil Samplers	
	Auger (A)
	Bulk sample (B)
	California sampler (C)
	Bulk/Grab sample (F)
	Pitcher (L)
	Denison (O)
	Standard penetration test (P)
	No recovery (X)

CPT INTERPRETATIONS

SOUNDING : CPT-01 PROJECT No.: 98-1571-1
PROJECT : AES-PANHANDLE CONE/RIG : 491,#1 JH,GO
DATE/TIME: 11-23-98 14:42

DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
.150	.49	154.90	1.69	SAND to SILTY SAND	39	62	89		
.300	.98	143.89	1.85	SILTY SAND to SANDY SILT	48	77	87		
.450	1.48	81.50	2.22	SILTY SAND to SANDY SILT	27	43	70		
.600	1.97	51.41	2.02	SANDY SILT to CLAYEY SILT	21	33		3.4	
.750	2.46	25.62	.90	SILTY SAND to SANDY SILT	9	14	37		43.5
.900	2.95	18.04	4.38	CLAY	18	29		1.2	
1.050	3.44	15.95	3.82	CLAY to SILTY CLAY	11	17		1.1	
1.200	3.94	19.76	1.87	SANDY SILT to CLAYEY SILT	8	13		1.6	
1.350	4.43	42.45	1.91	SANDY SILT to CLAYEY SILT	17	27		2.8	
1.500	4.92	33.63	2.35	SANDY SILT to CLAYEY SILT	13	22		2.2	
1.650	5.41	32.50	1.32	SILTY SAND to SANDY SILT	11	17	44		40.5
1.800	5.91	25.75	2.41	CLAYEY SILT to SILTY CLAY	13	21		1.7	
1.950	6.40	58.49	1.28	SILTY SAND to SANDY SILT	19	31	61		43.0
2.100	6.89	67.54	1.58	SILTY SAND to SANDY SILT	23	36	65		43.0
2.250	7.38	51.43	1.91	SILTY SAND to SANDY SILT	17	27	57		42.0
2.400	7.87	48.80	2.11	SANDY SILT to CLAYEY SILT	20	30		3.2	
2.550	8.37	42.15	1.68	SILTY SAND to SANDY SILT	14	21	52		39.5
2.700	8.86	33.40	1.77	SANDY SILT to CLAYEY SILT	13	19		2.6	
2.850	9.35	31.65	1.52	SANDY SILT to CLAYEY SILT	13	18		2.5	
3.000	9.84	28.30	1.70	SANDY SILT to CLAYEY SILT	11	15		2.2	
3.150	10.33	36.26	2.34	SANDY SILT to CLAYEY SILT	15	19		2.4	
3.300	10.83	49.95	2.08	SANDY SILT to CLAYEY SILT	20	26		3.3	
3.450	11.32	63.90	2.03	SILTY SAND to SANDY SILT	21	27	61		40.0
3.600	11.81	67.32	2.12	SILTY SAND to SANDY SILT	22	28	62		40.0
3.750	12.30	67.58	2.68	SANDY SILT to CLAYEY SILT	27	33		4.5	
3.900	12.80	64.58	2.15	SILTY SAND to SANDY SILT	22	26	59		39.5
4.050	13.29	56.77	2.66	SANDY SILT to CLAYEY SILT	23	27		3.7	
4.200	13.78	67.28	1.77	SILTY SAND to SANDY SILT	22	26	60		39.5
4.350	14.27	58.89	2.17	SANDY SILT to CLAYEY SILT	24	27		3.9	
4.500	14.76	116.15	1.14	SAND to SILTY SAND	29	32	74		42.0
4.650	15.26	96.66	.72	SAND to SILTY SAND	24	26	69		41.0
4.800	15.75	31.82	1.92	SANDY SILT to CLAYEY SILT	13	14		2.5	
4.950	16.24	18.65	3.00	CLAYEY SILT to SILTY CLAY	9	10		1.2	
5.100	16.73	10.43	3.93	CLAY	10	11		.6	
5.250	17.22	17.21	2.85	CLAYEY SILT to SILTY CLAY	9	9		1.1	
5.400	17.72	9.82	3.36	CLAY	10	10		.6	
5.550	18.21	6.05	9.42	CLAY	6	6		.3	
5.700	18.70	47.10	3.40	CLAYEY SILT to SILTY CLAY	24	23		2.7	
5.850	19.19	14.45	4.84	CLAY	14	14		.9	
6.000	19.69	16.70	4.79	CLAY	17	16		1.0	
6.150	20.18	94.07	.83	SAND to SILTY SAND	24	23	64		39.5

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 110 pcf
ASSUMED DEPTH OF WATER TABLE = 19.0 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

Interpretations based on: Robertson and Campanella, 1989.

SOUNDING : CPT-01

DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
6.300	20.67	68.30	1.08	SILTY SAND to SANDY SILT	23	22	55		38.0
6.450	21.16	93.75	.92	SAND to SILTY SAND	23	22	64		39.0
6.600	21.65	56.89	2.37	SANDY SILT to CLAYEY SILT	23	22		3.7	
6.750	22.15	32.59	2.79	CLAYEY SILT to SILTY CLAY	16	15		2.1	
6.900	22.64	56.98	1.30	SILTY SAND to SANDY SILT	19	18	49		37.5
7.050	23.13	162.95	.23	SAND	33	30	79		42.0
7.200	23.62	230.74	.26	SAND	46	43	89		43.5
7.350	24.11	95.22	.45	SAND to SILTY SAND	24	22	63		39.0
7.500	24.61	51.20	.82	SILTY SAND to SANDY SILT	17	16	45		36.5
7.650	25.10	19.10	2.04	CLAYEY SILT to SILTY CLAY	10	9		1.4	
7.800	25.59	56.28	2.88	SANDY SILT to CLAYEY SILT	23	21		3.7	
7.950	26.08	16.85	4.33	CLAY	17	15		1.0	
8.100	26.57	16.15	4.09	CLAY	16	15		1.0	
8.250	27.07	15.66	4.66	CLAY	16	14		.9	
8.400	27.56	16.23	4.25	CLAY	16	15		1.0	
8.550	28.05	25.64	6.94	CLAY	26	23		1.4	
8.700	28.54	97.85	4.22	CLAYEY SILT to SILTY CLAY	49	43		5.7	
8.850	29.04	11.30	6.37	CLAY	11	10		.6	
9.000	29.53	21.31	5.44	CLAY	21	19		1.2	
9.150	30.02	62.33	1.75	SILTY SAND to SANDY SILT	21	18	50		37.0
9.300	30.51	137.84	2.17	SILTY SAND to SANDY SILT	46	40	72		40.0
9.450	31.00	164.07	1.83	SILTY SAND to SANDY SILT	55	47	77		41.5
9.600	31.50	166.11	.52	SAND	33	29	77		41.5
9.750	31.99	57.83	2.35	SANDY SILT to CLAYEY SILT	23	20		3.7	
9.900	32.48	12.73	2.83	CLAY to SILTY CLAY	8	7		.7	
10.050	32.97	301.25	*****		0	0			.0

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 110 pcf
ASSUMED DEPTH OF WATER TABLE = 19.0 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

Interpretations based on: Robertson and Campanella, 1989.

CPT INTERPRETATIONS

SOUNDING : CPT-01A
PROJECT : AES-PANHANDLE
DATE/TIME: 11-24-98 10:20

PROJECT No.: 98-1571-1
CONE/RIG : 468/R#3 KC/MR

DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
.150	.49	75.82	1.56	SILTY SAND to SANDY SILT	25	40	68		
.300	.98	114.30	2.75	SANDY SILT to CLAYEY SILT	46	73		6.7	
.450	1.48	89.27	3.28	SANDY SILT to CLAYEY SILT	36	57		5.2	
.600	1.97	63.18	2.28	SANDY SILT to CLAYEY SILT	25	40		4.2	
.750	2.46	32.08	2.21	SANDY SILT to CLAYEY SILT	13	21		2.1	
.900	2.95	31.00	3.10	CLAYEY SILT to SILTY CLAY	16	25		2.1	
1.050	3.44	41.45	3.06	CLAYEY SILT to SILTY CLAY	21	33		2.8	
1.200	3.94	39.69	2.70	SANDY SILT to CLAYEY SILT	16	25		2.6	
1.350	4.43	38.75	3.59	CLAYEY SILT to SILTY CLAY	19	31		2.6	
1.500	4.92	40.77	3.80	CLAYEY SILT to SILTY CLAY	20	33		2.4	
1.650	5.41	54.41	2.87	SANDY SILT to CLAYEY SILT	22	35		3.6	
1.800	5.91	52.98	3.19	SANDY SILT to CLAYEY SILT	21	34		3.5	
1.950	6.40	53.28	3.32	CLAYEY SILT to SILTY CLAY	27	43		3.1	
2.100	6.89	52.73	3.13	SANDY SILT to CLAYEY SILT	21	34		3.5	
2.250	7.38	50.01	3.48	CLAYEY SILT to SILTY CLAY	25	39		2.9	
2.400	7.87	47.18	3.65	CLAYEY SILT to SILTY CLAY	24	36		2.7	
2.550	8.37	45.15	2.17	SANDY SILT to CLAYEY SILT	18	27		3.0	
2.700	8.86	42.77	3.51	CLAYEY SILT to SILTY CLAY	21	31		2.5	
2.850	9.35	35.95	3.48	CLAYEY SILT to SILTY CLAY	18	25		2.4	
3.000	9.84	36.48	2.88	CLAYEY SILT to SILTY CLAY	18	25		2.4	
3.150	10.33	35.44	3.30	CLAYEY SILT to SILTY CLAY	18	24		2.3	
3.300	10.83	48.86	3.44	CLAYEY SILT to SILTY CLAY	24	32		2.8	
3.450	11.32	47.84	3.24	CLAYEY SILT to SILTY CLAY	24	30		3.1	
3.600	11.81	52.43	3.60	CLAYEY SILT to SILTY CLAY	26	33		3.0	
3.750	12.30	62.23	3.66	CLAYEY SILT to SILTY CLAY	31	38		3.6	
3.900	12.80	75.53	3.10	SANDY SILT to CLAYEY SILT	30	36		4.4	
4.050	13.29	51.56	3.78	CLAYEY SILT to SILTY CLAY	26	30		3.0	
4.200	13.78	39.56	5.13	CLAY	40	45		2.3	
4.350	14.27	42.45	4.10	CLAYEY SILT to SILTY CLAY	21	24		2.5	
4.500	14.76	41.07	4.04	CLAYEY SILT to SILTY CLAY	21	23		2.4	
4.650	15.26	45.42	3.06	CLAYEY SILT to SILTY CLAY	23	25		3.0	
4.800	15.75	46.40	2.89	SANDY SILT to CLAYEY SILT	19	20		3.0	
4.950	16.24	30.10	3.36	CLAYEY SILT to SILTY CLAY	15	16		1.9	
5.100	16.73	26.56	3.20	CLAYEY SILT to SILTY CLAY	13	14		1.7	
5.250	17.22	31.61	2.18	SANDY SILT to CLAYEY SILT	13	13		2.0	
5.400	17.72	30.02	2.30	SANDY SILT to CLAYEY SILT	12	12		1.9	
5.550	18.21	10.13	1.48	CLAYEY SILT to SILTY CLAY	5	5		.7	
5.700	18.70	32.12	2.21	SANDY SILT to CLAYEY SILT	13	13		2.1	
5.850	19.19	69.34	1.15	SILTY SAND to SANDY SILT	23	23	56		38.5
6.000	19.69	72.17	2.29	SILTY SAND to SANDY SILT	24	23	57		38.5
6.150	20.18	71.23	2.19	SILTY SAND to SANDY SILT	24	23	56		38.5

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 110 pcf
ASSUMED DEPTH OF WATER TABLE = 19.0 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

Interpretations based on: Robertson and Campanella, 1989.

SOUNDING : CPT-01A

DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
6.300	20.67	137.58	1.51	SAND to SILTY SAND	34	33	75		42.0
6.450	21.16	200.06	1.16	SAND	40	38	86		43.5
6.600	21.65	139.98	1.67	SAND to SILTY SAND	35	33	75		42.0
6.750	22.15	31.04	2.38	SANDY SILT to CLAYEY SILT	12	12		2.0	
6.900	22.64	47.46	1.50	SILTY SAND to SANDY SILT	16	15	44		36.5
7.050	23.13	16.91	3.67	CLAY to SILTY CLAY	11	11		1.0	
7.200	23.62	22.09	4.84	CLAY	22	21		1.4	
7.350	24.11	70.28	1.31	SILTY SAND to SANDY SILT	23	22	55		38.0
7.500	24.61	60.23	2.32	SANDY SILT to CLAYEY SILT	24	22		3.9	
7.650	25.10	74.14	.97	SAND to SILTY SAND	19	17	56		38.0
7.800	25.59	20.71	4.88	CLAY	21	19		1.3	
7.950	26.08	26.39	4.55	CLAY	26	24		1.5	
8.100	26.57	33.38	3.33	CLAYEY SILT to SILTY CLAY	17	15		2.1	
8.250	27.07	15.32	5.16	CLAY	15	14		.9	
8.400	27.56	49.78	2.27	SANDY SILT to CLAYEY SILT	20	18		3.2	
8.550	28.05	165.99	1.56	SAND to SILTY SAND	41	37	78		42.0
8.700	28.54	18.31	5.68	CLAY	18	16		1.1	
8.850	29.04	19.84	5.75	CLAY	20	18		1.1	
9.000	29.53	33.33	4.29	CLAY to SILTY CLAY	22	20		1.9	
9.150	30.02	97.26	1.17	SAND to SILTY SAND	24	21	62		38.5
9.300	30.51	108.48	1.56	SILTY SAND to SANDY SILT	36	31	65		39.0
9.450	31.00	183.94	1.08	SAND	37	32	80		42.0
9.600	31.50	385.36	.53	GRAVELLY SAND to SAND	64	55	100		45.0
9.750	31.99	56.15	3.42	CLAYEY SILT to SILTY CLAY	28	24		3.2	

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 110 pcf
ASSUMED DEPTH OF WATER TABLE = 19.0 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

Interpretations based on: Robertson and Campanella, 1989.

CPT INTERPRETATIONS

SOUNDING : CPT-02 PROJECT No.: 98-1571-1
PROJECT : AES-PANHANDLE CONE/RIG : 468/R#3 KC/MR
DATE/TIME: 11-24-98 10:48

DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
.150	.49	125.75	1.78	SILTY SAND to SANDY SILT	42	67	83		
.300	.98	69.53	2.74	SANDY SILT to CLAYEY SILT	28	44		4.6	
.450	1.48	57.74	.67	SAND to SILTY SAND	14	23	61		48.5
.600	1.97	31.29	2.14	SANDY SILT to CLAYEY SILT	13	20		2.1	
.750	2.46	22.24	2.31	CLAYEY SILT to SILTY CLAY	11	18		1.5	
.900	2.95	14.40	2.48	CLAYEY SILT to SILTY CLAY	7	12		1.1	
1.050	3.44	9.16	2.23	CLAY to SILTY CLAY	6	10		.7	
1.200	3.94	11.81	3.66	CLAY	12	19		.8	
1.350	4.43	7.18	2.81	CLAY	7	11		.6	
1.500	4.92	11.51	2.90	CLAY to SILTY CLAY	8	12		.7	
1.650	5.41	14.40	1.38	SANDY SILT to CLAYEY SILT	6	9		1.1	
1.800	5.91	14.98	1.42	SANDY SILT to CLAYEY SILT	6	10		1.2	
1.950	6.40	10.22	2.13	CLAYEY SILT to SILTY CLAY	5	8		.8	
2.100	6.89	14.68	2.23	CLAYEY SILT to SILTY CLAY	7	12		1.1	
2.250	7.38	50.01	2.38	SANDY SILT to CLAYEY SILT	20	31		3.3	
2.400	7.87	145.65	1.26	SAND to SILTY SAND	36	55	87		46.0
2.550	8.37	50.01	5.39	CLAY	50	74		2.9	
2.700	8.86	18.80	4.55	CLAY	19	27		1.2	
2.850	9.35	18.12	4.42	CLAY	18	25		1.2	
3.000	9.84	46.06	3.60	CLAYEY SILT to SILTY CLAY	23	31		2.7	
3.150	10.33	12.28	5.55	CLAY	12	16		.8	
3.300	10.83	26.28	3.08	CLAYEY SILT to SILTY CLAY	13	17		1.7	
3.450	11.32	46.48	1.75	SILTY SAND to SANDY SILT	15	20	52		38.5
3.600	11.81	42.57	2.13	SANDY SILT to CLAYEY SILT	17	21		2.8	
3.750	12.30	51.26	1.86	SILTY SAND to SANDY SILT	17	21	53		38.5
3.900	12.80	47.33	1.97	SANDY SILT to CLAYEY SILT	19	23		3.1	
4.050	13.29	54.58	2.05	SANDY SILT to CLAYEY SILT	22	26		3.6	
4.200	13.78	22.86	3.57	CLAY to SILTY CLAY	15	18		1.5	
4.350	14.27	15.00	2.79	CLAYEY SILT to SILTY CLAY	8	8		.9	
4.500	14.76	48.14	1.15	SILTY SAND to SANDY SILT	16	18	49		38.0
4.650	15.26	39.30	2.32	SANDY SILT to CLAYEY SILT	16	17		2.6	
4.800	15.75	24.16	2.59	CLAYEY SILT to SILTY CLAY	12	13		1.6	
4.950	16.24	27.24	3.55	CLAYEY SILT to SILTY CLAY	14	14		1.8	
5.100	16.73	13.98	4.26	CLAY	14	15		.9	
5.250	17.22	13.13	4.54	CLAY	13	13		.8	
5.400	17.72	8.84	3.17	CLAY	9	9		.5	
5.550	18.21	28.89	2.95	CLAYEY SILT to SILTY CLAY	14	14		1.9	
5.700	18.70	12.22	4.02	CLAY	12	12		.7	
5.850	19.19	8.63	7.45	CLAY	9	8		.5	
6.000	19.69	228.55	1.39	SAND to SILTY SAND	57	55	90		44.0
6.150	20.18	52.50	2.10	SANDY SILT to CLAYEY SILT	21	20		3.4	

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 110 pcf
ASSUMED DEPTH OF WATER TABLE = 19.0 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

Interpretations based on: Robertson and Campanella, 1989.

SOUNDING : CPT-02

DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
6.300	20.67	17.21	5.74	CLAY	17	17		1.1	
6.450	21.16	195.94	2.21	SILTY SAND to SANDY SILT	65	62	85		43.0
6.600	21.65	209.18	1.36	SAND to SILTY SAND	52	50	87		43.5
6.750	22.15	165.35	1.16	SAND to SILTY SAND	41	39	80		42.5
6.900	22.64	98.96	1.29	SAND to SILTY SAND	25	23	65		39.5
7.050	23.13	36.29	1.76	SANDY SILT to CLAYEY SILT	15	14		2.8	
7.200	23.62	63.31	1.65	SILTY SAND to SANDY SILT	21	20	52		38.0
7.350	24.11	73.08	.92	SAND to SILTY SAND	18	17	56		38.0
7.500	24.61	27.17	6.81	CLAY	27	25		1.5	
7.650	25.10	203.36	*****		0	0			38.0

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 110 pcf
ASSUMED DEPTH OF WATER TABLE = 19.0 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

Interpretations based on: Robertson and Campanella, 1989.

CPT INTERPRETATIONS

SOUNDING : CPT-03 PROJECT No.: 98-1571-1
PROJECT : AES-PANHANDLE CONE/RIG : 491,#1 JH,GO
DATE/TIME: 11-23-98 14:00

DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
.150	.49	533.67	1.33	SAND	100	100	100		
.300	.98	67.79	5.11	*VERY STIFF FINE GRAINED	68	100			
.450	1.48	35.22	2.22	SANDY SILT to CLAYEY SILT	14	23		2.3	
.600	1.97	26.15	1.39	SANDY SILT to CLAYEY SILT	10	17		2.1	
.750	2.46	19.50	1.75	SANDY SILT to CLAYEY SILT	8	12		1.5	
.900	2.95	19.80	1.97	CLAYEY SILT to SILTY CLAY	10	16		1.6	
1.050	3.44	16.27	2.53	CLAYEY SILT to SILTY CLAY	8	13		1.1	
1.200	3.94	18.36	2.96	CLAYEY SILT to SILTY CLAY	9	15		1.2	
1.350	4.43	20.97	2.21	CLAYEY SILT to SILTY CLAY	10	17		1.7	
1.500	4.92	15.55	3.05	CLAY to SILTY CLAY	10	17		1.0	
1.650	5.41	14.94	3.63	CLAY to SILTY CLAY	10	16		1.0	
1.800	5.91	15.85	3.92	CLAY to SILTY CLAY	11	17		1.0	
1.950	6.40	19.04	5.00	CLAY	19	30		1.2	
2.100	6.89	10.05	9.61	CLAY	10	16		.6	
2.250	7.38	8.97	11.61	CLAY	9	14		.6	
2.400	7.87	8.92	13.28	CLAY	9	14		.6	
2.550	8.37	13.92	8.07	CLAY	14	21		.9	
2.700	8.86	33.12	1.71	SANDY SILT to CLAYEY SILT	13	19		2.6	
2.850	9.35	32.19	2.44	SANDY SILT to CLAYEY SILT	13	18		2.1	
3.000	9.84	25.49	2.40	CLAYEY SILT to SILTY CLAY	13	17		1.7	
3.150	10.33	22.18	2.45	CLAYEY SILT to SILTY CLAY	11	15		1.4	
3.300	10.83	23.31	2.82	CLAYEY SILT to SILTY CLAY	12	15		1.5	
3.450	11.32	20.50	3.18	CLAYEY SILT to SILTY CLAY	10	13		1.3	
3.600	11.81	18.19	2.76	CLAYEY SILT to SILTY CLAY	9	11		1.2	
3.750	12.30	19.25	2.66	CLAYEY SILT to SILTY CLAY	10	12		1.2	
3.900	12.80	15.85	3.14	CLAY to SILTY CLAY	11	13		1.0	
4.050	13.29	14.81	3.83	CLAY to SILTY CLAY	10	12		.9	
4.200	13.78	14.32	2.80	CLAYEY SILT to SILTY CLAY	7	8		.9	
4.350	14.27	17.08	3.05	CLAYEY SILT to SILTY CLAY	9	10		1.1	
4.500	14.76	18.10	3.65	CLAY to SILTY CLAY	12	13		1.2	
4.650	15.26	35.33	2.29	SANDY SILT to CLAYEY SILT	14	15		2.3	
4.800	15.75	29.76	1.94	SANDY SILT to CLAYEY SILT	12	13		2.3	
4.950	16.24	17.61	3.32	CLAY to SILTY CLAY	12	13		1.1	
5.100	16.73	19.84	2.72	CLAYEY SILT to SILTY CLAY	10	11		1.3	
5.250	17.22	18.27	2.98	CLAYEY SILT to SILTY CLAY	9	10		1.2	
5.400	17.72	14.45	3.44	CLAY to SILTY CLAY	10	10		.9	
5.550	18.21	29.72	1.37	SANDY SILT to CLAYEY SILT	12	12		2.3	
5.700	18.70	27.64	4.00	CLAY to SILTY CLAY	18	19		1.8	
5.850	19.19	68.22	.87	SAND to SILTY SAND	17	18	57		38.5
6.000	19.69	71.21	1.59	SILTY SAND to SANDY SILT	24	24	58		38.5
6.150	20.18	64.48	.80	SAND to SILTY SAND	16	16	55		38.5

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 110 pcf
ASSUMED DEPTH OF WATER TABLE = 15.5 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

Interpretations based on: Robertson and Campanella, 1989.

SOUNDING : CPT-03

DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
6.300	20.67	20.06	4.44	CLAY	20	20		1.3	
6.450	21.16	48.48	1.22	SILTY SAND to SANDY SILT	16	16	46		37.5
6.600	21.65	17.70	4.15	CLAY	18	18		1.1	
6.750	22.15	26.22	3.32	CLAYEY SILT to SILTY CLAY	13	13		1.7	
6.900	22.64	32.02	3.66	CLAYEY SILT to SILTY CLAY	16	16		2.1	
7.050	23.13	23.73	4.19	CLAY to SILTY CLAY	16	16		1.5	
7.200	23.62	38.79	2.79	SANDY SILT to CLAYEY SILT	16	15		2.5	
7.350	24.11	104.82	.93	SAND to SILTY SAND	26	25	68		40.0
7.500	24.61	100.28	.86	SAND to SILTY SAND	25	24	66		39.5
7.650	25.10	110.92	.46	SAND	22	21	69		40.0
7.800	25.59	135.16	1.14	SAND to SILTY SAND	34	32	74		41.5
7.950	26.08	80.79	.38	SAND to SILTY SAND	20	19	59		38.5
8.100	26.57	32.31	1.39	SANDY SILT to CLAYEY SILT	13	12		2.5	
8.250	27.07	45.59	.86	SILTY SAND to SANDY SILT	15	14	43		36.5
8.400	27.56	97.73	.45	SAND to SILTY SAND	24	23	64		39.0
8.550	28.05	9.69	15.82	CLAY	10	9		.5	
8.700	28.54	10.39	4.20	CLAY	10	10		.6	
8.850	29.04	5.14	2.50	CLAY	5	5		.3	
9.000	29.53	11.05	2.65	CLAY to SILTY CLAY	7	7		.8	
9.150	30.02	226.02	.95	SAND	45	41	88		43.5
9.300	30.51	69.53	2.41	SANDY SILT to CLAYEY SILT	28	25		4.5	
9.450	31.00	46.14	2.00	SANDY SILT to CLAYEY SILT	18	17		3.0	
9.600	31.50	51.99	1.75	SILTY SAND to SANDY SILT	17	16	45		36.5
9.750	31.99	46.46	3.22	CLAYEY SILT to SILTY CLAY	23	21		3.0	
9.900	32.48	76.74	1.01	SAND to SILTY SAND	19	17	56		38.0
10.050	32.97	235.07	2.24	SILTY SAND to SANDY SILT	78	70	88		43.5
10.200	33.46	180.39	1.15	SAND to SILTY SAND	45	40	80		42.0
10.350	33.96	263.69	1.84	SAND to SILTY SAND	66	58	91		44.0
10.500	34.45	162.33	.16	SAND	32	28	77		41.5
10.650	34.94	92.10	.89	SAND to SILTY SAND	23	20	61		38.5
10.800	35.43	39.54	2.46	SANDY SILT to CLAYEY SILT	16	14		2.5	
10.950	35.93	76.40	3.32	SANDY SILT to CLAYEY SILT	31	26		4.4	
11.100	36.42	250.63	1.63	SAND to SILTY SAND	63	54	89		43.5
11.250	36.91	392.75	.46	GRAVELLY SAND to SAND	65	56	100		45.0

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 110 pcf
ASSUMED DEPTH OF WATER TABLE = 15.5 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

Interpretations based on: Robertson and Campanella, 1989.

CPT INTERPRETATIONS

SOUNDING : CPT-03A
PROJECT : AES-PANHANDLE
DATE/TIME: 11-24-98 08:44

PROJECT No.: 98-1571-1
CONE/RIG : 468/R#3 KC/MR

DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
.150	.49	182.96	2.88	SILTY SAND to SANDY SILT	61	98	94		
.300	.98	158.95	2.99	SANDY SILT to CLAYEY SILT	64	100		9.3	
.450	1.48	80.77	3.66	CLAYEY SILT to SILTY CLAY	40	65		4.7	
.600	1.97	48.40	3.13	CLAYEY SILT to SILTY CLAY	24	39		3.2	
.750	2.46	23.50	3.24	CLAYEY SILT to SILTY CLAY	12	19		1.6	
.900	2.95	14.68	2.66	CLAYEY SILT to SILTY CLAY	7	12		1.0	
1.050	3.44	15.55	2.26	CLAYEY SILT to SILTY CLAY	8	12		1.2	
1.200	3.94	16.70	2.48	CLAYEY SILT to SILTY CLAY	8	13		1.1	
1.350	4.43	18.06	2.37	CLAYEY SILT to SILTY CLAY	9	14		1.2	
1.500	4.92	15.61	1.67	CLAYEY SILT to SILTY CLAY	8	12		1.2	
1.650	5.41	18.53	1.97	CLAYEY SILT to SILTY CLAY	9	15		1.5	
1.800	5.91	19.99	2.34	CLAYEY SILT to SILTY CLAY	10	16		1.3	
1.950	6.40	23.90	2.13	SANDY SILT to CLAYEY SILT	10	15		1.9	
2.100	6.89	30.64	1.83	SANDY SILT to CLAYEY SILT	12	20		2.4	
2.250	7.38	25.01	2.04	SANDY SILT to CLAYEY SILT	10	16		2.0	
2.400	7.87	29.25	1.88	SANDY SILT to CLAYEY SILT	12	18		2.3	
2.550	8.37	33.69	2.52	SANDY SILT to CLAYEY SILT	13	20		2.2	
2.700	8.86	43.55	2.41	SANDY SILT to CLAYEY SILT	17	25		2.9	
2.850	9.35	50.84	.86	SILTY SAND to SANDY SILT	17	24	57		40.0
3.000	9.84	49.65	2.17	SANDY SILT to CLAYEY SILT	20	27		3.3	
3.150	10.33	43.81	2.63	SANDY SILT to CLAYEY SILT	18	23		2.9	
3.300	10.83	44.30	3.02	CLAYEY SILT to SILTY CLAY	22	29		2.9	
3.450	11.32	66.90	1.12	SILTY SAND to SANDY SILT	22	28	62		40.5
3.600	11.81	120.31	2.12	SILTY SAND to SANDY SILT	40	50	78		43.5
3.750	12.30	100.72	1.24	SAND to SILTY SAND	25	31	73		42.5
3.900	12.80	59.76	2.35	SANDY SILT to CLAYEY SILT	24	28		3.9	
4.050	13.29	13.68	3.26	CLAY to SILTY CLAY	9	11		.9	
4.200	13.78	40.56	1.37	SILTY SAND to SANDY SILT	14	16	45		37.5
4.350	14.27	25.22	1.80	SANDY SILT to CLAYEY SILT	10	11		2.0	
4.500	14.76	14.64	1.93	CLAYEY SILT to SILTY CLAY	7	8		1.1	
4.650	15.26	25.15	1.40	SANDY SILT to CLAYEY SILT	10	11		1.9	
4.800	15.75	19.06	2.98	CLAYEY SILT to SILTY CLAY	10	10		1.2	
4.950	16.24	53.20	1.69	SILTY SAND to SANDY SILT	18	19	51		38.0
5.100	16.73	9.94	2.33	CLAY to SILTY CLAY	7	7		.7	
5.250	17.22	4.08	3.83	CLAY	4	4		.2	
5.400	17.72	13.36	1.37	CLAYEY SILT to SILTY CLAY	7	7		1.0	
5.550	18.21	4.89	2.42	CLAY	5	5		.3	
5.700	18.70	8.29	3.27	CLAY	8	9		.5	
5.850	19.19	8.33	4.55	CLAY	8	9		.5	
6.000	19.69	33.95	1.56	SANDY SILT to CLAYEY SILT	14	14		2.6	
6.150	20.18	11.94	4.71	CLAY	12	12		.7	

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 110 pcf
ASSUMED DEPTH OF WATER TABLE = 15.5 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

Interpretations based on: Robertson and Campanella, 1989.

SOUNDING : CPT-03A

DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
6.300	20.67	18.06	3.32	CLAY to SILTY CLAY	12	12		1.1	
6.450	21.16	12.62	3.61	CLAY to SILTY CLAY	8	8		.8	
6.600	21.65	11.00	3.77	CLAY	11	11		.7	
6.750	22.15	6.01	3.82	CLAY	6	6		.3	
6.900	22.64	7.44	3.80	CLAY	7	7		.4	
7.050	23.13	12.15	4.53	CLAY	12	12		.7	
7.200	23.62	24.24	5.31	CLAY	24	24		1.3	
7.350	24.11	9.60	4.99	CLAY	10	9		.6	
7.500	24.61	9.86	3.68	CLAY	10	10		.6	
7.650	25.10	9.88	3.80	CLAY	10	10		.6	
7.800	25.59	13.07	4.13	CLAY	13	13		.8	
7.950	26.08	13.60	3.87	CLAY	14	13		.8	
8.100	26.57	9.88	4.04	CLAY	10	9		.6	
8.250	27.07	11.26	4.84	CLAY	11	11		.7	
8.400	27.56	7.86	3.77	CLAY	8	7		.4	
8.550	28.05	5.99	5.51	CLAY	6	6		.3	
8.700	28.54	45.29	1.98	SANDY SILT to CLAYEY SILT	18	17		2.9	
8.850	29.04	43.21	3.05	CLAYEY SILT to SILTY CLAY	22	20		2.8	
9.000	29.53	19.25	2.92	CLAYEY SILT to SILTY CLAY	10	9		1.2	
9.150	30.02	10.66	6.60	CLAY	11	10		.6	
9.300	30.51	13.77	3.13	CLAY to SILTY CLAY	9	8		.8	
9.450	31.00	24.37	2.19	SANDY SILT to CLAYEY SILT	10	9		1.5	
9.600	31.50	15.59	3.25	CLAY to SILTY CLAY	10	9		.9	
9.750	31.99	9.16	3.02	CLAY to SILTY CLAY	6	5		.5	
9.900	32.48	6.25	3.77	CLAY	6	6		.3	
10.050	32.97	5.65	3.62	CLAY	6	5		.3	
10.200	33.46	5.37	2.96	CLAY	5	5		.3	
10.350	33.96	6.20	3.47	CLAY	6	5		.3	
10.500	34.45	7.46	3.08	CLAY	7	7		.4	
10.650	34.94	8.37	2.92	CLAY to SILTY CLAY	6	5		.4	
10.800	35.43	6.54	2.91	CLAY	7	6		.4	
10.950	35.93	7.14	2.77	CLAY	7	6		.4	
11.100	36.42	5.86	3.29	CLAY	6	5		.3	
11.250	36.91	9.75	2.62	CLAY to SILTY CLAY	7	6		.6	
11.400	37.40	8.77	3.40	CLAY	9	7		.4	
11.550	37.89	9.84	2.95	CLAY to SILTY CLAY	7	6		.5	
11.700	38.39	9.79	3.37	CLAY	10	8		.5	
11.850	38.88	8.14	3.04	CLAY	8	7		.4	
12.000	39.37	7.52	2.86	CLAY	8	6		.4	
12.150	39.86	7.16	3.47	CLAY	7	6		.3	
12.300	40.35	7.50	3.21	CLAY	8	6		.4	
12.450	40.85	8.60	2.53	CLAY to SILTY CLAY	6	5		.5	
12.600	41.34	8.14	4.09	CLAY	8	7		.4	
12.750	41.83	10.79	2.49	CLAY to SILTY CLAY	7	6		.7	
12.900	42.32	10.58	3.31	CLAY to SILTY CLAY	7	6		.6	
13.050	42.81	12.45	4.28	CLAY	12	10		.7	
13.200	43.31	13.32	4.83	CLAY	13	11		.7	
13.350	43.80	90.57	2.21	SILTY SAND to SANDY SILT	30	24	58		38.0
13.500	44.29	95.73	4.32	CLAYEY SILT to SILTY CLAY	48	39		5.5	
13.650	44.78	42.79	4.29	CLAY to SILTY CLAY	29	23		2.4	

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 110 pcf
ASSUMED DEPTH OF WATER TABLE = 15.5 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

SOUNDING : CPT-03A

DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
13.800	45.28	55.81	7.29	CLAY	56	45		3.1	
13.950	45.77	231.87	5.27	*VERY STIFF FINE GRAINED	100	100			
14.100	46.26	116.17	*****		0	0			.0

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 110 pcf
ASSUMED DEPTH OF WATER TABLE = 15.5 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

Interpretations based on: Robertson and Campanella, 1989.

CPT INTERPRETATIONS

SOUNDING : CPT-03B
PROJECT : AES-PANHANDLE
DATE/TIME: 11-24-98 11:30

PROJECT No.: 98-1571-1
CONE/RIG : 468/R#3 KC/MR

DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
.150	.49	2.36	48.73	ORGANIC MATERIAL	2	4		.2	
.300	.98	65.01	3.12	SANDY SILT to CLAYEY SILT	26	42		3.8	
.450	1.48	47.44	3.18	CLAYEY SILT to SILTY CLAY	24	38		3.2	
.600	1.97	32.44	2.74	CLAYEY SILT to SILTY CLAY	16	26		2.2	
.750	2.46	26.51	3.09	CLAYEY SILT to SILTY CLAY	13	21		1.8	
.900	2.95	18.65	3.38	CLAY to SILTY CLAY	12	20		1.2	
1.050	3.44	11.58	4.92	CLAY	12	19		.8	
1.200	3.94	12.24	4.82	CLAY	12	20		.8	
1.350	4.43	12.02	4.33	CLAY	12	19		.8	
1.500	4.92	13.36	3.74	CLAY	13	21		.9	
1.650	5.41	5.40	6.30	CLAY	5	9		.3	
1.800	5.91	6.50	3.54	CLAY	7	10		.4	
1.950	6.40	10.75	2.79	CLAY to SILTY CLAY	7	11		.7	
2.100	6.89	22.12	2.22	CLAYEY SILT to SILTY CLAY	11	18		1.4	
2.250	7.38	23.35	2.70	CLAYEY SILT to SILTY CLAY	12	18		1.5	
2.400	7.87	22.80	2.85	CLAYEY SILT to SILTY CLAY	11	17		1.5	
2.550	8.37	26.87	2.53	CLAYEY SILT to SILTY CLAY	13	20		1.8	
2.700	8.86	32.36	2.78	CLAYEY SILT to SILTY CLAY	16	23		2.1	
2.850	9.35	42.11	2.21	SANDY SILT to CLAYEY SILT	17	23		2.8	
3.000	9.84	33.50	3.19	CLAYEY SILT to SILTY CLAY	17	23		2.2	
3.150	10.33	31.59	3.29	CLAYEY SILT to SILTY CLAY	16	21		2.1	
3.300	10.83	27.79	3.60	CLAYEY SILT to SILTY CLAY	14	18		1.8	
3.450	11.32	23.43	4.87	CLAY	23	30		1.3	
3.600	11.81	27.24	3.82	CLAY to SILTY CLAY	18	23		1.8	
3.750	12.30	28.77	3.68	CLAYEY SILT to SILTY CLAY	14	17		1.9	
3.900	12.80	22.09	4.62	CLAY	22	26		1.4	
4.050	13.29	24.20	4.01	CLAY to SILTY CLAY	16	19		1.6	
4.200	13.78	23.09	5.24	CLAY	23	27		1.3	
4.350	14.27	50.07	2.56	SANDY SILT to CLAYEY SILT	20	23		3.3	
4.500	14.76	34.46	2.29	SANDY SILT to CLAYEY SILT	14	15		2.2	
4.650	15.26	28.11	3.98	CLAY to SILTY CLAY	19	20		1.8	
4.800	15.75	31.99	2.38	SANDY SILT to CLAYEY SILT	13	14		2.1	
4.950	16.24	14.02	3.92	CLAY	14	15		.9	
5.100	16.73	5.54	5.42	CLAY	6	6		.3	
5.250	17.22	6.63	6.18	CLAY	7	7		.4	
5.400	17.72	10.88	2.85	CLAY to SILTY CLAY	7	8		.7	
5.550	18.21	5.12	4.30	CLAY	5	5		.3	
5.700	18.70	4.61	3.47	CLAY	5	5		.2	
5.850	19.19	5.88	4.59	CLAY	6	6		.3	
6.000	19.69	10.79	4.54	CLAY	11	11		.6	
6.150	20.18	14.62	3.35	CLAY to SILTY CLAY	10	10		.9	

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 110 pcf
ASSUMED DEPTH OF WATER TABLE = 15.5 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

Interpretations based on: Robertson and Campanella, 1989.

SOUNDING : CPT-03B

DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
6.300	20.67	7.10	4.79	CLAY	7	7		.4	
6.450	21.16	4.53	6.62	CLAY	5	5		.2	
6.600	21.65	6.73	6.54	CLAY	7	7		.4	
6.750	22.15	27.85	4.56	CLAY to SILTY CLAY	19	18		1.6	
6.900	22.64	25.81	3.18	CLAYEY SILT to SILTY CLAY	13	13		1.6	
7.050	23.13	14.64	4.85	CLAY	15	14		.9	
7.200	23.62	10.01	4.60	CLAY	10	10		.6	
7.350	24.11	13.58	4.27	CLAY	14	13		.8	
7.500	24.61	11.20	5.00	CLAY	11	11		.7	
7.650	25.10	12.45	4.50	CLAY	12	12		.7	
7.800	25.59	34.95	2.17	SANDY SILT to CLAYEY SILT	14	13		2.2	
7.950	26.08	15.49	4.58	CLAY	15	15		.9	
8.100	26.57	9.18	5.99	CLAY	9	9		.5	
8.250	27.07	8.48	5.78	CLAY	8	8		.5	
8.400	27.56	10.77	5.66	CLAY	11	10		.6	
8.550	28.05	15.08	4.58	CLAY	15	14		.9	
8.700	28.54	9.79	4.29	CLAY	10	9		.5	
8.850	29.04	12.26	4.73	CLAY	12	11		.7	
9.000	29.53	11.45	4.10	CLAY	11	11		.7	
9.150	30.02	25.32	4.11	CLAY to SILTY CLAY	17	15		1.6	
9.300	30.51	50.24	1.97	SANDY SILT to CLAYEY SILT	20	18		3.2	
9.450	31.00	60.12	1.75	SILTY SAND to SANDY SILT	20	18	50		37.5
9.600	31.50	67.37	1.53	SILTY SAND to SANDY SILT	22	20	53		38.0
9.750	31.99	72.02	1.18	SILTY SAND to SANDY SILT	24	22	54		38.0
9.900	32.48	55.70	2.69	SANDY SILT to CLAYEY SILT	22	20		3.6	
10.050	32.97	74.08	2.39	SANDY SILT to CLAYEY SILT	30	26		4.8	
10.200	33.46	141.36	1.20	SAND to SILTY SAND	35	31	73		40.5
10.350	33.96	122.67	1.79	SILTY SAND to SANDY SILT	41	36	69		39.5
10.500	34.45	25.43	2.83	CLAYEY SILT to SILTY CLAY	13	11		1.6	
10.650	34.94	15.36	5.60	CLAY	15	13		.9	
10.800	35.43	32.63	3.86	CLAYEY SILT to SILTY CLAY	16	14		1.8	
10.950	35.93	85.43	3.52	SANDY SILT to CLAYEY SILT	34	30		4.9	

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 110 pcf
ASSUMED DEPTH OF WATER TABLE = 15.5 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

Interpretations based on: Robertson and Campanella, 1989.

CPT INTERPRETATIONS

SOUNDING : CPT-04 PROJECT No.: 98-1571-1
PROJECT : AES-PANHANDLE CONE/RIG : 491,#1 JH,GO
DATE/TIME: 11-23-98 12:41

DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
.150	.49	181.58	1.56	SAND to SILTY SAND	45	73	93		
.300	.98	122.84	2.68	SILTY SAND to SANDY SILT	41	65	82		
.450	1.48	85.15	2.28	SILTY SAND to SANDY SILT	28	45	72		
.600	1.97	36.35	1.76	SANDY SILT to CLAYEY SILT	15	23		2.9	
.750	2.46	21.18	1.74	SANDY SILT to CLAYEY SILT	8	14		1.7	
.900	2.95	17.34	1.92	CLAYEY SILT to SILTY CLAY	9	14		1.4	
1.050	3.44	14.00	2.37	CLAYEY SILT to SILTY CLAY	7	11		1.1	
1.200	3.94	13.49	2.60	CLAYEY SILT to SILTY CLAY	7	11		.9	
1.350	4.43	15.36	1.89	CLAYEY SILT to SILTY CLAY	8	12		1.2	
1.500	4.92	16.17	1.94	CLAYEY SILT to SILTY CLAY	8	13		1.3	
1.650	5.41	17.23	1.75	CLAYEY SILT to SILTY CLAY	9	14		1.4	
1.800	5.91	16.93	2.54	CLAYEY SILT to SILTY CLAY	8	14		1.1	
1.950	6.40	20.67	1.87	SANDY SILT to CLAYEY SILT	8	13		1.6	
2.100	6.89	22.24	1.96	SANDY SILT to CLAYEY SILT	9	14		1.7	
2.250	7.38	19.89	1.69	SANDY SILT to CLAYEY SILT	8	12		1.6	
2.400	7.87	16.57	1.67	SANDY SILT to CLAYEY SILT	7	10		1.3	
2.550	8.37	15.21	1.13	SANDY SILT to CLAYEY SILT	6	9		1.2	
2.700	8.86	18.87	2.06	CLAYEY SILT to SILTY CLAY	9	14		1.5	
2.850	9.35	19.46	1.62	SANDY SILT to CLAYEY SILT	8	11		1.5	
3.000	9.84	18.14	1.93	CLAYEY SILT to SILTY CLAY	9	12		1.4	
3.150	10.33	30.06	1.73	SANDY SILT to CLAYEY SILT	12	16		2.4	
3.300	10.83	56.15	1.69	SILTY SAND to SANDY SILT	19	24	58		39.5
3.450	11.32	46.87	.92	SILTY SAND to SANDY SILT	16	20	52		39.0
3.600	11.81	78.82	1.58	SILTY SAND to SANDY SILT	26	33	67		42.0
3.750	12.30	11.07	6.10	CLAY	11	14		.7	
3.900	12.80	9.88	4.28	CLAY	10	12		.6	
4.050	13.29	10.41	4.31	CLAY	10	13		.6	
4.200	13.78	21.73	2.07	SANDY SILT to CLAYEY SILT	9	11		1.7	
4.350	14.27	23.31	1.12	SANDY SILT to CLAYEY SILT	9	11		1.8	
4.500	14.76	6.65	3.11	CLAY	7	8		.4	
4.650	15.26	26.49	1.44	SANDY SILT to CLAYEY SILT	11	13		2.1	
4.800	15.75	26.53	1.13	SANDY SILT to CLAYEY SILT	11	13		2.1	
4.950	16.24	25.28	2.05	SANDY SILT to CLAYEY SILT	10	12		2.0	
5.100	16.73	27.17	1.88	SANDY SILT to CLAYEY SILT	11	13		2.1	
5.250	17.22	5.67	2.87	CLAY	6	7		.4	
5.400	17.72	16.51	3.78	CLAY to SILTY CLAY	11	13		1.0	
5.550	18.21	24.18	1.60	SANDY SILT to CLAYEY SILT	10	11		1.9	
5.700	18.70	10.39	6.04	CLAY	10	12		.6	
5.850	19.19	19.69	3.30	CLAYEY SILT to SILTY CLAY	10	11		1.2	
6.000	19.69	22.33	3.33	CLAYEY SILT to SILTY CLAY	11	12		1.4	
6.150	20.18	14.45	1.91	CLAYEY SILT to SILTY CLAY	7	8		1.1	

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 110 pcf
ASSUMED DEPTH OF WATER TABLE = 11.0 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

Interpretations based on: Robertson and Campanella, 1989.

SOUNDING : CPT-04

DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
6.300	20.67	13.17	3.45	CLAY to SILTY CLAY	9	10		.8	
6.450	21.16	12.81	5.35	CLAY	13	14		.8	
6.600	21.65	12.30	5.38	CLAY	12	13		.7	
6.750	22.15	9.26	4.37	CLAY	9	10		.5	
6.900	22.64	12.24	4.49	CLAY	12	13		.7	
7.050	23.13	10.81	4.47	CLAY	11	11		.6	
7.200	23.62	11.66	7.75	CLAY	12	12		.7	
7.350	24.11	16.97	6.80	CLAY	17	18		1.0	
7.500	24.61	10.94	4.90	CLAY	11	11		.6	
7.650	25.10	13.19	4.73	CLAY	13	14		.8	
7.800	25.59	15.40	5.04	CLAY	15	16		.9	
7.950	26.08	11.85	5.25	CLAY	12	12		.7	
8.100	26.57	15.32	4.71	CLAY	15	16		.9	
8.250	27.07	22.43	4.67	CLAY	22	23		1.4	
8.400	27.56	20.48	5.39	CLAY	20	20		1.1	
8.550	28.05	10.96	4.30	CLAY	11	11		.6	
8.700	28.54	21.52	4.38	CLAY	22	21		1.3	
8.850	29.04	37.37	2.93	CLAYEY SILT to SILTY CLAY	19	18		2.4	
9.000	29.53	31.08	3.02	CLAYEY SILT to SILTY CLAY	16	15		2.0	
9.150	30.02	10.35	5.14	CLAY	10	10		.6	
9.300	30.51	21.07	5.51	CLAY	21	20		1.1	
9.450	31.00	20.63	5.87	CLAY	21	20		1.1	
9.600	31.50	11.13	3.92	CLAY	11	11		.6	
9.750	31.99	13.53	2.98	CLAY to SILTY CLAY	9	9		.8	
9.900	32.48	9.28	2.59	CLAY to SILTY CLAY	6	6		.6	
10.050	32.97	6.90	3.18	CLAY	7	6		.3	
10.200	33.46	9.86	3.09	CLAY to SILTY CLAY	7	6		.5	
10.350	33.96	18.29	3.42	CLAY to SILTY CLAY	12	11		1.1	
10.500	34.45	9.52	4.38	CLAY	10	9		.5	
10.650	34.94	8.69	2.83	CLAY to SILTY CLAY	6	5		.5	
10.800	35.43	7.58	2.49	CLAY to SILTY CLAY	5	5		.5	
10.950	35.93	7.88	3.99	CLAY	8	7		.4	
11.100	36.42	8.18	3.39	CLAY	8	7		.4	
11.250	36.91	10.35	3.72	CLAY	10	9		.6	
11.400	37.40	18.04	5.26	CLAY	18	16		1.1	
11.550	37.89	12.28	7.30	CLAY	12	11		.7	
11.700	38.39	24.22	3.83	CLAY to SILTY CLAY	16	14		1.5	
11.850	38.88	8.48	10.80	CLAY	8	8		.4	
12.000	39.37	7.27	4.69	CLAY	7	6		.3	
12.150	39.86	8.71	4.23	CLAY	9	8		.4	
12.300	40.35	9.84	3.48	CLAY	10	9		.5	
12.450	40.85	9.41	4.97	CLAY	9	8		.5	
12.600	41.34	8.69	5.62	CLAY	9	8		.4	
12.750	41.83	14.15	2.65	CLAYEY SILT to SILTY CLAY	7	6		.8	
12.900	42.32	14.36	4.59	CLAY	14	12		.8	
13.050	42.81	10.41	3.73	CLAY	10	9		.5	
13.200	43.31	13.98	5.62	CLAY	14	12		.8	
13.350	43.80	20.25	6.28	CLAY	20	17		1.0	
13.500	44.29	136.54	1.74	SILTY SAND to SANDY SILT	46	39	71		39.5
13.650	44.78	151.41	1.88	SILTY SAND to SANDY SILT	50	43	74		40.5

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 110 pcf
ASSUMED DEPTH OF WATER TABLE = 11.0 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

SOUNDING : CPT-04

DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
13.800	45.28	163.78	2.19	SILTY SAND to SANDY SILT	55	46	76		41.0
13.950	45.77	218.61	2.52	SILTY SAND to SANDY SILT	73	61	84		42.5
14.100	46.26	111.96	4.64	*VERY STIFF FINE GRAINED	100	93			
14.250	46.75	154.26	4.99	*VERY STIFF FINE GRAINED	100	100			
14.400	47.24	188.46	4.54	*VERY STIFF FINE GRAINED	100	100			
14.550	47.74	294.62	5.68	*VERY STIFF FINE GRAINED	100	100			
14.700	48.23	333.95	4.99	*VERY STIFF FINE GRAINED	100	100			

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 110 pcf
ASSUMED DEPTH OF WATER TABLE = 11.0 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

Interpretations based on: Robertson and Campanella, 1989.

CPT INTERPRETATIONS

SOUNDING : CPT-05 PROJECT No.: 98-1571-1
PROJECT : AES-PANHANDLE CONE/RIG : 491,#1 JH,GO
DATE/TIME: 11-23-98 11:36

DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
.150	.49	20.03	1.75	SANDY SILT to CLAYEY SILT	8	13		1.6	
.300	.98	31.89	1.79	SANDY SILT to CLAYEY SILT	13	20		2.5	
.450	1.48	26.39	2.46	CLAYEY SILT to SILTY CLAY	13	21		1.8	
.600	1.97	22.97	3.13	CLAYEY SILT to SILTY CLAY	11	18		1.5	
.750	2.46	21.20	2.17	CLAYEY SILT to SILTY CLAY	11	17		1.7	
.900	2.95	10.88	2.39	CLAYEY SILT to SILTY CLAY	5	9		.9	
1.050	3.44	8.26	4.00	CLAY	8	13		.5	
1.200	3.94	9.24	2.38	CLAY to SILTY CLAY	6	10		.7	
1.350	4.43	6.20	3.55	CLAY	6	10		.4	
1.500	4.92	6.61	4.99	CLAY	7	11		.4	
1.650	5.41	8.69	4.14	CLAY	9	14		.6	
1.800	5.91	4.55	5.05	CLAY	5	7		.3	
1.950	6.40	3.57	5.04	CLAY	4	6		.2	
2.100	6.89	4.06	4.19	CLAY	4	6		.2	
2.250	7.38	4.44	5.18	CLAY	4	7		.3	
2.400	7.87	6.39	4.69	CLAY	6	10		.4	
2.550	8.37	6.10	4.75	CLAY	6	9		.4	
2.700	8.86	6.61	4.84	CLAY	7	9		.4	
2.850	9.35	5.76	4.69	CLAY	6	8		.3	
3.000	9.84	9.60	5.73	CLAY	10	13		.6	
3.150	10.33	19.08	4.77	CLAY	19	25		1.2	
3.300	10.83	30.85	4.51	CLAY to SILTY CLAY	21	27		1.8	
3.450	11.32	38.69	4.70	CLAY to SILTY CLAY	26	33		2.2	
3.600	11.81	26.85	5.18	CLAY	27	34		1.5	
3.750	12.30	18.06	5.65	CLAY	18	23		1.2	
3.900	12.80	17.04	4.28	CLAY	17	21		1.1	
4.050	13.29	16.25	4.55	CLAY	16	20		1.0	
4.200	13.78	16.53	4.90	CLAY	17	20		1.1	
4.350	14.27	16.59	4.82	CLAY	17	20		1.1	
4.500	14.76	14.19	3.88	CLAY	14	17		.9	
4.650	15.26	22.46	6.54	CLAY	22	27		1.3	
4.800	15.75	23.77	6.60	CLAY	24	28		1.3	
4.950	16.24	26.28	5.18	CLAY	26	31		1.5	
5.100	16.73	17.93	4.80	CLAY	18	21		1.1	
5.250	17.22	74.06	1.13	SILTY SAND to SANDY SILT	25	28	62		40.0
5.400	17.72	73.00	1.40	SILTY SAND to SANDY SILT	24	28	62		39.5
5.550	18.21	16.53	3.69	CLAY to SILTY CLAY	11	13		1.0	
5.700	18.70	6.99	3.00	CLAY	7	8		.5	
5.850	19.19	8.03	3.24	CLAY	8	9		.5	
6.000	19.69	10.69	3.18	CLAY to SILTY CLAY	7	8		.6	
6.150	20.18	6.63	2.26	CLAY to SILTY CLAY	4	5		.4	

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 110 pcf
ASSUMED DEPTH OF WATER TABLE = 11.0 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

Interpretations based on: Robertson and Campanella, 1989.

SOUNDING : CPT-05

DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
6.300	20.67	6.59	3.19	CLAY	7	7		.4	
6.450	21.16	17.89	2.68	CLAYEY SILT to SILTY CLAY	9	10		1.1	
6.600	21.65	12.47	2.65	CLAYEY SILT to SILTY CLAY	6	7		.8	
6.750	22.15	8.80	2.50	CLAY to SILTY CLAY	6	6		.6	
6.900	22.64	9.16	2.73	CLAY to SILTY CLAY	6	7		.6	
7.050	23.13	9.01	2.77	CLAY to SILTY CLAY	6	6		.6	
7.200	23.62	14.55	5.15	CLAY	15	15		.9	
7.350	24.11	27.02	5.03	CLAY	27	28		1.5	
7.500	24.61	10.69	4.02	CLAY	11	11		.6	
7.650	25.10	9.90	4.55	CLAY	10	10		.6	
7.800	25.59	10.73	2.98	CLAY to SILTY CLAY	7	7		.6	
7.950	26.08	8.58	3.50	CLAY	9	9		.5	
8.100	26.57	11.60	4.91	CLAY	12	12		.7	
8.250	27.07	11.11	2.79	CLAY to SILTY CLAY	7	7		.6	
8.400	27.56	9.96	2.71	CLAY to SILTY CLAY	7	7		.7	
8.550	28.05	11.79	3.56	CLAY	12	12		.7	
8.700	28.54	9.43	3.50	CLAY	9	9		.5	
8.850	29.04	8.84	2.71	CLAY to SILTY CLAY	6	6		.6	
9.000	29.53	8.14	2.95	CLAY to SILTY CLAY	5	5		.4	
9.150	30.02	7.31	2.87	CLAY	7	7		.5	
9.300	30.51	8.07	2.97	CLAY	8	8		.4	
9.450	31.00	17.40	4.77	CLAY	17	17		1.0	
9.600	31.50	16.61	6.68	CLAY	17	16		1.0	
9.750	31.99	32.95	5.95	CLAY	33	31		1.8	
9.900	32.48	37.31	6.00	CLAY	37	35		2.1	
10.050	32.97	61.63	3.02	SANDY SILT to CLAYEY SILT	25	23		4.0	
10.200	33.46	41.53	3.95	CLAYEY SILT to SILTY CLAY	21	19		2.3	
10.350	33.96	39.56	4.47	CLAY to SILTY CLAY	26	25		2.2	
10.500	34.45	24.37	5.87	CLAY	24	23		1.3	
10.650	34.94	34.91	3.61	CLAYEY SILT to SILTY CLAY	17	16		2.2	
10.800	35.43	16.72	4.25	CLAY	17	15		1.0	
10.950	35.93	8.46	3.07	CLAY	8	8		.4	
11.100	36.42	14.26	2.81	CLAYEY SILT to SILTY CLAY	7	6		.8	
11.250	36.91	11.39	3.07	CLAY to SILTY CLAY	8	7		.6	
11.400	37.40	9.77	3.28	CLAY to SILTY CLAY	7	6		.5	
11.550	37.89	9.62	2.60	CLAY to SILTY CLAY	6	6		.6	
11.700	38.39	7.82	2.30	CLAY to SILTY CLAY	5	5		.5	
11.850	38.88	7.88	1.90	CLAY to SILTY CLAY	5	5		.5	
12.000	39.37	8.71	3.56	CLAY	9	8		.4	
12.150	39.86	14.77	4.27	CLAY	15	13		.8	
12.300	40.35	10.35	2.90	CLAY to SILTY CLAY	7	6		.5	
12.450	40.85	12.60	5.32	CLAY	13	11		.7	
12.600	41.34	10.62	6.03	CLAY	11	9		.6	
12.750	41.83	23.58	2.04	SANDY SILT to CLAYEY SILT	9	8		1.7	
12.900	42.32	10.01	5.59	CLAY	10	9		.5	
13.050	42.81	35.76	5.34	CLAY	36	31		2.0	
13.200	43.31	18.99	3.95	CLAY to SILTY CLAY	13	11		1.1	
13.350	43.80	17.91	7.20	CLAY	18	15		1.0	
13.500	44.29	80.16	3.82	CLAYEY SILT to SILTY CLAY	40	34		4.6	
13.650	44.78	70.47	3.48	CLAYEY SILT to SILTY CLAY	35	30		4.0	

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 110 pcf
ASSUMED DEPTH OF WATER TABLE = 11.0 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

Interpretations based on: Robertson and Campanella, 1989.

SOUNDING : CPT-05

DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
13.800	45.28	67.39	4.99	*VERY STIFF FINE GRAINED	67	57			
13.950	45.77	145.02	2.42	SILTY SAND to SANDY SILT	48	40	72		40.0
14.100	46.26	159.04	3.16	SANDY SILT to CLAYEY SILT	64	53		9.2	
14.250	46.75	174.87	1.48	SAND to SILTY SAND	44	36	78		41.5
14.400	47.24	67.86	3.24	SANDY SILT to CLAYEY SILT	27	22		3.8	
14.550	47.74	87.32	5.34	*VERY STIFF FINE GRAINED	87	72			
14.700	48.23	110.81	4.90	*VERY STIFF FINE GRAINED	100	91			
14.850	48.72	91.18	5.79	*VERY STIFF FINE GRAINED	91	74			
15.000	49.21	102.72	7.51	*VERY STIFF FINE GRAINED	100	83			
15.150	49.70	147.52	4.59	*VERY STIFF FINE GRAINED	100	100			
15.300	50.20	131.34	*****		0	0			36.5

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 110 pcf
ASSUMED DEPTH OF WATER TABLE = 11.0 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

Interpretations based on: Robertson and Campanella, 1989.

CPT INTERPRETATIONS

SOUNDING : CPT-06 PROJECT No.: 98-1571-1
PROJECT : AES-PANHANDLE CONE/RIG : 491,#1 JH,GO
DATE/TIME: 11-23-98 09:59

DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
.150	.49	72.27	1.27	SILTY SAND to SANDY SILT	24	39	67		
.300	.98	59.34	1.59	SILTY SAND to SANDY SILT	20	32	61		
.450	1.48	53.86	2.37	SANDY SILT to CLAYEY SILT	22	34		3.6	
.600	1.97	49.44	4.44	CLAY to SILTY CLAY	33	53		2.9	
.750	2.46	35.76	5.00	CLAY	36	57		2.1	
.900	2.95	19.52	6.43	CLAY	20	31		1.1	
1.050	3.44	109.58	3.94	CLAYEY SILT to SILTY CLAY	55	88		6.4	
1.200	3.94	220.50	1.44	SAND to SILTY SAND	55	88	99		
1.350	4.43	135.20	2.50	SILTY SAND to SANDY SILT	45	72	85		48.0
1.500	4.92	57.04	3.43	CLAYEY SILT to SILTY CLAY	29	46		3.3	
1.650	5.41	42.23	3.81	CLAYEY SILT to SILTY CLAY	21	34		2.5	
1.800	5.91	27.07	2.98	CLAYEY SILT to SILTY CLAY	14	22		1.8	
1.950	6.40	25.22	1.32	SANDY SILT to CLAYEY SILT	10	16		2.0	
2.100	6.89	58.21	1.02	SILTY SAND to SANDY SILT	19	31	61		42.5
2.250	7.38	71.96	1.09	SAND to SILTY SAND	18	28	67		43.0
2.400	7.87	28.21	1.52	SANDY SILT to CLAYEY SILT	11	17		2.2	
2.550	8.37	26.51	1.45	SANDY SILT to CLAYEY SILT	11	16		2.1	
2.700	8.86	27.21	1.18	SANDY SILT to CLAYEY SILT	11	16		2.1	
2.850	9.35	56.66	3.05	SANDY SILT to CLAYEY SILT	23	32		3.7	
3.000	9.84	58.57	.98	SILTY SAND to SANDY SILT	20	27	60		40.5
3.150	10.33	65.35	1.06	SILTY SAND to SANDY SILT	22	29	63		41.0
3.300	10.83	72.70	.84	SAND to SILTY SAND	18	24	65		41.5
3.450	11.32	69.39	.62	SAND to SILTY SAND	17	22	63		40.5
3.600	11.81	90.14	1.47	SILTY SAND to SANDY SILT	30	37	70		42.0
3.750	12.30	64.88	1.42	SILTY SAND to SANDY SILT	22	26	60		39.5
3.900	12.80	35.50	2.69	SANDY SILT to CLAYEY SILT	14	17		2.3	
4.050	13.29	47.27	2.54	SANDY SILT to CLAYEY SILT	19	22		3.1	
4.200	13.78	37.92	1.45	SILTY SAND to SANDY SILT	13	15	43		37.5
4.350	14.27	33.08	2.16	SANDY SILT to CLAYEY SILT	13	15		2.2	
4.500	14.76	24.07	4.93	CLAY	24	27		1.4	
4.650	15.26	35.78	2.42	SANDY SILT to CLAYEY SILT	14	16		2.3	
4.800	15.75	32.87	3.13	CLAYEY SILT to SILTY CLAY	16	18		2.1	
4.950	16.24	31.31	2.39	SANDY SILT to CLAYEY SILT	13	13		2.0	
5.100	16.73	26.87	3.24	CLAYEY SILT to SILTY CLAY	13	14		1.7	
5.250	17.22	32.70	2.10	SANDY SILT to CLAYEY SILT	13	13		2.1	
5.400	17.72	35.92	2.81	CLAYEY SILT to SILTY CLAY	18	18		2.3	
5.550	18.21	55.77	2.07	SANDY SILT to CLAYEY SILT	22	22		3.7	
5.700	18.70	51.75	1.99	SANDY SILT to CLAYEY SILT	21	20		3.4	
5.850	19.19	39.71	2.00	SANDY SILT to CLAYEY SILT	16	15		2.6	
6.000	19.69	42.70	1.89	SANDY SILT to CLAYEY SILT	17	16		2.8	
6.150	20.18	40.81	1.93	SANDY SILT to CLAYEY SILT	16	15		2.6	

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 110 pcf
ASSUMED DEPTH OF WATER TABLE = 35.0 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

Interpretations based on: Robertson and Campanella, 1989.

SOUNDING : CPT-06

DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
6.300	20.67	37.14	2.16	SANDY SILT to CLAYEY SILT	15	14		2.4	
6.450	21.16	40.83	2.47	SANDY SILT to CLAYEY SILT	16	15		2.6	
6.600	21.65	38.90	1.87	SANDY SILT to CLAYEY SILT	16	14		2.5	
6.750	22.15	56.24	.64	SAND to SILTY SAND	14	13	48		37.0
6.900	22.64	162.31	1.71	SAND to SILTY SAND	41	36	78		42.0
7.050	23.13	43.45	2.11	SANDY SILT to CLAYEY SILT	17	15		2.8	
7.200	23.62	36.94	1.62	SANDY SILT to CLAYEY SILT	15	13		2.9	
7.350	24.11	43.34	2.87	SANDY SILT to CLAYEY SILT	17	15		2.8	
7.500	24.61	43.72	2.02	SANDY SILT to CLAYEY SILT	17	15		2.8	
7.650	25.10	79.20	1.00	SAND to SILTY SAND	20	17	56		38.0
7.800	25.59	51.58	2.75	SANDY SILT to CLAYEY SILT	21	17		3.3	
7.950	26.08	55.62	2.77	SANDY SILT to CLAYEY SILT	22	19		3.6	
8.100	26.57	69.28	1.92	SILTY SAND to SANDY SILT	23	19	51		37.0
8.250	27.07	86.17	2.81	SANDY SILT to CLAYEY SILT	34	28		5.0	
8.400	27.56	52.96	3.36	CLAYEY SILT to SILTY CLAY	26	22		3.0	
8.550	28.05	40.26	2.90	SANDY SILT to CLAYEY SILT	16	13		2.6	
8.700	28.54	74.42	.98	SAND to SILTY SAND	19	15	52		37.0
8.850	29.04	55.53	4.07	CLAYEY SILT to SILTY CLAY	28	22		3.2	
9.000	29.53	35.05	4.27	CLAY to SILTY CLAY	23	18		2.0	
9.150	30.02	31.76	4.63	CLAY to SILTY CLAY	21	16		1.8	
9.300	30.51	38.11	4.70	CLAY to SILTY CLAY	25	20		2.1	
9.450	31.00	93.14	3.17	SANDY SILT to CLAYEY SILT	37	29		5.4	
9.600	31.50	33.35	4.73	CLAY to SILTY CLAY	22	17		1.9	
9.750	31.99	25.83	4.51	CLAY to SILTY CLAY	17	13		1.4	
9.900	32.48	19.57	8.96	CLAY	20	15		1.2	
10.050	32.97	19.46	5.73	CLAY	19	14		1.0	
10.200	33.46	52.43	5.82	CLAY	52	39		3.0	
10.350	33.96	117.57	4.84	*VERY STIFF FINE GRAINED	100	86			
10.500	34.45	121.73	4.30	*VERY STIFF FINE GRAINED	100	88			
10.650	34.94	142.32	5.06	*VERY STIFF FINE GRAINED	100	100			
10.800	35.43	155.98	6.57	*VERY STIFF FINE GRAINED	100	100			
10.950	35.93	177.65	7.01	*VERY STIFF FINE GRAINED	100	100			
11.100	36.42	166.67	7.42	*VERY STIFF FINE GRAINED	100	100			
11.250	36.91	177.76	6.74	*VERY STIFF FINE GRAINED	100	100			
11.400	37.40	167.92	6.71	*VERY STIFF FINE GRAINED	100	100			
11.550	37.89	179.67	5.49	*VERY STIFF FINE GRAINED	100	100			

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 110 pcf
ASSUMED DEPTH OF WATER TABLE = 35.0 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

Interpretations based on: Robertson and Campanella, 1989.

CPT INTERPRETATIONS

SOUNDING : CPT-07 PROJECT No.: 98-1571-1
PROJECT : AES-PANHANDLE CONE/RIG : 491,#1 JH,GO
DATE/TIME: 11-23-98 09:21

DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
.150	.49	53.45	1.31	SILTY SAND to SANDY SILT	18	28	58		
.300	.98	32.55	2.64	SANDY SILT to CLAYEY SILT	13	21		2.2	
.450	1.48	41.68	2.09	SANDY SILT to CLAYEY SILT	17	27		2.8	
.600	1.97	24.54	1.30	SANDY SILT to CLAYEY SILT	10	16		2.0	
.750	2.46	16.78	1.49	SANDY SILT to CLAYEY SILT	7	11		1.3	
.900	2.95	71.57	.63	SAND to SILTY SAND	18	29	67		47.0
1.050	3.44	38.50	1.38	SILTY SAND to SANDY SILT	13	21	49		44.0
1.200	3.94	31.72	1.70	SANDY SILT to CLAYEY SILT	13	20		2.5	
1.350	4.43	32.76	1.43	SANDY SILT to CLAYEY SILT	13	21		2.6	
1.500	4.92	34.93	1.23	SILTY SAND to SANDY SILT	12	19	46		42.0
1.650	5.41	56.83	1.07	SILTY SAND to SANDY SILT	19	30	60		43.5
1.800	5.91	68.34	.97	SAND to SILTY SAND	17	27	65		44.0
1.950	6.40	54.56	1.04	SILTY SAND to SANDY SILT	18	29	59		42.5
2.100	6.89	44.81	.89	SILTY SAND to SANDY SILT	15	24	53		41.0
2.250	7.38	43.64	.80	SILTY SAND to SANDY SILT	15	23	53		40.5
2.400	7.87	40.54	1.41	SILTY SAND to SANDY SILT	14	21	50		39.5
2.550	8.37	38.05	.97	SILTY SAND to SANDY SILT	13	19	49		39.0
2.700	8.86	43.72	1.37	SILTY SAND to SANDY SILT	15	21	53		39.5
2.850	9.35	25.81	1.16	SANDY SILT to CLAYEY SILT	10	14		2.0	
3.000	9.84	20.37	2.60	CLAYEY SILT to SILTY CLAY	10	14		1.3	
3.150	10.33	26.15	1.72	SANDY SILT to CLAYEY SILT	10	14		2.0	
3.300	10.83	33.04	1.27	SILTY SAND to SANDY SILT	11	14	43		38.0
3.450	11.32	27.49	1.16	SANDY SILT to CLAYEY SILT	11	14		2.1	
3.600	11.81	31.85	2.76	CLAYEY SILT to SILTY CLAY	16	20		2.1	
3.750	12.30	62.69	2.36	SANDY SILT to CLAYEY SILT	25	30		4.1	
3.900	12.80	43.40	1.61	SILTY SAND to SANDY SILT	14	17	48		38.0
4.050	13.29	43.68	2.11	SANDY SILT to CLAYEY SILT	17	20		2.9	
4.200	13.78	47.50	1.52	SILTY SAND to SANDY SILT	16	18	50		38.0
4.350	14.27	41.81	1.77	SANDY SILT to CLAYEY SILT	17	19		3.3	
4.500	14.76	41.36	2.08	SANDY SILT to CLAYEY SILT	17	18		2.7	
4.650	15.26	43.72	1.60	SILTY SAND to SANDY SILT	15	16	46		37.5
4.800	15.75	38.52	2.80	SANDY SILT to CLAYEY SILT	15	17		2.5	
4.950	16.24	61.21	3.66	CLAYEY SILT to SILTY CLAY	31	32		3.5	
5.100	16.73	151.39	1.74	SAND to SILTY SAND	38	39	80		43.0
5.250	17.22	131.42	1.14	SAND to SILTY SAND	33	34	76		42.0
5.400	17.72	102.38	1.41	SAND to SILTY SAND	26	26	68		40.5
5.550	18.21	90.48	1.68	SILTY SAND to SANDY SILT	30	30	64		39.5
5.700	18.70	248.76	1.60	SAND to SILTY SAND	62	61	93		44.5
5.850	19.19	71.26	2.16	SILTY SAND to SANDY SILT	24	23	56		38.5
6.000	19.69	81.39	2.10	SILTY SAND to SANDY SILT	27	26	60		38.5
6.150	20.18	53.73	1.69	SILTY SAND to SANDY SILT	18	17	48		37.0

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 110 pcf
ASSUMED DEPTH OF WATER TABLE = 25.0 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

Interpretations based on: Robertson and Campanella, 1989.

SOUNDING : CPT-07

DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
6.300	20.67	58.06	1.50	SILTY SAND to SANDY SILT	19	18	50		37.5
6.450	21.16	65.01	1.62	SILTY SAND to SANDY SILT	22	20	52		38.0
6.600	21.65	128.02	.93	SAND to SILTY SAND	32	29	72		40.5
6.750	22.15	146.14	1.97	SILTY SAND to SANDY SILT	49	44	75		41.5
6.900	22.64	81.73	1.73	SILTY SAND to SANDY SILT	27	24	58		38.5
7.050	23.13	68.94	1.65	SILTY SAND to SANDY SILT	23	20	53		38.0
7.200	23.62	43.08	3.02	CLAYEY SILT to SILTY CLAY	22	19		2.8	
7.350	24.11	84.43	1.68	SILTY SAND to SANDY SILT	28	24	58		38.0
7.500	24.61	69.39	1.87	SILTY SAND to SANDY SILT	23	20	52		37.5
7.650	25.10	30.61	3.53	CLAYEY SILT to SILTY CLAY	15	13		1.9	
7.800	25.59	17.72	5.81	CLAY	18	15		1.1	
7.950	26.08	182.32	2.42	SILTY SAND to SANDY SILT	61	51	79		42.0
8.100	26.57	202.57	1.72	SAND to SILTY SAND	51	43	82		42.0
8.250	27.07	120.52	.94	SAND to SILTY SAND	30	25	67		39.0
8.400	27.56	88.57	1.13	SAND to SILTY SAND	22	18	58		38.0
8.550	28.05	109.37	2.00	SILTY SAND to SANDY SILT	36	30	64		38.5
8.700	28.54	154.30	2.82	SILTY SAND to SANDY SILT	51	43	74		40.5
8.850	29.04	47.95	2.57	SANDY SILT to CLAYEY SILT	19	16		3.1	
9.000	29.53	13.43	4.24	CLAY	13	11		.8	
9.150	30.02	7.78	3.21	CLAY	8	6		.4	
9.300	30.51	8.73	3.21	CLAY	9	7		.5	
9.450	31.00	8.14	3.19	CLAY	8	7		.4	
9.600	31.50	7.54	3.18	CLAY	8	6		.4	
9.750	31.99	7.95	4.03	CLAY	8	6		.4	
9.900	32.48	6.25	5.12	CLAY	6	5		.3	
10.050	32.97	6.33	4.58	CLAY	6	5		.3	
10.200	33.46	8.35	5.51	CLAY	8	7		.4	
10.350	33.96	6.50	4.46	CLAY	7	5		.3	
10.500	34.45	6.80	5.59	CLAY	7	5		.3	
10.650	34.94	9.26	6.91	CLAY	9	7		.5	
10.800	35.43	6.73	7.73	CLAY	7	5		.3	
10.950	35.93	9.79	5.41	CLAY	10	8		.5	
11.100	36.42	28.64	4.05	CLAY to SILTY CLAY	19	15		1.8	
11.250	36.91	18.76	9.91	CLAY	19	15		1.1	
11.400	37.40	64.73	2.18	SILTY SAND to SANDY SILT	22	17	47		36.0
11.550	37.89	71.19	8.61	*VERY STIFF FINE GRAINED	71	55			
11.700	38.39	124.90	5.71	*VERY STIFF FINE GRAINED	100	96			
11.850	38.88	101.49	5.45	*VERY STIFF FINE GRAINED	100	78			
12.000	39.37	135.05	4.30	*VERY STIFF FINE GRAINED	100	100			
12.150	39.86	333.82	5.76	*VERY STIFF FINE GRAINED	100	100			
12.300	40.35	277.35	6.92	*VERY STIFF FINE GRAINED	100	100			
12.450	40.85	187.95	6.30	*VERY STIFF FINE GRAINED	100	100			
12.600	41.34	180.90	6.45	*VERY STIFF FINE GRAINED	100	100			
12.750	41.83	180.88	5.36	*VERY STIFF FINE GRAINED	100	100			
12.900	42.32	167.83	6.01	*VERY STIFF FINE GRAINED	100	100			
13.050	42.81	319.33	6.11	*VERY STIFF FINE GRAINED	100	100			
13.200	43.31	250.79	6.79	*VERY STIFF FINE GRAINED	100	100			

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 110 pcf
ASSUMED DEPTH OF WATER TABLE = 25.0 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

Interpretations based on: Robertson and Campanella, 1989.

CPT INTERPRETATIONS

SOUNDING : CPT-08 PROJECT No.: 98-1571-1
PROJECT : AES-PANHANDLE CONE/RIG : 491,#1 JH,GO
DATE/TIME: 11-23-98 10:37

DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
.150	.49	15.23	1.29	SANDY SILT to CLAYEY SILT	6	10		1.2	
.300	.98	8.90	4.17	CLAY	9	14		.6	
.450	1.48	8.01	5.31	CLAY	8	13		.5	
.600	1.97	12.81	4.14	CLAY	13	20		.8	
.750	2.46	13.64	4.66	CLAY	14	22		.9	
.900	2.95	20.93	3.07	CLAYEY SILT to SILTY CLAY	10	17		1.4	
1.050	3.44	18.25	2.11	CLAYEY SILT to SILTY CLAY	9	15		1.4	
1.200	3.94	9.39	5.61	CLAY	9	15		.6	
1.350	4.43	13.09	4.76	CLAY	13	21		.9	
1.500	4.92	14.55	4.21	CLAY	15	23		1.0	
1.650	5.41	12.68	5.97	CLAY	13	20		.8	
1.800	5.91	22.60	3.73	CLAY to SILTY CLAY	15	24		1.5	
1.950	6.40	35.76	1.66	SANDY SILT to CLAYEY SILT	14	23		2.8	
2.100	6.89	34.37	1.97	SANDY SILT to CLAYEY SILT	14	22		2.3	
2.250	7.38	33.63	2.56	SANDY SILT to CLAYEY SILT	13	21		2.2	
2.400	7.87	30.66	3.42	CLAYEY SILT to SILTY CLAY	15	23		2.0	
2.550	8.37	29.91	3.63	CLAYEY SILT to SILTY CLAY	15	22		2.0	
2.700	8.86	22.80	4.03	CLAY to SILTY CLAY	15	22		1.5	
2.850	9.35	10.83	6.07	CLAY	11	15		.7	
3.000	9.84	7.69	6.37	CLAY	8	10		.5	
3.150	10.33	11.30	5.24	CLAY	11	15		.7	
3.300	10.83	22.16	4.11	CLAY to SILTY CLAY	15	19		1.4	
3.450	11.32	29.85	3.06	CLAYEY SILT to SILTY CLAY	15	19		1.9	
3.600	11.81	12.45	5.29	CLAY	12	16		.8	
3.750	12.30	20.82	6.26	CLAY	21	26		1.2	
3.900	12.80	27.75	5.55	CLAY	28	34		1.6	
4.050	13.29	12.07	6.07	CLAY	12	15		.8	
4.200	13.78	26.81	4.46	CLAY to SILTY CLAY	18	22		1.5	
4.350	14.27	56.17	1.70	SILTY SAND to SANDY SILT	19	23	56		39.0
4.500	14.76	36.29	2.19	SANDY SILT to CLAYEY SILT	15	17		2.4	
4.650	15.26	11.66	5.32	CLAY	12	14		.7	
4.800	15.75	15.15	7.07	CLAY	15	18		1.0	
4.950	16.24	21.86	6.71	CLAY	22	26		1.2	
5.100	16.73	39.20	2.57	SANDY SILT to CLAYEY SILT	16	18		2.6	
5.250	17.22	31.55	1.68	SANDY SILT to CLAYEY SILT	13	15		2.4	
5.400	17.72	10.03	4.88	CLAY	10	11		.6	
5.550	18.21	21.24	4.53	CLAY	21	24		1.3	
5.700	18.70	48.80	1.86	SILTY SAND to SANDY SILT	16	18	50		38.0
5.850	19.19	21.05	4.18	CLAY to SILTY CLAY	14	16		1.3	
6.000	19.69	15.36	6.80	CLAY	15	17		1.0	
6.150	20.18	16.04	7.59	CLAY	16	18		1.0	

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 110 pcf
ASSUMED DEPTH OF WATER TABLE = 11.0 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

Interpretations based on: Robertson and Campanella, 1989.

SOUNDING : CPT-08

DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
6.300	20.67	18.74	6.18	CLAY	19	21		1.0	
6.450	21.16	15.47	7.62	CLAY	15	17		1.0	
6.600	21.65	29.47	4.45	CLAY to SILTY CLAY	20	21		1.7	
6.750	22.15	27.75	5.48	CLAY	28	30		1.6	
6.900	22.64	11.09	6.50	CLAY	11	12		.7	
7.050	23.13	14.38	7.74	CLAY	14	15		.9	
7.200	23.62	20.56	6.36	CLAY	21	22		1.1	
7.350	24.11	25.83	4.91	CLAY	26	27		1.4	
7.500	24.61	53.28	2.69	SANDY SILT to CLAYEY SILT	21	22		3.5	
7.650	25.10	39.41	3.19	CLAYEY SILT to SILTY CLAY	20	20		2.5	
7.800	25.59	45.46	4.17	CLAYEY SILT to SILTY CLAY	23	23		2.6	
7.950	26.08	98.75	1.46	SILTY SAND to SANDY SILT	33	34	67		40.0
8.100	26.57	125.51	1.13	SAND to SILTY SAND	31	32	74		42.0
8.250	27.07	133.35	1.72	SILTY SAND to SANDY SILT	44	45	75		42.0
8.400	27.56	122.46	1.59	SAND to SILTY SAND	31	31	73		41.5
8.550	28.05	47.59	1.69	SILTY SAND to SANDY SILT	16	16	46		37.0
8.700	28.54	9.33	3.01	CLAY to SILTY CLAY	6	6		.5	
8.850	29.04	9.67	5.21	CLAY	10	10		.5	
9.000	29.53	26.79	5.22	CLAY	27	26		1.5	
9.150	30.02	10.49	3.44	CLAY	10	10		.6	
9.300	30.51	11.64	4.64	CLAY	12	11		.7	
9.450	31.00	15.32	4.01	CLAY	15	15		.9	
9.600	31.50	8.99	4.51	CLAY	9	9		.5	
9.750	31.99	14.60	4.85	CLAY	15	14		.9	
9.900	32.48	14.00	4.00	CLAY	14	13		.8	
10.050	32.97	22.24	4.22	CLAY to SILTY CLAY	15	14		1.4	
10.200	33.46	20.67	5.01	CLAY	21	19		1.3	
10.350	33.96	22.22	6.52	CLAY	22	21		1.2	
10.500	34.45	25.77	5.32	CLAY	26	24		1.4	
10.650	34.94	22.94	7.27	CLAY	23	21		1.2	
10.800	35.43	36.09	5.82	CLAY	36	33		2.0	
10.950	35.93	31.29	5.14	CLAY	31	29		1.7	
11.100	36.42	41.72	5.11	CLAY	42	38		2.3	
11.250	36.91	90.74	2.21	SILTY SAND to SANDY SILT	30	27	61		38.5
11.400	37.40	76.25	1.71	SILTY SAND to SANDY SILT	25	23	56		38.0
11.550	37.89	33.31	4.20	CLAY to SILTY CLAY	22	20		1.8	
11.700	38.39	12.47	2.99	CLAY to SILTY CLAY	8	7		.7	
11.850	38.88	12.94	3.65	CLAY to SILTY CLAY	9	8		.7	
12.000	39.37	21.95	4.86	CLAY	22	19		1.3	
12.150	39.86	34.86	6.26	CLAY	35	31		1.9	
12.300	40.35	13.43	8.29	CLAY	13	12		.7	
12.450	40.85	14.49	6.06	CLAY	14	13		.8	
12.600	41.34	15.02	4.83	CLAY	15	13		.8	
12.750	41.83	25.98	3.78	CLAY to SILTY CLAY	17	15		1.6	
12.900	42.32	34.84	4.78	CLAY	35	30		1.9	
13.050	42.81	10.69	6.06	CLAY	11	9		.6	
13.200	43.31	13.94	5.22	CLAY	14	12		.8	
13.350	43.80	16.51	4.92	CLAY	17	14		.9	
13.500	44.29	17.99	5.76	CLAY	18	15		1.0	
13.650	44.78	17.82	6.15	CLAY	18	15		1.0	

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 110 pcf
ASSUMED DEPTH OF WATER TABLE = 11.0 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

Interpretations based on: Robertson and Campanella, 1989.

SOUNDING : CPT-08

DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
13.800	45.28	22.07	5.33	CLAY	22	19		1.2	
13.950	45.77	20.23	4.93	CLAY	20	17		1.2	
14.100	46.26	16.91	4.85	CLAY	17	14		1.0	
14.250	46.75	15.02	5.49	CLAY	15	12		.8	
14.400	47.24	29.13	5.37	CLAY	29	24		1.6	
14.550	47.74	63.10	5.70	CLAY	63	52		3.6	
14.700	48.23	29.81	6.66	CLAY	30	24		1.6	
14.850	48.72	35.71	3.46	CLAYEY SILT to SILTY CLAY	18	15		2.2	
15.000	49.21	22.22	6.16	CLAY	22	18		1.1	
15.150	49.70	46.25	7.03	CLAY	46	37		2.6	
15.300	50.20	66.92	.60	SAND to SILTY SAND	17	13	49		36.5
15.450	50.69	31.53	5.72	CLAY	32	25		1.7	

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 110 pcf
ASSUMED DEPTH OF WATER TABLE = 11.0 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

Interpretations based on: Robertson and Campanella, 1989.

CPT INTERPRETATIONS

SOUNDING : CPT-09 PROJECT No.: 98-1571-1
PROJECT : AES-PANHANDLE CONE/RIG : 491,#1 JH,GO
DATE/TIME: 11-23-98 07:45

DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
.150	.49	178.69	.68	SAND	36	57	93		
.300	.98	356.89	2.19	SAND to SILTY SAND	89	100	100		
.450	1.48	550.28	2.62	*SAND to CLAYEY SAND	100	100			
.600	1.97	383.66	2.75	*SAND to CLAYEY SAND	100	100			
.750	2.46	220.61	2.29	SILTY SAND to SANDY SILT	74	100	99		
.900	2.95	191.25	2.81	SILTY SAND to SANDY SILT	64	100	95		
1.050	3.44	273.82	1.15	SAND	55	88	100		
1.200	3.94	265.88	1.61	SAND to SILTY SAND	66	100	100		
1.350	4.43	219.35	1.42	SAND to SILTY SAND	55	88	99		49.5
1.500	4.92	192.10	1.46	SAND to SILTY SAND	48	77	95		48.5
1.650	5.41	150.26	1.22	SAND to SILTY SAND	38	60	88		47.0
1.800	5.91	55.58	2.36	SANDY SILT to CLAYEY SILT	22	36		3.7	
1.950	6.40	19.74	3.95	CLAY to SILTY CLAY	13	21		1.3	
2.100	6.89	29.02	1.93	SANDY SILT to CLAYEY SILT	12	18		2.3	
2.250	7.38	33.33	1.71	SANDY SILT to CLAYEY SILT	13	20		2.6	
2.400	7.87	72.36	2.85	SANDY SILT to CLAYEY SILT	29	42		4.8	
2.550	8.37	70.26	2.06	SILTY SAND to SANDY SILT	23	33	66		42.0
2.700	8.86	60.23	1.48	SILTY SAND to SANDY SILT	20	28	61		41.0
2.850	9.35	64.07	1.59	SILTY SAND to SANDY SILT	21	29	62		41.0
3.000	9.84	94.50	1.07	SAND to SILTY SAND	24	31	73		42.5
3.150	10.33	140.28	.92	SAND to SILTY SAND	35	45	84		44.0
3.300	10.83	162.95	1.06	SAND to SILTY SAND	41	51	87		44.5
3.450	11.32	165.39	.92	SAND	33	40	87		44.5
3.600	11.81	230.12	.73	SAND	46	55	96		46.0
3.750	12.30	199.87	1.47	SAND to SILTY SAND	50	58	91		45.0
3.900	12.80	194.77	2.05	SILTY SAND to SANDY SILT	65	74	90		44.5
4.050	13.29	215.44	1.56	SAND to SILTY SAND	54	60	92		45.0
4.200	13.78	243.47	1.02	SAND	49	54	95		45.5
4.350	14.27	285.91	.77	SAND	57	62	99		46.0
4.500	14.76	394.35	.84	SAND	79	84	100		47.0
4.650	15.26	334.46	.55	GRAVELLY SAND to SAND	56	58	100		46.0
4.800	15.75	360.38	2.01	SAND to SILTY SAND	90	93	100		46.5
4.950	16.24	299.00	.67	SAND	60	61	99		45.5
5.100	16.73	336.05	.67	SAND	67	68	100		46.0
5.250	17.22	344.70	.54	GRAVELLY SAND to SAND	57	58	100		46.0
5.400	17.72	526.09	.77	GRAVELLY SAND to SAND	88	88	100		
5.550	18.21	494.83	.76	GRAVELLY SAND to SAND	82	82	100		47.0
5.700	18.70	389.12	.49	GRAVELLY SAND to SAND	65	64	100		46.5
5.850	19.19	260.08	.51	SAND	52	51	94		44.5
6.000	19.69	157.08	1.01	SAND to SILTY SAND	39	38	79		42.5
6.150	20.18	184.43	.91	SAND	37	36	84		43.0

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 120 pcf
ASSUMED DEPTH OF WATER TABLE = 15.5 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

Interpretations based on: Robertson and Campanella, 1989.

SOUNDING : CPT-09

DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
6.300	20.67	112.75	1.51	SAND to SILTY SAND	28	27	69		40.0
6.450	21.16	133.99	.83	SAND to SILTY SAND	33	32	74		41.5
6.600	21.65	142.04	1.81	SILTY SAND to SANDY SILT	47	45	76		42.0
6.750	22.15	168.75	.83	SAND	34	32	80		42.5
6.900	22.64	228.06	.84	SAND	46	43	89		44.0
7.050	23.13	283.87	.74	SAND	57	53	95		44.5
7.200	23.62	294.77	.85	SAND	59	55	96		44.5
7.350	24.11	245.51	.66	SAND	49	45	90		44.0
7.500	24.61	244.27	.43	SAND	49	45	90		44.0
7.650	25.10	238.39	.37	SAND	48	43	89		43.5
7.800	25.59	150.37	.81	SAND	30	27	76		41.5
7.950	26.08	116.85	.45	SAND	23	21	68		39.5
8.100	26.57	91.54	.44	SAND to SILTY SAND	23	20	61		38.5
8.250	27.07	120.16	1.58	SAND to SILTY SAND	30	27	69		39.5
8.400	27.56	187.34	.65	SAND	37	33	81		42.5
8.550	28.05	249.07	.42	SAND	50	44	89		43.5
8.700	28.54	284.23	.53	SAND	57	50	93		44.0
8.850	29.04	259.29	.48	SAND	52	45	90		43.5
9.000	29.53	283.72	.63	SAND	57	49	93		44.0
9.150	30.02	350.09	1.40	SAND	70	60	99		44.5
9.300	30.51	334.97	.84	SAND	67	57	97		44.5
9.450	31.00	242.70	.70	SAND	49	41	88		43.0
9.600	31.50	246.35	.73	SAND	49	42	88		43.0
9.750	31.99	250.58	.82	SAND	50	42	88		43.0
9.900	32.48	313.83	1.31	SAND	63	53	95		44.0
10.050	32.97	371.85	.77	SAND	74	62	99		44.5
10.200	33.46	555.34	.79	GRAVELLY SAND to SAND	93	77	100		
10.350	33.96	447.25	2.22	SAND to SILTY SAND	100	92	100		45.5
10.500	34.45	249.33	1.39	SAND to SILTY SAND	62	51	88		43.0
10.650	34.94	223.90	.35	SAND	45	37	84		42.5
10.800	35.43	151.56	.47	SAND	30	25	73		40.0
10.950	35.93	264.84	.53	SAND	53	43	89		43.0
11.100	36.42	138.47	.51	SAND	28	22	70		39.5
11.250	36.91	170.64	.32	SAND	34	27	76		40.5
11.400	37.40	204.57	.36	SAND	41	33	81		42.0
11.550	37.89	254.09	.93	SAND	51	40	87		42.5
11.700	38.39	252.01	.24	GRAVELLY SAND to SAND	42	33	87		42.5
11.850	38.88	234.14	.68	SAND	47	37	85		42.5
12.000	39.37	92.18	.73	SAND to SILTY SAND	23	18	58		38.0
12.150	39.86	76.18	.66	SAND to SILTY SAND	19	15	52		37.0
12.300	40.35	166.11	1.16	SAND to SILTY SAND	42	32	74		40.0
12.450	40.85	179.94	.68	SAND	36	28	77		40.5
12.600	41.34	183.83	.98	SAND	37	28	77		40.5
12.750	41.83	271.81	2.28	SILTY SAND to SANDY SILT	91	70	88		42.5
12.900	42.32	161.46	1.55	SAND to SILTY SAND	40	31	73		39.5
13.050	42.81	19.38	3.30	CLAYEY SILT to SILTY CLAY	10	7		1.1	
13.200	43.31	39.90	2.63	SANDY SILT to CLAYEY SILT	16	12		2.5	
13.350	43.80	75.59	2.62	SANDY SILT to CLAYEY SILT	30	23		4.9	
13.500	44.29	72.89	2.47	SANDY SILT to CLAYEY SILT	29	22		4.7	
13.650	44.78	82.90	2.06	SILTY SAND to SANDY SILT	28	21	53		37.0

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 120 pcf
ASSUMED DEPTH OF WATER TABLE = 15.5 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

Interpretations based on: Robertson and Campanella, 1989.

SOUNDING : CPT-09

DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
13.800	45.28	140.75	1.53	SAND to SILTY SAND	35	26	68		39.0
13.950	45.77	219.82	1.05	SAND	44	33	81		41.5
14.100	46.26	203.10	.86	SAND	41	30	79		40.5
14.250	46.75	126.68	.81	SAND to SILTY SAND	32	23	65		38.5
14.400	47.24	65.88	1.55	SILTY SAND to SANDY SILT	22	16	46		36.0
14.550	47.74	61.27	3.26	SANDY SILT to CLAYEY SILT	25	18		3.4	
14.700	48.23	266.20	.50	SAND	53	39	86		42.0
14.850	48.72	428.70	1.05	SAND	86	62	100		44.0
15.000	49.21	395.30	.53	GRAVELLY SAND to SAND	66	48	97		44.0
15.150	49.70	300.30	.65	SAND	60	43	89		42.5
15.300	50.20	371.78	.62	GRAVELLY SAND to SAND	62	45	95		43.5

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 120 pcf
ASSUMED DEPTH OF WATER TABLE = 15.5 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

Interpretations based on: Robertson and Campanella, 1989.

CPT INTERPRETATIONS

SOUNDING : CPT-10 PROJECT No.: 98-1571-1
PROJECT : AES-PANHANDLE CONE/RIG : 491,#1 JH,GO
DATE/TIME: 11-23-98 08:35

DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
.150	.49	186.51	2.95	SILTY SAND to SANDY SILT	62	99	94		
.300	.98	164.90	2.44	SILTY SAND to SANDY SILT	55	88	91		
.450	1.48	132.65	3.20	SANDY SILT to CLAYEY SILT	53	85		7.8	
.600	1.97	135.92	3.23	SANDY SILT to CLAYEY SILT	54	87		8.0	
.750	2.46	154.17	4.63	*VERY STIFF FINE GRAINED	100	100			
.900	2.95	208.88	3.81	*SAND to CLAYEY SAND	100	100			
1.050	3.44	195.81	3.24	SANDY SILT to CLAYEY SILT	78	100		11.5	
1.200	3.94	158.51	1.86	SILTY SAND to SANDY SILT	53	84	90		49.0
1.350	4.43	127.94	2.66	SILTY SAND to SANDY SILT	43	68	83		47.5
1.500	4.92	61.50	1.37	SILTY SAND to SANDY SILT	21	33	62		44.0
1.650	5.41	58.74	2.24	SANDY SILT to CLAYEY SILT	23	38		3.9	
1.800	5.91	47.08	1.60	SILTY SAND to SANDY SILT	16	25	55		42.5
1.950	6.40	31.40	1.39	SANDY SILT to CLAYEY SILT	13	20		2.5	
2.100	6.89	26.53	2.04	SANDY SILT to CLAYEY SILT	11	17		2.1	
2.250	7.38	25.28	1.53	SANDY SILT to CLAYEY SILT	10	16		2.0	
2.400	7.87	31.93	1.75	SANDY SILT to CLAYEY SILT	13	19		2.5	
2.550	8.37	78.33	2.50	SANDY SILT to CLAYEY SILT	31	46		5.2	
2.700	8.86	58.21	1.97	SILTY SAND to SANDY SILT	19	28	61		41.5
2.850	9.35	61.86	2.13	SILTY SAND to SANDY SILT	21	29	63		41.5
3.000	9.84	70.11	1.58	SILTY SAND to SANDY SILT	23	32	66		42.0
3.150	10.33	85.23	1.96	SILTY SAND to SANDY SILT	28	38	70		42.5
3.300	10.83	48.25	1.38	SILTY SAND to SANDY SILT	16	21	54		39.0
3.450	11.32	35.95	1.93	SANDY SILT to CLAYEY SILT	14	18		2.4	
3.600	11.81	39.28	2.67	SANDY SILT to CLAYEY SILT	16	19		2.6	
3.750	12.30	44.32	1.51	SILTY SAND to SANDY SILT	15	18	49		38.5
3.900	12.80	43.74	2.40	SANDY SILT to CLAYEY SILT	17	21		2.9	
4.050	13.29	46.65	1.70	SILTY SAND to SANDY SILT	16	18	50		38.0
4.200	13.78	39.45	2.04	SANDY SILT to CLAYEY SILT	16	18		2.6	
4.350	14.27	40.83	1.58	SILTY SAND to SANDY SILT	14	15	45		37.5
4.500	14.76	38.24	1.80	SANDY SILT to CLAYEY SILT	15	17		3.0	
4.650	15.26	35.76	1.92	SANDY SILT to CLAYEY SILT	14	16		2.3	
4.800	15.75	29.40	2.08	SANDY SILT to CLAYEY SILT	12	13		1.9	
4.950	16.24	30.34	2.13	SANDY SILT to CLAYEY SILT	12	13		2.0	
5.100	16.73	35.95	1.66	SANDY SILT to CLAYEY SILT	14	15		2.8	
5.250	17.22	28.98	3.30	CLAYEY SILT to SILTY CLAY	14	15		1.9	
5.400	17.72	50.92	1.83	SILTY SAND to SANDY SILT	17	17	48		37.5
5.550	18.21	115.10	1.98	SILTY SAND to SANDY SILT	38	38	71		41.0
5.700	18.70	119.08	1.74	SILTY SAND to SANDY SILT	40	39	72		41.0
5.850	19.19	88.99	1.28	SAND to SILTY SAND	22	22	63		39.0
6.000	19.69	63.05	1.38	SILTY SAND to SANDY SILT	21	20	53		38.0
6.150	20.18	35.97	2.40	SANDY SILT to CLAYEY SILT	14	14		2.3	

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 110 pcf
ASSUMED DEPTH OF WATER TABLE = 25.0 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

SOUNDING : CPT-10

DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
6.300	20.67	44.55	1.36	SILTY SAND to SANDY SILT	15	14	42		36.5
6.450	21.16	46.93	1.24	SILTY SAND to SANDY SILT	16	15	43		36.5
6.600	21.65	46.29	1.24	SILTY SAND to SANDY SILT	15	14	42		36.0
6.750	22.15	32.59	2.21	SANDY SILT to CLAYEY SILT	13	12		2.1	
6.900	22.64	19.61	3.50	CLAY to SILTY CLAY	13	12		1.2	
7.050	23.13	22.82	3.07	CLAYEY SILT to SILTY CLAY	11	10		1.4	
7.200	23.62	51.79	5.38	CLAY	52	45		3.0	
7.350	24.11	103.12	2.24	SILTY SAND to SANDY SILT	34	30	64		39.0
7.500	24.61	117.97	2.24	SILTY SAND to SANDY SILT	39	34	67		39.5
7.650	25.10	140.02	2.08	SILTY SAND to SANDY SILT	47	40	72		40.0
7.800	25.59	57.15	.90	SILTY SAND to SANDY SILT	19	16	46		36.5
7.950	26.08	67.20	1.51	SILTY SAND to SANDY SILT	22	19	51		37.0
8.100	26.57	22.77	4.22	CLAY to SILTY CLAY	15	13		1.4	
8.250	27.07	57.42	1.72	SILTY SAND to SANDY SILT	19	16	46		36.5
8.400	27.56	31.76	3.03	CLAYEY SILT to SILTY CLAY	16	13		2.0	
8.550	28.05	29.53	4.04	CLAY to SILTY CLAY	20	16		1.6	
8.700	28.54	117.00	2.13	SILTY SAND to SANDY SILT	39	32	66		39.0
8.850	29.04	65.41	1.45	SILTY SAND to SANDY SILT	22	18	49		37.0
9.000	29.53	34.46	4.04	CLAY to SILTY CLAY	23	19		1.9	
9.150	30.02	51.62	2.81	SANDY SILT to CLAYEY SILT	21	17		3.3	
9.300	30.51	138.81	1.45	SAND to SILTY SAND	35	28	70		39.5
9.450	31.00	81.18	1.79	SILTY SAND to SANDY SILT	27	22	55		37.5
9.600	31.50	110.47	.69	SAND to SILTY SAND	28	22	64		38.5
9.750	31.99	123.90	1.60	SAND to SILTY SAND	31	25	67		39.0
9.900	32.48	99.11	1.62	SILTY SAND to SANDY SILT	33	27	60		38.0
10.050	32.97	72.57	1.85	SILTY SAND to SANDY SILT	24	19	51		37.0
10.200	33.46	98.96	1.38	SAND to SILTY SAND	25	20	60		38.0
10.350	33.96	131.80	4.10	*VERY STIFF FINE GRAINED	100	100			
10.500	34.45	80.01	2.14	SILTY SAND to SANDY SILT	27	21	54		37.5
10.650	34.94	121.52	.93	SAND to SILTY SAND	30	24	66		38.5
10.800	35.43	163.56	1.54	SAND to SILTY SAND	41	32	74		40.0
10.950	35.93	127.15	1.05	SAND to SILTY SAND	32	25	67		39.0
11.100	36.42	84.79	.88	SAND to SILTY SAND	21	17	55		37.5
11.250	36.91	76.16	1.70	SILTY SAND to SANDY SILT	25	20	52		37.0
11.400	37.40	65.54	1.59	SILTY SAND to SANDY SILT	22	17	48		36.5
11.550	37.89	86.68	2.02	SILTY SAND to SANDY SILT	29	22	55		37.5
11.700	38.39	93.86	.85	SAND to SILTY SAND	23	18	58		38.0
11.850	38.88	98.38	.80	SAND to SILTY SAND	25	19	59		38.0
12.000	39.37	45.10	2.85	SANDY SILT to CLAYEY SILT	18	14		2.9	
12.150	39.86	53.28	1.85	SILTY SAND to SANDY SILT	18	14	41		34.5
12.300	40.35	91.10	.61	SAND to SILTY SAND	23	17	56		37.5
12.450	40.85	146.61	1.66	SAND to SILTY SAND	37	28	70		39.0
12.600	41.34	136.73	.68	SAND	27	21	68		39.0
12.750	41.83	103.48	.99	SAND to SILTY SAND	26	19	60		38.0
12.900	42.32	70.45	1.33	SILTY SAND to SANDY SILT	23	18	49		36.5
13.050	42.81	47.40	5.01	CLAY	47	35		2.6	
13.200	43.31	67.92	3.09	SANDY SILT to CLAYEY SILT	27	20		3.9	
13.350	43.80	104.52	1.10	SAND to SILTY SAND	26	19	60		38.0
13.500	44.29	161.95	1.93	SILTY SAND to SANDY SILT	54	40	72		39.5
13.650	44.78	91.40	1.82	SILTY SAND to SANDY SILT	30	22	56		37.5

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 110 pcf
ASSUMED DEPTH OF WATER TABLE = 25.0 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

Interpretations based on: Robertson and Campanella, 1989.

SOUNDING : CPT-10

DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
13.800	45.28	86.34	1.08	SAND to SILTY SAND	22	16	54		37.0
13.950	45.77	49.82	2.67	SANDY SILT to CLAYEY SILT	20	15		3.2	
14.100	46.26	159.55	.87	SAND	32	23	71		39.0
14.250	46.75	133.12	1.53	SAND to SILTY SAND	33	24	66		38.5
14.400	47.24	137.79	1.42	SAND to SILTY SAND	34	25	67		38.5
14.550	47.74	285.06	2.61	SILTY SAND to SANDY SILT	95	69	88		42.5
14.700	48.23	160.21	2.99	SANDY SILT to CLAYEY SILT	64	46		9.3	
14.850	48.72	150.18	3.72	SANDY SILT to CLAYEY SILT	60	43		8.7	
15.000	49.21	144.04	3.24	SANDY SILT to CLAYEY SILT	58	41		8.3	
15.150	49.70	371.13	*****		0	0			.0

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 110 pcf
ASSUMED DEPTH OF WATER TABLE = 25.0 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

Interpretations based on: Robertson and Campanella, 1989.

CPT INTERPRETATIONS

SOUNDING : CPT-11 PROJECT No.: 00-1571-1
PROJECT : AES/PANHANDLE CONE/RIG : 722/BH.GO/R#3
DATE/TIME: 04-04-00 12:28

DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
.150	.49	100.21	2.38	SILTY SAND to SANDY SILT	33	53	76		
.300	.98	98.43	4.43	*VERY STIFF FINE GRAINED	98	100			
.450	1.48	81.77	4.86	*VERY STIFF FINE GRAINED	82	100			
.600	1.97	131.97	3.36	SANDY SILT to CLAYEY SILT	53	84		7.8	
.750	2.46	79.24	6.07	*VERY STIFF FINE GRAINED	79	100			
.900	2.95	85.81	3.95	CLAYEY SILT to SILTY CLAY	43	69		5.0	
1.050	3.44	86.34	3.53	SANDY SILT to CLAYEY SILT	35	55		5.1	
1.200	3.94	98.13	3.70	CLAYEY SILT to SILTY CLAY	49	78		5.8	
1.350	4.43	109.86	3.44	SANDY SILT to CLAYEY SILT	44	70		6.4	
1.500	4.92	115.23	3.51	SANDY SILT to CLAYEY SILT	46	74		6.8	
1.650	5.41	139.39	1.32	SAND to SILTY SAND	35	56	86		46.5
1.800	5.91	93.84	4.58	*VERY STIFF FINE GRAINED	94	100			
1.950	6.40	101.64	4.90	*VERY STIFF FINE GRAINED	100	100			
2.100	6.89	125.15	3.81	SANDY SILT to CLAYEY SILT	50	78		7.3	
2.250	7.38	135.71	3.14	SANDY SILT to CLAYEY SILT	54	82		8.0	
2.400	7.87	109.11	2.93	SANDY SILT to CLAYEY SILT	44	63		6.4	
2.550	8.37	61.89	3.25	SANDY SILT to CLAYEY SILT	25	35		3.6	
2.700	8.86	45.93	3.03	SANDY SILT to CLAYEY SILT	18	25		3.0	
2.850	9.35	40.79	3.31	CLAYEY SILT to SILTY CLAY	20	27		2.7	
3.000	9.84	36.16	3.84	CLAYEY SILT to SILTY CLAY	18	24		2.1	
3.150	10.33	55.62	2.12	SANDY SILT to CLAYEY SILT	22	28		3.7	
3.300	10.83	74.36	1.13	SILTY SAND to SANDY SILT	25	31	65		41.0
3.450	11.32	39.22	4.51	CLAY to SILTY CLAY	26	32		2.3	
3.600	11.81	42.02	3.71	CLAYEY SILT to SILTY CLAY	21	25		2.4	
3.750	12.30	45.00	3.44	CLAYEY SILT to SILTY CLAY	23	26		2.6	
3.900	12.80	46.80	3.65	CLAYEY SILT to SILTY CLAY	23	27		2.7	
4.050	13.29	47.89	3.70	CLAYEY SILT to SILTY CLAY	24	27		2.8	
4.200	13.78	49.56	3.49	CLAYEY SILT to SILTY CLAY	25	27		2.9	
4.350	14.27	51.71	3.52	CLAYEY SILT to SILTY CLAY	26	28		3.0	
4.500	14.76	31.76	5.16	CLAY	32	34		1.8	
4.650	15.26	22.39	3.31	CLAYEY SILT to SILTY CLAY	11	12		1.4	
4.800	15.75	54.60	3.63	CLAYEY SILT to SILTY CLAY	27	28		3.2	
4.950	16.24	59.87	3.57	CLAYEY SILT to SILTY CLAY	30	30		3.5	
5.100	16.73	56.68	3.46	CLAYEY SILT to SILTY CLAY	28	28		3.3	
5.250	17.22	77.56	2.91	SANDY SILT to CLAYEY SILT	31	31		4.5	
5.400	17.72	96.24	2.20	SILTY SAND to SANDY SILT	32	31	65		39.5
5.550	18.21	32.59	5.43	CLAY	33	31		1.9	
5.700	18.70	17.91	2.23	CLAYEY SILT to SILTY CLAY	9	8		1.3	
5.850	19.19	18.82	2.28	CLAYEY SILT to SILTY CLAY	9	9		1.4	
6.000	19.69	18.87	2.91	CLAYEY SILT to SILTY CLAY	9	9		1.2	
6.150	20.18	14.60	2.12	CLAYEY SILT to SILTY CLAY	7	7		1.1	

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 120 pcf
ASSUMED DEPTH OF WATER TABLE = 25.0 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

Interpretations based on: Robertson and Campanella, 1989.

SOUNDING : CPT-11

DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
6.300	20.67	16.40	2.80	CLAYEY SILT to SILTY CLAY	8	7		1.0	
6.450	21.16	15.59	4.49	CLAY	16	14		1.0	
6.600	21.65	15.15	2.97	CLAYEY SILT to SILTY CLAY	8	7		.9	
6.750	22.15	13.68	3.07	CLAY to SILTY CLAY	9	8		.8	
6.900	22.64	14.91	2.55	CLAYEY SILT to SILTY CLAY	7	6		.9	
7.050	23.13	21.29	3.99	CLAY to SILTY CLAY	14	12		1.3	
7.200	23.62	33.69	3.41	CLAYEY SILT to SILTY CLAY	17	14		2.2	
7.350	24.11	53.18	3.31	CLAYEY SILT to SILTY CLAY	27	22		3.0	
7.500	24.61	106.61	2.54	SILTY SAND to SANDY SILT	36	29	63		38.5
7.650	25.10	82.15	1.97	SILTY SAND to SANDY SILT	27	22	55		38.0
7.800	25.59	21.86	6.63	CLAY	22	18		1.2	
7.950	26.08	33.12	4.08	CLAY to SILTY CLAY	22	18		1.9	
8.100	26.57	38.92	3.60	CLAYEY SILT to SILTY CLAY	19	16		2.5	
8.250	27.07	51.69	3.31	CLAYEY SILT to SILTY CLAY	26	21		2.9	
8.400	27.56	27.13	5.42	CLAY	27	22		1.5	
8.550	28.05	19.50	7.44	CLAY	20	15		1.2	
8.700	28.54	48.50	4.10	CLAYEY SILT to SILTY CLAY	24	19		2.8	
8.850	29.04	45.08	4.13	CLAYEY SILT to SILTY CLAY	23	18		2.5	
9.000	29.53	32.63	3.49	CLAYEY SILT to SILTY CLAY	16	13		2.1	
9.150	30.02	76.78	2.93	SANDY SILT to CLAYEY SILT	31	24		4.4	
9.300	30.51	116.93	2.92	SANDY SILT to CLAYEY SILT	47	36		6.8	
9.450	31.00	120.12	2.98	SANDY SILT to CLAYEY SILT	48	37		7.0	
9.600	31.50	104.67	2.89	SANDY SILT to CLAYEY SILT	42	32		6.0	
9.750	31.99	106.35	2.00	SILTY SAND to SANDY SILT	35	27	61		38.0
9.900	32.48	147.57	2.22	SILTY SAND to SANDY SILT	49	38	70		39.0
10.050	32.97	183.36	1.13	SAND to SILTY SAND	46	35	76		40.5
10.200	33.46	201.06	2.16	SILTY SAND to SANDY SILT	67	51	79		41.0
10.350	33.96	271.95	2.80	SILTY SAND to SANDY SILT	91	68	88		42.5
10.500	34.45	305.78	1.55	SAND to SILTY SAND	76	57	91		43.0
10.650	34.94	325.30	1.15	SAND	65	49	92		43.5
10.800	35.43	335.09	.50	GRAVELLY SAND to SAND	56	42	93		43.5
10.950	35.93	279.84	.58	SAND	56	42	88		42.5
11.100	36.42	260.65	.83	SAND	52	39	86		42.0
11.250	36.91	305.59	1.22	SAND	61	45	90		43.0
11.400	37.40	339.94	1.00	SAND	68	50	93		43.5
11.550	37.89	290.37	.46	SAND	58	42	89		42.5
11.700	38.39	162.42	.23	SAND	32	24	72		39.0
11.850	38.88	121.92	1.53	SAND to SILTY SAND	30	22	63		38.0
12.000	39.37	52.22	3.10	SANDY SILT to CLAYEY SILT	21	15		3.3	
12.150	39.86	41.75	4.62	CLAY to SILTY CLAY	28	20		2.3	
12.300	40.35	88.78	1.72	SILTY SAND to SANDY SILT	30	21	54		37.0
12.450	40.85	127.58	2.09	SILTY SAND to SANDY SILT	43	30	64		38.5
12.600	41.34	113.94	2.45	SILTY SAND to SANDY SILT	38	27	61		38.0
12.750	41.83	104.16	1.56	SILTY SAND to SANDY SILT	35	25	58		37.5
12.900	42.32	129.95	2.62	SILTY SAND to SANDY SILT	43	31	65		38.5
13.050	42.81	114.98	2.98	SANDY SILT to CLAYEY SILT	46	32		6.6	
13.200	43.31	53.98	3.30	CLAYEY SILT to SILTY CLAY	27	19		3.0	
13.350	43.80	43.11	3.90	CLAYEY SILT to SILTY CLAY	22	15		2.4	
13.500	44.29	43.98	4.05	CLAYEY SILT to SILTY CLAY	22	15		2.4	
13.650	44.78	21.82	6.69	CLAY	22	15		1.1	

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 120 pcf
ASSUMED DEPTH OF WATER TABLE = 25.0 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

Interpretations based on: Robertson and Campanella, 1989.

SOUNDING : CPT-11

DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
13.800	45.28	118.16	2.40	SILTY SAND to SANDY SILT	39	27	61		38.0
13.950	45.77	143.32	2.41	SILTY SAND to SANDY SILT	48	33	67		38.5
14.100	46.26	36.50	6.96	CLAY	37	25		2.0	
14.250	46.75	50.99	3.82	CLAYEY SILT to SILTY CLAY	25	17		2.8	
14.400	47.24	42.40	5.17	CLAY	42	29		2.3	
14.550	47.74	50.39	4.88	CLAY to SILTY CLAY	34	23		2.8	
14.700	48.23	18.04	5.93	CLAY	18	12		1.0	
14.850	48.72	50.37	4.29	CLAYEY SILT to SILTY CLAY	25	17		2.8	
15.000	49.21	43.98	5.28	CLAY	44	30		2.4	
15.150	49.70	42.02	4.81	CLAY to SILTY CLAY	28	19		2.3	
15.300	50.20	18.93	5.97	CLAY	19	13		.9	
15.450	50.69	18.12	5.85	CLAY	18	12		1.0	
15.600	51.18	31.89	5.24	CLAY	32	21		1.7	
15.750	51.67	21.39	5.70	CLAY	21	14		1.1	
15.900	52.17	18.42	7.00	CLAY	18	12		1.0	
16.050	52.66	107.10	3.07	SANDY SILT to CLAYEY SILT	43	28		6.1	
16.200	53.15	107.31	3.27	SANDY SILT to CLAYEY SILT	43	28		6.1	
16.350	53.64	95.47	3.12	SANDY SILT to CLAYEY SILT	38	25		5.4	
16.500	54.13	40.90	6.50	CLAY	41	27		2.2	
16.650	54.63	81.47	2.14	SILTY SAND to SANDY SILT	27	18	49		36.0
16.800	55.12	106.88	1.27	SAND to SILTY SAND	27	17	57		37.0
16.950	55.61	46.36	8.50	CLAY	46	30		2.5	
17.100	56.10	289.06	2.40	SILTY SAND to SANDY SILT	96	62	85		41.5
17.250	56.59	404.76	1.62	SAND to SILTY SAND	100	65	94		43.0
17.400	57.09	343.17	1.99	SAND to SILTY SAND	86	55	90		42.0
17.550	57.58	364.33	2.48	SILTY SAND to SANDY SILT	100	78	91		42.5
17.700	58.07	330.04	2.48	SILTY SAND to SANDY SILT	100	70	88		42.0
17.850	58.56	397.77	1.62	SAND to SILTY SAND	99	63	94		42.5
18.000	59.06	350.20	2.05	SAND to SILTY SAND	88	56	90		42.0
18.150	59.55	358.46	2.11	SAND to SILTY SAND	90	57	90		42.0
18.300	60.04	379.05	1.78	SAND to SILTY SAND	95	60	92		42.5

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 120 pcf
ASSUMED DEPTH OF WATER TABLE = 25.0 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

Interpretations based on: Robertson and Campanella, 1989.

CPT INTERPRETATIONS

SOUNDING : CPT-12 PROJECT No.: 00-1571-1
PROJECT : AES/PANHANDLE CONE/RIG : 722/BH.GO/R#3
DATE/TIME: 04-04-00 08:45

DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
.150	.49	63.22	3.01	SANDY SILT to CLAYEY SILT	25	40		4.2	
.300	.98	38.79	4.51	CLAY to SILTY CLAY	26	41		2.3	
.450	1.48	48.18	5.42	CLAY	48	77		2.8	
.600	1.97	57.40	2.07	SANDY SILT to CLAYEY SILT	23	37		3.8	
.750	2.46	58.76	4.08	CLAYEY SILT to SILTY CLAY	29	47		3.4	
.900	2.95	27.92	5.66	CLAY	28	45		1.6	
1.050	3.44	31.17	6.13	CLAY	31	50		1.8	
1.200	3.94	43.40	5.28	CLAY	43	69		2.5	
1.350	4.43	53.09	4.16	CLAYEY SILT to SILTY CLAY	27	42		3.1	
1.500	4.92	46.27	5.30	CLAY	46	74		2.7	
1.650	5.41	56.62	4.72	CLAY to SILTY CLAY	38	60		3.3	
1.800	5.91	66.43	4.46	CLAYEY SILT to SILTY CLAY	33	53		3.9	
1.950	6.40	70.45	4.94	*VERY STIFF FINE GRAINED	70	100			
2.100	6.89	71.89	5.06	*VERY STIFF FINE GRAINED	72	100			
2.250	7.38	59.29	5.01	CLAY to SILTY CLAY	40	59		3.5	
2.400	7.87	63.31	4.23	CLAYEY SILT to SILTY CLAY	32	46		3.7	
2.550	8.37	69.32	4.28	CLAYEY SILT to SILTY CLAY	35	49		4.0	
2.700	8.86	68.20	3.39	SANDY SILT to CLAYEY SILT	27	37		4.0	
2.850	9.35	82.32	2.26	SILTY SAND to SANDY SILT	27	37	70		42.5
3.000	9.84	85.36	4.46	CLAYEY SILT to SILTY CLAY	43	56		5.0	
3.150	10.33	71.45	4.98	*VERY STIFF FINE GRAINED	71	91			
3.300	10.83	98.87	3.21	SANDY SILT to CLAYEY SILT	40	49		5.8	
3.450	11.32	103.16	4.38	*VERY STIFF FINE GRAINED	100	100			
3.600	11.81	92.10	4.58	*VERY STIFF FINE GRAINED	92	100			
3.750	12.30	74.91	4.61	CLAY to SILTY CLAY	50	58		4.4	
3.900	12.80	115.81	3.56	SANDY SILT to CLAYEY SILT	46	53		6.8	
4.050	13.29	141.11	3.15	SANDY SILT to CLAYEY SILT	56	63		8.3	
4.200	13.78	95.33	3.35	SANDY SILT to CLAYEY SILT	38	42		5.6	
4.350	14.27	72.78	3.15	SANDY SILT to CLAYEY SILT	29	31		4.2	
4.500	14.76	46.99	2.15	SANDY SILT to CLAYEY SILT	19	20		3.1	
4.650	15.26	99.83	2.11	SILTY SAND to SANDY SILT	33	35	68		40.5
4.800	15.75	83.28	3.39	SANDY SILT to CLAYEY SILT	33	34		4.8	
4.950	16.24	58.68	3.68	CLAYEY SILT to SILTY CLAY	29	30		3.4	
5.100	16.73	39.66	4.29	CLAY to SILTY CLAY	26	26		2.3	
5.250	17.22	41.98	4.17	CLAY to SILTY CLAY	28	28		2.4	
5.400	17.72	52.43	3.64	CLAYEY SILT to SILTY CLAY	26	25		3.0	
5.550	18.21	65.77	2.87	SANDY SILT to CLAYEY SILT	26	25		4.3	
5.700	18.70	67.01	2.54	SANDY SILT to CLAYEY SILT	27	25		4.4	
5.850	19.19	80.22	2.62	SANDY SILT to CLAYEY SILT	32	30		5.3	
6.000	19.69	72.13	2.94	SANDY SILT to CLAYEY SILT	29	27		4.2	
6.150	20.18	58.00	3.64	CLAYEY SILT to SILTY CLAY	29	26		3.3	

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 120 pcf
ASSUMED DEPTH OF WATER TABLE = 27.0 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

SOUNDING : CPT-12

DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
6.300	20.67	71.96	2.97	SANDY SILT to CLAYEY SILT	29	26		4.2	
6.450	21.16	125.62	3.10	SANDY SILT to CLAYEY SILT	50	45		7.3	
6.600	21.65	167.01	2.56	SILTY SAND to SANDY SILT	56	49	78		42.0
6.750	22.15	107.54	3.51	SANDY SILT to CLAYEY SILT	43	37		6.2	
6.900	22.64	73.29	3.42	SANDY SILT to CLAYEY SILT	29	25		4.2	
7.050	23.13	61.38	3.81	CLAYEY SILT to SILTY CLAY	31	26		3.5	
7.200	23.62	18.76	3.14	CLAYEY SILT to SILTY CLAY	9	8		1.2	
7.350	24.11	16.89	2.78	CLAYEY SILT to SILTY CLAY	8	7		1.0	
7.500	24.61	22.77	3.86	CLAY to SILTY CLAY	15	12		1.4	
7.650	25.10	18.82	4.73	CLAY	19	15		1.2	
7.800	25.59	42.70	3.26	CLAYEY SILT to SILTY CLAY	21	17		2.7	
7.950	26.08	28.32	5.51	CLAY	28	23		1.6	
8.100	26.57	21.65	4.71	CLAY	22	17		1.3	
8.250	27.07	18.95	3.59	CLAY to SILTY CLAY	13	10		1.2	
8.400	27.56	16.12	3.60	CLAY to SILTY CLAY	11	8		1.0	
8.550	28.05	14.47	3.94	CLAY	14	11		.9	
8.700	28.54	15.87	3.40	CLAY to SILTY CLAY	11	8		.9	
8.850	29.04	16.23	4.44	CLAY	16	13		1.0	
9.000	29.53	47.80	4.35	CLAY to SILTY CLAY	32	24		2.7	
9.150	30.02	20.50	4.39	CLAY	21	16		1.2	
9.300	30.51	50.69	2.51	SANDY SILT to CLAYEY SILT	20	15		3.3	
9.450	31.00	30.64	5.19	CLAY	31	23		1.7	
9.600	31.50	15.89	2.96	CLAYEY SILT to SILTY CLAY	8	6		.9	
9.750	31.99	14.26	2.81	CLAYEY SILT to SILTY CLAY	7	5		.8	
9.900	32.48	14.40	3.13	CLAY to SILTY CLAY	10	7		.8	
10.050	32.97	15.30	3.33	CLAY to SILTY CLAY	10	8		.9	
10.200	33.46	14.47	3.46	CLAY to SILTY CLAY	10	7		.8	
10.350	33.96	42.26	3.19	CLAYEY SILT to SILTY CLAY	21	16		2.7	
10.500	34.45	21.69	4.75	CLAY	22	16		1.3	
10.650	34.94	60.06	3.96	CLAYEY SILT to SILTY CLAY	30	22		3.4	
10.800	35.43	204.76	1.01	SAND	41	30	79		40.5
10.950	35.93	203.31	1.25	SAND to SILTY SAND	51	37	78		40.5
11.100	36.42	214.40	1.80	SAND to SILTY SAND	54	39	80		41.0
11.250	36.91	247.42	1.57	SAND to SILTY SAND	62	45	84		42.0
11.400	37.40	243.51	1.20	SAND	49	35	83		42.0
11.550	37.89	142.94	1.36	SAND to SILTY SAND	36	26	68		38.5
11.700	38.39	51.90	4.35	CLAY to SILTY CLAY	35	25		2.9	
11.850	38.88	23.43	4.18	CLAY to SILTY CLAY	16	11		1.4	
12.000	39.37	23.62	2.03	SANDY SILT to CLAYEY SILT	9	7		1.7	
12.150	39.86	114.15	2.57	SILTY SAND to SANDY SILT	38	27	61		38.0
12.300	40.35	24.39	2.87	CLAYEY SILT to SILTY CLAY	12	9		1.5	
12.450	40.85	45.15	3.48	CLAYEY SILT to SILTY CLAY	23	16		2.5	
12.600	41.34	58.70	3.65	CLAYEY SILT to SILTY CLAY	29	21		3.3	
12.750	41.83	25.60	6.29	CLAY	26	18		1.4	
12.900	42.32	16.76	3.10	CLAYEY SILT to SILTY CLAY	8	6		.9	
13.050	42.81	25.03	6.11	CLAY	25	17		1.3	
13.200	43.31	37.16	5.46	CLAY	37	26		2.0	
13.350	43.80	22.24	6.79	CLAY	22	15		1.2	
13.500	44.29	74.59	2.41	SANDY SILT to CLAYEY SILT	30	21		4.8	
13.650	44.78	80.67	1.75	SILTY SAND to SANDY SILT	27	18	50		36.0

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 120 pcf
ASSUMED DEPTH OF WATER TABLE = 27.0 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

Interpretations based on: Robertson and Campanella, 1989.

SOUNDING : CPT-12

DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
13.800	45.28	34.50	5.42	CLAY	35	24		1.9	
13.950	45.77	21.61	3.98	CLAY to SILTY CLAY	14	10		1.3	
14.100	46.26	15.57	4.05	CLAY	16	11		.9	
14.250	46.75	17.44	4.99	CLAY	17	12		1.0	
14.400	47.24	16.53	4.11	CLAY	17	11		.9	
14.550	47.74	14.87	3.03	CLAY to SILTY CLAY	10	7		.8	
14.700	48.23	13.58	3.39	CLAY to SILTY CLAY	9	6		.7	
14.850	48.72	12.94	3.17	CLAY to SILTY CLAY	9	6		.7	
15.000	49.21	17.00	3.76	CLAY to SILTY CLAY	11	8		.9	
15.150	49.70	61.46	2.38	SANDY SILT to CLAYEY SILT	25	16		3.9	
15.300	50.20	53.39	*****		0	0			.0

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 120 pcf
ASSUMED DEPTH OF WATER TABLE = 27.0 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

Interpretations based on: Robertson and Campanella, 1989.

CPT INTERPRETATIONS

SOUNDING : CPT-13 PROJECT No.: 00-1571-1
PROJECT : AES/PANHANDLE CONE/RIG : 722/BH.GO/R#3
DATE/TIME: 04-05-00 12:34

DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
.150	.49	92.63	1.49	SILTY SAND to SANDY SILT	31	49	74		
.300	.98	107.60	3.53	SANDY SILT to CLAYEY SILT	43	69		6.3	
.450	1.48	86.96	3.35	SANDY SILT to CLAYEY SILT	35	56		5.1	
.600	1.97	90.33	3.45	SANDY SILT to CLAYEY SILT	36	58		5.3	
.750	2.46	118.84	3.32	SANDY SILT to CLAYEY SILT	48	76		7.0	
.900	2.95	160.33	3.41	SANDY SILT to CLAYEY SILT	64	100		9.4	
1.050	3.44	123.77	4.10	*VERY STIFF FINE GRAINED	100	100			
1.200	3.94	77.76	4.78	*VERY STIFF FINE GRAINED	78	100			
1.350	4.43	73.34	2.88	SANDY SILT to CLAYEY SILT	29	47		4.9	
1.500	4.92	69.83	1.30	SILTY SAND to SANDY SILT	23	37	66		44.5
1.650	5.41	71.13	1.14	SILTY SAND to SANDY SILT	24	38	67		44.0
1.800	5.91	63.52	1.50	SILTY SAND to SANDY SILT	21	34	63		43.0
1.950	6.40	77.93	1.21	SILTY SAND to SANDY SILT	26	42	69		44.0
2.100	6.89	108.09	1.50	SAND to SILTY SAND	27	42	79		45.0
2.250	7.38	57.19	1.75	SILTY SAND to SANDY SILT	19	29	60		42.0
2.400	7.87	119.44	.98	SAND to SILTY SAND	30	43	81		44.5
2.550	8.37	153.90	.83	SAND	31	43	89		45.5
2.700	8.86	48.20	3.20	CLAYEY SILT to SILTY CLAY	24	33		3.2	
2.850	9.35	34.14	3.10	CLAYEY SILT to SILTY CLAY	17	23		2.2	
3.000	9.84	25.81	3.45	CLAYEY SILT to SILTY CLAY	13	17		1.7	
3.150	10.33	9.86	5.78	CLAY	10	13		.6	
3.300	10.83	10.73	4.38	CLAY	11	13		.7	
3.450	11.32	11.88	4.12	CLAY	12	14		.7	
3.600	11.81	32.87	1.95	SANDY SILT to CLAYEY SILT	13	16		2.6	
3.750	12.30	27.60	2.75	CLAYEY SILT to SILTY CLAY	14	16		1.8	
3.900	12.80	69.90	1.44	SILTY SAND to SANDY SILT	23	27	60		39.5
4.050	13.29	52.52	.82	SILTY SAND to SANDY SILT	18	20	52		38.5
4.200	13.78	18.02	4.61	CLAY	18	20		1.1	
4.350	14.27	107.03	1.40	SAND to SILTY SAND	27	29	71		41.5
4.500	14.76	140.98	1.74	SILTY SAND to SANDY SILT	47	50	79		42.5
4.650	15.26	155.79	1.51	SAND to SILTY SAND	39	41	81		43.0
4.800	15.75	171.53	1.68	SAND to SILTY SAND	43	44	83		43.5
4.950	16.24	180.43	1.62	SAND to SILTY SAND	45	46	84		43.5
5.100	16.73	218.89	1.22	SAND	44	44	89		44.0
5.250	17.22	225.62	1.15	SAND	45	44	90		44.0
5.400	17.72	231.02	1.49	SAND to SILTY SAND	58	56	90		44.0
5.550	18.21	255.07	1.05	SAND	51	49	93		44.5
5.700	18.70	258.32	1.05	SAND	52	49	93		44.5
5.850	19.19	214.08	1.22	SAND to SILTY SAND	54	50	87		43.5
6.000	19.69	158.49	.83	SAND	32	29	78		42.0
6.150	20.18	88.48	.40	SAND to SILTY SAND	22	20	61		38.5

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 120 pcf
ASSUMED DEPTH OF WATER TABLE = 20.0 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

SOUNDING : CPT-13

DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
6.300	20.67	31.57	2.15	SANDY SILT to CLAYEY SILT	13	11		2.0	
6.450	21.16	73.23	.85	SAND to SILTY SAND	18	16	55		38.0
6.600	21.65	47.99	.71	SILTY SAND to SANDY SILT	16	14	43		36.0
6.750	22.15	41.62	2.23	SANDY SILT to CLAYEY SILT	17	15		2.7	
6.900	22.64	46.84	3.22	CLAYEY SILT to SILTY CLAY	23	21		3.0	
7.050	23.13	36.18	4.04	CLAY to SILTY CLAY	24	21		2.0	
7.200	23.62	143.11	1.56	SAND to SILTY SAND	36	31	73		40.5
7.350	24.11	184.49	1.22	SAND to SILTY SAND	46	40	81		42.0
7.500	24.61	211.49	1.39	SAND to SILTY SAND	53	46	84		42.5
7.650	25.10	197.56	1.70	SAND to SILTY SAND	49	43	82		42.5
7.800	25.59	180.54	1.60	SAND to SILTY SAND	45	39	79		42.0
7.950	26.08	193.52	1.22	SAND to SILTY SAND	48	41	81		42.0
8.100	26.57	244.27	.98	SAND	49	41	88		43.0
8.250	27.07	248.88	.80	SAND	50	42	88		43.0
8.400	27.56	210.20	.72	SAND	42	35	83		42.5
8.550	28.05	178.05	.84	SAND	36	30	78		41.5
8.700	28.54	160.10	1.75	SAND to SILTY SAND	40	33	75		40.5
8.850	29.04	172.72	1.43	SAND to SILTY SAND	43	36	77		41.0
9.000	29.53	170.32	1.00	SAND	34	28	77		41.0
9.150	30.02	185.08	.64	SAND	37	30	79		41.5
9.300	30.51	249.01	.84	SAND	50	41	87		43.0
9.450	31.00	458.61	1.22	SAND	92	74	100		45.5
9.600	31.50	393.71	.58	GRAVELLY SAND to SAND	66	53	100		44.5
9.750	31.99	267.20	.93	SAND	53	43	89		43.0
9.900	32.48	130.95	2.23	SILTY SAND to SANDY SILT	44	35	68		39.0
10.050	32.97	191.46	.57	SAND	38	31	79		41.5
10.200	33.46	219.67	.58	SAND	44	35	83		42.0
10.350	33.96	187.76	.46	SAND	38	30	78		41.0
10.500	34.45	222.92	1.51	SAND to SILTY SAND	56	44	83		42.0
10.650	34.94	183.11	.34	SAND	37	29	77		41.0
10.800	35.43	144.97	.49	SAND	29	23	70		39.5
10.950	35.93	138.62	.66	SAND	28	22	69		39.0
11.100	36.42	160.97	.81	SAND	32	25	73		39.5
11.250	36.91	156.26	.28	SAND	31	24	72		39.5
11.400	37.40	123.07	.50	SAND	25	19	65		38.5
11.550	37.89	149.22	1.08	SAND to SILTY SAND	37	28	71		39.0
11.700	38.39	137.62	.44	SAND	28	21	68		39.0
11.850	38.88	137.24	.66	SAND	27	21	68		39.0
12.000	39.37	148.10	.29	SAND	30	22	70		39.0
12.150	39.86	128.23	.49	SAND	26	19	66		38.5
12.300	40.35	123.62	.40	SAND	25	18	65		38.5
12.450	40.85	96.26	.62	SAND to SILTY SAND	24	18	57		37.5
12.600	41.34	86.98	.70	SAND to SILTY SAND	22	16	54		37.0
12.750	41.83	121.07	.59	SAND	24	18	64		38.5
12.900	42.32	96.39	1.11	SAND to SILTY SAND	24	18	57		37.5
13.050	42.81	89.95	1.20	SAND to SILTY SAND	22	17	55		37.0
13.200	43.31	169.89	1.02	SAND	34	25	73		39.5
13.350	43.80	285.85	1.42	SAND to SILTY SAND	71	52	88		42.5
13.500	44.29	326.30	1.90	SAND to SILTY SAND	82	59	92		43.0

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 120 pcf
ASSUMED DEPTH OF WATER TABLE = 20.0 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

Interpretations based on: Robertson and Campanella, 1989.

CPT INTERPRETATIONS

SOUNDING : CPT-14 PROJECT No.: 00-1571-1
PROJECT : AES/PANHANDLE CONE/RIG : 722/BH.GO/R#3
DATE/TIME: 04-04-00 07:57

DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
.150	.49	39.37	1.90	SANDY SILT to CLAYEY SILT	16	25		2.6	
.300	.98	49.29	2.58	SANDY SILT to CLAYEY SILT	20	32		3.3	
.450	1.48	34.35	3.36	CLAYEY SILT to SILTY CLAY	17	27		2.3	
.600	1.97	23.09	3.13	CLAYEY SILT to SILTY CLAY	12	18		1.5	
.750	2.46	16.61	2.57	CLAYEY SILT to SILTY CLAY	8	13		1.1	
.900	2.95	18.36	2.48	CLAYEY SILT to SILTY CLAY	9	15		1.2	
1.050	3.44	19.97	2.90	CLAYEY SILT to SILTY CLAY	10	16		1.3	
1.200	3.94	27.87	3.86	CLAY to SILTY CLAY	19	30		1.8	
1.350	4.43	61.38	3.24	SANDY SILT to CLAYEY SILT	25	39		3.6	
1.500	4.92	48.91	2.63	SANDY SILT to CLAYEY SILT	20	31		3.2	
1.650	5.41	53.35	2.37	SANDY SILT to CLAYEY SILT	21	34		3.5	
1.800	5.91	65.12	2.32	SANDY SILT to CLAYEY SILT	26	42		4.3	
1.950	6.40	62.67	2.44	SANDY SILT to CLAYEY SILT	25	40		4.2	
2.100	6.89	58.59	2.26	SANDY SILT to CLAYEY SILT	23	36		3.9	
2.250	7.38	50.88	3.19	CLAYEY SILT to SILTY CLAY	25	38		3.4	
2.400	7.87	58.23	2.75	SANDY SILT to CLAYEY SILT	23	34		3.9	
2.550	8.37	78.99	2.15	SILTY SAND to SANDY SILT	26	37	70		42.5
2.700	8.86	102.97	1.70	SILTY SAND to SANDY SILT	34	47	77		43.5
2.850	9.35	150.63	.67	SAND	30	40	87		45.0
3.000	9.84	138.58	2.88	SANDY SILT to CLAYEY SILT	55	72		8.1	
3.150	10.33	65.69	1.67	SILTY SAND to SANDY SILT	22	28	62		40.5
3.300	10.83	30.42	3.84	CLAYEY SILT to SILTY CLAY	15	19		2.0	
3.450	11.32	46.44	1.96	SANDY SILT to CLAYEY SILT	19	23		3.1	
3.600	11.81	44.32	2.72	SANDY SILT to CLAYEY SILT	18	21		2.9	
3.750	12.30	40.45	1.72	SANDY SILT to CLAYEY SILT	16	19		3.2	
3.900	12.80	32.25	2.56	SANDY SILT to CLAYEY SILT	13	15		2.1	
4.050	13.29	24.35	2.57	CLAYEY SILT to SILTY CLAY	12	14		1.6	
4.200	13.78	21.63	3.33	CLAYEY SILT to SILTY CLAY	11	12		1.4	
4.350	14.27	49.71	1.78	SILTY SAND to SANDY SILT	17	18	49		38.0
4.500	14.76	83.68	1.35	SILTY SAND to SANDY SILT	28	30	64		39.5
4.650	15.26	31.72	1.11	SILTY SAND to SANDY SILT	11	11	35		36.0
4.800	15.75	8.24	3.33	CLAY	8	9		.5	
4.950	16.24	23.58	2.54	CLAYEY SILT to SILTY CLAY	12	12		1.5	
5.100	16.73	44.55	.95	SILTY SAND to SANDY SILT	15	15	45		37.0
5.250	17.22	11.28	2.93	CLAY to SILTY CLAY	8	8		.7	
5.400	17.72	8.18	4.00	CLAY	8	8		.5	
5.550	18.21	9.52	5.44	CLAY	10	10		.6	
5.700	18.70	8.35	1.85	CLAYEY SILT to SILTY CLAY	4	4		.6	
5.850	19.19	5.57	2.88	CLAY	6	6		.4	
6.000	19.69	25.03	2.28	SANDY SILT to CLAYEY SILT	10	10		1.6	
6.150	20.18	60.36	2.19	SANDY SILT to CLAYEY SILT	24	24		3.9	

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 120 pcf
ASSUMED DEPTH OF WATER TABLE = 15.0 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

Interpretations based on: Robertson and Campanella, 1989.

SOUNDING : CPT-14

DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
6.300	20.67	22.05	2.97	CLAYEY SILT to SILTY CLAY	11	11		1.4	
6.450	21.16	50.18	1.54	SILTY SAND to SANDY SILT	17	16	46		37.0
6.600	21.65	87.40	1.99	SILTY SAND to SANDY SILT	29	28	62		39.0
6.750	22.15	71.00	.93	SAND to SILTY SAND	18	17	56		38.0
6.900	22.64	32.82	1.12	SILTY SAND to SANDY SILT	11	10	33		34.0
7.050	23.13	16.08	4.16	CLAY	16	15		1.0	
7.200	23.62	21.27	3.50	CLAY to SILTY CLAY	14	13		1.3	
7.350	24.11	7.52	1.75	CLAY to SILTY CLAY	5	5		.5	
7.500	24.61	9.52	1.84	CLAYEY SILT to SILTY CLAY	5	4		.6	
7.650	25.10	24.43	4.53	CLAY	24	22		1.3	
7.800	25.59	8.41	4.48	CLAY	8	8		.5	
7.950	26.08	7.12	2.57	CLAY to SILTY CLAY	5	4		.4	
8.100	26.57	7.90	3.49	CLAY	8	7		.4	
8.250	27.07	10.11	4.03	CLAY	10	9		.6	
8.400	27.56	14.30	3.80	CLAY to SILTY CLAY	10	8		.8	
8.550	28.05	21.71	6.03	CLAY	22	19		1.2	
8.700	28.54	13.98	5.54	CLAY	14	12		.8	
8.850	29.04	10.03	4.45	CLAY	10	9		.6	
9.000	29.53	9.09	6.75	CLAY	9	8		.5	
9.150	30.02	41.38	3.56	CLAYEY SILT to SILTY CLAY	21	18		2.3	
9.300	30.51	30.19	3.56	CLAYEY SILT to SILTY CLAY	15	13		1.9	
9.450	31.00	8.48	3.56	CLAY	8	7		.4	
9.600	31.50	15.19	5.79	CLAY	15	13		.9	
9.750	31.99	25.85	5.66	CLAY	26	22		1.4	
9.900	32.48	18.31	5.68	CLAY	18	15		1.1	
10.050	32.97	18.87	5.94	CLAY	19	16		1.0	
10.200	33.46	24.98	7.04	CLAY	25	21		1.4	
10.350	33.96	25.43	6.28	CLAY	25	21		1.4	
10.500	34.45	14.68	6.91	CLAY	15	12		.8	
10.650	34.94	42.53	4.52	CLAY to SILTY CLAY	28	23		2.4	
10.800	35.43	30.32	6.78	CLAY	30	25		1.7	
10.950	35.93	22.90	6.68	CLAY	23	19		1.2	
11.100	36.42	42.04	4.59	CLAY to SILTY CLAY	28	23		2.3	
11.250	36.91	41.41	4.76	CLAY to SILTY CLAY	28	22		2.3	
11.400	37.40	57.55	4.35	CLAYEY SILT to SILTY CLAY	29	23		3.3	
11.550	37.89	64.20	3.72	CLAYEY SILT to SILTY CLAY	32	26		3.6	
11.700	38.39	50.20	3.92	CLAYEY SILT to SILTY CLAY	25	20		2.8	
11.850	38.88	38.16	7.02	CLAY	38	30		2.1	
12.000	39.37	83.60	2.30	SILTY SAND to SANDY SILT	28	22	55		37.5
12.150	39.86	121.71	3.21	SANDY SILT to CLAYEY SILT	49	38		7.0	
12.300	40.35	107.52	3.43	SANDY SILT to CLAYEY SILT	43	34		6.2	
12.450	40.85	77.93	1.54	SILTY SAND to SANDY SILT	26	20	53		37.0
12.600	41.34	110.75	3.35	SANDY SILT to CLAYEY SILT	44	34		6.4	
12.750	41.83	89.84	2.36	SILTY SAND to SANDY SILT	30	23	57		37.5
12.900	42.32	80.60	4.81	*VERY STIFF FINE GRAINED	81	62			
13.050	42.81	113.26	1.40	SAND to SILTY SAND	28	22	63		38.5
13.200	43.31	94.92	2.74	SANDY SILT to CLAYEY SILT	38	29		5.4	
13.350	43.80	116.76	1.27	SAND to SILTY SAND	29	22	64		38.5
13.500	44.29	81.24	3.27	SANDY SILT to CLAYEY SILT	32	25		4.6	
13.650	44.78	91.40	4.32	CLAYEY SILT to SILTY CLAY	46	34		5.2	

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 120 pcf
ASSUMED DEPTH OF WATER TABLE = 15.0 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

Interpretations based on: Robertson and Campanella, 1989.

SOUNDING : CPT-14

DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
13.800	45.28	190.88	2.38	SILTY SAND to SANDY SILT	64	48	77		40.5
13.950	45.77	107.97	3.10	SANDY SILT to CLAYEY SILT	43	32		6.2	
14.100	46.26	120.16	2.66	SILTY SAND to SANDY SILT	40	30	64		38.5
14.250	46.75	138.49	3.73	SANDY SILT to CLAYEY SILT	55	41		8.0	
14.400	47.24	236.20	1.22	SAND	47	35	83		42.0
14.550	47.74	208.94	1.19	SAND	42	31	79		41.0
14.700	48.23	173.38	1.05	SAND to SILTY SAND	43	32	74		39.5
14.850	48.72	151.75	1.22	SAND to SILTY SAND	38	28	70		39.0
15.000	49.21	44.51	5.41	CLAY	45	32		2.4	
15.150	49.70	39.94	5.68	CLAY	40	29		2.2	
15.300	50.20	65.58	2.42	SANDY SILT to CLAYEY SILT	26	19		4.2	

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 120 pcf
ASSUMED DEPTH OF WATER TABLE = 15.0 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

Interpretations based on: Robertson and Campanella, 1989.

CPT INTERPRETATIONS

SOUNDING : CPT-15 PROJECT No.: 00-1571-1
PROJECT : AES/PANHANDLE CONE/RIG : 722/BH.GO/R#3
DATE/TIME: 04-04-00 09:24

DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
.150	.49	60.78	2.85	SANDY SILT to CLAYEY SILT	24	39		4.1	
.300	.98	56.57	4.09	CLAYEY SILT to SILTY CLAY	28	45		3.3	
.450	1.48	81.75	1.98	SILTY SAND to SANDY SILT	27	44	71		
.600	1.97	123.75	1.31	SAND to SILTY SAND	31	49	82		
.750	2.46	101.27	2.29	SILTY SAND to SANDY SILT	34	54	77		48.5
.900	2.95	155.66	1.40	SAND to SILTY SAND	39	62	89		49.5
1.050	3.44	200.66	2.15	SILTY SAND to SANDY SILT	67	100	96		
1.200	3.94	125.30	1.85	SILTY SAND to SANDY SILT	42	67	83		47.5
1.350	4.43	135.01	1.74	SILTY SAND to SANDY SILT	45	72	85		47.5
1.500	4.92	143.08	1.72	SAND to SILTY SAND	36	57	87		47.0
1.650	5.41	243.38	.61	SAND	49	78	100		49.0
1.800	5.91	311.66	1.20	SAND	62	100	100		49.5
1.950	6.40	232.01	1.35	SAND to SILTY SAND	58	93	100		48.0
2.100	6.89	223.62	1.15	SAND	45	70	99		47.5
2.250	7.38	223.50	.85	SAND	45	67	99		47.5
2.400	7.87	246.12	.94	SAND	49	72	100		47.5
2.550	8.37	257.27	.66	SAND	51	73	100		47.5
2.700	8.86	270.17	.39	SAND	54	74	100		47.5
2.850	9.35	366.71	2.76	*SAND to CLAYEY SAND	100	100			
3.000	9.84	211.96	2.82	SILTY SAND to SANDY SILT	71	92	96		46.0
3.150	10.33	101.30	.58	SAND to SILTY SAND	25	32	74		43.0
3.300	10.83	27.00	2.88	CLAYEY SILT to SILTY CLAY	14	17		1.8	
3.450	11.32	13.58	2.84	CLAY to SILTY CLAY	9	11		.9	
3.600	11.81	10.75	3.03	CLAY to SILTY CLAY	7	9		.7	
3.750	12.30	12.66	4.62	CLAY	13	15		.8	
3.900	12.80	9.45	6.49	CLAY	9	11		.6	
4.050	13.29	29.85	2.14	SANDY SILT to CLAYEY SILT	12	13		1.9	
4.200	13.78	21.03	3.58	CLAY to SILTY CLAY	14	15		1.3	
4.350	14.27	6.84	4.06	CLAY	7	7		.4	
4.500	14.76	9.41	4.22	CLAY	9	10		.6	
4.650	15.26	30.87	.96	SILTY SAND to SANDY SILT	10	11	35		36.0
4.800	15.75	26.19	1.59	SANDY SILT to CLAYEY SILT	10	11		2.0	
4.950	16.24	15.13	4.83	CLAY	15	16		.9	
5.100	16.73	21.33	3.31	CLAYEY SILT to SILTY CLAY	11	11		1.4	
5.250	17.22	8.77	9.97	CLAY	9	9		.5	
5.400	17.72	106.35	1.06	SAND to SILTY SAND	27	27	69		40.5
5.550	18.21	259.91	2.00	SAND to SILTY SAND	65	65	94		45.0
5.700	18.70	277.24	.85	SAND	55	55	96		45.0
5.850	19.19	355.53	.94	SAND	71	70	100		46.0
6.000	19.69	312.47	1.09	SAND	62	61	99		45.5
6.150	20.18	244.42	1.18	SAND	49	48	92		44.5

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 120 pcf
ASSUMED DEPTH OF WATER TABLE = 15.0 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

Interpretations based on: Robertson and Campanella, 1989.

SOUNDING : CPT-15

DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
6.300	20.67	307.77	.82	SAND	62	60	98		45.0
6.450	21.16	389.76	1.01	SAND	78	75	100		46.0
6.600	21.65	284.13	1.33	SAND	57	54	96		45.0
6.750	22.15	228.38	.29	SAND	46	43	89		44.0
6.900	22.64	30.10	3.97	CLAY to SILTY CLAY	20	19		1.9	
7.050	23.13	43.76	1.11	SILTY SAND to SANDY SILT	15	14	41		36.0
7.200	23.62	39.37	.59	SILTY SAND to SANDY SILT	13	12	38		36.0
7.350	24.11	37.16	1.42	SILTY SAND to SANDY SILT	12	11	36		35.0
7.500	24.61	56.51	1.73	SILTY SAND to SANDY SILT	19	17	48		37.0
7.650	25.10	102.63	1.28	SAND to SILTY SAND	26	24	65		39.0
7.800	25.59	119.80	.65	SAND	24	22	69		40.0
7.950	26.08	193.90	.90	SAND	39	35	83		42.5
8.100	26.57	388.89	.71	SAND	78	70	100		45.5
8.250	27.07	298.96	.72	SAND	60	54	95		44.5
8.400	27.56	241.55	1.25	SAND	48	43	89		43.5
8.550	28.05	235.31	1.39	SAND to SILTY SAND	59	52	88		43.5
8.700	28.54	218.38	.91	SAND	44	38	86		43.0
8.850	29.04	222.50	1.45	SAND to SILTY SAND	56	49	86		43.0
9.000	29.53	348.54	.95	SAND	70	61	99		45.0
9.150	30.02	314.10	.64	SAND	63	54	96		44.5
9.300	30.51	256.85	.76	SAND	51	44	90		43.5
9.450	31.00	304.44	.84	SAND	61	52	94		44.0
9.600	31.50	263.33	.67	SAND	53	45	90		43.5
9.750	31.99	226.19	.22	SAND	45	38	86		42.5
9.900	32.48	215.29	.33	SAND	43	36	84		42.5
10.050	32.97	244.46	.43	SAND	49	41	88		43.0
10.200	33.46	214.55	.36	SAND	43	36	84		42.5
10.350	33.96	84.41	.57	SAND to SILTY SAND	21	18	57		38.0
10.500	34.45	92.01	2.18	SILTY SAND to SANDY SILT	31	25	59		38.0
10.650	34.94	210.79	.41	SAND	42	35	83		42.0
10.800	35.43	230.65	.72	SAND	46	38	85		42.5
10.950	35.93	333.16	.50	GRAVELLY SAND to SAND	56	45	96		44.0
11.100	36.42	360.48	.77	SAND	72	59	98		44.5
11.250	36.91	417.04	.62	GRAVELLY SAND to SAND	70	56	100		45.0
11.400	37.40	363.10	.36	GRAVELLY SAND to SAND	61	49	98		44.5
11.550	37.89	380.47	.56	GRAVELLY SAND to SAND	63	51	99		44.5
11.700	38.39	317.10	.34	GRAVELLY SAND to SAND	53	42	94		44.0
11.850	38.88	350.14	.59	GRAVELLY SAND to SAND	58	46	96		44.0
12.000	39.37	508.81	.85	GRAVELLY SAND to SAND	85	67	100		45.5
12.150	39.86	495.77	.77	GRAVELLY SAND to SAND	83	65	100		45.5
12.300	40.35	542.70	.61	GRAVELLY SAND to SAND	90	71	100		
12.450	40.85	464.20	.46	GRAVELLY SAND to SAND	77	60	100		45.0
12.600	41.34	489.65	.52	GRAVELLY SAND to SAND	82	63	100		45.5
12.750	41.83	457.10	.42	GRAVELLY SAND to SAND	76	59	100		45.0
12.900	42.32	400.57	.60	GRAVELLY SAND to SAND	67	51	99		44.5
13.050	42.81	287.12	.48	SAND	57	44	90		43.0
13.200	43.31	191.67	.54	SAND	38	29	78		40.5
13.350	43.80	214.91	1.38	SAND to SILTY SAND	54	41	81		41.5
13.500	44.29	222.54	.88	SAND	45	34	82		42.0
13.650	44.78	182.98	1.07	SAND	37	28	76		40.0

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 120 pcf
ASSUMED DEPTH OF WATER TABLE = 15.0 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

Interpretations based on: Robertson and Campanella, 1989.

SOUNDING : CPT-15

DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
13.800	45.28	153.90	.49	SAND	31	23	71		39.0
13.950	45.77	91.50	1.89	SILTY SAND to SANDY SILT	31	23	56		37.5
14.100	46.26	48.59	3.05	SANDY SILT to CLAYEY SILT	19	14		3.1	
14.250	46.75	15.72	5.46	CLAY	16	12		.9	
14.400	47.24	43.53	3.76	CLAYEY SILT to SILTY CLAY	22	16		2.4	
14.550	47.74	15.74	5.49	CLAY	16	12		.9	
14.700	48.23	24.26	7.05	CLAY	24	18		1.3	
14.850	48.72	84.00	2.46	SANDY SILT to CLAYEY SILT	34	25		5.4	
15.000	49.21	33.06	4.50	CLAY to SILTY CLAY	22	16		1.8	
15.150	49.70	9.52	2.53	CLAY to SILTY CLAY	6	5		.5	
15.300	50.20	9.45	5.38	CLAY	9	7		.4	

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 120 pcf
ASSUMED DEPTH OF WATER TABLE = 15.0 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

Interpretations based on: Robertson and Campanella, 1989.

CPT INTERPRETATIONS

SOUNDING : CPT-16 PROJECT No.: 00-1571-1
PROJECT : AES/PANHANDLE CONE/RIG : 722/BH.GO/R#3
DATE/TIME: 04-04-00 10:16

DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
.150	.49	51.58	2.53	SANDY SILT to CLAYEY SILT	21	33		3.4	
.300	.98	24.05	4.28	CLAY to SILTY CLAY	16	26		1.6	
.450	1.48	15.68	6.56	CLAY	16	25		1.0	
.600	1.97	69.17	1.94	SILTY SAND to SANDY SILT	23	37	66		48.0
.750	2.46	98.79	1.90	SILTY SAND to SANDY SILT	33	53	76		48.5
.900	2.95	165.84	1.31	SAND to SILTY SAND	41	66	91		
1.050	3.44	185.81	1.30	SAND to SILTY SAND	46	74	94		
1.200	3.94	221.33	1.28	SAND to SILTY SAND	55	88	99		
1.350	4.43	218.52	1.60	SAND to SILTY SAND	55	87	99		49.5
1.500	4.92	179.56	1.45	SAND to SILTY SAND	45	72	93		48.0
1.650	5.41	187.55	.88	SAND	38	60	94		48.0
1.800	5.91	115.78	1.56	SAND to SILTY SAND	29	46	81		46.0
1.950	6.40	125.43	.98	SAND to SILTY SAND	31	50	83		46.0
2.100	6.89	105.74	1.04	SAND to SILTY SAND	26	41	78		44.5
2.250	7.38	129.59	3.00	SANDY SILT to CLAYEY SILT	52	78		7.6	
2.400	7.87	141.60	1.31	SAND to SILTY SAND	35	52	86		45.5
2.550	8.37	151.69	.28	SAND	30	43	88		45.5
2.700	8.86	101.93	1.35	SAND to SILTY SAND	25	35	77		43.5
2.850	9.35	155.13	1.34	SAND to SILTY SAND	39	52	88		45.0
3.000	9.84	224.43	1.78	SAND to SILTY SAND	56	73	98		46.5
3.150	10.33	282.81	2.00	SAND to SILTY SAND	71	90	100		47.0
3.300	10.83	286.91	.97	SAND	57	71	100		47.0
3.450	11.32	368.09	.80	SAND	74	89	100		47.5
3.600	11.81	377.10	.32	GRAVELLY SAND to SAND	63	75	100		47.5
3.750	12.30	266.71	.90	SAND	53	62	99		46.0
3.900	12.80	270.55	1.54	SAND to SILTY SAND	68	77	99		46.0
4.050	13.29	282.77	1.70	SAND to SILTY SAND	71	79	100		46.0
4.200	13.78	200.85	.79	SAND	40	44	90		44.5
4.350	14.27	119.67	.61	SAND	24	26	74		42.0
4.500	14.76	35.16	1.11	SILTY SAND to SANDY SILT	12	13	39		36.5
4.650	15.26	11.28	1.66	CLAYEY SILT to SILTY CLAY	6	6		.8	
4.800	15.75	12.66	2.18	CLAYEY SILT to SILTY CLAY	6	7		.9	
4.950	16.24	62.65	.98	SILTY SAND to SANDY SILT	21	22	55		38.5
5.100	16.73	9.77	3.53	CLAY	10	10		.6	
5.250	17.22	19.29	1.68	SANDY SILT to CLAYEY SILT	8	8		1.5	
5.400	17.72	7.97	3.98	CLAY	8	8		.5	
5.550	18.21	17.72	2.70	CLAYEY SILT to SILTY CLAY	9	9		1.1	
5.700	18.70	169.81	1.01	SAND	34	34	82		43.0
5.850	19.19	251.64	1.01	SAND	50	50	93		44.5
6.000	19.69	240.77	1.60	SAND to SILTY SAND	60	60	92		44.5
6.150	20.18	241.94	.83	SAND	48	48	92		44.5

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 120 pcf
ASSUMED DEPTH OF WATER TABLE = 14.5 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

Interpretations based on: Robertson and Campanella, 1989.

SOUNDING : CPT-16

DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
6.300	20.67	225.36	.77	SAND	45	44	90		44.0
6.450	21.16	151.18	.82	SAND	30	29	78		42.0
6.600	21.65	212.11	.94	SAND	42	41	87		43.5
6.750	22.15	149.35	.45	SAND	30	29	77		42.0
6.900	22.64	120.54	.52	SAND	24	23	71		40.5
7.050	23.13	118.50	.54	SAND	24	22	70		40.5
7.200	23.62	139.58	1.55	SAND to SILTY SAND	35	33	75		41.5
7.350	24.11	286.53	1.44	SAND to SILTY SAND	72	67	95		44.5
7.500	24.61	266.86	.89	SAND	53	50	93		44.0
7.650	25.10	282.11	.19	GRAVELLY SAND to SAND	47	43	94		44.5
7.800	25.59	138.77	.89	SAND to SILTY SAND	35	32	74		41.0
7.950	26.08	32.53	1.30	SILTY SAND to SANDY SILT	11	10	32		33.5
8.100	26.57	30.91	.63	SILTY SAND to SANDY SILT	10	9	30		33.0
8.250	27.07	23.05	1.60	SANDY SILT to CLAYEY SILT	9	8		1.7	
8.400	27.56	44.23	1.05	SILTY SAND to SANDY SILT	15	13	40		36.0
8.550	28.05	96.88	2.28	SILTY SAND to SANDY SILT	32	29	63		39.0
8.700	28.54	194.05	1.35	SAND to SILTY SAND	49	43	82		42.5
8.850	29.04	320.97	.53	GRAVELLY SAND to SAND	53	47	97		44.5
9.000	29.53	326.15	.81	SAND	65	57	97		44.5
9.150	30.02	314.85	.76	SAND	63	55	96		44.5
9.300	30.51	366.20	.50	GRAVELLY SAND to SAND	61	53	100		45.0
9.450	31.00	362.90	.31	GRAVELLY SAND to SAND	60	52	100		45.0
9.600	31.50	354.77	.30	GRAVELLY SAND to SAND	59	51	99		45.0
9.750	31.99	214.04	.37	SAND	43	37	84		42.5
9.900	32.48	184.32	.26	SAND	37	31	80		42.0
10.050	32.97	167.69	.16	SAND	34	28	77		41.5
10.200	33.46	65.84	3.62	CLAYEY SILT to SILTY CLAY	33	28		3.8	
10.350	33.96	89.38	2.14	SILTY SAND to SANDY SILT	30	25	59		38.0
10.500	34.45	70.64	2.93	SANDY SILT to CLAYEY SILT	28	24		4.0	
10.650	34.94	68.09	1.75	SILTY SAND to SANDY SILT	23	19	51		37.0
10.800	35.43	60.23	1.64	SILTY SAND to SANDY SILT	20	17	47		36.5
10.950	35.93	25.15	4.44	CLAY to SILTY CLAY	17	14		1.4	
11.100	36.42	26.83	2.75	CLAYEY SILT to SILTY CLAY	13	11		1.6	
11.250	36.91	44.87	3.80	CLAYEY SILT to SILTY CLAY	22	18		2.5	
11.400	37.40	208.94	.72	SAND	42	34	82		42.0
11.550	37.89	216.06	.70	SAND	43	35	83		42.0
11.700	38.39	221.77	.48	SAND	44	36	83		42.0
11.850	38.88	168.60	1.16	SAND to SILTY SAND	42	34	75		40.5
12.000	39.37	253.83	1.11	SAND	51	40	87		42.5
12.150	39.86	429.42	2.00	SAND to SILTY SAND	100	85	100		45.0
12.300	40.35	405.35	.99	SAND	81	64	100		44.5
12.450	40.85	375.33	.60	GRAVELLY SAND to SAND	63	49	98		44.5
12.600	41.34	342.70	.41	GRAVELLY SAND to SAND	57	45	95		44.0
12.750	41.83	313.17	.29	GRAVELLY SAND to SAND	52	41	92		43.5
12.900	42.32	336.39	.36	GRAVELLY SAND to SAND	56	43	94		44.0
13.050	42.81	358.17	.79	SAND	72	55	96		44.0
13.200	43.31	417.78	.89	SAND	84	64	100		44.5
13.350	43.80	571.80	1.31	SAND	100	87	100		
13.500	44.29	571.27	1.06	SAND	100	87	100		
13.650	44.78	529.78	.63	GRAVELLY SAND to SAND	88	67	100		

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 120 pcf
ASSUMED DEPTH OF WATER TABLE = 14.5 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

Interpretations based on: Robertson and Campanella, 1989.

SOUNDING : CPT-16

DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
13.800	45.28	386.12	.34	GRAVELLY SAND to SAND	64	49	98		44.0
13.950	45.77	324.13	.41	GRAVELLY SAND to SAND	54	41	92		43.5
14.100	46.26	273.57	.36	GRAVELLY SAND to SAND	46	34	88		42.5
14.250	46.75	253.56	.37	SAND	51	38	85		42.0
14.400	47.24	76.50	1.52	SILTY SAND to SANDY SILT	26	19	51		36.5
14.550	47.74	21.18	4.16	CLAY to SILTY CLAY	14	10		1.2	
14.700	48.23	65.82	1.85	SILTY SAND to SANDY SILT	22	16	46		36.0
14.850	48.72	44.49	3.51	CLAYEY SILT to SILTY CLAY	22	16		2.4	
15.000	49.21	27.19	5.34	CLAY	27	20		1.4	
15.150	49.70	35.31	4.63	CLAY to SILTY CLAY	24	17		1.9	
15.300	50.20	36.20	5.89	CLAY	36	26		2.0	

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 120 pcf
ASSUMED DEPTH OF WATER TABLE = 14.5 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

Interpretations based on: Robertson and Campanella, 1989.

CPT INTERPRETATIONS

SOUNDING : CPT-17
PROJECT : AES/PANHANDLE
DATE/TIME: 04-04-00 06:57

PROJECT No.: 00-1571-1
CONE/RIG : 722/BH.GO/R#3

DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
.150	.49	67.07	2.91	SANDY SILT to CLAYEY SILT	27	43		4.5	
.300	.98	37.88	3.46	CLAYEY SILT to SILTY CLAY	19	30		2.5	
.450	1.48	19.76	3.80	CLAY to SILTY CLAY	13	21		1.3	
.600	1.97	12.92	3.33	CLAY to SILTY CLAY	9	14		.9	
.750	2.46	13.00	3.08	CLAY to SILTY CLAY	9	14		.9	
.900	2.95	13.15	3.57	CLAY to SILTY CLAY	9	14		.9	
1.050	3.44	9.54	1.36	CLAYEY SILT to SILTY CLAY	5	8		.7	
1.200	3.94	12.43	4.99	CLAY	12	20		.8	
1.350	4.43	18.78	3.35	CLAY to SILTY CLAY	13	20		1.2	
1.500	4.92	27.49	3.53	CLAYEY SILT to SILTY CLAY	14	22		1.8	
1.650	5.41	21.56	4.92	CLAY	22	34		1.4	
1.800	5.91	20.27	5.67	CLAY	20	32		1.2	
1.950	6.40	19.35	6.25	CLAY	19	31		1.1	
2.100	6.89	18.99	5.16	CLAY	19	30		1.2	
2.250	7.38	17.93	5.35	CLAY	18	27		1.2	
2.400	7.87	15.15	7.00	CLAY	15	22		1.0	
2.550	8.37	13.81	6.23	CLAY	14	19		.9	
2.700	8.86	18.89	5.56	CLAY	19	26		1.2	
2.850	9.35	45.53	4.00	CLAYEY SILT to SILTY CLAY	23	30		2.6	
3.000	9.84	67.05	1.95	SILTY SAND to SANDY SILT	22	29	63		41.0
3.150	10.33	83.24	1.60	SILTY SAND to SANDY SILT	28	35	69		42.0
3.300	10.83	55.96	2.16	SANDY SILT to CLAYEY SILT	22	28		3.7	
3.450	11.32	40.41	4.36	CLAY to SILTY CLAY	27	33		2.3	
3.600	11.81	45.87	2.53	SANDY SILT to CLAYEY SILT	18	22		3.0	
3.750	12.30	28.55	4.62	CLAY	29	33		1.6	
3.900	12.80	24.24	4.25	CLAY to SILTY CLAY	16	18		1.6	
4.050	13.29	30.00	3.43	CLAYEY SILT to SILTY CLAY	15	17		1.9	
4.200	13.78	46.12	1.67	SILTY SAND to SANDY SILT	15	17	48		38.0
4.350	14.27	13.38	5.75	CLAY	13	14		.8	
4.500	14.76	8.12	4.43	CLAY	8	9		.5	
4.650	15.26	4.38	5.02	CLAY	4	5		.2	
4.800	15.75	5.93	6.58	CLAY	6	6		.3	
4.950	16.24	7.27	4.95	CLAY	7	8		.4	
5.100	16.73	7.88	8.38	CLAY	8	8		.5	
5.250	17.22	27.04	3.14	CLAYEY SILT to SILTY CLAY	14	14		1.7	
5.400	17.72	11.15	7.09	CLAY	11	11		.7	
5.550	18.21	11.66	5.40	CLAY	12	12		.7	
5.700	18.70	34.08	3.02	CLAYEY SILT to SILTY CLAY	17	17		2.2	
5.850	19.19	59.49	1.36	SILTY SAND to SANDY SILT	20	20	52		38.0
6.000	19.69	69.36	1.28	SILTY SAND to SANDY SILT	23	23	56		38.5
6.150	20.18	99.36	1.72	SILTY SAND to SANDY SILT	33	33	66		39.5

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 120 pcf
ASSUMED DEPTH OF WATER TABLE = 14.5 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

Interpretations based on: Robertson and Campanella, 1989.

SOUNDING : CPT-17

DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
6.300	20.67	86.72	2.14	SILTY SAND to SANDY SILT	29	28	62		39.0
6.450	21.16	52.64	1.41	SILTY SAND to SANDY SILT	18	17	48		37.5
6.600	21.65	39.66	.88	SILTY SAND to SANDY SILT	13	13	39		36.0
6.750	22.15	11.73	3.24	CLAY to SILTY CLAY	8	7		.7	
6.900	22.64	4.70	2.98	CLAY	5	4		.3	
7.050	23.13	6.90	2.46	CLAY to SILTY CLAY	5	4		.4	
7.200	23.62	7.33	7.37	CLAY	7	7		.4	
7.350	24.11	11.13	5.39	CLAY	11	10		.6	
7.500	24.61	46.46	1.79	SILTY SAND to SANDY SILT	15	14	43		36.5
7.650	25.10	14.87	2.89	CLAYEY SILT to SILTY CLAY	7	7		.9	
7.800	25.59	5.80	2.76	CLAY	6	5		.3	
7.950	26.08	4.42	15.38	ORGANIC MATERIAL	4	4		.3	
8.100	26.57	28.51	3.23	CLAYEY SILT to SILTY CLAY	14	13		1.8	
8.250	27.07	9.58	7.41	CLAY	10	9		.5	
8.400	27.56	18.06	3.38	CLAY to SILTY CLAY	12	11		1.1	
8.550	28.05	5.80	6.72	CLAY	6	5		.3	
8.700	28.54	7.50	7.73	CLAY	8	7		.4	
8.850	29.04	7.56	5.29	CLAY	8	7		.4	
9.000	29.53	8.31	7.34	CLAY	8	7		.4	
9.150	30.02	13.28	6.02	CLAY	13	12		.8	
9.300	30.51	17.31	6.01	CLAY	17	15		1.0	
9.450	31.00	27.17	3.64	CLAYEY SILT to SILTY CLAY	14	12		1.7	
9.600	31.50	42.34	2.50	SANDY SILT to CLAYEY SILT	17	15		2.7	
9.750	31.99	326.43	.22	GRAVELLY SAND to SAND	54	46	96		44.5
9.900	32.48	197.77	1.83	SAND to SILTY SAND	49	42	82		42.0
10.050	32.97	14.72	5.23	CLAY	15	12		.8	
10.200	33.46	21.90	7.72	CLAY	22	18		1.3	
10.350	33.96	42.64	4.62	CLAY to SILTY CLAY	28	24		2.4	
10.500	34.45	44.13	4.44	CLAY to SILTY CLAY	29	24		2.5	
10.650	34.94	135.97	4.77	*VERY STIFF FINE GRAINED	100	100			
10.800	35.43	77.12	6.95	*VERY STIFF FINE GRAINED	77	64			
10.950	35.93	68.51	5.81	*VERY STIFF FINE GRAINED	69	56			
11.100	36.42	69.49	6.48	*VERY STIFF FINE GRAINED	69	57			
11.250	36.91	71.87	8.00	*VERY STIFF FINE GRAINED	72	58			
11.400	37.40	76.99	5.73	*VERY STIFF FINE GRAINED	77	62			
11.550	37.89	103.42	6.76	*VERY STIFF FINE GRAINED	100	83			
11.700	38.39	124.66	6.55	*VERY STIFF FINE GRAINED	100	100			
11.850	38.88	118.38	6.45	*VERY STIFF FINE GRAINED	100	94			
12.000	39.37	71.23	7.02	*VERY STIFF FINE GRAINED	71	57			
12.150	39.86	104.63	6.39	*VERY STIFF FINE GRAINED	100	83			
12.300	40.35	80.50	6.57	*VERY STIFF FINE GRAINED	81	63			
12.450	40.85	112.02	4.26	*VERY STIFF FINE GRAINED	100	88			
12.600	41.34	115.30	4.79	*VERY STIFF FINE GRAINED	100	90			

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 120 pcf
ASSUMED DEPTH OF WATER TABLE = 14.5 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

Interpretations based on: Robertson and Campanella, 1989.

CPT INTERPRETATIONS

SOUNDING : CPT-18 PROJECT No.: 00-1571-1
PROJECT : AES/PANHANDLE CONE/RIG : 473/BH,GO/R#3
DATE/TIME: 04-03-00 16:19

DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
.150	.49	54.94	1.65	SILTY SAND to SANDY SILT	18	29	59		
.300	.98	69.45	2.49	SANDY SILT to CLAYEY SILT	28	44		4.6	
.450	1.48	57.72	2.42	SANDY SILT to CLAYEY SILT	23	37		3.8	
.600	1.97	66.50	1.61	SILTY SAND to SANDY SILT	22	35	65		48.0
.750	2.46	102.82	1.66	SILTY SAND to SANDY SILT	34	55	77		48.5
.900	2.95	93.39	2.33	SILTY SAND to SANDY SILT	31	50	74		47.5
1.050	3.44	66.90	2.48	SANDY SILT to CLAYEY SILT	27	43		4.4	
1.200	3.94	29.02	4.04	CLAY to SILTY CLAY	19	31		1.9	
1.350	4.43	49.88	2.07	SANDY SILT to CLAYEY SILT	20	32		3.3	
1.500	4.92	43.02	2.36	SANDY SILT to CLAYEY SILT	17	28		2.8	
1.650	5.41	27.43	4.17	CLAY to SILTY CLAY	18	29		1.6	
1.800	5.91	28.64	4.49	CLAY to SILTY CLAY	19	31		1.7	
1.950	6.40	31.91	4.47	CLAY to SILTY CLAY	21	34		1.9	
2.100	6.89	19.72	6.18	CLAY	20	31		1.1	
2.250	7.38	16.89	5.54	CLAY	17	25		1.1	
2.400	7.87	11.79	4.29	CLAY	12	17		.8	
2.550	8.37	9.86	4.19	CLAY	10	14		.6	
2.700	8.86	13.24	3.73	CLAY	13	18		.8	
2.850	9.35	15.34	3.94	CLAY	15	20		1.0	
3.000	9.84	9.82	4.34	CLAY	10	13		.6	
3.150	10.33	10.92	4.39	CLAY	11	14		.7	
3.300	10.83	16.12	4.46	CLAY	16	20		1.0	
3.450	11.32	24.39	3.88	CLAY to SILTY CLAY	16	20		1.6	
3.600	11.81	31.31	4.19	CLAY to SILTY CLAY	21	25		1.8	
3.750	12.30	28.02	3.98	CLAY to SILTY CLAY	19	22		1.8	
3.900	12.80	31.91	4.38	CLAY to SILTY CLAY	21	24		1.8	
4.050	13.29	24.58	4.01	CLAY to SILTY CLAY	16	18		1.6	
4.200	13.78	19.04	3.61	CLAY to SILTY CLAY	13	14		1.2	
4.350	14.27	18.89	4.39	CLAY	19	20		1.2	
4.500	14.76	15.17	4.24	CLAY	15	16		1.0	
4.650	15.26	13.64	3.60	CLAY to SILTY CLAY	9	10		.8	
4.800	15.75	15.15	3.35	CLAY to SILTY CLAY	10	11		.9	
4.950	16.24	24.26	4.53	CLAY	24	25		1.4	
5.100	16.73	22.01	4.75	CLAY	22	23		1.4	
5.250	17.22	36.80	2.84	CLAYEY SILT to SILTY CLAY	18	19		2.4	
5.400	17.72	17.78	5.12	CLAY	18	18		1.1	
5.550	18.21	69.79	1.10	SILTY SAND to SANDY SILT	23	23	57		38.5
5.700	18.70	29.04	3.72	CLAYEY SILT to SILTY CLAY	15	14		1.9	
5.850	19.19	33.91	2.34	SANDY SILT to CLAYEY SILT	14	13		2.2	
6.000	19.69	19.86	4.16	CLAY to SILTY CLAY	13	13		1.2	
6.150	20.18	6.50	3.51	CLAY	7	6		.4	

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 120 pcf
ASSUMED DEPTH OF WATER TABLE = 15.0 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

Interpretations based on: Robertson and Campanella, 1989.

SOUNDING : CPT-18

DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
6.300	20.67	5.06	3.13	CLAY	5	5		.3	
6.450	21.16	4.70	3.38	CLAY	5	5		.2	
6.600	21.65	6.33	4.55	CLAY	6	6		.3	
6.750	22.15	9.14	5.89	CLAY	9	9		.5	
6.900	22.64	13.34	3.98	CLAY	13	13		.8	
7.050	23.13	7.78	2.35	CLAY to SILTY CLAY	5	5		.5	
7.200	23.62	9.01	2.84	CLAY to SILTY CLAY	6	6		.6	
7.350	24.11	10.47	3.71	CLAY	10	10		.6	
7.500	24.61	9.45	2.94	CLAY to SILTY CLAY	6	6		.5	
7.650	25.10	10.98	3.10	CLAY to SILTY CLAY	7	7		.6	
7.800	25.59	9.28	2.84	CLAY to SILTY CLAY	6	6		.5	
7.950	26.08	6.52	3.46	CLAY	7	6		.3	
8.100	26.57	7.63	2.73	CLAY to SILTY CLAY	5	5		.5	
8.250	27.07	8.67	3.77	CLAY	9	8		.5	
8.400	27.56	9.39	5.30	CLAY	9	8		.5	
8.550	28.05	11.90	4.05	CLAY	12	11		.7	
8.700	28.54	16.76	4.90	CLAY	17	15		1.0	
8.850	29.04	16.08	4.89	CLAY	16	14		1.0	
9.000	29.53	28.00	4.98	CLAY	28	24		1.5	
9.150	30.02	15.64	3.49	CLAY to SILTY CLAY	10	9		.9	
9.300	30.51	13.53	3.57	CLAY to SILTY CLAY	9	8		.8	
9.450	31.00	17.12	5.68	CLAY	17	15		1.0	
9.600	31.50	19.67	3.17	CLAYEY SILT to SILTY CLAY	10	8		1.2	
9.750	31.99	17.02	3.28	CLAY to SILTY CLAY	11	10		1.0	
9.900	32.48	27.62	4.70	CLAY	28	23		1.5	
10.050	32.97	21.48	4.10	CLAY to SILTY CLAY	14	12		1.3	
10.200	33.46	34.03	4.82	CLAY	34	28		1.9	
10.350	33.96	40.37	5.14	CLAY	40	34		2.3	
10.500	34.45	66.88	2.51	SANDY SILT to CLAYEY SILT	27	22		4.3	
10.650	34.94	67.88	1.95	SILTY SAND to SANDY SILT	23	19	50		37.0
10.800	35.43	102.65	1.38	SAND to SILTY SAND	26	21	62		38.5
10.950	35.93	144.72	1.21	SAND to SILTY SAND	36	30	72		39.5
11.100	36.42	93.03	2.27	SILTY SAND to SANDY SILT	31	25	59		38.0
11.250	36.91	77.80	1.89	SILTY SAND to SANDY SILT	26	21	54		37.5
11.400	37.40	41.32	2.79	SANDY SILT to CLAYEY SILT	17	13		2.6	
11.550	37.89	32.36	9.25	CLAY	32	26		1.8	
11.700	38.39	91.48	2.26	SILTY SAND to SANDY SILT	30	24	58		38.0
11.850	38.88	145.51	1.47	SAND to SILTY SAND	36	29	71		39.5
12.000	39.37	213.74	1.05	SAND	43	34	82		42.0
12.150	39.86	92.67	1.88	SILTY SAND to SANDY SILT	31	24	58		38.0
12.300	40.35	41.09	2.85	SANDY SILT to CLAYEY SILT	16	13		2.6	
12.450	40.85	16.27	2.00	CLAYEY SILT to SILTY CLAY	8	6		1.1	
12.600	41.34	10.28	1.42	CLAYEY SILT to SILTY CLAY	5	4		.6	
12.750	41.83	12.83	1.58	CLAYEY SILT to SILTY CLAY	6	5		.8	
12.900	42.32	11.43	2.87	CLAY to SILTY CLAY	8	6		.6	
13.050	42.81	8.46	2.48	CLAY to SILTY CLAY	6	4		.5	
13.200	43.31	11.00	1.83	CLAYEY SILT to SILTY CLAY	6	4		.7	
13.350	43.80	11.28	3.44	CLAY to SILTY CLAY	8	6		.6	
13.500	44.29	126.45	3.29	SANDY SILT to CLAYEY SILT	51	38		7.3	
13.650	44.78	184.30	4.64	*VERY STIFF FINE GRAINED	100	100			

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 120 pcf
ASSUMED DEPTH OF WATER TABLE = 15.0 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

SOUNDING : CPT-18

DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
13.800	45.28	188.74	5.57	*VERY STIFF FINE GRAINED	100	100			
13.950	45.77	300.72	4.26	*SAND to CLAYEY SAND	100	100			
14.100	46.26	286.87	5.18	*VERY STIFF FINE GRAINED	100	100			
14.250	46.75	294.64	5.66	*VERY STIFF FINE GRAINED	100	100			
14.400	47.24	279.26	3.73	*SAND to CLAYEY SAND	100	100			
14.550	47.74	273.00	5.12	*VERY STIFF FINE GRAINED	100	100			
14.700	48.23	342.00	4.73	*VERY STIFF FINE GRAINED	100	100			
14.850	48.72	342.59	5.66	*VERY STIFF FINE GRAINED	100	100			
15.000	49.21	395.98	*****		0	0			

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 120 pcf
ASSUMED DEPTH OF WATER TABLE = 15.0 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

Interpretations based on: Robertson and Campanella, 1989.

CPT INTERPRETATIONS

SOUNDING : CPT-19 SEIS
PROJECT : AES/PANHANDLE
DATE/TIME: 04-05-00 14:09
PROJECT No.: 00-1571-1
CONE/RIG : 722/BH.GO/R#3

DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
.150	.49	157.36	1.56	SAND to SILTY SAND	39	63	89		
.300	.98	176.27	3.01	SILTY SAND to SANDY SILT	59	94	93		
.450	1.48	85.85	4.15	CLAYEY SILT to SILTY CLAY	43	69		5.0	
.600	1.97	69.53	4.00	CLAYEY SILT to SILTY CLAY	35	56		4.1	
.750	2.46	67.09	2.86	SANDY SILT to CLAYEY SILT	27	43		4.5	
.900	2.95	76.42	2.98	SANDY SILT to CLAYEY SILT	31	49		4.5	
1.050	3.44	41.83	3.35	CLAYEY SILT to SILTY CLAY	21	33		2.8	
1.200	3.94	69.15	1.08	SILTY SAND to SANDY SILT	23	37	66		45.5
1.350	4.43	31.80	2.64	CLAYEY SILT to SILTY CLAY	16	25		2.1	
1.500	4.92	32.36	2.66	CLAYEY SILT to SILTY CLAY	16	26		2.1	
1.650	5.41	36.80	2.80	SANDY SILT to CLAYEY SILT	15	24		2.4	
1.800	5.91	32.06	3.06	CLAYEY SILT to SILTY CLAY	16	26		2.1	
1.950	6.40	23.86	3.48	CLAYEY SILT to SILTY CLAY	12	19		1.6	
2.100	6.89	14.32	4.82	CLAY	14	22		.9	
2.250	7.38	17.21	3.89	CLAY to SILTY CLAY	11	17		1.1	
2.400	7.87	40.15	4.13	CLAY to SILTY CLAY	27	39		2.3	
2.550	8.37	25.92	5.71	CLAY	26	37		1.5	
2.700	8.86	60.80	2.66	SANDY SILT to CLAYEY SILT	24	33		4.0	
2.850	9.35	45.51	3.89	CLAYEY SILT to SILTY CLAY	23	30		2.6	
3.000	9.84	46.16	3.44	CLAYEY SILT to SILTY CLAY	23	30		2.7	
3.150	10.33	45.08	3.13	CLAYEY SILT to SILTY CLAY	23	29		3.0	
3.300	10.83	43.83	3.33	CLAYEY SILT to SILTY CLAY	22	27		2.9	
3.450	11.32	32.48	4.62	CLAY to SILTY CLAY	22	26		1.9	
3.600	11.81	30.74	2.96	CLAYEY SILT to SILTY CLAY	15	18		2.0	
3.750	12.30	25.03	4.55	CLAY	25	29		1.4	
3.900	12.80	19.95	5.41	CLAY	20	23		1.1	
4.050	13.29	9.77	5.83	CLAY	10	11		.6	
4.200	13.78	7.07	5.09	CLAY	7	8		.4	
4.350	14.27	8.33	5.40	CLAY	8	9		.5	
4.500	14.76	7.82	5.75	CLAY	8	8		.5	
4.650	15.26	9.28	4.96	CLAY	9	10		.6	
4.800	15.75	11.79	5.17	CLAY	12	12		.7	
4.950	16.24	14.40	7.01	CLAY	14	15		.9	
5.100	16.73	31.63	5.06	CLAY	32	32		1.8	
5.250	17.22	19.82	7.27	CLAY	20	20		1.3	
5.400	17.72	50.92	2.10	SANDY SILT to CLAYEY SILT	20	21		3.3	
5.550	18.21	34.57	3.38	CLAYEY SILT to SILTY CLAY	17	17		2.2	
5.700	18.70	31.53	4.66	CLAY to SILTY CLAY	21	21		1.8	
5.850	19.19	14.02	5.78	CLAY	14	14		.9	
6.000	19.69	30.59	2.94	CLAYEY SILT to SILTY CLAY	15	15		2.0	
6.150	20.18	42.40	2.62	SANDY SILT to CLAYEY SILT	17	17		2.7	

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 120 pcf
ASSUMED DEPTH OF WATER TABLE = 15.0 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

Interpretations based on: Robertson and Campanella, 1989.

SOUNDING : CPT-19 SEIS

DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
6.300	20.67	13.55	6.05	CLAY	14	13		.8	
6.450	21.16	14.51	6.62	CLAY	15	14		.9	
6.600	21.65	14.40	6.53	CLAY	14	14		.9	
6.750	22.15	20.18	3.22	CLAYEY SILT to SILTY CLAY	10	10		1.3	
6.900	22.64	21.14	2.89	CLAYEY SILT to SILTY CLAY	11	10		1.3	
7.050	23.13	17.25	3.54	CLAY to SILTY CLAY	12	11		1.1	
7.200	23.62	17.04	4.46	CLAY	17	16		1.0	
7.350	24.11	26.09	2.80	CLAYEY SILT to SILTY CLAY	13	12		1.6	
7.500	24.61	38.56	1.76	SANDY SILT to CLAYEY SILT	15	14		3.0	
7.650	25.10	59.38	1.48	SILTY SAND to SANDY SILT	20	18	50		37.5
7.800	25.59	21.24	5.04	CLAY	21	19		1.2	
7.950	26.08	12.41	7.01	CLAY	12	11		.7	
8.100	26.57	40.68	2.56	SANDY SILT to CLAYEY SILT	16	15		2.6	
8.250	27.07	22.16	6.27	CLAY	22	20		1.2	
8.400	27.56	26.51	5.09	CLAY	27	24		1.5	
8.550	28.05	34.25	4.38	CLAY to SILTY CLAY	23	20		1.9	
8.700	28.54	136.48	1.92	SILTY SAND to SANDY SILT	45	40	72		40.5
8.850	29.04	132.50	2.80	SILTY SAND to SANDY SILT	44	39	71		40.0
9.000	29.53	156.70	1.44	SAND to SILTY SAND	39	34	76		41.0
9.150	30.02	61.78	2.36	SANDY SILT to CLAYEY SILT	25	21		4.0	
9.300	30.51	27.66	3.62	CLAYEY SILT to SILTY CLAY	14	12		1.7	
9.450	31.00	18.02	3.55	CLAY to SILTY CLAY	12	10		1.1	
9.600	31.50	7.67	4.04	CLAY	8	7		.4	
9.750	31.99	7.18	4.18	CLAY	7	6		.4	
9.900	32.48	9.28	3.56	CLAY	9	8		.5	
10.050	32.97	13.00	3.54	CLAY to SILTY CLAY	9	7		.7	
10.200	33.46	13.49	3.34	CLAY to SILTY CLAY	9	8		.8	
10.350	33.96	14.91	3.55	CLAY to SILTY CLAY	10	8		.9	
10.500	34.45	29.83	4.96	CLAY	30	25		1.6	
10.650	34.94	15.59	6.74	CLAY	16	13		.9	
10.800	35.43	20.40	8.33	CLAY	20	17		1.2	
10.950	35.93	34.71	6.51	CLAY	35	28		1.9	
11.100	36.42	17.72	5.87	CLAY	18	14		1.0	
11.250	36.91	14.81	5.87	CLAY	15	12		.8	
11.400	37.40	55.79	1.58	SILTY SAND to SANDY SILT	19	15	44		36.0
11.550	37.89	165.22	1.47	SAND to SILTY SAND	41	33	75		40.5
11.700	38.39	169.53	2.12	SILTY SAND to SANDY SILT	57	45	76		40.5
11.850	38.88	98.36	1.84	SILTY SAND to SANDY SILT	33	26	60		38.0
12.000	39.37	26.15	2.60	CLAYEY SILT to SILTY CLAY	13	10		1.6	
12.150	39.86	23.71	3.67	CLAY to SILTY CLAY	16	12		1.4	
12.300	40.35	14.66	8.59	CLAY	15	11		.8	
12.450	40.85	97.68	2.16	SILTY SAND to SANDY SILT	33	25	59		38.0
12.600	41.34	99.96	1.99	SILTY SAND to SANDY SILT	33	26	60		38.0
12.750	41.83	69.98	2.19	SILTY SAND to SANDY SILT	23	18	49		36.5
12.900	42.32	55.28	3.04	SANDY SILT to CLAYEY SILT	22	17		3.5	
13.050	42.81	12.83	5.22	CLAY	13	10		.7	
13.200	43.31	12.75	2.43	CLAYEY SILT to SILTY CLAY	6	5		.8	
13.350	43.80	18.46	6.28	CLAY	18	14		1.1	
13.500	44.29	18.21	5.82	CLAY	18	14		1.0	
13.650	44.78	14.55	3.78	CLAY to SILTY CLAY	10	7		.8	

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 120 pcf
ASSUMED DEPTH OF WATER TABLE = 15.0 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

Interpretations based on: Robertson and Campanella, 1989.

SOUNDING : CPT-19 SEIS

DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
13.800	45.28	14.60	4.66	CLAY	15	11		.8	
13.950	45.77	16.68	4.74	CLAY	17	12		.9	
14.100	46.26	11.68	4.02	CLAY	12	9		.6	
14.250	46.75	24.11	2.99	CLAYEY SILT to SILTY CLAY	12	9		1.4	
14.400	47.24	24.09	11.79	CLAY	24	18		1.4	
14.550	47.74	88.74	2.97	SANDY SILT to CLAYEY SILT	35	26		5.1	
14.700	48.23	262.90	2.77	SILTY SAND to SANDY SILT	88	64	86		42.0
14.850	48.72	392.71	3.66	*SAND to CLAYEY SAND	100	100			
15.000	49.21	496.60	1.66	SAND to SILTY SAND	100	90	100		45.0
15.150	49.70	602.65	2.41	*SAND to CLAYEY SAND	100	100			
15.300	50.20	594.43	*****		0	0			

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 120 pcf
ASSUMED DEPTH OF WATER TABLE = 15.0 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

Interpretations based on: Robertson and Campanella, 1989.

CPT INTERPRETATIONS

SOUNDING : CPT-20 PROJECT No.: 00-1571-1
PROJECT : AES/PANHANDLE CONE/RIG : 722/BH.GO/R#3
DATE/TIME: 04-04-00 11:08

DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
.150	.49	22.33	.85	SANDY SILT to CLAYEY SILT	9	14		1.8	
.300	.98	36.18	1.13	SILTY SAND to SANDY SILT	12	19	47		48.0
.450	1.48	22.80	3.55	CLAY to SILTY CLAY	15	24		1.5	
.600	1.97	73.78	.81	SAND to SILTY SAND	18	29	68		48.0
.750	2.46	56.07	1.44	SILTY SAND to SANDY SILT	19	30	60		46.5
.900	2.95	36.56	1.72	SANDY SILT to CLAYEY SILT	15	23		2.9	
1.050	3.44	31.31	1.25	SILTY SAND to SANDY SILT	10	17	43		42.5
1.200	3.94	28.47	1.51	SANDY SILT to CLAYEY SILT	11	18		2.3	
1.350	4.43	23.99	2.00	SANDY SILT to CLAYEY SILT	10	15		1.9	
1.500	4.92	53.39	1.12	SILTY SAND to SANDY SILT	18	28	58		43.0
1.650	5.41	73.61	.52	SAND to SILTY SAND	18	29	68		44.0
1.800	5.91	72.30	.73	SAND to SILTY SAND	18	29	67		44.0
1.950	6.40	119.69	1.05	SAND to SILTY SAND	30	48	81		45.5
2.100	6.89	164.12	.90	SAND	33	51	91		46.5
2.250	7.38	134.80	.82	SAND to SILTY SAND	34	51	85		45.5
2.400	7.87	189.46	.93	SAND	38	55	95		46.5
2.550	8.37	285.49	.92	SAND	57	81	100		48.0
2.700	8.86	279.69	1.15	SAND	56	77	100		47.5
2.850	9.35	270.98	.84	SAND	54	72	100		47.0
3.000	9.84	142.77	2.15	SILTY SAND to SANDY SILT	48	62	85		44.5
3.150	10.33	333.10	1.45	SAND	67	85	100		47.5
3.300	10.83	375.18	1.20	SAND	75	93	100		48.0
3.450	11.32	317.52	.96	SAND	64	77	100		47.0
3.600	11.81	235.60	.74	SAND	47	56	96		46.0
3.750	12.30	261.67	.74	SAND	52	61	99		46.0
3.900	12.80	190.44	1.00	SAND	38	43	89		44.5
4.050	13.29	81.56	1.02	SAND to SILTY SAND	20	23	64		40.0
4.200	13.78	74.95	1.97	SILTY SAND to SANDY SILT	25	27	61		39.5
4.350	14.27	73.29	.89	SAND to SILTY SAND	18	20	60		39.0
4.500	14.76	66.90	.93	SAND to SILTY SAND	17	18	57		38.5
4.650	15.26	107.99	.21	SAND	22	23	71		41.5
4.800	15.75	112.34	2.14	SILTY SAND to SANDY SILT	37	39	71		41.5
4.950	16.24	128.38	1.26	SAND to SILTY SAND	32	33	75		42.0
5.100	16.73	83.68	2.31	SILTY SAND to SANDY SILT	28	29	63		39.5
5.250	17.22	105.44	1.16	SAND to SILTY SAND	26	27	69		40.5
5.400	17.72	171.83	2.06	SILTY SAND to SANDY SILT	57	58	83		43.0
5.550	18.21	171.57	.67	SAND	34	34	83		43.0
5.700	18.70	200.91	1.12	SAND	40	40	87		43.5
5.850	19.19	158.44	.85	SAND	32	31	80		42.5
6.000	19.69	161.72	.61	SAND	32	32	80		42.5
6.150	20.18	177.05	.62	SAND	35	35	83		43.0

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 120 pcf
ASSUMED DEPTH OF WATER TABLE = 15.0 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

Interpretations based on: Robertson and Campanella, 1989.

SOUNDING : CPT-20

DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
6.300	20.67	171.32	.78	SAND	34	33	82		42.5
6.450	21.16	200.34	.52	SAND	40	39	86		43.5
6.600	21.65	186.06	.26	SAND	37	36	84		43.0
6.750	22.15	220.10	.61	SAND	44	42	88		43.5
6.900	22.64	232.40	.65	SAND	46	44	90		44.0
7.050	23.13	192.80	.62	SAND	39	36	84		43.0
7.200	23.62	191.88	.39	SAND	38	36	84		43.0
7.350	24.11	188.34	.46	SAND	38	35	83		42.5
7.500	24.61	135.73	.44	SAND	27	25	73		41.0
7.650	25.10	135.67	.26	SAND	27	25	73		41.0
7.800	25.59	164.29	.74	SAND	33	30	79		42.0
7.950	26.08	156.11	.32	SAND	31	28	77		42.0
8.100	26.57	171.74	.32	SAND	34	31	79		42.0
8.250	27.07	219.27	.99	SAND	44	39	86		43.0
8.400	27.56	255.04	1.77	SAND to SILTY SAND	64	57	90		44.0
8.550	28.05	277.37	.56	SAND	55	49	93		44.0
8.700	28.54	175.67	.23	SAND	35	31	79		42.0
8.850	29.04	91.86	.66	SAND to SILTY SAND	23	20	61		38.5
9.000	29.53	47.10	2.10	SANDY SILT to CLAYEY SILT	19	16		3.0	
9.150	30.02	72.02	1.07	SAND to SILTY SAND	18	16	53		38.0
9.300	30.51	51.77	2.24	SANDY SILT to CLAYEY SILT	21	18		3.3	
9.450	31.00	22.77	3.51	CLAYEY SILT to SILTY CLAY	11	10		1.4	
9.600	31.50	13.02	4.22	CLAY	13	11		.7	
9.750	31.99	41.77	1.48	SILTY SAND to SANDY SILT	14	12	37		34.5
9.900	32.48	36.48	2.06	SANDY SILT to CLAYEY SILT	15	12		2.3	
10.050	32.97	11.94	3.69	CLAY	12	10		.7	
10.200	33.46	21.71	3.96	CLAY to SILTY CLAY	14	12		1.3	
10.350	33.96	26.92	3.23	CLAYEY SILT to SILTY CLAY	13	11		1.7	
10.500	34.45	14.89	6.45	CLAY	15	12		.9	
10.650	34.94	67.01	1.54	SILTY SAND to SANDY SILT	22	18	50		37.0
10.800	35.43	51.26	2.11	SANDY SILT to CLAYEY SILT	21	17		3.3	
10.950	35.93	46.10	3.21	CLAYEY SILT to SILTY CLAY	23	19		2.9	
11.100	36.42	21.56	5.52	CLAY	22	18		1.1	
11.250	36.91	20.99	4.19	CLAY to SILTY CLAY	14	11		1.3	
11.400	37.40	26.05	3.84	CLAY to SILTY CLAY	17	14		1.6	
11.550	37.89	40.83	1.32	SILTY SAND to SANDY SILT	14	11	35		33.0
11.700	38.39	30.30	4.36	CLAY to SILTY CLAY	20	16		1.6	
11.850	38.88	42.96	4.66	CLAY to SILTY CLAY	29	23		2.4	
12.000	39.37	173.02	1.12	SAND to SILTY SAND	43	34	76		40.5
12.150	39.86	183.22	.57	SAND	37	29	77		41.0
12.300	40.35	63.93	1.30	SILTY SAND to SANDY SILT	21	17	47		36.5
12.450	40.85	20.46	3.32	CLAYEY SILT to SILTY CLAY	10	8		1.2	
12.600	41.34	13.34	2.55	CLAYEY SILT to SILTY CLAY	7	5		.9	
12.750	41.83	11.26	8.97	CLAY	11	9		.6	
12.900	42.32	108.11	1.29	SAND to SILTY SAND	27	21	62		38.0
13.050	42.81	125.83	1.12	SAND to SILTY SAND	31	24	66		38.5
13.200	43.31	76.99	1.61	SILTY SAND to SANDY SILT	26	20	52		37.0
13.350	43.80	41.30	4.48	CLAY to SILTY CLAY	28	21		2.3	
13.500	44.29	31.95	5.20	CLAY	32	24		1.7	
13.650	44.78	21.97	4.14	CLAY to SILTY CLAY	15	11		1.3	

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 120 pcf
ASSUMED DEPTH OF WATER TABLE = 15.0 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

Interpretations based on: Robertson and Campanella, 1989.

SOUNDING : CPT-20

DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
13.800	45.28	46.80	3.63	CLAYEY SILT to SILTY CLAY	23	18		2.6	
13.950	45.77	17.95	5.01	CLAY	18	13		1.0	
14.100	46.26	97.26	1.42	SILTY SAND to SANDY SILT	32	24	58		38.0
14.250	46.75	48.88	3.76	CLAYEY SILT to SILTY CLAY	24	18		2.7	
14.400	47.24	18.10	3.87	CLAY to SILTY CLAY	12	9		1.0	
14.550	47.74	18.70	2.78	CLAYEY SILT to SILTY CLAY	9	7		1.1	
14.700	48.23	19.21	3.02	CLAYEY SILT to SILTY CLAY	10	7		1.1	
14.850	48.72	43.93	5.42	CLAY	44	32		2.4	
15.000	49.21	57.89	5.61	CLAY	58	42		3.2	
15.150	49.70	64.29	4.67	CLAY to SILTY CLAY	43	31		3.6	
15.300	50.20	32.63	*****		0	0			

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 120 pcf
ASSUMED DEPTH OF WATER TABLE = 15.0 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

Interpretations based on: Robertson and Campanella, 1989.

CPT INTERPRETATIONS

SOUNDING : CPT-21 PROJECT No.: 00-1571-1
PROJECT : AES/PANHANDLE CONE/RIG : 473/BH,GO/R#3
DATE/TIME: 04-03-00 15:23

DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
.150	.49	25.56	.63	SILTY SAND to SANDY SILT	9	14	37		49.5
.300	.98	85.51	.92	SAND to SILTY SAND	21	34	72		
.450	1.48	150.88	.94	SAND to SILTY SAND	38	60	88		
.600	1.97	172.89	1.24	SAND to SILTY SAND	43	69	92		
.750	2.46	151.65	.65	SAND	30	49	88		
.900	2.95	108.45	.49	SAND	22	35	79		48.0
1.050	3.44	93.43	.69	SAND to SILTY SAND	23	37	74		47.0
1.200	3.94	98.72	.81	SAND to SILTY SAND	25	39	76		46.5
1.350	4.43	221.50	1.14	SAND	44	71	99		49.5
1.500	4.92	168.75	.51	SAND	34	54	91		48.0
1.650	5.41	237.13	.19	SAND	47	76	100		49.0
1.800	5.91	208.35	.79	SAND	42	67	97		48.0
1.950	6.40	188.93	.49	SAND	38	60	95		47.0
2.100	6.89	191.76	.36	SAND	38	60	95		47.0
2.250	7.38	188.57	.48	SAND	38	57	95		46.5
2.400	7.87	200.81	.56	SAND	40	58	96		46.5
2.550	8.37	181.01	.41	SAND	36	51	93		46.0
2.700	8.86	130.76	1.14	SAND to SILTY SAND	33	45	84		44.5
2.850	9.35	70.15	1.51	SILTY SAND to SANDY SILT	23	31	65		41.5
3.000	9.84	155.15	.75	SAND	31	40	87		45.0
3.150	10.33	156.98	.82	SAND	31	40	87		44.5
3.300	10.83	142.40	1.19	SAND to SILTY SAND	36	44	83		44.0
3.450	11.32	130.08	.70	SAND	26	32	80		43.5
3.600	11.81	132.48	.56	SAND	26	32	80		43.5
3.750	12.30	142.74	.86	SAND to SILTY SAND	36	42	82		44.0
3.900	12.80	171.57	1.25	SAND to SILTY SAND	43	50	87		44.5
4.050	13.29	186.53	.41	SAND	37	43	89		44.5
4.200	13.78	157.85	.58	SAND	32	36	84		44.0
4.350	14.27	149.75	.87	SAND	30	34	82		43.5
4.500	14.76	134.86	.28	SAND	27	30	79		43.0
4.650	15.26	176.91	.79	SAND	35	40	87		44.0
4.800	15.75	137.33	.58	SAND	27	30	79		43.0
4.950	16.24	135.75	.95	SAND to SILTY SAND	34	37	78		43.0
5.100	16.73	94.26	.37	SAND to SILTY SAND	24	26	68		41.0
5.250	17.22	75.78	.84	SAND to SILTY SAND	19	20	61		39.5
5.400	17.72	131.91	.36	SAND	26	28	77		42.5
5.550	18.21	191.61	.29	SAND	38	41	87		44.0
5.700	18.70	245.72	.27	SAND	49	52	94		45.0
5.850	19.19	194.50	.30	SAND	39	41	87		44.0
6.000	19.69	252.28	.52	SAND	50	52	95		45.0
6.150	20.18	259.14	.29	GRAVELLY SAND to SAND	43	45	95		45.0

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 120 pcf
ASSUMED DEPTH OF WATER TABLE = 11.5 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

Interpretations based on: Robertson and Campanella, 1989.

SOUNDING : CPT-21

DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
6.300	20.67	238.66	.70	SAND	48	49	93		44.5
6.450	21.16	234.67	.48	SAND	47	48	92		44.5
6.600	21.65	209.30	.44	SAND	42	42	88		44.0
6.750	22.15	217.93	.44	SAND	44	44	89		44.0
6.900	22.64	229.59	.24	SAND	46	46	91		44.0
7.050	23.13	223.60	.25	SAND	45	44	90		44.0
7.200	23.62	216.70	.42	SAND	43	43	89		44.0
7.350	24.11	248.56	.33	SAND	50	48	92		44.5
7.500	24.61	248.01	.77	SAND	50	48	92		44.5
7.650	25.10	197.70	.49	SAND	40	38	85		43.5
7.800	25.59	274.46	.72	SAND	55	52	95		44.5
7.950	26.08	326.36	.30	GRAVELLY SAND to SAND	54	52	99		45.5
8.100	26.57	310.58	.26	GRAVELLY SAND to SAND	52	49	98		45.0
8.250	27.07	258.91	.44	SAND	52	49	92		44.0
8.400	27.56	278.31	.69	SAND	56	52	94		44.5
8.550	28.05	323.77	1.81	SAND to SILTY SAND	81	75	98		45.0
8.700	28.54	222.18	.46	SAND	44	41	87		43.5
8.850	29.04	139.20	1.04	SAND to SILTY SAND	35	32	74		41.0
9.000	29.53	212.15	.43	SAND	42	39	86		43.0
9.150	30.02	233.65	.45	SAND	47	42	88		43.5
9.300	30.51	241.28	.40	SAND	48	43	89		43.5
9.450	31.00	190.88	.43	SAND	38	34	82		42.5
9.600	31.50	89.40	1.48	SILTY SAND to SANDY SILT	30	26	60		38.5
9.750	31.99	158.51	.91	SAND	32	28	77		41.5
9.900	32.48	209.20	1.69	SAND to SILTY SAND	52	46	84		42.5
10.050	32.97	281.35	1.34	SAND	56	49	93		44.0
10.200	33.46	301.21	.79	SAND	60	52	95		44.0
10.350	33.96	279.24	.49	SAND	56	48	92		44.0
10.500	34.45	266.09	.88	SAND	53	46	91		43.5
10.650	34.94	216.06	.37	SAND	43	37	85		42.5
10.800	35.43	211.70	.94	SAND	42	36	84		42.5
10.950	35.93	218.14	1.01	SAND	44	37	85		42.5
11.100	36.42	205.93	1.00	SAND	41	35	83		42.5
11.250	36.91	299.66	.70	SAND	60	50	93		44.0
11.400	37.40	342.55	.52	GRAVELLY SAND to SAND	57	48	97		44.5
11.550	37.89	316.99	.51	GRAVELLY SAND to SAND	53	44	95		44.0
11.700	38.39	338.88	.19	GRAVELLY SAND to SAND	56	47	96		44.5
11.850	38.88	340.41	.35	GRAVELLY SAND to SAND	57	47	96		44.5
12.000	39.37	343.10	.45	GRAVELLY SAND to SAND	57	47	97		44.0
12.150	39.86	344.25	.47	GRAVELLY SAND to SAND	57	47	97		44.0
12.300	40.35	366.24	.56	GRAVELLY SAND to SAND	61	49	98		44.5
12.450	40.85	364.75	.52	GRAVELLY SAND to SAND	61	49	98		44.5
12.600	41.34	351.26	.69	SAND	70	56	97		44.0
12.750	41.83	331.72	.34	GRAVELLY SAND to SAND	55	44	95		44.0
12.900	42.32	293.50	1.59	SAND to SILTY SAND	73	58	91		43.5
13.050	42.81	324.56	.57	GRAVELLY SAND to SAND	54	43	94		44.0
13.200	43.31	241.47	.60	SAND	48	38	85		42.5
13.350	43.80	216.25	.30	SAND	43	34	82		42.0
13.500	44.29	267.32	.46	SAND	53	42	88		43.0
13.650	44.78	288.04	.47	SAND	58	45	90		43.0

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 120 pcf
ASSUMED DEPTH OF WATER TABLE = 11.5 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

Interpretations based on: Robertson and Campanella, 1989.

SOUNDING : CPT-21

DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
13.800	45.28	269.79	.34	GRAVELLY SAND to SAND	45	35	88		42.5
13.950	45.77	412.26	2.10	SAND to SILTY SAND	100	80	100		44.5
14.100	46.26	411.96	1.12	SAND	82	63	100		44.5
14.250	46.75	358.44	.61	GRAVELLY SAND to SAND	60	46	96		44.0
14.400	47.24	421.90	.73	GRAVELLY SAND to SAND	70	54	100		44.5
14.550	47.74	396.60	.97	SAND	79	60	99		44.0
14.700	48.23	451.92	.65	GRAVELLY SAND to SAND	75	57	100		44.5
14.850	48.72	475.35	.60	GRAVELLY SAND to SAND	79	60	100		45.0
15.000	49.21	508.86	1.22	SAND	100	76	100		45.0

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 120 pcf
ASSUMED DEPTH OF WATER TABLE = 11.5 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

Interpretations based on: Robertson and Campanella, 1989.

CPT INTERPRETATIONS

SOUNDING : CPT-22 PROJECT No.: 00-1571-1
PROJECT : AES/PANHANDLE CONE/RIG : 473/BH,GO/R#3
DATE/TIME: 04-03-00 14:59

DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
.150	.49	26.36	1.02	SILTY SAND to SANDY SILT	9	14	38		
.300	.98	47.10	1.57	SILTY SAND to SANDY SILT	16	25	55		49.0
.450	1.48	26.70	1.87	SANDY SILT to CLAYEY SILT	11	17		2.1	
.600	1.97	19.06	2.12	CLAYEY SILT to SILTY CLAY	10	15		1.5	
.750	2.46	16.83	1.35	SANDY SILT to CLAYEY SILT	7	11		1.3	
.900	2.95	68.30	1.56	SILTY SAND to SANDY SILT	23	36	65		46.5
1.050	3.44	46.19	1.31	SILTY SAND to SANDY SILT	15	25	54		44.0
1.200	3.94	34.76	3.15	CLAYEY SILT to SILTY CLAY	17	28		2.3	
1.350	4.43	66.73	1.05	SILTY SAND to SANDY SILT	22	36	65		44.5
1.500	4.92	113.23	.84	SAND to SILTY SAND	28	45	80		46.5
1.650	5.41	111.26	1.25	SAND to SILTY SAND	28	44	79		46.0
1.800	5.91	29.15	2.27	SANDY SILT to CLAYEY SILT	12	19		1.9	
1.950	6.40	14.98	3.58	CLAY to SILTY CLAY	10	16		1.0	
2.100	6.89	62.14	1.23	SILTY SAND to SANDY SILT	21	32	63		42.5
2.250	7.38	80.96	.60	SAND to SILTY SAND	20	30	70		43.5
2.400	7.87	109.71	1.02	SAND to SILTY SAND	27	40	79		44.5
2.550	8.37	140.47	.74	SAND	28	40	86		45.0
2.700	8.86	156.43	.74	SAND	31	43	89		45.5
2.850	9.35	110.22	1.20	SAND to SILTY SAND	28	37	78		43.5
3.000	9.84	147.80	.78	SAND	30	38	86		44.5
3.150	10.33	111.66	.65	SAND to SILTY SAND	28	35	77		43.0
3.300	10.83	46.74	1.01	SILTY SAND to SANDY SILT	16	19	51		38.5
3.450	11.32	51.54	.79	SILTY SAND to SANDY SILT	17	21	54		38.5
3.600	11.81	44.25	.68	SILTY SAND to SANDY SILT	15	18	49		38.0
3.750	12.30	21.01	1.38	SANDY SILT to CLAYEY SILT	8	10		1.6	
3.900	12.80	14.96	2.10	CLAYEY SILT to SILTY CLAY	7	9		1.1	
4.050	13.29	27.04	1.41	SANDY SILT to CLAYEY SILT	11	12		2.1	
4.200	13.78	41.83	.98	SILTY SAND to SANDY SILT	14	15	45		37.5
4.350	14.27	30.72	2.15	SANDY SILT to CLAYEY SILT	12	13		2.0	
4.500	14.76	13.49	2.37	CLAYEY SILT to SILTY CLAY	7	7		1.0	
4.650	15.26	51.54	.69	SILTY SAND to SANDY SILT	17	19	50		38.0
4.800	15.75	65.18	.62	SAND to SILTY SAND	16	17	57		38.5
4.950	16.24	63.82	1.22	SILTY SAND to SANDY SILT	21	23	56		38.5
5.100	16.73	94.31	.83	SAND to SILTY SAND	24	25	67		40.0
5.250	17.22	91.03	.64	SAND to SILTY SAND	23	24	66		40.0
5.400	17.72	40.45	.69	SILTY SAND to SANDY SILT	13	14	42		36.5
5.550	18.21	28.13	2.90	CLAYEY SILT to SILTY CLAY	14	14		1.8	
5.700	18.70	151.48	.62	SAND	30	31	79		42.5
5.850	19.19	231.44	1.24	SAND	46	47	91		44.5
6.000	19.69	236.99	1.11	SAND	47	48	92		44.5
6.150	20.18	274.29	1.62	SAND to SILTY SAND	69	68	96		45.0

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 120 pcf
ASSUMED DEPTH OF WATER TABLE = 13.5 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

Interpretations based on: Robertson and Campanella, 1989.

SOUNDING : CPT-22

DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
6.300	20.67	458.93	1.19	SAND	92	91	100		47.0
6.450	21.16	474.40	1.01	SAND	95	93	100		47.0
6.600	21.65	388.14	1.13	SAND	78	76	100		46.0
6.750	22.15	396.28	.50	GRAVELLY SAND to SAND	66	64	100		46.0
6.900	22.64	372.85	.41	GRAVELLY SAND to SAND	62	60	100		46.0
7.050	23.13	380.94	.40	GRAVELLY SAND to SAND	63	61	100		46.0
7.200	23.62	420.88	.40	GRAVELLY SAND to SAND	70	67	100		46.5
7.350	24.11	372.42	.37	GRAVELLY SAND to SAND	62	59	100		46.0
7.500	24.61	321.33	.43	GRAVELLY SAND to SAND	54	50	99		45.0
7.650	25.10	312.49	.73	SAND	62	58	98		45.0
7.800	25.59	352.30	.66	SAND	70	65	100		45.5
7.950	26.08	465.96	.46	GRAVELLY SAND to SAND	78	72	100		46.5
8.100	26.57	395.92	.33	GRAVELLY SAND to SAND	66	61	100		46.0
8.250	27.07	230.19	.49	SAND	46	42	88		43.5
8.400	27.56	283.58	.97	SAND	57	51	94		44.5
8.550	28.05	223.13	.55	SAND	45	40	87		43.5

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 120 pcf
ASSUMED DEPTH OF WATER TABLE = 13.5 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

Interpretations based on: Robertson and Campanella, 1989.

CPT INTERPRETATIONS

SOUNDING : CPT-23 PROJECT No.: 00-1571-1
PROJECT : AES/PANHANDLE CONE/RIG : 473/BH,GO/R#3
DATE/TIME: 04-03-00 11:14

DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
.150	.49	62.99	1.79	SILTY SAND to SANDY SILT	21	34	63		
.300	.98	70.13	.87	SAND to SILTY SAND	18	28	66		
.450	1.48	47.57	1.11	SILTY SAND to SANDY SILT	16	25	55		47.5
.600	1.97	90.57	.79	SAND to SILTY SAND	23	36	73		49.0
.750	2.46	113.36	.52	SAND	23	36	80		49.0
.900	2.95	142.55	.78	SAND	29	46	86		49.0
1.050	3.44	94.45	.93	SAND to SILTY SAND	24	38	75		47.0
1.200	3.94	60.04	.57	SAND to SILTY SAND	15	24	62		44.5
1.350	4.43	26.98	1.22	SANDY SILT to CLAYEY SILT	11	17		2.1	
1.500	4.92	16.83	1.70	CLAYEY SILT to SILTY CLAY	8	13		1.3	
1.650	5.41	13.70	1.99	CLAYEY SILT to SILTY CLAY	7	11		1.1	
1.800	5.91	6.20	3.43	CLAY	6	10		.4	
1.950	6.40	20.03	3.50	CLAY to SILTY CLAY	13	21		1.3	
2.100	6.89	21.50	3.51	CLAY to SILTY CLAY	14	22		1.4	
2.250	7.38	38.54	1.93	SANDY SILT to CLAYEY SILT	15	23		2.5	
2.400	7.87	55.28	1.53	SILTY SAND to SANDY SILT	18	27	59		41.0
2.550	8.37	71.45	3.89	CLAYEY SILT to SILTY CLAY	36	50		4.2	
2.700	8.86	108.52	1.35	SAND to SILTY SAND	27	37	78		44.0
2.850	9.35	114.51	2.44	SILTY SAND to SANDY SILT	38	51	79		44.0
3.000	9.84	103.14	1.04	SAND to SILTY SAND	26	34	75		43.0
3.150	10.33	94.71	.87	SAND to SILTY SAND	24	30	72		42.5
3.300	10.83	93.05	.75	SAND to SILTY SAND	23	29	71		42.0
3.450	11.32	50.73	.78	SILTY SAND to SANDY SILT	17	21	53		38.5
3.600	11.81	25.66	1.95	SANDY SILT to CLAYEY SILT	10	12		2.0	
3.750	12.30	21.69	1.69	SANDY SILT to CLAYEY SILT	9	10		1.7	
3.900	12.80	38.41	1.44	SILTY SAND to SANDY SILT	13	15	43		37.5
4.050	13.29	16.68	3.01	CLAYEY SILT to SILTY CLAY	8	9		1.1	
4.200	13.78	24.22	2.31	CLAYEY SILT to SILTY CLAY	12	13		1.6	
4.350	14.27	31.21	1.70	SANDY SILT to CLAYEY SILT	12	13		2.4	
4.500	14.76	57.25	1.20	SILTY SAND to SANDY SILT	19	20	53		38.0
4.650	15.26	132.72	.47	SAND	27	28	76		42.5
4.800	15.75	135.05	1.71	SILTY SAND to SANDY SILT	45	46	76		42.0
4.950	16.24	171.17	1.57	SAND to SILTY SAND	43	43	83		43.0
5.100	16.73	174.78	1.34	SAND to SILTY SAND	44	44	83		43.0
5.250	17.22	381.17	.97	SAND	76	75	100		46.0
5.400	17.72	388.14	1.06	SAND	78	76	100		46.0
5.550	18.21	363.65	.64	GRAVELLY SAND to SAND	61	59	100		46.0
5.700	18.70	380.47	.67	GRAVELLY SAND to SAND	63	61	100		46.0
5.850	19.19	296.45	.73	SAND	59	57	97		45.0
6.000	19.69	179.39	1.21	SAND to SILTY SAND	45	43	82		42.5
6.150	20.18	343.95	.55	GRAVELLY SAND to SAND	57	54	100		45.5

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 120 pcf
ASSUMED DEPTH OF WATER TABLE = 17.5 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

Interpretations based on: Robertson and Campanella, 1989.

SOUNDING : CPT-23

DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
6.300	20.67	261.76	.62	SAND	52	49	93		44.0
6.450	21.16	176.44	.63	SAND	35	33	81		42.5
6.600	21.65	122.18	1.28	SAND to SILTY SAND	31	28	70		40.0
6.750	22.15	150.80	.81	SAND	30	28	76		42.0
6.900	22.64	129.68	.88	SAND to SILTY SAND	32	30	72		40.5
7.050	23.13	162.61	.94	SAND	33	30	78		42.0
7.200	23.62	183.05	.88	SAND	37	33	81		42.5
7.350	24.11	152.71	1.32	SAND to SILTY SAND	38	34	76		41.5
7.500	24.61	118.04	.60	SAND	24	21	68		39.5
7.650	25.10	52.79	.93	SILTY SAND to SANDY SILT	18	16	45		36.5
7.800	25.59	36.77	1.54	SANDY SILT to CLAYEY SILT	15	13		2.8	
7.950	26.08	136.41	.83	SAND to SILTY SAND	34	30	72		40.5
8.100	26.57	171.53	.79	SAND	34	30	79		42.0
8.250	27.07	185.34	.54	SAND	37	32	81		42.0
8.400	27.56	227.19	.72	SAND	45	39	86		43.0
8.550	28.05	237.79	.89	SAND	48	41	87		43.0
8.700	28.54	240.85	.32	SAND	48	41	88		43.0
8.850	29.04	190.91	.44	SAND	38	32	81		42.0
9.000	29.53	194.43	.41	SAND	39	33	81		42.0
9.150	30.02	229.78	.59	SAND	46	39	86		42.5
9.300	30.51	206.16	.38	SAND	41	35	83		42.5
9.450	31.00	256.62	.29	GRAVELLY SAND to SAND	43	36	89		43.0
9.600	31.50	242.13	.40	SAND	48	40	87		43.0
9.750	31.99	205.18	.88	SAND	41	34	82		42.0
9.900	32.48	213.96	1.18	SAND	43	35	83		42.0
10.050	32.97	252.86	.67	SAND	51	41	88		43.0
10.200	33.46	261.59	.76	SAND	52	43	89		43.0
10.350	33.96	256.68	1.00	SAND	51	42	88		43.0
10.500	34.45	268.85	.52	SAND	54	43	89		43.0
10.650	34.94	263.03	.52	SAND	53	42	88		43.0
10.800	35.43	304.71	.73	SAND	61	49	92		43.5
10.950	35.93	307.16	.34	GRAVELLY SAND to SAND	51	41	93		43.5
11.100	36.42	321.73	.41	GRAVELLY SAND to SAND	54	42	94		44.0
11.250	36.91	286.72	.52	SAND	57	45	90		43.0
11.400	37.40	282.73	.49	SAND	57	44	90		43.0
11.550	37.89	303.33	1.01	SAND	61	47	92		43.5
11.700	38.39	274.57	.76	SAND	55	43	89		43.0
11.850	38.88	63.03	3.66	CLAYEY SILT to SILTY CLAY	32	24		3.6	
12.000	39.37	42.32	5.13	CLAY	42	33		2.4	
12.150	39.86	134.97	1.90	SILTY SAND to SANDY SILT	45	35	68		39.0
12.300	40.35	249.88	.89	SAND	50	38	86		42.5
12.450	40.85	215.23	1.23	SAND to SILTY SAND	54	41	81		41.5
12.600	41.34	286.19	1.36	SAND	57	43	89		43.0
12.750	41.83	385.87	.94	SAND	77	58	98		44.0
12.900	42.32	273.97	.54	SAND	55	41	88		42.5
13.050	42.81	295.83	1.13	SAND	59	44	90		43.0
13.200	43.31	252.98	.86	SAND	51	38	85		42.0
13.350	43.80	264.92	.68	SAND	53	39	86		42.5
13.500	44.29	335.54	.76	SAND	67	50	93		43.5
13.650	44.78	354.00	.73	SAND	71	52	94		43.5

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 120 pcf
ASSUMED DEPTH OF WATER TABLE = 17.5 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

Interpretations based on: Robertson and Campanella, 1989.

SOUNDING : CPT-23

DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
13.800	45.28	328.36	.44	GRAVELLY SAND to SAND	55	40	92		43.0
13.950	45.77	307.35	.43	GRAVELLY SAND to SAND	51	38	90		43.0
14.100	46.26	270.57	.44	SAND	54	39	86		42.0
14.250	46.75	265.96	.60	SAND	53	39	86		42.0
14.400	47.24	299.59	.59	SAND	60	43	89		42.5
14.550	47.74	308.03	.32	GRAVELLY SAND to SAND	51	37	90		42.5
14.700	48.23	382.45	.56	GRAVELLY SAND to SAND	64	46	96		43.5
14.850	48.72	436.13	.28	GRAVELLY SAND to SAND	73	52	100		44.0
15.000	49.21	238.94	1.57	SAND to SILTY SAND	60	43	82		41.5
15.150	49.70	26.19	11.71	CLAY	26	19		1.5	
15.300	50.20	153.94	3.36	SANDY SILT to CLAYEY SILT	62	44		8.9	

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 120 pcf
ASSUMED DEPTH OF WATER TABLE = 17.5 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

Interpretations based on: Robertson and Campanella, 1989.

CPT INTERPRETATIONS

SOUNDING : CPT-24 PROJECT No.: 00-1571-1
PROJECT : AES/PANHANDLE CONE/RIG : 473/BH,GO/R#3
DATE/TIME: 04-03-00 13:51

DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
.150	.49	147.33	1.24	SAND to SILTY SAND	37	59	87		
.300	.98	107.84	1.62	SILTY SAND to SANDY SILT	36	57	78		
.450	1.48	63.08	1.55	SILTY SAND to SANDY SILT	21	34	63		48.5
.600	1.97	54.98	1.00	SILTY SAND to SANDY SILT	18	29	59		47.0
.750	2.46	127.58	1.25	SAND to SILTY SAND	32	51	83		49.5
.900	2.95	136.33	1.18	SAND to SILTY SAND	34	55	85		49.0
1.050	3.44	163.08	1.14	SAND to SILTY SAND	41	65	90		49.0
1.200	3.94	144.95	.99	SAND to SILTY SAND	36	58	87		48.0
1.350	4.43	129.17	1.07	SAND to SILTY SAND	32	52	84		47.0
1.500	4.92	157.13	1.40	SAND to SILTY SAND	39	63	89		47.5
1.650	5.41	148.12	.84	SAND	30	47	88		47.0
1.800	5.91	205.20	1.40	SAND to SILTY SAND	51	82	97		48.0
1.950	6.40	155.58	1.23	SAND to SILTY SAND	39	62	89		46.5
2.100	6.89	134.20	1.71	SILTY SAND to SANDY SILT	45	70	85		46.0
2.250	7.38	124.07	1.23	SAND to SILTY SAND	31	47	83		45.0
2.400	7.87	124.26	1.13	SAND to SILTY SAND	31	45	83		45.0
2.550	8.37	115.74	.57	SAND	23	33	81		44.5
2.700	8.86	148.76	1.04	SAND to SILTY SAND	37	51	87		45.0
2.850	9.35	187.91	1.53	SAND to SILTY SAND	47	63	93		46.0
3.000	9.84	189.63	1.17	SAND to SILTY SAND	47	62	93		46.0
3.150	10.33	171.81	1.40	SAND to SILTY SAND	43	55	89		45.0
3.300	10.83	281.35	.99	SAND	56	70	100		46.5
3.450	11.32	334.07	1.46	SAND	67	81	100		47.0
3.600	11.81	368.43	1.09	SAND	74	88	100		47.5
3.750	12.30	284.43	.97	SAND	57	66	100		46.5
3.900	12.80	245.40	1.08	SAND	49	56	96		45.5
4.050	13.29	259.34	.77	SAND	52	58	98		46.0
4.200	13.78	358.23	2.23	SAND to SILTY SAND	90	98	100		46.5
4.350	14.27	366.71	1.39	SAND	73	79	100		46.5
4.500	14.76	262.33	1.10	SAND	52	56	96		45.5
4.650	15.26	195.35	.55	SAND	39	41	88		44.0
4.800	15.75	191.67	.47	SAND	38	40	87		44.0
4.950	16.24	160.70	1.34	SAND to SILTY SAND	40	42	82		43.0
5.100	16.73	120.80	.43	SAND	24	25	73		42.0
5.250	17.22	53.54	.54	SAND to SILTY SAND	13	14	50		38.0
5.400	17.72	13.32	1.65	CLAYEY SILT to SILTY CLAY	7	7		1.0	
5.550	18.21	5.35	6.17	CLAY	5	5		.3	
5.700	18.70	25.68	.62	SILTY SAND to SANDY SILT	9	9	28		33.0
5.850	19.19	105.46	.59	SAND to SILTY SAND	26	26	68		40.0
6.000	19.69	191.99	.36	SAND	38	38	85		43.5
6.150	20.18	167.79	1.41	SAND to SILTY SAND	42	41	81		42.5

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 120 pcf
ASSUMED DEPTH OF WATER TABLE = 14.5 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

Interpretations based on: Robertson and Campanella, 1989.

SOUNDING : CPT-24

DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
6.300	20.67	295.96	1.94	SAND to SILTY SAND	74	72	97		45.0
6.450	21.16	294.73	1.45	SAND to SILTY SAND	74	72	97		45.0
6.600	21.65	207.54	.72	SAND	42	40	87		43.5
6.750	22.15	204.86	.68	SAND	41	39	86		43.5
6.900	22.64	274.12	.51	SAND	55	52	94		44.5
7.050	23.13	305.88	.72	SAND	61	58	97		45.0
7.200	23.62	339.47	.99	SAND	68	64	100		45.5
7.350	24.11	224.52	.32	SAND	45	42	88		43.5
7.500	24.61	167.18	.71	SAND	33	31	80		42.0
7.650	25.10	284.21	.67	SAND	57	52	95		44.5
7.800	25.59	390.39	.88	SAND	78	72	100		46.0
7.950	26.08	383.81	.49	GRAVELLY SAND to SAND	64	58	100		45.5
8.100	26.57	397.96	1.01	SAND	80	72	100		46.0
8.250	27.07	443.51	.70	GRAVELLY SAND to SAND	74	67	100		46.0
8.400	27.56	372.70	.30	GRAVELLY SAND to SAND	62	56	100		45.5
8.550	28.05	391.71	.27	GRAVELLY SAND to SAND	65	58	100		45.5
8.700	28.54	367.56	.47	GRAVELLY SAND to SAND	61	54	100		45.0
8.850	29.04	363.86	.23	GRAVELLY SAND to SAND	61	53	100		45.0
9.000	29.53	334.35	.26	GRAVELLY SAND to SAND	56	49	98		44.5
9.150	30.02	467.66	.42	GRAVELLY SAND to SAND	78	68	100		46.0
9.300	30.51	391.90	.34	GRAVELLY SAND to SAND	65	57	100		45.5
9.450	31.00	345.55	.25	GRAVELLY SAND to SAND	58	50	98		44.5
9.600	31.50	322.98	.22	GRAVELLY SAND to SAND	54	46	96		44.5
9.750	31.99	363.05	.53	GRAVELLY SAND to SAND	61	52	99		45.0
9.900	32.48	358.82	.25	GRAVELLY SAND to SAND	60	51	99		44.5
10.050	32.97	432.25	.45	GRAVELLY SAND to SAND	72	61	100		45.5
10.200	33.46	459.27	.49	GRAVELLY SAND to SAND	77	64	100		46.0
10.350	33.96	422.71	.54	GRAVELLY SAND to SAND	70	59	100		45.5
10.500	34.45	427.36	.25	GRAVELLY SAND to SAND	71	59	100		45.5
10.650	34.94	185.25	.82	SAND	37	31	79		42.0
10.800	35.43	22.43	4.90	CLAY	22	18		1.2	
10.950	35.93	6.27	.32	SENSITIVE FINE GRAINED	3	3		.4	
11.100	36.42	136.18	1.23	SAND to SILTY SAND	34	28	70		39.5
11.250	36.91	160.42	2.36	SILTY SAND to SANDY SILT	53	43	75		40.5
11.400	37.40	406.05	1.48	SAND	81	66	100		45.0
11.550	37.89	358.48	.37	GRAVELLY SAND to SAND	60	48	97		44.5
11.700	38.39	230.23	.28	SAND	46	37	85		42.5
11.850	38.88	132.29	1.01	SAND to SILTY SAND	33	26	69		39.0
12.000	39.37	477.58	1.33	SAND	96	76	100		45.5
12.150	39.86	335.73	2.10	SAND to SILTY SAND	84	66	95		44.0
12.300	40.35	394.54	1.10	SAND	79	62	99		44.5
12.450	40.85	431.21	.52	GRAVELLY SAND to SAND	72	56	100		45.0
12.600	41.34	430.70	.74	GRAVELLY SAND to SAND	72	56	100		45.0
12.750	41.83	472.68	.91	SAND	95	73	100		45.0
12.900	42.32	541.93	.95	SAND	100	84	100		
13.050	42.81	570.64	1.07	SAND	100	88	100		
13.200	43.31	504.78	.65	GRAVELLY SAND to SAND	84	65	100		45.5
13.350	43.80	461.82	.47	GRAVELLY SAND to SAND	77	59	100		45.0
13.500	44.29	352.58	.23	GRAVELLY SAND to SAND	59	45	95		44.0
13.650	44.78	137.79	2.08	SILTY SAND to SANDY SILT	46	35	68		39.0

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 120 pcf
ASSUMED DEPTH OF WATER TABLE = 14.5 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

Interpretations based on: Robertson and Campanella, 1989.

SOUNDING : CPT-24

DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
13.800	45.28	85.70	2.56	SANDY SILT to CLAYEY SILT	34	26		5.5	
13.950	45.77	93.46	1.19	SAND to SILTY SAND	23	18	57		37.5
14.100	46.26	211.87	*****		0	0			42.5

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 120 pcf
ASSUMED DEPTH OF WATER TABLE = 14.5 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

Interpretations based on: Robertson and Campanella, 1989.

CPT INTERPRETATIONS

SOUNDING : CPT-25 PROJECT No.: 00-1571-1
PROJECT : AES/PANHANDLE CONE/RIG : 473/BH,GO/R#3
DATE/TIME: 04-03-00 10:34

DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
.150	.49	15.98	.75	SANDY SILT to CLAYEY SILT	6	10		1.6	
.300	.98	26.53	.90	SILTY SAND to SANDY SILT	9	14	38		47.0
.450	1.48	45.02	1.04	SILTY SAND to SANDY SILT	15	24	53		47.5
.600	1.97	53.77	.37	SAND to SILTY SAND	13	21	59		47.0
.750	2.46	24.81	1.41	SANDY SILT to CLAYEY SILT	10	16		2.0	
.900	2.95	19.04	2.10	CLAYEY SILT to SILTY CLAY	10	15		1.5	
1.050	3.44	17.17	2.50	CLAYEY SILT to SILTY CLAY	9	14		1.1	
1.200	3.94	11.47	3.92	CLAY	11	18		.7	
1.350	4.43	22.50	2.09	SANDY SILT to CLAYEY SILT	9	14		1.8	
1.500	4.92	34.44	2.00	SANDY SILT to CLAYEY SILT	14	22		2.3	
1.650	5.41	34.82	1.98	SANDY SILT to CLAYEY SILT	14	22		2.3	
1.800	5.91	40.11	2.12	SANDY SILT to CLAYEY SILT	16	26		2.7	
1.950	6.40	37.99	2.42	SANDY SILT to CLAYEY SILT	15	24		2.5	
2.100	6.89	27.98	3.07	CLAYEY SILT to SILTY CLAY	14	22		1.8	
2.250	7.38	27.53	3.63	CLAYEY SILT to SILTY CLAY	14	21		1.8	
2.400	7.87	34.27	1.37	SILTY SAND to SANDY SILT	11	17	46		38.5
2.550	8.37	130.04	1.15	SAND to SILTY SAND	33	46	84		44.5
2.700	8.86	114.87	1.24	SAND to SILTY SAND	29	39	80		44.0
2.850	9.35	57.38	1.90	SILTY SAND to SANDY SILT	19	26	59		40.0
3.000	9.84	84.47	1.15	SAND to SILTY SAND	21	27	70		42.0
3.150	10.33	89.53	1.23	SAND to SILTY SAND	22	28	71		42.0
3.300	10.83	125.13	.74	SAND to SILTY SAND	31	39	80		43.5
3.450	11.32	65.43	1.12	SILTY SAND to SANDY SILT	22	26	60		39.5
3.600	11.81	50.01	1.34	SILTY SAND to SANDY SILT	17	20	52		38.5
3.750	12.30	50.95	1.37	SILTY SAND to SANDY SILT	17	20	52		38.5
3.900	12.80	52.73	1.21	SILTY SAND to SANDY SILT	18	20	53		38.5
4.050	13.29	17.85	3.19	CLAYEY SILT to SILTY CLAY	9	10		1.1	
4.200	13.78	14.64	3.35	CLAY to SILTY CLAY	10	11		.9	
4.350	14.27	24.71	2.71	CLAYEY SILT to SILTY CLAY	12	14		1.6	
4.500	14.76	94.48	.86	SAND to SILTY SAND	24	26	68		41.0
4.650	15.26	123.75	.86	SAND to SILTY SAND	31	34	76		42.5
4.800	15.75	76.91	1.33	SILTY SAND to SANDY SILT	26	28	62		39.5
4.950	16.24	121.39	1.85	SILTY SAND to SANDY SILT	40	44	75		42.0
5.100	16.73	318.12	.93	SAND	64	68	100		46.0
5.250	17.22	258.02	.84	SAND	52	55	96		45.5
5.400	17.72	225.03	.57	SAND	45	47	92		44.5
5.550	18.21	227.19	.52	SAND	45	48	92		44.5
5.700	18.70	229.81	.18	SAND	46	48	92		44.5
5.850	19.19	210.79	.35	SAND	42	43	89		44.0
6.000	19.69	236.05	.87	SAND	47	48	92		44.5
6.150	20.18	229.59	.55	SAND	46	47	91		44.5

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 120 pcf
ASSUMED DEPTH OF WATER TABLE = 12.5 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

Interpretations based on: Robertson and Campanella, 1989.

SOUNDING : CPT-25

DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
6.300	20.67	205.01	.69	SAND	41	41	88		44.0
6.450	21.16	227.51	.74	SAND	46	46	91		44.0
6.600	21.65	249.01	.57	SAND	50	49	93		44.5
6.750	22.15	217.16	.37	SAND	43	43	89		44.0
6.900	22.64	267.09	.50	SAND	53	52	95		44.5
7.050	23.13	320.44	.62	SAND	64	62	100		45.5
7.200	23.62	279.37	1.06	SAND	56	54	95		45.0
7.350	24.11	386.06	.84	SAND	77	74	100		46.0
7.500	24.61	472.00	.96	SAND	94	90	100		46.5
7.650	25.10	360.50	.88	SAND	72	68	100		46.0
7.800	25.59	321.92	.31	GRAVELLY SAND to SAND	54	51	99		45.0
7.950	26.08	284.38	.70	SAND	57	53	95		44.5
8.100	26.57	280.28	.64	SAND	56	52	94		44.5
8.250	27.07	231.80	.52	SAND	46	43	89		43.5
8.400	27.56	295.41	.86	SAND	59	54	96		44.5
8.550	28.05	205.71	2.00	SILTY SAND to SANDY SILT	69	63	85		43.0
8.700	28.54	243.44	.15	GRAVELLY SAND to SAND	41	37	90		44.0
8.850	29.04	296.66	1.18	SAND	59	54	95		44.5
9.000	29.53	324.17	.77	SAND	65	58	98		45.0
9.150	30.02	368.02	.36	GRAVELLY SAND to SAND	61	55	100		45.5
9.300	30.51	403.42	.75	SAND	81	72	100		45.5
9.450	31.00	298.45	.47	GRAVELLY SAND to SAND	50	44	95		44.5
9.600	31.50	333.69	.52	GRAVELLY SAND to SAND	56	49	98		44.5
9.750	31.99	242.25	.53	SAND	48	42	88		43.5
9.900	32.48	126.02	1.92	SILTY SAND to SANDY SILT	42	36	70		39.5
10.050	32.97	87.76	1.33	SILTY SAND to SANDY SILT	29	25	59		38.5
10.200	33.46	74.04	2.77	SANDY SILT to CLAYEY SILT	30	25		4.8	
10.350	33.96	54.54	2.44	SANDY SILT to CLAYEY SILT	22	19		3.5	
10.500	34.45	84.41	2.54	SANDY SILT to CLAYEY SILT	34	29		5.5	
10.650	34.94	83.66	2.09	SILTY SAND to SANDY SILT	28	24	57		38.0
10.800	35.43	149.05	1.34	SAND to SILTY SAND	37	31	73		40.5
10.950	35.93	245.31	.99	SAND	49	41	88		43.0
11.100	36.42	251.86	.94	SAND	50	42	88		43.0
11.250	36.91	248.05	1.29	SAND	50	41	88		43.0
11.400	37.40	282.66	.83	SAND	57	47	91		43.5
11.550	37.89	289.29	.39	GRAVELLY SAND to SAND	48	40	92		43.5
11.700	38.39	112.39	1.19	SAND to SILTY SAND	28	23	65		38.5
11.850	38.88	260.80	.84	SAND	52	42	89		43.0
12.000	39.37	433.44	.90	SAND	87	70	100		45.0
12.150	39.86	433.61	.80	SAND	87	70	100		45.0
12.300	40.35	365.67	.44	GRAVELLY SAND to SAND	61	49	98		44.5
12.450	40.85	433.84	.42	GRAVELLY SAND to SAND	72	58	100		45.0
12.600	41.34	382.22	.81	SAND	76	61	99		44.5
12.750	41.83	343.04	.75	SAND	69	54	96		44.0
12.900	42.32	309.32	.50	GRAVELLY SAND to SAND	52	41	93		43.5
13.050	42.81	397.75	.36	GRAVELLY SAND to SAND	66	52	100		44.5
13.200	43.31	255.41	.49	SAND	51	40	87		42.5
13.350	43.80	51.96	2.37	SANDY SILT to CLAYEY SILT	21	16		3.3	
13.500	44.29	56.72	2.33	SANDY SILT to CLAYEY SILT	23	18		3.6	
13.650	44.78	88.19	1.09	SAND to SILTY SAND	22	17	56		37.5

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 120 pcf
ASSUMED DEPTH OF WATER TABLE = 12.5 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

SOUNDING : CPT-25

DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
13.800	45.28	98.26	.62	SAND to SILTY SAND	25	19	59		38.0
13.950	45.77	23.58	3.39	CLAYEY SILT to SILTY CLAY	12	9		1.4	
14.100	46.26	20.40	3.82	CLAY to SILTY CLAY	14	10		1.2	
14.250	46.75	17.46	2.41	CLAYEY SILT to SILTY CLAY	9	7		1.0	
14.400	47.24	19.21	2.50	CLAYEY SILT to SILTY CLAY	10	7		1.1	
14.550	47.74	21.05	3.42	CLAYEY SILT to SILTY CLAY	11	8		1.2	
14.700	48.23	18.55	3.50	CLAY to SILTY CLAY	12	9		1.0	
14.850	48.72	15.78	2.72	CLAYEY SILT to SILTY CLAY	8	6		.9	
15.000	49.21	17.19	3.84	CLAY to SILTY CLAY	11	9		.9	
15.150	49.70	16.51	2.79	CLAYEY SILT to SILTY CLAY	8	6		.9	
15.300	50.20	17.74	*****		0	0			.0

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 120 pcf
ASSUMED DEPTH OF WATER TABLE = 12.5 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

Interpretations based on: Robertson and Campanella, 1989.

CPT INTERPRETATIONS

SOUNDING : SDF-26 PROJECT No.: 00-1571-1
PROJECT : AES/PANHANDLE CONE/RIG : 722/BH.GO/R#3
DATE/TIME: 04-04-00 13:33

DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
.150	.49	67.64	2.00	SILTY SAND to SANDY SILT	23	36	65		
.300	.98	124.77	3.08	SANDY SILT to CLAYEY SILT	50	80		7.3	
.450	1.48	104.04	3.09	SANDY SILT to CLAYEY SILT	42	67		6.1	
.600	1.97	54.05	4.82	CLAY to SILTY CLAY	36	58		3.2	
.750	2.46	38.56	4.93	CLAY	39	62		2.3	
.900	2.95	40.15	4.23	CLAY to SILTY CLAY	27	43		2.4	
1.050	3.44	34.57	4.30	CLAY to SILTY CLAY	23	37		2.0	
1.200	3.94	32.21	3.02	CLAYEY SILT to SILTY CLAY	16	26		2.1	
1.350	4.43	40.24	3.26	CLAYEY SILT to SILTY CLAY	20	32		2.7	
1.500	4.92	36.39	3.39	CLAYEY SILT to SILTY CLAY	18	29		2.4	
1.650	5.41	32.33	3.70	CLAYEY SILT to SILTY CLAY	16	26		2.1	
1.800	5.91	87.72	.96	SAND to SILTY SAND	22	35	73		44.5
1.950	6.40	189.59	.60	SAND	38	61	95		47.5
2.100	6.89	93.88	1.51	SILTY SAND to SANDY SILT	31	49	75		44.0
2.250	7.38	36.39	2.25	SANDY SILT to CLAYEY SILT	15	22		2.4	
2.400	7.87	23.41	4.54	CLAY	23	34		1.5	
2.550	8.37	30.36	3.11	CLAYEY SILT to SILTY CLAY	15	21		2.0	
2.700	8.86	34.27	3.32	CLAYEY SILT to SILTY CLAY	17	24		2.2	
2.850	9.35	17.12	4.44	CLAY	17	23		1.1	
3.000	9.84	12.39	4.82	CLAY	12	16		.8	
3.150	10.33	20.61	3.80	CLAY to SILTY CLAY	14	17		1.3	
3.300	10.83	41.62	2.45	SANDY SILT to CLAYEY SILT	17	21		2.7	
3.450	11.32	65.46	1.72	SILTY SAND to SANDY SILT	22	26	60		39.5
3.600	11.81	133.04	1.51	SAND to SILTY SAND	33	40	80		43.5
3.750	12.30	186.64	1.89	SAND to SILTY SAND	47	54	89		44.5
3.900	12.80	272.53	1.44	SAND to SILTY SAND	68	78	99		46.0
4.050	13.29	215.63	1.22	SAND to SILTY SAND	54	60	92		45.0
4.200	13.78	201.83	1.01	SAND	40	44	90		44.5
4.350	14.27	202.89	1.06	SAND	41	44	89		44.5
4.500	14.76	208.90	.98	SAND	42	44	90		44.5
4.650	15.26	248.01	.91	SAND	50	52	94		45.0
4.800	15.75	249.35	1.18	SAND	50	51	94		45.0
4.950	16.24	223.20	1.59	SAND to SILTY SAND	56	57	90		44.0
5.100	16.73	267.34	1.86	SAND to SILTY SAND	67	67	95		45.0
5.250	17.22	322.09	1.84	SAND to SILTY SAND	81	79	100		45.5
5.400	17.72	372.15	1.95	SAND to SILTY SAND	93	90	100		46.0
5.550	18.21	407.03	1.16	SAND	81	78	100		46.0
5.700	18.70	301.72	1.28	SAND	60	57	97		45.0
5.850	19.19	178.99	1.09	SAND to SILTY SAND	45	42	82		42.5
6.000	19.69	32.65	3.69	CLAYEY SILT to SILTY CLAY	16	15		2.1	
6.150	20.18	26.85	3.52	CLAYEY SILT to SILTY CLAY	13	12		1.7	

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 120 pcf
ASSUMED DEPTH OF WATER TABLE = 25.0 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

Interpretations based on: Robertson and Campanella, 1989.

SOUNDING : SDF-26

DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
6.300	20.67	64.46	1.85	SILTY SAND to SANDY SILT	21	19	51		37.5
6.450	21.16	84.60	1.87	SILTY SAND to SANDY SILT	28	25	59		38.5
6.600	21.65	86.89	2.45	SILTY SAND to SANDY SILT	29	25	59		38.5
6.750	22.15	138.43	1.99	SILTY SAND to SANDY SILT	46	40	72		40.0
6.900	22.64	278.18	2.15	SAND to SILTY SAND	70	60	92		44.0
7.050	23.13	241.09	1.32	SAND to SILTY SAND	60	51	87		43.0
7.200	23.62	250.24	.72	SAND	50	42	88		43.0
7.350	24.11	262.56	.78	SAND	53	44	89		43.0
7.500	24.61	246.08	1.35	SAND to SILTY SAND	62	51	87		43.0
7.650	25.10	251.79	1.04	SAND	50	41	88		43.0
7.800	25.59	213.49	1.96	SAND to SILTY SAND	53	43	83		42.0
7.950	26.08	314.66	2.07	SAND to SILTY SAND	79	64	94		44.0
8.100	26.57	234.99	.58	SAND	47	38	85		42.5
8.250	27.07	198.07	3.57	*SAND to CLAYEY SAND	99	79			
8.400	27.56	233.84	2.11	SILTY SAND to SANDY SILT	78	62	85		42.5
8.550	28.05	73.25	.87	SAND to SILTY SAND	18	15	51		37.0
8.700	28.54	89.95	3.30	SANDY SILT to CLAYEY SILT	36	28		5.2	
8.850	29.04	132.89	1.16	SAND to SILTY SAND	33	26	68		39.0
9.000	29.53	138.86	.73	SAND	28	22	69		39.0
9.150	30.02	186.47	1.12	SAND to SILTY SAND	47	36	78		41.0
9.300	30.51	313.08	2.67	SILTY SAND to SANDY SILT	100	81	92		43.5
9.450	31.00	282.34	2.06	SAND to SILTY SAND	71	55	89		43.0
9.600	31.50	234.44	1.51	SAND to SILTY SAND	59	45	84		42.0
9.750	31.99	328.27	1.46	SAND to SILTY SAND	82	63	93		43.5
9.900	32.48	377.46	.74	SAND	75	58	97		44.0
10.050	32.97	325.83	.88	SAND	65	50	93		43.5
10.200	33.46	275.16	.55	SAND	55	42	88		42.5
10.350	33.96	138.90	.67	SAND	28	21	68		39.0
10.500	34.45	84.70	1.32	SILTY SAND to SANDY SILT	28	21	54		37.0
10.650	34.94	9.54	3.11	CLAY to SILTY CLAY	6	5		.5	
10.800	35.43	8.07	1.54	CLAYEY SILT to SILTY CLAY	4	3		.5	
10.950	35.93	4.23	4.37	CLAY	4	3		.1	
11.100	36.42	21.65	1.23	SANDY SILT to CLAYEY SILT	9	6		1.6	
11.250	36.91	16.25	5.61	CLAY	16	12		.9	
11.400	37.40	40.96	1.73	SANDY SILT to CLAYEY SILT	16	12		3.1	
11.550	37.89	192.97	1.06	SAND	39	28	77		40.0
11.700	38.39	437.03	1.06	SAND	87	64	100		44.5
11.850	38.88	554.72	1.60	SAND	100	80	100		
12.000	39.37	492.71	1.43	SAND	99	71	100		44.5

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 120 pcf
ASSUMED DEPTH OF WATER TABLE = 25.0 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

Interpretations based on: Robertson and Campanella, 1989.

CPT INTERPRETATIONS

SOUNDING : CPT-27 PROJECT No.: 00-1571-1
PROJECT : AES/PANHANDLE CONE/RIG : 473/BH,GO/R#3
DATE/TIME: 04-03-00 09:57

DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
.150	.49	13.15	.25	SANDY SILT to CLAYEY SILT	5	8		1.3	
.300	.98	30.00	.52	SILTY SAND to SANDY SILT	10	16	42		47.5
.450	1.48	52.71	.88	SILTY SAND to SANDY SILT	18	28	58		48.0
.600	1.97	36.39	.69	SILTY SAND to SANDY SILT	12	19	47		45.5
.750	2.46	18.84	1.06	SANDY SILT to CLAYEY SILT	8	12		1.5	
.900	2.95	17.85	1.18	SANDY SILT to CLAYEY SILT	7	11		1.4	
1.050	3.44	21.92	1.66	SANDY SILT to CLAYEY SILT	9	14		1.7	
1.200	3.94	19.27	1.82	SANDY SILT to CLAYEY SILT	8	12		1.5	
1.350	4.43	22.33	1.92	SANDY SILT to CLAYEY SILT	9	14		1.8	
1.500	4.92	28.89	1.66	SANDY SILT to CLAYEY SILT	12	18		2.3	
1.650	5.41	40.37	1.61	SILTY SAND to SANDY SILT	13	22	50		41.5
1.800	5.91	41.11	1.47	SILTY SAND to SANDY SILT	14	22	51		41.0
1.950	6.40	36.01	2.44	SANDY SILT to CLAYEY SILT	14	23		2.4	
2.100	6.89	40.09	1.38	SILTY SAND to SANDY SILT	13	21	50		39.5
2.250	7.38	43.55	1.56	SILTY SAND to SANDY SILT	15	22	53		40.0
2.400	7.87	43.59	1.75	SANDY SILT to CLAYEY SILT	17	25		3.4	
2.550	8.37	49.29	1.70	SILTY SAND to SANDY SILT	16	23	56		40.0
2.700	8.86	54.15	1.30	SILTY SAND to SANDY SILT	18	25	58		40.0
2.850	9.35	83.39	1.23	SAND to SILTY SAND	21	28	70		42.5
3.000	9.84	43.04	1.82	SANDY SILT to CLAYEY SILT	17	22		2.8	
3.150	10.33	42.45	1.77	SANDY SILT to CLAYEY SILT	17	22		3.3	
3.300	10.83	43.15	1.69	SILTY SAND to SANDY SILT	14	18	49		38.5
3.450	11.32	33.89	2.31	SANDY SILT to CLAYEY SILT	14	16		2.2	
3.600	11.81	34.33	2.22	SANDY SILT to CLAYEY SILT	14	16		2.2	
3.750	12.30	33.23	1.38	SILTY SAND to SANDY SILT	11	13	40		37.0
3.900	12.80	26.15	2.27	SANDY SILT to CLAYEY SILT	10	12		1.7	
4.050	13.29	20.35	2.85	CLAYEY SILT to SILTY CLAY	10	11		1.3	
4.200	13.78	23.62	1.75	SANDY SILT to CLAYEY SILT	9	10		1.8	
4.350	14.27	37.69	1.39	SILTY SAND to SANDY SILT	13	14	41		37.0
4.500	14.76	57.87	3.39	CLAYEY SILT to SILTY CLAY	29	31		3.4	
4.650	15.26	252.43	.91	SAND	50	53	95		45.0
4.800	15.75	357.34	.81	SAND	71	74	100		46.5
4.950	16.24	302.19	.81	SAND	60	62	100		46.0
5.100	16.73	249.63	.77	SAND	50	51	94		45.0
5.250	17.22	233.93	.69	SAND	47	48	92		44.5
5.400	17.72	177.61	.27	SAND	36	36	84		43.5
5.550	18.21	76.38	.24	SAND to SILTY SAND	19	19	59		39.0
5.700	18.70	63.44	.39	SAND to SILTY SAND	16	16	54		38.0
5.850	19.19	127.30	.84	SAND to SILTY SAND	32	31	74		41.5
6.000	19.69	179.92	.47	SAND	36	35	83		43.0
6.150	20.18	166.05	.67	SAND	33	32	81		42.5

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 120 pcf
ASSUMED DEPTH OF WATER TABLE = 15.0 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

Interpretations based on: Robertson and Campanella, 1989.

SOUNDING : CPT-27

DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
6.300	20.67	129.89	.55	SAND	26	25	74		41.5
6.450	21.16	142.89	1.13	SAND to SILTY SAND	36	34	76		42.0
6.600	21.65	83.30	1.48	SILTY SAND to SANDY SILT	28	27	60		39.0
6.750	22.15	135.88	.82	SAND to SILTY SAND	34	32	74		41.5
6.900	22.64	159.19	1.04	SAND to SILTY SAND	40	38	79		42.0
7.050	23.13	194.94	.99	SAND	39	37	84		43.0
7.200	23.62	163.63	1.03	SAND to SILTY SAND	41	38	79		42.0
7.350	24.11	172.23	2.34	SILTY SAND to SANDY SILT	57	53	80		42.5
7.500	24.61	150.73	.28	SAND	30	28	76		42.0
7.650	25.10	27.43	3.06	CLAYEY SILT to SILTY CLAY	14	13		1.7	
7.800	25.59	36.80	1.01	SILTY SAND to SANDY SILT	12	11	36		34.5
7.950	26.08	67.77	1.20	SILTY SAND to SANDY SILT	23	20	53		38.0
8.100	26.57	145.08	1.01	SAND to SILTY SAND	36	33	75		41.0
8.250	27.07	150.09	.87	SAND	30	27	75		41.5
8.400	27.56	89.80	.88	SAND to SILTY SAND	22	20	61		38.5
8.550	28.05	65.90	.73	SAND to SILTY SAND	16	15	52		37.5
8.700	28.54	32.53	2.51	SANDY SILT to CLAYEY SILT	13	11		2.1	
8.850	29.04	15.89	4.36	CLAY	16	14		.9	
9.000	29.53	44.30	2.55	SANDY SILT to CLAYEY SILT	18	15		2.8	
9.150	30.02	62.42	2.45	SANDY SILT to CLAYEY SILT	25	22		4.0	
9.300	30.51	170.96	.48	SAND	34	29	78		42.0
9.450	31.00	166.58	.61	SAND	33	29	77		41.5
9.600	31.50	174.04	.57	SAND	35	30	78		42.0
9.750	31.99	213.94	1.48	SAND to SILTY SAND	53	45	84		42.5
9.900	32.48	215.40	.53	SAND	43	36	84		42.5
10.050	32.97	246.89	.66	SAND	49	41	88		43.0
10.200	33.46	258.12	.60	SAND	52	43	89		43.0
10.350	33.96	262.56	.61	SAND	53	44	89		43.5
10.500	34.45	280.94	.51	SAND	56	46	91		43.5
10.650	34.94	263.92	.45	SAND	53	43	89		43.0
10.800	35.43	232.44	.23	SAND	46	38	85		42.5
10.950	35.93	151.16	.26	SAND	30	25	73		40.0
11.100	36.42	40.15	3.47	CLAYEY SILT to SILTY CLAY	20	16		2.5	
11.250	36.91	59.32	3.49	CLAYEY SILT to SILTY CLAY	30	24		3.4	
11.400	37.40	98.49	2.31	SILTY SAND to SANDY SILT	33	26	60		38.0
11.550	37.89	86.85	1.76	SILTY SAND to SANDY SILT	29	23	57		38.0
11.700	38.39	167.30	2.26	SILTY SAND to SANDY SILT	56	44	75		40.5
11.850	38.88	215.44	1.10	SAND	43	34	82		42.0
12.000	39.37	389.84	1.01	SAND	78	62	99		44.5
12.150	39.86	599.63	1.51	SAND	100	94	100		
12.300	40.35	503.61	.72	GRAVELLY SAND to SAND	84	66	100		45.5
12.450	40.85	416.23	.35	GRAVELLY SAND to SAND	69	54	100		44.5
12.600	41.34	379.24	.43	GRAVELLY SAND to SAND	63	49	98		44.0
12.750	41.83	378.75	.39	GRAVELLY SAND to SAND	63	49	98		44.0
12.900	42.32	384.53	.35	GRAVELLY SAND to SAND	64	49	98		44.0
13.050	42.81	433.84	.58	GRAVELLY SAND to SAND	72	55	100		44.5
13.200	43.31	633.22	.69	GRAVELLY SAND to SAND	100	81	100		
13.350	43.80	647.86	.71	GRAVELLY SAND to SAND	100	82	100		
13.500	44.29	637.47	.96	GRAVELLY SAND to SAND	100	80	100		
13.650	44.78	693.62	.54	GRAVELLY SAND to SAND	100	87	100		

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 120 pcf
ASSUMED DEPTH OF WATER TABLE = 15.0 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

Interpretations based on: Robertson and Campanella, 1989.

SOUNDING : CPT-27

DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
13.800	45.28	623.03	.58	GRAVELLY SAND to SAND	100	78	100		
13.950	45.77	606.37	.75	GRAVELLY SAND to SAND	100	76	100		
14.100	46.26	419.95	.68	GRAVELLY SAND to SAND	70	52	100		44.5
14.250	46.75	391.46	.91	SAND	78	58	98		44.0
14.400	47.24	390.76	.39	GRAVELLY SAND to SAND	65	48	97		44.0
14.550	47.74	421.82	.48	GRAVELLY SAND to SAND	70	52	99		44.0
14.700	48.23	410.58	.24	GRAVELLY SAND to SAND	68	50	99		44.0
14.850	48.72	379.39	.34	GRAVELLY SAND to SAND	63	46	96		44.0
15.000	49.21	211.15	.12	SAND	42	31	79		40.5
15.150	49.70	207.82	.18	SAND	42	30	79		40.5
15.300	50.20	299.70	.22	GRAVELLY SAND to SAND	50	36	89		42.5

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 120 pcf
ASSUMED DEPTH OF WATER TABLE = 15.0 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

Interpretations based on: Robertson and Campanella, 1989.

CPT INTERPRETATIONS

SOUNDING : CPT-28 PROJECT No.: 00-1571-1
PROJECT : AES/PANHANDLE CONE/RIG : 473/BH,GO/R#3
DATE/TIME: 04-03-00 12:22

DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
.150	.49	9.84	.85	CLAYEY SILT to SILTY CLAY	5	8		1.0	
.300	.98	24.41	1.27	SANDY SILT to CLAYEY SILT	10	16		1.9	
.450	1.48	22.60	2.14	SANDY SILT to CLAYEY SILT	9	14		1.8	
.600	1.97	24.45	1.82	SANDY SILT to CLAYEY SILT	10	16		1.9	
.750	2.46	40.68	1.36	SILTY SAND to SANDY SILT	14	22	51		45.0
.900	2.95	37.37	1.60	SANDY SILT to CLAYEY SILT	15	24		3.0	
1.050	3.44	103.12	1.37	SAND to SILTY SAND	26	41	77		47.5
1.200	3.94	116.38	.93	SAND to SILTY SAND	29	47	81		47.5
1.350	4.43	107.29	1.07	SAND to SILTY SAND	27	43	78		46.5
1.500	4.92	114.04	.81	SAND to SILTY SAND	29	46	80		46.5
1.650	5.41	162.67	1.30	SAND to SILTY SAND	41	65	90		47.5
1.800	5.91	136.58	2.85	SILTY SAND to SANDY SILT	46	73	85		46.5
1.950	6.40	140.73	3.84	*SAND to CLAYEY SAND	70	100			
2.100	6.89	89.93	2.33	SILTY SAND to SANDY SILT	30	47	73		44.0
2.250	7.38	222.94	3.51	*SAND to CLAYEY SAND	100	100			
2.400	7.87	211.98	.63	SAND	42	62	98		47.0
2.550	8.37	264.58	1.61	SAND to SILTY SAND	66	93	100		47.5
2.700	8.86	174.44	1.65	SAND to SILTY SAND	44	60	92		46.0
2.850	9.35	180.52	.85	SAND	36	48	92		46.0
3.000	9.84	199.57	.61	SAND	40	52	94		46.0
3.150	10.33	263.03	1.77	SAND to SILTY SAND	66	84	100		46.5
3.300	10.83	157.89	.77	SAND	32	39	86		44.5
3.450	11.32	58.59	1.66	SILTY SAND to SANDY SILT	20	24	57		39.0
3.600	11.81	18.80	3.22	CLAYEY SILT to SILTY CLAY	9	11		1.2	
3.750	12.30	14.91	2.39	CLAYEY SILT to SILTY CLAY	7	9		1.1	
3.900	12.80	35.29	1.16	SILTY SAND to SANDY SILT	12	13	41		37.0
4.050	13.29	24.43	2.62	CLAYEY SILT to SILTY CLAY	12	14		1.6	
4.200	13.78	74.97	.86	SAND to SILTY SAND	19	21	61		39.5
4.350	14.27	56.19	1.44	SILTY SAND to SANDY SILT	19	20	53		38.5
4.500	14.76	33.86	1.88	SANDY SILT to CLAYEY SILT	14	14		2.6	
4.650	15.26	35.44	1.94	SANDY SILT to CLAYEY SILT	14	15		2.3	
4.800	15.75	50.18	1.31	SILTY SAND to SANDY SILT	17	17	48		37.5
4.950	16.24	28.57	2.40	SANDY SILT to CLAYEY SILT	11	12		1.8	
5.100	16.73	30.38	2.56	SANDY SILT to CLAYEY SILT	12	12		2.0	
5.250	17.22	51.07	1.57	SILTY SAND to SANDY SILT	17	17	48		37.5
5.400	17.72	27.81	3.69	CLAYEY SILT to SILTY CLAY	14	14		1.8	
5.550	18.21	41.60	1.79	SANDY SILT to CLAYEY SILT	17	17		3.2	
5.700	18.70	19.16	3.99	CLAY to SILTY CLAY	13	13		1.2	
5.850	19.19	89.78	1.32	SAND to SILTY SAND	22	22	63		39.0
6.000	19.69	109.07	1.44	SAND to SILTY SAND	27	27	69		40.0
6.150	20.18	111.30	1.48	SAND to SILTY SAND	28	27	69		40.0

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 120 pcf
ASSUMED DEPTH OF WATER TABLE = 15.5 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

Interpretations based on: Robertson and Campanella, 1989.

SOUNDING : CPT-28

DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
6.300	20.67	93.26	1.70	SILTY SAND to SANDY SILT	31	30	64		39.0
6.450	21.16	129.13	1.89	SILTY SAND to SANDY SILT	43	41	73		41.0
6.600	21.65	254.13	2.45	SILTY SAND to SANDY SILT	85	81	92		44.0
6.750	22.15	231.23	.25	SAND	46	44	89		44.0
6.900	22.64	140.66	.30	SAND	28	26	75		41.5
7.050	23.13	135.67	.51	SAND	27	25	74		41.0
7.200	23.62	150.35	.61	SAND	30	28	76		42.0
7.350	24.11	149.16	.98	SAND to SILTY SAND	37	34	76		42.0
7.500	24.61	173.12	1.38	SAND to SILTY SAND	43	40	80		42.5
7.650	25.10	176.63	1.40	SAND to SILTY SAND	44	40	81		42.5
7.800	25.59	194.11	.81	SAND	39	35	83		42.5
7.950	26.08	194.39	.36	SAND	39	35	83		42.5
8.100	26.57	207.99	.69	SAND	42	37	85		43.0
8.250	27.07	196.54	1.60	SAND to SILTY SAND	49	44	83		42.5
8.400	27.56	238.05	.84	SAND	48	42	88		43.5
8.550	28.05	159.25	.86	SAND	32	28	77		41.5
8.700	28.54	82.30	.86	SAND to SILTY SAND	21	18	58		38.0
8.850	29.04	16.44	2.89	CLAYEY SILT to SILTY CLAY	8	7		1.0	
9.000	29.53	21.99	2.94	CLAYEY SILT to SILTY CLAY	11	10		1.3	
9.150	30.02	7.80	6.54	CLAY	8	7		.4	
9.300	30.51	12.64	3.42	CLAY to SILTY CLAY	8	7		.7	
9.450	31.00	62.97	7.68	CLAY	63	54		3.6	
9.600	31.50	314.04	2.33	SILTY SAND to SANDY SILT	100	89	95		44.0
9.750	31.99	285.81	1.01	SAND	57	48	92		44.0
9.900	32.48	314.61	.76	SAND	63	53	95		44.0
10.050	32.97	291.29	.84	SAND	58	49	92		44.0
10.200	33.46	330.00	.96	SAND	66	55	96		44.0
10.350	33.96	343.21	.76	SAND	69	57	97		44.5
10.500	34.45	422.77	1.58	SAND to SILTY SAND	100	87	100		45.0
10.650	34.94	411.36	.74	GRAVELLY SAND to SAND	69	56	100		45.0
10.800	35.43	374.82	.65	GRAVELLY SAND to SAND	62	51	99		44.5
10.950	35.93	375.71	1.61	SAND to SILTY SAND	94	76	99		44.5
11.100	36.42	414.10	1.36	SAND	83	67	100		45.0
11.250	36.91	413.83	1.36	SAND	83	67	100		45.0
11.400	37.40	377.75	.75	SAND	76	60	99		44.5
11.550	37.89	354.68	.86	SAND	71	57	97		44.0
11.700	38.39	345.27	.75	SAND	69	55	96		44.0
11.850	38.88	279.75	.48	SAND	56	44	90		43.0
12.000	39.37	285.68	.95	SAND	57	45	90		43.0
12.150	39.86	67.11	2.71	SANDY SILT to CLAYEY SILT	27	21		4.3	
12.300	40.35	59.83	2.89	SANDY SILT to CLAYEY SILT	24	19		3.8	
12.450	40.85	117.53	3.95	CLAYEY SILT to SILTY CLAY	59	46		6.8	
12.600	41.34	128.53	1.92	SILTY SAND to SANDY SILT	43	33	67		39.0
12.750	41.83	82.98	1.64	SILTY SAND to SANDY SILT	28	21	54		37.5
12.900	42.32	21.65	18.76	CLAY	22	17		1.3	
13.050	42.81	229.44	1.00	SAND	46	35	83		42.0
13.200	43.31	212.04	1.55	SAND to SILTY SAND	53	40	81		41.5
13.350	43.80	208.60	.74	SAND	42	32	80		41.5
13.500	44.29	257.89	.92	SAND	52	39	86		42.5
13.650	44.78	283.30	.96	SAND	57	43	89		42.5

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 120 pcf
ASSUMED DEPTH OF WATER TABLE = 15.5 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

Interpretations based on: Robertson and Campanella, 1989.

SOUNDING : CPT-28

DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
13.800	45.28	313.15	.74	SAND	63	47	91		43.0
13.950	45.77	317.80	1.42	SAND	64	47	92		43.0
14.100	46.26	246.18	1.54	SAND to SILTY SAND	62	46	84		42.0
14.250	46.75	375.44	.92	SAND	75	56	96		44.0
14.400	47.24	367.92	.41	GRAVELLY SAND to SAND	61	45	96		43.5
14.550	47.74	136.12	1.09	SAND to SILTY SAND	34	25	67		38.5
14.700	48.23	97.68	.73	SAND to SILTY SAND	24	18	57		37.5
14.850	48.72	111.20	.71	SAND to SILTY SAND	28	20	61		38.0
15.000	49.21	196.45	.80	SAND	39	28	77		40.0
15.150	49.70	66.77	3.12	SANDY SILT to CLAYEY SILT	27	19		3.8	
15.300	50.20	50.90	5.26	CLAY	51	37		2.8	

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 120 pcf
ASSUMED DEPTH OF WATER TABLE = 15.5 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

Interpretations based on: Robertson and Campanella, 1989.

CPT INTERPRETATIONS

SOUNDING : CPT-29 PROJECT No.: 00-1571-1
PROJECT : AES/PANHANDLE CONE/RIG : 473/BH,GO/R#3
DATE/TIME: 04-03-00 09:18

DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
.150	.49	40.39	1.28	SILTY SAND to SANDY SILT	13	22	50		
.300	.98	40.66	1.69	SANDY SILT to CLAYEY SILT	16	26		3.2	
.450	1.48	29.53	1.14	SILTY SAND to SANDY SILT	10	16	41		46.0
.600	1.97	30.32	.89	SILTY SAND to SANDY SILT	10	16	42		44.5
.750	2.46	48.14	.69	SILTY SAND to SANDY SILT	16	26	55		46.0
.900	2.95	23.20	2.87	CLAYEY SILT to SILTY CLAY	12	19		1.5	
1.050	3.44	12.51	3.82	CLAY	13	20		.8	
1.200	3.94	15.95	2.54	CLAYEY SILT to SILTY CLAY	8	13		1.0	
1.350	4.43	37.05	1.20	SILTY SAND to SANDY SILT	12	20	48		42.0
1.500	4.92	27.49	2.06	SANDY SILT to CLAYEY SILT	11	18		2.2	
1.650	5.41	30.51	.98	SILTY SAND to SANDY SILT	10	16	42		39.5
1.800	5.91	27.62	2.23	SANDY SILT to CLAYEY SILT	11	18		1.8	
1.950	6.40	47.31	1.36	SILTY SAND to SANDY SILT	16	25	55		41.5
2.100	6.89	56.26	1.09	SILTY SAND to SANDY SILT	19	29	60		42.0
2.250	7.38	68.98	1.24	SILTY SAND to SANDY SILT	23	35	66		42.5
2.400	7.87	96.49	1.04	SAND to SILTY SAND	24	35	75		44.0
2.550	8.37	172.47	1.27	SAND to SILTY SAND	43	61	92		46.0
2.700	8.86	158.17	.81	SAND	32	43	89		45.5
2.850	9.35	155.53	.59	SAND	31	42	88		45.0
3.000	9.84	156.66	.62	SAND	31	41	87		45.0
3.150	10.33	130.29	1.11	SAND to SILTY SAND	33	41	81		44.0
3.300	10.83	159.63	.72	SAND	32	40	87		44.5
3.450	11.32	226.72	.87	SAND	45	55	96		46.0
3.600	11.81	181.90	.50	SAND	36	43	89		44.5
3.750	12.30	158.44	.99	SAND to SILTY SAND	40	46	85		44.0
3.900	12.80	167.58	1.62	SAND to SILTY SAND	42	48	86		44.0
4.050	13.29	236.92	1.04	SAND	47	53	95		45.5
4.200	13.78	189.19	.90	SAND	38	42	88		44.0
4.350	14.27	204.04	.71	SAND	41	44	90		44.5
4.500	14.76	182.73	.64	SAND	37	39	86		44.0
4.650	15.26	166.69	1.07	SAND to SILTY SAND	42	44	83		43.5
4.800	15.75	207.41	.79	SAND	41	44	89		44.0
4.950	16.24	219.20	2.63	SILTY SAND to SANDY SILT	73	76	91		44.5
5.100	16.73	176.27	.84	SAND	35	36	84		43.5
5.250	17.22	143.95	.45	SAND	29	30	78		42.5
5.400	17.72	160.50	1.31	SAND to SILTY SAND	40	41	81		43.0
5.550	18.21	170.28	.42	SAND	34	34	83		43.0
5.700	18.70	172.42	.73	SAND	34	35	83		43.0
5.850	19.19	157.66	1.02	SAND to SILTY SAND	39	39	80		42.5
6.000	19.69	175.78	.32	SAND	35	35	83		43.0
6.150	20.18	207.71	.21	SAND	42	41	87		44.0

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 120 pcf
ASSUMED DEPTH OF WATER TABLE = 14.5 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

Interpretations based on: Robertson and Campanella, 1989.

SOUNDING : CPT-29

DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
6.300	20.67	240.72	.30	SAND	48	47	91		44.0
6.450	21.16	271.11	.66	SAND	54	53	95		44.5
6.600	21.65	278.01	.34	GRAVELLY SAND to SAND	46	45	95		44.5
6.750	22.15	251.75	.58	SAND	50	48	92		44.5
6.900	22.64	228.79	1.09	SAND	46	44	89		44.0
7.050	23.13	317.59	.79	SAND	64	60	98		45.0
7.200	23.62	259.23	.68	SAND	52	49	92		44.0
7.350	24.11	242.11	.55	SAND	48	45	90		44.0
7.500	24.61	224.05	.91	SAND	45	42	88		43.5
7.650	25.10	188.21	.59	SAND	38	35	83		42.5
7.800	25.59	83.22	.98	SAND to SILTY SAND	21	19	59		38.5
7.950	26.08	97.00	.92	SAND to SILTY SAND	24	22	63		39.0
8.100	26.57	108.01	.44	SAND	22	20	66		39.5
8.250	27.07	143.17	.61	SAND	29	26	74		41.0
8.400	27.56	156.62	.96	SAND to SILTY SAND	39	35	77		41.5
8.550	28.05	179.60	1.00	SAND	36	32	80		42.0
8.700	28.54	143.34	1.01	SAND to SILTY SAND	36	32	74		41.0
8.850	29.04	123.62	.61	SAND	25	22	69		39.5
9.000	29.53	146.97	.40	SAND	29	26	74		41.0
9.150	30.02	92.41	.72	SAND to SILTY SAND	23	20	61		38.5
9.300	30.51	157.79	2.24	SILTY SAND to SANDY SILT	53	46	76		41.0
9.450	31.00	149.84	.59	SAND	30	26	74		40.5
9.600	31.50	196.17	1.66	SAND to SILTY SAND	49	42	82		42.0
9.750	31.99	395.17	.54	GRAVELLY SAND to SAND	66	56	100		45.0
9.900	32.48	338.20	.91	SAND	68	57	97		44.5
10.050	32.97	287.53	.18	GRAVELLY SAND to SAND	48	40	92		44.0
10.200	33.46	264.41	.29	GRAVELLY SAND to SAND	44	37	90		43.5
10.350	33.96	283.62	.31	GRAVELLY SAND to SAND	47	40	92		43.5
10.500	34.45	329.83	.80	SAND	66	55	96		44.0
10.650	34.94	350.26	.36	GRAVELLY SAND to SAND	58	48	97		44.5
10.800	35.43	356.13	.36	GRAVELLY SAND to SAND	59	49	98		44.5
10.950	35.93	368.55	.27	GRAVELLY SAND to SAND	61	50	99		44.5
11.100	36.42	364.11	.30	GRAVELLY SAND to SAND	61	50	98		44.5
11.250	36.91	382.15	.70	SAND	76	62	99		44.5
11.400	37.40	403.72	.53	GRAVELLY SAND to SAND	67	54	100		45.0
11.550	37.89	365.20	.42	GRAVELLY SAND to SAND	61	49	98		44.5
11.700	38.39	344.00	.56	GRAVELLY SAND to SAND	57	46	96		44.0
11.850	38.88	341.79	.73	SAND	68	55	96		44.0
12.000	39.37	384.08	1.39	SAND	77	61	99		44.5
12.150	39.86	363.84	.51	GRAVELLY SAND to SAND	61	48	97		44.0
12.300	40.35	338.13	.75	SAND	68	53	95		44.0
12.450	40.85	374.63	.68	SAND	75	59	98		44.5
12.600	41.34	295.03	.19	GRAVELLY SAND to SAND	49	38	91		43.0
12.750	41.83	213.49	.47	SAND	43	33	81		42.0
12.900	42.32	125.81	.86	SAND to SILTY SAND	31	24	66		38.5
13.050	42.81	113.68	2.07	SILTY SAND to SANDY SILT	38	29	63		38.5
13.200	43.31	83.09	3.69	CLAYEY SILT to SILTY CLAY	42	32		4.7	
13.350	43.80	198.38	3.29	SANDY SILT to CLAYEY SILT	79	61		11.5	
13.500	44.29	49.33	4.40	CLAY to SILTY CLAY	33	25		2.7	
13.650	44.78	67.01	2.11	SILTY SAND to SANDY SILT	22	17	48		36.0

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 120 pcf
ASSUMED DEPTH OF WATER TABLE = 14.5 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

Interpretations based on: Robertson and Campanella, 1989.

SOUNDING : CPT-29

DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
13.800	45.28	34.82	5.45	CLAY	35	26		1.9	
13.950	45.77	124.66	1.88	SILTY SAND to SANDY SILT	42	31	65		38.5
14.100	46.26	222.14	.97	SAND	44	33	82		41.5
14.250	46.75	190.27	.79	SAND	38	28	77		40.5
14.400	47.24	83.39	3.65	CLAYEY SILT to SILTY CLAY	42	31		4.7	
14.550	47.74	36.99	5.04	CLAY	37	27		2.0	
14.700	48.23	39.86	7.50	CLAY	40	29		2.2	
14.850	48.72	93.46	4.55	*VERY STIFF FINE GRAINED	93	69			
15.000	49.21	149.88	3.46	SANDY SILT to CLAYEY SILT	60	44		8.6	
15.150	49.70	78.84	3.47	SANDY SILT to CLAYEY SILT	32	23		4.5	
15.300	50.20	39.26	6.66	CLAY	39	28		2.1	

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 120 pcf
ASSUMED DEPTH OF WATER TABLE = 14.5 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

Interpretations based on: Robertson and Campanella, 1989.

CPT INTERPRETATIONS

SOUNDING : CPT-30 PROJECT No.: 00-1571-1
PROJECT : AES/PANHANDLE CONE/RIG : 473/BH,GO/R#3
DATE/TIME: 04-03-00 08:53

DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
.150	.49	18.16	1.79	SANDY SILT to CLAYEY SILT	7	12		1.5	
.300	.98	25.22	1.87	SANDY SILT to CLAYEY SILT	10	16		2.0	
.450	1.48	31.74	2.15	SANDY SILT to CLAYEY SILT	13	20		2.1	
.600	1.97	20.97	1.77	SANDY SILT to CLAYEY SILT	8	13		1.7	
.750	2.46	21.56	1.53	SANDY SILT to CLAYEY SILT	9	14		1.7	
.900	2.95	19.06	1.10	SANDY SILT to CLAYEY SILT	8	12		1.5	
1.050	3.44	15.68	1.39	SANDY SILT to CLAYEY SILT	6	10		1.2	
1.200	3.94	48.16	1.46	SILTY SAND to SANDY SILT	16	26	55		44.0
1.350	4.43	35.95	3.28	CLAYEY SILT to SILTY CLAY	18	29		2.4	
1.500	4.92	31.68	3.52	CLAYEY SILT to SILTY CLAY	16	25		2.1	
1.650	5.41	28.57	2.44	SANDY SILT to CLAYEY SILT	11	18		1.9	
1.800	5.91	67.45	2.14	SILTY SAND to SANDY SILT	22	36	65		43.5
1.950	6.40	28.04	4.09	CLAY to SILTY CLAY	19	30		1.8	
2.100	6.89	29.57	2.79	CLAYEY SILT to SILTY CLAY	15	23		1.9	
2.250	7.38	26.07	4.34	CLAY to SILTY CLAY	17	26		1.5	
2.400	7.87	25.47	4.41	CLAY to SILTY CLAY	17	25		1.5	
2.550	8.37	30.23	4.60	CLAY to SILTY CLAY	20	28		1.7	
2.700	8.86	38.07	3.16	CLAYEY SILT to SILTY CLAY	19	26		2.5	
2.850	9.35	31.61	4.52	CLAY to SILTY CLAY	21	28		1.8	
3.000	9.84	20.88	5.03	CLAY	21	27		1.4	
3.150	10.33	25.56	5.33	CLAY	26	32		1.5	
3.300	10.83	26.11	6.20	CLAY	26	32		1.5	
3.450	11.32	32.97	5.11	CLAY	33	40		1.9	
3.600	11.81	21.90	5.91	CLAY	22	26		1.2	
3.750	12.30	32.55	5.75	CLAY	33	38		1.9	
3.900	12.80	29.93	5.85	CLAY	30	34		1.7	
4.050	13.29	30.47	6.11	CLAY	30	34		1.7	
4.200	13.78	45.36	6.32	CLAY	45	50		2.6	
4.350	14.27	63.80	6.73	CLAY	64	69		3.7	
4.500	14.76	63.18	5.73	CLAY	63	67		3.7	
4.650	15.26	101.06	5.20	*VERY STIFF FINE GRAINED	100	100			
4.800	15.75	95.33	6.17	*VERY STIFF FINE GRAINED	95	98			
4.950	16.24	99.79	6.62	*VERY STIFF FINE GRAINED	100	100			
5.100	16.73	111.66	5.70	*VERY STIFF FINE GRAINED	100	100			
5.250	17.22	103.40	5.97	*VERY STIFF FINE GRAINED	100	100			
5.400	17.72	80.41	6.63	*VERY STIFF FINE GRAINED	80	78			
5.550	18.21	85.26	6.29	*VERY STIFF FINE GRAINED	85	82			
5.700	18.70	102.48	6.05	*VERY STIFF FINE GRAINED	100	97			
5.850	19.19	133.80	5.80	*VERY STIFF FINE GRAINED	100	100			
6.000	19.69	83.05	6.56	*VERY STIFF FINE GRAINED	83	76			
6.150	20.18	205.73	5.76	*VERY STIFF FINE GRAINED	100	100			

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 120 pcf
ASSUMED DEPTH OF WATER TABLE = 22.0 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

Interpretations based on: Robertson and Campanella, 1989.

SOUNDING : CPT-30

DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
6.300	20.67	439.96	4.35	*SAND to CLAYEY SAND	100	100			

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 120 pcf
ASSUMED DEPTH OF WATER TABLE = 22.0 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

Interpretations based on: Robertson and Campanella, 1989.

CPT INTERPRETATIONS

SOUNDING : CPT-31A
PROJECT : RIVER PARK
DATE/TIME: 03-11-02 08:55

PROJECT No.: 02-1571-4
CONE/RIG : 471/GO-KP/R#4

DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
.150	.49	20.01	.90	SANDY SILT to CLAYEY SILT	8	13		1.6	
.300	.98	45.42	1.06	SILTY SAND to SANDY SILT	15	24	54		49.0
.450	1.48	87.80	.85	SAND to SILTY SAND	22	35	73		
.600	1.97	48.95	1.04	SILTY SAND to SANDY SILT	16	26	56		46.5
.750	2.46	43.13	.83	SILTY SAND to SANDY SILT	14	23	52		45.5
.900	2.95	20.63	1.11	SANDY SILT to CLAYEY SILT	8	13		1.6	
1.050	3.44	35.01	1.57	SANDY SILT to CLAYEY SILT	14	22		2.8	
1.200	3.94	29.19	2.06	SANDY SILT to CLAYEY SILT	12	19		1.9	
1.350	4.43	30.85	.94	SILTY SAND to SANDY SILT	10	16	43		41.0
1.500	4.92	52.09	1.79	SILTY SAND to SANDY SILT	17	28	58		43.0
1.650	5.41	80.14	.80	SAND to SILTY SAND	20	32	70		44.5
1.800	5.91	65.03	1.52	SILTY SAND to SANDY SILT	22	35	64		43.5
1.950	6.40	74.72	1.55	SILTY SAND to SANDY SILT	25	40	68		43.5
2.100	6.89	66.58	1.64	SILTY SAND to SANDY SILT	22	35	65		42.5
2.250	7.38	60.74	1.51	SILTY SAND to SANDY SILT	20	30	62		42.0
2.400	7.87	47.04	1.47	SILTY SAND to SANDY SILT	16	23	55		40.0
2.550	8.37	116.55	2.32	SILTY SAND to SANDY SILT	39	55	81		44.5
2.700	8.86	95.01	1.13	SAND to SILTY SAND	24	33	75		43.0
2.850	9.35	149.84	2.17	SILTY SAND to SANDY SILT	50	67	87		45.0
3.000	9.84	110.56	1.49	SAND to SILTY SAND	28	36	77		43.5
3.150	10.33	115.87	1.07	SAND to SILTY SAND	29	37	78		43.5
3.300	10.83	110.98	1.33	SAND to SILTY SAND	28	34	76		43.0
3.450	11.32	80.26	1.25	SILTY SAND to SANDY SILT	27	32	66		41.0
3.600	11.81	78.97	1.29	SILTY SAND to SANDY SILT	26	31	65		40.5
3.750	12.30	87.93	1.46	SILTY SAND to SANDY SILT	29	34	68		41.5
3.900	12.80	93.54	1.46	SILTY SAND to SANDY SILT	31	36	69		41.5
4.050	13.29	96.81	1.55	SILTY SAND to SANDY SILT	32	36	69		41.5
4.200	13.78	88.53	1.38	SILTY SAND to SANDY SILT	30	32	66		40.5
4.350	14.27	97.36	2.17	SILTY SAND to SANDY SILT	32	35	68		41.0
4.500	14.76	74.85	1.55	SILTY SAND to SANDY SILT	25	27	60		39.0
4.650	15.26	94.11	2.39	SILTY SAND to SANDY SILT	31	33	66		40.0
4.800	15.75	55.77	5.11	CLAY to SILTY CLAY	37	38		3.2	
4.950	16.24	54.98	5.27	CLAY	55	56		3.2	
5.100	16.73	61.36	2.22	SANDY SILT to CLAYEY SILT	25	24		4.0	
5.250	17.22	67.71	2.38	SANDY SILT to CLAYEY SILT	27	27		4.4	
5.400	17.72	77.50	4.03	CLAYEY SILT to SILTY CLAY	39	38		4.5	
5.550	18.21	155.13	1.80	SILTY SAND to SANDY SILT	52	49	78		42.0
5.700	18.70	163.14	1.67	SAND to SILTY SAND	41	39	79		42.5
5.850	19.19	160.19	3.30	SANDY SILT to CLAYEY SILT	64	60		9.4	
6.000	19.69	147.59	2.32	SILTY SAND to SANDY SILT	49	45	76		41.5
6.150	20.18	176.14	2.02	SILTY SAND to SANDY SILT	59	53	80		42.5

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 120 pcf
ASSUMED DEPTH OF WATER TABLE = 32.0 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

SOUNDING : CPT-31A

DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
6.300	20.67	121.29	2.25	SILTY SAND to SANDY SILT	40	36	69		39.5
6.450	21.16	92.61	4.64	*VERY STIFF FINE GRAINED	93	82			
6.600	21.65	84.75	4.59	*VERY STIFF FINE GRAINED	85	74			
6.750	22.15	91.12	5.04	*VERY STIFF FINE GRAINED	91	79			
6.900	22.64	81.50	3.34	SANDY SILT to CLAYEY SILT	33	28		4.7	
7.050	23.13	99.21	2.68	SANDY SILT to CLAYEY SILT	40	34		5.8	
7.200	23.62	77.25	1.85	SILTY SAND to SANDY SILT	26	22	55		38.0
7.350	24.11	74.34	1.82	SILTY SAND to SANDY SILT	25	21	53		37.5
7.500	24.61	101.19	1.63	SILTY SAND to SANDY SILT	34	28	62		38.5
7.650	25.10	110.58	1.81	SILTY SAND to SANDY SILT	37	30	64		38.5
7.800	25.59	111.13	1.92	SILTY SAND to SANDY SILT	37	30	64		38.5
7.950	26.08	107.41	2.77	SANDY SILT to CLAYEY SILT	43	34		6.2	
8.100	26.57	121.14	3.62	SANDY SILT to CLAYEY SILT	48	38		7.0	
8.250	27.07	74.10	5.41	*VERY STIFF FINE GRAINED	74	58			
8.400	27.56	163.48	2.94	SILTY SAND to SANDY SILT	54	42	74		40.0
8.550	28.05	116.38	5.31	*VERY STIFF FINE GRAINED	100	90			
8.700	28.54	283.89	2.18	SAND to SILTY SAND	71	54	89		43.0
8.850	29.04	368.72	4.15	*SAND to CLAYEY SAND	100	100			

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 120 pcf
ASSUMED DEPTH OF WATER TABLE = 32.0 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

CPT INTERPRETATIONS

SOUNDING : CPT-32B
PROJECT : RIVER PARK
DATE/TIME: 03-11-02 11:03

PROJECT No.: 02-1571-4
CONE/RIG : 471/GO-KP/R#4

DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
.150	.49	15.25	3.74	CLAY to SILTY CLAY	10	16		1.0	
.300	.98	25.68	4.71	CLAY	26	41		1.5	
.450	1.48	47.38	2.83	SANDY SILT to CLAYEY SILT	19	30		3.2	
.600	1.97	27.32	2.89	CLAYEY SILT to SILTY CLAY	14	22		1.8	
.750	2.46	24.86	3.38	CLAYEY SILT to SILTY CLAY	12	20		1.6	
.900	2.95	31.85	3.08	CLAYEY SILT to SILTY CLAY	16	25		2.1	
1.050	3.44	37.82	3.44	CLAYEY SILT to SILTY CLAY	19	30		2.5	
1.200	3.94	42.02	2.90	SANDY SILT to CLAYEY SILT	17	27		2.8	
1.350	4.43	33.31	4.47	CLAY to SILTY CLAY	22	36		1.9	
1.500	4.92	41.43	2.82	SANDY SILT to CLAYEY SILT	17	27		2.7	
1.650	5.41	37.16	4.39	CLAY to SILTY CLAY	25	40		2.2	
1.800	5.91	93.18	2.12	SILTY SAND to SANDY SILT	31	50	74		45.0
1.950	6.40	58.76	3.30	CLAYEY SILT to SILTY CLAY	29	47		3.4	
2.100	6.89	34.71	3.08	CLAYEY SILT to SILTY CLAY	17	27		2.3	
2.250	7.38	46.04	3.87	CLAYEY SILT to SILTY CLAY	23	35		2.7	
2.400	7.87	64.46	2.23	SANDY SILT to CLAYEY SILT	26	38		4.3	
2.550	8.37	56.34	1.33	SILTY SAND to SANDY SILT	19	27	60		41.0
2.700	8.86	72.42	1.02	SAND to SILTY SAND	18	25	67		42.0
2.850	9.35	109.58	1.32	SAND to SILTY SAND	27	37	78		43.5
3.000	9.84	113.87	2.85	SANDY SILT to CLAYEY SILT	46	59		6.7	
3.150	10.33	89.48	2.12	SILTY SAND to SANDY SILT	30	38	71		42.0
3.300	10.83	105.67	2.73	SANDY SILT to CLAYEY SILT	42	52		6.2	
3.450	11.32	82.49	1.22	SAND to SILTY SAND	21	25	67		41.5
3.600	11.81	70.36	.74	SAND to SILTY SAND	18	21	62		40.0
3.750	12.30	85.23	1.82	SILTY SAND to SANDY SILT	28	33	67		41.0
3.900	12.80	57.21	1.01	SILTY SAND to SANDY SILT	19	22	55		38.5
4.050	13.29	56.28	1.01	SILTY SAND to SANDY SILT	19	21	54		38.5
4.200	13.78	53.56	1.81	SILTY SAND to SANDY SILT	18	20	52		38.0
4.350	14.27	43.11	.70	SILTY SAND to SANDY SILT	14	16	45		37.5
4.500	14.76	56.62	.81	SILTY SAND to SANDY SILT	19	20	52		38.0
4.650	15.26	56.45	1.36	SILTY SAND to SANDY SILT	19	20	52		38.0
4.800	15.75	75.14	.87	SAND to SILTY SAND	19	19	60		39.0
4.950	16.24	76.06	1.05	SAND to SILTY SAND	19	19	59		39.0
5.100	16.73	64.18	1.06	SILTY SAND to SANDY SILT	21	21	54		38.0
5.250	17.22	60.42	.74	SAND to SILTY SAND	15	15	52		38.0
5.400	17.72	70.58	.95	SAND to SILTY SAND	18	17	56		38.5
5.550	18.21	83.83	1.09	SAND to SILTY SAND	21	20	61		39.0
5.700	18.70	96.39	1.67	SILTY SAND to SANDY SILT	32	30	64		39.0
5.850	19.19	128.47	.77	SAND to SILTY SAND	32	30	72		40.5
6.000	19.69	183.26	1.07	SAND	37	34	82		42.5
6.150	20.18	240.30	2.32	SILTY SAND to SANDY SILT	80	73	89		43.5

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 120 pcf
ASSUMED DEPTH OF WATER TABLE = 32.0 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

Interpretations based on: Robertson and Campanella, 1989.

SOUNDING : CPT-32B

DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
6.300	20.67	115.34	2.05	SILTY SAND to SANDY SILT	38	35	68		39.5
6.450	21.16	72.95	1.25	SILTY SAND to SANDY SILT	24	22	55		38.0
6.600	21.65	62.14	.89	SAND to SILTY SAND	16	14	50		37.0
6.750	22.15	77.46	1.25	SILTY SAND to SANDY SILT	26	22	56		38.0
6.900	22.64	109.09	.78	SAND to SILTY SAND	27	23	65		39.0
7.050	23.13	74.27	.81	SAND to SILTY SAND	19	16	54		37.5
7.200	23.62	55.92	1.34	SILTY SAND to SANDY SILT	19	16	45		36.5
7.350	24.11	44.61	3.65	CLAYEY SILT to SILTY CLAY	22	19		2.5	
7.500	24.61	263.24	.76	SAND	53	43	89		43.0
7.650	25.10	153.41	1.12	SAND to SILTY SAND	38	31	73		40.0
7.800	25.59	103.46	.88	SAND to SILTY SAND	26	21	62		38.5
7.950	26.08	86.59	.64	SAND to SILTY SAND	22	17	56		38.0
8.100	26.57	65.31	1.07	SILTY SAND to SANDY SILT	22	17	48		36.5
8.250	27.07	74.38	1.20	SILTY SAND to SANDY SILT	25	19	52		37.0
8.400	27.56	160.78	2.66	SILTY SAND to SANDY SILT	54	42	73		39.5
8.550	28.05	73.17	.90	SAND to SILTY SAND	18	14	51		36.5
8.700	28.54	91.76	2.92	SANDY SILT to CLAYEY SILT	37	28		5.3	
8.850	29.04	130.08	.65	SAND	26	20	67		38.5
9.000	29.53	57.55	.76	SAND to SILTY SAND	14	11	43		35.0
9.150	30.02	79.46	1.25	SILTY SAND to SANDY SILT	26	20	52		37.0
9.300	30.51	107.65	.42	SAND	22	16	60		38.0
9.450	31.00	109.30	2.53	SILTY SAND to SANDY SILT	36	27	61		38.0
9.600	31.50	149.16	1.08	SAND to SILTY SAND	37	27	69		39.0

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 120 pcf
ASSUMED DEPTH OF WATER TABLE = 32.0 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

Interpretations based on: Robertson and Campanella, 1989.

CPT INTERPRETATIONS

SOUNDING : CPT-33 PROJECT No.: 02-1571-4
PROJECT : RIVER PARK CONE/RIG : 471/GO-KP/R#4
DATE/TIME: 03-11-02 13:45

DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
.150	.49	.32	3.13	ORGANIC MATERIAL	0	1		.0	
.300	.98	29.15	.03	SILTY SAND to SANDY SILT	10	16	41		47.5
.450	1.48	36.60	.55	SILTY SAND to SANDY SILT	12	20	48		46.5
.600	1.97	27.68	1.23	SANDY SILT to CLAYEY SILT	11	18		2.2	
.750	2.46	29.45	1.22	SILTY SAND to SANDY SILT	10	16	41		43.5
.900	2.95	36.46	1.81	SANDY SILT to CLAYEY SILT	15	23		2.9	
1.050	3.44	44.47	1.57	SILTY SAND to SANDY SILT	15	24	53		44.0
1.200	3.94	36.84	1.06	SILTY SAND to SANDY SILT	12	20	48		42.5
1.350	4.43	27.77	1.33	SANDY SILT to CLAYEY SILT	11	18		2.2	
1.500	4.92	25.52	1.06	SANDY SILT to CLAYEY SILT	10	16		2.0	
1.650	5.41	38.58	1.22	SILTY SAND to SANDY SILT	13	21	49		41.0
1.800	5.91	46.74	2.14	SANDY SILT to CLAYEY SILT	19	30		3.1	
1.950	6.40	90.04	1.61	SILTY SAND to SANDY SILT	30	48	73		44.5
2.100	6.89	98.32	1.27	SAND to SILTY SAND	25	38	76		44.5
2.250	7.38	98.15	1.55	SILTY SAND to SANDY SILT	33	49	76		44.0
2.400	7.87	64.92	1.20	SILTY SAND to SANDY SILT	22	31	64		42.0
2.550	8.37	57.96	.72	SAND to SILTY SAND	14	20	61		41.0
2.700	8.86	54.17	.76	SILTY SAND to SANDY SILT	18	25	58		40.0
2.850	9.35	50.88	1.12	SILTY SAND to SANDY SILT	17	23	56		39.5
3.000	9.84	52.47	1.20	SILTY SAND to SANDY SILT	17	23	56		39.5
3.150	10.33	65.37	2.33	SANDY SILT to CLAYEY SILT	26	33		4.3	
3.300	10.83	44.21	1.95	SANDY SILT to CLAYEY SILT	18	22		2.9	
3.450	11.32	70.15	1.21	SILTY SAND to SANDY SILT	23	28	62		40.0
3.600	11.81	148.86	1.49	SAND to SILTY SAND	37	44	83		44.0
3.750	12.30	130.10	1.11	SAND to SILTY SAND	33	38	79		43.0
3.900	12.80	106.10	1.09	SAND to SILTY SAND	27	30	72		42.0
4.050	13.29	81.24	1.48	SILTY SAND to SANDY SILT	27	30	64		40.0
4.200	13.78	68.90	1.39	SILTY SAND to SANDY SILT	23	25	59		39.0
4.350	14.27	58.61	1.84	SILTY SAND to SANDY SILT	20	21	54		38.5
4.500	14.76	59.42	2.29	SANDY SILT to CLAYEY SILT	24	25		3.9	
4.650	15.26	50.52	2.57	SANDY SILT to CLAYEY SILT	20	21		3.3	
4.800	15.75	44.49	2.58	SANDY SILT to CLAYEY SILT	18	18		2.9	
4.950	16.24	43.66	2.59	SANDY SILT to CLAYEY SILT	17	18		2.8	
5.100	16.73	47.25	2.75	SANDY SILT to CLAYEY SILT	19	19		3.1	
5.250	17.22	31.31	5.49	CLAY	31	31		1.8	
5.400	17.72	51.82	2.72	SANDY SILT to CLAYEY SILT	21	20		3.4	
5.550	18.21	48.88	2.66	SANDY SILT to CLAYEY SILT	20	19		3.2	
5.700	18.70	50.73	2.76	SANDY SILT to CLAYEY SILT	20	19		3.3	
5.850	19.19	52.41	2.86	SANDY SILT to CLAYEY SILT	21	20		3.4	
6.000	19.69	63.80	2.52	SANDY SILT to CLAYEY SILT	26	23		4.2	
6.150	20.18	81.30	1.28	SILTY SAND to SANDY SILT	27	25	58		38.5

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 120 pcf
ASSUMED DEPTH OF WATER TABLE = 34.0 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

Interpretations based on: Robertson and Campanella, 1989.

SOUNDING : CPT-33

DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
6.300	20.67	46.89	4.05	CLAYEY SILT to SILTY CLAY	23	21		2.7	
6.450	21.16	54.58	3.76	CLAYEY SILT to SILTY CLAY	27	24		3.1	
6.600	21.65	83.81	2.53	SANDY SILT to CLAYEY SILT	34	29		5.5	
6.750	22.15	93.48	2.48	SILTY SAND to SANDY SILT	31	27	61		38.5
6.900	22.64	87.02	2.21	SILTY SAND to SANDY SILT	29	25	59		38.0
7.050	23.13	75.87	2.62	SANDY SILT to CLAYEY SILT	30	26		5.0	
7.200	23.62	66.54	3.05	SANDY SILT to CLAYEY SILT	27	22		3.8	
7.350	24.11	75.42	2.03	SILTY SAND to SANDY SILT	25	21	54		37.5
7.500	24.61	79.22	2.59	SANDY SILT to CLAYEY SILT	32	26		5.2	
7.650	25.10	130.63	1.34	SAND to SILTY SAND	33	27	69		39.0
7.800	25.59	134.08	1.07	SAND to SILTY SAND	34	27	69		39.5
7.950	26.08	66.11	2.86	SANDY SILT to CLAYEY SILT	26	21		4.3	
8.100	26.57	34.65	5.02	CLAY	35	27		1.9	
8.250	27.07	31.06	5.02	CLAY	31	24		1.7	
8.400	27.56	58.19	3.44	CLAYEY SILT to SILTY CLAY	29	23		3.3	
8.550	28.05	277.52	1.17	SAND	56	43	89		43.0
8.700	28.54	134.52	1.43	SAND to SILTY SAND	34	26	68		39.0
8.850	29.04	77.71	2.03	SILTY SAND to SANDY SILT	26	20	52		37.0
9.000	29.53	107.27	2.07	SILTY SAND to SANDY SILT	36	27	61		38.0
9.150	30.02	60.25	4.25	CLAYEY SILT to SILTY CLAY	30	22		3.4	
9.300	30.51	126.73	1.36	SAND to SILTY SAND	32	23	65		38.5
9.450	31.00	74.40	3.40	SANDY SILT to CLAYEY SILT	30	22		4.3	
9.600	31.50	44.06	1.88	SANDY SILT to CLAYEY SILT	18	13		2.8	
9.750	31.99	39.45	4.03	CLAYEY SILT to SILTY CLAY	20	14		2.2	
9.900	32.48	50.07	3.40	CLAYEY SILT to SILTY CLAY	25	18		2.8	
10.050	32.97	69.28	1.34	SILTY SAND to SANDY SILT	23	16	47		36.0
10.200	33.46	99.85	2.03	SILTY SAND to SANDY SILT	33	23	57		37.5
10.350	33.96	111.26	1.63	SILTY SAND to SANDY SILT	37	26	60		38.0
10.500	34.45	128.38	1.50	SAND to SILTY SAND	32	22	64		38.0
10.650	34.94	96.66	1.50	SILTY SAND to SANDY SILT	32	22	56		37.0
10.800	35.43	85.85	1.82	SILTY SAND to SANDY SILT	29	20	52		36.5
10.950	35.93	104.72	1.86	SILTY SAND to SANDY SILT	35	24	58		37.5
11.100	36.42	140.22	1.47	SAND to SILTY SAND	35	24	66		38.5
11.250	36.91	167.43	1.18	SAND to SILTY SAND	42	29	71		39.0
11.400	37.40	171.32	1.73	SAND to SILTY SAND	43	29	72		39.0
11.550	37.89	144.89	1.07	SAND to SILTY SAND	36	25	67		38.5
11.700	38.39	156.66	1.40	SAND to SILTY SAND	39	27	69		38.5
11.850	38.88	169.75	1.18	SAND to SILTY SAND	42	29	71		39.0
12.000	39.37	148.71	1.38	SAND to SILTY SAND	37	25	67		38.5
12.150	39.86	191.69	1.39	SAND to SILTY SAND	48	32	74		39.0
12.300	40.35	119.01	1.81	SILTY SAND to SANDY SILT	40	27	61		37.5
12.450	40.85	131.14	1.30	SAND to SILTY SAND	33	22	63		38.0
12.600	41.34	93.50	2.87	SANDY SILT to CLAYEY SILT	37	25		5.4	
12.750	41.83	79.35	3.96	CLAYEY SILT to SILTY CLAY	40	26		4.5	
12.900	42.32	192.50	*****		0	0			39.5

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 120 pcf
ASSUMED DEPTH OF WATER TABLE = 34.0 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

Interpretations based on: Robertson and Campanella, 1989.

CPT INTERPRETATIONS

SOUNDING : CPT-34A
PROJECT : RIVER PARK
DATE/TIME: 03-11-02 12:39

PROJECT No.: 02-1571-4
CONE/RIG : 471/GO-KP/R#4

DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
.150	.49	13.55	-.07		0	0			
.300	.98	28.17	.04	SILTY SAND to SANDY SILT	9	15	40		47.0
.450	1.48	42.32	.02	SAND to SILTY SAND	11	17	52		47.0
.600	1.97	36.63	.16	SILTY SAND to SANDY SILT	12	20	48		45.5
.750	2.46	22.09	.23	SILTY SAND to SANDY SILT	7	12	33		42.5
.900	2.95	37.39	.94	SILTY SAND to SANDY SILT	12	20	48		44.0
1.050	3.44	46.57	.77	SILTY SAND to SANDY SILT	16	25	54		44.0
1.200	3.94	68.54	.54	SAND to SILTY SAND	17	27	66		45.5
1.350	4.43	77.18	.91	SAND to SILTY SAND	19	31	69		45.5
1.500	4.92	84.04	1.23	SAND to SILTY SAND	21	34	71		45.0
1.650	5.41	96.05	1.74	SILTY SAND to SANDY SILT	32	51	75		45.5
1.800	5.91	95.01	1.43	SILTY SAND to SANDY SILT	32	51	75		45.0
1.950	6.40	107.50	2.47	SILTY SAND to SANDY SILT	36	57	78		45.0
2.100	6.89	81.50	2.05	SILTY SAND to SANDY SILT	27	42	70		43.5
2.250	7.38	89.46	1.89	SILTY SAND to SANDY SILT	30	45	73		44.0
2.400	7.87	106.33	1.34	SAND to SILTY SAND	27	39	78		44.0
2.550	8.37	119.14	1.23	SAND to SILTY SAND	30	42	81		44.5
2.700	8.86	120.22	1.47	SAND to SILTY SAND	30	41	81		44.0
2.850	9.35	114.40	1.42	SAND to SILTY SAND	29	38	79		44.0
3.000	9.84	117.70	1.37	SAND to SILTY SAND	29	38	79		43.5
3.150	10.33	108.43	1.28	SAND to SILTY SAND	27	34	76		43.0
3.300	10.83	127.30	.95	SAND to SILTY SAND	32	39	80		43.5
3.450	11.32	136.86	1.29	SAND to SILTY SAND	34	42	82		44.0
3.600	11.81	156.87	1.26	SAND to SILTY SAND	39	47	85		44.0
3.750	12.30	141.41	1.65	SAND to SILTY SAND	35	41	81		43.5
3.900	12.80	144.78	1.69	SAND to SILTY SAND	36	41	81		43.5
4.050	13.29	172.61	1.32	SAND to SILTY SAND	43	48	86		44.0
4.200	13.78	181.22	1.07	SAND	36	40	87		44.0
4.350	14.27	159.59	1.82	SILTY SAND to SANDY SILT	53	57	83		43.5
4.500	14.76	208.60	1.11	SAND	42	44	90		44.5
4.650	15.26	211.79	1.12	SAND	42	44	90		44.5
4.800	15.75	249.88	1.44	SAND to SILTY SAND	62	64	94		45.0
4.950	16.24	234.12	1.06	SAND	47	47	92		44.5
5.100	16.73	208.16	1.04	SAND	42	42	88		44.0
5.250	17.22	205.44	1.25	SAND to SILTY SAND	51	51	87		43.5
5.400	17.72	245.63	1.18	SAND	49	48	92		44.5
5.550	18.21	238.30	1.38	SAND to SILTY SAND	60	57	91		44.0
5.700	18.70	194.50	.94	SAND	39	37	84		43.0
5.850	19.19	238.77	1.11	SAND	48	45	90		44.0
6.000	19.69	206.67	1.78	SAND to SILTY SAND	52	48	85		43.0
6.150	20.18	216.53	1.79	SAND to SILTY SAND	54	49	86		43.0

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 120 pcf
ASSUMED DEPTH OF WATER TABLE = 34.0 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

Interpretations based on: Robertson and Campanella, 1989.

SOUNDING : CPT-34A

DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
6.300	20.67	287.00	1.57	SAND to SILTY SAND	72	64	94		44.5
6.450	21.16	156.85	1.80	SILTY SAND to SANDY SILT	52	46	76		41.5
6.600	21.65	168.20	1.61	SAND to SILTY SAND	42	37	78		42.0
6.750	22.15	220.63	1.47	SAND to SILTY SAND	55	48	86		43.0
6.900	22.64	275.84	1.33	SAND	55	47	92		44.0
7.050	23.13	321.54	1.83	SAND to SILTY SAND	80	68	96		44.5
7.200	23.62	245.10	1.22	SAND	49	41	88		43.0
7.350	24.11	320.48	1.56	SAND to SILTY SAND	80	67	95		44.0
7.500	24.61	283.51	.95	SAND	57	47	91		43.5
7.650	25.10	147.50	1.58	SAND to SILTY SAND	37	30	72		39.5
7.800	25.59	196.73	1.18	SAND to SILTY SAND	49	40	80		42.0
7.950	26.08	240.75	1.25	SAND	48	38	86		42.5
8.100	26.57	235.22	1.93	SAND to SILTY SAND	59	47	85		42.5
8.250	27.07	247.99	1.16	SAND	50	39	86		42.5
8.400	27.56	231.23	1.31	SAND to SILTY SAND	58	45	84		42.0
8.550	28.05	252.69	1.24	SAND	51	39	86		42.5
8.700	28.54	308.11	.99	SAND	62	47	92		43.0
8.850	29.04	295.24	1.19	SAND	59	45	90		43.0
9.000	29.53	327.13	1.13	SAND	65	49	93		43.5
9.150	30.02	361.74	1.26	SAND	72	54	95		44.0
9.300	30.51	245.02	1.04	SAND	49	36	84		42.0
9.450	31.00	316.10	1.02	SAND	63	46	91		43.0
9.600	31.50	313.38	1.25	SAND	63	46	91		43.0
9.750	31.99	377.07	1.29	SAND	75	54	96		43.5
9.900	32.48	398.09	1.32	SAND	80	57	97		44.0
10.050	32.97	368.26	1.29	SAND	74	52	95		43.5
10.200	33.46	315.53	1.14	SAND	63	45	90		42.5
10.350	33.96	312.64	1.46	SAND to SILTY SAND	78	55	89		42.5
10.500	34.45	408.64	1.48	SAND	82	57	97		43.5
10.650	34.94	232.55	.75	SAND	47	32	81		41.0
10.800	35.43	116.46	1.58	SILTY SAND to SANDY SILT	39	27	61		38.0
10.950	35.93	78.20	1.14	SAND to SILTY SAND	20	14	49		36.0
11.100	36.42	79.16	1.69	SILTY SAND to SANDY SILT	26	18	50		36.0
11.250	36.91	124.43	1.46	SAND to SILTY SAND	31	21	62		38.0
11.400	37.40	96.03	1.55	SILTY SAND to SANDY SILT	32	22	55		37.0
11.550	37.89	78.22	1.69	SILTY SAND to SANDY SILT	26	18	49		36.0
11.700	38.39	94.73	1.77	SILTY SAND to SANDY SILT	32	21	54		36.5
11.850	38.88	76.52	1.75	SILTY SAND to SANDY SILT	26	17	48		36.0
12.000	39.37	73.23	2.09	SILTY SAND to SANDY SILT	24	16	47		35.5
12.150	39.86	105.50	2.18	SILTY SAND to SANDY SILT	35	24	57		37.0
12.300	40.35	152.41	1.25	SAND to SILTY SAND	38	26	68		38.5
12.450	40.85	151.54	1.68	SAND to SILTY SAND	38	25	67		38.5
12.600	41.34	95.41	1.40	SILTY SAND to SANDY SILT	32	21	54		36.5
12.750	41.83	98.98	2.51	SILTY SAND to SANDY SILT	33	22	55		36.5
12.900	42.32	202.42	1.19	SAND to SILTY SAND	51	34	75		39.5
13.050	42.81	190.88	1.39	SAND to SILTY SAND	48	32	74		39.0
13.200	43.31	103.21	1.98	SILTY SAND to SANDY SILT	34	23	56		37.0
13.350	43.80	142.66	1.44	SAND to SILTY SAND	36	23	65		38.0
13.500	44.29	122.24	1.46	SAND to SILTY SAND	31	20	61		37.5
13.650	44.78	97.81	2.03	SILTY SAND to SANDY SILT	33	21	54		36.5

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 120 pcf
ASSUMED DEPTH OF WATER TABLE = 34.0 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

Interpretations based on: Robertson and Campanella, 1989.

SOUNDING : CPT-34A

DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
13.800	45.28	138.79	1.51	SAND to SILTY SAND	35	23	64		38.0
13.950	45.77	113.77	1.38	SAND to SILTY SAND	28	18	58		37.0
14.100	46.26	77.93	2.18	SILTY SAND to SANDY SILT	26	17	47		35.5
14.250	46.75	72.38	3.79	CLAYEY SILT to SILTY CLAY	36	23		4.1	
14.400	47.24	150.07	1.81	SILTY SAND to SANDY SILT	50	32	66		38.0
14.550	47.74	174.06	1.73	SAND to SILTY SAND	44	28	70		38.5
14.700	48.23	149.56	2.61	SILTY SAND to SANDY SILT	50	32	66		38.0
14.850	48.72	312.53	1.14	SAND	63	40	87		42.0
15.000	49.21	310.79	1.48	SAND to SILTY SAND	78	49	86		41.5
15.150	49.70	297.77	*****		0	0			.0

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 120 pcf
ASSUMED DEPTH OF WATER TABLE = 34.0 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

Interpretations based on: Robertson and Campanella, 1989.

CPT INTERPRETATIONS

SOUNDING : CPT-35A
PROJECT : RIVER PARK
DATE/TIME: 03-11-02 15:29

PROJECT No.: 02-1571-4
CONE/RIG : 471/GO-KP/R#4

DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
.150	.49	21.78	1.93	SANDY SILT to CLAYEY SILT	9	14		1.7	
.300	.98	21.78	1.97	SANDY SILT to CLAYEY SILT	9	14		1.7	
.450	1.48	19.31	1.61	SANDY SILT to CLAYEY SILT	8	12		1.5	
.600	1.97	54.98	.33	SAND to SILTY SAND	14	22	59		47.0
.750	2.46	100.83	1.62	SILTY SAND to SANDY SILT	34	54	77		48.5
.900	2.95	48.03	1.10	SILTY SAND to SANDY SILT	16	26	55		45.0
1.050	3.44	33.65	1.31	SILTY SAND to SANDY SILT	11	18	45		42.5
1.200	3.94	41.89	1.31	SILTY SAND to SANDY SILT	14	22	51		43.0
1.350	4.43	79.18	1.78	SILTY SAND to SANDY SILT	26	42	70		45.5
1.500	4.92	101.19	1.32	SAND to SILTY SAND	25	40	77		46.0
1.650	5.41	95.13	.62	SAND to SILTY SAND	24	38	75		45.5
1.800	5.91	111.49	.90	SAND to SILTY SAND	28	45	79		45.5
1.950	6.40	99.62	1.25	SAND to SILTY SAND	25	40	76		44.5
2.100	6.89	81.54	1.25	SILTY SAND to SANDY SILT	27	42	70		43.5
2.250	7.38	85.55	.88	SAND to SILTY SAND	21	32	72		43.5
2.400	7.87	103.93	1.50	SILTY SAND to SANDY SILT	35	50	77		44.0
2.550	8.37	118.21	1.07	SAND to SILTY SAND	30	42	81		44.5
2.700	8.86	76.23	.72	SAND to SILTY SAND	19	26	68		42.0
2.850	9.35	85.72	1.61	SILTY SAND to SANDY SILT	29	38	71		42.5
3.000	9.84	69.22	.95	SAND to SILTY SAND	17	23	64		41.0
3.150	10.33	97.34	.38	SAND to SILTY SAND	24	31	73		42.5
3.300	10.83	92.95	1.44	SILTY SAND to SANDY SILT	31	38	71		42.0
3.450	11.32	92.92	1.28	SAND to SILTY SAND	23	28	70		42.0
3.600	11.81	95.92	1.63	SILTY SAND to SANDY SILT	32	38	71		42.0
3.750	12.30	92.46	1.02	SAND to SILTY SAND	23	27	69		41.5
3.900	12.80	166.30	2.72	SILTY SAND to SANDY SILT	55	63	85		44.0
4.050	13.29	120.86	1.16	SAND to SILTY SAND	30	34	76		42.5
4.200	13.78	133.14	1.37	SAND to SILTY SAND	33	37	78		42.5
4.350	14.27	134.76	1.28	SAND to SILTY SAND	34	36	78		42.5
4.500	14.76	135.58	1.56	SAND to SILTY SAND	34	36	77		42.5
4.650	15.26	147.27	1.53	SAND to SILTY SAND	37	38	79		42.5
4.800	15.75	129.53	1.37	SAND to SILTY SAND	32	33	75		42.0
4.950	16.24	187.04	1.19	SAND to SILTY SAND	47	47	85		43.5
5.100	16.73	218.74	1.03	SAND	44	44	89		44.0
5.250	17.22	141.79	1.82	SILTY SAND to SANDY SILT	47	46	77		42.0
5.400	17.72	158.44	1.59	SAND to SILTY SAND	40	38	79		42.5
5.550	18.21	155.34	1.13	SAND to SILTY SAND	39	37	78		42.0
5.700	18.70	159.46	1.14	SAND to SILTY SAND	40	38	79		42.0
5.850	19.19	176.78	1.02	SAND	35	33	81		42.5
6.000	19.69	170.64	1.22	SAND to SILTY SAND	43	39	80		42.0
6.150	20.18	161.29	1.05	SAND to SILTY SAND	40	37	78		42.0

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 120 pcf
ASSUMED DEPTH OF WATER TABLE = 55.0 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

Interpretations based on: Robertson and Campanella, 1989.

SOUNDING : CPT-35A

DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
6.300	20.67	143.47	1.32	SAND to SILTY SAND	36	32	74		41.0
6.450	21.16	130.44	2.32	SILTY SAND to SANDY SILT	43	39	71		40.0
6.600	21.65	143.81	1.28	SAND to SILTY SAND	36	32	74		40.5
6.750	22.15	173.23	1.06	SAND to SILTY SAND	43	38	79		42.0
6.900	22.64	226.45	1.57	SAND to SILTY SAND	57	49	86		43.0
7.050	23.13	243.34	1.10	SAND	49	41	88		43.0
7.200	23.62	210.68	.54	SAND	42	35	83		42.5

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 120 pcf
ASSUMED DEPTH OF WATER TABLE = 55.0 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

Interpretations based on: Robertson and Campanella, 1989.

CPT INTERPRETATIONS

SOUNDING : CPT-36 PROJECT No.: 02-1571-4
PROJECT : RIVER PARK CONE/RIG : 471/GO-KP/R#4
DATE/TIME: 03-12-02 11:26

DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
.150	.49	7.33	.82	SENSITIVE FINE GRAINED	4	6		.7	
.300	.98	28.09	.99	SILTY SAND to SANDY SILT	9	15	40		47.0
.450	1.48	54.41	1.02	SILTY SAND to SANDY SILT	18	29	59		48.0
.600	1.97	49.84	.79	SILTY SAND to SANDY SILT	17	27	56		46.5
.750	2.46	66.96	1.94	SILTY SAND to SANDY SILT	22	36	65		47.0
.900	2.95	76.84	1.51	SILTY SAND to SANDY SILT	26	41	69		46.5
1.050	3.44	123.50	.68	SAND	25	40	82		48.0
1.200	3.94	116.80	.99	SAND to SILTY SAND	29	47	81		47.5
1.350	4.43	113.13	1.90	SILTY SAND to SANDY SILT	38	60	80		46.5
1.500	4.92	109.22	.68	SAND to SILTY SAND	27	44	79		46.0
1.650	5.41	101.95	.73	SAND to SILTY SAND	25	41	77		45.5
1.800	5.91	130.61	.87	SAND to SILTY SAND	33	52	84		46.0
1.950	6.40	187.34	2.66	SILTY SAND to SANDY SILT	62	100	94		47.0
2.100	6.89	289.80	1.84	SAND to SILTY SAND	72	100	100		48.5
2.250	7.38	209.11	1.37	SAND to SILTY SAND	52	79	97		47.0
2.400	7.87	159.40	1.80	SAND to SILTY SAND	40	58	90		46.0
2.550	8.37	168.43	.80	SAND	34	48	91		46.0
2.700	8.86	138.88	.97	SAND to SILTY SAND	35	48	85		45.0
2.850	9.35	147.29	.85	SAND	29	39	86		45.0
3.000	9.84	154.87	.90	SAND	31	40	87		45.0
3.150	10.33	227.91	.95	SAND	46	58	97		46.0
3.300	10.83	190.50	.94	SAND	38	47	92		45.5
3.450	11.32	261.35	.59	SAND	52	63	100		46.5
3.600	11.81	264.90	.76	SAND	53	63	100		46.0
3.750	12.30	196.77	.84	SAND	39	46	91		45.0
3.900	12.80	160.76	.87	SAND	32	37	84		44.0
4.050	13.29	132.06	1.03	SAND to SILTY SAND	33	37	78		43.0
4.200	13.78	222.09	1.31	SAND to SILTY SAND	56	61	93		45.0
4.350	14.27	233.48	1.09	SAND	47	50	93		45.0
4.500	14.76	272.80	1.01	SAND	55	58	97		45.5
4.650	15.26	298.96	.95	SAND	60	62	100		46.0
4.800	15.75	210.47	1.91	SAND to SILTY SAND	53	54	89		44.0
4.950	16.24	219.23	2.09	SILTY SAND to SANDY SILT	73	74	90		44.0
5.100	16.73	211.64	2.49	SILTY SAND to SANDY SILT	71	70	88		44.0
5.250	17.22	176.86	1.94	SILTY SAND to SANDY SILT	59	58	83		43.0
5.400	17.72	149.67	1.41	SAND to SILTY SAND	37	36	78		42.0
5.550	18.21	153.43	2.66	SILTY SAND to SANDY SILT	51	49	78		42.0
5.700	18.70	119.27	2.88	SANDY SILT to CLAYEY SILT	48	45		6.9	
5.850	19.19	142.06	2.04	SILTY SAND to SANDY SILT	47	44	75		41.5
6.000	19.69	173.17	1.87	SAND to SILTY SAND	43	40	80		42.5
6.150	20.18	250.82	1.22	SAND	50	46	91		44.0

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 120 pcf
ASSUMED DEPTH OF WATER TABLE = 36.0 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

Interpretations based on: Robertson and Campanella, 1989.

SOUNDING : CPT-36

DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
6.300	20.67	250.56	1.07	SAND	50	45	90		44.0
6.450	21.16	257.40	1.13	SAND	51	46	91		44.0
6.600	21.65	193.75	1.23	SAND to SILTY SAND	48	42	82		42.5
6.750	22.15	172.51	1.28	SAND to SILTY SAND	43	37	79		42.0
6.900	22.64	156.98	1.02	SAND to SILTY SAND	39	34	76		41.0
7.050	23.13	122.03	1.74	SILTY SAND to SANDY SILT	41	35	68		39.5
7.200	23.62	147.61	2.30	SILTY SAND to SANDY SILT	49	41	73		40.0
7.350	24.11	219.63	2.23	SILTY SAND to SANDY SILT	73	61	84		42.5

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 120 pcf
ASSUMED DEPTH OF WATER TABLE = 36.0 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

Interpretations based on: Robertson and Campanella, 1989.

CPT INTERPRETATIONS

SOUNDING : CPT-37 PROJECT No.: 02-1571-4
PROJECT : RIVER PARK CONE/RIG : 471/GO-KP/R#4
DATE/TIME: 03-12-02 12:45

DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
.150	.49	11.71	.77	SANDY SILT to CLAYEY SILT	5	7		1.2	
.300	.98	62.46	1.10	SILTY SAND to SANDY SILT	21	33	63		
.450	1.48	97.36	1.11	SAND to SILTY SAND	24	39	76		
.600	1.97	109.26	1.29	SAND to SILTY SAND	27	44	79		
.750	2.46	88.82	1.54	SILTY SAND to SANDY SILT	30	47	73		48.0
.900	2.95	90.57	1.55	SILTY SAND to SANDY SILT	30	48	73		47.5
1.050	3.44	96.24	1.47	SILTY SAND to SANDY SILT	32	51	75		47.0
1.200	3.94	113.55	2.15	SILTY SAND to SANDY SILT	38	61	80		47.0
1.350	4.43	177.20	2.84	SILTY SAND to SANDY SILT	59	94	93		48.5
1.500	4.92	155.98	1.02	SAND to SILTY SAND	39	62	89		47.5
1.650	5.41	165.37	1.83	SAND to SILTY SAND	41	66	91		47.5
1.800	5.91	154.83	1.49	SAND to SILTY SAND	39	62	89		47.0
1.950	6.40	164.56	2.85	SILTY SAND to SANDY SILT	55	88	91		46.5
2.100	6.89	156.19	1.04	SAND to SILTY SAND	39	61	89		46.5
2.250	7.38	170.11	.71	SAND	34	51	92		46.5
2.400	7.87	214.04	.95	SAND	43	62	98		47.0
2.550	8.37	183.26	.91	SAND	37	52	94		46.0
2.700	8.86	149.33	.74	SAND	30	41	88		45.0
2.850	9.35	130.59	.69	SAND	26	35	83		44.5
3.000	9.84	114.96	.77	SAND to SILTY SAND	29	37	79		43.5
3.150	10.33	121.58	2.17	SILTY SAND to SANDY SILT	41	51	79		43.5
3.300	10.83	143.74	1.79	SILTY SAND to SANDY SILT	48	59	84		44.0
3.450	11.32	146.42	1.50	SAND to SILTY SAND	37	44	83		44.0
3.600	11.81	245.08	.55	SAND	49	58	98		46.0
3.750	12.30	313.59	.87	SAND	63	73	100		46.5
3.900	12.80	145.55	1.68	SAND to SILTY SAND	36	42	82		43.5
4.050	13.29	135.41	1.45	SAND to SILTY SAND	34	38	79		43.0
4.200	13.78	139.79	.63	SAND	28	31	79		43.0
4.350	14.27	139.75	1.17	SAND to SILTY SAND	35	38	79		43.0
4.500	14.76	151.39	1.06	SAND to SILTY SAND	38	40	81		43.0
4.650	15.26	289.55	2.21	SILTY SAND to SANDY SILT	97	100	99		45.5
4.800	15.75	253.30	1.11	SAND	51	52	94		45.0
4.950	16.24	241.30	.78	SAND	48	49	93		44.5
5.100	16.73	258.25	2.74	SILTY SAND to SANDY SILT	86	86	94		44.5
5.250	17.22	205.82	1.19	SAND to SILTY SAND	51	51	87		43.5
5.400	17.72	223.64	1.12	SAND	45	43	89		44.0
5.550	18.21	166.33	1.34	SAND to SILTY SAND	42	40	80		42.5
5.700	18.70	150.77	1.61	SAND to SILTY SAND	38	36	77		42.0
5.850	19.19	143.23	2.28	SILTY SAND to SANDY SILT	48	44	75		41.5
6.000	19.69	106.71	2.45	SILTY SAND to SANDY SILT	36	33	66		39.5
6.150	20.18	119.78	1.91	SILTY SAND to SANDY SILT	40	36	69		40.0

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 120 pcf
ASSUMED DEPTH OF WATER TABLE = 37.0 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

Interpretations based on: Robertson and Campanella, 1989.

SOUNDING : CPT-37

DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
6.300	20.67	196.20	2.56	SILTY SAND to SANDY SILT	65	59	83		42.5
6.450	21.16	201.34	1.64	SAND to SILTY SAND	50	45	84		42.5
6.600	21.65	177.20	1.27	SAND to SILTY SAND	44	39	80		42.0
6.750	22.15	152.96	1.24	SAND to SILTY SAND	38	33	75		41.0
6.900	22.64	188.53	1.47	SAND to SILTY SAND	47	40	81		42.0
7.050	23.13	181.92	1.30	SAND to SILTY SAND	45	39	79		42.0
7.200	23.62	187.83	1.28	SAND to SILTY SAND	47	39	80		42.0
7.350	24.11	202.23	1.27	SAND to SILTY SAND	51	42	82		42.0
7.500	24.61	179.35	1.05	SAND	36	30	78		41.5
7.650	25.10	96.56	1.47	SILTY SAND to SANDY SILT	32	26	60		38.0
7.800	25.59	64.75	2.30	SANDY SILT to CLAYEY SILT	26	21		4.2	
7.950	26.08	87.57	1.35	SILTY SAND to SANDY SILT	29	23	57		38.0
8.100	26.57	99.68	1.62	SILTY SAND to SANDY SILT	33	26	60		38.0
8.250	27.07	94.14	1.33	SAND to SILTY SAND	24	18	58		38.0
8.400	27.56	143.61	1.81	SILTY SAND to SANDY SILT	48	37	70		39.0
8.550	28.05	95.64	1.40	SILTY SAND to SANDY SILT	32	25	58		38.0
8.700	28.54	196.30	1.15	SAND	39	30	79		41.0
8.850	29.04	284.02	1.14	SAND	57	43	89		43.0
9.000	29.53	303.35	2.22	SAND to SILTY SAND	76	57	91		43.0
9.150	30.02	462.22	1.91	SAND to SILTY SAND	100	86	100		44.5
9.300	30.51	393.20	1.69	SAND to SILTY SAND	98	73	98		44.0
9.450	31.00	424.92	1.21	SAND	85	62	100		44.0
9.600	31.50	342.62	1.12	SAND	69	50	93		43.0
9.750	31.99	339.22	2.41	SILTY SAND to SANDY SILT	100	82	93		43.0
9.900	32.48	291.90	1.31	SAND	58	42	88		42.5
10.050	32.97	338.30	1.09	SAND	68	48	92		43.0
10.200	33.46	329.44	1.09	SAND	66	46	91		43.0
10.350	33.96	286.68	1.05	SAND	57	40	87		42.0
10.500	34.45	272.74	1.08	SAND	55	38	85		42.0
10.650	34.94	252.39	1.20	SAND	50	35	83		41.5
10.800	35.43	289.12	1.37	SAND	58	40	87		42.0
10.950	35.93	368.85	1.33	SAND	74	50	93		43.0
11.100	36.42	356.17	1.45	SAND	71	48	92		43.0
11.250	36.91	364.14	1.37	SAND	73	49	93		43.0
11.400	37.40	304.80	1.25	SAND	61	41	87		42.0
11.550	37.89	299.91	1.31	SAND	60	40	87		42.0
11.700	38.39	300.83	1.03	SAND	60	40	87		42.0
11.850	38.88	370.85	1.35	SAND	74	49	93		43.0
12.000	39.37	383.24	1.19	SAND	77	51	94		43.0
12.150	39.86	341.91	1.44	SAND	68	45	90		42.5
12.300	40.35	373.08	1.42	SAND	75	49	93		42.5
12.450	40.85	275.80	1.58	SAND to SILTY SAND	69	45	84		41.0
12.600	41.34	316.40	1.58	SAND to SILTY SAND	79	52	88		42.0
12.750	41.83	375.46	1.15	SAND	75	49	93		42.5

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 120 pcf
ASSUMED DEPTH OF WATER TABLE = 37.0 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

Interpretations based on: Robertson and Campanella, 1989.

Appendix B

APPENDIX B

GEOTECHNICAL LABORATORY INVESTIGATION

1. General

a. The purpose of the laboratory investigation was to evaluate the geotechnical engineering characteristics of the various materials encountered during the field investigation. The investigation program was carried out employing, wherever practical, currently accepted test procedures of the American Society of Testing and Materials (ASTM) and California Test Standards.

b. Relatively undisturbed ring samples and bag samples were obtained during the course of the field investigation. Laboratory sample identification is by project name and number, drill hole number or trench number and depth.

c. Geotechnical laboratory testing is classified in two major subgroups:
   - Index Properties Tests, and
   - Geotechnical Engineering Properties Tests

d. We also performed soluble chloride and sulfate contents, resistivity and pH tests to evaluate the corrosivity potential of onsite soils and bedrock.

2. Index Properties Tests

The following Index Properties test were performed on native soils collected during the field exploration.

Test Type	No. of Tests Performed	Testing Standard
Moisture Content & Unit Weight	103	ASTM D 2216 (Water Content)
Percent-Finer Than #200 Sieve	100	ASTM D 1140
Particle-size Analysis	20	ASTM D 422 and D 1140
Atterberg Limits	19	ASTM D 4318
Expansion Index	5	ASTM D 4829
Sulfate-Content	5	EPA Standard 9056
Chloride-Content	5	EPA Standard 9056
Resistivity	5	California Test Method 532
pH	5	--

APPENDIX B

The purpose of each test is briefly described below.

a. The in-situ water content and dry unit weight of native soils provided an indication of their strength before additional testing was performed. These data, in conjunction with field blow count data, served in the selection of samples for additional testing. Test results are presented on the Drill Hole Logs within **Appendix A**.

b. Minus No. 200 wash-sieve analyses were performed on selected samples to evaluate only the percentage of fine particles smaller than 75 microns within the soil. These tests were conducted to aid in classifying the soils in accordance with the Unified Soil Classification System (USCS). Test results are presented on the Drill Hole Logs within **Appendix A**, and in other test reports within **this Appendix**. In addition, shallow bedrock samples were tested for their percentages of fines. The following results were obtained:

SAMPLE	DESCRIPTION	% FINES
T-31 @ 1'	Clayey Sandstone Bedding	30
T-32 @ 1'	TQs Siltstone Red Bed	70
T-34 @ 1'	TQs-Qt weathered	46

c. Complete mechanical particle-size analyses of soil fractions larger and smaller than 75 microns (No. 200 sieve) were conducted to aid in classifying the soils in accordance with the Unified Soil Classification System (USCS). Test results are presented on **Figures B1.1 through B1.5** within **this Appendix**.

d. Liquid and plastic limit tests (Atterberg limits) were conducted on selected samples to aid in classifying the soils in accordance with USCS (by evaluating soil plasticity). Test results are presented on the Drill Hole Logs and on **Figures B2.1 through B2.5** within **this Appendix.**

e. Expansion Index Tests provided an index to the expansion potential of soils when inundated with water. This test method controls variables that influence the expansive characteristics of soils. Results are summarized below:

APPENDIX B

SAMPLES	ROCK OR USCS	Expansion Index (UBC)	Expansion Classification (UBC)
BA-6 @ 5'	SM	18	Very Low
BA-6 @ 23'	SM	61	Medium
T-31 @ 1'	TQs Clayey Sandstone	41	Low
T-32 @ 1'	TQs-Siltstone "Red Bed"	26	Low
T-34 @ 1'	TQs-Qt Weathered	45	Low

f. Soluble sulfates and chloride contents, resistivity and pH tests were conducted to access the potential corrosive effects of soils on concrete, ferrous and non-ferrous metals. Test results are presented on **Table B1** within **this Appendix**.

3. Geotechnical Engineering Properties Tests

The following Geotechnical Engineering Property Tests were performed on bulk samples or relatively undisturbed ring samples, as applicable, collected at this site.

TEST TYPE	TEST NO.	TESTING STANDARD
Compaction	6	ASTM D 1557-91
Consolidation	7	ASTM D 2435
Direct Shear	19	ASTM D 3080

The purpose of each test is briefly described below.

a. Compaction tests were performed on selected samples to assess the moisture-density relationship of materials that may be used for recompaction at removal areas. Test results are presented on **Figures B3.1 through B3.6** within **this Appendix.**

b. One-dimensional consolidation tests were performed on selected ring samples to assess the soils compressibility characteristics by subjecting the specimens to loads ranging from 120 psf to 19,200 psf, and with the addition of water at loads near the overburden pressure. Tests results are plotted on **Figures B4.1 through B4.7** within **this Appendix.**

APPENDIX B

c. Direct shear tests were performed on relatively undisturbed or remolded test specimens using a displacement-controlled direct shear machine. Samples were tested at normal pressures ranging from approximately **1000 psf to 8000 psf** in order to define both the peak and residual shear strength parameters. Each sample was consolidated under the normal load at saturated conditions and then sheared horizontally at a controlled displacement rate until a residual strength was attained. For remolded specimens, passing no. 4 sieve material was used. Test results are plotted on **Figures B5.1 through B5.19** within **this Appendix**.

The following attachments completed this Appendix

LABORATORY TEST RESULTS

- Corrosion Test Results on Soil Samples Table B1
- Summary of Shear Strength Test Data Table B2
- Particle Size Distribution Test Report Figure B1.1 thru B1.5
- Liquid and Plastic Limits Test Report Figure B2.1 thru B2.5
- Compaction Test Reports Figure B3.1 thru B3.6
- Consolidation Test Reports Figure B4.1 thru B4.7
- Direct Shear Test Results Figure B5.1 thru B5.19

APPENDIX B

CORROSION TEST RESULTS ON SOIL SAMPLES

Sample Location	T-31 @ 1'	T-32 @ 1'	T-34 @ 1'	HS-3 @ 3'	HS-4 @ 2'	BA-6 @ 6'	BA-6 @ 23'
Bedrock or Soil Type (USCS)	TQs - Clayey Sandstone	TQs - Siltstone	Weathered TQs-Qt	SM	SM	SM	SM
Resistivity (Ω - cm)	1034	1067	1534	-	-	1129	970
Corrosivity Potential[1]	Corrosive	Corrosive	Corrosive	-	-	Corrosive	Severely Corrosive

Chemical Analyses

pH	7.4	6.8	6.6	6.8	7.0	-	-
Chloride Cl (ppm)	60	ND	ND	4.5	3.6	-	-
Sulfate SO_4 (%)	0.003	ND	ND	ND	ND	-	-
Concrete exposure to sulfate[2]	Negligible	Negligible	Negligible	Negligible	Negligible	-	-

ND = not detected

[1] Per County of Los Angeles Classification
[2] Per 1997 UBC – Table 19-A-4

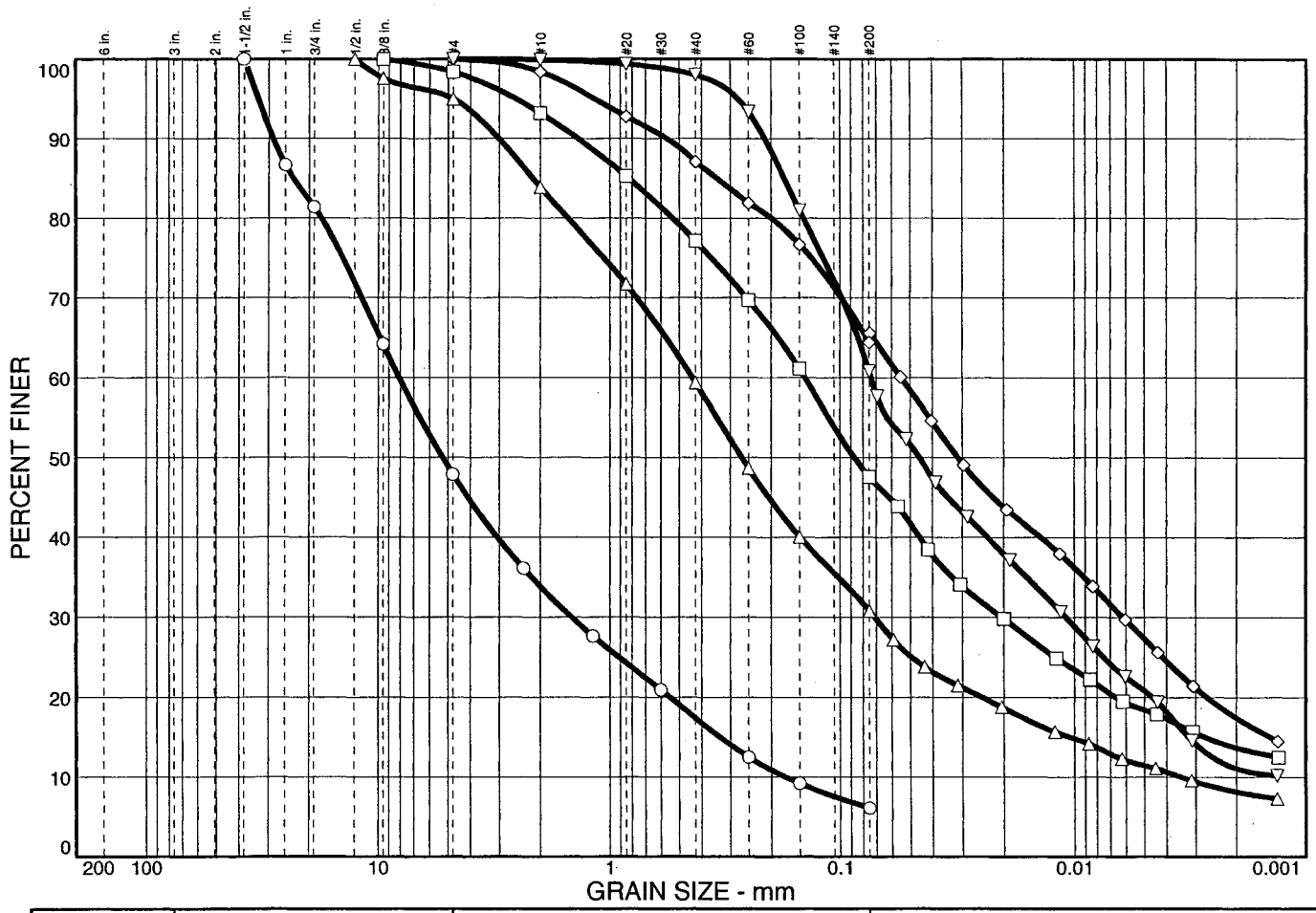
APPENDIX B

SUMMARY OF SHEAR STRENGTH TEST DATA

Material	Boring or Test Pit No.	Fig. No.	Peak		Residual		Unit Wt. (pcf)
			Cohesion (psf)	Phi ϕ	Cohesion (psf)	Phi ϕ	
Landslide Debris (Qls)	BA-7 @ 20'	B5.1	489	40.4°	189	35.9°	131
Landslide Plane (Qls)	BA-3 @ 30'*	B5.2	775	15.5°	318	8.5°	131
	BA-4 @ 24'*	B5.3	1633	11.0°	603	9.5°	131
Bedrock (TQs) Along Siltsone Bedding	BA-1 @ 47'*	B5.4	1982	24.3°	479	19.4°	128
Bedrock (TQs) Along Claystone Bedding	BA-7 @ 50'	B5.5	2622	33.5°	0	30.0°	140
	BA-7 @ 54'*	B5.6	467	16.0°	265	14.7°	131
Bedrock (TQs) Cross-Bedding	BA-5 @ 30'*	B5.7	334	49.0°	295	32.0°	140
	BA-6 @ 77'	B5.8	1758	31.1°	313	31.0°	139
	BA-7 @ 40'	B5.9	178	40.5°	280	30.5°	127
	BA-8 @ 30'	B5.10	444	40.0°	307	31.7°	131
Compacted Fill (Cef)	BA-6 @ 5'	B5.11	204	27.3°	126	28.2°	122
	BA-6 @ 23'	B5.12	282	30.8°	114	30.5°	129
	BA-6 @ 40'	B5.13	294	23.9°	144	24.7°	117
	BA-8 @ 43'	B5.14	48	31.6°	36	31.0°	126
	T-12 & T-28*	B5.15	429	31.1°	259	30.5°	117
Alluvium (Qal)	RW-10 @ 12'	B5.16	956	31.1°	348	30.2°	128
Terrace Deposits (Qt)	BA-6 @ 4'	B5.17	33	42.3°	0	32.0°	134
	BA-7 @ 8'	B5.18	0	34.0°	168	27.7°	121
	BA-8 @ 4'	B5.19	420	28.6°	109	30.6°	126

* Note: Taken from previous investigations performed on this site for Castaic Lake Water Agency (CLWA), see References for citations of reports prepared for CLWA.

PARTICLE SIZE DISTRIBUTION TEST REPORT



	% COBBLES	% GRAVEL		% SAND			% FINES	
		CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
○	0.0	18.6	33.5	14.1	16.4	11.3	6.1	
□	0.0	0.0	1.6	5.2	16.1	29.5	29.1	18.5
△	0.0	0.0	5.0	11.1	24.5	28.6	19.3	11.5
◇	0.0	0.0	0.0	1.6	11.3	22.7	37.1	27.3
▽	0.0	0.0	0.0	0.1	1.9	37.2	40.0	20.8

SOIL DATA

SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	DESCRIPTION	USCS
○	RW-1	1	15'	Grayish-brown well-graded gravel with silt and sand	GW-GM
□	RW-2	1	15'	Brown clayey sand	SC
△	RW-2	2	30'	Brown clayey sand	SC
◇	RW-3	2	35'	Reddish brown sandy lean clay	CL
▽	RW-3	3	40'	Sandy lean clay	CL

PARTICLE SIZE DISTRIBUTION TEST REPORT

ALLAN E. SEWARD

ENGINEERING GEOLOGY, INC.

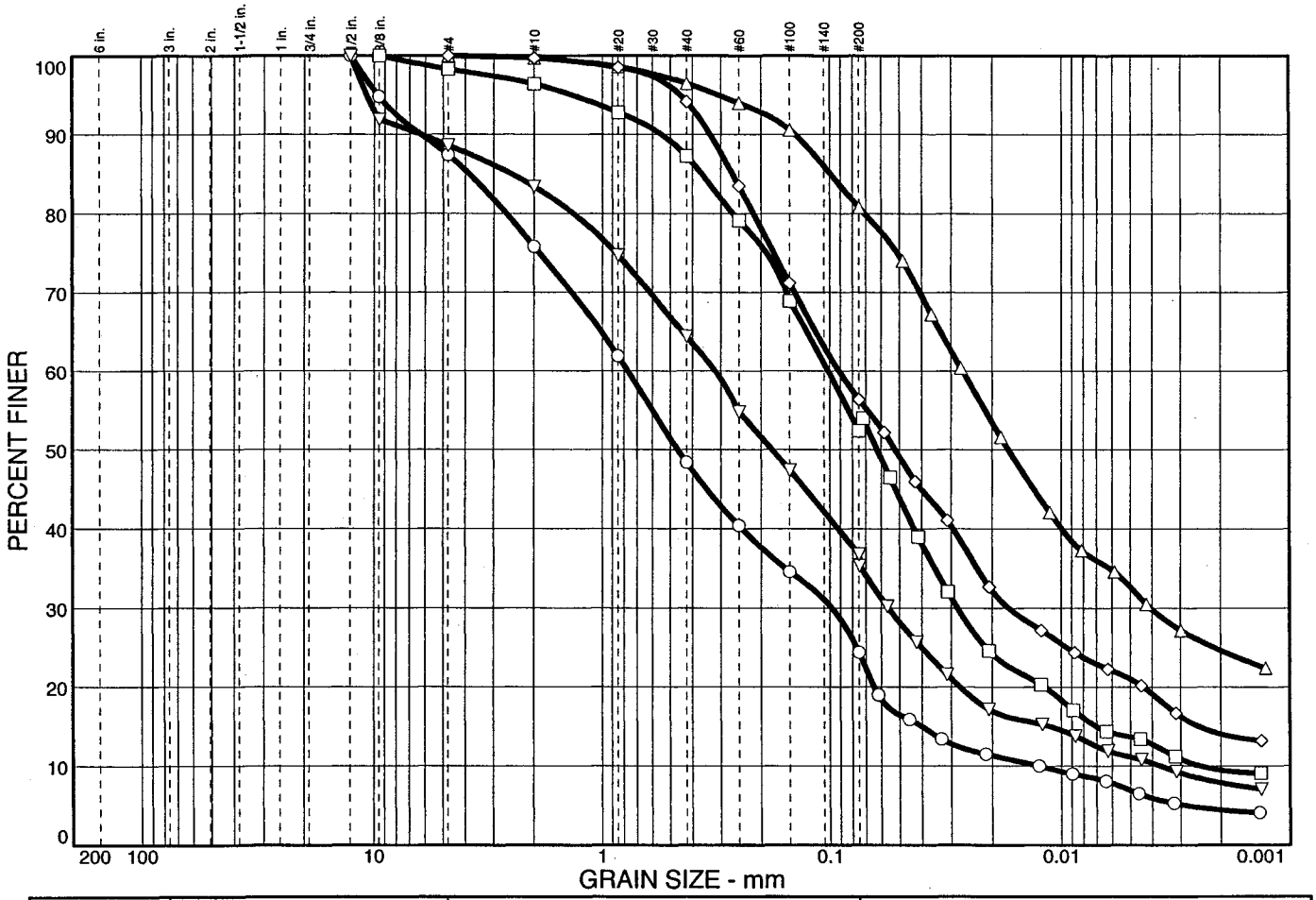
Client: Newhall Land

Project: Tentative Tract 53425, River Park
City of Santa Clarita, California

Project No.: 03-1571-4

Figure B1.1

PARTICLE SIZE DISTRIBUTION TEST REPORT



	% COBBLES	% GRAVEL		% SAND			% FINES	
		CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
○	0.0	0.0	12.6	11.6	27.4	24.0	17.5	6.9
□	0.0	0.0	1.7	1.9	9.1	34.9	38.7	13.7
△	0.0	0.0	0.0	0.3	3.2	15.7	48.1	32.7
◇	0.0	0.0	0.0	0.3	5.5	37.8	35.4	21.0
▽	0.0	0.0	11.4	5.2	19.0	27.6	25.7	11.1

SOIL DATA

SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	DESCRIPTION	USCS
○	RW-3	4	45'	Light brown clayey sand w/little gravel	SC
□	RW-4	2	20'	Sandy lean clay	CL
△	RW-4	3	25'	Grayish brown lean clay w/sand	CL
◇	RW-4	4	35'	Grayish brown sandy lean clay	CL
▽	RW-4	5	45'	Grayish brown clayey sand w/little gravel	SC

PARTICLE SIZE DISTRIBUTION TEST REPORT

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Figure B1.2

PARTICLE SIZE DISTRIBUTION TEST REPORT

	% COBBLES	% GRAVEL		% SAND			% FINES	
		CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
○	0.0	0.0	0.0	1.6	10.8	51.5	27.9	8.2
□	0.0	0.0	0.0	0.2	2.2	44.8	38.5	14.3

SOIL DATA

SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	DESCRIPTION	USCS
○	RW-5	1	15'	Silty sand	SM
□	RW-5	2	25'	Dark grayish brown sandy silt	ML

PARTICLE SIZE DISTRIBUTION TEST REPORT

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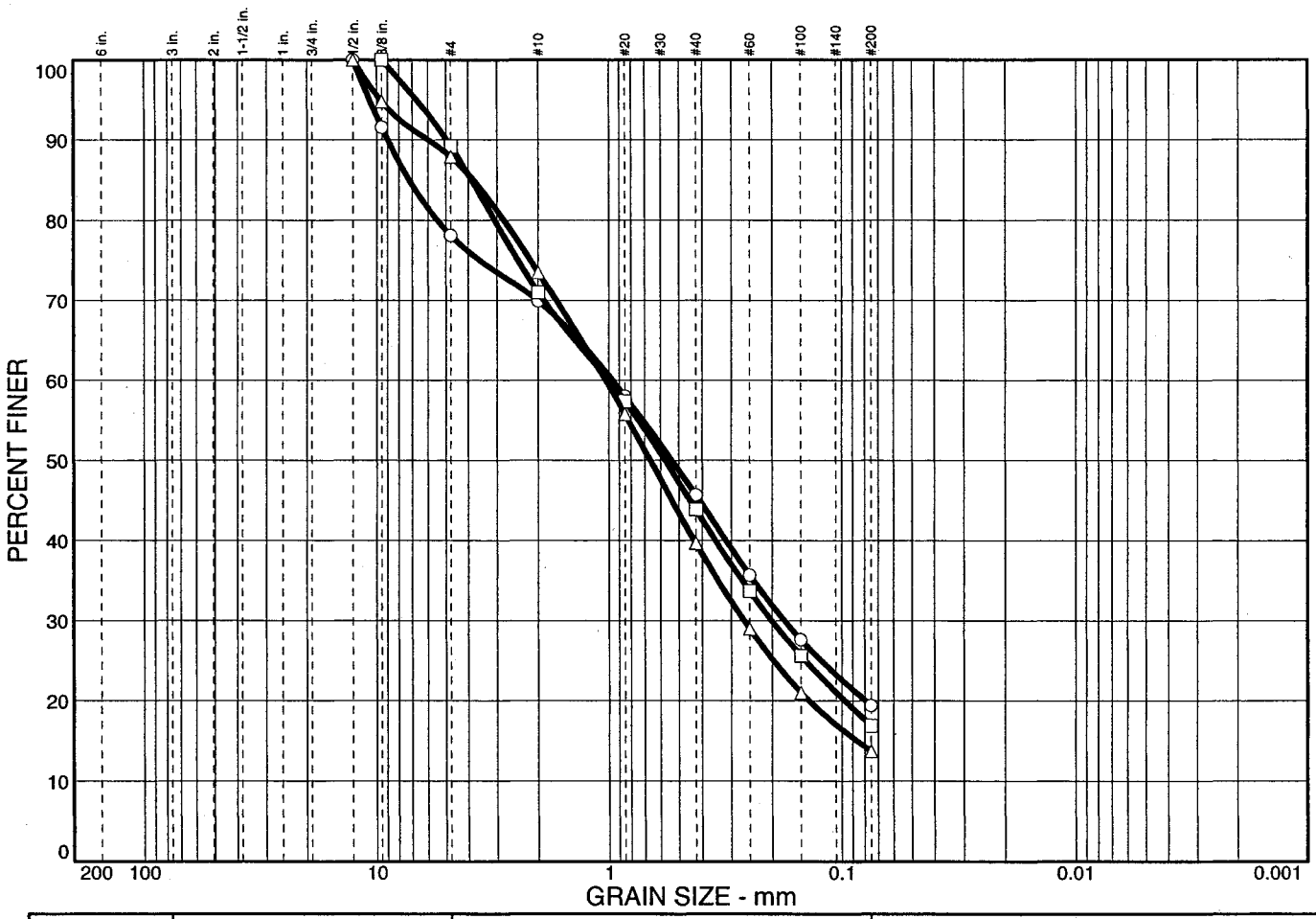
Figure B1.3

PARTICLE SIZE DISTRIBUTION TEST REPORT



	% COBBLES	% GRAVEL		% SAND			% FINES	
		CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
○	0.0	0.0	21.9	8.2	24.2	26.3	19.4	
□	0.0	0.0	10.8	18.2	27.1	27.0	16.9	
△	0.0	0.0	12.1	14.4	33.8	26.0	13.7	

SOIL DATA

SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	DESCRIPTION	USCS
○	RW-9		15	Silty sand with gravel	SM
□	RW-10		12	Silty sand	SM
△	RW-10		36	Silty sand	SM

PARTICLE SIZE DISTRIBUTION TEST REPORT

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Client: Newhall Land

Project: Tentative Tract 53425, River Park
City of Santa Clarita, California

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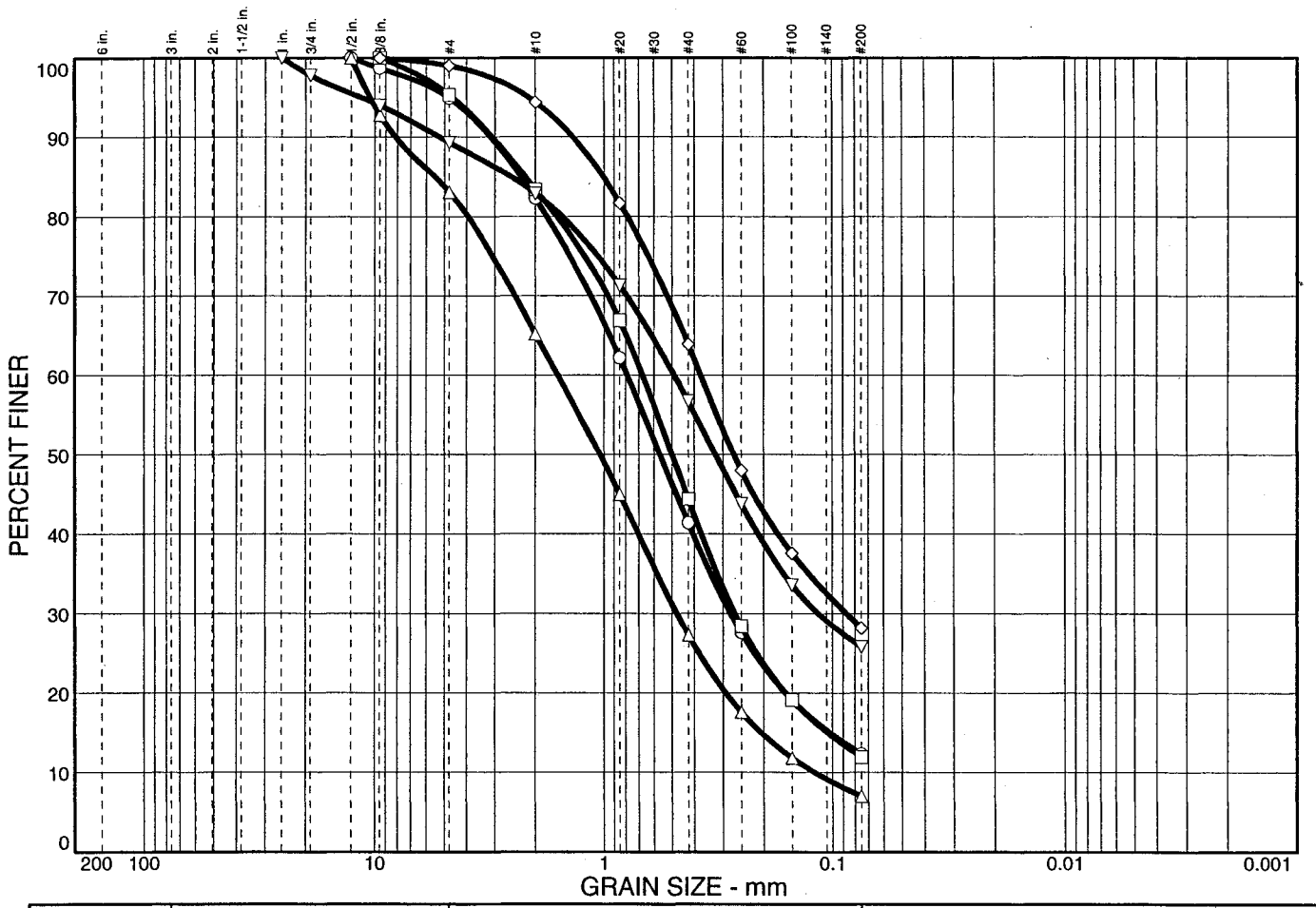
Figure B1.4

PARTICLE SIZE DISTRIBUTION TEST REPORT



	% COBBLES	% GRAVEL		% SAND			% FINES	
		CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
○	0.0	0.0	5.1	12.6	40.9	29.1	12.3	
□	0.0	0.0	4.7	11.9	39.0	32.5	11.9	
△	0.0	0.0	16.9	17.9	37.9	20.3	7.0	
◇	0.0	0.0	1.0	4.6	30.5	35.7	28.2	
▽	0.0	2.2	8.5	6.4	26.2	30.9	25.8	

SOIL DATA

SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	DESCRIPTION	USCS
○	HS-2		5	Silty sand	SM
□	HS-3		15	Poorly graded sand with silt	SP-SM
△	HS-4		20	Poorly-graded sand with silt and gravel	SP-SM
◇	BA-8		30	Silty sand	SM
▽	BA-8		43	Silty sand	SM

PARTICLE SIZE DISTRIBUTION TEST REPORT

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Client: Newhall Land

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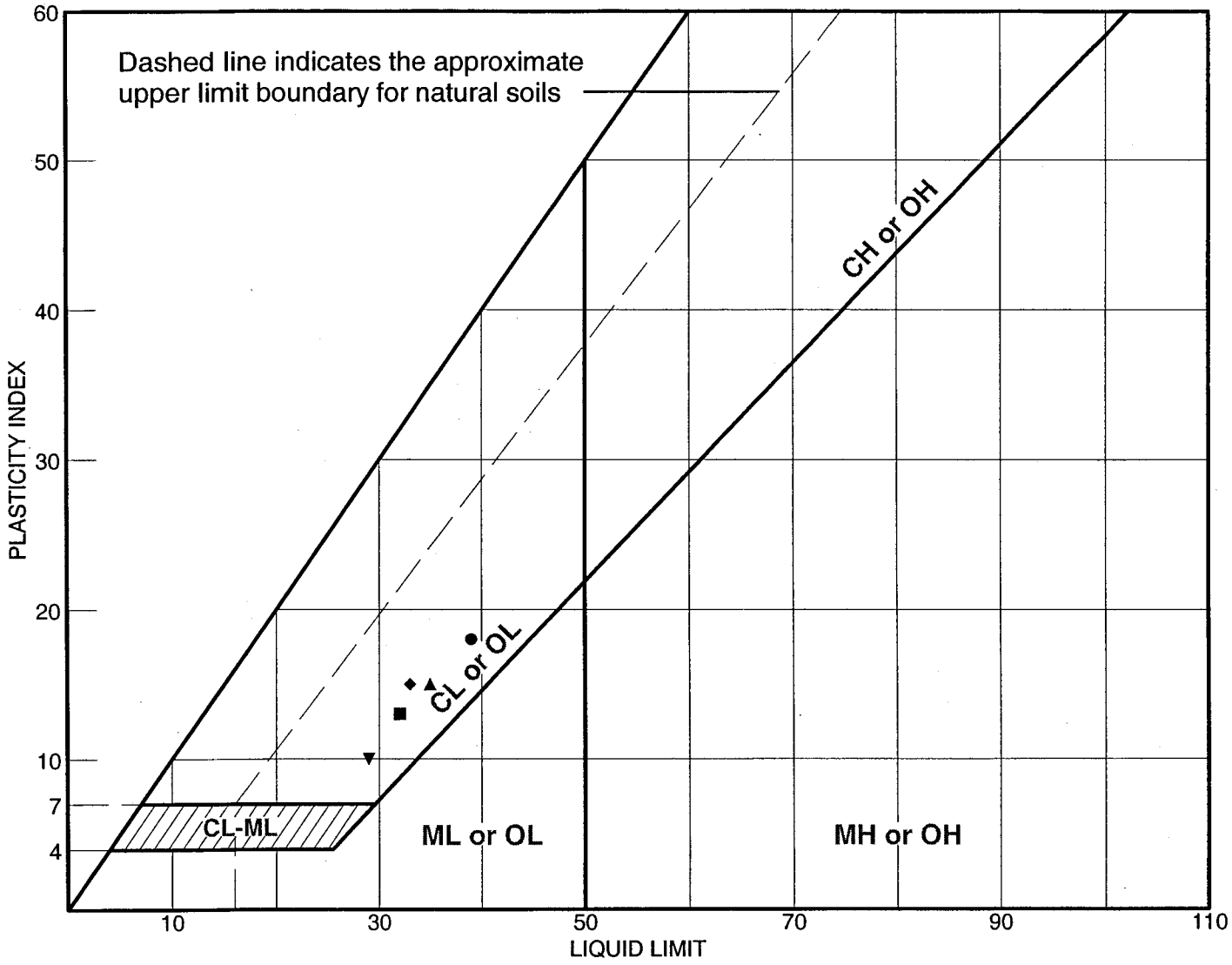
City of Santa Clarita, California

Project No.: 03-1571-4

Figure B1.5

LIQUID AND PLASTIC LIMITS TEST REPORT



SOIL DATA

SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	USCS
●	RW-2	1	15'		21	39	18	SC
■	RW-3	1	8'		19	32	13	SC
▲	RW-3	2	35'		20	35	15	CL
◆	RW-3	3	40'		18	33	15	CL
▼	RW-3	4	45'		19	29	10	SC

LIQUID AND PLASTIC LIMITS TEST REPORT

ALLAN E. SEWARD

ENGINEERING GEOLOGY, INC.

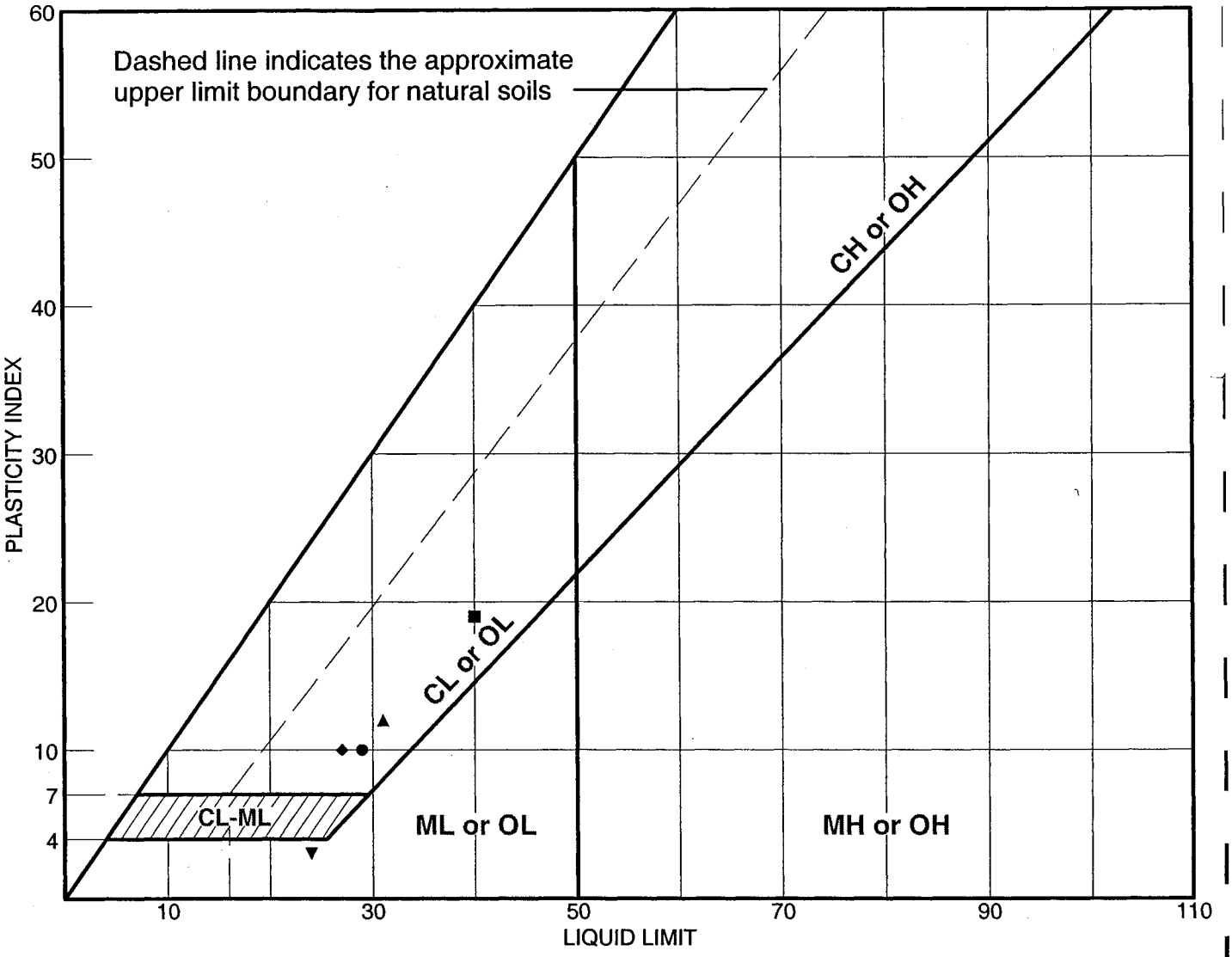
Client: Newhall Land

Project: Tentative Tract 53425, River Park
City of Santa Clarita, California

Project No.: 03-1571-4

Figure B2.1

LIQUID AND PLASTIC LIMITS TEST REPORT



SOIL DATA								
SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	USCS
●	RW-4	2	20'		19	29	10	CL
■	RW-4	3	25'		21	40	19	CL
▲	RW-4	4	35'		19	31	12	CL
◆	RW-4	5	45'		17	27	10	SC
▼	RW-5	2	25'		21	24	3	ML

LIQUID AND PLASTIC LIMITS TEST REPORT

ALLAN E. SEWARD

ENGINEERING GEOLOGY, INC.

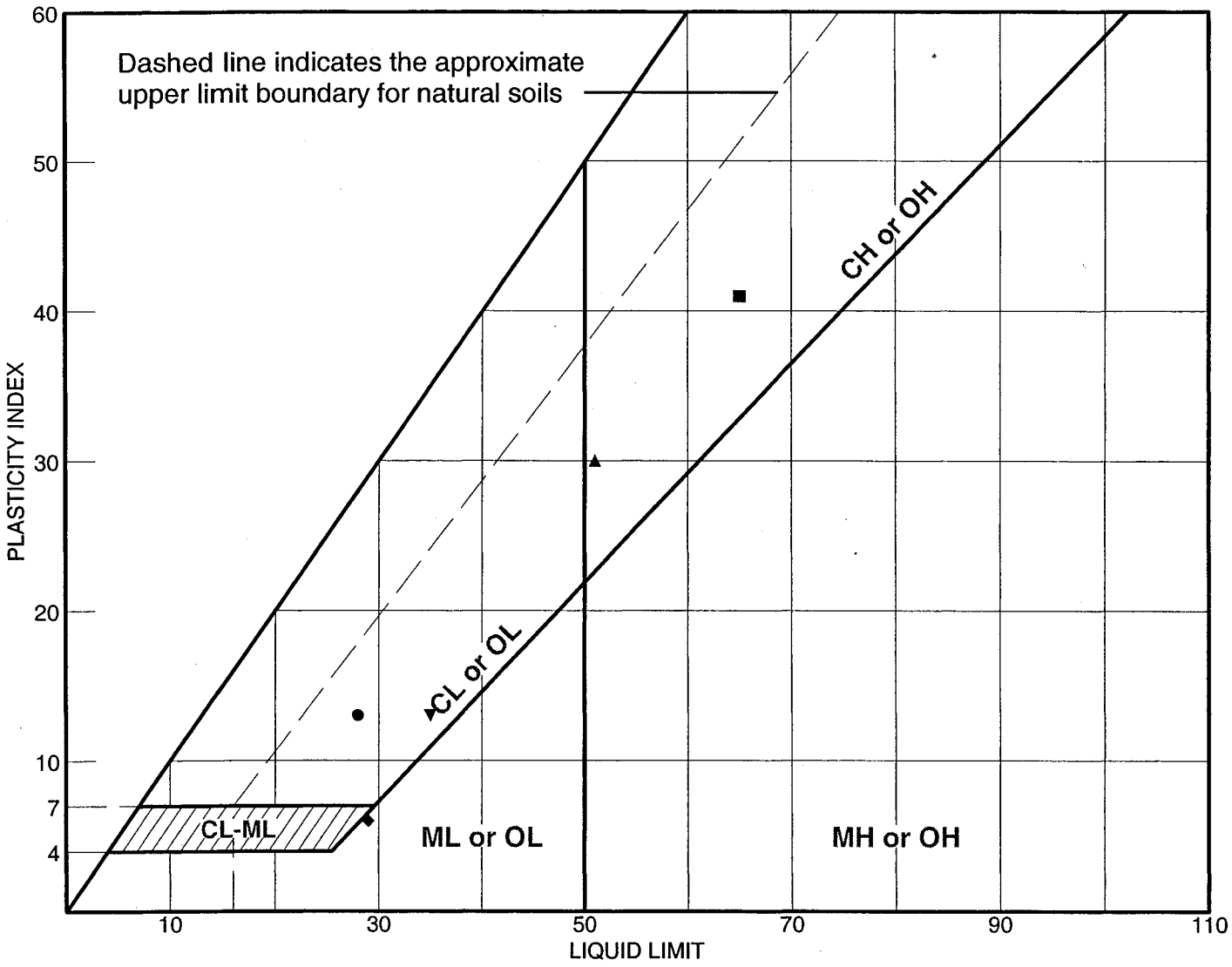
Client: Newhall Land

Project: Tentative Tract 53425, River Park
City of Santa Clarita, California

Project No.: 03-1571-4

Figure B2.2

LIQUID AND PLASTIC LIMITS TEST REPORT



SOIL DATA								
SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	USCS
●	RW-10		18		15	28	13	SC
■	BA-3		66		24	65	41	CH
▲	BA-4		106		21	51	30	CH
◆	BA-6		23		23	29	6	SM
▼	BA-7		28		22	35	13	CL

LIQUID AND PLASTIC LIMITS TEST REPORT

ALLAN E. SEWARD ENGINEERING GEOLOGY, INC.

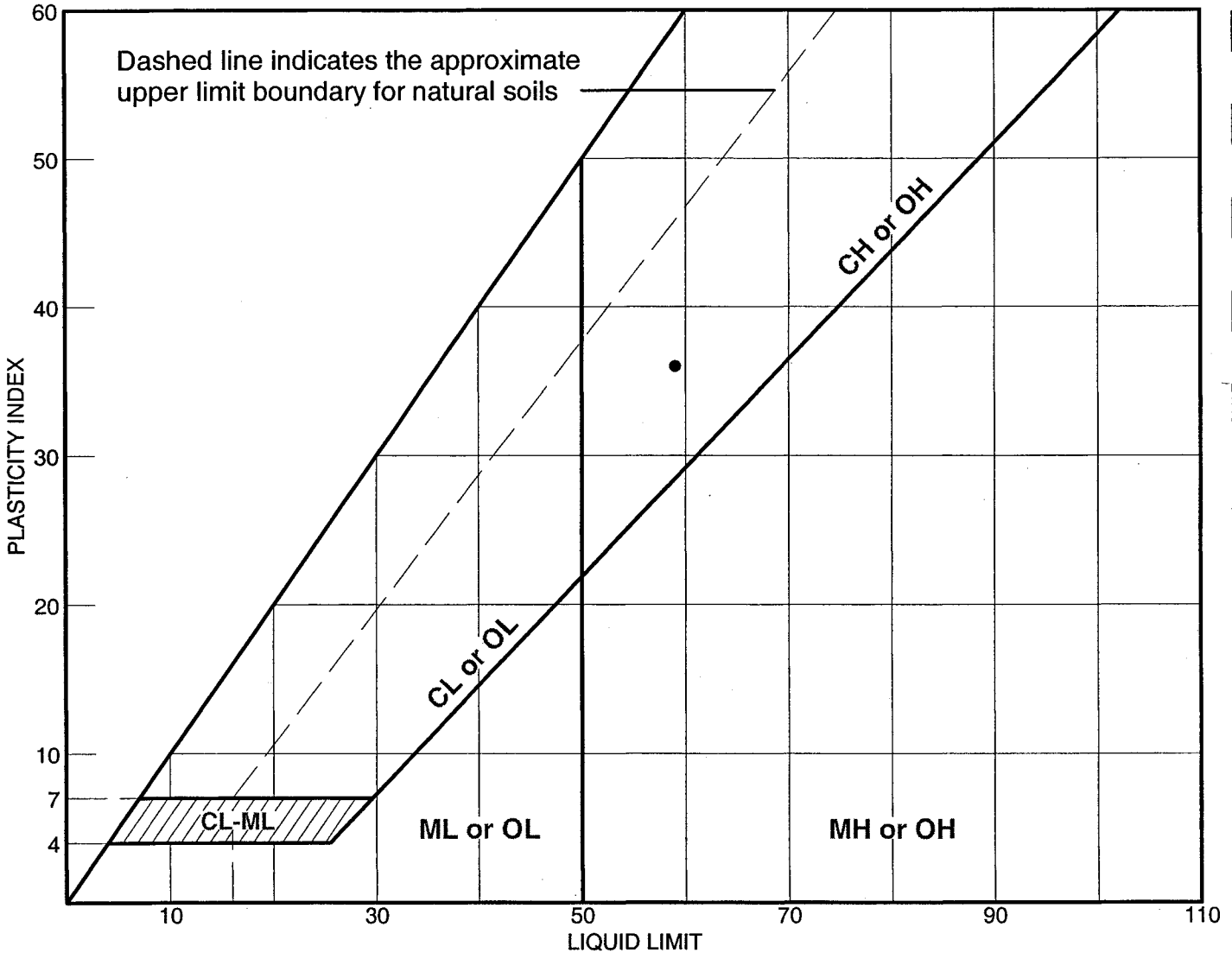
Client: Newhall Land

Project: Tentative Tract 53425, River Park
City of Santa Clarita, California

Project No.: 03-1571-4

Figure B2.3

LIQUID AND PLASTIC LIMITS TEST REPORT



SOIL DATA								
SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	USCS
●	BA-7		29		23	59	36	CH

LIQUID AND PLASTIC LIMITS TEST REPORT

ALLAN E. SEWARD ENGINEERING GEOLOGY, INC.

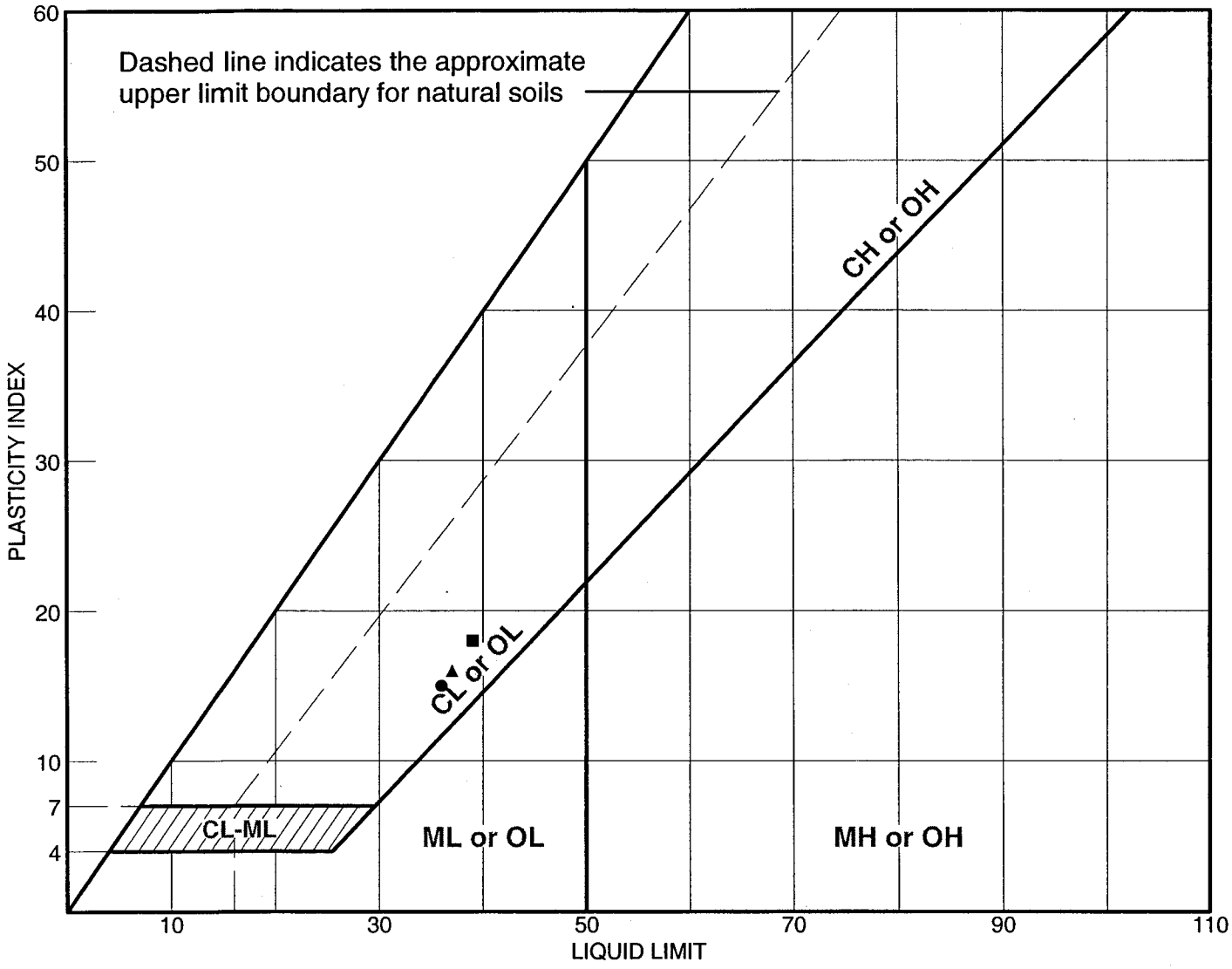
Client: Newhall Land

Project: Tentative Tract 53425, River Park
City of Santa Clarita, California

Project No.: 03-1571-4

Figure B2.4

LIQUID AND PLASTIC LIMITS TEST REPORT



SOIL DATA								
SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	USCS
●		T-31	1'		21	36	15	SC
■		T-32	1'		21	39	18	CL
▲		T-34	1'		21	37	16	CL

LIQUID AND PLASTIC LIMITS TEST REPORT

ALLAN E. SEWARD

ENGINEERING GEOLOGY, INC.

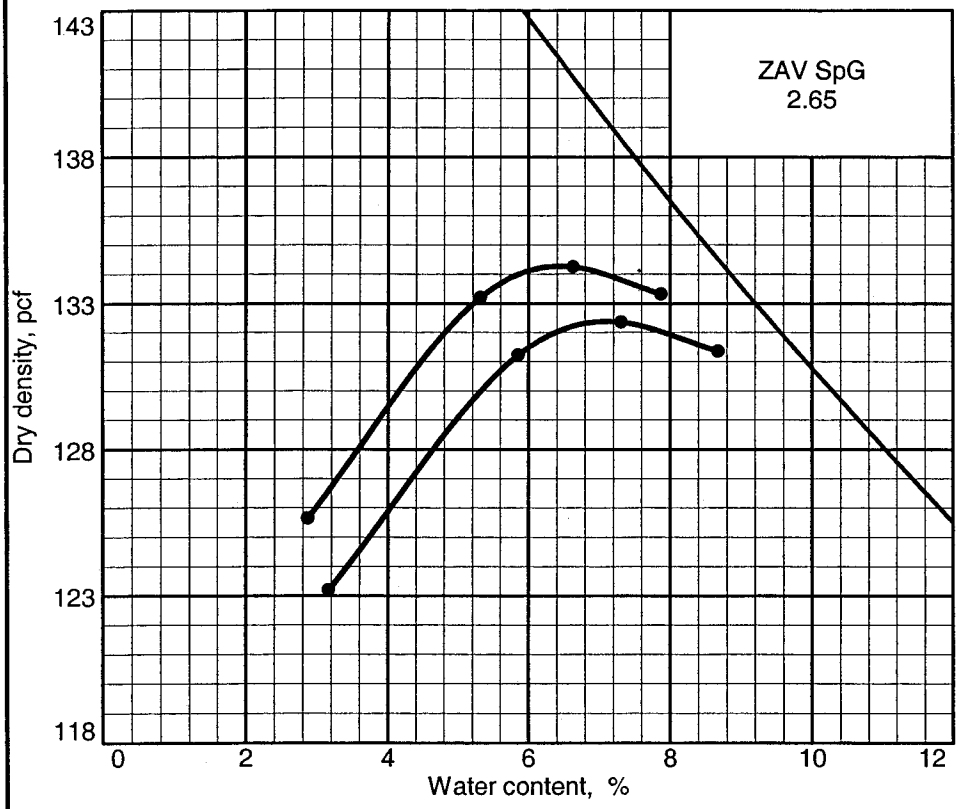
Client: Newhall Land

Project: Tentative Tract 53425, River Park
City of Santa Clarita, California

Project No.: 03-1571-4

Figure B2.5

COMPACTION TEST REPORT



Curve No.
A

Test Specification:
ASTM D 1557-91 Procedure A Modified
Oversize correction applied to each point

Hammer Wt.: 10 lb.
Hammer Drop: 18 in.
Number of Layers: five
Blows per Layer: 25
Mold Size: .03333 cu.ft.

Test Performed on Material Passing No.4 **Sieve**

Soil Data

NM _____ **Sp.G.** 2.65
LL 29 **PI** 6
%>No.4 9.3 **%<#200** 33.6
USCS SM **AASHTO** _____

TESTING DATA

	1	2	3	4	5	6
WM + WS	8.70	9.10	9.20	9.23		
WM	4.47	4.47	4.47	4.47		
WW + T #1	456.25	485.08	527.42	542.19		
WD + T #1	443.25	460.02	493.70	501.50		
TARE #1	32.10	31.80	32.29	32.43		
WW + T #2						
WD + T #2						
TARE #2						
MOISTURE	2.9	5.3	6.6	7.9		
DRY DENSITY	125.7	133.2	134.3	133.3		

TEST RESULTS

Maximum dry density = 134.5 pcf

Optimum moisture = 6.5 %

Material Description

Yellowish-brown silty SAND w/trace of gravel

Project No. 03-1571-4 **Client:** Newhall Land
Project: Tentative Tract 53425, River Park
City of Santa Clarita, California
● **Source:** BA-6 **Elev./Depth:** 23

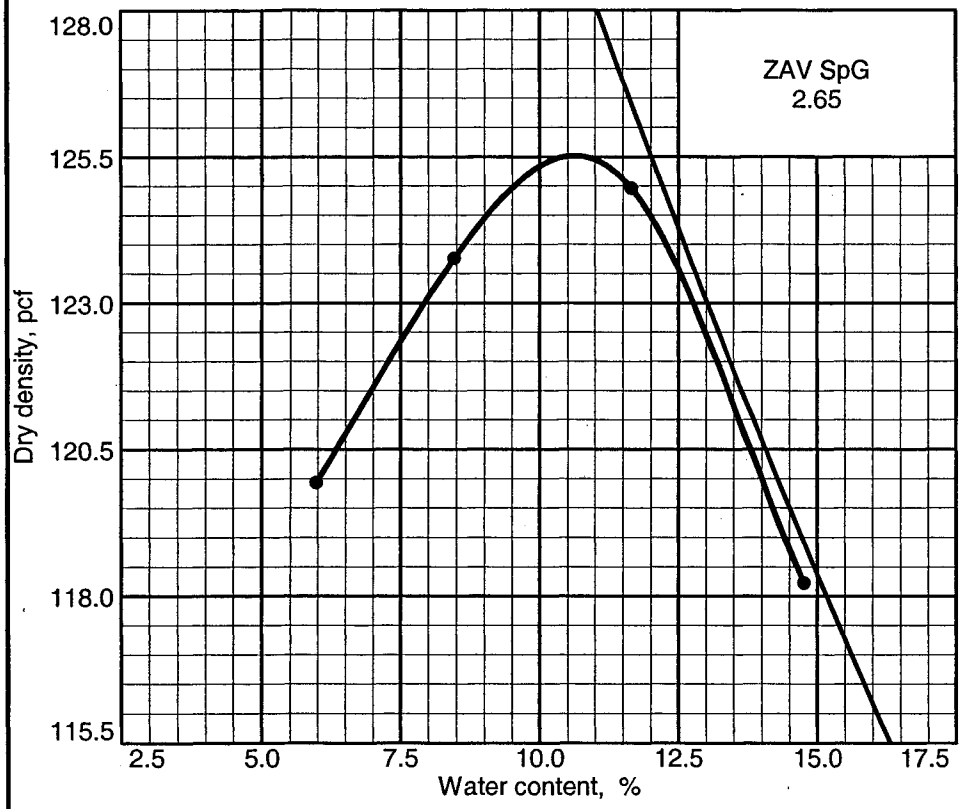
Remarks:
Bedrock (TQs)

COMPACTION TEST REPORT

ALLAN E. SEWARD ENGINEERING GEOLOGY, INC.

Figure B3.1

COMPACTION TEST REPORT



Curve No.
B

Test Specification:
ASTM D 1557-91 Procedure A Modified

Hammer Wt.: 10 lb.
Hammer Drop: 18 in.
Number of Layers: five
Blows per Layer: 25
Mold Size: .03333 cu.ft.

Test Performed on Material Passing No.4 **Sieve**

Soil Data

NM _____ **Sp.G.** 2.65
LL _____ **PI** _____
%>No.4 0.6 **%<#200** 69.6
USCS CL **AASHTO** _____

TESTING DATA

	1	2	3	4	5	6
WM + WS	8.70	8.94	9.12	8.99		
WM	4.47	4.47	4.47	4.47		
WW + T #1	422.21	441.82	463.74	488.74		
WD + T #1	400.24	409.67	418.67	430.05		
TARE #1	32.08	29.57	31.69	32.39		
WW + T #2						
WD + T #2						
TARE #2						
MOISTURE	6.0	8.5	11.6	14.8		
DRY DENSITY	119.9	123.8	125.0	118.2		

TEST RESULTS

Maximum dry density = 125.5 pcf

Optimum moisture = 10.5 %

Material Description

Reddish-brown sandy lean CLAY

Project No. 03-1571-4 **Client:** Newhall Land
Project: Tentative Tract 53425, River Park
City of Santa Clarita, California
● **Source:** BA-6 **Elev./Depth:** 40

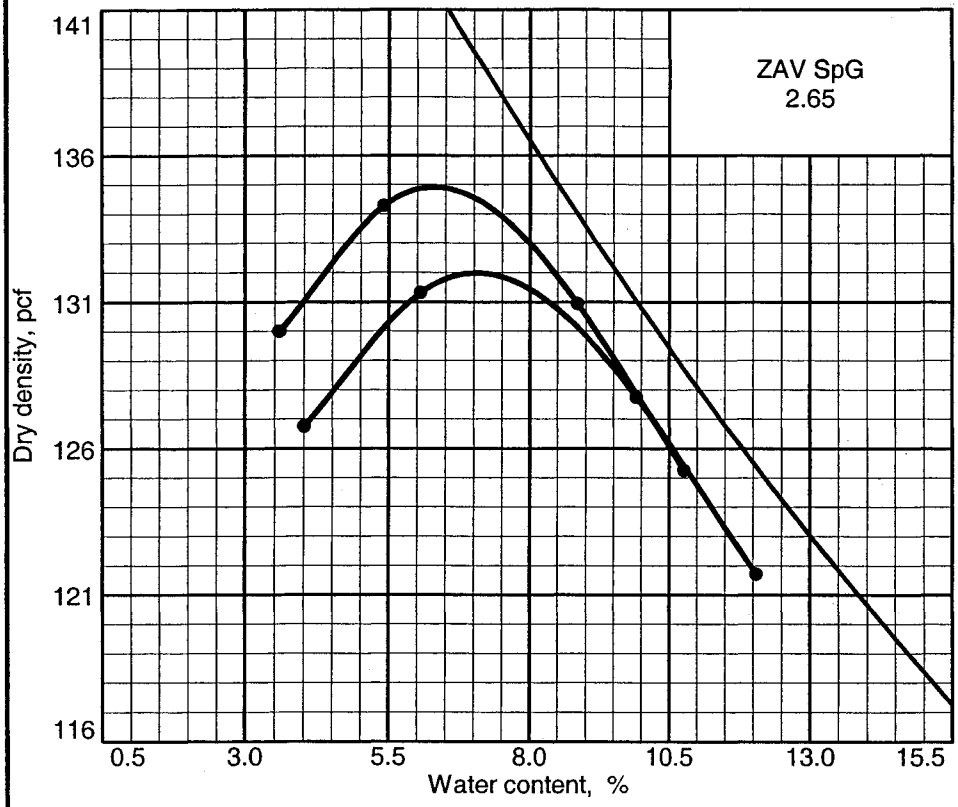
Remarks:
Bedrock (TQs)

COMPACTION TEST REPORT

ALLAN E. SEWARD ENGINEERING GEOLOGY, INC.

Figure B3.2

COMPACTION TEST REPORT



Curve No.
C

Test Specification:
ASTM D 1557-00 Method A Modified
Oversize correction applied to each point

Hammer Wt.: 10 lb.
Hammer Drop: 18 in.
Number of Layers: five
Blows per Layer: 25
Mold Size: .03333 cu.ft.

Test Performed on Material Passing No.4 **Sieve**

Soil Data

NM _____ **Sp.G.** 2.65
LL _____ **PI** _____
%>No.4 10.7 **%<#200** 25.8
USCS SM **AASHTO** _____

TESTING DATA

	1	2	3	4	5	6
WM + WS	8.86	9.11	9.15	9.01		
WM	4.47	4.47	4.47	4.47		
WW + T #1	418.74	435.10	453.38	470.14		
WD + T #1	403.75	412.04	415.29	422.78		
TARE #1	29.41	31.35	31.03	30.00		
WW + T #2						
WD + T #2						
TARE #2						
MOISTURE	3.6	5.4	8.9	10.8		
DRY DENSITY	130.0	134.3	130.9	125.3		

TEST RESULTS

Maximum dry density = 135 pcf

Optimum moisture = 6.5 %

Material Description

Silty sand

Project No. 03-1571-4 **Client:** Newhall Land
Project: Tentative Tract 53425, River Park
City of Santa Clarita, California
● **Source:** BA-8 **Elev./Depth:** 43

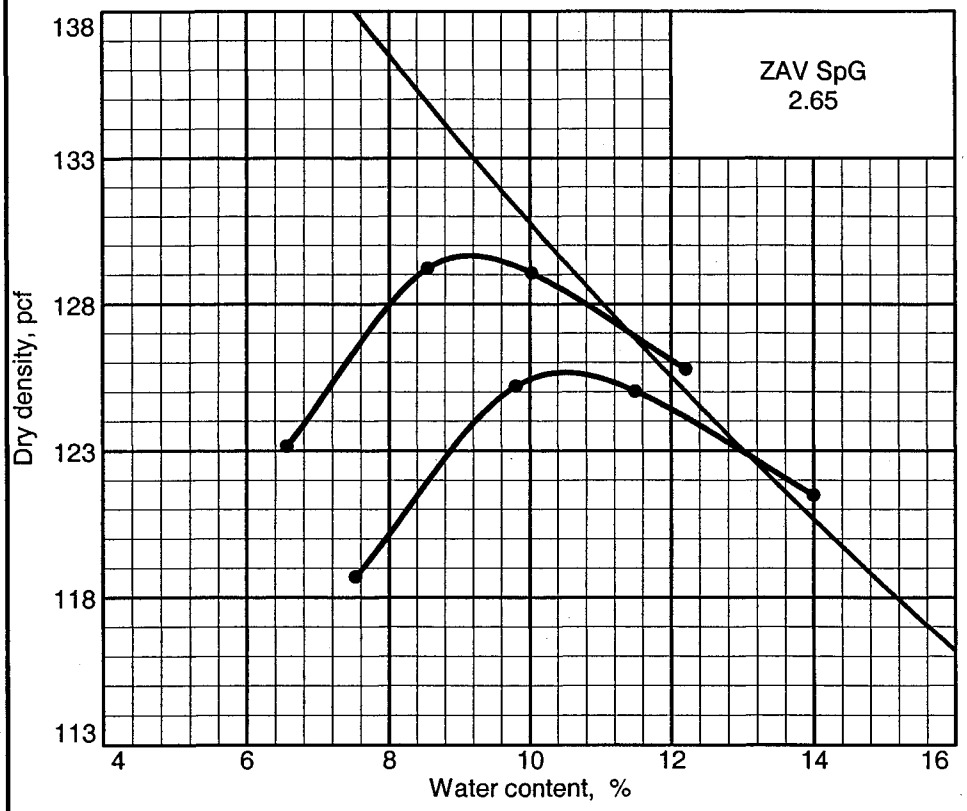
Remarks:
Bedrock (TQs)

COMPACTION TEST REPORT

ALLAN E. SEWARD ENGINEERING GEOLOGY, INC.

Figure B3.3

COMPACTION TEST REPORT



Curve No.
D

Test Specification:
ASTM D 1557-00 Method A Modified
Oversize correction applied to each point

Hammer Wt.: 10 lb.
Hammer Drop: 18 in.
Number of Layers: five
Blows per Layer: 25
Mold Size: .03333 cu.ft.

Test Performed on Material Passing No.4 **Sieve**

Soil Data

NM _____ **Sp.G.** 2.65
LL _____ **PI** _____
%>No.4 12.8 **%<#200** 32.9
USCS SM **AASHTO** _____

TESTING DATA

	1	2	3	4	5	6
WM + WS	8.72	9.05	9.11	9.08		
WM	4.47	4.47	4.47	4.47		
WW + T #1	414.15	425.77	439.99	455.88		
WD + T #1	387.25	390.63	397.87	403.78		
TARE #1	29.80	32.20	31.44	31.48		
WW + T #2						
WD + T #2						
TARE #2						
MOISTURE	6.6	8.5	10.0	12.2		
DRY DENSITY	123.2	129.2	129.1	125.8		

TEST RESULTS

Maximum dry density = 129.5 pcf

Optimum moisture = 9 %

Material Description

Reddish-brown silty sand

Project No. 03-1571-4 **Client:** Newhall Land
Project: Tentative Tract 53425, River Park
City of Santa Clarita, California
● **Source:** BA-6 **Elev./Depth:** 5

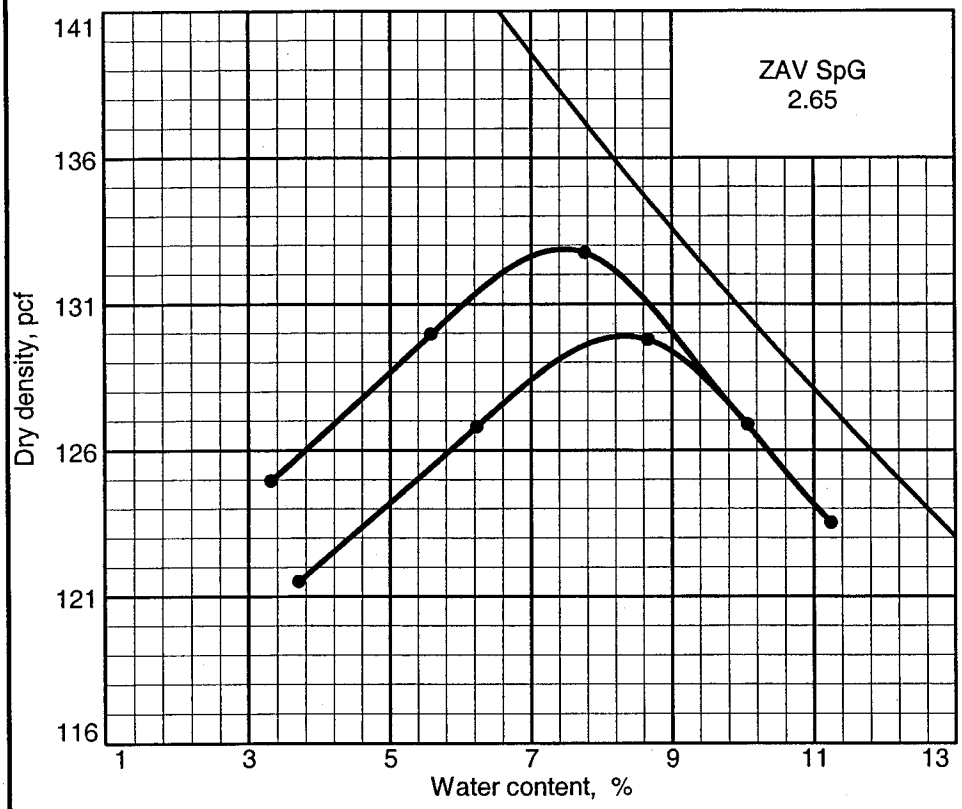
Remarks:
Terrace Deposits (Qt)

COMPACTION TEST REPORT

ALLAN E. SEWARD ENGINEERING GEOLOGY, INC.

Figure B3.4

COMPACTION TEST REPORT



Curve No.
E

Test Specification:
ASTM D 1557-91 Procedure A Modified
Oversize correction applied to each point

Hammer Wt.: 10 lb.
Hammer Drop: 18 in.
Number of Layers: five
Blows per Layer: 25
Mold Size: .03333 cu.ft.

Test Performed on Material Passing No.4 **Sieve**

Soil Data

NM _____ **Sp.G.** 2.65
LL _____ **PI** _____
%>No.4 10.4 **%<#200** 32.8
USCS SC-SM **AASHTO** _____

TESTING DATA

	1	2	3	4	5	6
WM + WS	8.69	8.98	9.19	9.07		
WM	4.49	4.49	4.49	4.49		
WW + T #1	208.69	216.58	225.70	234.35		
WD + T #1	202.32	205.60	210.24	213.94		
TARE #1	30.18	29.36	31.76	32.37		
WW + T #2						
WD + T #2						
TARE #2						
MOISTURE	3.3	5.6	7.8	10.1		
DRY DENSITY	125.0	130.0	132.7	126.9		

TEST RESULTS

Maximum dry density = 133 pcf

Optimum moisture = 7.5 %

Material Description

Yellowish-brown silty, clayey sand

Project No. 03-1571-4 **Client:** Newhall Land
Project: Tentative Tract 53425, River Park
City of Santa Clarita, California
● **Source:** **Sample No.:** E

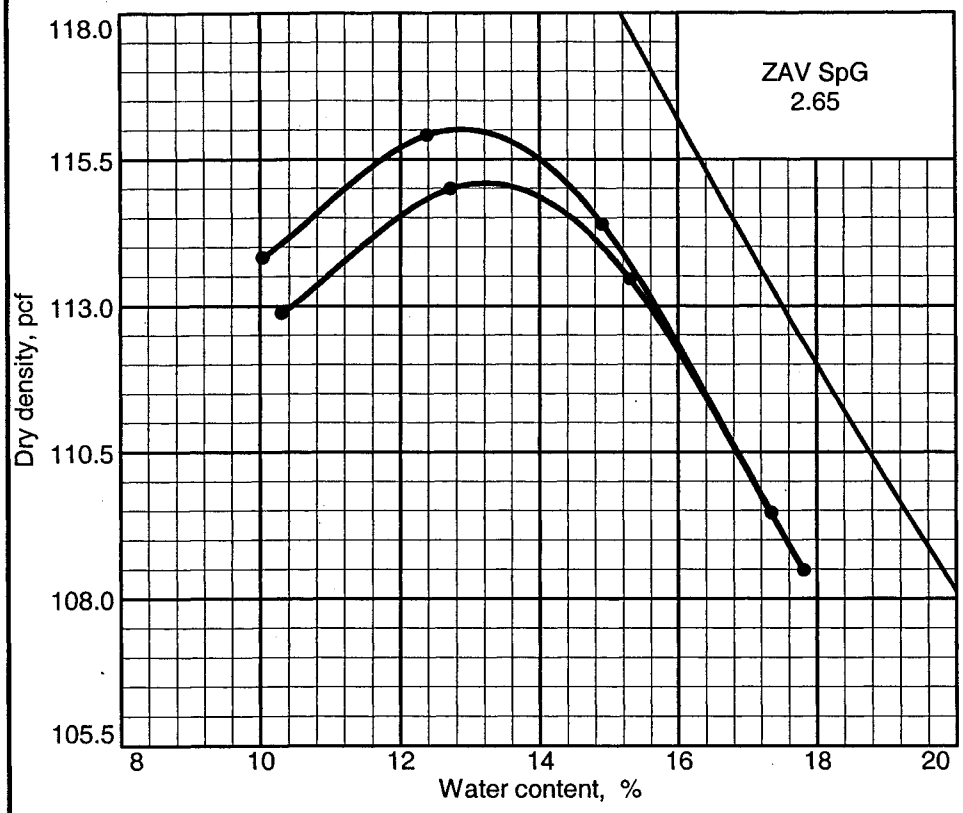
Remarks:
Alluvium (Qal)

COMPACTION TEST REPORT

ALLAN E. SEWARD ENGINEERING GEOLOGY, INC.

Figure B3.5

COMPACTION TEST REPORT



Curve No.
F

Test Specification:
ASTM D 1557-91 Procedure A Modified
Oversize correction applied to each point

Hammer Wt.: 10 lb.
Hammer Drop: 18 in.
Number of Layers: five
Blows per Layer: 25
Mold Size: .03333 cu.ft.

Test Performed on Material Passing No.4 **Sieve**

Soil Data

NM _____ **Sp.G.** 2.65
LL _____ **PI** _____
%>No.4 2.6 **%<#200** 71.2
USCS CL **AASHTO** _____

TESTING DATA

	1	2	3	4	5	6
WM + WS	8.64	8.81	8.85	8.75		
WM	4.49	4.49	4.49	4.49		
WW + T #1	207.50	216.54	226.40	233.41		
WD + T #1	191.12	195.65	200.65	202.92		
TARE #1	32.16	31.33	32.35	31.78		
WW + T #2						
WD + T #2						
TARE #2						
MOISTURE	10.0	12.4	14.9	17.4		
DRY DENSITY	113.8	115.9	114.4	109.5		

TEST RESULTS

Maximum dry density = 116 pcf

Optimum moisture = 13 %

Material Description

Very dark grayish brown lean clay with sand

Project No. 03-1571-4 **Client:** Newhall Land
Project: Tentative Tract 53425, River Park
City of Santa Clarita, California
● **Source:** **Sample No.:** F

Remarks:
Alluvium (Qal)

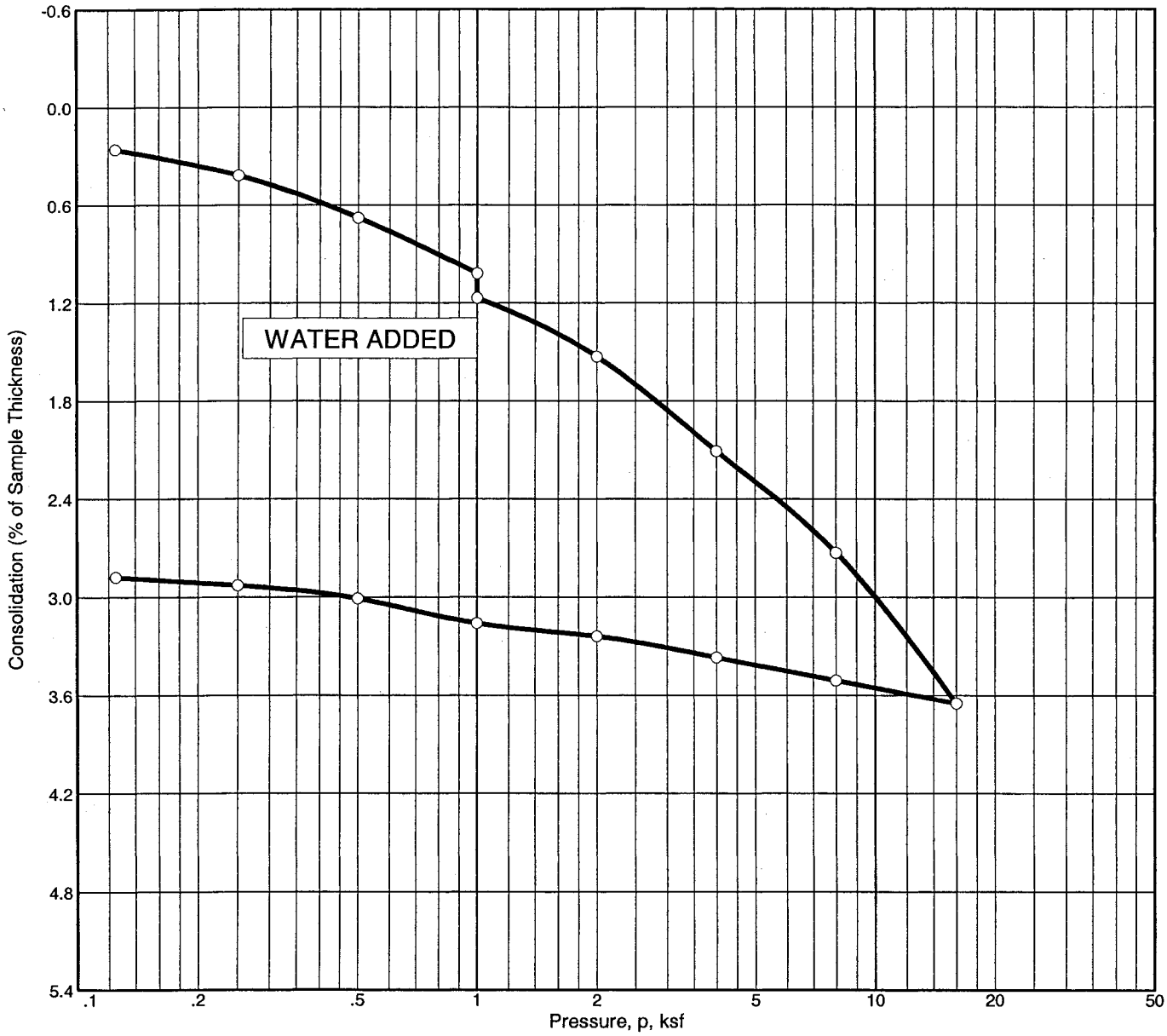
COMPACTION TEST REPORT

ALLAN E. SEWARD ENGINEERING GEOLOGY, INC.

Figure B3.6

CONSOLIDATION TEST REPORT

DRAWN BY	CHECKED BY
DATE	APPROVED BY



SUMMARY OF TEST RESULTS

	DRY DENSITY (pcf)	MOISTURE CONTENT, (%)	SATURATION (%)	HEIGHT (in.)	VOID RATIO	SPECIFIC GRAVITY	C_c	P'_o (ksf)	P_c (ksf)	USCS
INITIAL	117.9	10.8	71.0	1.000	0.403	2.65	0.04	0.60	4.09	SW
FINAL	121.4	14.0	100.0	0.971	0.362					

Source: RW-1 **Sample No.:** 2 **Elev./Depth:** 5'-6.5'
Material Description: Well-graded sand with gravel
Remarks:

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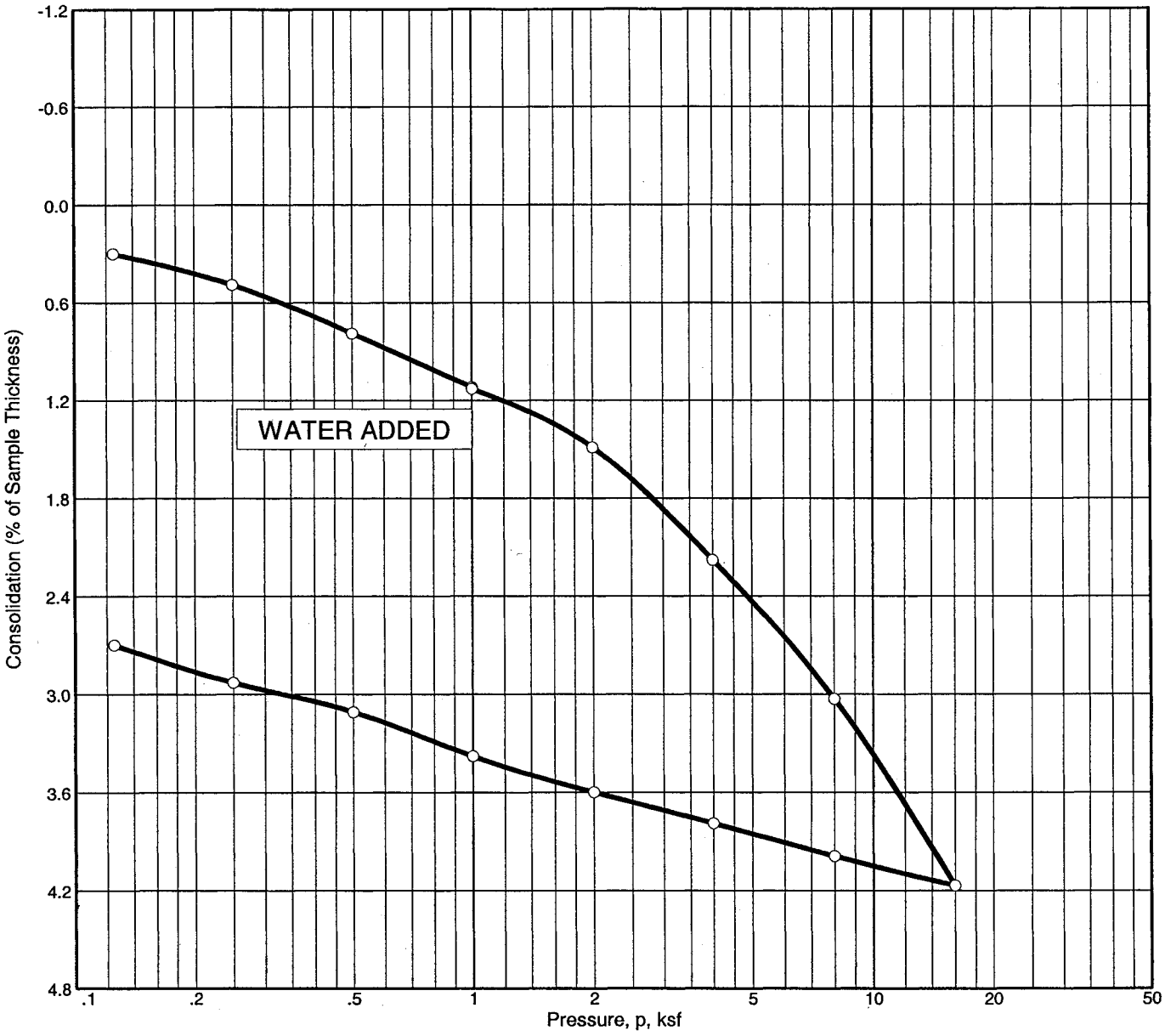
Client: Newhall Land
Project: Tentative Tract 53425, River Park
City of Santa Clarita, California
Job No.: 03-1571-4 **Figure** B4.1

CONSOLIDATION TEST REPORT

DRAWN BY | CHECKED BY
DATE | APPROVED BY



SUMMARY OF TEST RESULTS

	DRY DENSITY (pcf)	MOISTURE CONTENT, (%)	SATURATION (%)	HEIGHT (in.)	VOID RATIO	SPECIFIC GRAVITY	C_c	P'_o (ksf)	P_c (ksf)	USCS
INITIAL	106.1	20.3	96.3	1.000	0.559	2.65	0.06	0.48	3.75	ML
FINAL	109.1	22.8	100.0	0.973	0.517					

Source: RW-4 **Sample No.:** 1 **Elev./Depth:** 4'-5.5'
Material Description: Sandy silt with organic particles
Remarks:

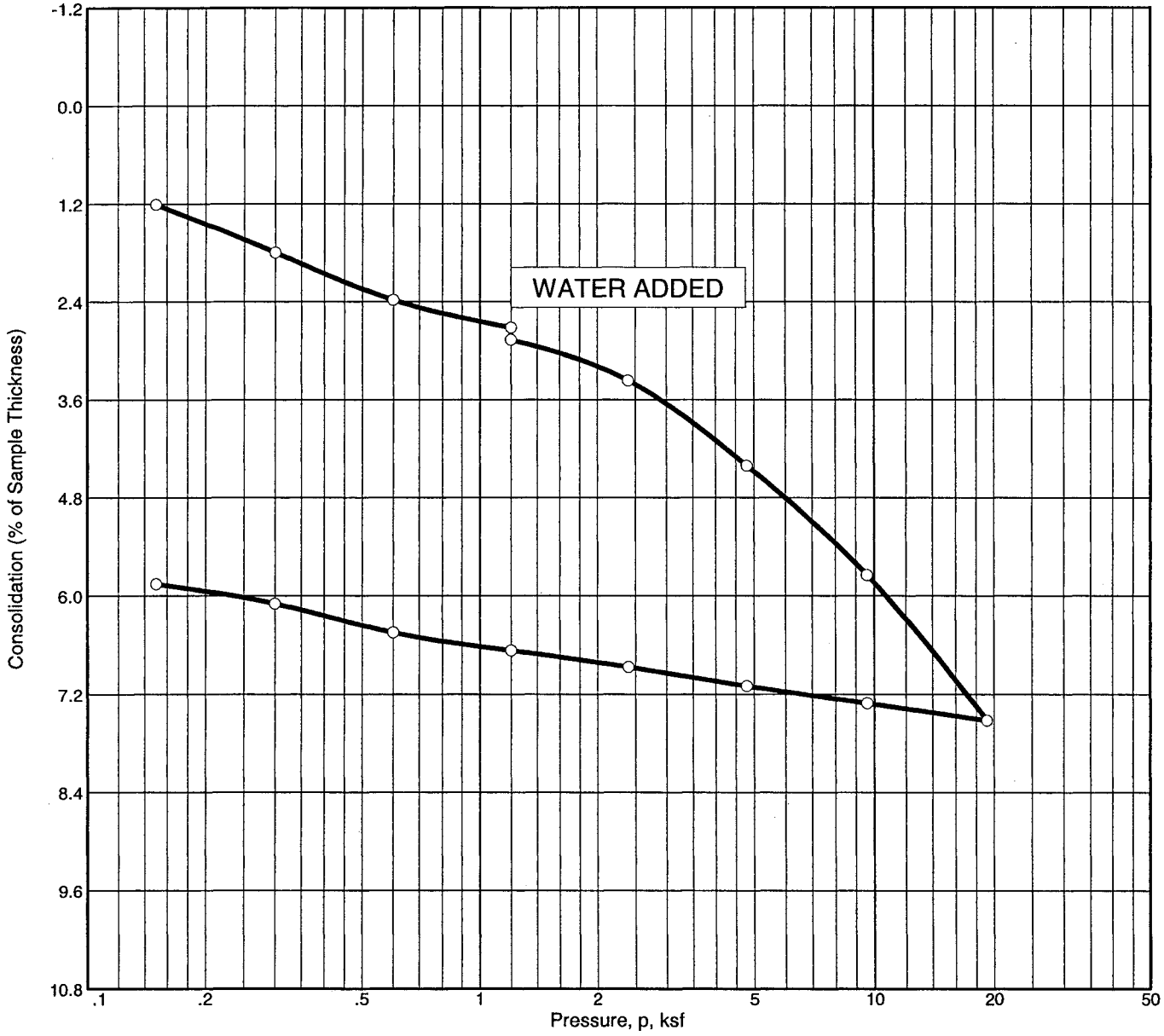
ALLAN E. SEWARD

ENGINEERING GEOLOGY, INC.

Client: Newhall Land
Project: Tentative Tract 53425, River Park
City of Santa Clarita, California
Job No.: 03-1571-4 **Figure** B4.2

CONSOLIDATION TEST REPORT

DRAWN BY	CHECKED BY
DATE	APPROVED BY



SUMMARY OF TEST RESULTS

	DRY DENSITY (pcf)	MOISTURE CONTENT, (%)	SATURATION (%)	HEIGHT (in.)	VOID RATIO	SPECIFIC GRAVITY	C_c	P'_o (ksf)	P_c (ksf)	USCS
INITIAL	116.4	14.7	92.3	1.000	0.421	2.65	0.08	1.20	4.46	SC
FINAL	123.7	14.1	100.0	0.941	0.338					

Source: RW-7 **Sample No.:** 1 **Elev./Depth:** 10'
Material Description: Clayey sand
Remarks:

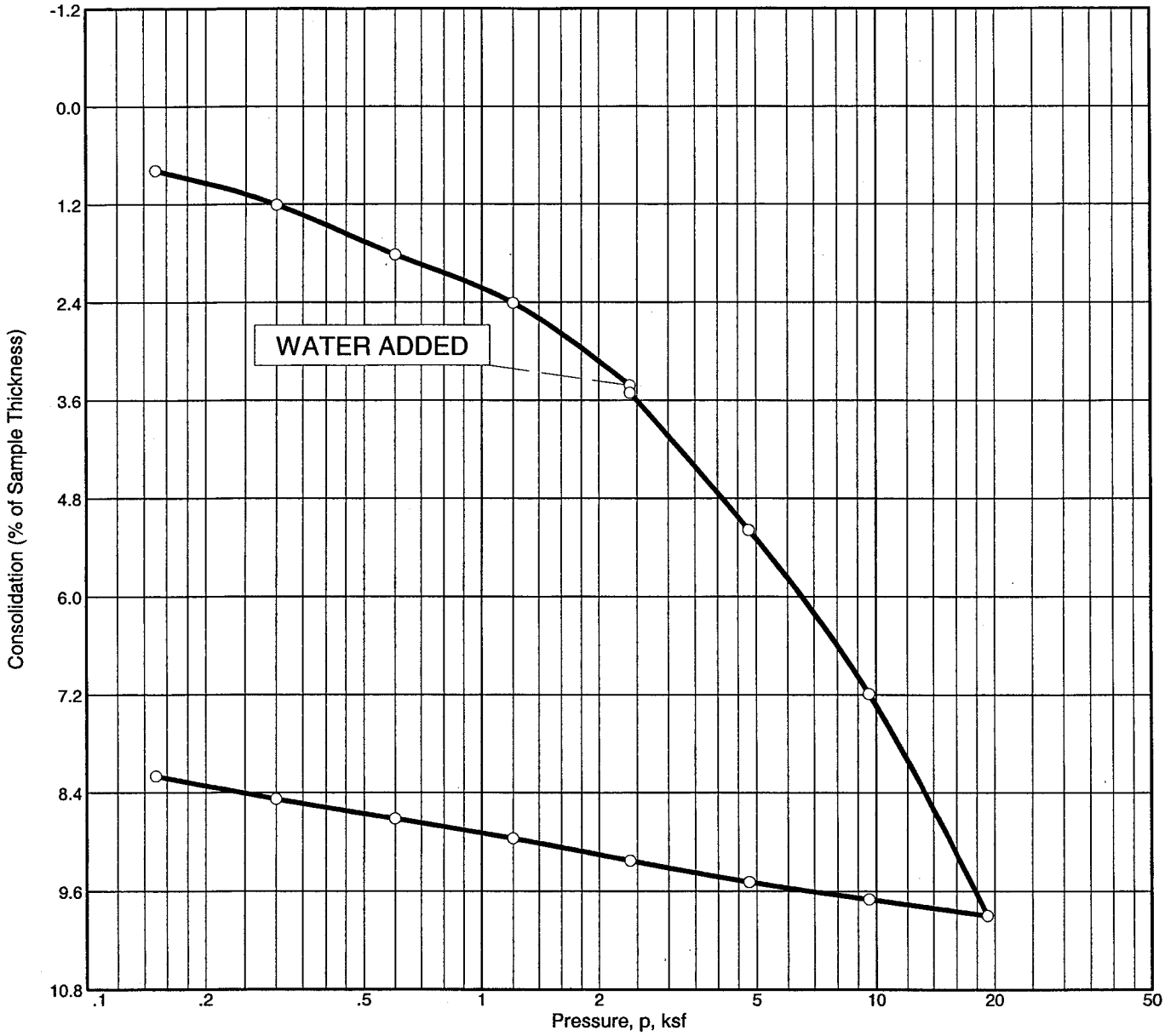
ALLAN E. SEWARD

ENGINEERING GEOLOGY, INC.

Client: Newhall Land
Project: Tentative Tract 53425, River Park
City of Santa Clarita, California
Job No.: 03-1571-4 **Figure** B4.3

CONSOLIDATION TEST REPORT

DRAWN BY	CHECKED BY
DATE	APPROVED BY



SUMMARY OF TEST RESULTS

	DRY DENSITY (pcf)	MOISTURE CONTENT, (%)	SATURATION (%)	HEIGHT (in.)	VOID RATIO	SPECIFIC GRAVITY	C_c	P'_o (ksf)	P_c (ksf)	USCS
INITIAL	118.5	14.2	94.9	1.000	0.396	2.65	0.13	2.40	3.41	CL
FINAL	129.1	14.6	100.0	0.918	0.282					

Source: RW-7 **Sample No.:** 2 **Elev./Depth:** 20'
Material Description: Sandy clay
Remarks:

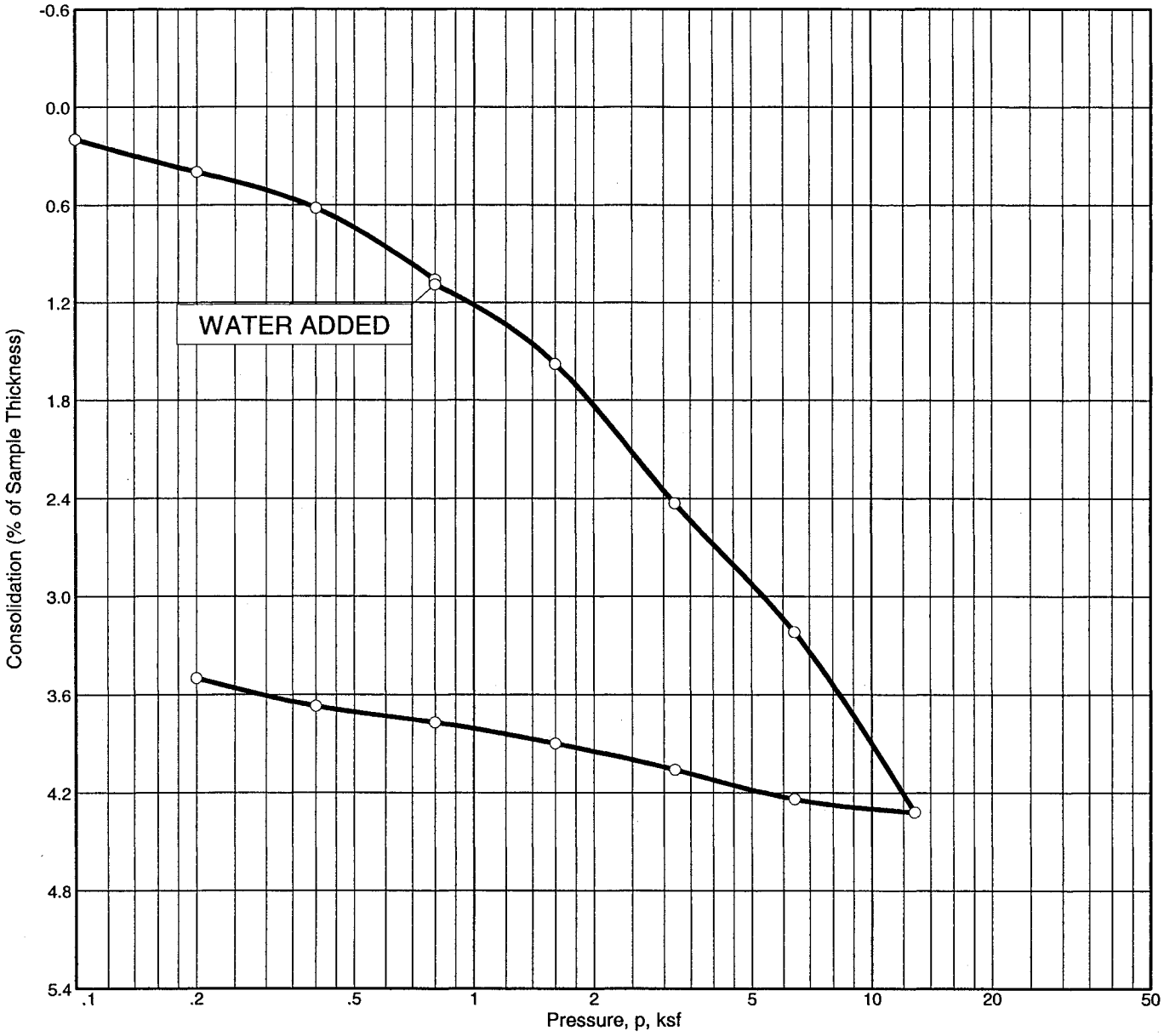
ALLAN E. SEWARD

ENGINEERING GEOLOGY, INC.

Client: Newhall Land
Project: Tentative Tract 53425, River Park
City of Santa Clarita, California
Job No.: 03-1571-4 **Figure** B4.4

CONSOLIDATION TEST REPORT

DRAWN BY	CHECKED BY
DATE	APPROVED BY



SUMMARY OF TEST RESULTS

	DRY DENSITY (pcf)	MOISTURE CONTENT, (%)	SATURATION (%)	HEIGHT (in.)	VOID RATIO	SPECIFIC GRAVITY	C_c	P'_o (ksf)	P_c (ksf)	USCS
INITIAL	114.9	4.7	28.4	1.000	0.440	2.65	0.05	0.60	2.88	SM
FINAL	119.1	14.3	97.2	0.965	0.389					

Source: HS-2 **Elev./Depth:** 5
Material Description: Silty sand
Remarks:

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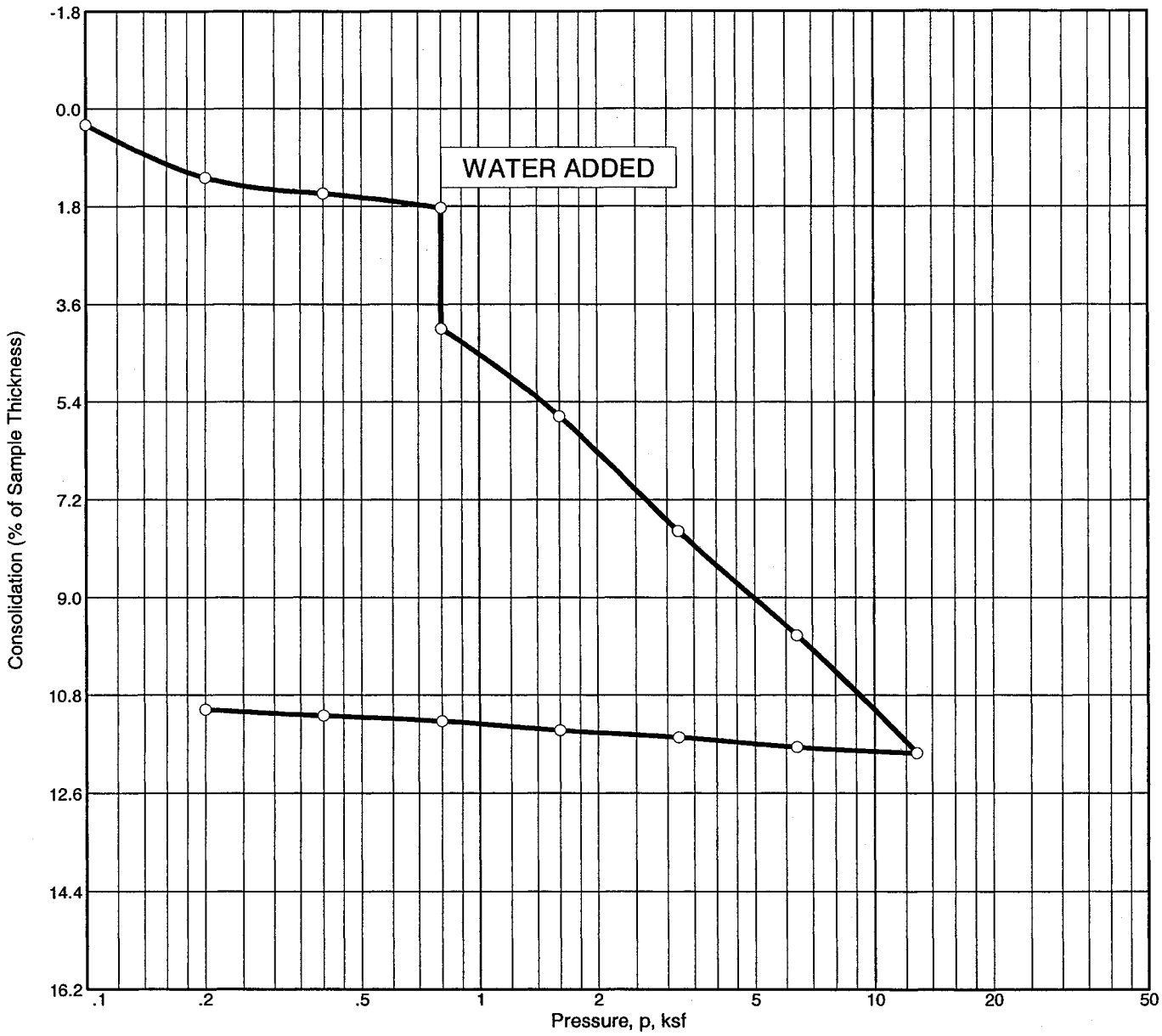
ENGINEERING GEOLOGY, INC.

Client: Newhall Land
Project: Tentative Tract 53425, River Park
City of Santa Clarita, California
Job No.: 03-1571-4 **Figure** B4.5

CONSOLIDATION TEST REPORT

DRAWN BY	CHECKED BY
DATE	APPROVED BY



SUMMARY OF TEST RESULTS

	DRY DENSITY (pcf)	MOISTURE CONTENT, (%)	SATURATION (%)	HEIGHT (in.)	VOID RATIO	SPECIFIC GRAVITY	C_c	P'_o (ksf)	P_c (ksf)	USCS
INITIAL	101.5	2.8	11.8	1.000	0.630	2.65	0.12	0.60	0.52	SM
FINAL	114.1	16.7	98.2	0.889	0.450					

Source: HS-4 **Elev./Depth:** 5
Material Description: Silty sand
Remarks:

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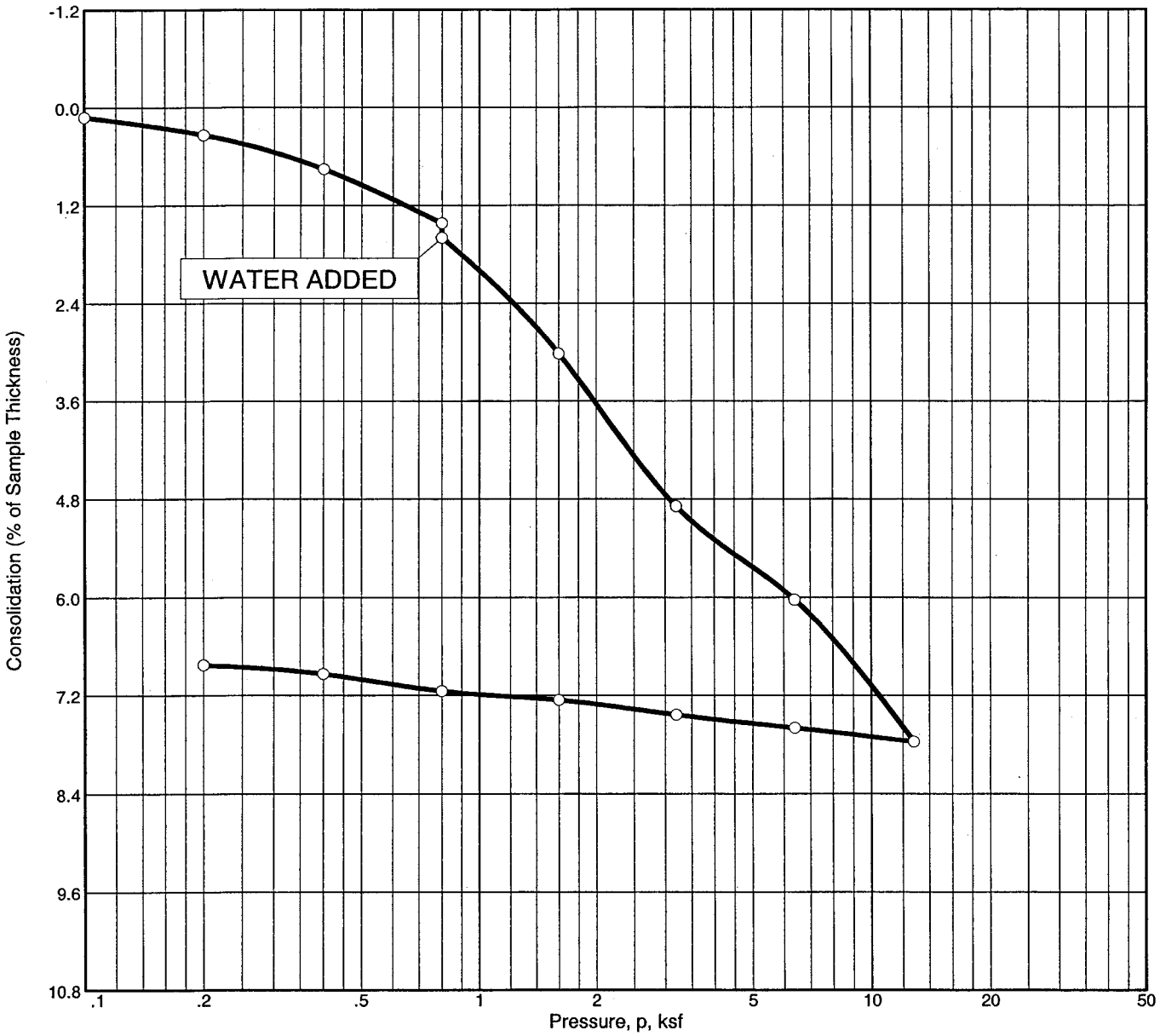
ENGINEERING GEOLOGY, INC.

Client: Newhall Land
Project: Tentative Tract 53425, River Park
City of Santa Clarita, California
Job No.: 03-1571-4 **Figure** B4.6

CONSOLIDATION TEST REPORT

DRAWN BY	CHECKED BY
DATE	APPROVED BY



SUMMARY OF TEST RESULTS

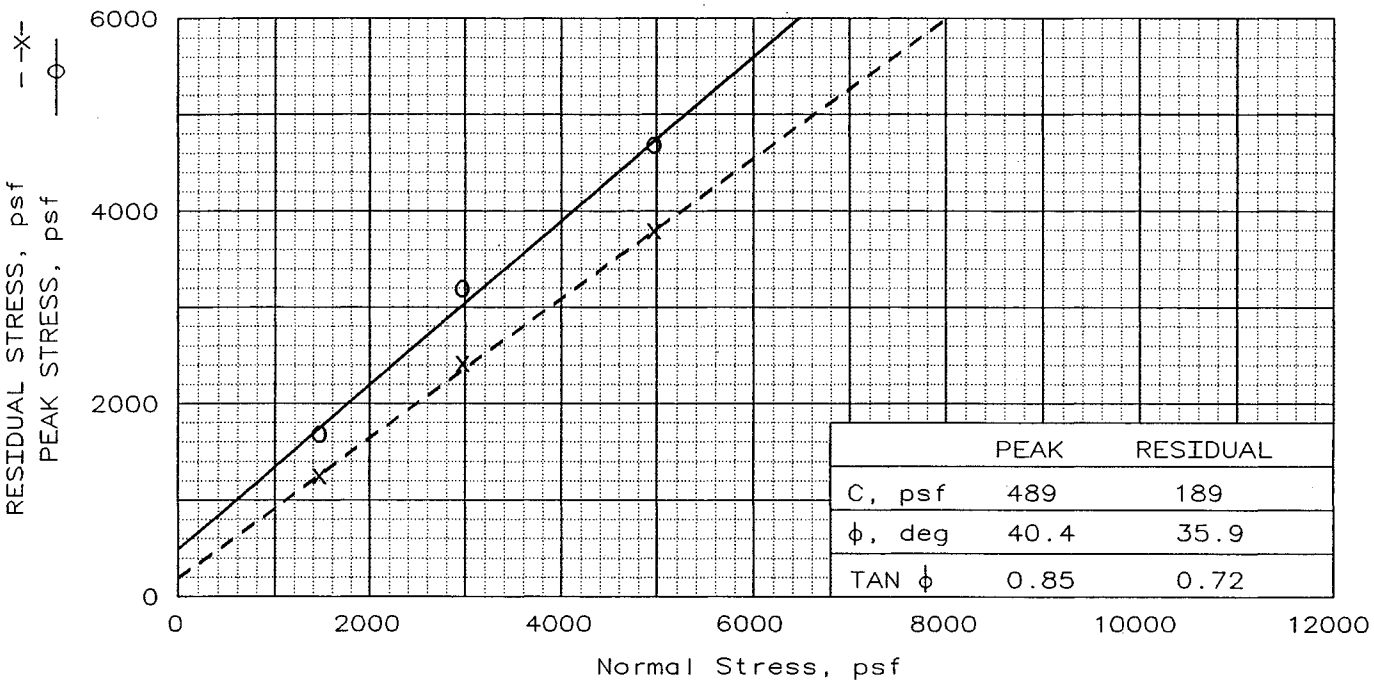
	DRY DENSITY (pcf)	MOISTURE CONTENT, (%)	SATURATION (%)	HEIGHT (in.)	VOID RATIO	SPECIFIC GRAVITY	C_c	P'_o (ksf)	P_c (ksf)	USCS
INITIAL	108.9	6.3	32.1	1.000	0.520	2.65	0.09	0.72	5.30	SM
FINAL	116.8	15.0	95.7	0.932	0.416					

Source: HS-5 **Elev./Depth:** 6
Material Description: Silty sand
Remarks:

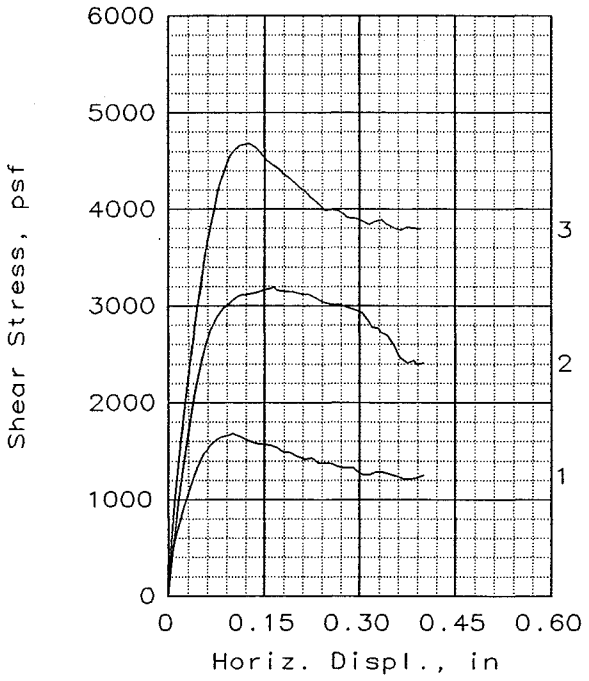
ALLAN E. SEWARD

ENGINEERING GEOLOGY, INC.

Client: Newhall Land
Project: Tentative Tract 53425, River Park
City of Santa Clarita, California
Job No.: 03-1571-4 **Figure** B4.7



	PEAK	RESIDUAL
C, psf	489	189
ϕ, deg	40.4	35.9
TAN ϕ	0.85	0.72



SAMPLE No:		1	2	3
INITIAL	WATER CONTENT, %	6.9	8.0	11.6
	DRY DENSITY, pcf	116.8	118.0	114.2
	SATURATION, %	44.3	52.6	68.4
	VOID RATIO	0.416	0.403	0.448
	DIAMETER, in	2.42	2.42	2.42
	HEIGHT, in	1.00	1.00	1.00
AT TEST	WATER CONTENT, %	14.5	14.1	14.4
	DRY DENSITY, pcf	118.6	120.2	118.5
	SATURATION, %	97.2	99.4	96.4
	VOID RATIO	0.394	0.376	0.396
	DIAMETER, in	2.42	2.42	2.42
	HEIGHT, in	0.98	0.98	0.96
NORMAL STRESS, psf		1500	3000	5000
PEAK STRESS, psf		1680	3192	4680
DISPLACEMENT, in		0.10	0.17	0.13
RESIDUAL STRESS, psf		1248	2412	3792
DISPLACEMENT, in		0.40	0.40	0.40
Strain rate, in/min		0.0100	0.0100	0.0100

SAMPLE TYPE: Undisturbed
DESCRIPTION: Poorly graded SAND (SP)

SPECIFIC GRAVITY= 2.65
REMARKS: Landslide debris (Qls)

% Fines=14

Fig. No.: B5.1

CLIENT: Newhall Land

PROJECT: Tentative Tract 53425
River Park
SAMPLE LOCATION: BA-7 @ 20 ft.

PROJ. NO.: 03-1571-4 DATE: 4/4/03

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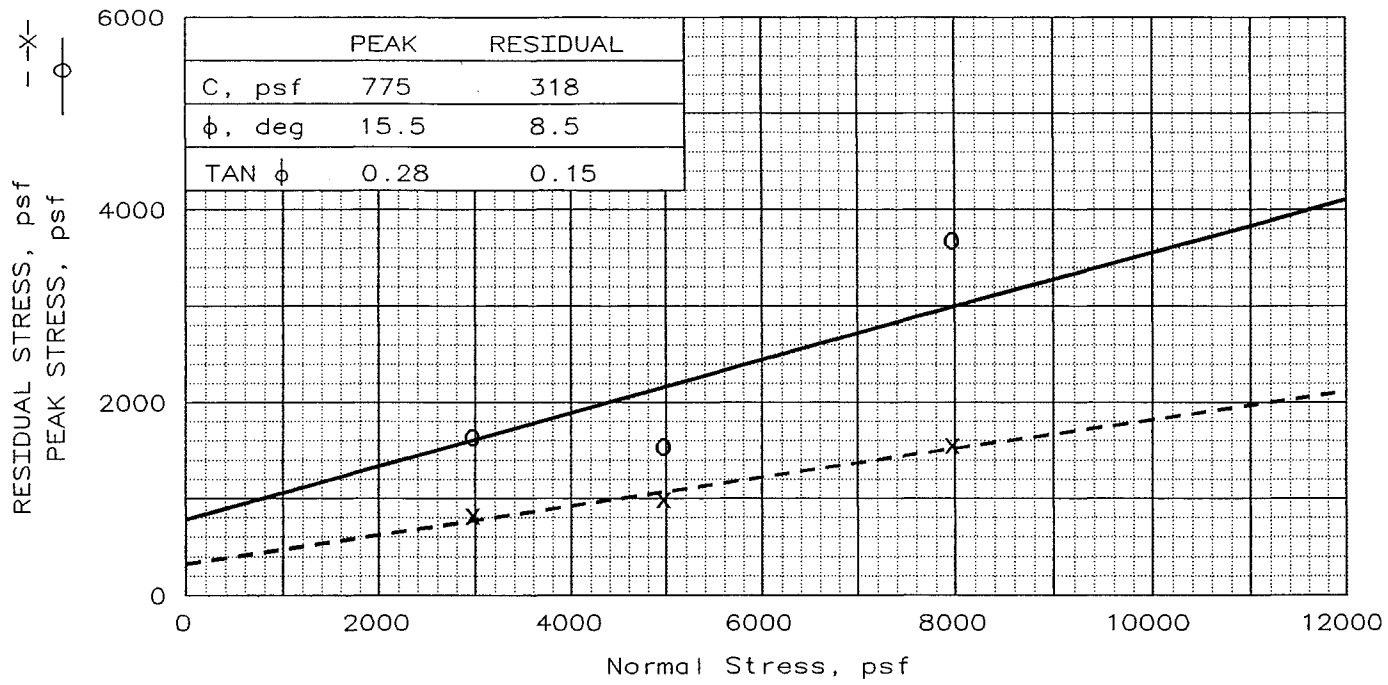

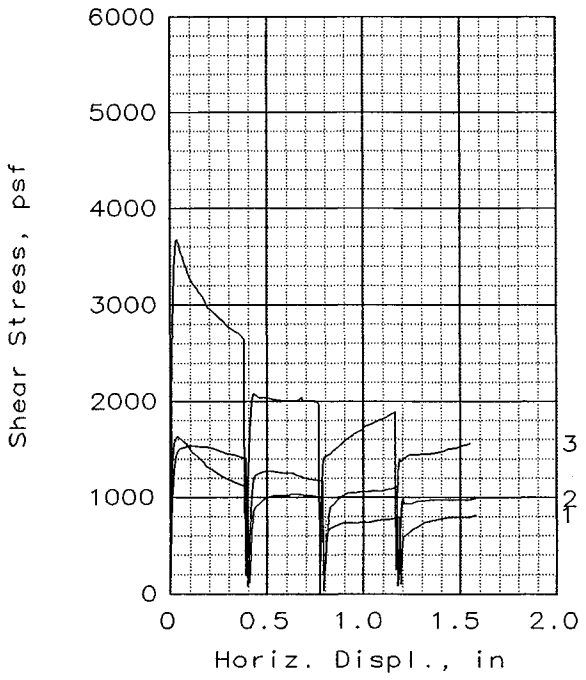

SAMPLE No:		1	2	3
INITIAL	WATER CONTENT, %	19.1	19.6	18.0
	DRY DENSITY, pcf	109.9	108.9	111.9
	SATURATION, %	100.0	100.0	100.0
	VOID RATIO	0.505	0.519	0.478
	DIAMETER, in	2.42	2.42	2.42
	HEIGHT, in	1.00	1.00	1.00
AT TEST	WATER CONTENT, %	16.1	10.1	10.4
	DRY DENSITY, pcf	115.9	130.3	129.6
	SATURATION, %	99.9	99.8	99.9
	VOID RATIO	0.427	0.270	0.277
	DIAMETER, in	2.42	2.42	2.42
	HEIGHT, in	0.95	0.84	0.86
NORMAL STRESS, psf		3000	5000	8000
PEAK STRESS, psf		1632	1536	3672
DISPLACEMENT, in		0.04	0.09	0.04
RESIDUAL STRESS, psf		816	984	1548
DISPLACEMENT, in		1.58	1.58	1.54
Strain rate, in/min		0.0050	0.0050	0.0050

SAMPLE TYPE: Undisturbed
DESCRIPTION: Silty Clay (CL)

SPECIFIC GRAVITY= 2.65
REMARKS: Basal Landslide Plane
Hand-driven rings

Fig. No.: B5.2

CLIENT: Castaic Lake Water Agency

PROJECT: Castaic Lake Water Agency,
Road Alignment and Development
SAMPLE LOCATION: BA-3 @ 30 ft.

PROJ. NO.: 00-1571C-1 DATE: 3/3/00

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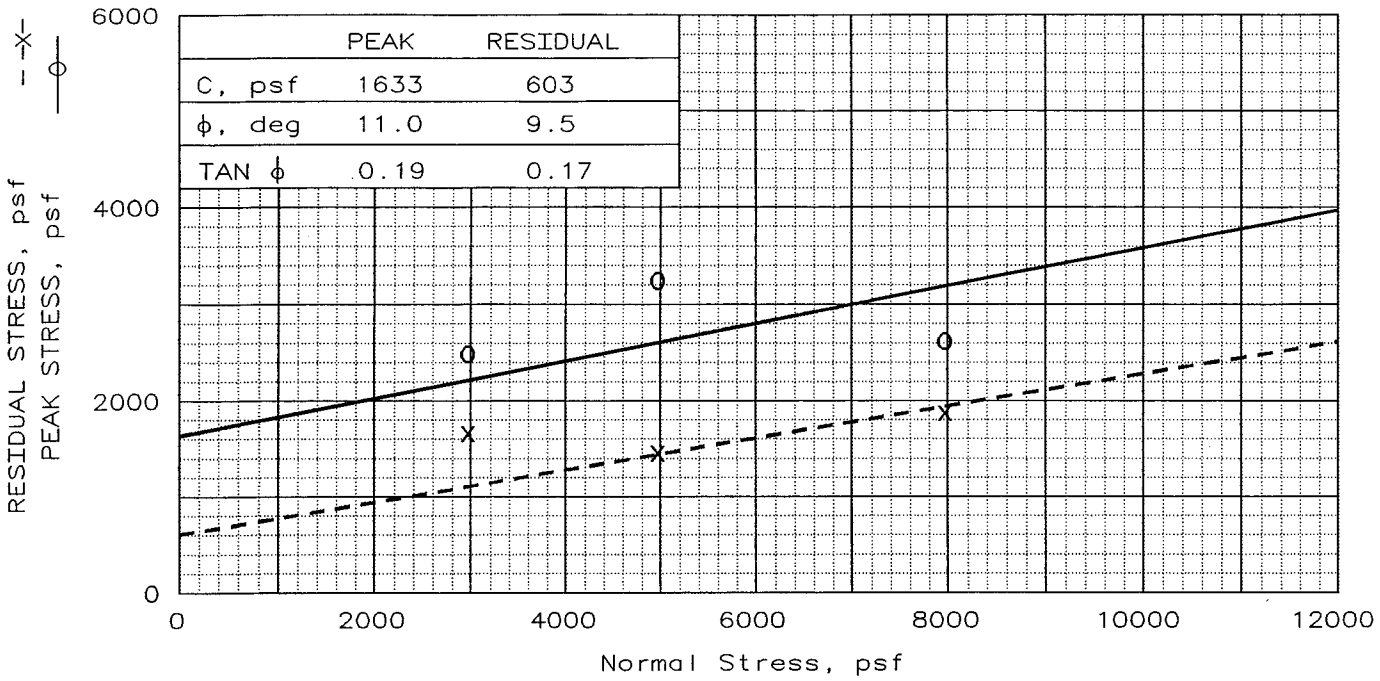

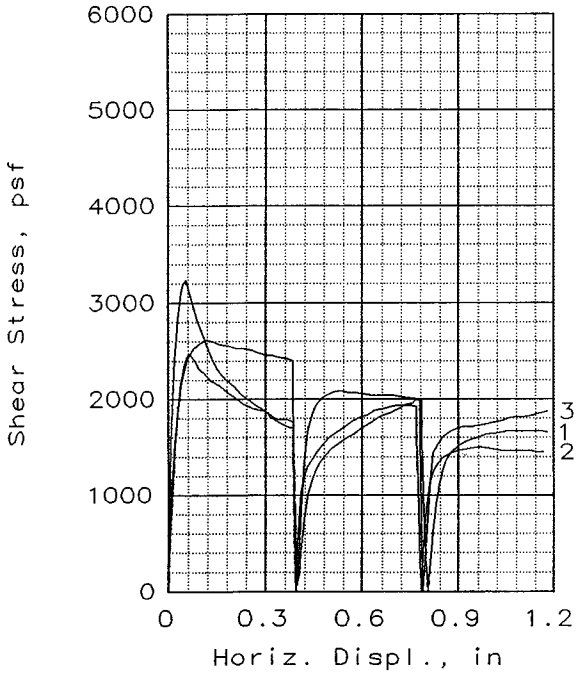

SAMPLE No:		1	2	3
INITIAL	WATER CONTENT, %	13.8	13.3	16.2
	DRY DENSITY, pcf	111.3	111.0	108.7
	SATURATION, %	74.9	71.9	82.5
	VOID RATIO	0.487	0.491	0.522
	DIAMETER, in	2.42	2.42	2.42
	HEIGHT, in	1.00	1.00	1.00
AT TEST	WATER CONTENT, %	17.7	17.7	18.1
	DRY DENSITY, pcf	111.3	112.7	111.8
	SATURATION, %	96.2	100.0	99.7
	VOID RATIO	0.487	0.468	0.480
	DIAMETER, in	2.42	2.42	2.42
	HEIGHT, in	1.00	0.98	0.97
NORMAL STRESS, psf		3000	5000	8000
PEAK STRESS, psf		2484	3240	2616
DISPLACEMENT, in		0.07	0.06	0.12
RESIDUAL STRESS, psf		1656	1452	1872
DISPLACEMENT, in		1.18	1.17	1.18
Strain rate, in/min		0.0050	0.0050	0.0050

SAMPLE TYPE: Undisturbed
DESCRIPTION: Fat Clay (CH)

LL= 51 PL= 23 PI= 28
SPECIFIC GRAVITY= 2.65
REMARKS: Basal Landslide Plane
Hand-driven rings
-#200 = 89.3%

Fig. No.: B5.3

CLIENT: Castaic Lake Water Agency

PROJECT: Castaic Lake Water Agency
Road Alignment and Development
SAMPLE LOCATION: BA-4 @ 29 ft.

PROJ. NO.: 00-1571C-1 DATE: 3/3/00

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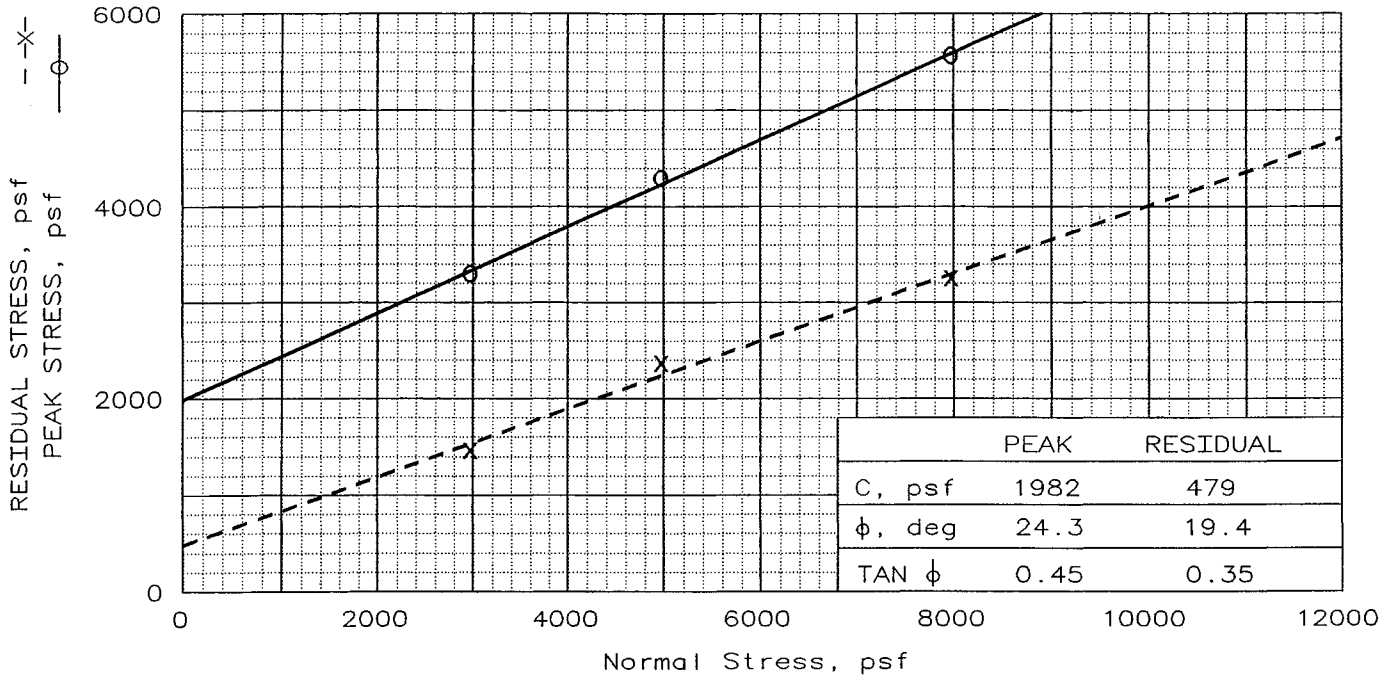
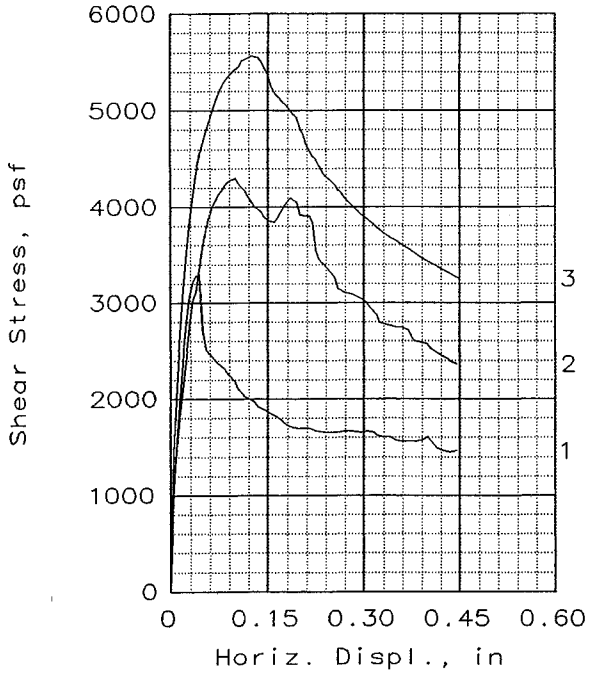


	PEAK	RESIDUAL
C, psf	1982	479
ϕ, deg	24.3	19.4
TAN ϕ	0.45	0.35



SAMPLE No:		1	2	3
INITIAL	WATER CONTENT, %	14.4	14.4	14.6
	DRY DENSITY, pcf	112.2	111.7	111.8
	SATURATION, %	80.1	79.6	80.6
	VOID RATIO	0.475	0.481	0.480
	DIAMETER, in	2.42	2.42	2.42
	HEIGHT, in	1.00	1.00	1.00
AT TEST	WATER CONTENT, %	15.5	13.2	8.2
	DRY DENSITY, pcf	117.1	122.7	135.8
	SATURATION, %	99.6	100.0	99.7
	VOID RATIO	0.413	0.349	0.218
	DIAMETER, in	2.42	2.42	2.42
	HEIGHT, in	0.96	0.91	0.82
NORMAL STRESS, psf		3000	5000	8000
PEAK STRESS, psf		3300	4296	5567
DISPLACEMENT, in		0.05	0.10	0.13
RESIDUAL STRESS, psf		1464	2364	3252
DISPLACEMENT, in		0.45	0.45	0.45
Strain rate, in/min		0.0050	0.0050	0.0050

SAMPLE TYPE: Undisturbed
DESCRIPTION: Sandy SILTSTONE

SPECIFIC GRAVITY= 2.65
REMARKS: Bedrock (TQs) along
siltstone bedding
Hand-driven rings
-#200 = 90.6%
Fig. No.: B5.4

CLIENT: Castaic Lake Water Agency

PROJECT: Castaic Lake Water Agency,
Road Alignment and Development
SAMPLE LOCATION: BA-1 @ 47 ft.

PROJ. NO.: 00-1571C-1 DATE: 3/3/00

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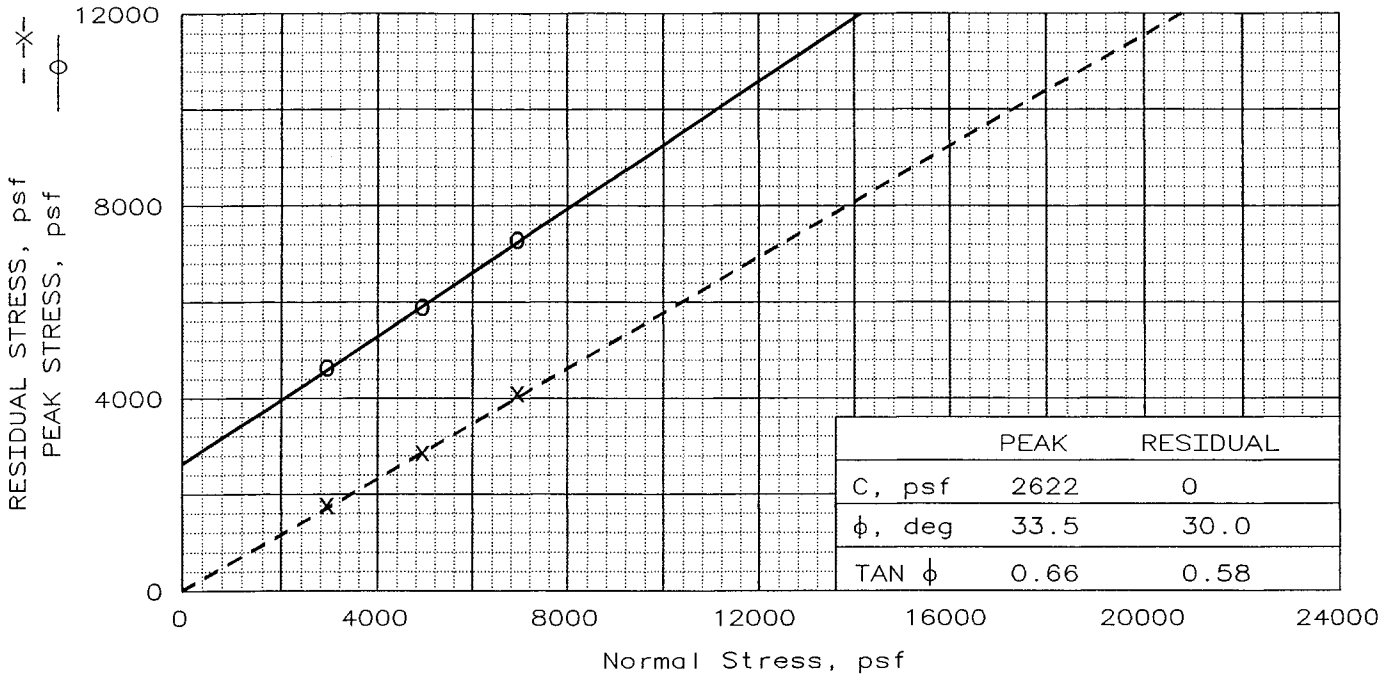

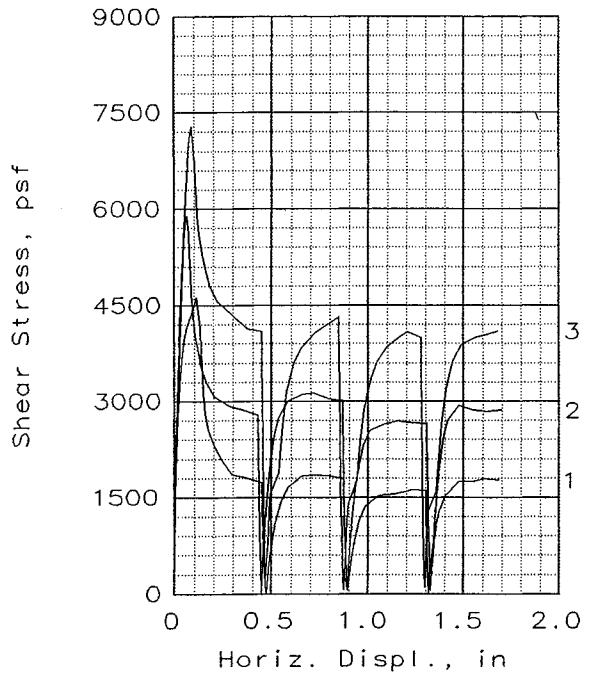

SAMPLE No:		1	2	3
INITIAL	WATER CONTENT, %	11.0	10.3	10.7
	DRY DENSITY, pcf	128.9	130.3	126.5
	SATURATION, %	103.1	101.6	91.8
	VOID RATIO	0.283	0.269	0.308
	DIAMETER, in	2.42	2.42	2.42
	HEIGHT, in	1.00	1.00	1.00
AT TEST	WATER CONTENT, %	10.4	9.5	8.7
	DRY DENSITY, pcf	129.7	132.0	134.3
	SATURATION, %	99.9	99.6	99.3
	VOID RATIO	0.275	0.253	0.232
	DIAMETER, in	2.42	2.42	2.42
	HEIGHT, in	0.99	0.99	0.94
NORMAL STRESS, psf		3000	5000	7000
PEAK STRESS, psf		4632	5891	7283
DISPLACEMENT, in		0.12	0.07	0.09
RESIDUAL STRESS, psf		1764	2856	4092
DISPLACEMENT, in		1.69	1.70	1.68
Strain rate, in/min		0.0050	0.0050	0.0050

SAMPLE TYPE: Undisturbed
DESCRIPTION: Sandy CLAYSTONE

SPECIFIC GRAVITY= 2.65
REMARKS: Bedrock (TQs) along claystone bedding

Fig. No.: B5.5

CLIENT: Newhall Land

PROJECT: Tentative Tract 53425
River Park
SAMPLE LOCATION: BA-7 @ 50 ft.

PROJ. NO.: 02-1571-4 DATE: 11/14/02

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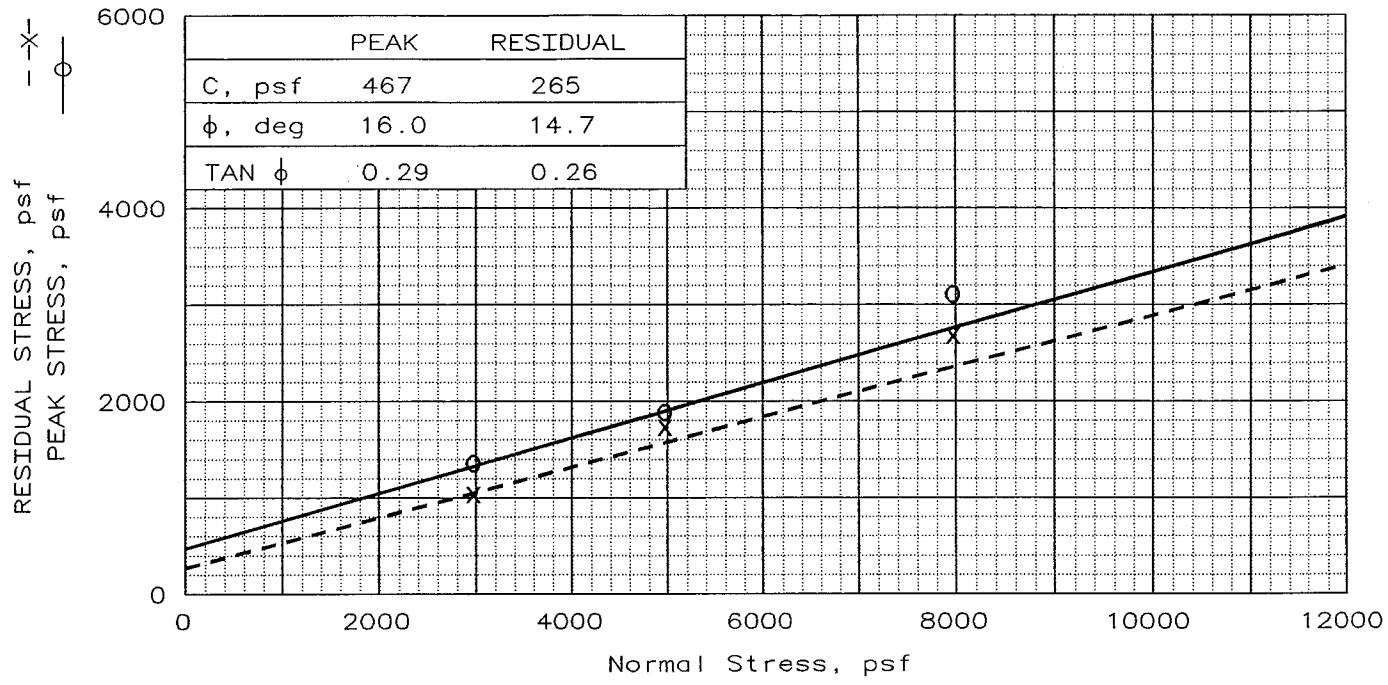
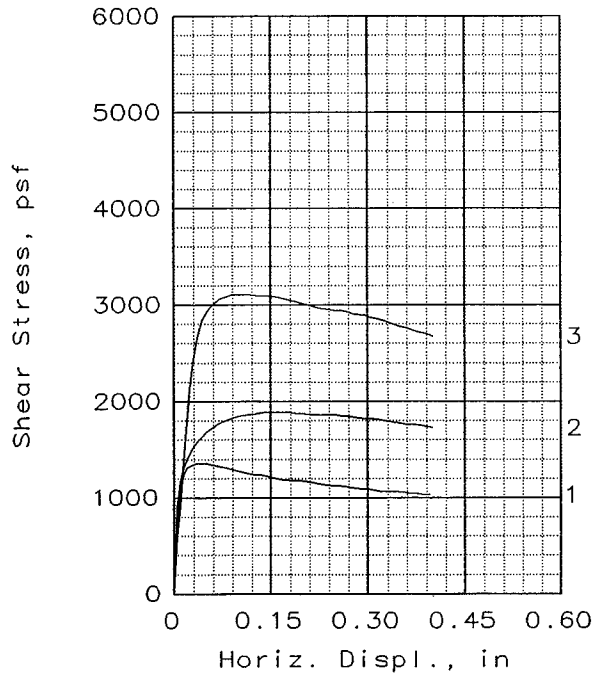
ENGINEERING GEOLOGY, INC.



	PEAK	RESIDUAL
C, psf	467	265
ϕ, deg	16.0	14.7
TAN ϕ	0.29	0.26



SAMPLE No:		1	2	3
INITIAL	WATER CONTENT, %	19.5	18.9	18.1
	DRY DENSITY, pcf	108.8	110.1	111.4
	SATURATION, %	99.2	99.9	98.7
	VOID RATIO	0.521	0.502	0.485
	DIAMETER, in	2.42	2.42	2.42
	HEIGHT, in	1.00	1.00	1.00
AT TEST	WATER CONTENT, %	18.7	17.6	16.0
	DRY DENSITY, pcf	109.8	112.7	116.1
	SATURATION, %	97.5	99.8	99.6
	VOID RATIO	0.507	0.468	0.425
	DIAMETER, in	2.42	2.42	2.42
	HEIGHT, in	0.99	0.98	0.96
NORMAL STRESS, psf		3000	5000	8000
PEAK STRESS, psf		1356	1884	3108
DISPLACEMENT, in		0.04	0.14	0.09
RESIDUAL STRESS, psf		1032	1728	2676
DISPLACEMENT, in		0.40	0.40	0.40
Strain rate, in/min		0.0050	0.0050	0.0050

SAMPLE TYPE: Undisturbed
DESCRIPTION: CLAYSTONE (Lean to Fat Clay) (CL/CH)
LL= 50 PL= 22 PI= 28
SPECIFIC GRAVITY= 2.65
REMARKS: Bedrock (TQs) along claystone bedding
Hand-driven rings
-#200 = 96.9%
Fig. No.: B5.6

CLIENT: Castaic Lake Water Agency

PROJECT: Castaic Lake Water Agency
Road Alignment and Development
SAMPLE LOCATION: BA-7 @ 54'

PROJ. NO.: 00-1571C-1 DATE: 3/3/00

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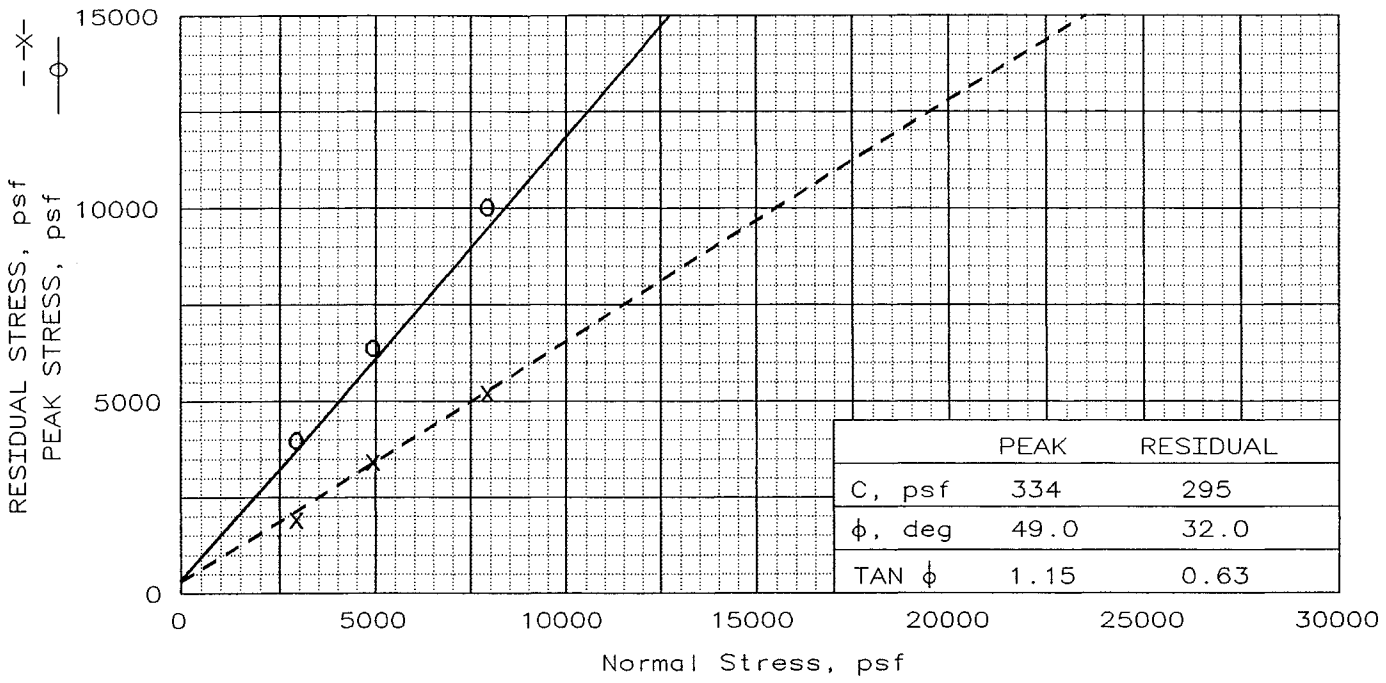

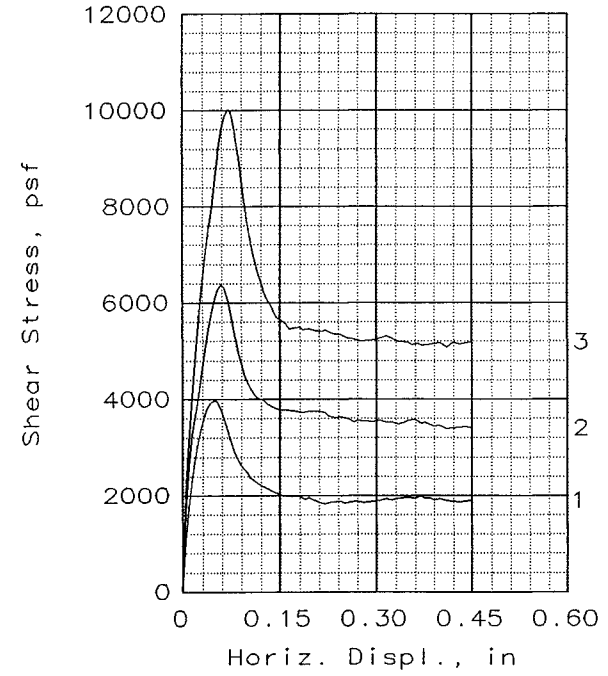

SAMPLE No:		1	2	3
INITIAL	WATER CONTENT, %	7.5	6.7	7.4
	DRY DENSITY, pcf	130.0	131.9	131.3
	SATURATION, %	72.5	68.1	75.8
	VOID RATIO	0.272	0.264	0.260
	DIAMETER, in	2.42	2.42	2.42
	HEIGHT, in	1.00	1.00	1.00
AT TEST	WATER CONTENT, %	10.2	9.4	9.0
	DRY DENSITY, pcf	130.2	133.3	133.5
	SATURATION, %	100.0	99.7	99.6
	VOID RATIO	0.271	0.250	0.240
	DIAMETER, in	2.42	2.42	2.42
	HEIGHT, in	1.00	0.99	0.98
NORMAL STRESS, psf		3000	5000	8000
PEAK STRESS, psf		3972	6371	10019
DISPLACEMENT, in		0.05	0.06	0.07
RESIDUAL STRESS, psf		1908	3408	5196
DISPLACEMENT, in		0.45	0.45	0.45
Strain rate, in/min		0.0100	0.0100	0.0100

SAMPLE TYPE: Undisturbed
DESCRIPTION: SANDSTONE

SPECIFIC GRAVITY= 2.65
REMARKS: Bedrock (TQs)
Cross-bedding

Fig. No.: B5.7

CLIENT: Castaic Lake Water Agency

PROJECT: Castaic Lake Water Agency
Road Alignment and Development
SAMPLE LOCATION: BA-5 @ 30 ft.

PROJ. NO.: 00-1571C-1 DATE: 3/3/00

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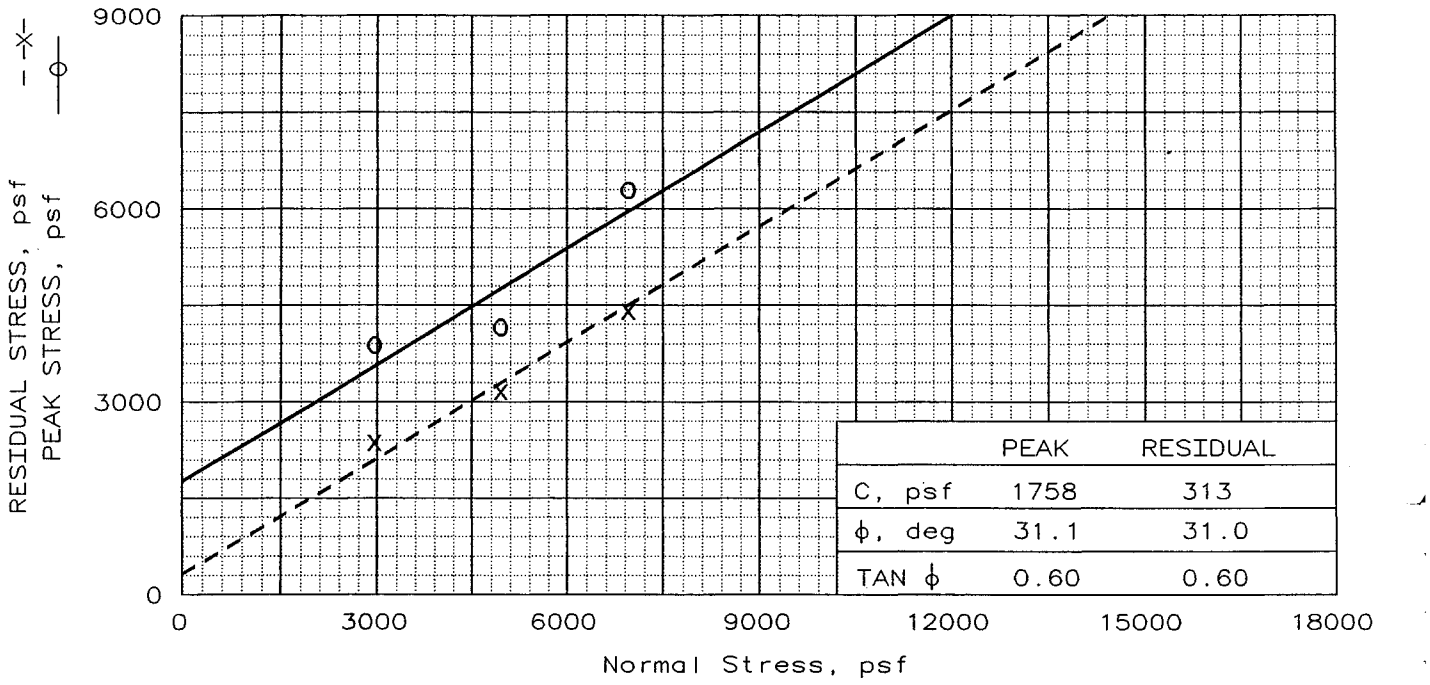
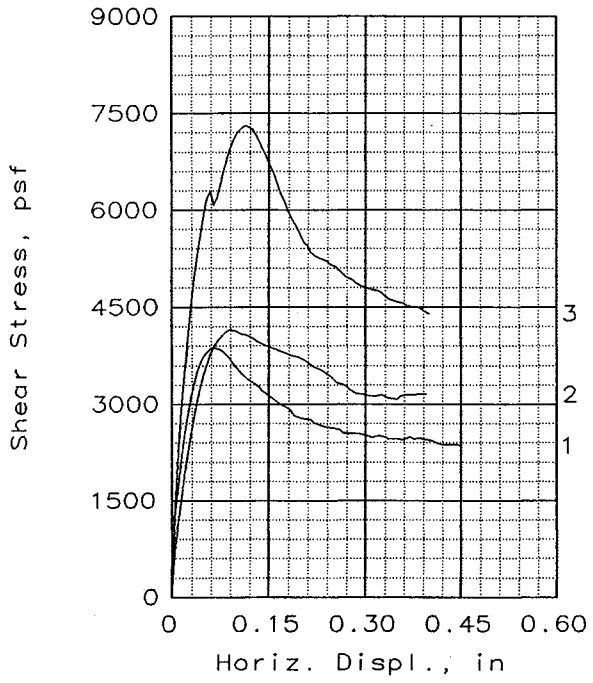


	PEAK	RESIDUAL
C, psf	1758	313
ϕ, deg	31.1	31.0
TAN ϕ	0.60	0.60



SAMPLE No:		1	2	3
INITIAL	WATER CONTENT, %	9.3	10.2	8.4
	DRY DENSITY, pcf	127.8	123.4	131.6
	SATURATION, %	83.4	79.7	87.0
	VOID RATIO	0.295	0.340	0.257
	DIAMETER, in	2.42	2.42	2.42
	HEIGHT, in	1.00	1.00	1.00
AT TEST	WATER CONTENT, %	10.6	7.4	8.4
	DRY DENSITY, pcf	129.0	138.2	135.0
	SATURATION, %	99.5	99.4	99.0
	VOID RATIO	0.283	0.197	0.226
	DIAMETER, in	2.42	2.42	2.42
	HEIGHT, in	0.99	0.89	0.98
NORMAL STRESS, psf		3000	5000	7000
PEAK STRESS, psf		3876	4152	6287
DISPLACEMENT, in		0.07	0.09	0.06
RESIDUAL STRESS, psf		2364	3156	4404
DISPLACEMENT, in		0.45	0.40	0.40
Strain rate, in/min		0.0100	0.0100	0.0100

SAMPLE TYPE: Undisturbed
DESCRIPTION: Silty SANDSTONE
(SM)

SPECIFIC GRAVITY= 2.65
REMARKS: Bedrock (TQs)
Cross-bedding
% Fines=36

Fig. No.: B5.8

CLIENT: Newhall Land

PROJECT: Tentative Tract 53425
River Park
SAMPLE LOCATION: BA-6 @ 77 ft.

PROJ. NO.: 03-1571-4 DATE: 4/4/03

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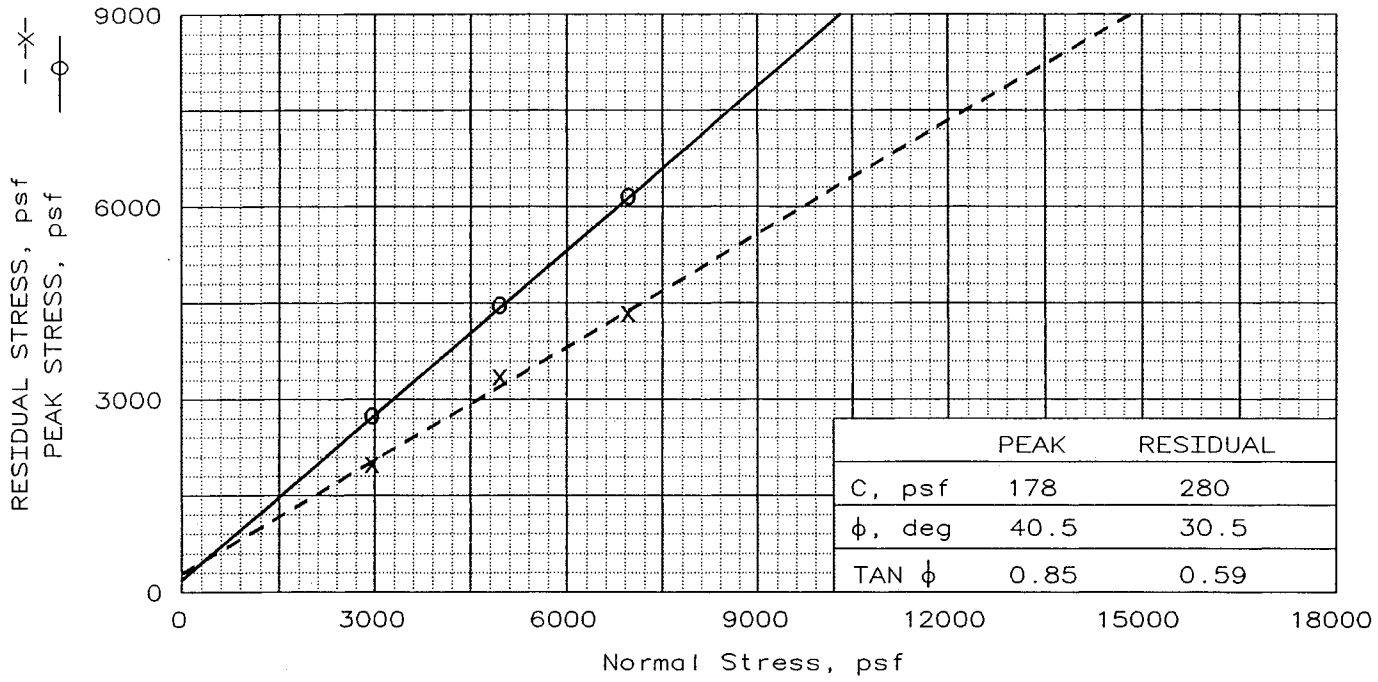

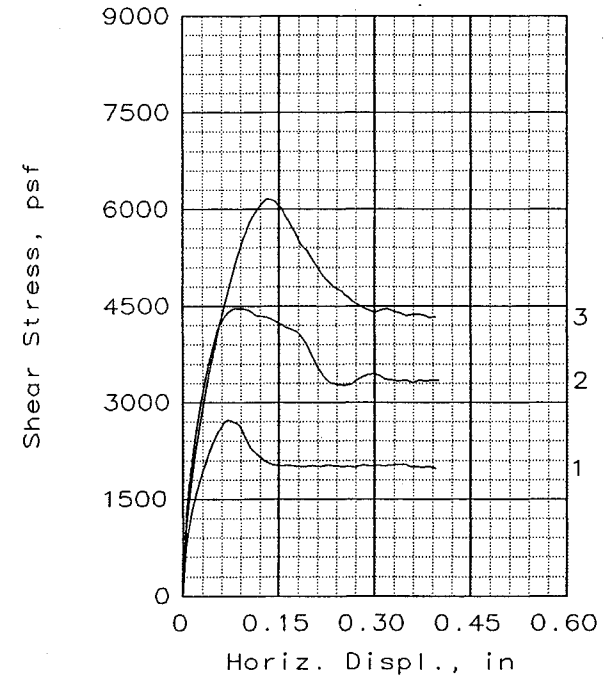

SAMPLE No:		1	2	3
INITIAL	WATER CONTENT, %	8.6	8.7	8.5
	DRY DENSITY, pcf	116.1	116.7	113.1
	SATURATION, %	53.3	55.2	48.7
	VOID RATIO	0.425	0.418	0.462
	DIAMETER, in	2.42	2.42	2.42
	HEIGHT, in	1.00	1.00	1.00
AT TEST	WATER CONTENT, %	14.7	14.6	14.7
	DRY DENSITY, pcf	117.3	119.1	116.7
	SATURATION, %	94.9	99.4	93.2
	VOID RATIO	0.411	0.389	0.417
	DIAMETER, in	2.42	2.42	2.42
	HEIGHT, in	0.99	0.98	0.97
NORMAL STRESS, psf		3000	5000	7000
PEAK STRESS, psf		2736	4464	6155
DISPLACEMENT, in		0.07	0.08	0.13
RESIDUAL STRESS, psf		1980	3348	4332
DISPLACEMENT, in		0.40	0.40	0.40
Strain rate, in/min		0.0100	0.0100	0.0100

SAMPLE TYPE: Undisturbed
DESCRIPTION: Silty SANDSTONE (SM)

SPECIFIC GRAVITY= 2.65
REMARKS: Bedrock (TQs) Cross-bedding

Fig. No.: B5.9

CLIENT: Newhall Land

PROJECT: Tentative Tract 53425
River Park
SAMPLE LOCATION: BA-7 @ 40 ft.

PROJ. NO.: 03-1571-4 DATE: 4/4/03

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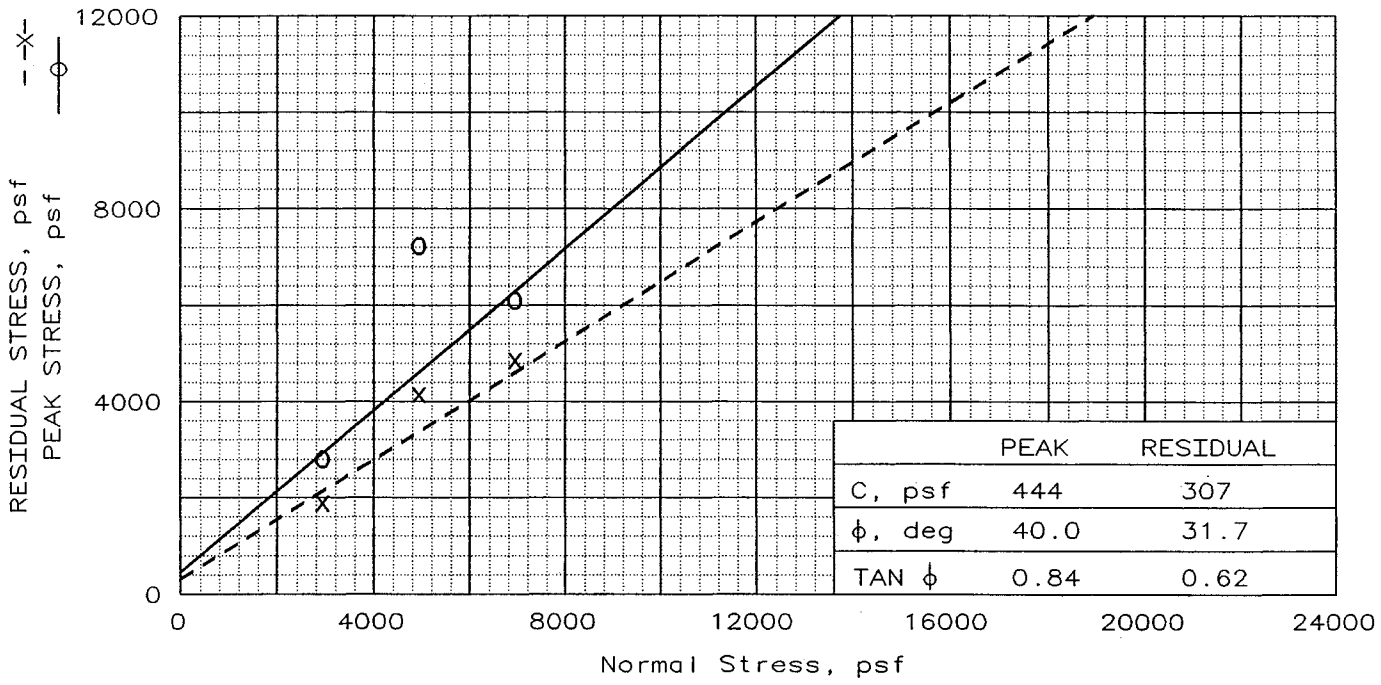
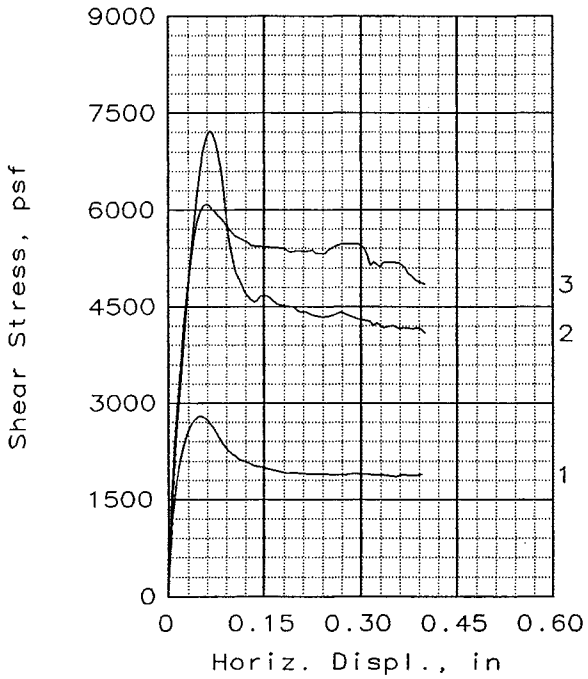


	PEAK	RESIDUAL
C, psf	444	307
ϕ, deg	40.0	31.7
TAN ϕ	0.84	0.62



SAMPLE No:		1	2	3
INITIAL	WATER CONTENT, %	9.5	7.0	7.6
	DRY DENSITY, pcf	122.0	130.2	127.1
	SATURATION, %	70.6	68.5	66.6
	VOID RATIO	0.356	0.270	0.302
	DIAMETER, in	2.42	2.42	2.42
	HEIGHT, in	1.00	1.00	1.00
AT TEST	WATER CONTENT, %	12.9	9.3	10.6
	DRY DENSITY, pcf	123.1	132.0	129.2
	SATURATION, %	99.8	97.5	100.0
	VOID RATIO	0.344	0.254	0.280
	DIAMETER, in	2.42	2.42	2.42
	HEIGHT, in	0.99	0.99	0.98
NORMAL STRESS, psf		3000	5000	7000
PEAK STRESS, psf		2796	7223	6095
DISPLACEMENT, in		0.05	0.07	0.06
RESIDUAL STRESS, psf		1884	4140	4848
DISPLACEMENT, in		0.40	0.40	0.40
Strain rate, in/min		0.0100	0.0100	0.0100

SAMPLE TYPE: Undisturbed
DESCRIPTION: SANDSTONE

SPECIFIC GRAVITY= 2.65
REMARKS: Bedrock (TQs)
Cross-bedding
% Fines=28

Fig. No.: B5.10

CLIENT: Newhall Land

PROJECT: Tentative Tract 53425
River Park
SAMPLE LOCATION: BA-8 @ 30 ft.

PROJ. NO.: 03-1571-4 DATE: 4/4/03

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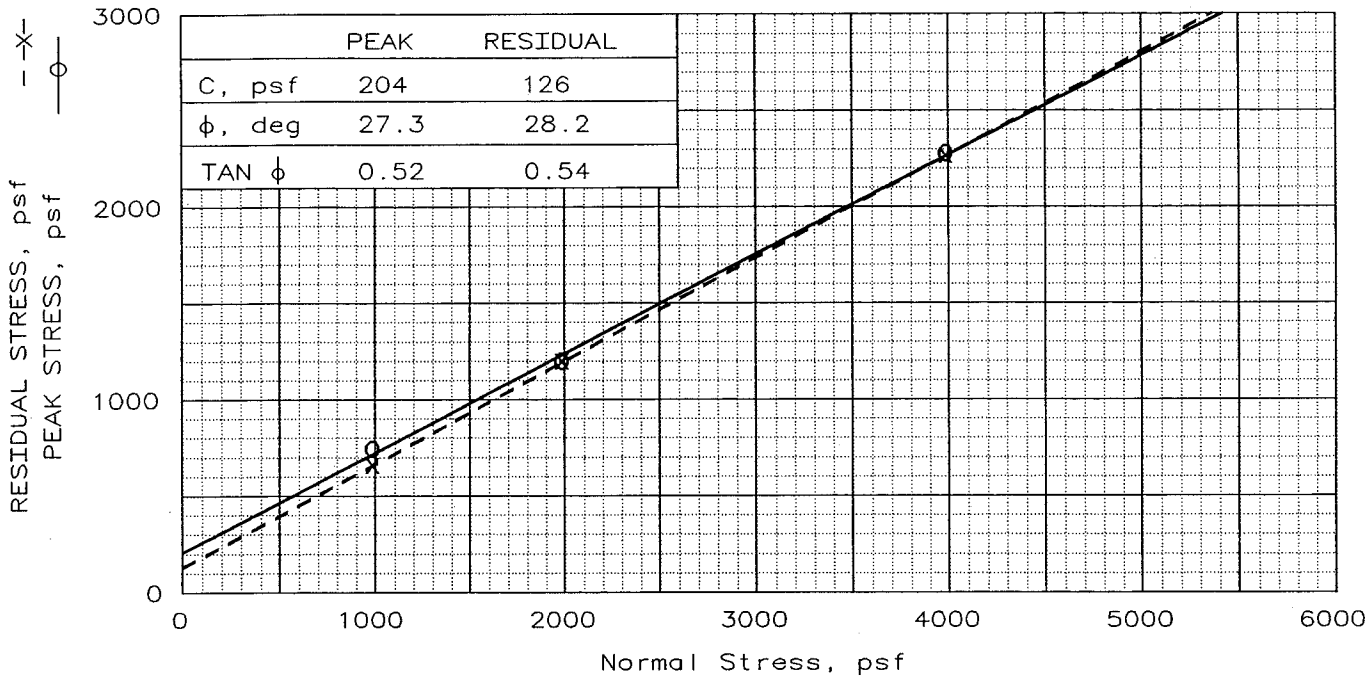

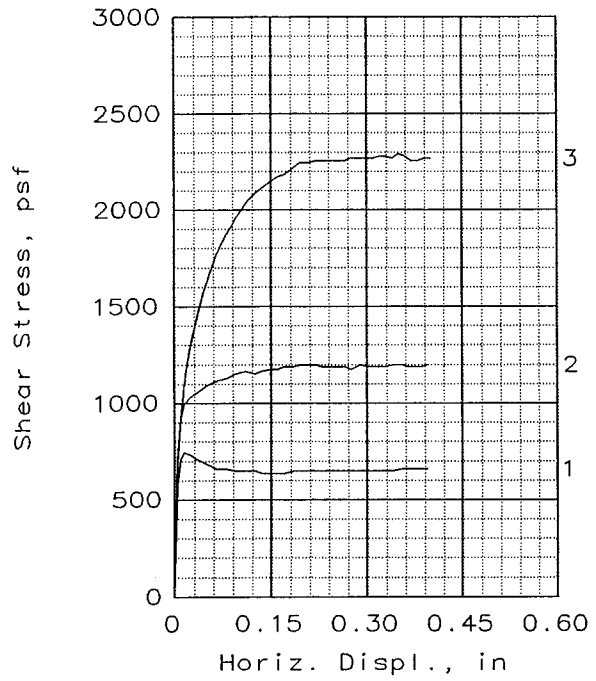

SAMPLE No:		1	2	3
INITIAL	WATER CONTENT, %	10.6	11.2	11.5
	DRY DENSITY, pcf	111.9	111.7	111.5
	SATURATION, %	58.9	61.6	62.9
	VOID RATIO	0.479	0.482	0.484
	DIAMETER, in	2.42	2.42	2.42
	HEIGHT, in	1.00	1.00	1.00
AT TEST	WATER CONTENT, %	17.3	17.1	16.4
	DRY DENSITY, pcf	112.7	113.5	114.9
	SATURATION, %	97.9	99.0	98.8
	VOID RATIO	0.468	0.457	0.440
	DIAMETER, in	2.42	2.42	2.42
	HEIGHT, in	0.99	0.98	0.97
NORMAL STRESS, psf		1000	2000	4000
PEAK STRESS, psf		744	1200	2280
DISPLACEMENT, in		0.02	0.20	0.36
RESIDUAL STRESS, psf		660	1200	2268
DISPLACEMENT, in		0.40	0.40	0.40
Strain rate, in/min		0.0100	0.0100	0.0100

SAMPLE TYPE: 90% Remolded
DESCRIPTION: Silty SAND (SM)

SPECIFIC GRAVITY= 2.65
REMARKS: Compacted Fill
Remold of Qt
% Fines=33

Fig. No.: B5.11

CLIENT: Newhall Land

PROJECT: Tentative Tract 53425
River Park
SAMPLE LOCATION: BA-6 @ 5 ft.

PROJ. NO.: 03-1571-4 DATE: 4/4/03

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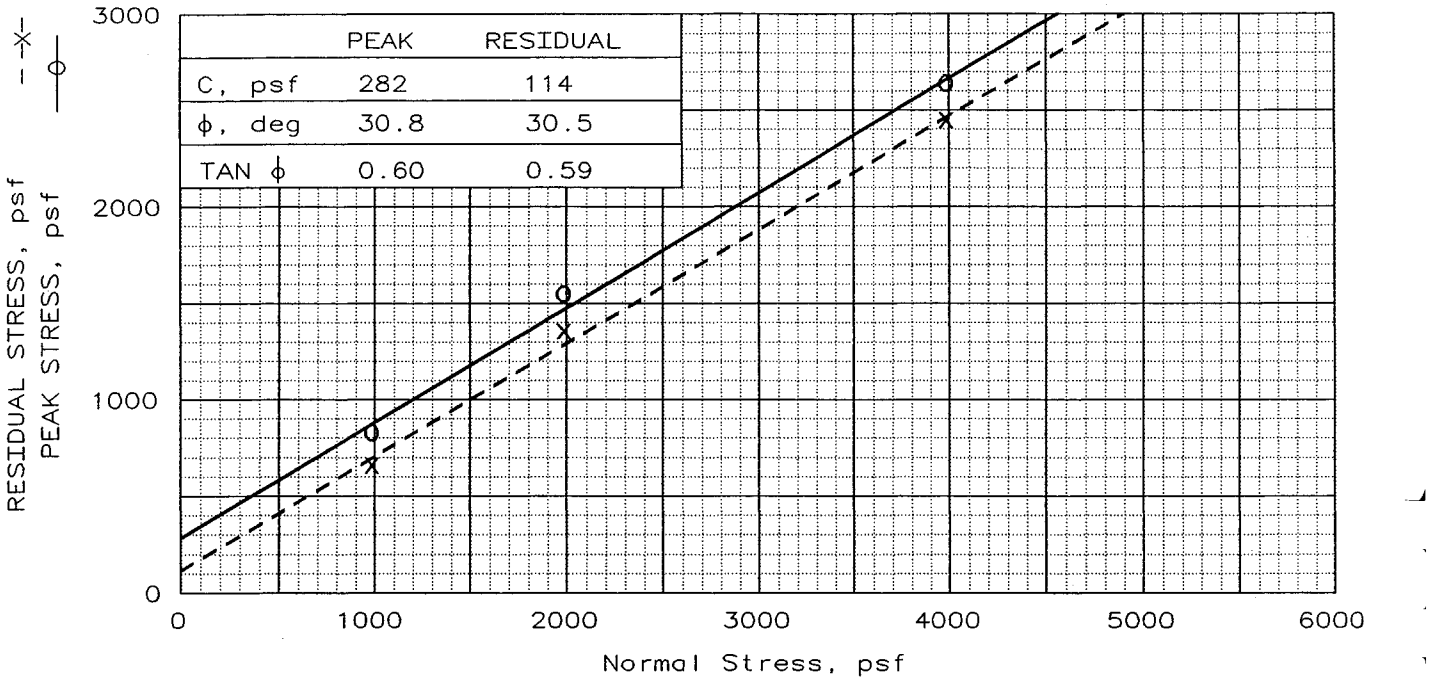

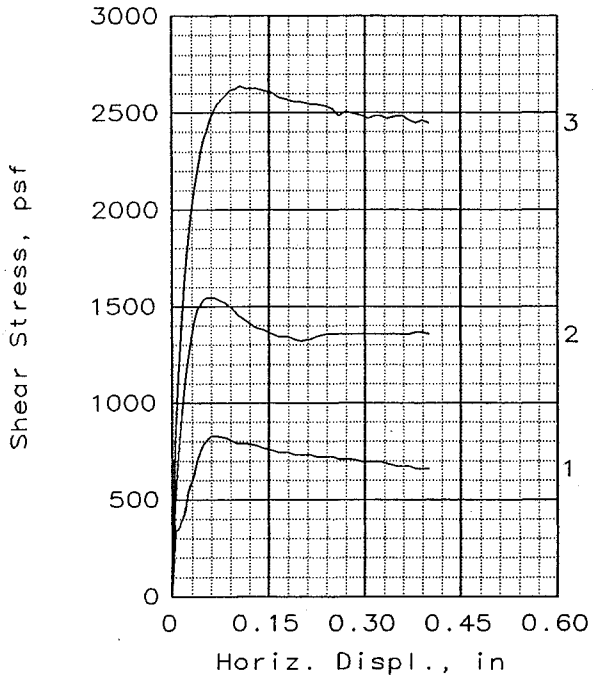

SAMPLE No:		1	2	3
INITIAL	WATER CONTENT, %	9.0	8.6	9.5
	DRY DENSITY, pcf	118.3	118.5	117.9
	SATURATION, %	59.7	57.4	62.3
	VOID RATIO	0.399	0.397	0.403
	DIAMETER, in	2.42	2.42	2.42
	HEIGHT, in	1.00	1.00	1.00
AT TEST	WATER CONTENT, %	18.1	17.0	15.4
	DRY DENSITY, pcf	93.3	97.5	92.2
	SATURATION, %	62.0	64.5	51.4
	VOID RATIO	0.773	0.697	0.794
	DIAMETER, in	2.42	2.42	2.42
	HEIGHT, in	1.27	1.22	1.28
NORMAL STRESS, psf		1000	2000	4000
PEAK STRESS, psf		828	1548	2640
DISPLACEMENT, in		0.06	0.06	0.11
RESIDUAL STRESS, psf		660	1356	2448
DISPLACEMENT, in		0.40	0.40	0.40
Strain rate, in/min		0.0100	0.0100	0.0100

SAMPLE TYPE: 90% Remolded
DESCRIPTION: Silty SAND (SM)

LL= 29 PL= 23 PI= 6
SPECIFIC GRAVITY= 2.65
REMARKS: Compacted Fill
Remold of TQs
% Fines=34

Fig. No.: B5.12

CLIENT: Newhall Land

PROJECT: Tentative Tract 53425
River Park
SAMPLE LOCATION: BA-6 @ 23 ft.

PROJ. NO.: 03-1571-4 DATE: 4/4/03

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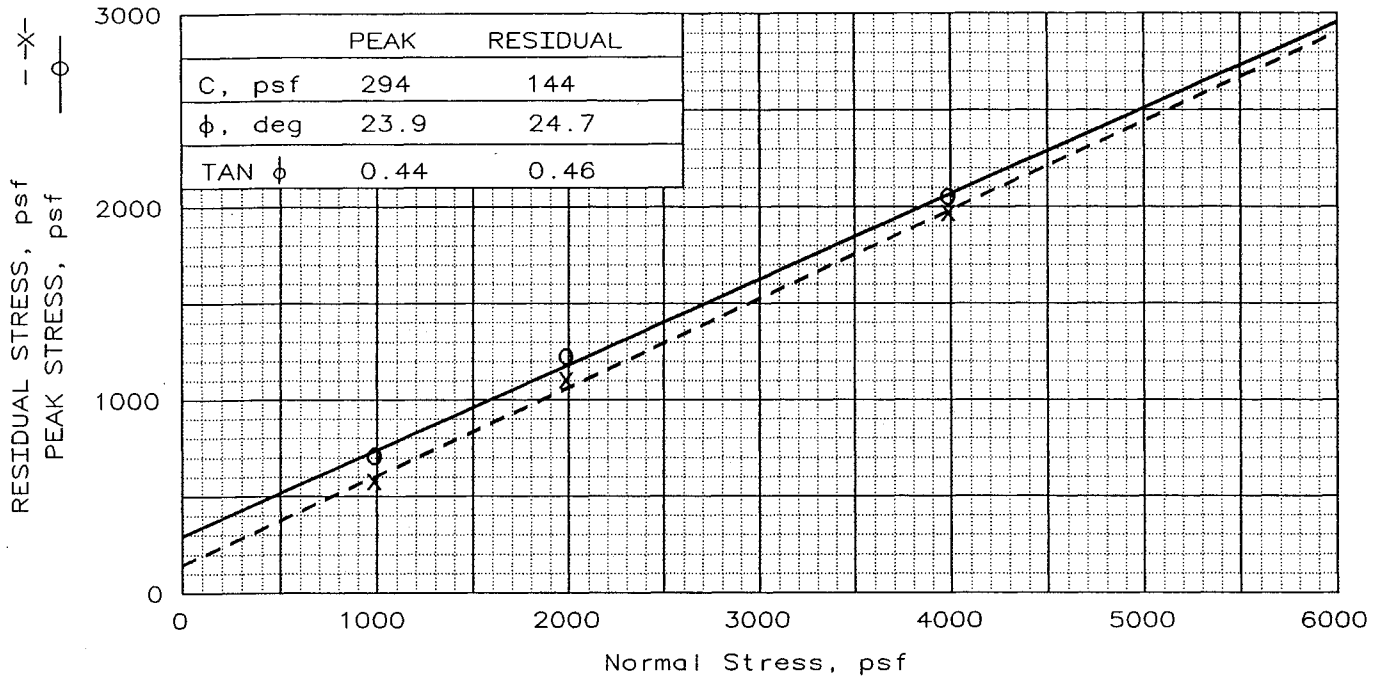

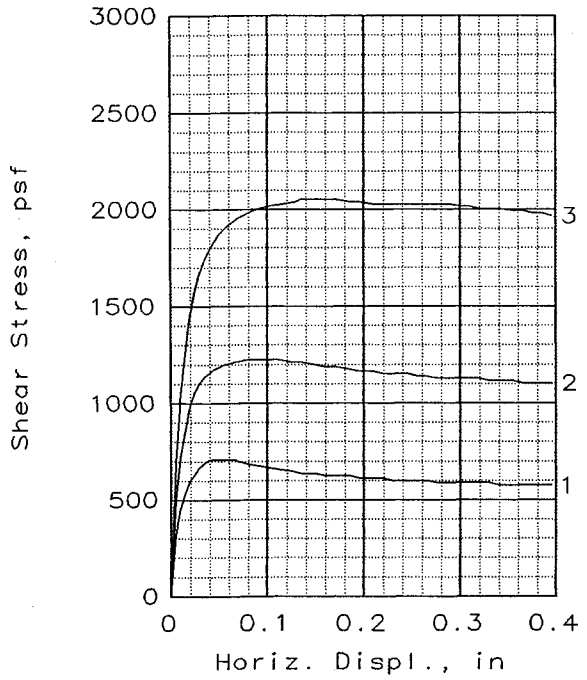

SAMPLE No:		1	2	3
INITIAL	WATER CONTENT, %	13.0	24.5	12.7
	DRY DENSITY, pcf	112.8	101.5	110.2
	SATURATION, %	73.7	103.1	67.1
	VOID RATIO	0.466	0.630	0.501
	DIAMETER, in	2.42	2.42	2.42
	HEIGHT, in	1.00	1.00	1.00
AT TEST	WATER CONTENT, %	22.1	19.9	20.6
	DRY DENSITY, pcf	87.3	80.7	90.9
	SATURATION, %	65.4	50.1	66.5
	VOID RATIO	0.896	1.051	0.820
	DIAMETER, in	2.42	2.42	2.42
	HEIGHT, in	1.29	1.26	1.21
NORMAL STRESS, psf		1000	2000	4000
PEAK STRESS, psf		708	1224	2052
DISPLACEMENT, in		0.04	0.08	0.14
RESIDUAL STRESS, psf		576	1104	1968
DISPLACEMENT, in		0.40	0.40	0.40
Strain rate, in/min		0.0100	0.0100	0.0100

SAMPLE TYPE: 90% Remolded
DESCRIPTION: Sandy lean CLAY (CL)

SPECIFIC GRAVITY= 2.65
REMARKS: Compacted Fill
Remold of TQs
% Fines=70

Fig. No.: B5.13

CLIENT: Newhall Land

PROJECT: Tentative Tract 53425
River Park
SAMPLE LOCATION: BA-6 @ 40 ft.

PROJ. NO.: 03-1571-4 DATE: 4/4/03

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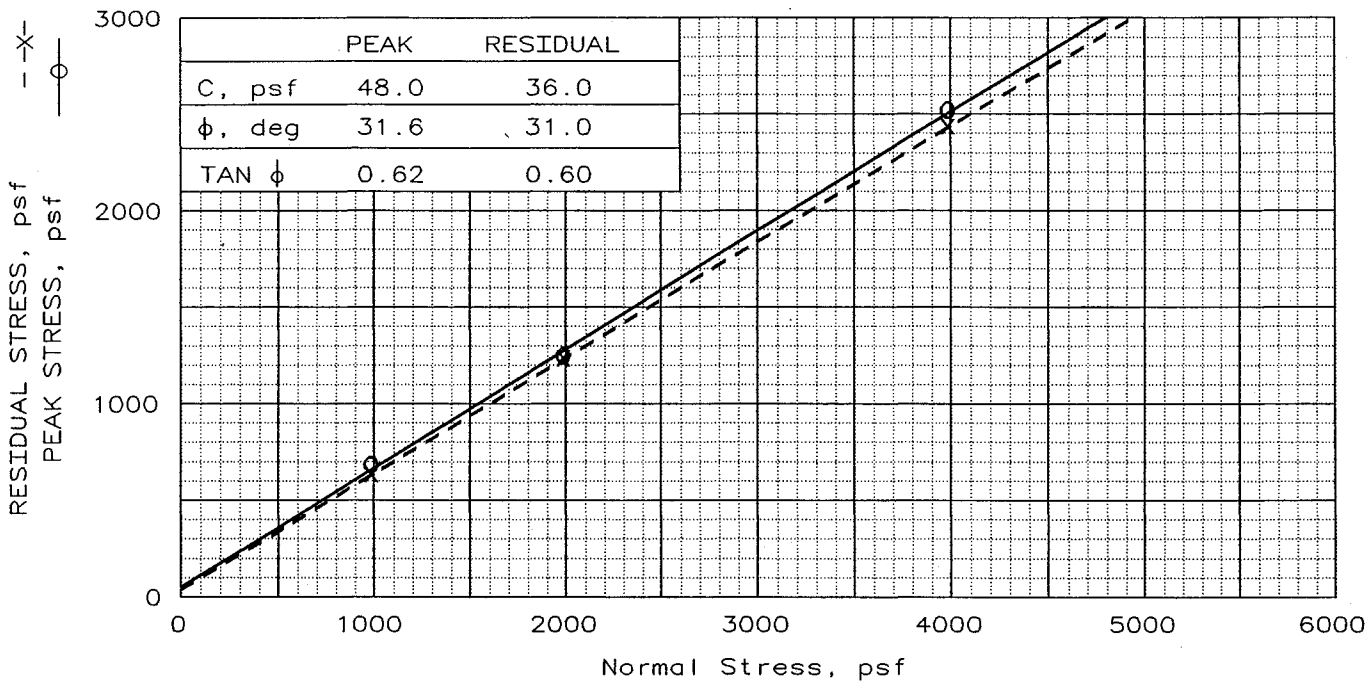

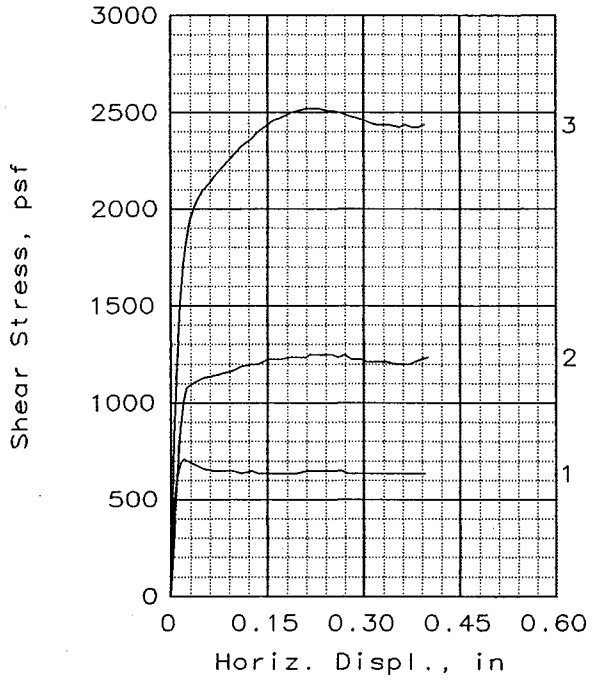

SAMPLE No:		1	2	3
INITIAL	WATER CONTENT, %	8.0	8.0	8.0
	DRY DENSITY, pcf	117.0	117.1	117.1
	SATURATION, %	51.6	51.3	51.5
	VOID RATIO	0.413	0.413	0.413
	DIAMETER, in	2.42	2.42	2.42
	HEIGHT, in	1.00	1.00	1.00
AT TEST	WATER CONTENT, %	15.3	15.0	14.9
	DRY DENSITY, pcf	117.8	118.4	118.5
	SATURATION, %	100.0	99.7	99.5
	VOID RATIO	0.405	0.398	0.396
	DIAMETER, in	2.42	2.42	2.42
	HEIGHT, in	0.99	0.99	0.99
NORMAL STRESS, psf		1000	2000	4000
PEAK STRESS, psf		684	1248	2520
DISPLACEMENT, in		0.04	0.22	0.21
RESIDUAL STRESS, psf		636	1236	2436
DISPLACEMENT, in		0.40	0.40	0.40
Strain rate, in/min		0.0100	0.0100	0.0100

SAMPLE TYPE: 90% Remolded
DESCRIPTION: Silty SAND (SM)

SPECIFIC GRAVITY= 2.65
REMARKS: Compacted Fill
Remold of TQs
% Fines=26

Fig. No.: B5.14

CLIENT: Newhall Land

PROJECT: Tentative Tract 53425
River Park
SAMPLE LOCATION: BA-8 @ 43 ft.

PROJ. NO.: 03-1571-4 DATE: 4/4/03

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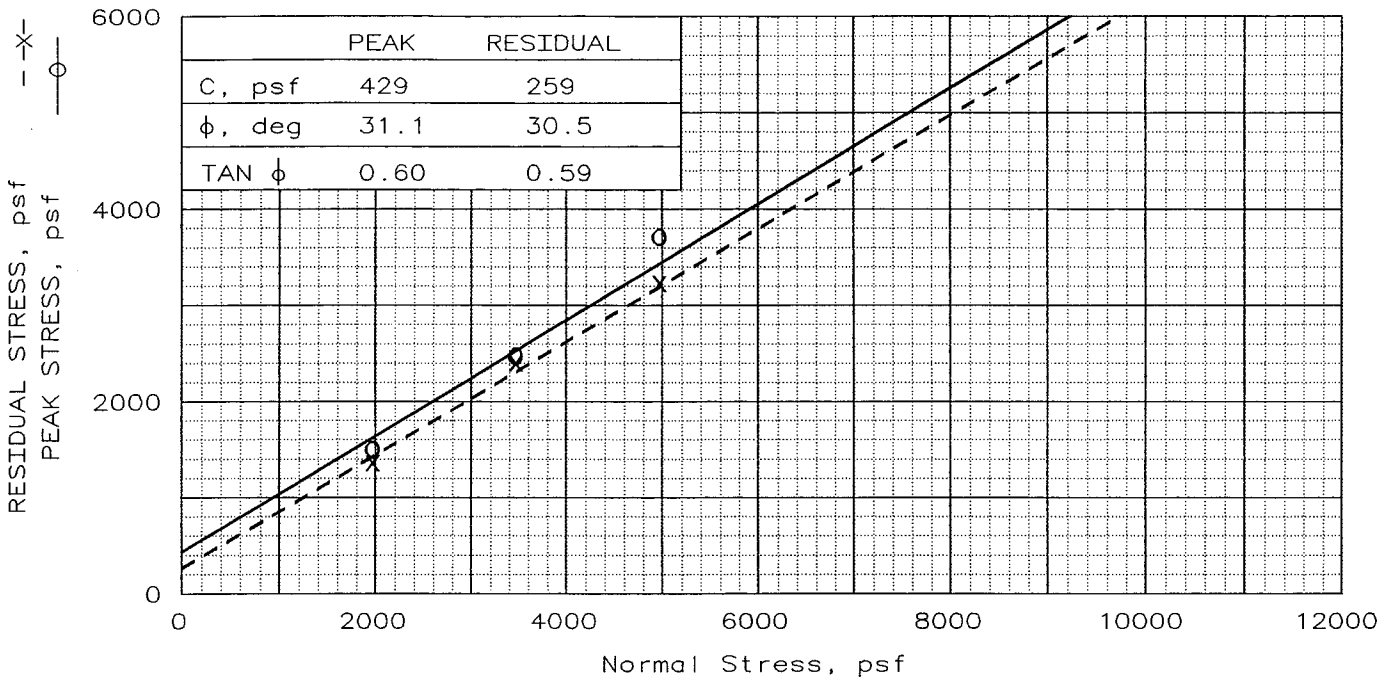

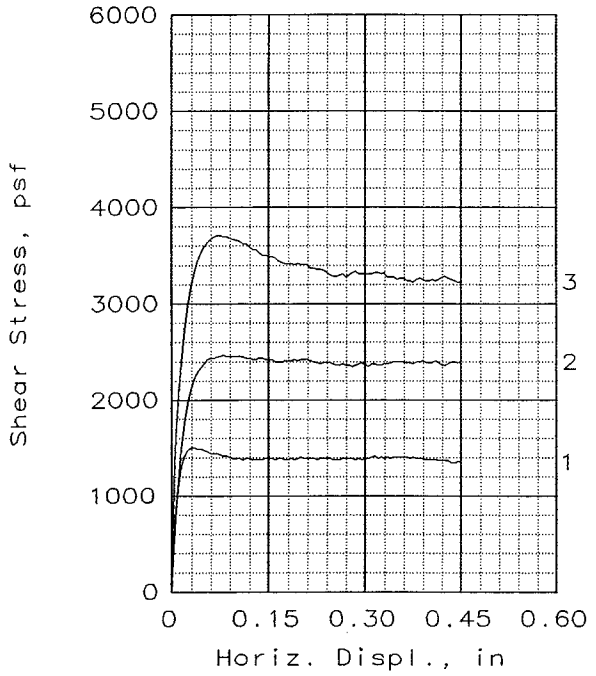

SAMPLE No:		1	2	3
INITIAL	WATER CONTENT, %	10.0	10.1	9.9
	DRY DENSITY, pcf	116.1	116.1	116.1
	SATURATION, %	62.1	63.0	61.7
	VOID RATIO	0.425	0.425	0.425
	DIAMETER, in	2.42	2.42	2.42
	HEIGHT, in	1.00	1.00	1.00
AT TEST	WATER CONTENT, %	15.2	14.9	14.8
	DRY DENSITY, pcf	117.7	118.7	118.7
	SATURATION, %	99.6	100.0	99.9
	VOID RATIO	0.406	0.394	0.394
	DIAMETER, in	2.42	2.42	2.42
	HEIGHT, in	0.99	0.98	0.98
NORMAL STRESS, psf		2000	3500	5000
PEAK STRESS, psf		1500	2472	3708
DISPLACEMENT, in		0.03	0.08	0.07
RESIDUAL STRESS, psf		1356	2400	3228
DISPLACEMENT, in		0.45	0.45	0.45
Strain rate, in/min		0.0100	0.0100	0.0100

SAMPLE TYPE: 90% Remolded
DESCRIPTION: Silty SAND (SM)

SPECIFIC GRAVITY= 2.65
REMARKS: Compacted Fill
Remold of TQs

Fig. No.: B5.15

CLIENT: Castaic Lake Water Agency

PROJECT: CLWA Road Alignment

SAMPLE LOCATION: T-12 & T-28 Mix @ 4 ft.

PROJ. NO.: 99-1571C-1 DATE: June 11, 1999

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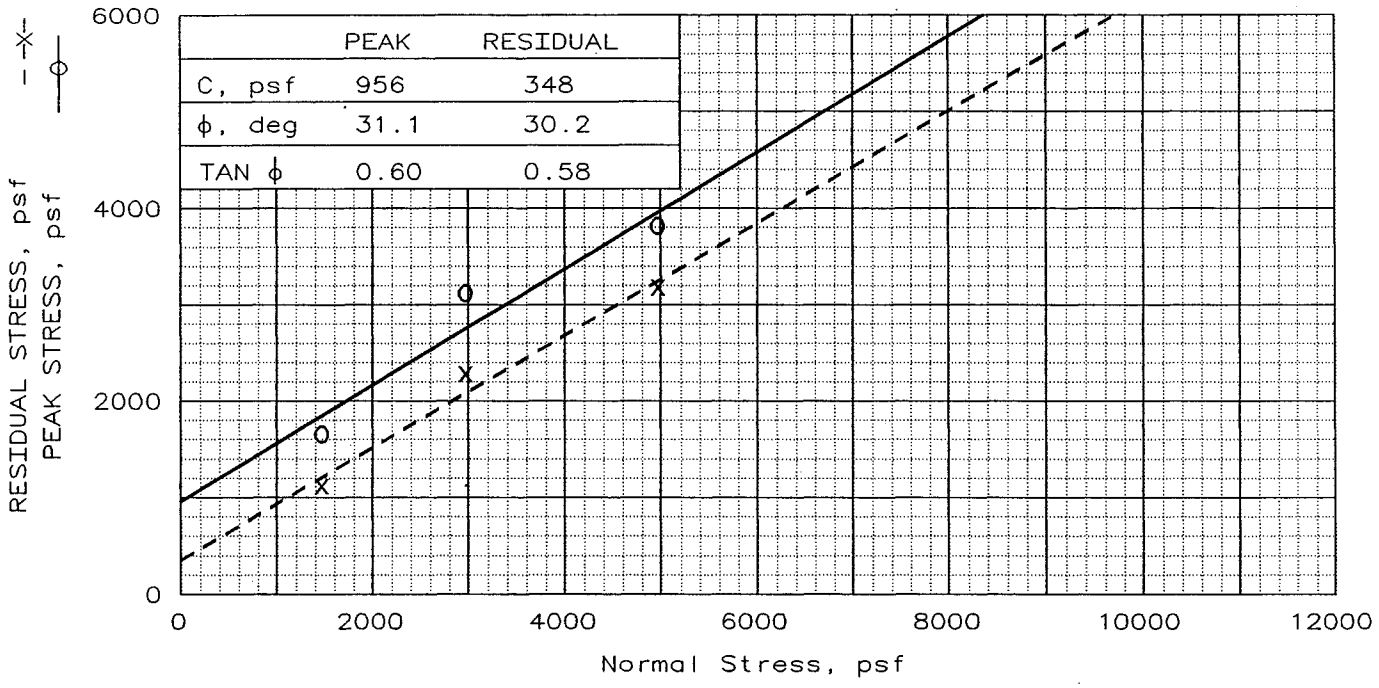

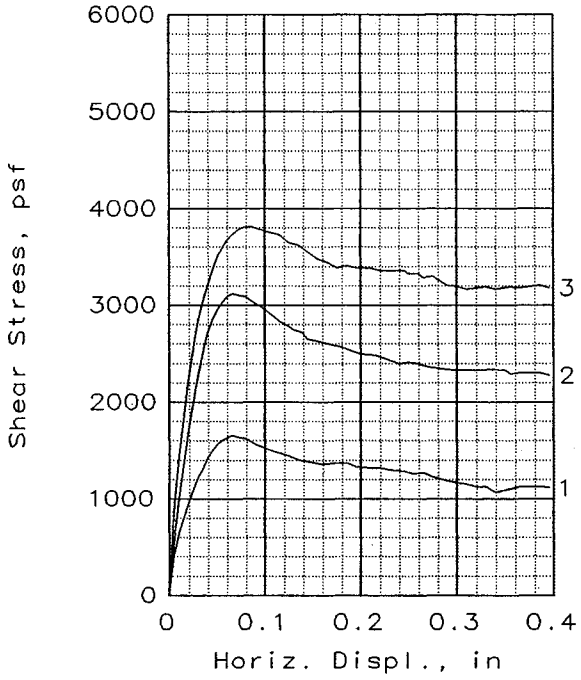

SAMPLE No:		1	2	3
INITIAL	WATER CONTENT, %	4.5	7.1	6.2
	DRY DENSITY, pcf	120.5	122.3	122.7
	SATURATION, %	32.1	53.3	47.4
	VOID RATIO	0.373	0.353	0.348
	DIAMETER, in	2.42	2.42	2.42
	HEIGHT, in	1.00	1.00	1.00
AT TEST	WATER CONTENT, %	13.7	12.3	11.7
	DRY DENSITY, pcf	121.3	123.9	124.6
	SATURATION, %	100.0	96.9	94.9
	VOID RATIO	0.363	0.335	0.327
	DIAMETER, in	2.42	2.42	2.42
	HEIGHT, in	0.99	0.99	0.98
NORMAL STRESS, psf		1500	3000	5000
PEAK STRESS, psf		1656	3120	3816
DISPLACEMENT, in		0.07	0.07	0.09
RESIDUAL STRESS, psf		1116	2280	3180
DISPLACEMENT, in		0.40	0.40	0.40
Strain rate, in/min		0.0100	0.0100	0.0100

SAMPLE TYPE: Undisturbed
DESCRIPTION: Silty SAND (SM)

SPECIFIC GRAVITY= 2.65
REMARKS: Alluvial (Qal)

% Fines=17

Fig. No.: B5.16

CLIENT: Newhall Land

PROJECT: Tentative Tract 53425
River Park
SAMPLE LOCATION: RW-10 @ 12 ft.

PROJ. NO.: 03-1571-4 DATE: 4/4/03

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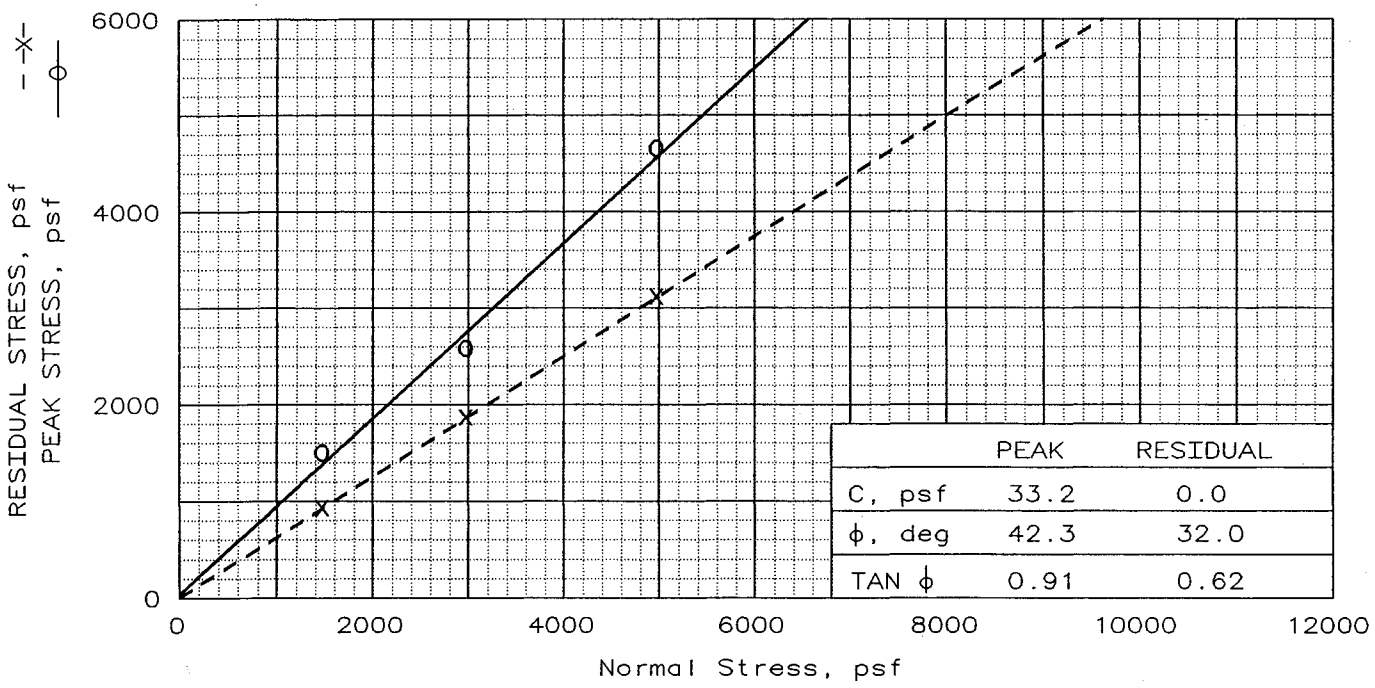

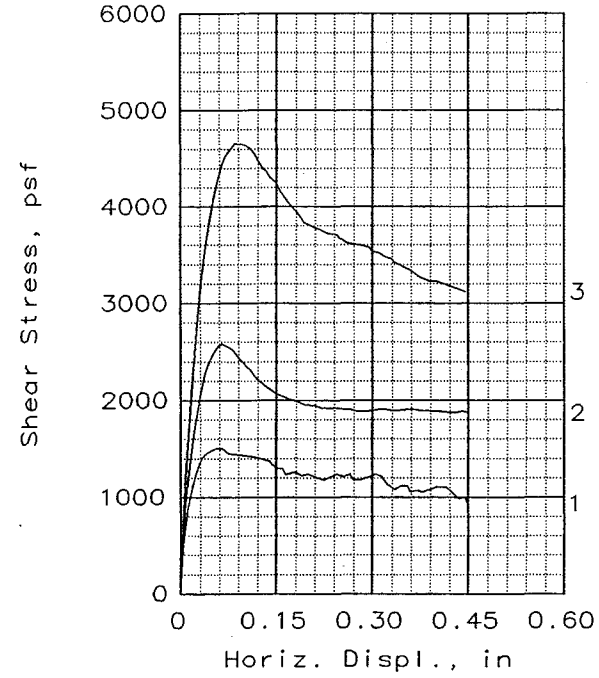

SAMPLE No:		1	2	3
INITIAL	WATER CONTENT, %	8.1	11.7	9.2
	DRY DENSITY, pcf	124.3	115.7	125.4
	SATURATION, %	64.6	71.9	76.0
	VOID RATIO	0.331	0.430	0.319
	DIAMETER, in	2.42	2.42	2.42
	HEIGHT, in	1.00	1.00	1.00
AT TEST	WATER CONTENT, %	11.9	14.8	10.9
	DRY DENSITY, pcf	125.7	118.6	127.9
	SATURATION, %	100.0	99.6	98.9
	VOID RATIO	0.316	0.395	0.293
	DIAMETER, in	2.42	2.42	2.42
	HEIGHT, in	0.99	0.98	0.98
NORMAL STRESS, psf		1500	3000	5000
PEAK STRESS, psf		1500	2580	4656
DISPLACEMENT, in		0.06	0.07	0.09
RESIDUAL STRESS, psf		936	1872	3120
DISPLACEMENT, in		0.45	0.45	0.45
Strain rate, in/min		0.0050	0.0100	0.0100

SAMPLE TYPE: Undisturbed
DESCRIPTION: Poorly graded SAND with silt (SP-SM)

SPECIFIC GRAVITY= 2.65
REMARKS: Terrace deposits (Qt)

Fig. No.: B5.17

CLIENT: Newhall Land

PROJECT: Tentative Tract 53425
River Park
SAMPLE LOCATION: BA-6 @ 4 ft.

PROJ. NO.: 03-1571-4 DATE: 4/4/03

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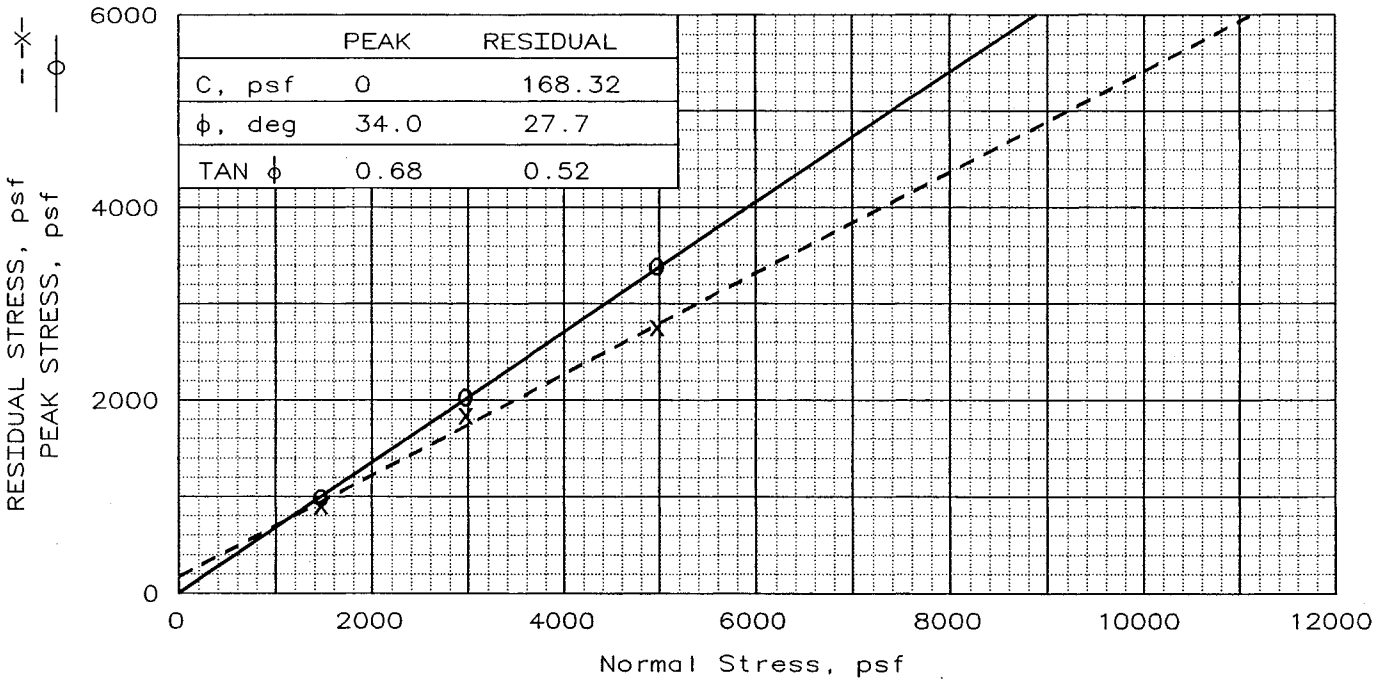

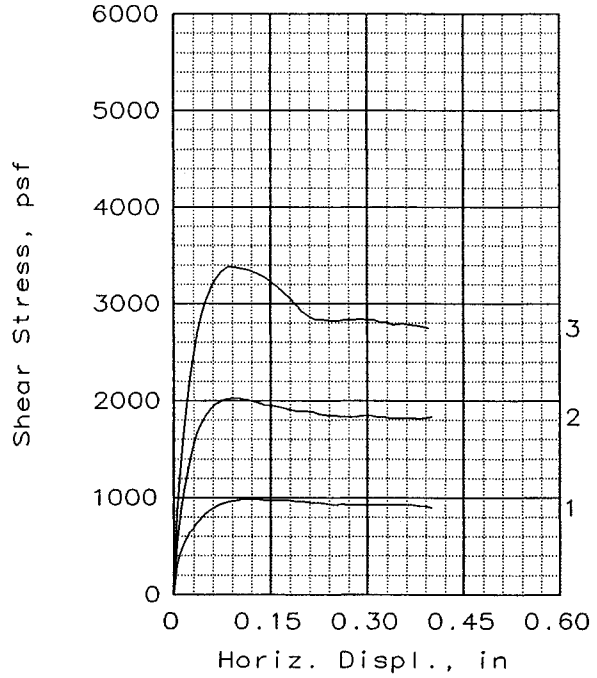

SAMPLE No:		1	2	3
INITIAL	WATER CONTENT, %	4.5	3.6	3.5
	DRY DENSITY, pcf	98.2	105.2	106.5
	SATURATION, %	17.3	16.5	16.8
	VOID RATIO	0.684	0.573	0.554
	DIAMETER, in	2.42	2.42	2.42
	HEIGHT, in	1.00	1.00	1.00
AT TEST	WATER CONTENT, %	19.0	19.2	18.8
	DRY DENSITY, pcf	105.1	108.4	110.4
	SATURATION, %	87.7	96.9	100.0
	VOID RATIO	0.574	0.526	0.499
	DIAMETER, in	2.42	2.42	2.42
	HEIGHT, in	0.93	0.97	0.96
NORMAL STRESS, psf		1500	3000	5000
PEAK STRESS, psf		984	2028	3384
DISPLACEMENT, in		0.11	0.09	0.09
RESIDUAL STRESS, psf		900	1836	2748
DISPLACEMENT, in		0.40	0.40	0.40
Strain rate, in/min		0.0100	0.0100	0.0100

SAMPLE TYPE: Undisturbed
DESCRIPTION: Poorly graded SAND with silt (SP-SM)

SPECIFIC GRAVITY= 2.65
REMARKS: Terrace deposits (Qt)

% Fines=11

Fig. No.: B5.18

CLIENT: Newhall Land

PROJECT: Tentative Tract 53425
River Park
SAMPLE LOCATION: BA-7 @ 8 ft.

PROJ. NO.: 03-1571-4 DATE: 4/4/03

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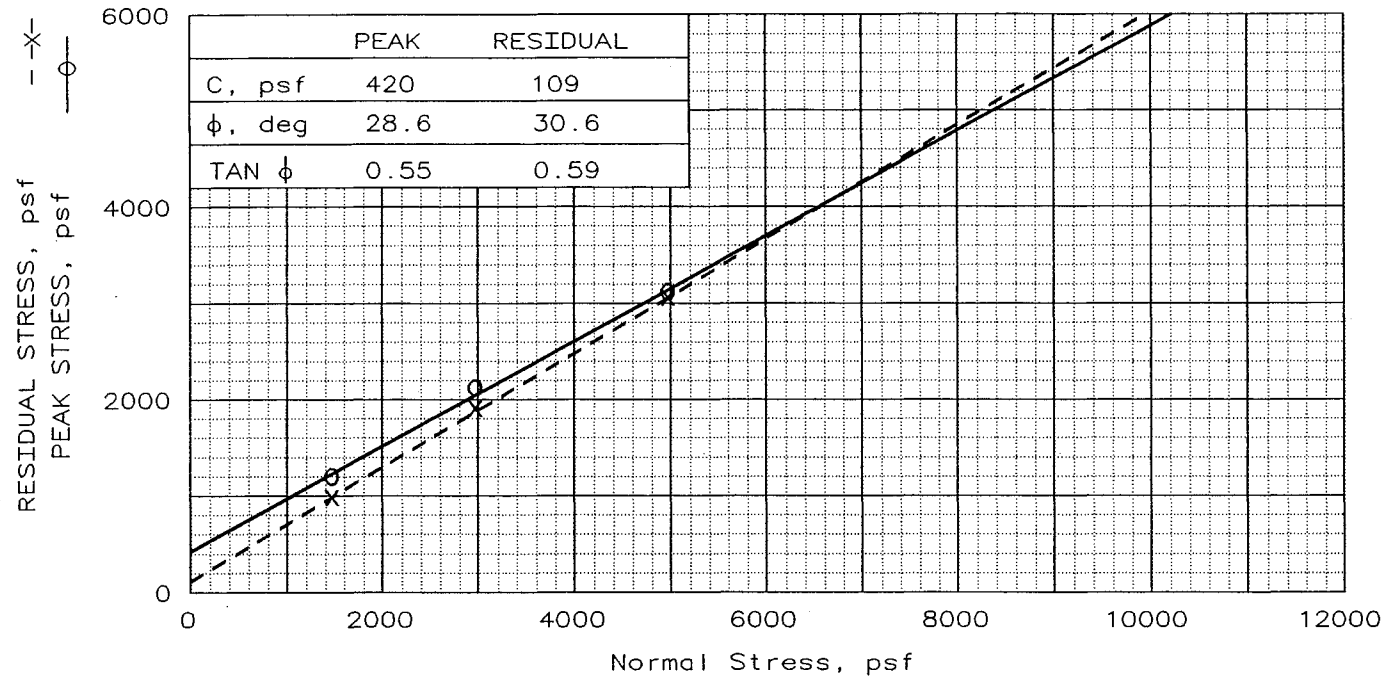

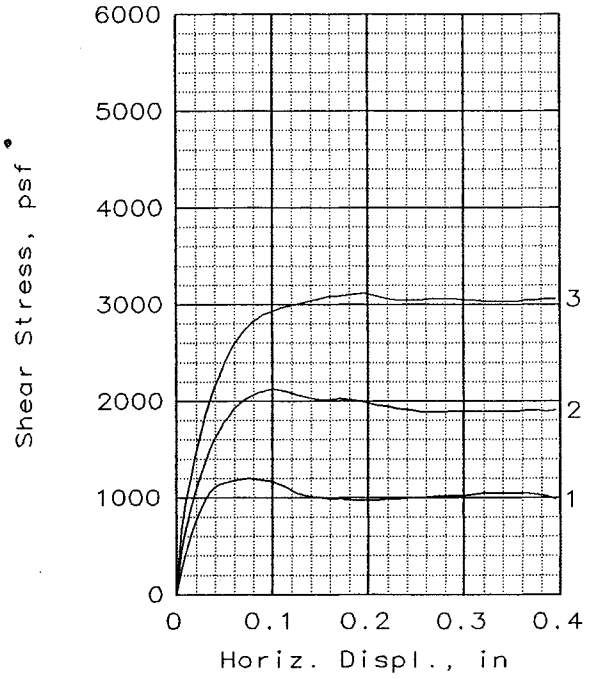

SAMPLE No:		1	2	3
INITIAL	WATER CONTENT, %	7.3	7.6	6.9
	DRY DENSITY, pcf	110.3	107.1	109.6
	SATURATION, %	38.6	37.2	36.1
	VOID RATIO	0.500	0.544	0.510
	DIAMETER, in	2.42	2.42	2.42
	HEIGHT, in	1.00	1.00	1.00
AT TEST	WATER CONTENT, %	12.0	18.5	17.4
	DRY DENSITY, pcf	124.1	110.3	113.2
	SATURATION, %	95.2	98.0	99.7
	VOID RATIO	0.333	0.500	0.462
	DIAMETER, in	2.42	2.42	2.42
	HEIGHT, in	0.89	0.97	0.97
NORMAL STRESS, psf		1500	3000	5000
PEAK STRESS, psf		1200	2124	3120
DISPLACEMENT, in		0.08	0.10	0.20
RESIDUAL STRESS, psf		984	1908	3060
DISPLACEMENT, in		0.40	0.40	0.40
Strain rate, in/min		0.0100	0.0100	0.0100

SAMPLE TYPE: Undisturbed
DESCRIPTION: Silty SAND (SM)

SPECIFIC GRAVITY= 2.65
REMARKS: Terrace deposits (Qt)

Fig. No.: B5.19

CLIENT: Newhall Land

PROJECT: Tentative Tract 53425
River Park
SAMPLE LOCATION: BA-8 @ 4 ft.

PROJ. NO.: 03-1571-4 DATE: 4/4/03

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Appendix C

APPENDIX C

LIQUEFACTION POTENTIAL ASSESSMENT AND EVALUATION OF EARTHQUAKE-INDUCED SETTLEMENTS

1.0 INTRODUCTION

We have completed our liquefaction and cyclic settlements evaluations of the subject property. The results of these evaluations affected the removals and recompaction recommended for the project. Thus, the recommended removal depths are based, in part, on upper non-liquefiable soil layers (including proposed fills to be placed above the existing ground surface), and/or cyclic settlements, or blow-count data from CPTs and borings (i.e. weak soils). The need for removals to mitigate static behavior of existing soils is evaluated in the main text of this report.

The combination of the removal, any existing non-liquefiable layer immediately beneath the removal, and the additional fill (as applicable) provided an ultimate cap of non-liquefiable soils at each location analyzed. These caps are sufficient (or much more than adequate at locations of proposed high fills) to mitigate liquefaction at these locations and to attenuate any effects from cyclic settlements remaining at depth.

2.0 DATA AND ASSUMPTIONS

Based on the probabilistic seismic hazard analyses (PSHA) presented in **Appendix D** of this report, a design basis earthquake (DBE) magnitude of 6.50 generating an estimated peak horizontal ground acceleration of 0.71g, and a horizontal acceleration of 0.49g corresponding to an earthquake with a weighted magnitude of 7.5 were used for the liquefaction and earthquake-induced settlement analyses.

Basic information included soil types, existing ground water levels and blow counts obtained from field data. These data are plotted versus depth on **Figures C1** through **C37, graphs (a)** and **(b)**.

For analysis, in the absence of well data, a conservative historic high ground water depth of 5 feet was used, except for a water depth of 12 feet for CPT-6.

Seed et al. (1984) presents design curves based on field performance during earthquakes (cases where evidence of liquefaction has been observed), which provides a higher level of confidence in the analyses results. These curves distinctly separate liquefiable and non-

liquefiable soil conditions. Therefore, liquefiable zones in this analysis are based upon the premise that liquefaction potential exists if the cyclic resistance ratio (CRR) against liquefaction is less than the earthquake-induced cyclic stress ratio; this is to say, a stress ratio factor of safety less than unity. The earthquake-induced settlement analysis also considers zones that may settle somewhat even though the factor of safety may be greater than one (i.e. a non-liquefaction condition).

3.0 CORRELATIONS BETWEEN CPTs AND BORINGS

During our investigations, we excavated 10 rotary-wash (RW) borings next to CPT soundings to verify the soil parameters interpreted from the CPTs. Based on the field data, in general, blow counts and percent fines from the CPTs generally correlate well with data from the borings. This is shown in **Table C1**. However, blow count data from CPT-11 are liberal to 15 feet, and are conservative below 15 feet. In CPT-10, the percent fines are somewhat overestimated (liberal) to 30 feet and are estimated conservatively below this depth. In CPT-19 the percent fines are estimated conservatively to 40 feet and liberally below 40 feet (to 50 feet).

The generally good correlation shown in **Table C1** provides an adequate level of confidence in CPT data enhanced with the fact that the CPTs are continuous and sample disturbance is less. Furthermore, soil intervals of conservative data are typically thicker (see **Table C1**) which is expected to more than adequately compensate the effects in the analyses from liberal data. Also, at the locations of CPT-10, CPT-11 and CPT-19, proposed fills (above existing ground surface) and the ultimate non-liquefiable caps are significant (greater than 20-foot fills and thicker than 48-foot caps. See **Table C2**).

4.0 ASSESSMENT OF LIQUEFACTION POTENTIAL

4.1 Method of Analysis

Liquefaction is a phenomenon whereby a saturated granular soil temporarily loses its strength because of the buildup of pore water pressure during seismic excitation. This loss of strength may cause structures founded on these soils to experience subsidence and/or lateral movement due to earthquakes.

Liquefaction potential analyses are performed by a method proposed by Seed, et al. (1984) as mentioned in Section 2 above. Some data provided by the liquefaction

analyses are used for the evaluation of earthquake-induced settlements. Per Seed's method, the earthquake-induced stresses at any depth are estimated and compared with empirically based stresses (strength) for sites where liquefaction has occurred.

The calculation of available cyclic resistance ratios versus expected (seismically induced) cyclic shear stress ratios is based on existing soil data from CPTs, such as effective overburden pressure, blow count and percent fines. Corrected SPT blow count data are utilized to determine the strength/overburden pressure ratio for 7 ½ magnitude earthquakes. Correction of blow count for normalized overburden pressure is provided by Liao and Whitman (1986) by the equation C_n =SQRT(1/σ'_o), where σ'_o = effective overburden pressure in TSF. Based on data by Liao and Whitman, we interpret a maximum value of C_n of 2 and a minimum of 0.5. The formula for the corrected SPT "N" is: $N_1=C_nN$.

Correction for fines is provided following procedures of Youd & Idriss (NCEER, 1997). This correction provides equivalent blow count data for clean sand, which is ultimately used to assess strength against liquefaction.

The earthquake-induced horizontal stress is calculated per the following equation by Seed (1984):

Earthquake-induced stress = τ_{av} =0.65 (a_{max}/g) σ_o r_d

Where a_{max}/g= ratio of peak ground acceleration and acceleration of gravity.
σ_o =Total overburden pressure
r_d = stress reduction factor to account for soil deformability

Theoretical factors of safety against liquefaction are calculated using corrected blow count data per Youd and Idriss (NCEER, 1997).

4.2 Results of Liquefaction Potential Assessment

Results of computerized calculations for the assessment of liquefaction potential are presented in the attached, **Figures C1 through C37, graphs (a), (b) and (c).**

APPENDIX C

5.0 ESTIMATION OF EARTHQUAKE-INDUCED SETTLEMENTS

5.1 Method of Analysis

Earthquake-induced settlements were estimated using procedures presented by Tokimatsu and Seed (1987) for dry/moist soils (above the water table) and saturated sands. Settlement analyses were performed for the same location analyzed for liquefaction potential to estimate the possible range of settlements to be expected at the project site.

Volumetric strains for soils above the water table were estimated using blow count data and cyclic shear strain. **The volumetric strain was then doubled to account for multidirectional effects** (the volumetric strain data were originally obtained from one-dimensional laboratory testing). Seismic settlement was obtained by multiplying the thickness of the soil layer by the calculated volumetric strain.

Blow counts used in the settlement calculations above the water table were not corrected for fines content (but were corrected for other factors addressed in the liquefaction potential assessment). Although the referenced procedure applies to both silty and clean sands, the use of the blow counts without corrections for fines content produces more conservative results.

Seismic settlements for saturated sands were estimated using blow count data corrected for fines content (i.e. blow counts for equivalent clean sand were used) and other factors used for liquefaction analyses. The referenced procedure applies only to saturated clean sands.

Volumetric strain for saturated sands was estimated using the calculated earthquake-induced cyclic shear stress and corrected blow count. The seismic settlement was obtained by multiplying the thickness of the liquefied soil layer by the volumetric strain. The volumetric strain obtained from the design chart for saturated sands includes the multidirectional effect.

5.2 Results of Earthquake-Induced Settlement Analysis

The results of computerized cyclic settlement analyses are presented in **Figures C1** through **C37, graphs (d)**, and summarized in **Table C2**. Actual seismic settlements are expected to be less due to built-in conservatism in the procedures. A maximum

cumulative total settlement of 2.14 inches has been estimated at the location of CPT-10, but approximately 92 percent (24/26) of the analyses in the proposed development show total cyclic settlements less than 1.0 inches. After a removal of 23 feet, the total settlement is reduced to 1.72 inches and the maximum differential settlement is 1.15 inches at CPT-10 location. At this location, a proposed fill height of 36 feet coupled with the removal and recompaction of 23 feet and the existing non-liquefiable soils beneath the removal will result in a **cap of non-liquefiable soils of 61 feet** which will readily attenuate any potential effects from this localized differential settlement (1.15 inches).

Similarly, at the CPT-13 location (**Table C2**), the potential effect from a maximum differential settlement of 1.04 inch (after a removal of 12 feet) will readily be attenuated by the proposed additional 7 feet of fill and a resulting **cap of non-liquefiable soils of 27 feet**. At the remaining CPT's locations the estimated maximum differential settlement is less than 0.60 inch which will be attenuated by a minimum thickness of non-liquefiable soils of 30 feet.

6.0 CONCLUSIONS

The results of the liquefaction assessment indicated that some liquefaction-prone zones exist in the alluvium on site, provided ground water rises to within the upper 5 feet below the existing ground surface. Recommended removals and recompaction will partly eliminate liquefiable zones at some locations.

Certified compacted fill used to replace proposed removals shown in the **Geologic/Geotechnical Map**, existing non-liquefiable soils immediately beneath the removals, and additional proposed fills above existing grade, will result in substantial caps (see **Table C2**) which are anticipated to mitigate any probability of surface manifestation and attenuate/mitigate effects from cyclic settlements due to soil replacement and/or expected bridging effects.

Based upon analytical procedures set forth by Bartlett & Youd (1995), **no lateral spreading** due to liquefaction is expected at this site for the following reasons:

- Alluvial subsurface soils are essentially horizontally layered.
- There is not a free-face toward which liquefied soils could move, and for the "ground surface condition" (Bartlett & Youd), granular soils with $N1_{(60)}$ less than 15 in the

liquefaction-prone zones are few, isolated and thin (cumulative thickness <1m at applicable locations).

- It should be noted that the cyclic settlement calculations include multi-directional effects in the volumetric strains. Proposed removals and recompaction and additional fills will provide caps which will attenuate the effects of strains at depth.

7.0 RECOMMENDATIONS

Owing to the typically low magnitude of estimated conservative earthquake-induced differential settlements, and the proposed recompacted layers and additional fills resulting in significantly thick caps of non-liquefiable soils (see **Table C1**), special measures to further mitigate these settlements are considered to be unnecessary.

The following attachments are located within the Appendix.

References
Correlations Between Field Data from Adjacent CPTs and Borings — Table C1
Summary of Cyclic Settlement Analyses and Removals
(Based on CPT and RW Data) — Table C2
Graphs of the Assessment of Liquefaction Potential and Earthquake-Induced
Settlements: CPT-1 through CPT-37 — Figures C-1 thru C-37

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REFERENCES

Bartlett, S.F., and Youd, T.L., "Empirical prediction of liquefaction – induced lateral spread", Journal of Geotechnical Engineering, Vol. 121, No. 4, April 1995

California Division of Mines and Geology, Special Publication 117, "Guidelines for Evaluating and Mitigating Seismic Hazards in California", adopted by the State on March 13, 1997.

Douglas, B.J., and Olsen, R.S., "Soil classification using Electric Cone Penetrometer", ASCE Special Technical Publication, ST. Louis, Missouri, October, 1981.

Douglas, B.J., Olsen, R.S., and Martin, G.R., "Evaluation of the Cone Penetrometer Test for use in SPT--Liquefaction Potential Assessment," ASCE Preprint Volume No. 81-544, St. Louis, Missouri, October 1981.

Fear and McRoberts, "Reconsideration of initiation of liquefaction in sandy soils", ASCE Geotechnical Journal, March 1995.

Housner, G.W., Chairman of Committee on Earthquake Engineering, Book, "Liquefaction of soils during earthquakes", p. 110-114, National Academy Press, 1985.

Ishihara, K., "Soil Behaviour in Earthquake Geotechnics", Clarendon Press, Oxford, 1996.

Ishihara, K., "Stability of natural deposits during earthquakes", Proceedings of the Eleventh International Conference on Soil Mechanics and Foundation Engineering, A.A. Balkema Publishers, Rotterdame, Netherlands, 1985

Liao, S.S.C., and Whitman, R.V., "Overburden correction factors for SPT in sand", Journal of Geotechnical Engineering, Vol. 112, No. 3, March 1986.

Pradel, D., "Procedure to evaluate earthquake-induced settlements in dry sandy soils," Journal of Geotechnical and Geoenvironmental Engineering, ASCE, Vol. 124, No. 4, April 1998.

Proprietary charts for correction of blow-count by sampler type to N-SPT

Robertson, P.K., and Fear, C.E., "Soil liquefaction and its evaluation based on SPT and CPT" Liquefaction Workshop, University of Alberta, January 1996.

Robertson, P.K., and Fear, C.E., "Liquefaction of sands and its evaluation", First International Conference and Earthquake Geotechnical Engineering, 1995.

Robertson, P.K., and Campanella, R.G., "Guidelines for Geotechnical Design using the Cone Penetrometer Test and CPT with Pore Pressure Measurement", University of Alberta and University of British Columbia, 4th edition, 1989.

Seed, H.B., "Design problems in soil liquefaction," Report No. UCB/EERC-86/02, February, 1986

Seed, H.B., Tokimatsu, K., Harder, L.F., and Chung, R.M., "The influence of SPT procedures in soil liquefaction resistance evaluations", Earthquake Engineering Research Center Report No. 84/15, University of California, Berkeley, 1984.

APPENDIX C

REFERENCES

Seed, H.B., Idriss, I.M., and Arango, I., "Evaluation of liquefaction potential using field performance data", Journal of Geotechnical Engineering, Vol. 109, No.3, March 1983.

Seed, H.B. and Idriss, I.M., "Ground motions and soil liquefaction during earthquakes", 1982, Monograph, Earthquake Engineering Research Institute.

Seed, H.B. and Idriss, I.M., "A simplified procedure for evaluating soil liquefaction potential", EERC 70-9, Nov. 1970.

Tokimatsu, K., Seed, H.B., "Evaluation of settlements in sands due to earthquake shaking", Journal of Geotechnical Engineering, Vol. 113, No. 8, August, 1987.

University of Southern California (USC), Southern California Earthquake Center, Workshop on "Recommended Procedures for Implementation of DMG Special Publication 117, Guidelines for Analyzing and Mitigating Liquefaction in California", USC, Los Angeles, California, June 17, 1999.

Youd, T.L. and Idriss, I.M., "Proceedings of the NCEER Workshop on Evaluation of Liquefaction Resistance of Soils", Technical Report NCEER-97-0022, December, 1997.

Youd, T. Leslie, Hanson, Corbett M. and Bartlett, Steven F. "Revised MLR Equations for Predicting Lateral Spread Displacement", Notes & Handout, ASCE Los Angeles Section Seminar, July, 1999.

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CORRELATIONS BETWEEN FIELD DATA FROM ADJACENT CPTs AND BORINGS

CPT - vs. Boring		CORRELATION	
		CPT Blow Count (N)	CPT % Fines
CPT - 3	RW - 8	Good	Good
CPT - 10	RW - 3	Good	Liberal (to 30')
CPT - 11	RW - 5	Liberal (to 15') Conservative (below 15')	Good
CPT - 13	RW - 6	Good	Good
CPT - 14	RW - 7	Good	Good
CPT - 17	RW - 2	Good	Good
CPT - 19	RW - 4	Good	Liberal (40' – 50')
CPT - 24	RW - 1	Good	Good
CPT - 32b	RW - 9	Good	Good
CPT - 33	RW - 10	Good	Good

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SUMMARY OF CYCLIC SETTLEMENT ANALYSES AND REMOVALS (BASED ON CPT and RW DATA)

Analyzed Location	Ground Surface Elevation (MSL) (Ft)	Depth to Existing Ground Water (Ft)	Depth to Historic High Ground Water (Ft)	Estimated Total Cyclic Settlement [a] (Prior to removal and recompaction) (Inch)	Proposed Fill Height (Ft)	Estimated Required Removal Depth [b] (Ft)	Estimated Total Cyclic Settlement (After removal and recompaction) (Inch)	Estimated Differential Cyclic Settlement [c] (After removal and recompaction) (Inch)	Ultimate Non-Liquefiable Cap (Removal and New Fill Included) (Ft)
CPT-1	1212	19.0	5.0	0.48	No Grading	-	-	-	-
CPT-2	1212	19.0	5.0	0.25	No Grading	-	-	-	-
CPT-3	1203	15.5	5.0	1.01	No Grading	-	-	-	-
CPT-4	1196	11.0	5.0	0.01	No Grading	-	-	-	-
CPT-5	1195	11.0	5.0	0.00	5	9	-	-	47
CPT-6	1224	35.0	12.0	0.39	36	17	0.30	0.20	57
CPT-7	1210	25.0	5.0	0.54	40	16	0.29	.019	68
CPT-8	1198	11.0	5.0	0.36	30	10	0.36	0.24	52
CPT-9	1196	15.5	5.0	0.99	-2 (cut)	10	0.98	0.66	18
CPT-10	1194	25.0	5.0	2.14	31	23	1.72	1.15	61
CPT-11	1186	25.2	5.0	0.27	39	11	0.27	.018	76
CPT-12	1194	27.9	5.0	0.20	25	9	0.20	0.13	63
CPT-13	1177	20.8	5.0	1.56	8	12	1.55	1.04	27
CPT-14	1188	15.2	5.0	0.65	37	10	0.65	0.43	52
CPT-15	1185	15.3	5.0	0.77	22	8	0.77	0.52	41
CPT-16	1188	14.4	5.0	0.79	25	5	0.79	0.53	42.5
CPT-17	1192	14.6	5.0	0.27	27	17	0.22	0.15	49
CPT-18	1194	15.4	5.0	0.21	0	9	0.21	0.14	34
CPT-19	1193	16.0	5.0	0.18	23	8	0.18	0.12	48
CPT-20	1195	14.9	5.0	1.18	13	15	0.90	0.60	39
CPT-21	1195	11.5	5.0	0.24	15	7	0.24	0.16	31
CPT-22	1199	13.5	5.0	0.41	16.5	7	0.41	0.28	30

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Analyzed Location	Ground Surface Elevation (MSL) (Ft)	Depth to Existing Ground Water (Ft)	Depth to Historic High Ground Water (Ft)	Estimated Total Cyclic Settlement [a] (Prior to Removal and Recompaction) (Inch)	Proposed Fill Height (Ft)	Estimated Required Removal Depth [b] (Ft)	Estimated Total Cyclic Settlement (After Removal and Recompaction) (Inch)	Estimated Differential Cyclic Settlement [c] (After Removal and Recompaction) (Inch)	Ultimate Non-Liquefiable Cap (Removal and New Fill Included) (Ft)
CPT-23	1206	17.5	5.0	0.27	18	8	0.26	0.17	30
CPT-24	1205	15.4	5.0	0.55	15	3	0.55	0.37	31
CPT-25	1208	12.4	5.0	0.36	18	8	0.30	0.20	55
CPT-26	1176	25.0	5.0	0.28	4	11	0.28	0.19	31
CPT-27	1210	15.0	5.0	0.98	19	14	0.87	0.58	32.5
CPT-28	1209	15.5	5.0	0.89	20	5	0.89	0.60	32
CPT-29	1210	14.4	5.0	0.79	10	-	-	-	No Development
CPT-30	1214	>20.0	5.0	0.00	0-16	-	-	-	No Development
CPT-31A	1261	32	5.0	0.02	19	15	0.00	-	50
CPT-32B	1270	32	5.0	1.29	40	18	0.79	0.53	61
CPT-33	1266	34	5.0	0.37	No Grading	-	-	-	-
CPT-34A	1278	34	5.0	0.63	-	-	-	-	-
CPT-35A	1282	55	5.0	0.12	-	-	-	-	-
CPT-36	1294	36	5.0	0.01	-	-	-	-	-
CPT-37	1304	37	5.0	0.07	-	-	-	-	-

a. Estimated total cyclic settlements based on seismic analysis.

b. Estimated removal depths are based on required (per Ishihara) upper non-liquefiable soil layers (including new fill), and/or cyclic settlements or adjacent borings or CPT blow count.

c. Based on CDMG Special Publication 117 and Los Angeles County-adopted Recommended Procedures for Implementation of CDMG Special Publication 117.

APPENDIX C

LIQUEFACTION POTENTIAL ASSESSMENT AND EVALUATION OF EARTHQUAKE-INDUCED SETTLEMENTS

1.0 INTRODUCTION

We have completed our liquefaction and cyclic settlements evaluations of the subject property. The results of these evaluations affected the removals and recompaction recommended for the project. Thus, the recommended removal depths are based, in part, on upper non-liquefiable soil layers (including proposed fills to be placed above the existing ground surface), and/or cyclic settlements, or blow-count data from CPTs and borings (i.e. weak soils). The need for removals to mitigate static behavior of existing soils is evaluated in the main text of this report.

The combination of the removal, any existing non-liquefiable layer immediately beneath the removal, and the additional fill (as applicable) provided an ultimate cap of non-liquefiable soils at each location analyzed. These caps are sufficient (or much more than adequate at locations of proposed high fills) to mitigate liquefaction at these locations and to attenuate any effects from cyclic settlements remaining at depth.

2.0 DATA AND ASSUMPTIONS

Based on the probabilistic seismic hazard analyses (PSHA) presented in **Appendix D** of this report, a design basis earthquake (DBE) magnitude of 6.50 generating an estimated peak horizontal ground acceleration of 0.71g, and a horizontal acceleration of 0.49g corresponding to an earthquake with a weighted magnitude of 7.5 were used for the liquefaction and earthquake-induced settlement analyses.

Basic information included soil types, existing ground water levels and blow counts obtained from field data. These data are plotted versus depth on **Figures C1** through **C37, graphs (a)** and **(b)**.

For analysis, in the absence of well data, a conservative historic high ground water depth of 5 feet was used, except for a water depth of 12 feet for CPT-6.

Seed et al. (1984) presents design curves based on field performance during earthquakes (cases where evidence of liquefaction has been observed), which provides a higher level of confidence in the analyses results. These curves distinctly separate liquefiable and non-

liquefiable soil conditions. Therefore, liquefiable zones in this analysis are based upon the premise that liquefaction potential exists if the cyclic resistance ratio (CRR) against liquefaction is less than the earthquake-induced cyclic stress ratio; this is to say, a stress ratio factor of safety less than unity. The earthquake-induced settlement analysis also considers zones that may settle somewhat even though the factor of safety may be greater than one (i.e. a non-liquefaction condition).

3.0 CORRELATIONS BETWEEN CPTs AND BORINGS

During our investigations, we excavated 10 rotary-wash (RW) borings next to CPT soundings to verify the soil parameters interpreted from the CPTs. Based on the field data, in general, blow counts and percent fines from the CPTs generally correlate well with data from the borings. This is shown in **Table C1**. However, blow count data from CPT-11 are liberal to 15 feet, and are conservative below 15 feet. In CPT-10, the percent fines are somewhat overestimated (liberal) to 30 feet and are estimated conservatively below this depth. In CPT-19 the percent fines are estimated conservatively to 40 feet and liberally below 40 feet (to 50 feet).

The generally good correlation shown in **Table C1** provides an adequate level of confidence in CPT data enhanced with the fact that the CPTs are continuous and sample disturbance is less. Furthermore, soil intervals of conservative data are typically thicker (see **Table C1**) which is expected to more than adequately compensate the effects in the analyses from liberal data. Also, at the locations of CPT-10, CPT-11 and CPT-19, proposed fills (above existing ground surface) and the ultimate non-liquefiable caps are significant (greater than 20-foot fills and thicker than 48-foot caps. See **Table C2**).

4.0 ASSESSMENT OF LIQUEFACTION POTENTIAL

4.1 Method of Analysis

Liquefaction is a phenomenon whereby a saturated granular soil temporarily loses its strength because of the buildup of pore water pressure during seismic excitation. This loss of strength may cause structures founded on these soils to experience subsidence and/or lateral movement due to earthquakes.

Liquefaction potential analyses are performed by a method proposed by Seed, et al. (1984) as mentioned in Section 2 above. Some data provided by the liquefaction

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Blow counts used in the settlement calculations above the water table were not corrected for fines content (but were corrected for other factors addressed in the liquefaction potential assessment). Although the referenced procedure applies to both silty and clean sands, the use of the blow counts without corrections for fines content produces more conservative results.

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REFERENCES

Bartlett, S.F., and Youd, T.L., "Empirical prediction of liquefaction – induced lateral spread", Journal of Geotechnical Engineering, Vol. 121, No. 4, April 1995

California Division of Mines and Geology, Special Publication 117, "Guidelines for Evaluating and Mitigating Seismic Hazards in California", adopted by the State on March 13, 1997.

Douglas, B.J., and Olsen, R.S., "Soil classification using Electric Cone Penetrometer", ASCE Special Technical Publication, ST. Louis, Missouri, October, 1981.

Douglas, B.J., Olsen, R.S., and Martin, G.R., "Evaluation of the Cone Penetrometer Test for use in SPT--Liquefaction Potential Assessment," ASCE Preprint Volume No. 81-544, St. Louis, Missouri, October 1981.

Fear and McRoberts, "Reconsideration of initiation of liquefaction in sandy soils", ASCE Geotechnical Journal, March 1995.

Housner, G.W., Chairman of Committee on Earthquake Engineering, Book, "Liquefaction of soils during earthquakes", p. 110-114, National Academy Press, 1985.

Ishihara, K., "Soil Behaviour in Earthquake Geotechnics", Clarendon Press, Oxford, 1996.

Ishihara, K., "Stability of natural deposits during earthquakes", Proceedings of the Eleventh International Conference on Soil Mechanics and Foundation Engineering, A.A. Balkema Publishers, Rotterdame, Netherlands, 1985

Liao, S.S.C., and Whitman, R.V., "Overburden correction factors for SPT in sand", Journal of Geotechnical Engineering, Vol. 112, No. 3, March 1986.

Pradel, D., "Procedure to evaluate earthquake-induced settlements in dry sandy soils," Journal of Geotechnical and Geoenvironmental Engineering, ASCE, Vol. 124, No. 4, April 1998.

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Robertson, P.K., and Fear, C.E., "Liquefaction of sands and its evaluation", First International Conference and Earthquake Geotechnical Engineering, 1995.

Robertson, P.K., and Campanella, R.G., "Guidelines for Geotechnical Design using the Cone Penetrometer Test and CPT with Pore Pressure Measurement", University of Alberta and University of British Columbia, 4th edition, 1989.

Seed, H.B., "Design problems in soil liquefaction," Report No. UCB/EERC-86/02, February, 1986

Seed, H.B., Tokimatsu, K., Harder, L.F., and Chung, R.M., "The influence of SPT procedures in soil liquefaction resistance evaluations", Earthquake Engineering Research Center Report No. 84/15, University of California, Berkeley, 1984.

APPENDIX C

REFERENCES

Seed, H.B., Idriss, I.M., and Arango, I., "Evaluation of liquefaction potential using field performance data", Journal of Geotechnical Engineering, Vol. 109, No.3, March 1983.

Seed, H.B. and Idriss, I.M., "Ground motions and soil liquefaction during earthquakes", 1982, Monograph, Earthquake Engineering Research Institute.

Seed, H.B. and Idriss, I.M., "A simplified procedure for evaluating soil liquefaction potential", EERC 70-9, Nov. 1970.

Tokimatsu, K., Seed, H.B., "Evaluation of settlements in sands due to earthquake shaking", Journal of Geotechnical Engineering, Vol. 113, No. 8, August, 1987.

University of Southern California (USC), Southern California Earthquake Center, Workshop on "Recommended Procedures for Implementation of DMG Special Publication 117, Guidelines for Analyzing and Mitigating Liquefaction in California", USC, Los Angeles, California, June 17, 1999.

Youd, T.L. and Idriss, I.M., "Proceedings of the NCEER Workshop on Evaluation of Liquefaction Resistance of Soils", Technical Report NCEER-97-0022, December, 1997.

Youd, T. Leslie, Hanson, Corbett M. and Bartlett, Steven F. "Revised MLR Equations for Predicting Lateral Spread Displacement", Notes & Handout, ASCE Los Angeles Section Seminar, July, 1999.

APPENDIX C

CORRELATIONS BETWEEN FIELD DATA FROM ADJACENT CPTs AND BORINGS

CPT - vs. Boring		CORRELATION	
		CPT Blow Count (N)	CPT % Fines
CPT - 3	RW - 8	Good	Good
CPT - 10	RW - 3	Good	Liberal (to 30')
CPT - 11	RW - 5	Liberal (to 15') Conservative (below 15')	Good
CPT - 13	RW - 6	Good	Good
CPT - 14	RW - 7	Good	Good
CPT - 17	RW - 2	Good	Good
CPT - 19	RW - 4	Good	Liberal (40' – 50')
CPT - 24	RW - 1	Good	Good
CPT - 32b	RW - 9	Good	Good
CPT - 33	RW - 10	Good	Good

APPENDIX C

SUMMARY OF CYCLIC SETTLEMENT ANALYSES AND REMOVALS (BASED ON CPT and RW DATA)

Analyzed Location	Ground Surface Elevation (MSL) (Ft)	Depth to Existing Ground Water (Ft)	Depth to Historic High Ground Water (Ft)	Estimated Total Cyclic Settlement [a] (Prior to removal and recompaction) (Inch)	Proposed Fill Height (Ft)	Estimated Required Removal Depth [b] (Ft)	Estimated Total Cyclic Settlement (After removal and recompaction) (Inch)	Estimated Differential Cyclic Settlement [c] (After removal and recompaction) (Inch)	Ultimate Non-Liquefiable Cap (Removal and New Fill Included) (Ft)
CPT-1	1212	19.0	5.0	0.48	No Grading	-	-	-	-
CPT-2	1212	19.0	5.0	0.25	No Grading	-	-	-	-
CPT-3	1203	15.5	5.0	1.01	No Grading	-	-	-	-
CPT-4	1196	11.0	5.0	0.01	No Grading	-	-	-	-
CPT-5	1195	11.0	5.0	0.00	5	9	-	-	47
CPT-6	1224	35.0	12.0	0.39	36	17	0.30	0.20	57
CPT-7	1210	25.0	5.0	0.54	40	16	0.29	.019	68
CPT-8	1198	11.0	5.0	0.36	30	10	0.36	0.24	52
CPT-9	1196	15.5	5.0	0.99	-2 (cut)	10	0.98	0.66	18
CPT-10	1194	25.0	5.0	2.14	31	23	1.72	1.15	61
CPT-11	1186	25.2	5.0	0.27	39	11	0.27	.018	76
CPT-12	1194	27.9	5.0	0.20	25	9	0.20	0.13	63
CPT-13	1177	20.8	5.0	1.56	8	12	1.55	1.04	27
CPT-14	1188	15.2	5.0	0.65	37	10	0.65	0.43	52
CPT-15	1185	15.3	5.0	0.77	22	8	0.77	0.52	41
CPT-16	1188	14.4	5.0	0.79	25	5	0.79	0.53	42.5
CPT-17	1192	14.6	5.0	0.27	27	17	0.22	0.15	49
CPT-18	1194	15.4	5.0	0.21	0	9	0.21	0.14	34
CPT-19	1193	16.0	5.0	0.18	23	8	0.18	0.12	48
CPT-20	1195	14.9	5.0	1.18	13	15	0.90	0.60	39
CPT-21	1195	11.5	5.0	0.24	15	7	0.24	0.16	31
CPT-22	1199	13.5	5.0	0.41	16.5	7	0.41	0.28	30

APPENDIX C

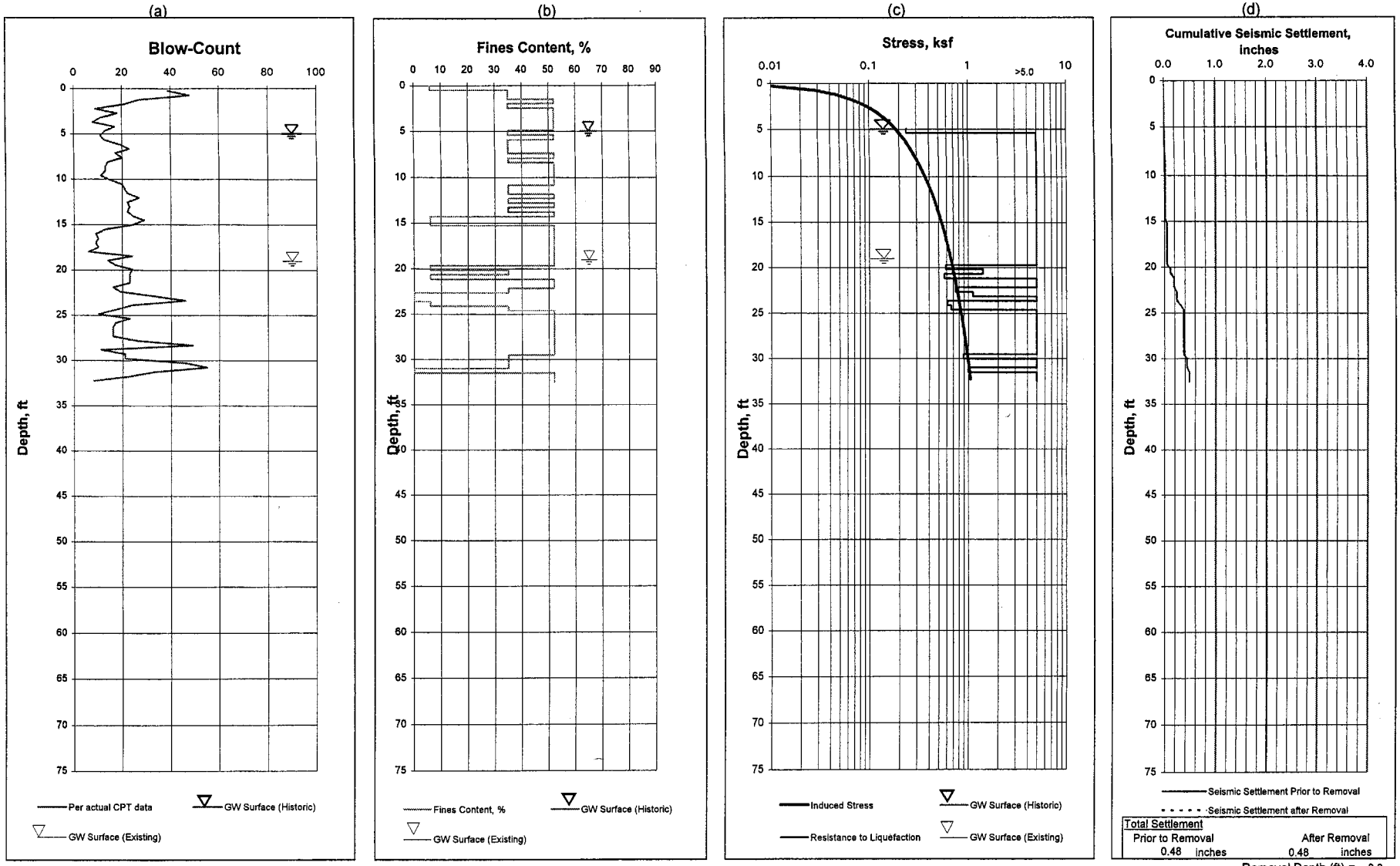
Analyzed Location	Ground Surface Elevation (MSL) (Ft)	Depth to Existing Ground Water (Ft)	Depth to Historic High Ground Water (Ft)	Estimated Total Cyclic Settlement [a] (Prior to Removal and Recompaction) (Inch)	Proposed Fill Height (Ft)	Estimated Required Removal Depth [b] (Ft)	Estimated Total Cyclic Settlement (After Removal and Recompaction) (Inch)	Estimated Differential Cyclic Settlement [c] (After Removal and Recompaction) (Inch)	Ultimate Non-Liquefiable Cap (Removal and New Fill Included) (Ft)
CPT-23	1206	17.5	5.0	0.27	18	8	0.26	0.17	30
CPT-24	1205	15.4	5.0	0.55	15	3	0.55	0.37	31
CPT-25	1208	12.4	5.0	0.36	18	8	0.30	0.20	55
CPT-26	1176	25.0	5.0	0.28	4	11	0.28	0.19	31
CPT-27	1210	15.0	5.0	0.98	19	14	0.87	0.58	32.5
CPT-28	1209	15.5	5.0	0.89	20	5	0.89	0.60	32
CPT-29	1210	14.4	5.0	0.79	10	-	-	-	No Development
CPT-30	1214	>20.0	5.0	0.00	0-16	-	-	-	No Development
CPT-31A	1261	32	5.0	0.02	19	15	0.00	-	50
CPT-32B	1270	32	5.0	1.29	40	18	0.79	0.53	61
CPT-33	1266	34	5.0	0.37	No Grading	-	-	-	-
CPT-34A	1278	34	5.0	0.63	-	-	-	-	-
CPT-35A	1282	55	5.0	0.12	-	-	-	-	-
CPT-36	1294	36	5.0	0.01	-	-	-	-	-
CPT-37	1304	37	5.0	0.07	-	-	-	-	-

a. Estimated total cyclic settlements based on seismic analysis.

b. Estimated removal depths are based on required (per Ishihara) upper non-liquefiable soil layers (including new fill), and/or cyclic settlements or adjacent borings or CPT blow count.

c. Based on CDMG Special Publication 117 and Los Angeles County-adopted Recommended Procedures for Implementation of CDMG Special Publication 117.

Location..... CPT-1
Elevation (MSL)..... 1212 ft



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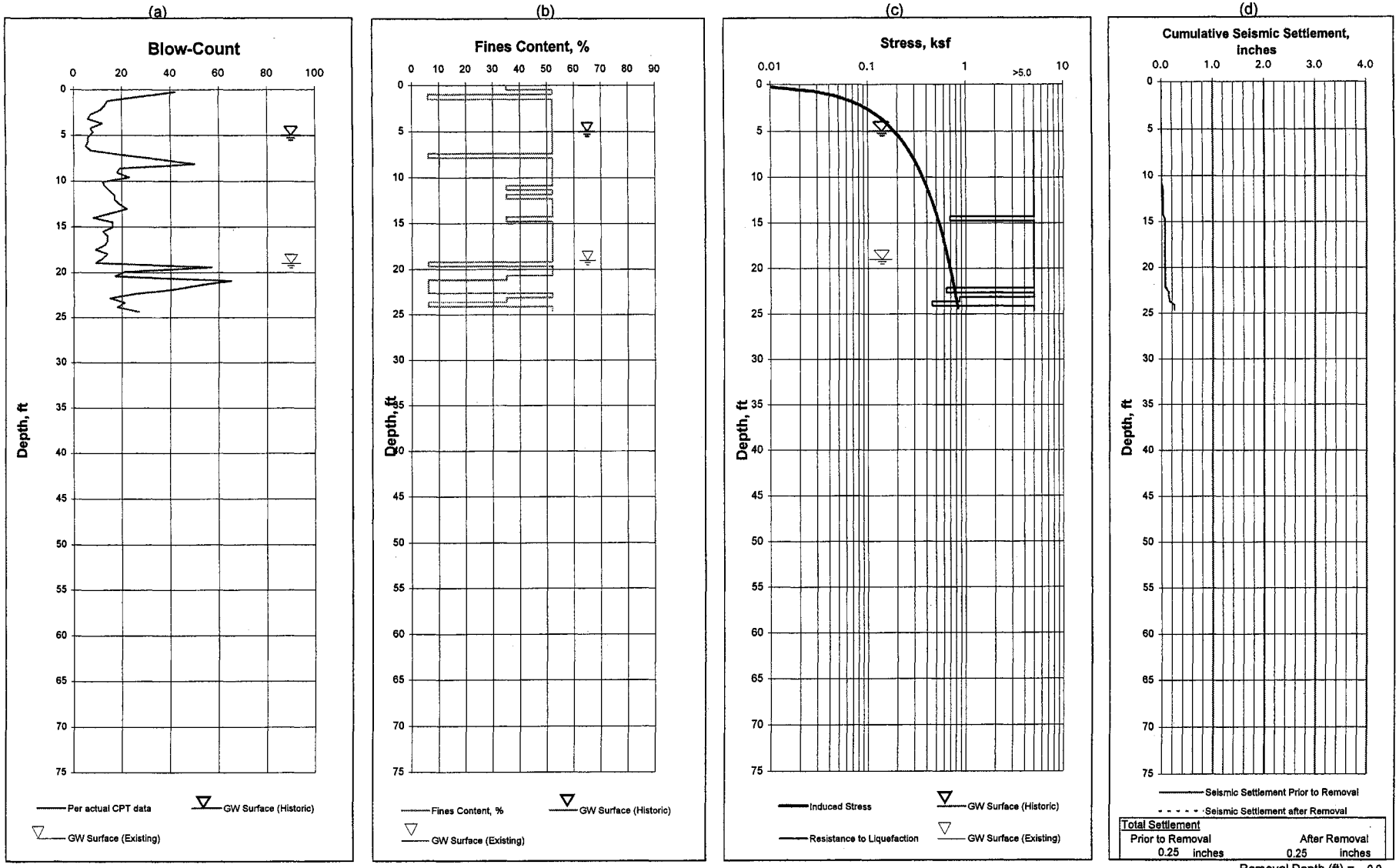
Geological and Geotechnical Consultants

Analysis of Liquefaction Potential Based on N-Value (Interpreted from CPT Data)

Project: T.T. 53425, River Park	Weighted Gr. Acc. (M=7.5).	0.49 g	Project No.	03-1571-4
City of Santa Clarita, California	Design Gr. Acc.(M= 6.5)...	0.71 g	Figure No.	C-1
For: Newhall Land Company	Magnification Factor.....	1	Date.	4-4-2003

Location..... CPT-2
Elevation (MSL)..... 1212 ft



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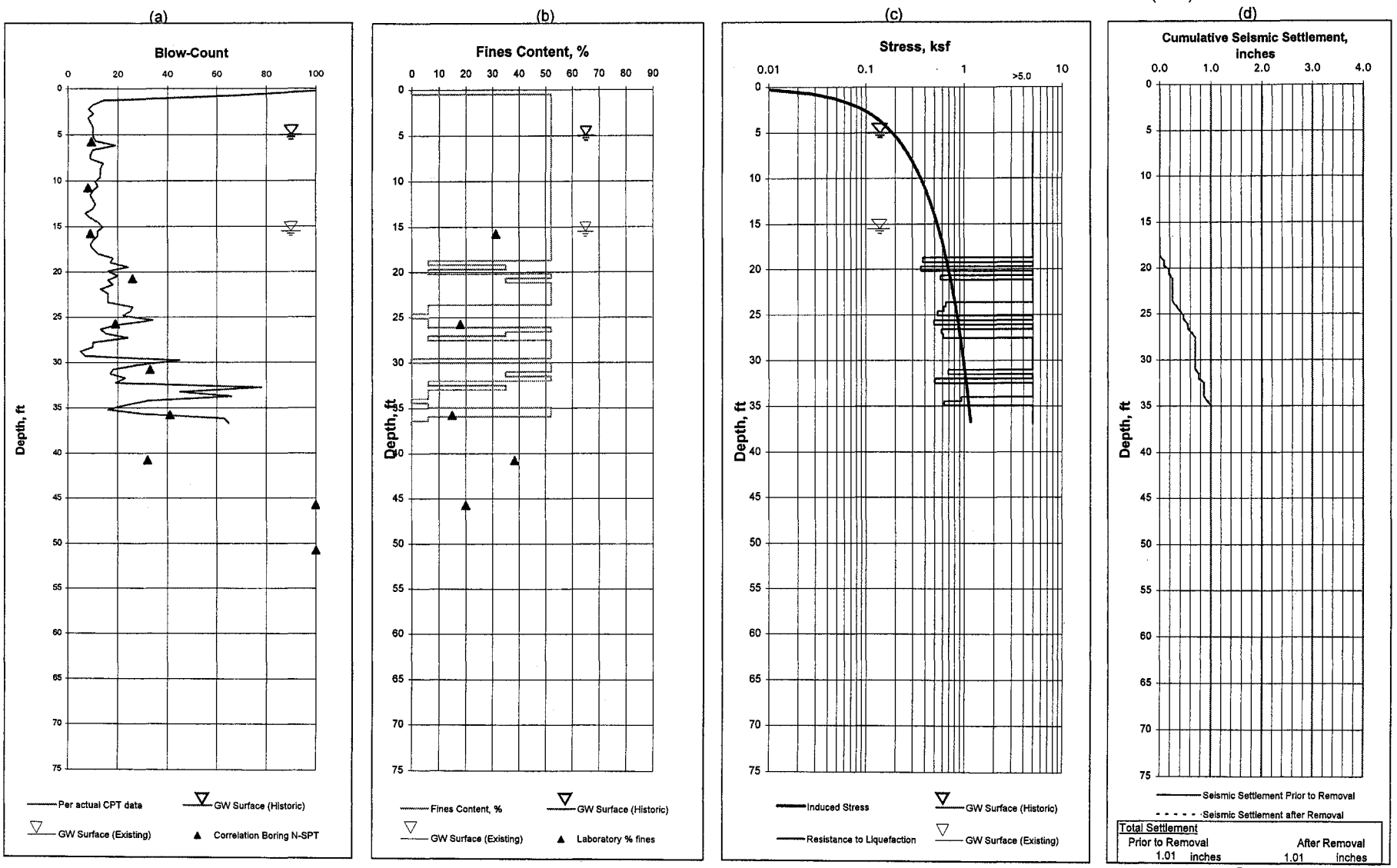
Project: T.T. 53425, River Park	Weighted Gr. Acc. (M=7.5).	0.49 g	Project No.	03-1571-4
City of Santa Clarita, California	Design Gr. Acc.(M= 6.5)...	0.71 g	Figure No.	C-2
For: Newhall Land Company	Magnification Factor.....	1	Date.	4-4-2003

Location..... CPT-3 Near RW-8

Elevation (MSL)..... 1203 ft



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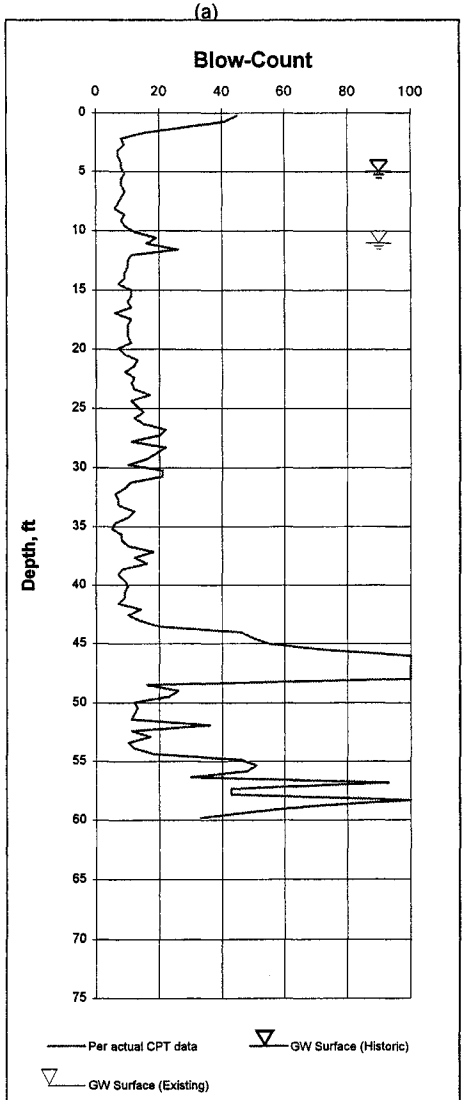
City of Santa Clarita, California	Design Gr. Acc.(M= 6.5)...	0.71 g	Figure No.	C-3
For: Newhall Land Company	Magnification Factor.....	1	Date.	4-4-2003

Location..... CPT-4
Elevation (MSL)..... 1196 ft

(a)



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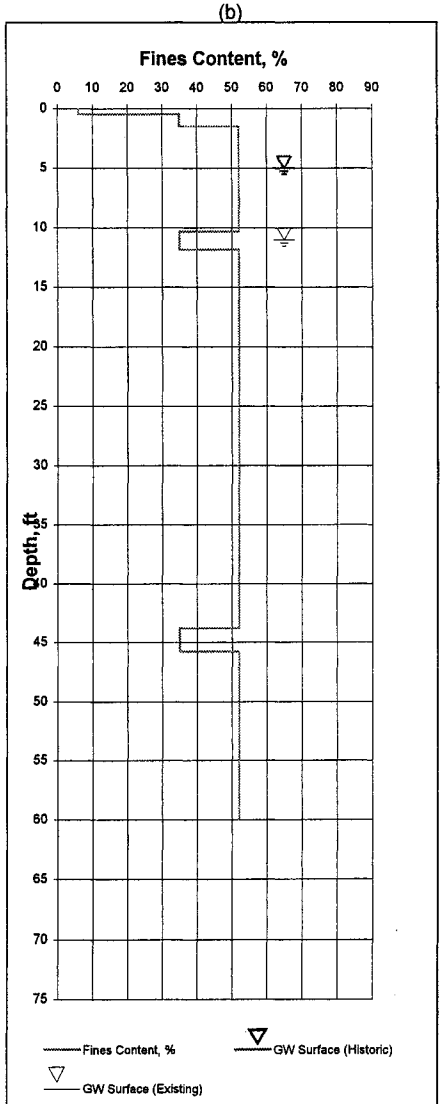

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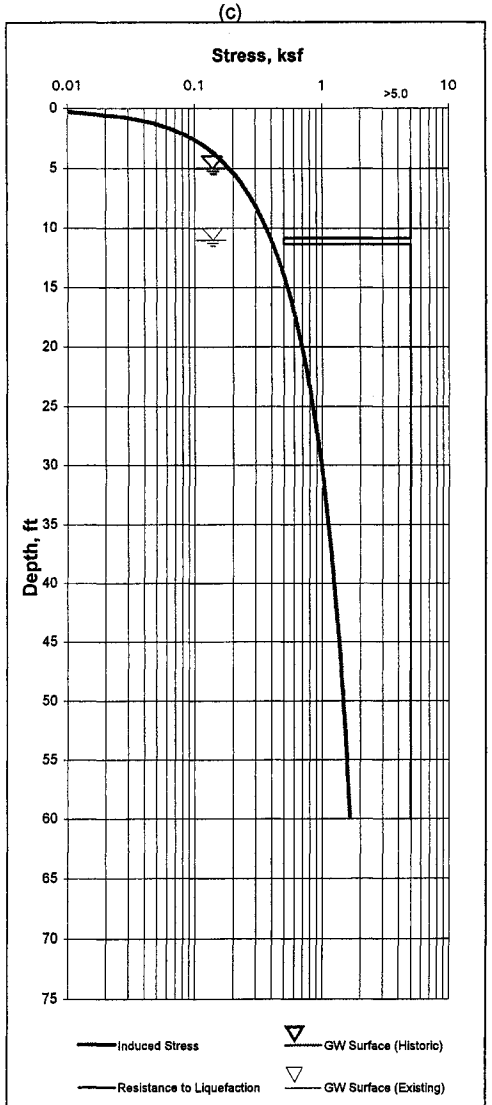

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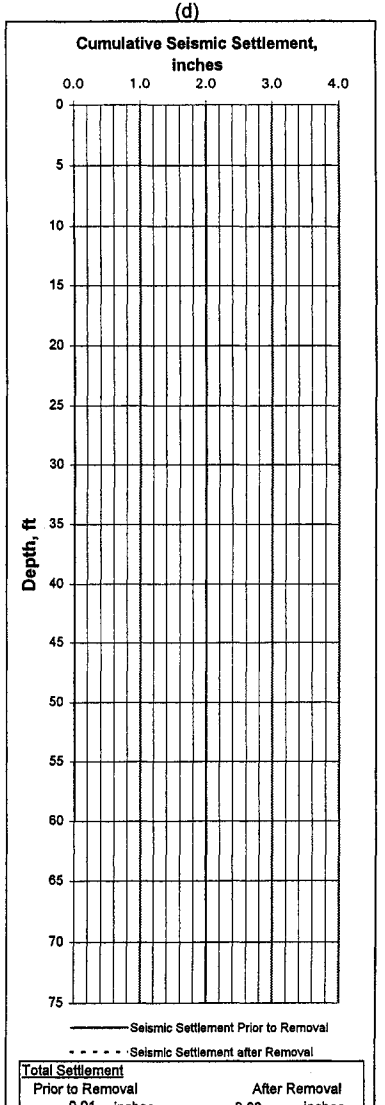

Total Settlement	
Prior to Removal	After Removal
0.01 inches	0.00 inches

Removal Depth (ft) = 0.0

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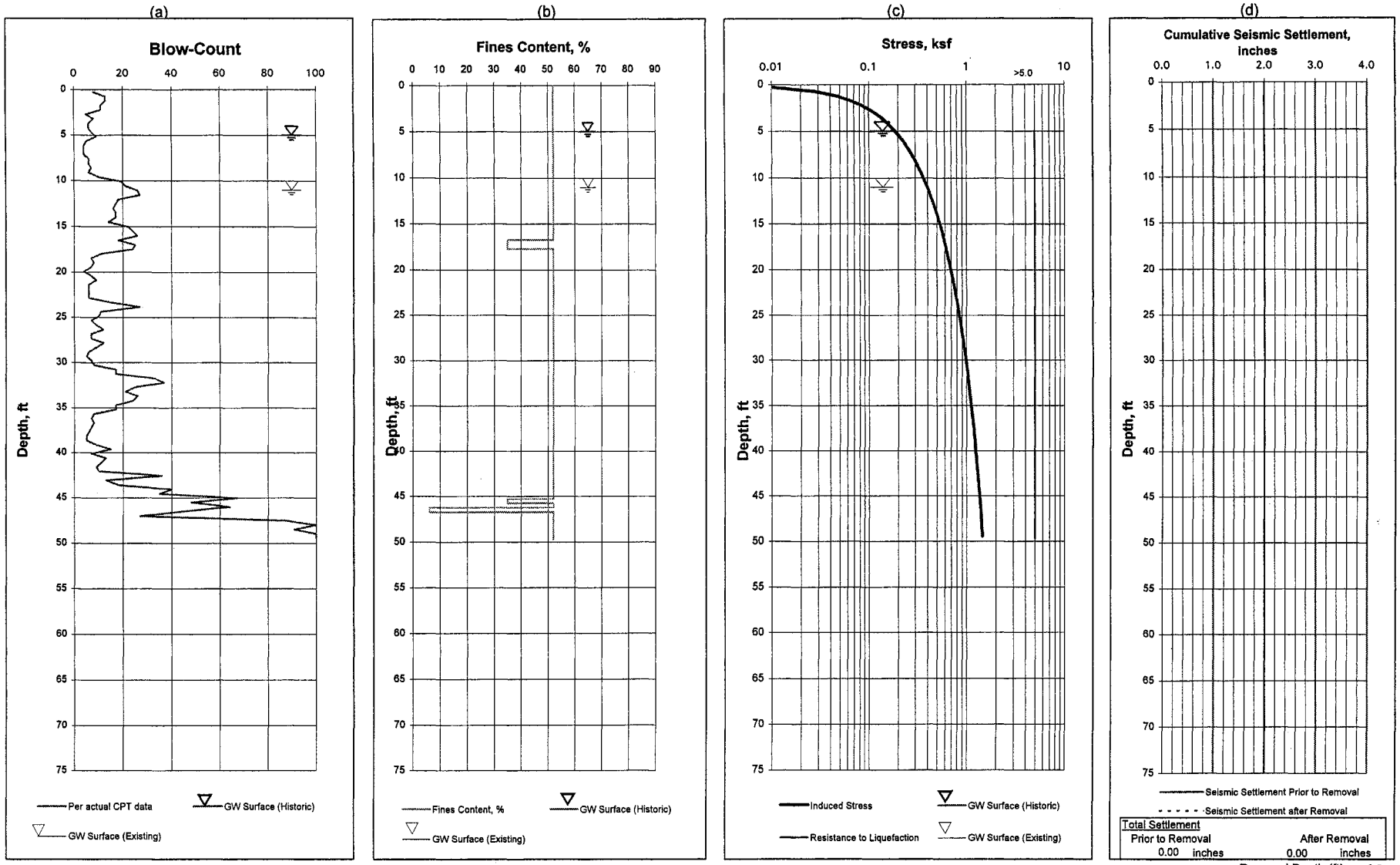
Project: T.T. 53425, River Park	Weighted Gr. Acc. (M=7.5).	0.49 g	Project No.	03-1571-4
City of Santa Clarita, California	Design Gr. Acc.(M= 6.5)...	0.71 g	Figure No.	C-4
For: Newhall Land Company	Magnification Factor.....	1	Date.	4-4-2003

Location..... CPT-5
Elevation (MSL)..... 1195 ft



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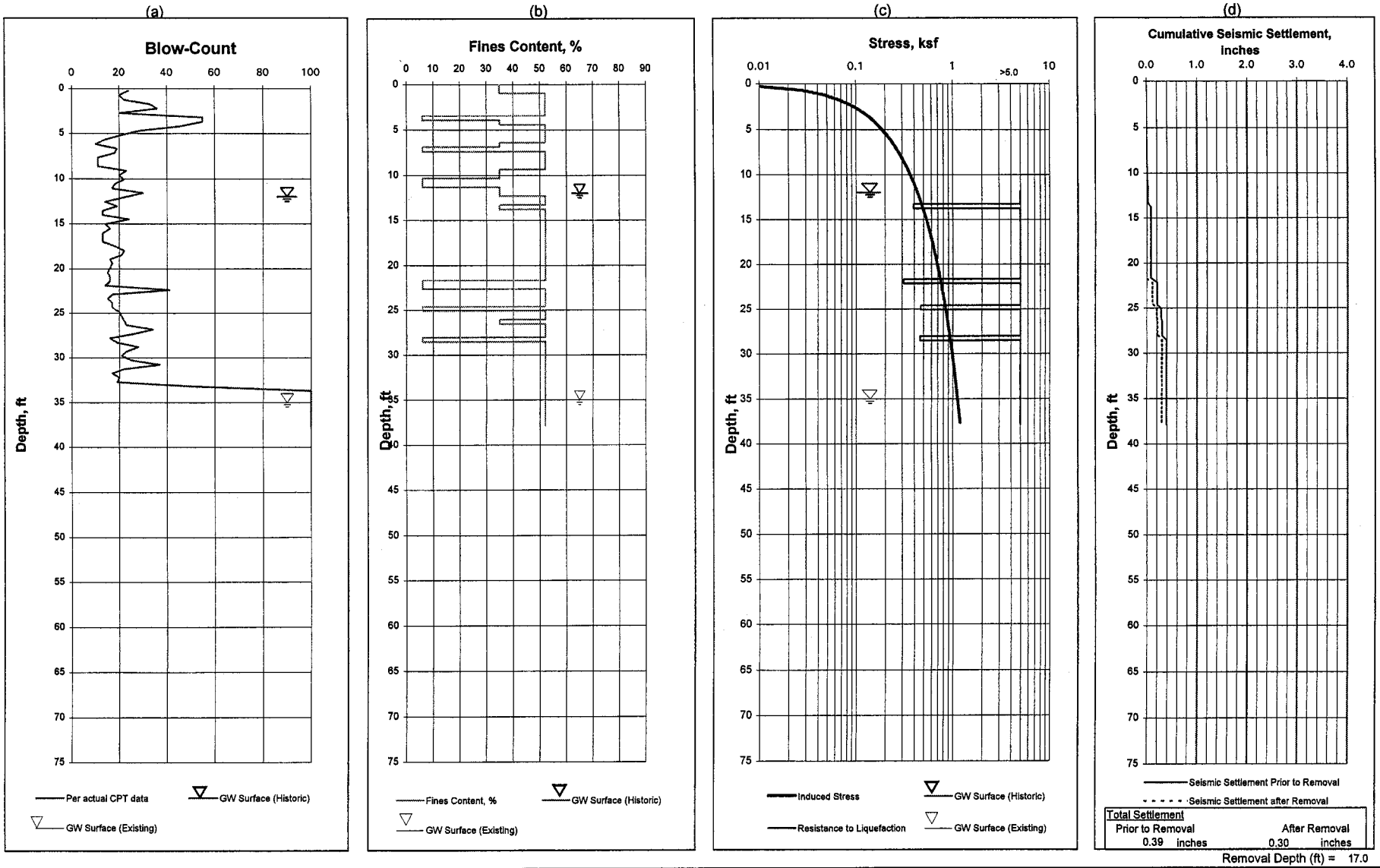
Project: T.T. 53425, River Park	Weighted Gr. Acc. (M=7.5).	0.49 g	Project No.	03-1571-4
City of Santa Clarita, California	Design Gr. Acc.(M= 6.5)...	0.71 g	Figure No.	C-5
For: Newhall Land Company	Magnification Factor.....	1	Date.	4-4-2003

Location..... CPT-6
Elevation (MSL)..... 1224 ft



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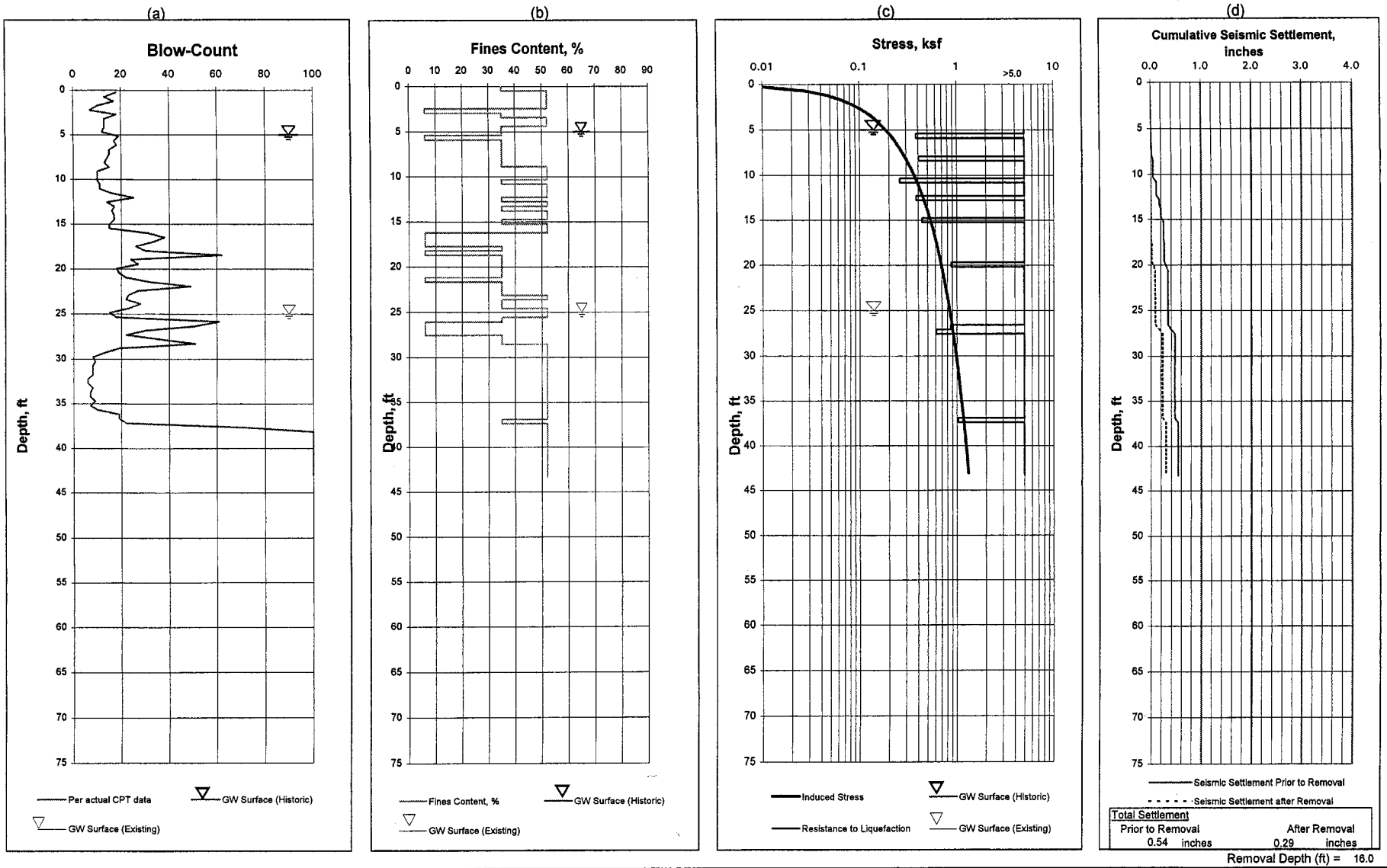
Analysis of Liquefaction Potential Based on N-Value (Interpreted from CPT Data)

Project: T.T. 53425, River Park	Weighted Gr. Acc. (M=7.5).	0.49 g	Project No.	03-1571-4
City of Santa Clarita, California	Design Gr. Acc.(M= 6.5)...	0.71 g	Figure No.	C-6
For: Newhall Land Company	Magnification Factor.....	1	Date.	4-4-2003

Location..... **CPT-7**

Elevation (MSL)..... 1210 ft



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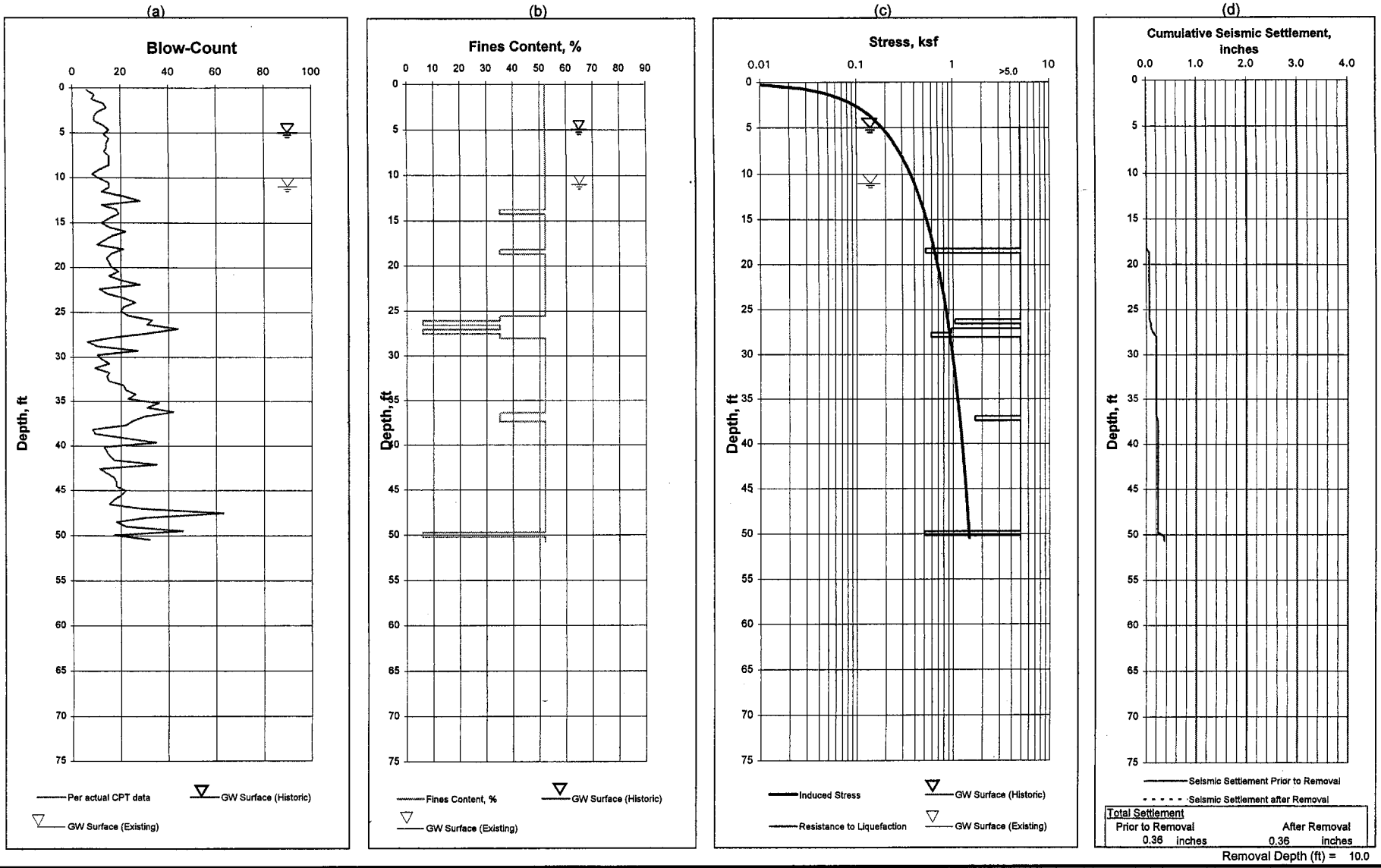
Project: T.T. 53425, River Park	Weighted Gr. Acc. (M=7.5). 0.49 g	Project No.	03-1571-4
City of Santa Clarita, California	Design Gr. Acc.(M= 6.5)... 0.71 g	Figure No.	C-7
For: Newhall Land Company	Magnification Factor..... 1	Date.	4-4-2003

Location..... **CPT-8**
Elevation (MSL)..... 1198 ft



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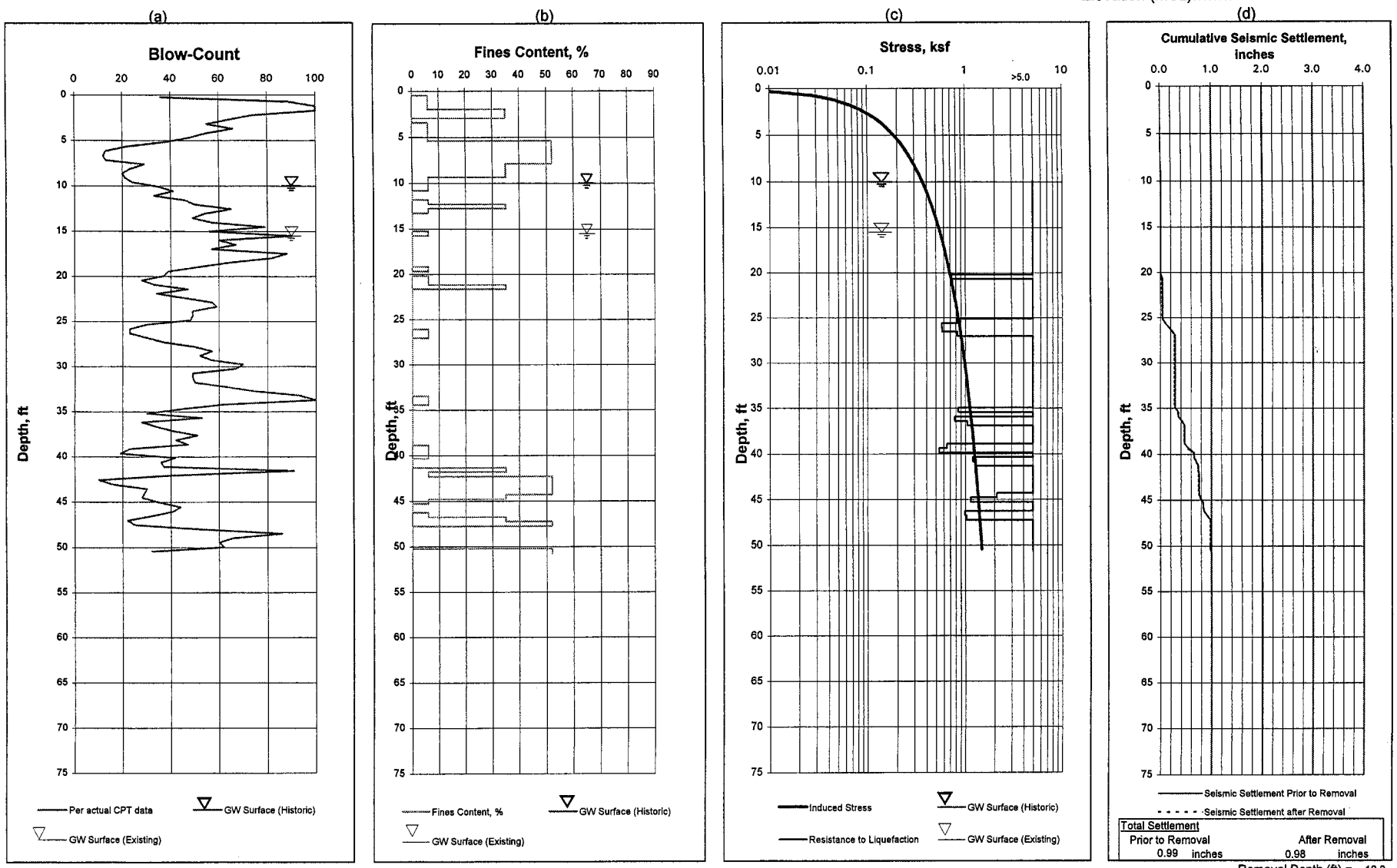
Project: T.T. 53425, River Park	Weighted Gr. Acc. (M=7.5).	0.49 g	Project No.	03-1571-4
City of Santa Clarita, California	Design Gr. Acc.(M= 6.5)...	0.71 g	Figure No.	C-8
For: Newhall Land Company	Magnification Factor.....	1	Date.	4-4-2003

Location..... CPT-9
Elevation (MSL)..... 1196 ft



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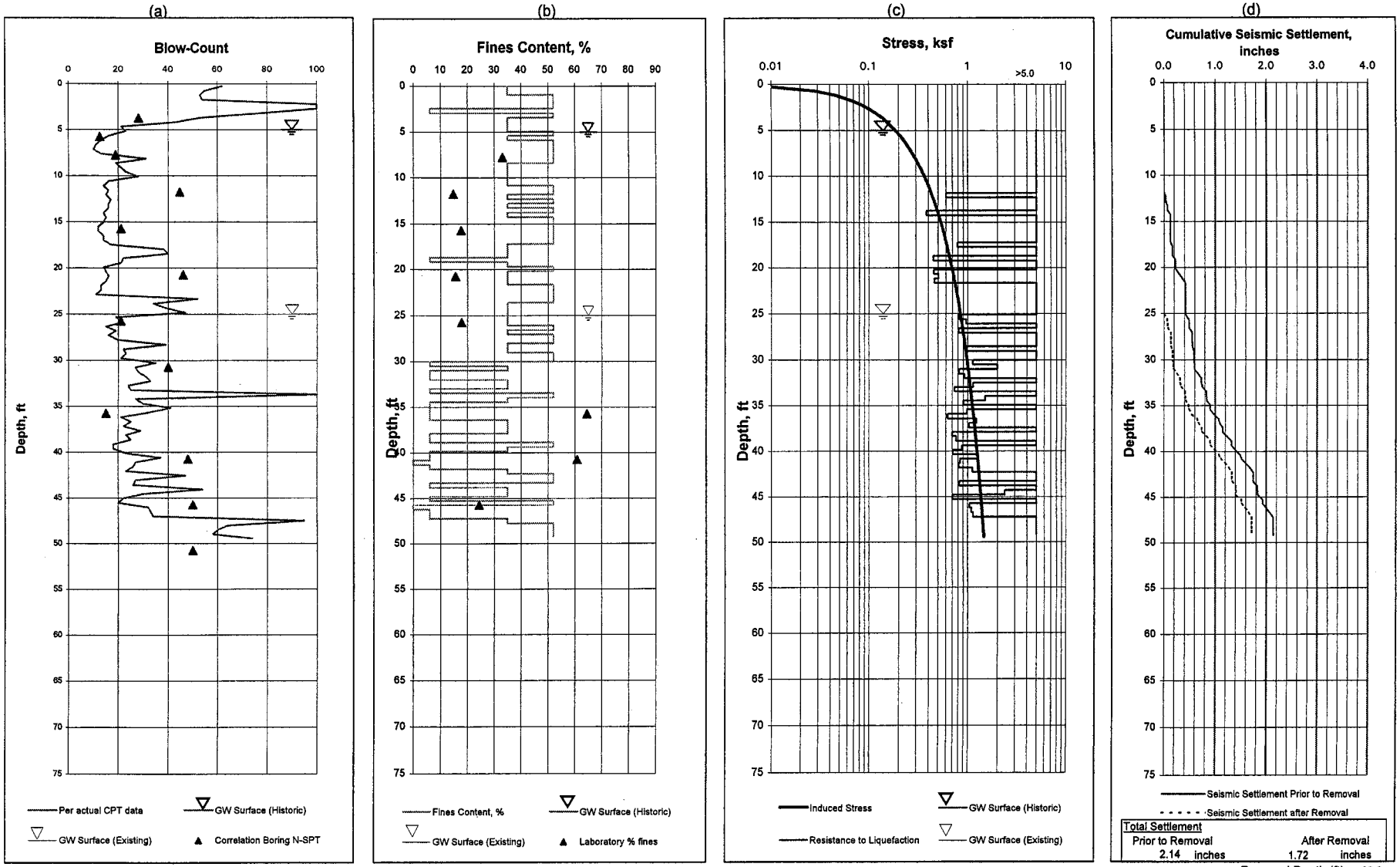
Project: T.T. 53425, River Park	Weighted Gr. Acc. (M=7.5). 0.49 g	Project No.	03-1571-4
City of Santa Clarita, California	Design Gr. Acc.(M= 6.5)... 0.71 g	Figure No.	C-9
For: Newhall Land Company	Magnification Factor..... 1	Date.	4-4-2003

Location..... CPT- 10 Near RW-3

Elevation (MSL)..... 1194 ft



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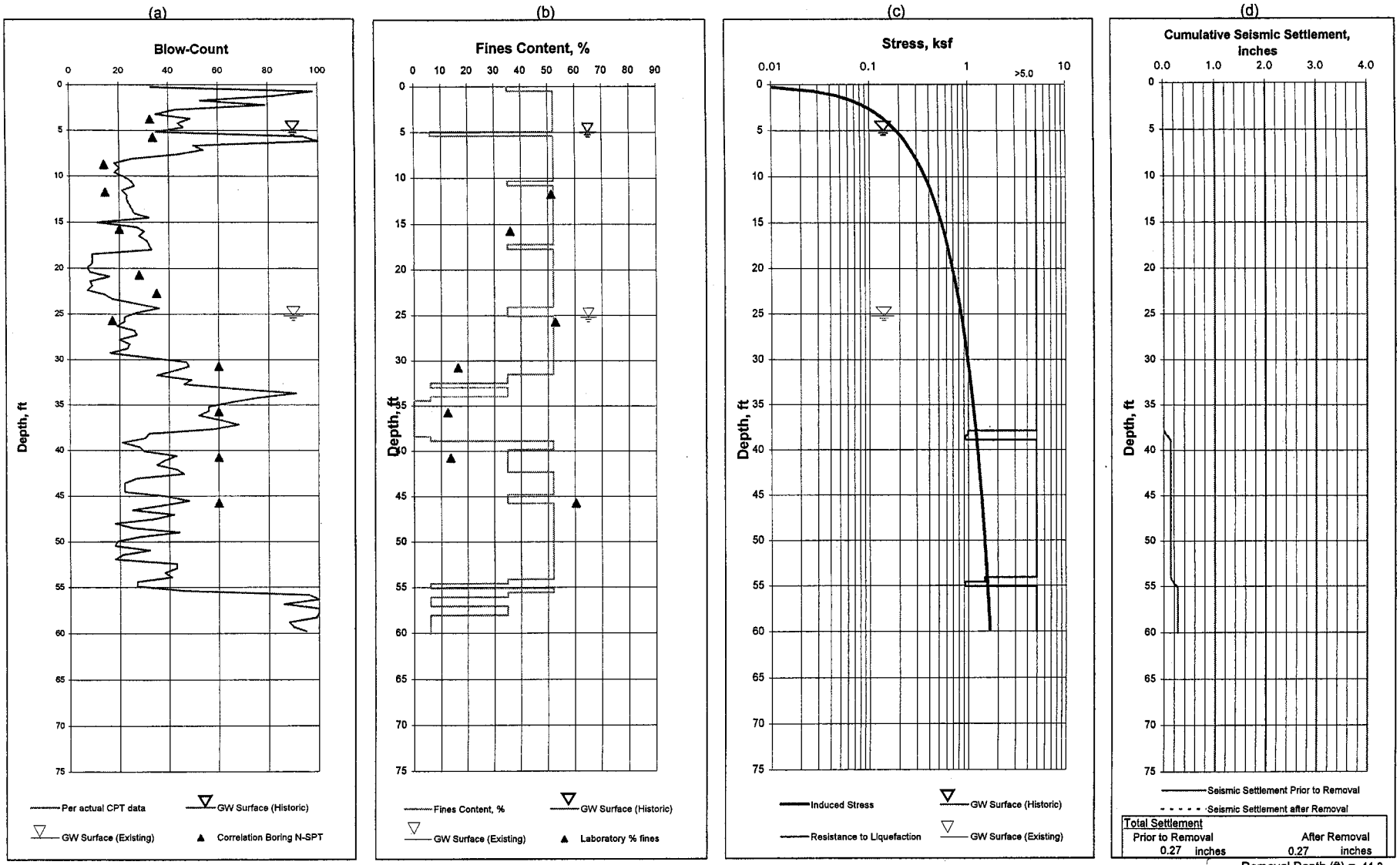
Analysis of Liquefaction Potential Based on N-Value (Interpreted from CPT Data)

Project: T.T. 53425, River Park	Weighted Gr. Acc. (M=7.5).	0.49 g	Project No.	03-1571-4
City of Santa Clarita, California	Design Gr. Acc.(M= 6.5)...	0.71 g	Figure No.	C-10
For: Newhall Land Company	Magnification Factor.....	1	Date.	4-4-2003

Location..... CPT- 11 Near RW - 5

Elevation (MSL)..... 1186 ft



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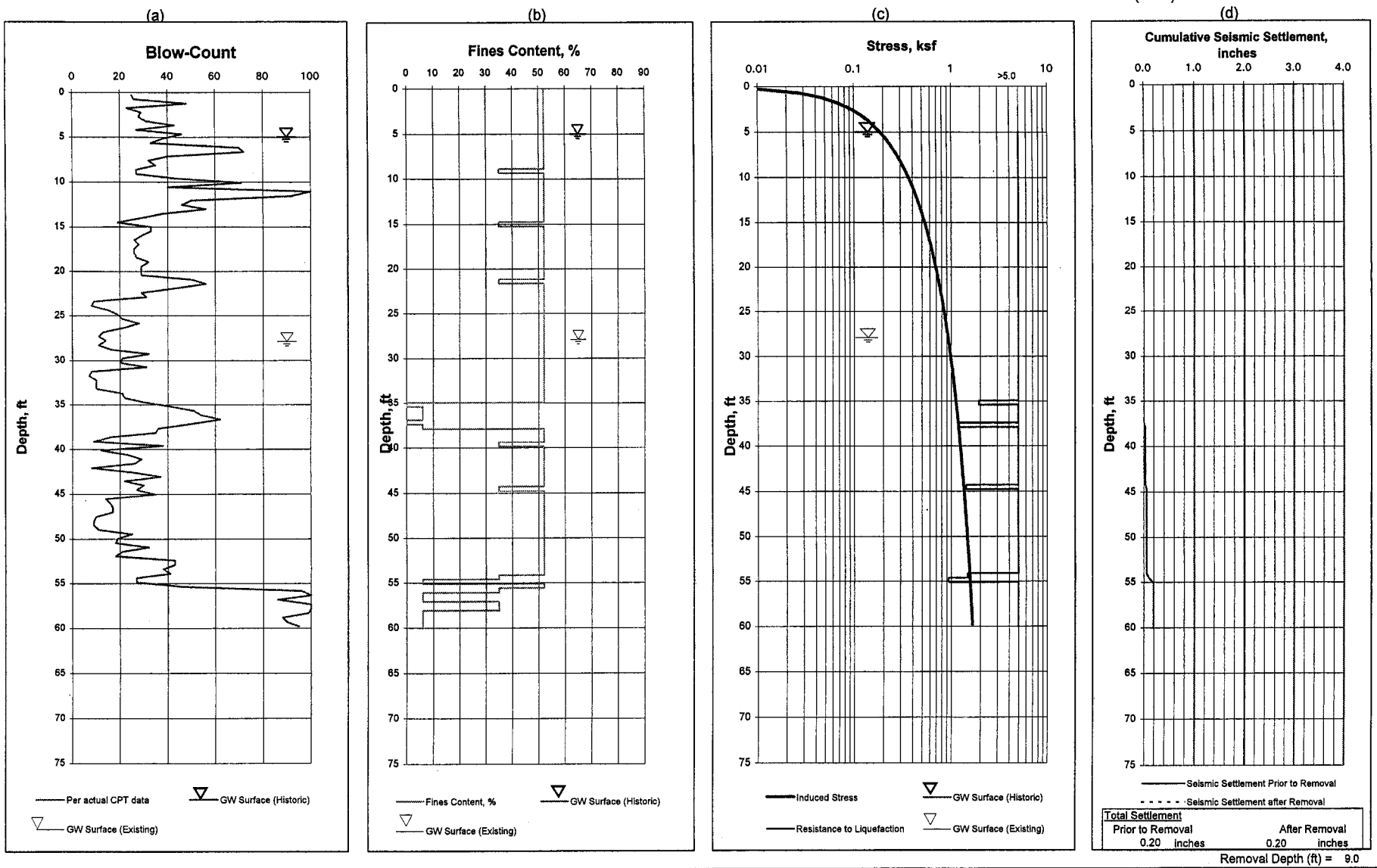
City of Santa Clarita, California	Design Gr. Acc.(M= 6.5)...	0.71 g	Figure No.	C-11
For: Newhall Land Company	Magnification Factor.....	1	Date.	4-4-2003

Location..... CPT-12
Elevation (MSL)..... 1194 ft



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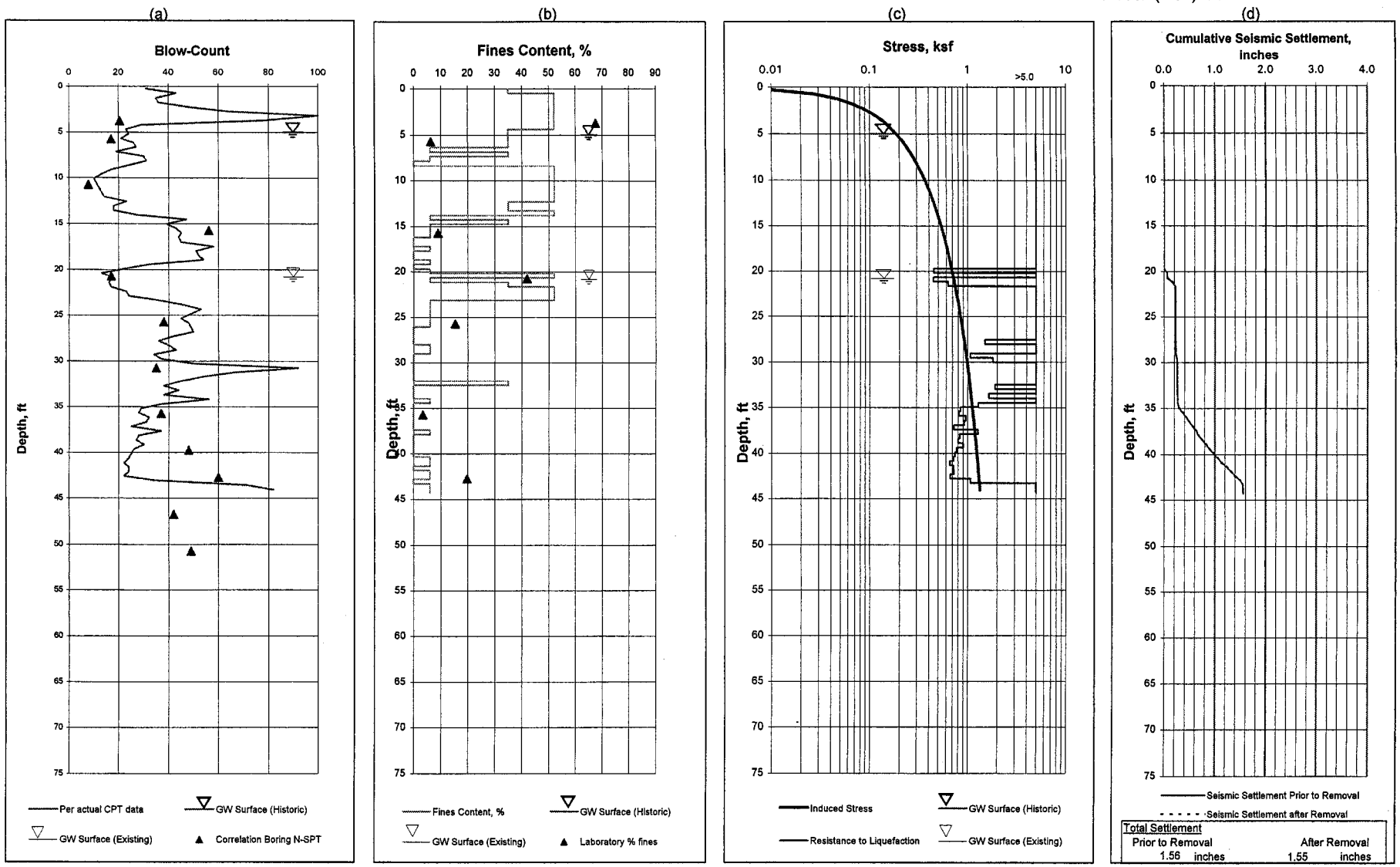
Analysis of Liquefaction Potential Based on N-Value (Interpreted from CPT Data)

Project: T.T. 53425, River Park	Weighted Gr. Acc. (M=7.5).	0.49 g	Project No.	03-1571-4
City of Santa Clarita, California	Design Gr. Acc.(M= 6.5)...	0.71 g	Figure No.	C-12
For: Newhall Land Company	Magnification Factor.....	1	Date.	4-4-2003

Location..... CPT- 13 Near RW - 6

Elevation (MSL)..... 1177 ft



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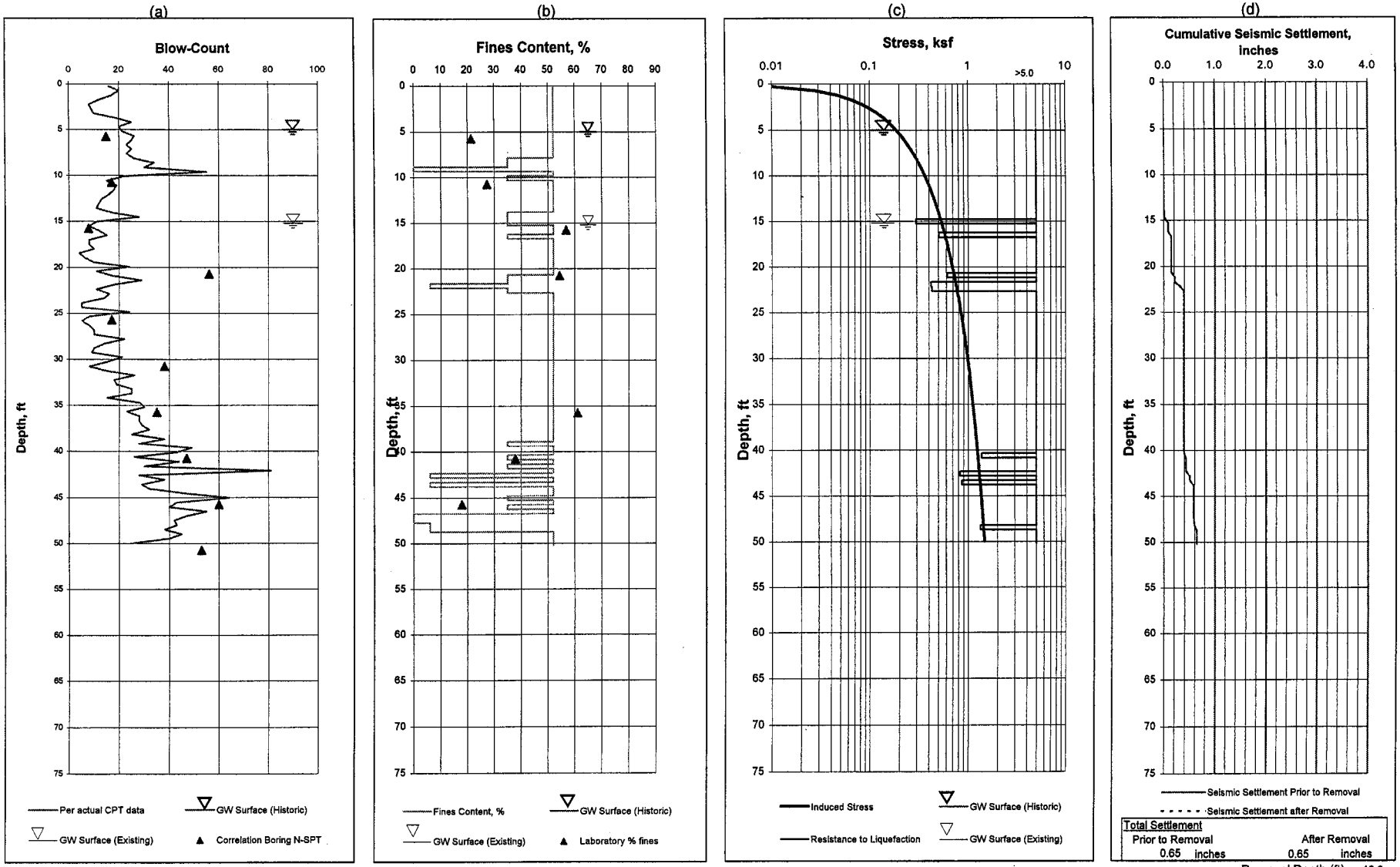
Analysis of Liquefaction Potential Based on N-Value (Interpreted from CPT Data)

Project: T.T. 53425, River Park	Weighted Gr. Acc. (M=7.5).	0.49 g	Project No.	03-1571-4
City of Santa Clarita, California	Design Gr. Acc.(M= 6.5)...	0.71 g	Figure No.	C-13
For: Newhall Land Company	Magnification Factor.....	1	Date.	4-4-2003

Location..... CPT- 14 Near RW-7

Elevation (MSL)..... 1188 ft



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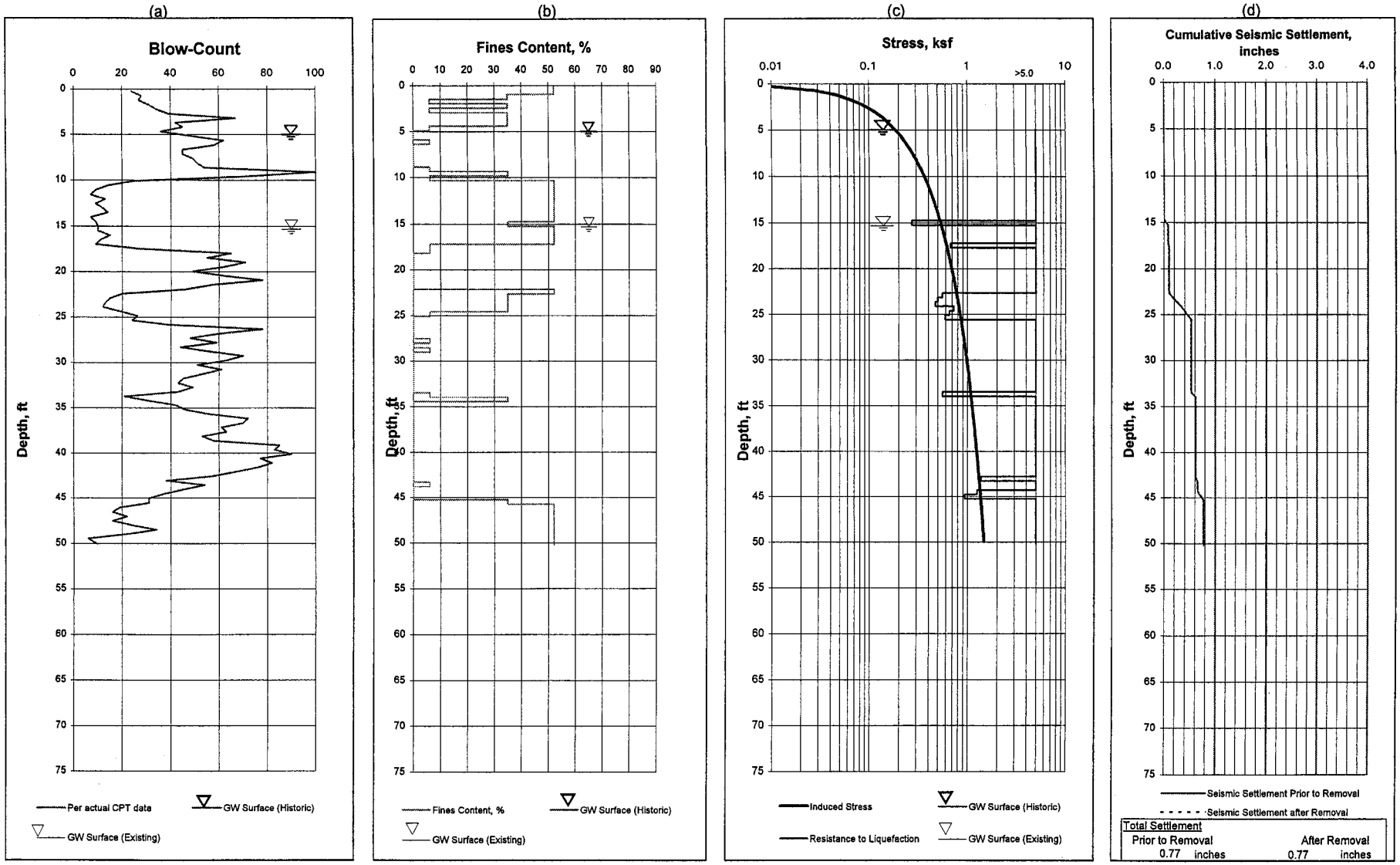
Analysis of Liquefaction Potential Based on N-Value (Interpreted from CPT Data)

Project: T.T. 53425, River Park	Weighted Gr. Acc. (M=7.5).	0.49 g	Project No.	03-1571-4
City of Santa Clarita, California	Design Gr. Acc.(M= 6.5)...	0.71 g	Figure No.	C-14
For: Newhall Land Company	Magnification Factor.....	1	Date.	4-4-2003

Location..... CPT-15
Elevation (MSL)..... 1185 ft



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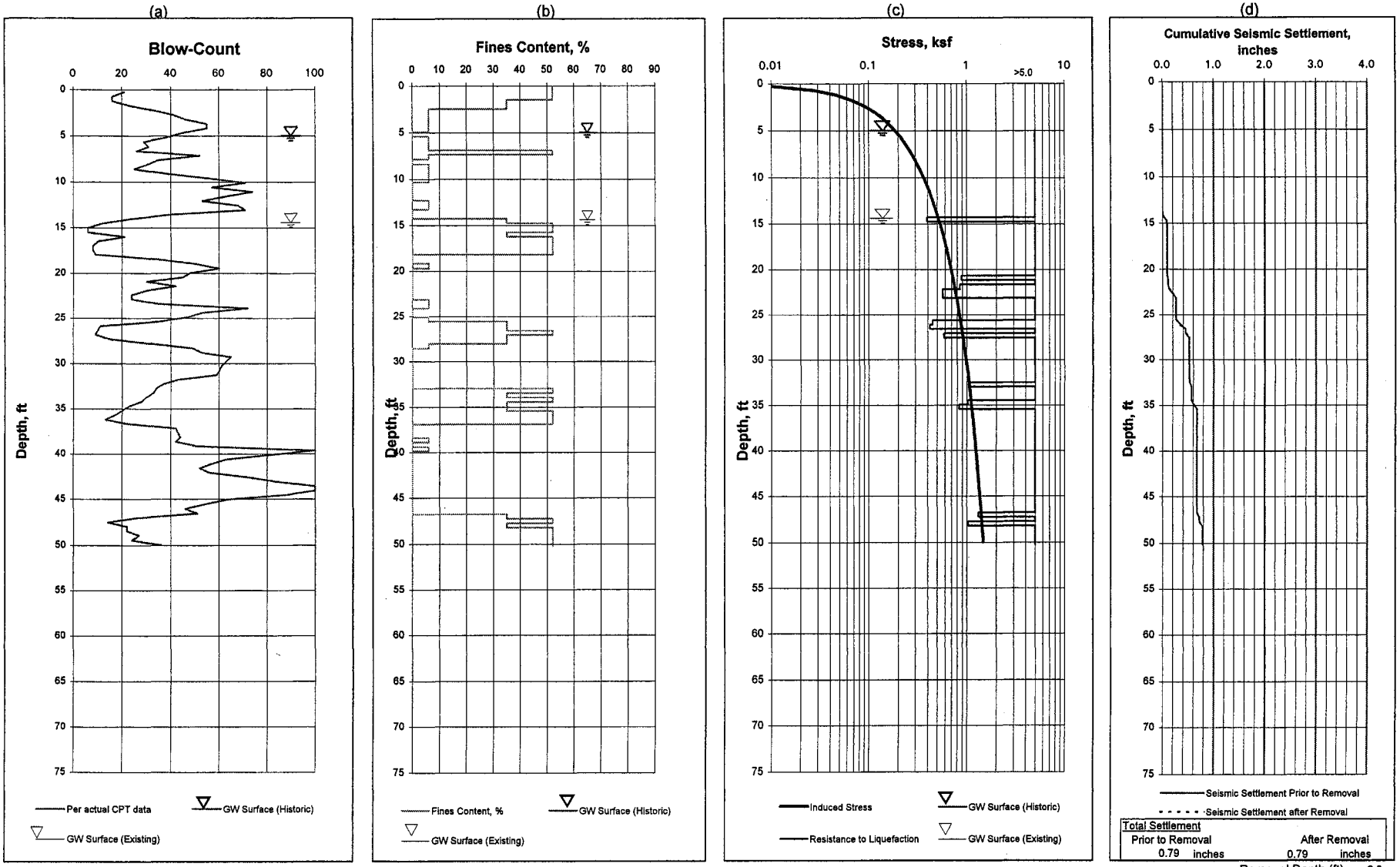
Analysis of Liquefaction Potential Based on N-Value (Interpreted from CPT Data)

Project: T.T. 53425, River Park	Weighted Gr. Acc. (M=7.5).	0.49 g	Project No.	03-1571-4
City of Santa Clarita, California	Design Gr. Acc.(M= 6.5)...	0.71 g	Figure No.	C-15
For: Newhall Land Company	Magnification Factor.....	1	Date.	4-4-2003

Location..... **CPT-16**
Elevation (MSL)..... 1188 ft



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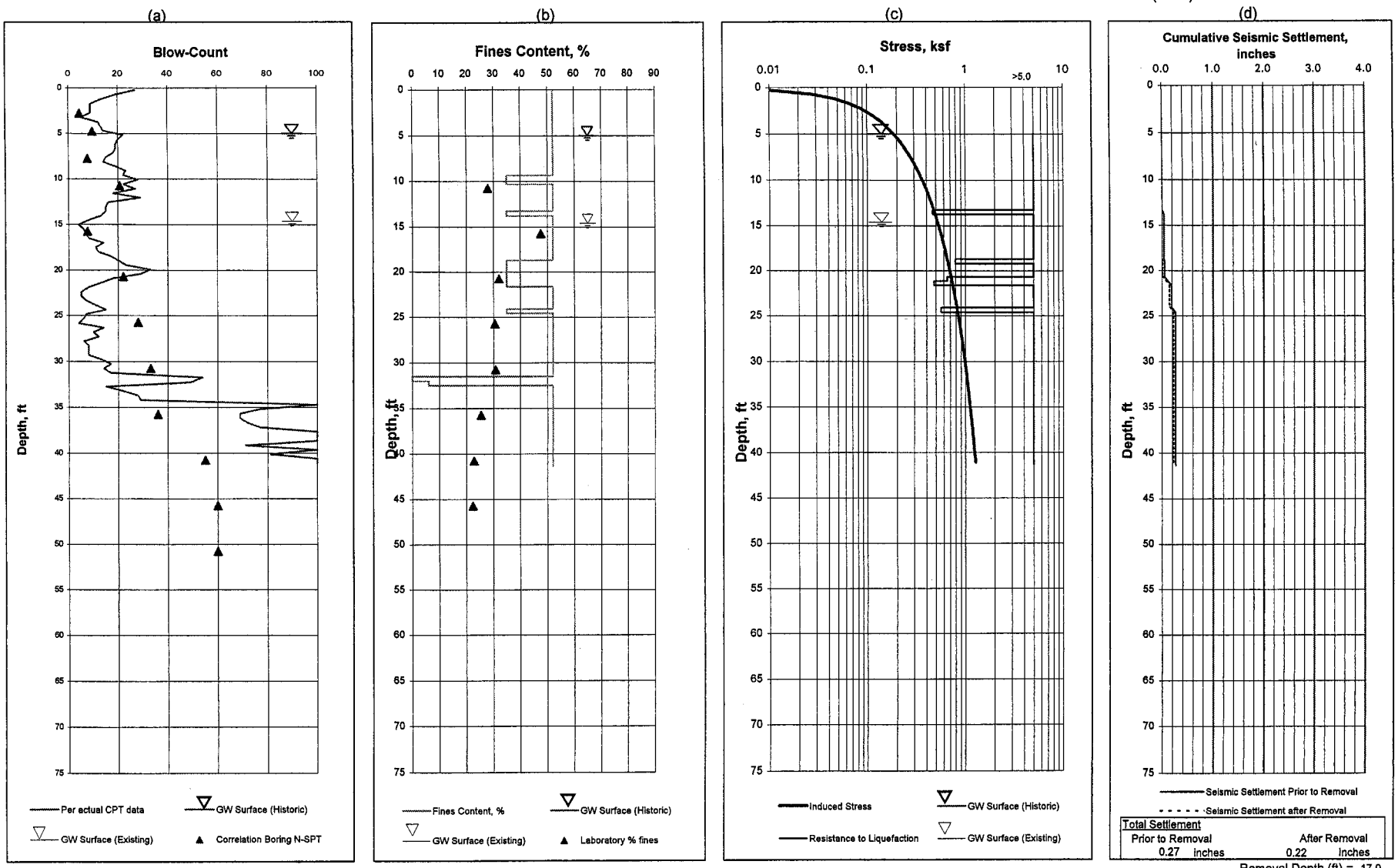
Analysis of Liquefaction Potential Based on N-Value (Interpreted from CPT Data)

Project: T.T. 53425, River Park	Weighted Gr. Acc. (M=7.5).	0.49 g	Project No.	03-1571-4
City of Santa Clarita, California	Design Gr. Acc.(M= 6.5)...	0.71 g	Figure No.	C-16
For: Newhall Land Company	Magnification Factor.....	1	Date.	4-4-2003

Location..... CPT-17 Near RW-2

Elevation (MSL)..... 1192 ft



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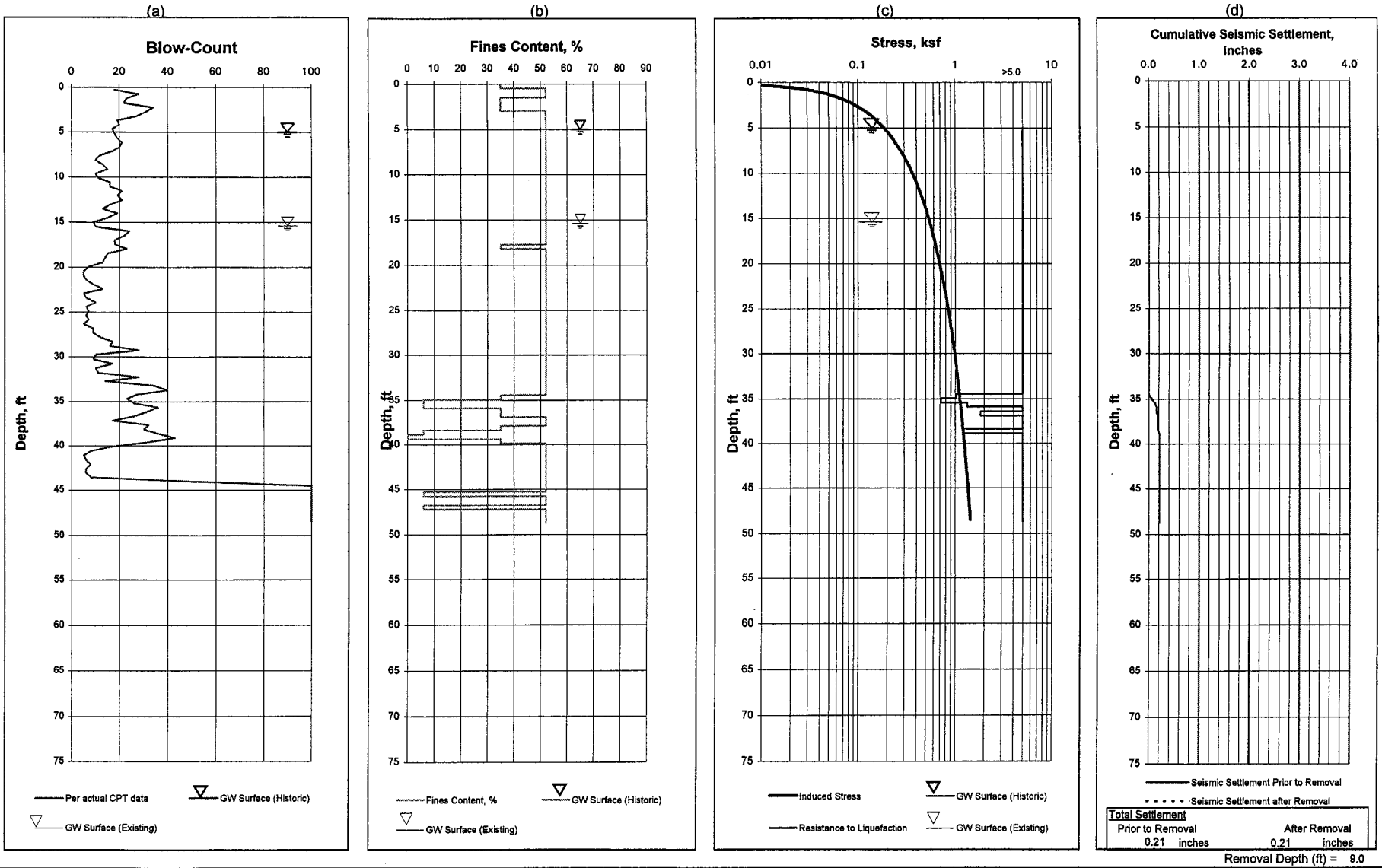
Analysis of Liquefaction Potential Based on N-Value (Interpreted from CPT Data)

Project: T.T. 53425, River Park	Weighted Gr. Acc. (M=7.5).	0.49 g	Project No.	03-1571-4
City of Santa Clarita, California	Design Gr. Acc.(M= 6.5)...	0.71 g	Figure No.	C-17
For: Newhall Land Company	Magnification Factor.....	1	Date.	4-4-2003

Location..... **CPT-18**
Elevation (MSL)..... 1194 ft



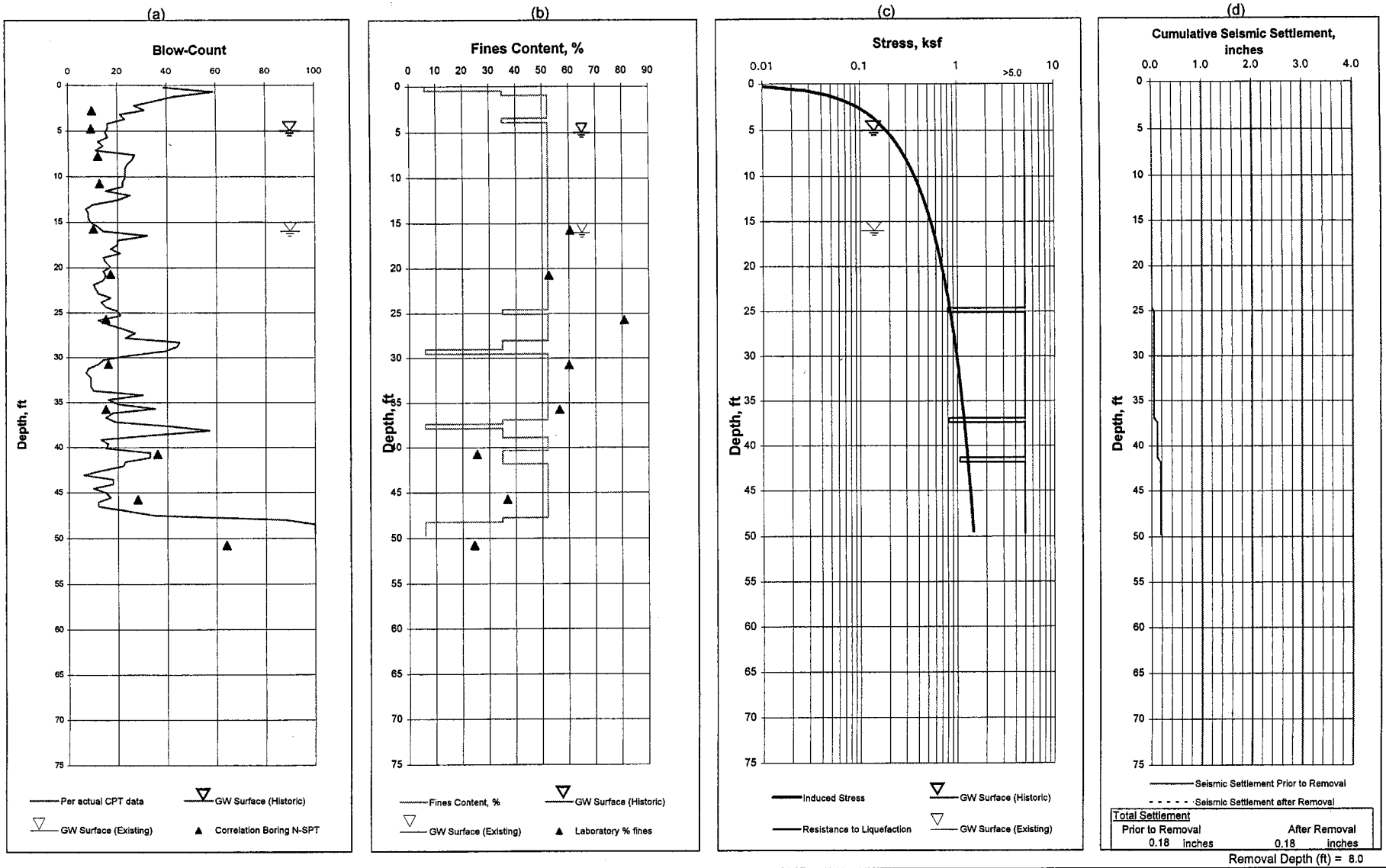
Allan E. Seward Engineering Geology, Inc.
Geological and Geotechnical Consultants

Analysis of Liquefaction Potential Based on N-Value (Interpreted from CPT Data)

Project: T.T. 53425, River Park	Weighted Gr. Acc. (M=7.5).	0.49 g	Project No.	03-1571-4
City of Santa Clarita, California	Design Gr. Acc.(M= 6.5)...	0.71 g	Figure No.	C-18
For: Newhall Land Company	Magnification Factor.....	1	Date.	4-4-2003

Location..... CPT-19 Near RW-4

Elevation (MSL)..... 1193 ft



Removal Depth (ft) = 8.0

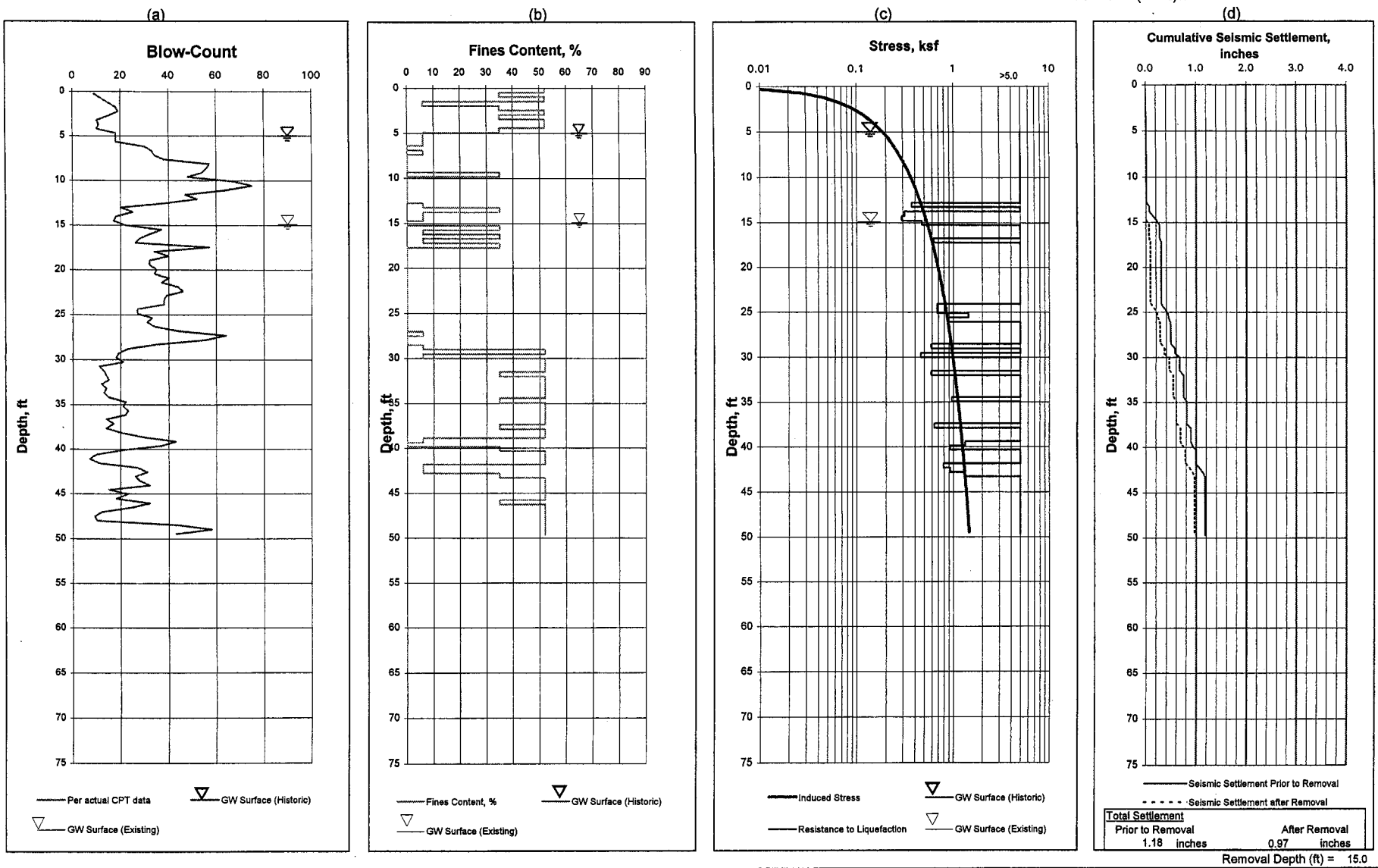
Allan E. Seward Engineering Geology, Inc.

Geological and Geotechnical Consultants

Analysis of Liquefaction Potential Based on N-Value (Interpreted from CPT Data)

Project: T.T. 53425, River Park	Weighted Gr. Acc. (M=7.5).	0.49 g	Project No.	03-1571-4
City of Santa Clarita, California	Design Gr. Acc.(M= 6.5)...	0.71 g	Figure No.	C-19
For: Newhall Land Company	Magnification Factor.....	1	Date.	4-4-2003

Location..... CPT-20
Elevation (MSL)..... 1195 ft

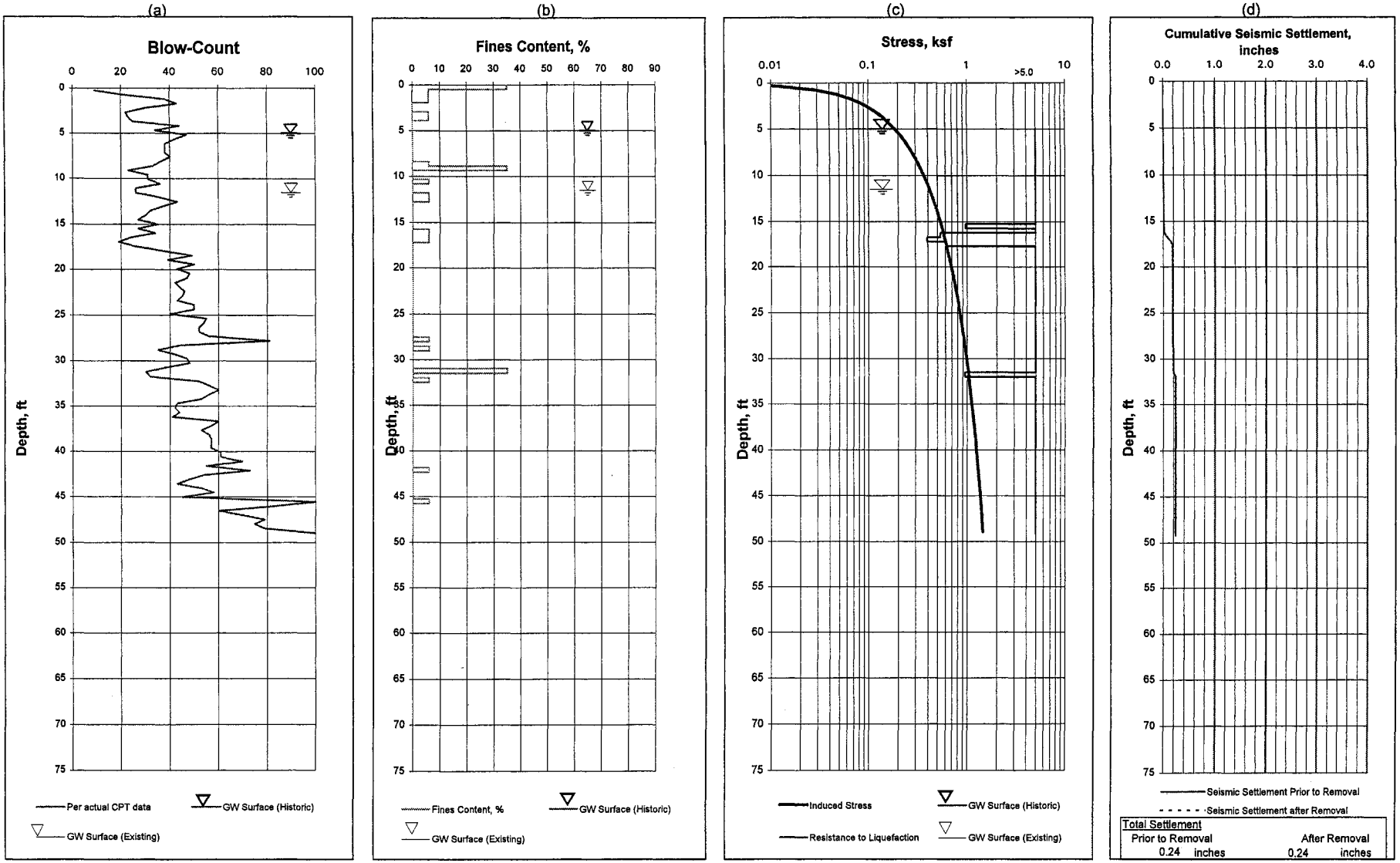


Allan E. Seward Engineering Geology, Inc.
Geological and Geotechnical Consultants

Analysis of Liquefaction Potential Based on N-Value (Interpreted from CPT Data)

Project: T.T. 53425, River Park	Weighted Gr. Acc. (M=7.5).	0.49 g	Project No.	03-1571-4
City of Santa Clarita, California	Design Gr. Acc.(M= 6.5)...	0.71 g	Figure No.	C-20
For: Newhall Land Company	Magnification Factor.....	1	Date.	4-4-2003

Location..... CPT-21
Elevation (MSL)..... 1195 ft



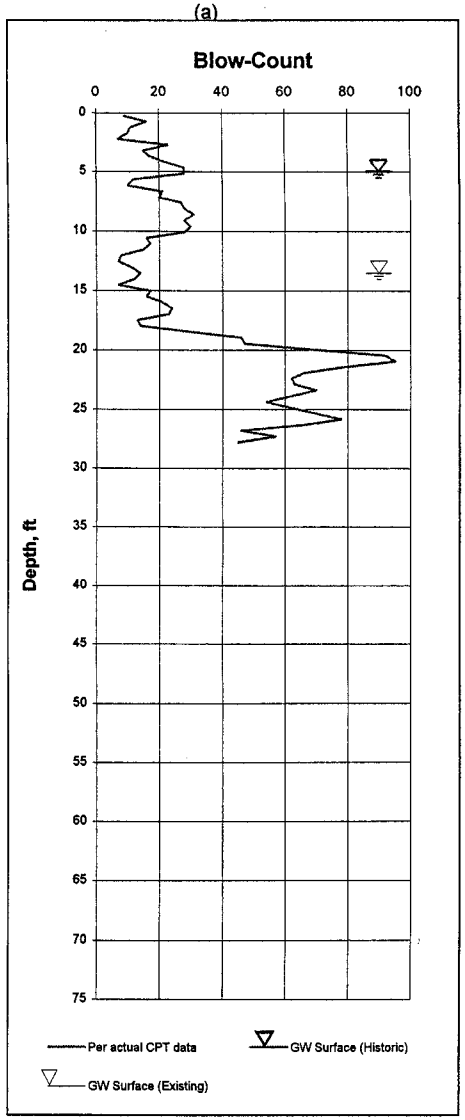
Allan E. Seward Engineering Geology, Inc.
Geological and Geotechnical Consultants

Analysis of Liquefaction Potential Based on N-Value (Interpreted from CPT Data)

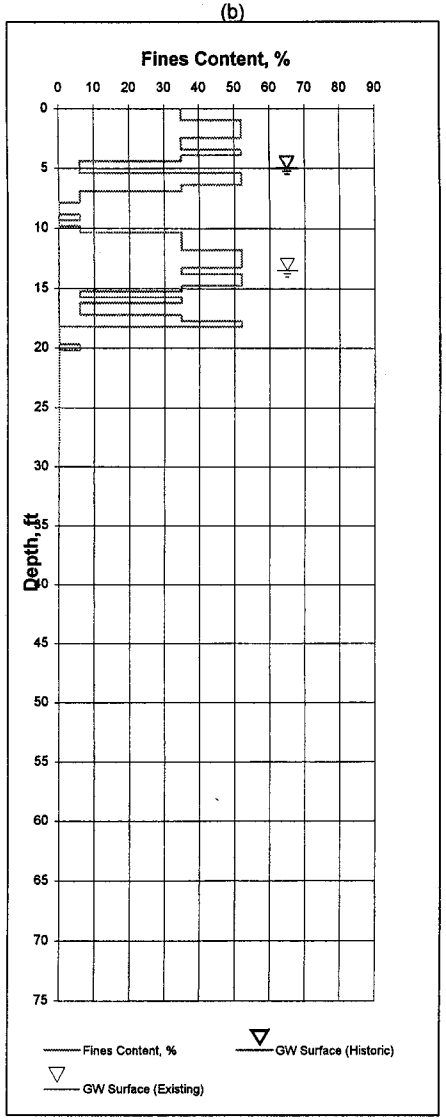
Project: T.T. 53425, River Park	Weighted Gr. Acc. (M=7.5).	0.49 g	Project No.	03-1571-4
City of Santa Clarita, California	Design Gr. Acc.(M= 6.5)...	0.71 g	Figure No.	C-21
For: Newhall Land Company	Magnification Factor.....	1	Date.	4-4-2003

Location..... **CPT-22**
Elevation (MSL)..... 1199 ft

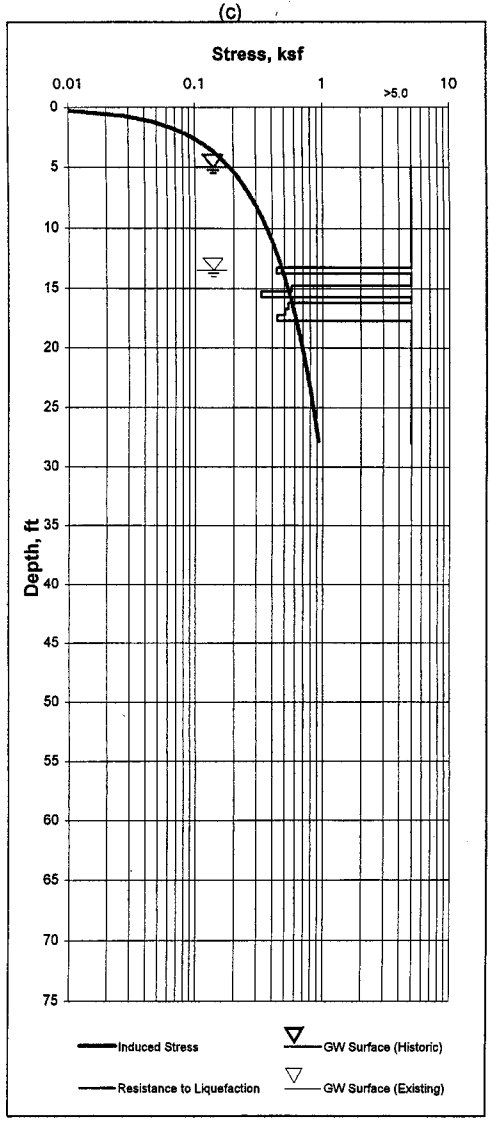
(a)



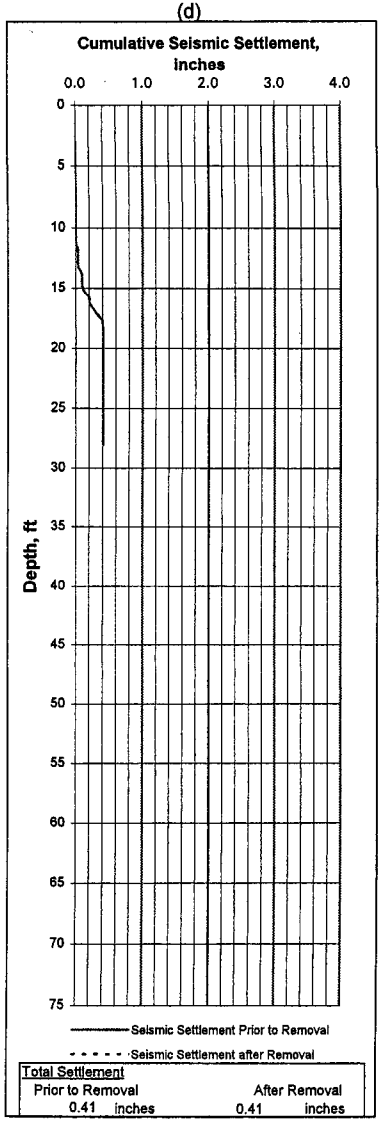
(b)



(c)



(d)



Total Settlement	
Prior to Removal	After Removal
0.41 inches	0.41 inches

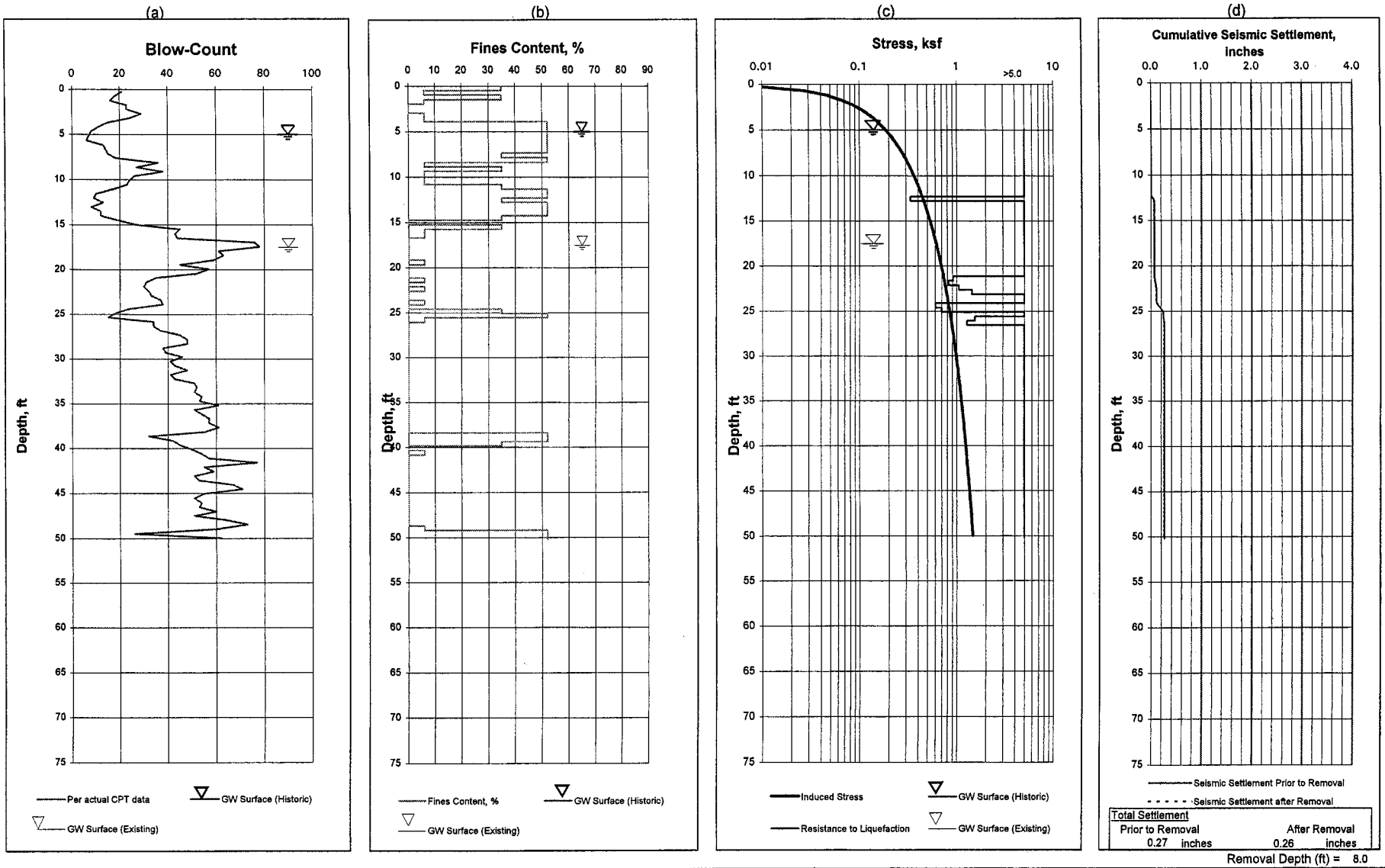
Removal Depth (ft) = 7.0

Allan E. Seward Engineering Geology, Inc.
Geological and Geotechnical Consultants

Analysis of Liquefaction Potential Based on N-Value (Interpreted from CPT Data)

Project: T.T. 53425, River Park	Weighted Gr. Acc. (M=7.5).	0.49 g	Project No.	03-1571-4
City of Santa Clarita, California	Design Gr. Acc.(M= 6.5)...	0.71 g	Figure No.	C-22
For: Newhall Land Company	Magnification Factor.....	1	Date.	4-4-2003

Location..... CPT-23
Elevation (MSL)..... 1206 ft

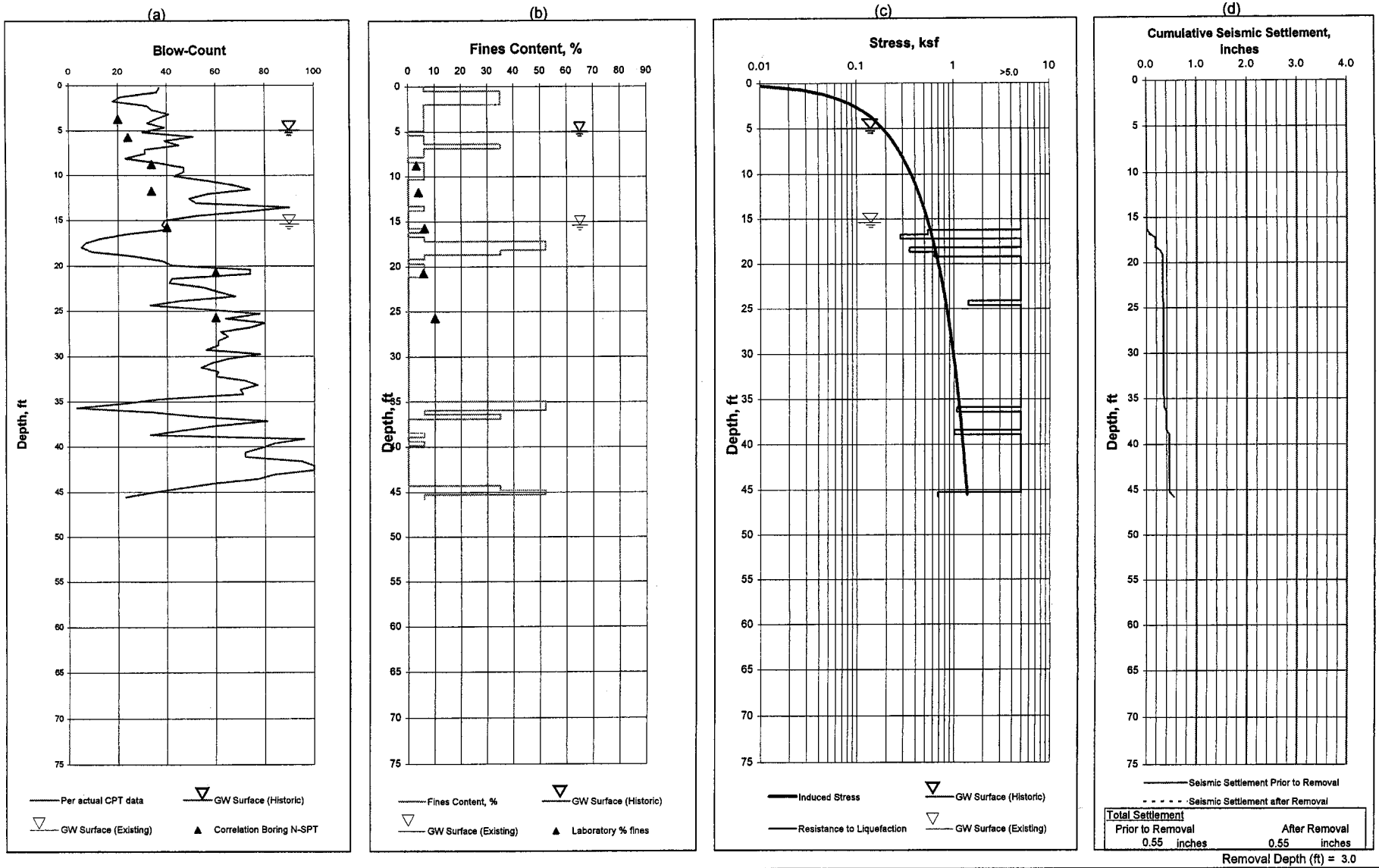


Allan E. Seward Engineering Geology, Inc.
Geological and Geotechnical Consultants

Analysis of Liquefaction Potential Based on N-Value (Interpreted from CPT Data)

Project: T.T. 53425, River Park	Weighted Gr. Acc. (M=7.5).	0.49 g	Project No.	03-1571-4
City of Santa Clarita, California	Design Gr. Acc.(M= 6.5)...	0.71 g	Figure No.	C-23
For: Newhall Land Company	Magnification Factor.....	1	Date.	4-4-2003

Location..... CPT-24 Near RW-1
Elevation (MSL)..... 1205 ft

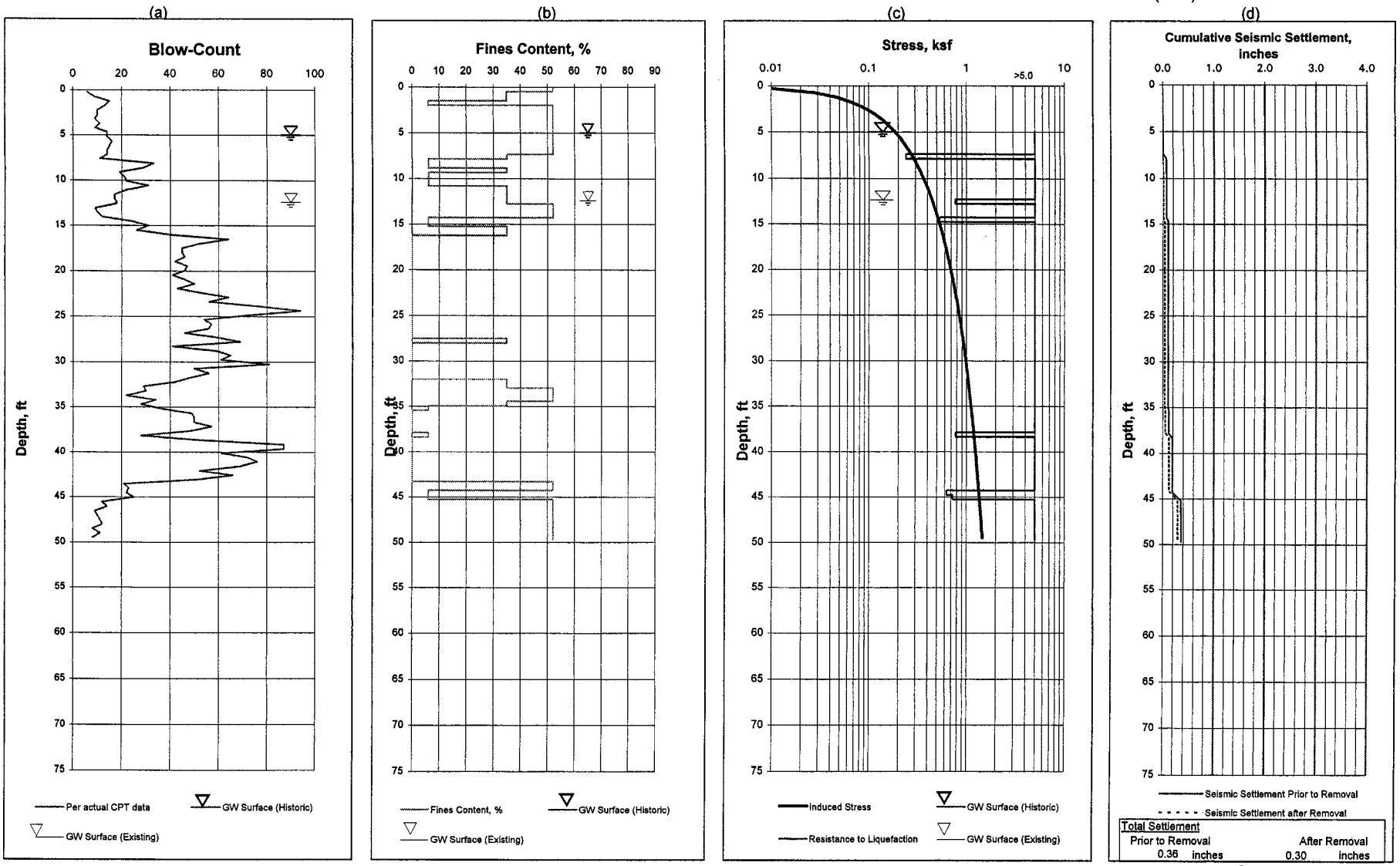


Allan E. Seward Engineering Geology, Inc.
Geological and Geotechnical Consultants

Analysis of Liquefaction Potential Based on N-Value (Interpreted from CPT Data)

Project: T.T. 53425, River Park	Weighted Gr. Acc. (M=7.5).	0.49 g	Project No.	03-1571-4
City of Santa Clarita, California	Design Gr. Acc.(M= 6.5)...	0.71 g	Figure No.	C-24
For: Newhall Land Company	Magnification Factor.....	1	Date.	4-4-2003

Location..... CPT-25
Elevation (MSL)..... 1208 ft

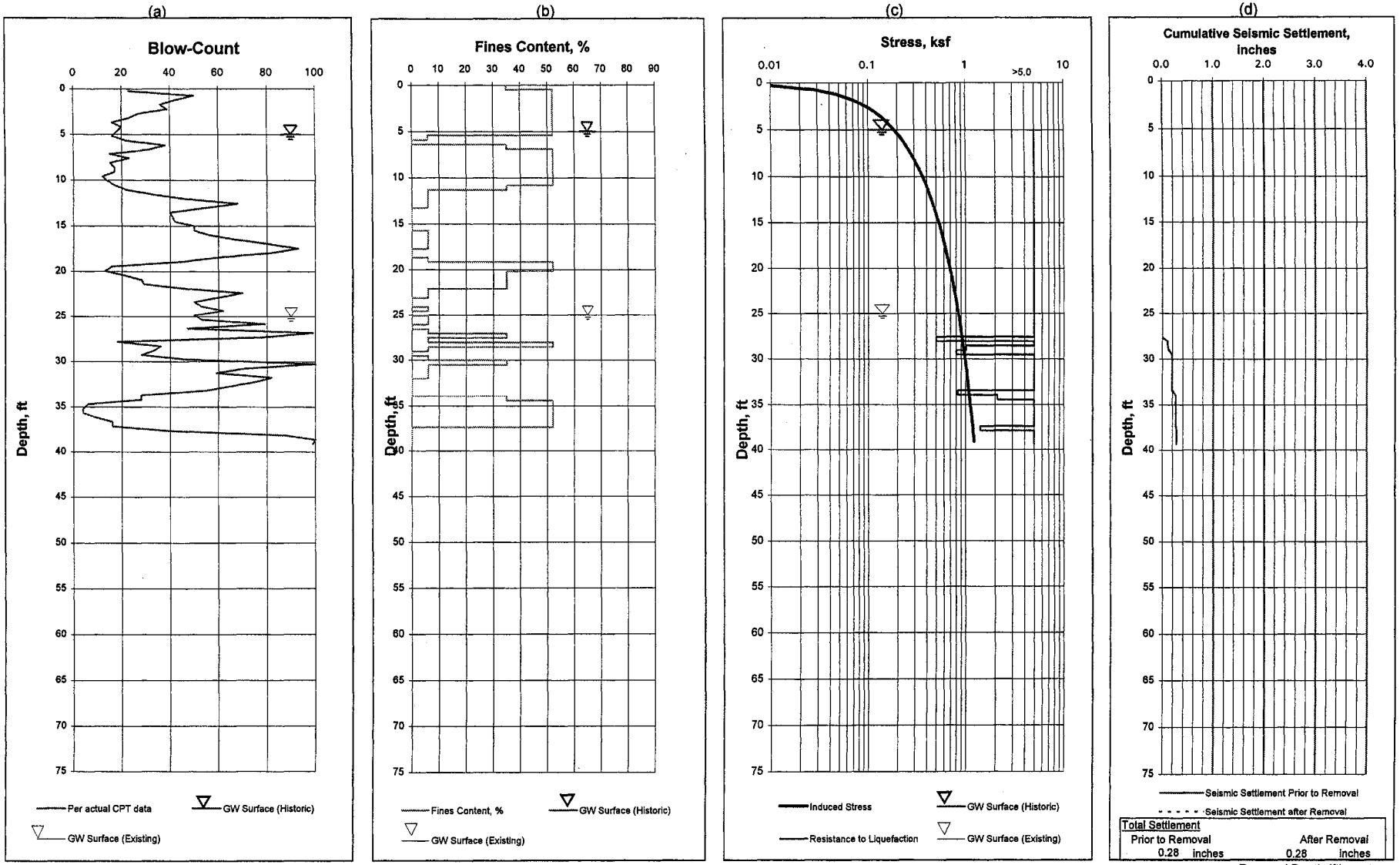


Allan E. Seward Engineering Geology, Inc.
Geological and Geotechnical Consultants

Analysis of Liquefaction Potential Based on N-Value (Interpreted from CPT Data)

Project: T.T. 53425, River Park	Weighted Gr. Acc. (M=7.5).	0.49 g	Project No.	03-1571-4
City of Santa Clarita, California	Design Gr. Acc.(M= 6.5)...	0.71 g	Figure No.	C-25
For: Newhall Land Company	Magnification Factor.....	1	Date.	4-4-2003

Location..... CPT-26
Elevation (MSL)..... 1176 ft

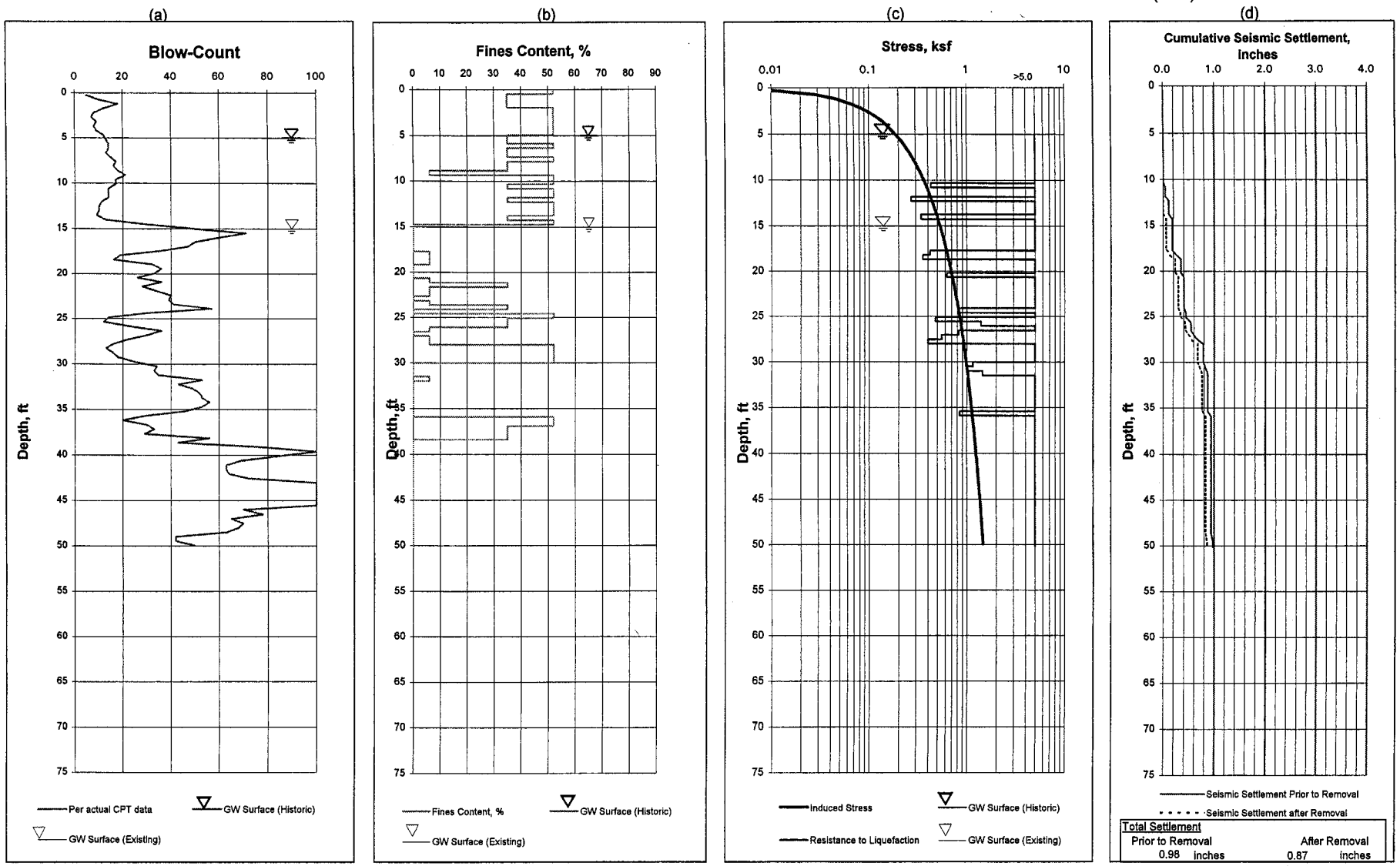


Allan E. Seward Engineering Geology, Inc.
Geological and Geotechnical Consultants

Analysis of Liquefaction Potential Based on N-Value (Interpreted from CPT Data)

Project: T.T. 53425, River Park	Weighted Gr. Acc. (M=7.5).	0.49 g	Project No.	03-1571-4
City of Santa Clarita, California	Design Gr. Acc.(M= 6.5)...	0.71 g	Figure No.	C-26
For: Newhall Land Company	Magnification Factor.....	1	Date.	4-4-2003

Location..... CPT-27
Elevation (MSL)..... 1210 ft

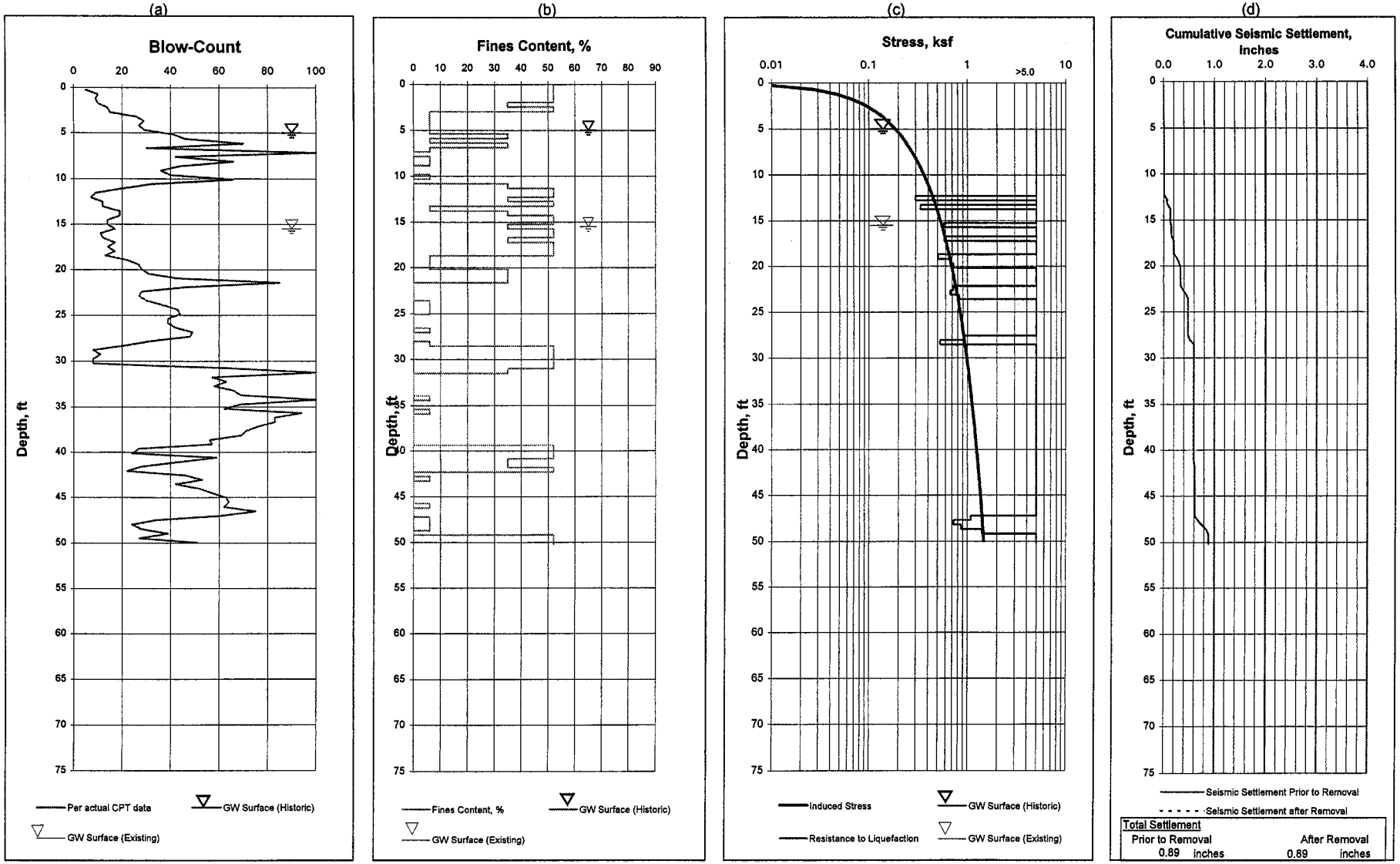


Allan E. Seward Engineering Geology, Inc.
Geological and Geotechnical Consultants

Analysis of Liquefaction Potential Based on N-Value (Interpreted from CPT Data)

Project: T.T. 53425, River Park	Weighted Gr. Acc. (M=7.5).	0.49 g	Project No.	03-1571-4
City of Santa Clarita, California	Design Gr. Acc.(M= 6.5)...	0.71 g	Figure No.	C-27
For: Newhall Land Company	Magnification Factor.....	1	Date.	4-4-2003

Location..... CPT-28
Elevation (MSL)..... 1209 ft

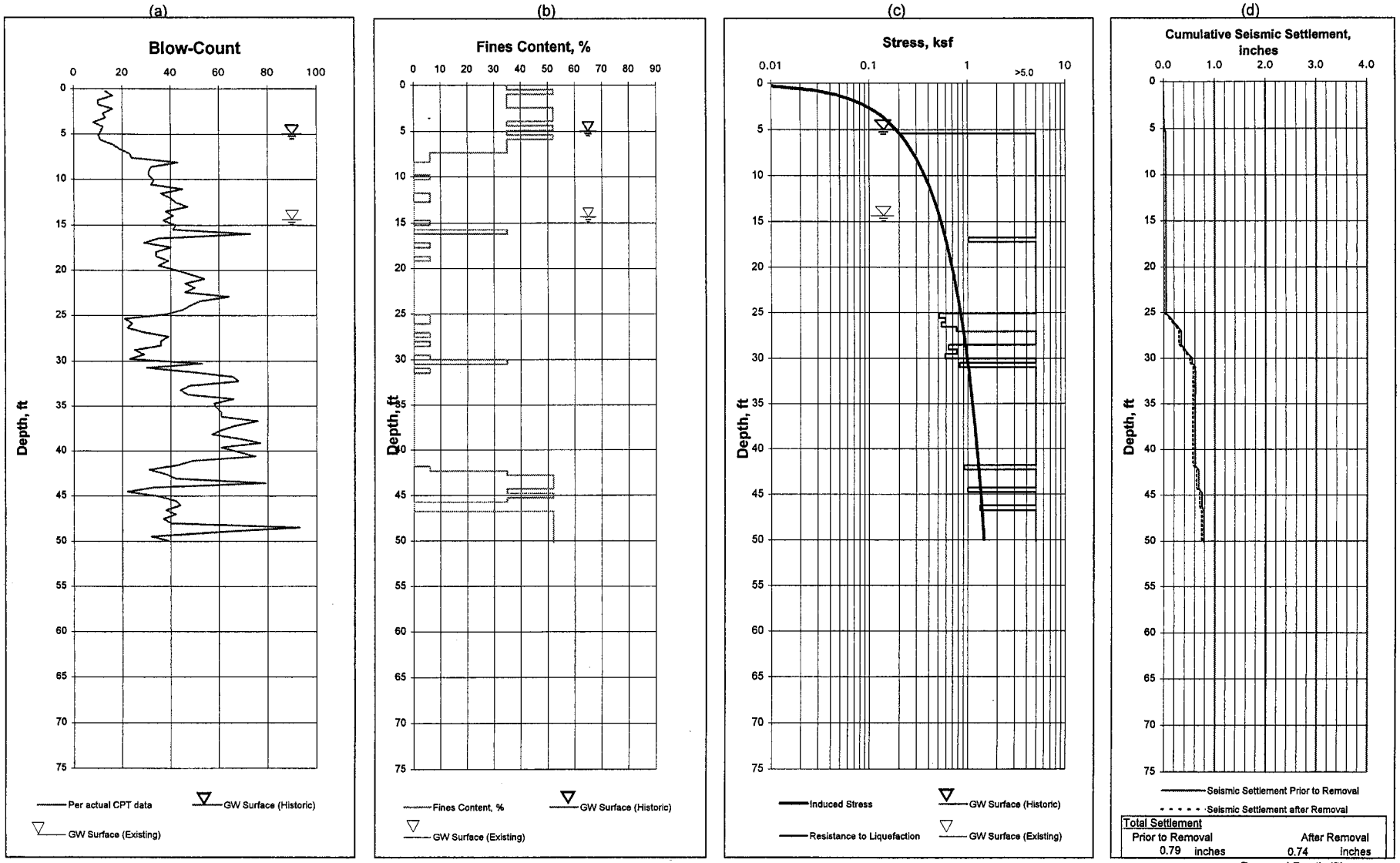


Allan E. Seward Engineering Geology, Inc.
Geological and Geotechnical Consultants

Analysis of Liquefaction Potential Based on N-Value (Interpreted from CPT Data)

Project: T.T. 53425, River Park	Weighted Gr. Acc. (M=7.5).	0.49 g	Project No.	03-1571-4
City of Santa Clarita, California	Design Gr. Acc.(M= 6.5)...	0.71 g	Figure No.	C-28
For: Newhall Land Company	Magnification Factor.....	1	Date.	4-4-2003

Location..... CPT-29
Elevation (MSL)..... 1210 ft

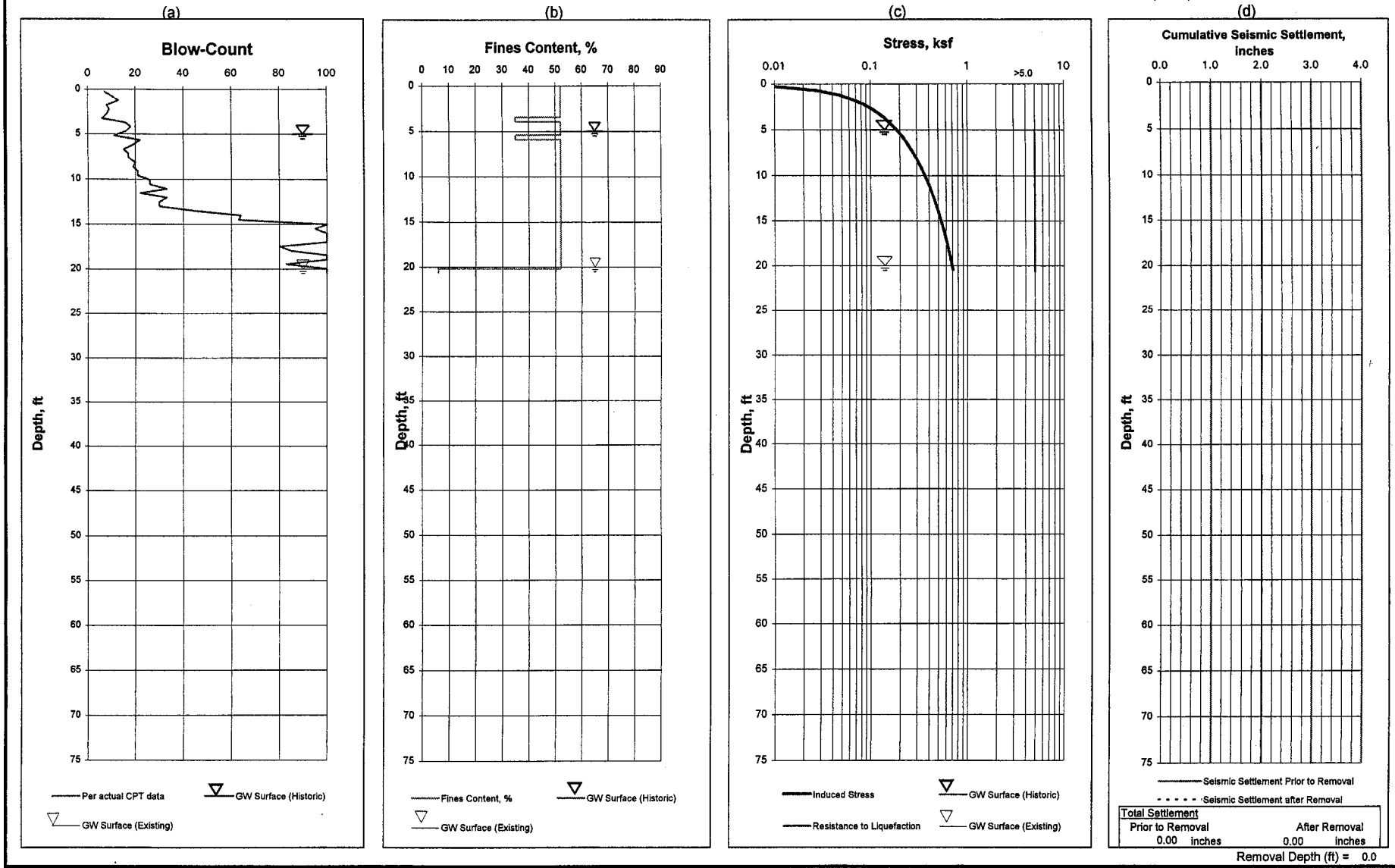


Allan E. Seward Engineering Geology, Inc.
Geological and Geotechnical Consultants

Analysis of Liquefaction Potential Based on N-Value (Interpreted from CPT Data)

Project: T.T. 53425, River Park	Weighted Gr. Acc. (M=7.5).	0.49 g	Project No.	03-1571-4
City of Santa Clarita, California	Design Gr. Acc.(M= 6.5)...	0.71 g	Figure No.	C-29
For: Newhall Land Company	Magnification Factor.....	1	Date.	4-4-2003

Location..... CPT-30
Elevation (MSL)..... 1214 ft

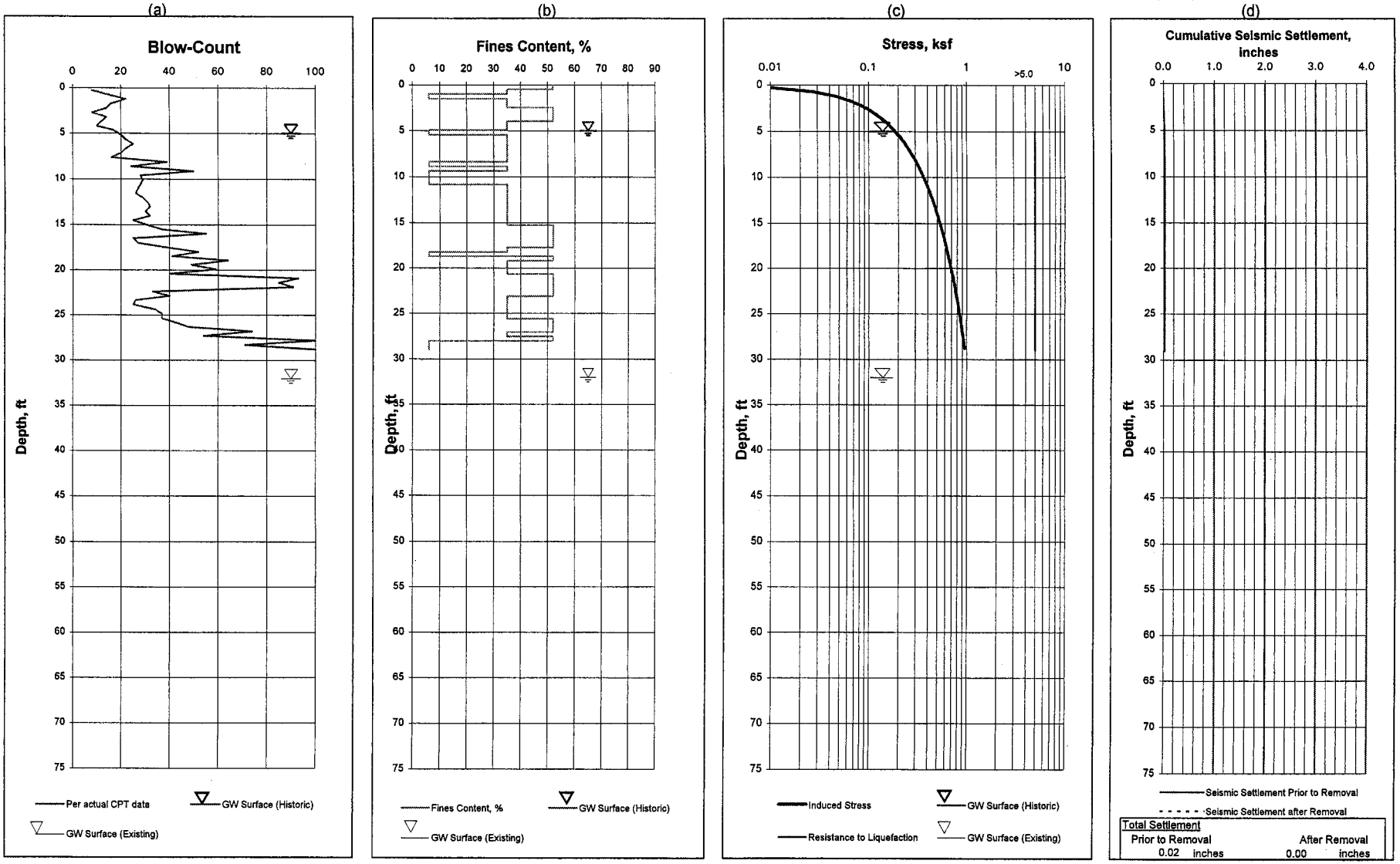


Allan E. Seward Engineering Geology, Inc.
Geological and Geotechnical Consultants

Analysis of Liquefaction Potential Based on N-Value (Interpreted from CPT Data)

Project: T.T. 53425, River Park	Weighted Gr. Acc. (M=7.5).	0.49 g	Project No.	03-1571-4
City of Santa Clarita, California	Design Gr. Acc.(M= 6.5)...	0.71 g	Figure No.	C-30
For: Newhall Land Company	Magnification Factor.....	1	Date.	4-4-2003

Location..... CPT-31a
Elevation (MSL)..... 1261 ft



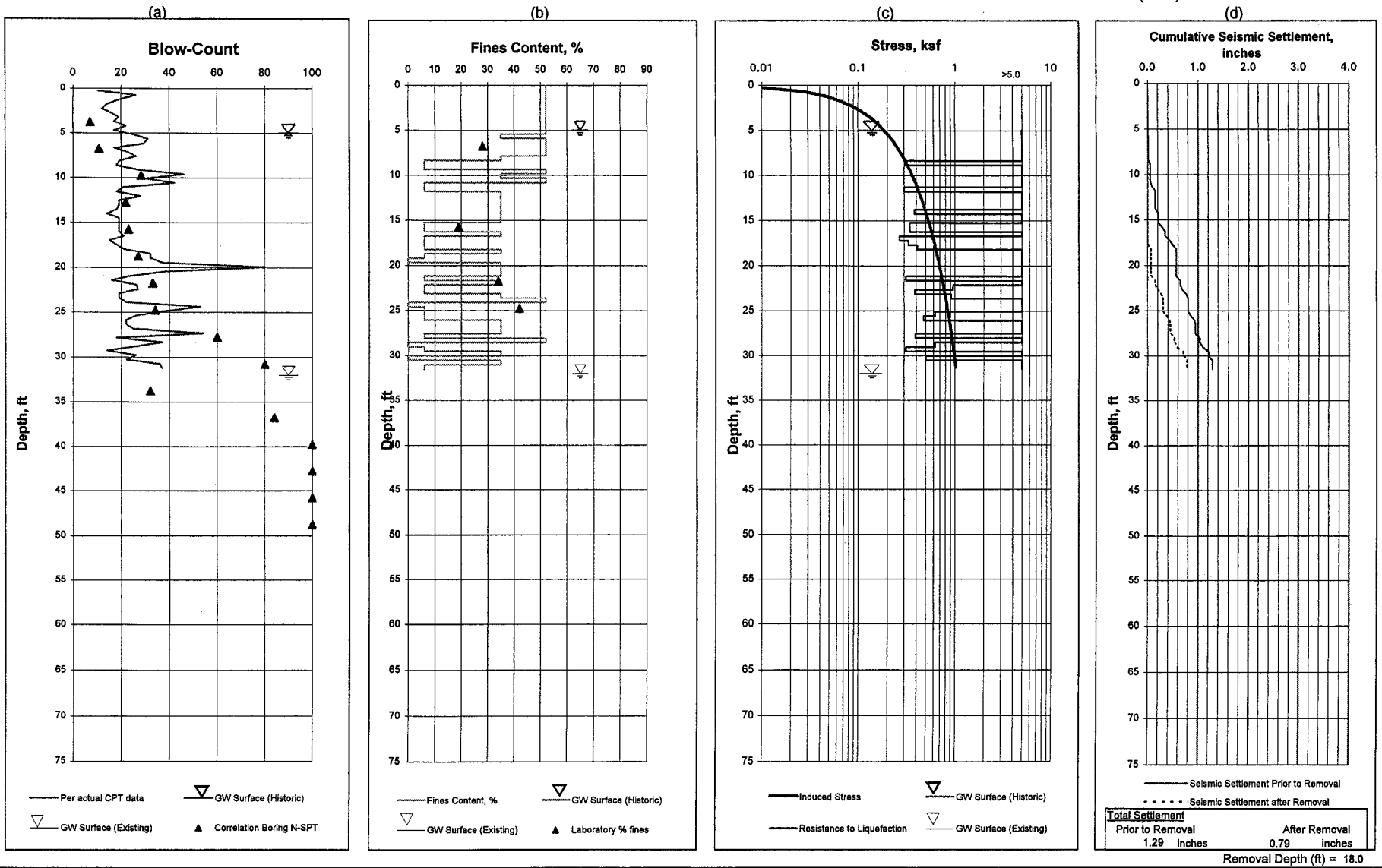
Allan E. Seward Engineering Geology, Inc.
Geological and Geotechnical Consultants

Analysis of Liquefaction Potential Based on N-Value (Interpreted from CPT Data)

Project: T.T. 53425, River Park	Weighted Gr. Acc. (M=7.5).	0.49 g	Project No.	03-1571-4
City of Santa Clarita, California	Design Gr. Acc.(M= 6.50)...	0.71 g	Figure No.	C-31
For: Newhall Land Company	Magnification Factor.....	1	Date.	4-4-2003

Location..... CPT-32b Near RW-9

Elevation (MSL)..... 1270 ft



Allan E. Seward Engineering Geology, Inc.

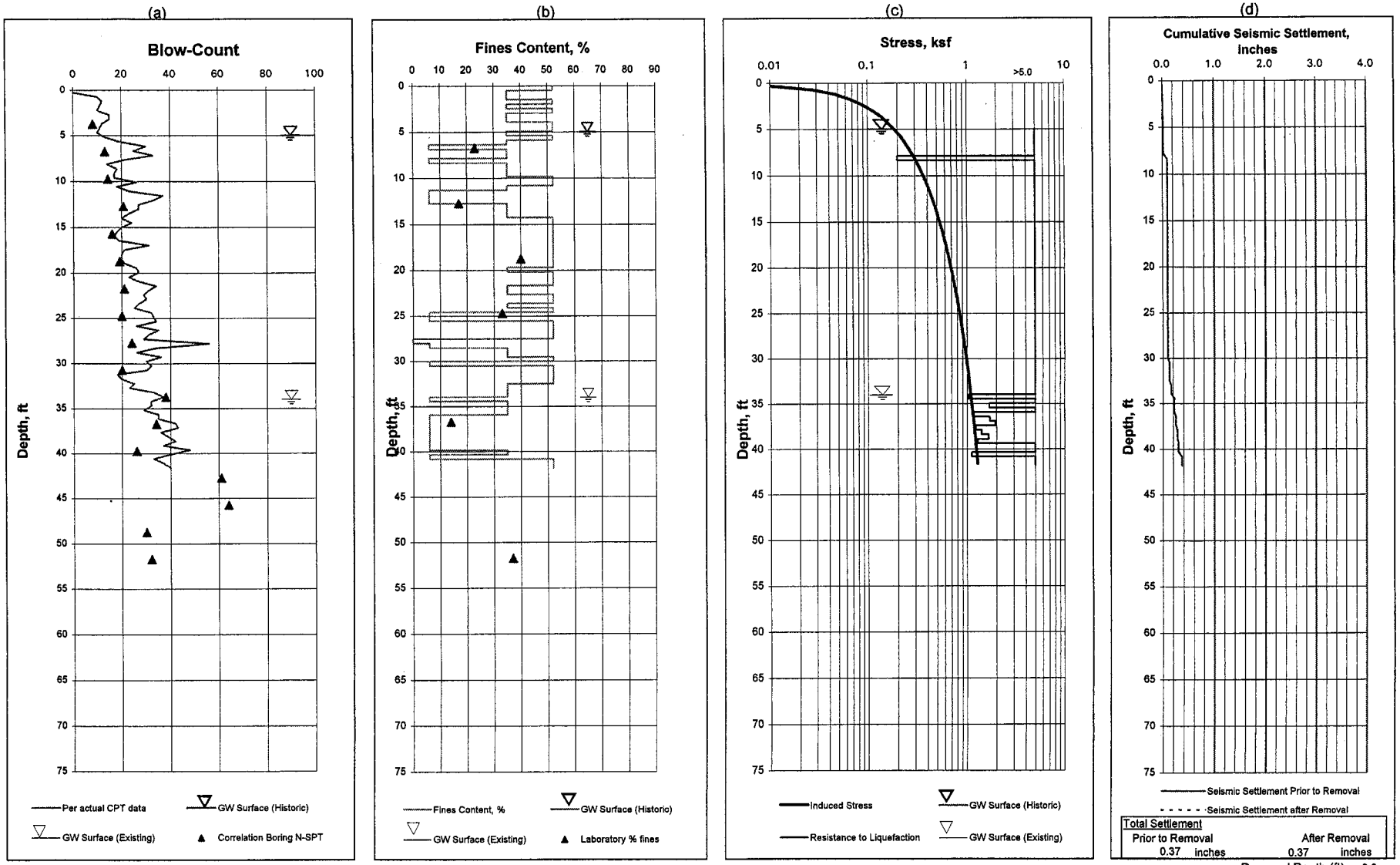
Geological and Geotechnical Consultants

Analysis of Liquefaction Potential Based on N-Value (Interpreted from CPT Data)

Project: T.T. 53425, River Park	Weighted Gr. Acc. (M=7.5).	0.49 g	Project No.	03-1571-4
City of Santa Clarita, California	Design Gr. Acc.(M= 6.5)...	0.71 g	Figure No.	C-32
For: Newhall Land Company	Magnification Factor.....	1	Date.	4-4-2003

Location..... CPT-33 Near RW-10

Elevation (MSL)..... 1266 ft



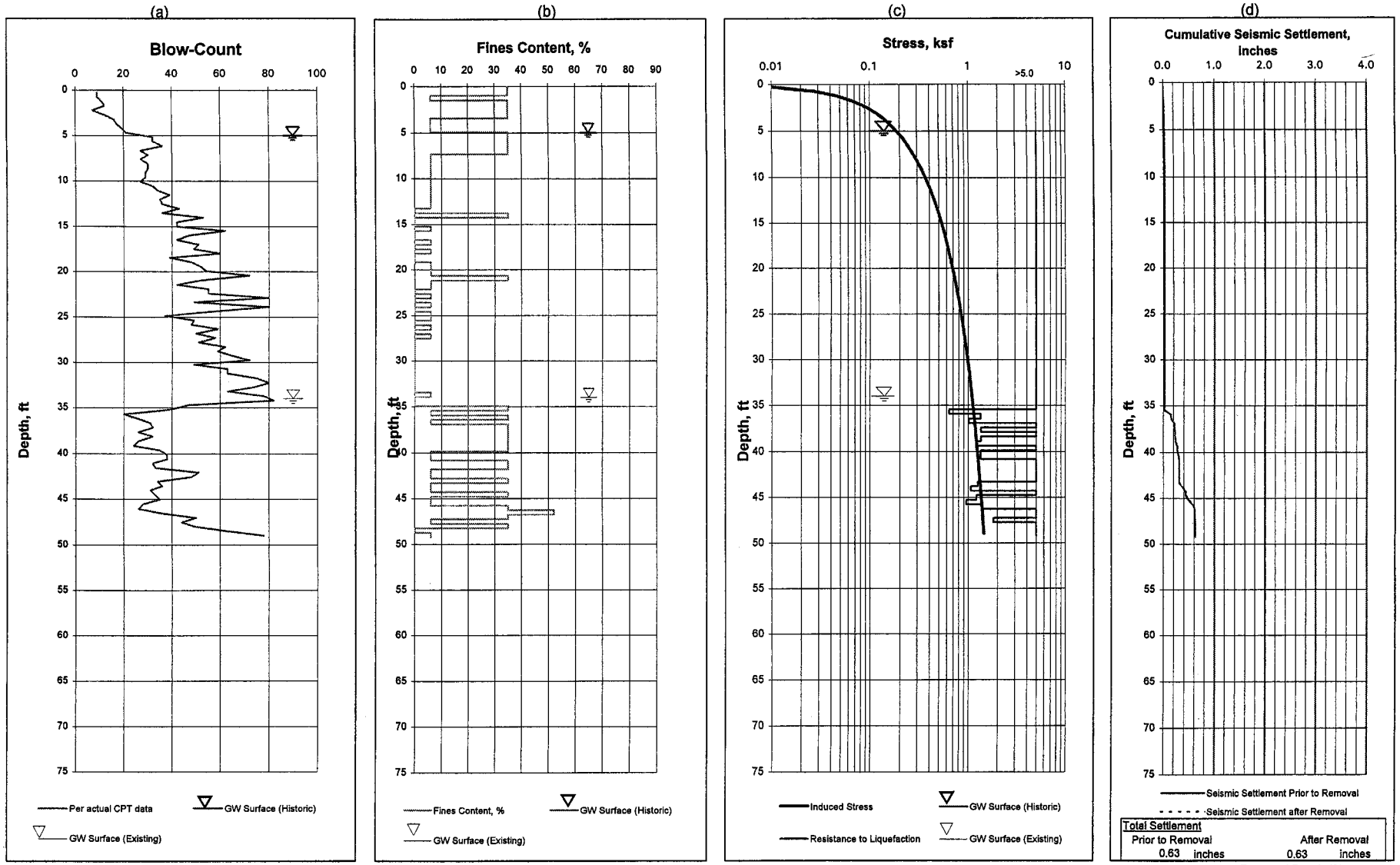
Allan E. Seward Engineering Geology, Inc.

Geological and Geotechnical Consultants

Analysis of Liquefaction Potential Based on N-Value (Interpreted from CPT Data)

Project: T.T. 53425, River Park	Weighted Gr. Acc. (M=7.5).	0.49 g	Project No.	03-1571-4
City of Santa Clarita, California	Design Gr. Acc.(M= 6.5)...	0.71 g	Figure No.	C-33
For: Newhall Land Company	Magnification Factor.....	1	Date.	4-4-2003

Location..... **CPT-34a**
Elevation (MSL)..... 1278 ft

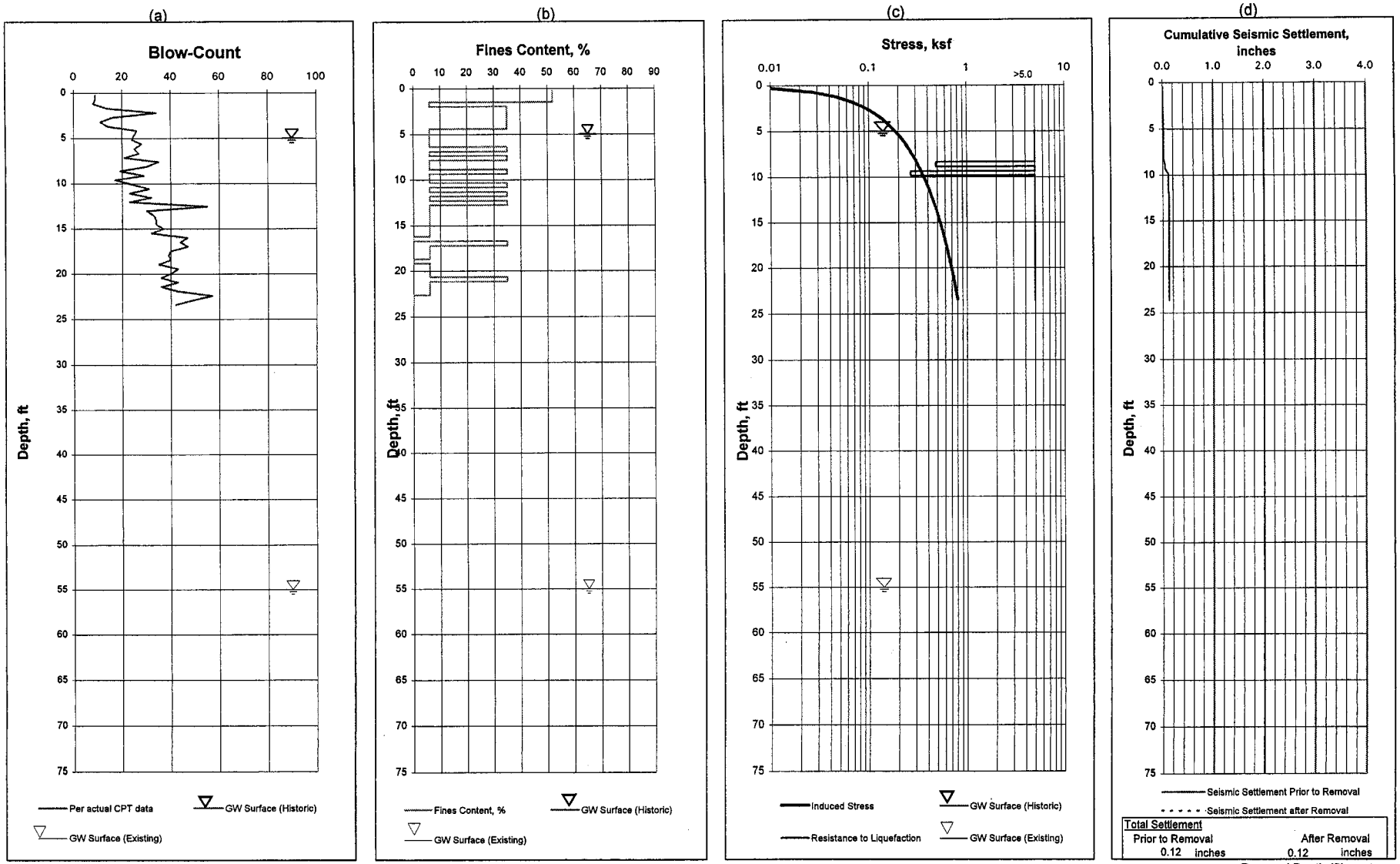


Allan E. Seward Engineering Geology, Inc.
Geological and Geotechnical Consultants

Analysis of Liquefaction Potential Based on N-Value (Interpreted from CPT Data)

Project: T.T. 53425, River Park	Weighted Gr. Acc. (M=7.5).	0.49 g	Project No.	03-1571-4
City of Santa Clarita, California	Design Gr. Acc.(M= 6.50)...	0.71 g	Figure No.	C-34
For: Newhall Land Company	Magnification Factor.....	1	Date.	4-4-2003

Location..... **CPT-35a**
Elevation (MSL)..... 1282 ft



Removal Depth (ft) = 0.0

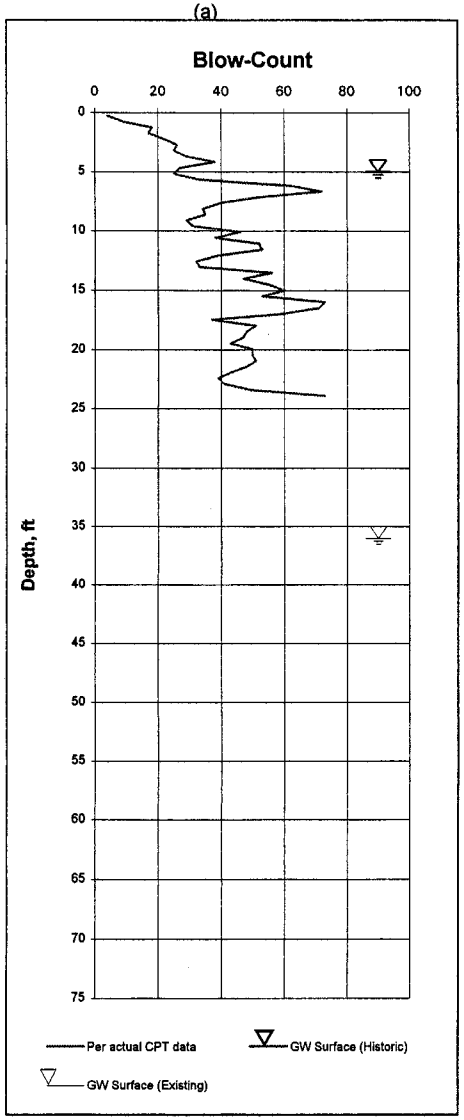
Allan E. Seward Engineering Geology, Inc.
Geological and Geotechnical Consultants

Analysis of Liquefaction Potential Based on N-Value (Interpreted from CPT Data)

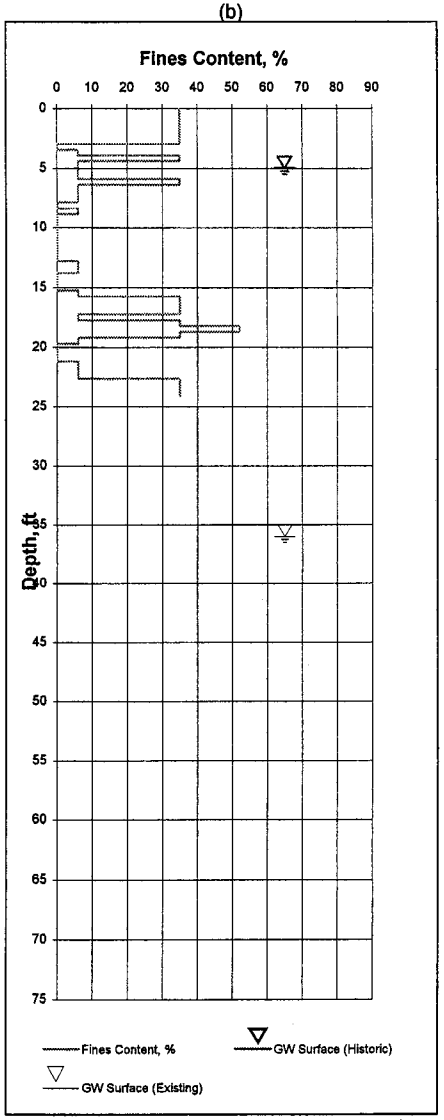
Project: T.T. 53425, River Park	Weighted Gr. Acc. (M=7.5).	0.49 g	Project No.	03-1571-4
City of Santa Clarita, California	Design Gr. Acc.(M= 6.50)...	0.71 g	Figure No.	C-35
For: Newhall Land Company	Magnification Factor.....	1	Date.	4-4-2003

Location..... **CPT-36**
Elevation (MSL)..... 1294 ft

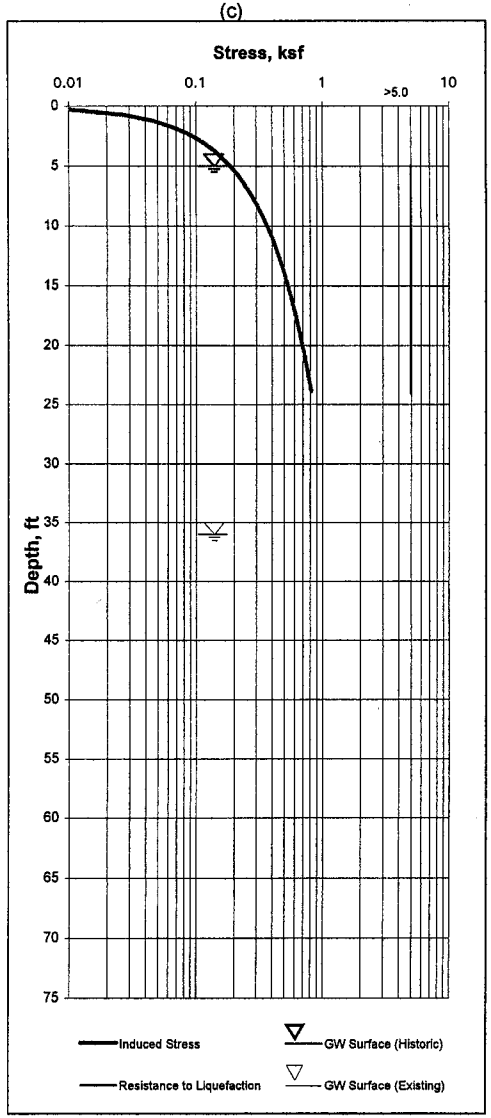
(a)



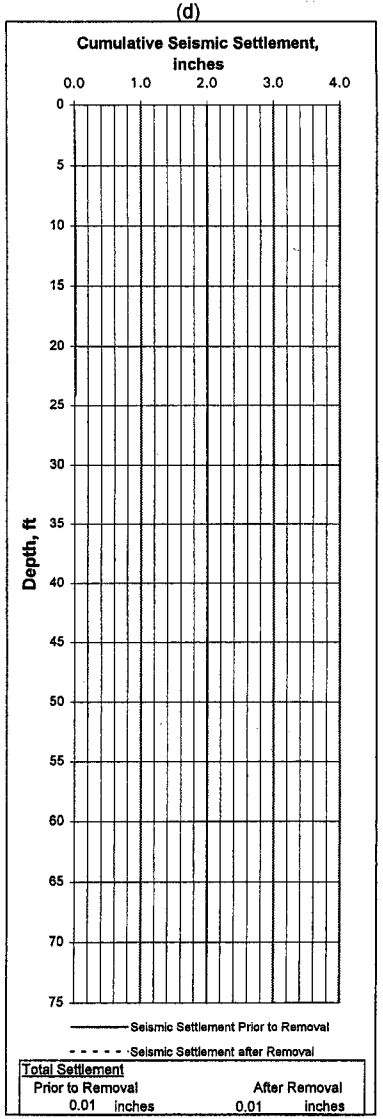
(b)



(c)



(d)



Total Settlement	
Prior to Removal	After Removal
0.01 inches	0.01 inches

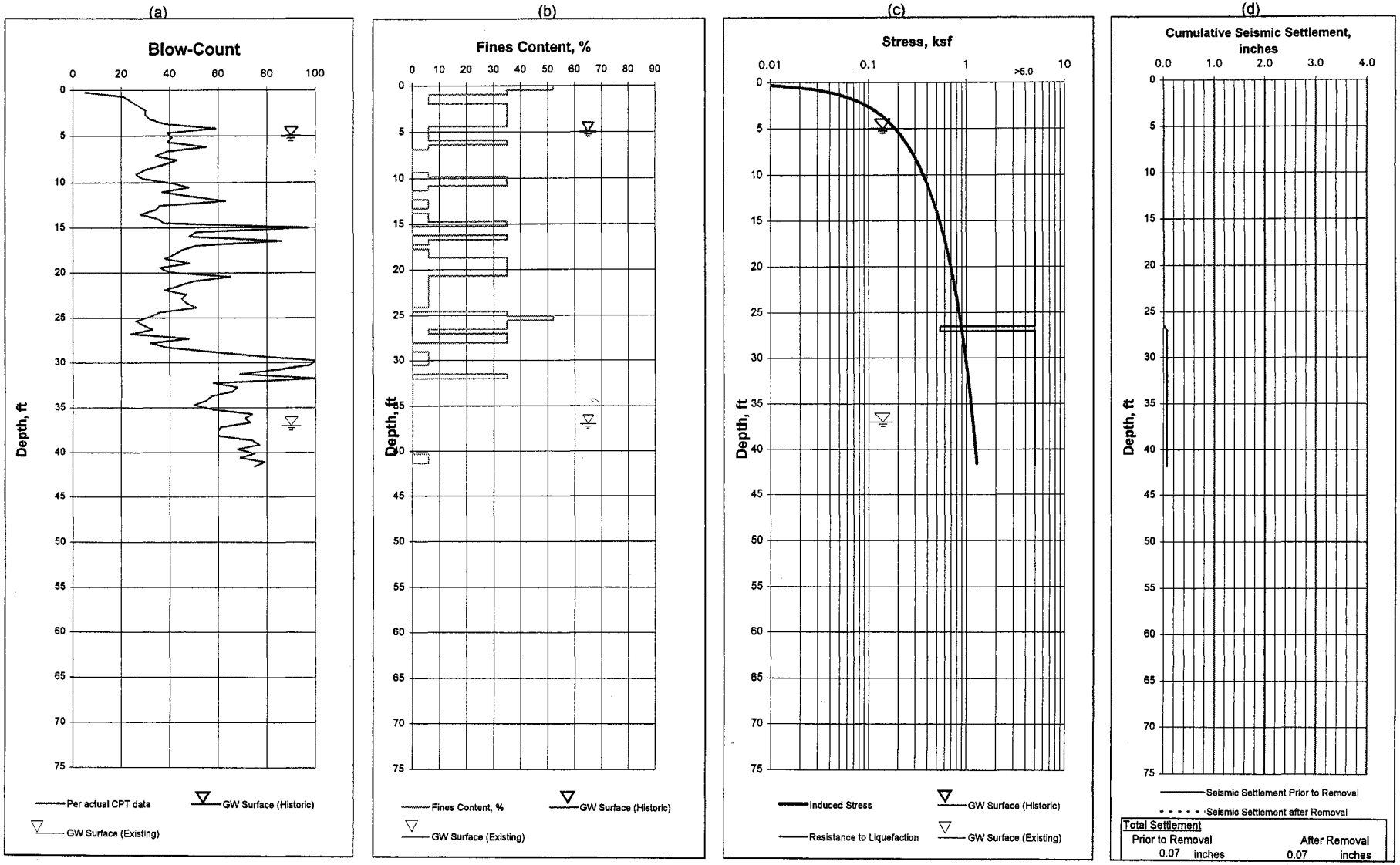
Removal Depth (ft) = 0.0

Allan E. Seward Engineering Geology, Inc.
Geological and Geotechnical Consultants

Analysis of Liquefaction Potential Based on N-Value (Interpreted from CPT Data)

Project: T.T. 53425, River Park	Weighted Gr. Acc. (M=7.5).	0.49 g	Project No.	03-1571-4
City of Santa Clarita, California	Design Gr. Acc.(M= 6.50)...	0.71 g	Figure No.	C-36
For: Newhall Land Company	Magnification Factor.....	1	Date.	4-4-2003

Location..... **CPT-37**
Elevation (MSL)..... 1304 ft



Allan E. Seward Engineering Geology, Inc.
Geological and Geotechnical Consultants

Analysis of Liquefaction Potential Based on N-Value (Interpreted from CPT Data)

Project: T.T. 53425, River Park	Weighted Gr. Acc. (M=7.5). 0.49 g	Project No.	03-1571-4
City of Santa Clarita, California	Design Gr. Acc.(M= 6.50)... 0.71 g	Figure No.	C-37
For: Newhall Land Company	Magnification Factor..... 1	Date.	4-4-2003

Appendix D

APPENDIX D

SEISMICITY

1.0 EVALUATION OF POTENTIAL SEISMIC HAZARDS

1.1 Ground Motion

1.1.1 Introduction

Ground motion is generated during an earthquake as two blocks of the earth's crust slip past each other. The intensity of ground motion at a specific site is controlled primarily by the magnitude of the earthquake and the distance from the epicenter and/or ground rupture area. Ground motion generally increases with increasing magnitude and is generally greatest near the epicenter and/or rupture area, and decreases (attenuates) with increasing distance. However, the ground motion measured at a given site is modified by a number of factors including focal depth, proximity to projected or actual fault rupture, fault mechanism, duration of shaking, local geologic structure, source direction of earthquake, underlying earth material characteristics, and topography. All of these factors make it difficult to accurately predict potential ground motions at a given site in the geologically and topographically complex Southern California area.

Current methods used to evaluate future potential ground motions are based on the review of historic earthquakes and statistical distributions of both rupture dimensions and ground motions generated during these earthquakes. Three primary procedures are currently in use to evaluate potential ground motions at a site:

1. Review of ground motions recorded during historic earthquakes
2. Deterministic seismic hazard analysis (DSHA)
3. Probabilistic seismic hazard analysis (PSHA)

Procedure number one involves the use of historically recorded earthquake magnitudes and ground accelerations to estimate accelerations, which have occurred at a given site during known earthquake events. Deterministic analysis (DSHA) utilizes maximum potential magnitude values for each significant fault to estimate maximum potential ground accelerations at a site without reference to a specific time frame. A probabilistic analysis (PSHA) evaluates potential earthquake magnitudes and accelerations based on historic earthquake data and interpreted slip rates for each

fault to estimate potential accelerations anticipated within a particular time frame (return period) of interest.

Review of Guidelines for Evaluating and Mitigating Seismic Hazards in California (CDCDMG, 1997) indicates that potential ground motion should be evaluated using simple prescribed parameter values derived from published State maps (Petersen, et al., 1996; SHMA Quadrangle Maps) or by site specific probabilistic or deterministic analyses where sites are in close proximity to seismic sources. In accordance with current State guidelines for geotechnical and geologic reports, we have evaluated potential ground motions at the site with a probabilistic procedure, utilizing the computer program FRISKSP by Thomas Blake and compared our estimate with the Seismic Hazard Map for the Newhall Quadrangle. Historic ground motions at the site have been estimated with the computer program EQSEARCH.

1.1.2 Earthquake Magnitude

Earthquake **magnitude** is a quantitative measure of the strength of an earthquake or the strain energy released by it, as determined by seismographic or geologic observations. It does not vary with distance or the underlying earth material. This differs from **intensity**, which is a qualitative measure of the effects a given earthquake has on people, structures, loose objects, and the ground at a specific location. Intensity generally increases with increasing magnitude and in areas underlain by unconsolidated materials, and decreases with distance from the epicenter. **Figure E-2** gives the 1956 version of the Modified Mercalli intensity scale and the approximate magnitude necessary to generate the effects.

Review of criteria presented in CDCDMG Special Publication 117 indicates that probabilistic ground motions should be estimated based on maximum moment magnitude earthquakes for each fault of interest. In this report we have utilized the default magnitudes contained in the CDMGSCF.DAT file provided with Version 4.00 of the FRISKSP Program by Thomas Blake. These magnitudes were derived primarily from CDMG Open-File Report 96-08 (Peterson et al., 1996) and are based on historic displacements per seismic event or the rupture area-to-magnitude relationships of Wells and Coppersmith (1994). The maximum magnitudes for the significant faults within 50 km of the site are presented in **Table D-II** under the AMMAX descriptor for each fault.

APPENDIX D

1.1.3 Ground Acceleration

Ground motion is typically reported with respect to the acceleration of gravity in units of g. Maximum, peak amplitudes in two perpendicular horizontal directions and the vertical axis are typically recorded during historic earthquakes on accelerograms.

Review of Sections 1804.5 and 1629A of the 1998 California Building Code (based on the 1997 UBC) and Chapter 4 of the CDCDMG 1997 Guidelines, indicates that an acceleration with a 10% chance of exceedance in 50 years (design basis earthquake ground motion) should be utilized for the evaluation of liquefaction potential for standard structures. This roughly correlates to a 475 year return period.

Site specific evaluation of potential ground motions requires the use of an attenuation relationship based on the observed attenuation of ground motions during historic earthquakes to estimate how ground acceleration will dissipate with increasing distance from the earthquake source. Review of CDCDMG Open-File Report 96-08 and SCEC Implementation Guidelines (Martin and Lew, 1999) indicates that design ground accelerations can be based on the equally weighted average of accelerations from three acceptable attenuation relationships. This procedure has been followed in our probabilistic analysis.

It should be emphasized that the ground acceleration values presented in our report are based on simplified curves of fault rupture area to magnitude, and ground motion attenuation relationships which represent averages of highly variable data measured during historic earthquakes. Predicted accelerations should be considered rough estimates rather than precise facts and, therefore, ground accelerations at the subject site from future seismic events may exceed the predicted accelerations. Due to the dip-slip nature of most of the faults in Southern California, vertical accelerations may equal horizontal accelerations. Ground motions may originate from virtually any direction due to the presence of major faults in all directions from the site.

1.1.4 Seismic Analysis – Tentative Tract 53425

1.1.4.1 Site Conditions

The elevated portions of the site are underlain by Quaternary Terrace Deposits and Saugus Formation Bedrock. Alluvial deposits are present in the low-lying

areas within the Santa Clara River drainage and its tributary canyons. The Terrace deposits typically consist of friable fine-to very coarse-grained sand and pebbly sand with cobbles and boulders. The bedrock generally consists of sandstones and pebbly sandstones with interbeds of reddish-brown silty sandstones and mudstones (see **Plate I**). To the depths explored, alluvium is comprised of interbeds of granular soils and fine-grained soils, but granular soils predominate. Generally, these soils are strong, except typically the top 2 feet to 3 feet and at some locations and depths noted in the main text of this report. Weaker upper soils will be removed and recompacted. Therefore, it is reasonable to classify the site as S_C per the Uniform Building Code ("Very Dense Soil and Soft Rock"). For our analysis, we used soil profile type S_c.

1.1.4.2 Maximum Historic Accelerations

In order to provide a rough estimate of maximum ground motions which have occurred at the site from known, historic earthquakes, a site specific analysis using the computer program EQSEARCH (Version 3.00) by Thomas F. Blake was completed. This program utilizes a data base file that contains data on approximately 6000 events greater than magnitude 4 which have occurred in California between 1800 and 2000. This data was extracted primarily from the CDMG computerized earthquake catalog, Townley and Allen (1939) and the U.S. Geological Survey's Earthquake Data Base System. The attenuation relationship of Boore et al. (1997) with a random horizontal component and Site Class C Soil Classification was used to estimate the dissipation of ground motion from the epicenter to the subject site.

Table D-I summarizes the input parameters and a listing of earthquakes of magnitude 5 or greater which have occurred within 50 miles of the site, and the estimated ground motions produced at the site from each event. The locations of historic earthquakes near the subject site are shown on **Figure E-1**. The largest historic acceleration indicated by EQSEARCH for the alluvium at the site is 0.38g from the 1971 San Fernando Earthquake. Review of the contour map of accelerations for bedrock and soil sites prepared by Stewart et al. (1994) indicates a site ground acceleration of approximately 0.45g during the Northridge Earthquake (**Figure D-3**).

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1.1.4.3 Probabilistic Seismic Hazard Analysis

In order to provide a site specific, probabilistic seismic hazard analysis for the proposed development, the computer program FRISKSP (Version 4.00) by Thomas F. Blake was utilized. This program evaluates potential ground motions which may statistically occur within a time frame (return period) of interest. For this investigation a return period of 475 years was analyzed. Potential ground motions include a standard deviation to account for variability in observed ground motion attenuation.

The peak ground acceleration with a 10% probability of exceedance in 50 years (design basis ground motion) was calculated to be 0.71g for the alluvial portions of the site. This acceleration was determined by using an unweighted average of the three accelerations indicated by the attenuation relationships of Boore et al. (1997) for a Site Class C, Sadigh et al. (1997) for deep soil, and Campbell and Bozorgnia (1997) for alluvium (see Summary of Calculated Accelerations **Table D-III**). The Seismic Hazard Zone Report for the Newhall Quadrangle (Open-File Report 97-11) indicates a peak ground acceleration with a 10 percent probability of exceedance in 50 years to be 0.68g for the alluvial portion of the site.

The dominant fault controlling maximum potential ground accelerations at the site is the Santa Susana Fault, with secondary impacts from the, San Gabriel, Northridge (East Oak Ridge) and Sierra Madre (San Fernando) Faults per analysis with Boore et al. (1997) (**see Table D-II** for Summaries of Significant Faults). Site-fault distances for faults within 50 km of the site are summarized at the end of **Table D-II**.

The FRISKSP program runs two problems for each attenuation relationship evaluated. The first evaluates potential accelerations, which may be generated within the return period of interest. The second problem normalizes potential accelerations to a 7.5 magnitude based on published empirical relationships because most liquefaction and settlement analyses are based on this standard magnitude. The acceleration is normalized to account for changes in duration for the same acceleration because larger, more distant earthquakes will produce ground motions with a longer duration (i.e. more cycles and more distress) than smaller, closer earthquakes. Where the design earthquake is smaller than a 7.5 magnitude, the normalized acceleration will be smaller than the design

acceleration to account for the shorter duration of shaking from the design earthquake compared to the same acceleration from the larger 7.5 magnitude earthquake. The empirical relationship used for magnitude weighting in our analysis is from Youd and Idriss (1997). The average, magnitude-weighted acceleration was found to be 0.49g for the design basis earthquake (see **Table D-III**).

1.1.5 Deaggregation of Fault Hazard

A probabilistic analysis evaluates a range of magnitudes from 5.0 to the maximum magnitude for each fault. However, the dominant magnitude which statistically generates the peak acceleration within a limited time period (e.g. 475 years) is typically less than the maximum magnitude for a given fault. We have, therefore, performed a deaggregation of fault hazard analysis with the PROBOUT Sub-Program of FRISKSP to evaluate what dominate magnitude-distance combination produces the design basis accelerations (DBA). We utilized the unweighted acceleration from Boore et al. (1997) of 0.715g (DBA) for our deaggregation analyses. Review of the magnitude-distance contributions to hazard indicates that the dominant magnitude which generates the DBA acceleration is 6.5 as shown graphically in **Figure D-4**.

1.1.6 Summary

The peak design basis ground acceleration value used in our liquefaction analysis was 0.71g from a 6.5 magnitude earthquake based on our probabilistic evaluation of the site.

Although research on earthquakes during the last forty years has greatly enhanced the level of understanding of earthquake faulting in California, the record is much too short to constrain behavior of all faults in Southern California and the attenuation characteristics of all areas relative to each future potential earthquakes. Predicted accelerations should, therefore, be considered **rough estimates** rather than precise facts and ground motions from future earthquakes may exceed the predicted accelerations. Neither the **Time, Location, nor Magnitude** of an earthquake can be accurately predicted at this time.

The proposed development is located in Southern California, which is in a geologically and seismically active region where large magnitude, potentially

destructive earthquakes are common. Therefore, it is reasonable to assume that moderate or large magnitude earthquakes will affect the site during the life of a given structure. The current standards for construction provided in the California Building Code based on the 1997 Uniform Building Code are designed to safeguard against major failures and loss of life, but are not intended to limit damage, maintain functions or provide for easy repair. Per SEAOC, conformance to these recommendations does not constitute any kind of guarantee or assurance that significant structural damage will not occur in the event of a maximum level of earthquake ground motion. However, it is reasonable to expect that a well-planned and constructed structure will not collapse in a major earthquake and that protection of life is reasonably provided, but not with complete assurance.

1.2 Ground Failure

Ground failure is a general term describing seismically induced, secondary permanent ground deformation caused by strong ground motion. This includes liquefaction, lateral spreading, seismic settlement of poorly consolidated materials (dynamic densification), differential materials response, slope failures, sympathetic movement on weak bedding planes or non-causative faults, shattered ridge effects and ground lurching.

Seismic hazards map for the Newhall Quadrangle (dated 2/1/98) indicates that the alluvial portions of Tentative Tract 53425 are in designated zones of required investigation to evaluate the potential for liquefaction and lateral spreading. The potential for liquefaction and seismic settlement has been evaluated in **Appendix C** of this report. Recommended measures to mitigate potential liquefaction and seismic settlements are provided in the earthworks recommendations and foundation and settlement considerations of this report. Historic high ground water levels were assumed at a conservative depth of 5 feet below existing topography based on historical water well records available at the County of Los Angeles.

Differential materials response refers to the different responses various materials display when subjected to seismic waves. Where materials with different densities or strengths are in contact, differential response to the seismic energy may cause distress along the contact. The combination of dynamic compaction and differential settlement along with differential materials response is a source of future potential hazard along cut/fill and bedrock/alluvium contacts. It is, therefore, recommended that **lots** underlain by

APPENDIX D

transitions between different material types (ex. bedrock to fill, bedrock to alluvium, etc.) be **over-excavated 5 feet** to minimize potential adverse impacts.

Earthquake-induced slope failures include activation and reactivation of landslides, rock falls, debris flows and surficial failures. Review of the SHMA map for the Newhall Quadrangle indicates that much of the slope areas on the site are within designated areas requiring investigation to evaluate potential earthquake-induced landslides. Landslides and surficial failures have been mapped by this firm in the vicinity of the proposed development. Existing landslides which could potentially impact the proposed development have been evaluated and appropriate mitigation recommended as presented in this report. The stability of natural and constructed slopes which could potentially affect the proposed development has been evaluated and appropriate mitigation recommended. The potential for earthquake-induced slope failures to adversely impact the proposed development is considered negligible, provided that our Recommendations and those of the Supervising Civil Engineer are incorporated into the proposed design and implemented during construction.

The specific location of future potential sympathetic movement along weak planes such as inclined clay beds cannot be reliably predicted on a site specific basis at this time. Over-excavation of clay-rich bedding planes of the Saugus Formation and subsequent placement of a certified fill cap has been recommended to mitigate potential hazards from expansive material. This certified fill will also reduce potential hazards from potential secondary seismogenic movement along bedding planes.

Development is not proposed on ridgelines, therefore, potential hazards from shattered ridge affects are considered negligible.

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The following attachments complete this Appendix

Summary Table of EQSEARCH Parameters and Output	Table D-I
Summary Table of FRISKSP Parameters and Output (.out File) Boore et al. (1997) + Portions of Sadigh et al. (1997) & Campbell (1997)	Table D-II
Summary of Calculated Accelerations	Table D-III
Fault and Earthquake Epicenter Location Map	Figure D-1
Modified Mercalli Scale, 1956 Version	Figure D-2
Contours of Maximum Acceleration, Northridge Earthquake (Stewart et al., 1994)	Figure D-3
Excel Histograms of Magnitude - Distance Contributions to Hazard	Figure D-4

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*************************
*                       *
*    E Q S E A R C H    *
*                       *
*     Version 3.00      *
*                       *
*************************

      ESTIMATION OF
  PEAK ACCELERATION FROM
CALIFORNIA EARTHQUAKE CATALOGS

JOB NUMBER: 02-1571-4
                                                DATE: 07-08-2002

JOB NAME: River Park

EARTHQUAKE-CATALOG-FILE NAME: ALLQUAKE.DAT

MAGNITUDE RANGE:
   MINIMUM MAGNITUDE:  5.00
   MAXIMUM MAGNITUDE:  9.00

SITE COORDINATES:
   SITE LATITUDE:  34.4153
   SITE LONGITUDE:  118.5208

SEARCH DATES:
           START DATE:   1800
           END DATE:   2000

SEARCH RADIUS:
           50.0 mi
           80.5 km

ATTENUATION RELATION:   2) Boore et al. (1997) Horiz. - NEHRP C (520)
   UNCERTAINTY (M=Median, S=Sigma): S       Number of Sigmas:  1.0
   ASSUMED SOURCE TYPE:  DS [SS=Strike-slip, DS=Reverse-slip, BT=Blind-thrust]
   SCOND:   0  Depth Source:  A
   Basement Depth:  5.00 km     Campbell SSR:        Campbell SHR:
   COMPUTE PEAK HORIZONTAL ACCELERATION

MINIMUM DEPTH VALUE (km):  0.0
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EARTHQUAKE SEARCH RESULTS

FILE CODE	LAT. NORTH	LONG. WEST	DATE	TIME (UTC) H M Sec	DEPTH (km)	QUAKE MAG.	SITE ACC. g	SITE MM INT.	APPROX. DISTANCE mi [km]
GSP	34.3780	118.6180	01/19/1994	211144.9	11.0	5.10	0.204	VIII	6.1(9.8)
DMG	34.4110	118.4010	02/09/1971	14 041.8	8.4	6.40	0.378	IX	6.8(11.0)
DMG	34.4110	118.4010	02/09/1971	14 1 8.0	8.0	5.80	0.275	IX	6.8(11.0)
DMG	34.4110	118.4010	02/09/1971	141028.0	8.0	5.30	0.212	VIII	6.8(11.0)
DMG	34.4110	118.4010	02/09/1971	14 244.0	8.0	5.80	0.275	IX	6.8(11.0)
GSB	34.3010	118.5650	01/17/1994	204602.4	9.0	5.20	0.177	VIII	8.3(13.3)
GSP	34.3050	118.5790	01/29/1994	112036.0	1.0	5.10	0.168	VIII	8.3(13.4)
DMG	34.3080	118.4540	02/09/1971	144346.7	6.2	5.20	0.177	VIII	8.3(13.4)
GSP	34.3940	118.6690	06/26/1995	084028.9	13.0	5.00	0.156	VIII	8.6(13.8)
DMG	34.3000	118.6000	04/04/1893	1940 0.0	0.0	6.00	0.253	IX	9.1(14.7)
GSP	34.3690	118.6720	04/26/1997	103730.7	16.0	5.10	0.157	VIII	9.2(14.8)
GSP	34.3770	118.6980	01/18/1994	004308.9	11.0	5.20	0.151	VIII	10.4(16.8)
GSB	34.3790	118.7110	01/19/1994	210928.6	14.0	5.50	0.170	VIII	11.1(17.9)
GSP	34.3260	118.6980	01/17/1994	233330.7	9.0	5.60	0.171	VIII	11.8(19.0)
GSP	34.2310	118.4750	03/20/1994	212012.3	13.0	5.30	0.137	VIII	13.0(20.9)
GSP	34.2130	118.5370	01/17/1994	123055.4	18.0	6.70	0.270	IX	14.0(22.5)
DMG	34.5190	118.1980	08/23/1952	10 9 7.1	13.1	5.00	0.086	VII	19.7(31.7)
MGI	34.0800	118.2600	07/16/1920	18 8 0.0	0.0	5.00	0.066	VI	27.5(44.3)
MGI	34.0000	118.5000	11/19/1918	2018 0.0	0.0	5.00	0.064	VI	28.7(46.2)
DMG	34.0000	118.5000	08/04/1927	1224 0.0	0.0	5.00	0.064	VI	28.7(46.2)
MGI	34.0000	118.3000	09/03/1905	540 0.0	0.0	5.30	0.070	VI	31.3(50.4)
GSP	34.2620	118.0020	06/28/1991	144354.5	11.0	5.40	0.074	VII	31.4(50.5)
T-A	34.8300	118.7500	11/27/1852	0 0 0.0	0.0	7.00	0.172	VIII	31.5(50.6)
MGI	34.1000	118.1000	07/11/1855	415 0.0	0.0	6.30	0.116	VII	32.4(52.2)
T-A	34.0000	118.2500	01/10/1856	0 0 0.0	0.0	5.00	0.058	VI	32.6(52.4)
T-A	34.0000	118.2500	03/26/1860	0 0 0.0	0.0	5.00	0.058	VI	32.6(52.4)
T-A	34.0000	118.2500	09/23/1827	0 0 0.0	0.0	5.00	0.058	VI	32.6(52.4)
DMG	33.9500	118.6320	08/31/1930	04036.0	0.0	5.20	0.065	VI	32.7(52.7)
DMG	34.7000	119.0000	10/23/1916	254 0.0	0.0	5.50	0.074	VII	33.6(54.1)
PAS	34.0730	118.0980	10/04/1987	105938.2	8.2	5.30	0.066	VI	33.8(54.3)
PAS	33.9440	118.6810	01/01/1979	231438.9	11.3	5.00	0.057	VI	33.8(54.4)
PAS	33.9190	118.6270	01/19/1989	65328.8	11.9	5.00	0.055	VI	34.8(56.0)
PAS	34.0610	118.0790	10/01/1987	144220.0	9.5	5.90	0.088	VII	35.1(56.5)
DMG	34.0650	119.0350	02/21/1973	144557.3	8.0	5.90	0.083	VII	38.0(61.2)
DMG	34.2000	117.9000	08/28/1889	215 0.0	0.0	5.50	0.067	VI	38.4(61.8)
PAS	34.9430	118.7430	06/10/1988	23 643.0	6.8	5.40	0.063	VI	38.6(62.0)
DMG	34.8670	118.9330	09/21/1941	1953 7.2	0.0	5.20	0.056	VI	39.0(62.8)
MGI	34.0000	119.0000	12/14/1912	0 0 0.0	0.0	5.70	0.072	VII	39.6(63.8)
DMG	34.0000	119.0000	09/24/1827	4 0 0.0	0.0	7.00	0.144	VIII	39.6(63.8)
DMG	34.9000	118.9000	10/23/1916	244 0.0	0.0	6.00	0.085	VII	39.8(64.0)
MGI	34.0000	118.0000	12/25/1903	1745 0.0	0.0	5.00	0.049	VI	41.3(66.5)
DMG	34.9000	118.9500	08/01/1952	13 430.0	0.0	5.10	0.051	VI	41.4(66.6)

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EARTHQUAKE SEARCH RESULTS

FILE CODE	LAT. NORTH	LONG. WEST	DATE	TIME (UTC) H M Sec	DEPTH (km)	QUAKE MAG.	SITE ACC. g	SITE MM INT.	APPROX. DISTANCE mi [km]
T-A	34.9200	118.9200	01/20/1857	0 0 0.0	0.0	5.00	0.048	VI	41.6(66.9)
T-A	34.9200	118.9200	05/23/1857	0 0 0.0	0.0	5.00	0.048	VI	41.6(66.9)
DMG	33.8500	118.2670	03/11/1933	1425 0.0	0.0	5.00	0.048	VI	41.6(67.0)
DMG	34.9500	118.8670	07/21/1952	121936.0	0.0	5.30	0.056	VI	41.8(67.3)
DMG	34.8000	119.1000	09/05/1883	1230 0.0	0.0	6.00	0.081	VII	42.3(68.1)
DMG	34.9320	118.9760	03/01/1963	02557.9	13.9	5.00	0.046	VI	44.1(70.9)
DMG	35.0000	118.8330	07/23/1952	75319.0	0.0	5.40	0.057	VI	44.1(70.9)
DMG	35.0000	118.8330	07/23/1952	181351.0	0.0	5.20	0.051	VI	44.1(70.9)
DMG	34.9410	118.9870	11/15/1961	53855.5	10.7	5.00	0.045	VI	44.9(72.3)
DMG	33.7830	118.2500	11/14/1941	84136.3	0.0	5.40	0.055	VI	46.3(74.5)
DMG	34.9830	118.9830	05/23/1954	235243.0	0.0	5.10	0.046	VI	47.2(75.9)
DMG	35.0000	119.0000	02/16/1919	1557 0.0	0.0	5.00	0.043	VI	48.7(78.3)
DMG	35.0000	119.0000	07/21/1952	12 531.0	0.0	6.40	0.089	VII	48.7(78.3)
DMG	33.7830	118.1330	10/02/1933	91017.6	0.0	5.40	0.053	VI	49.0(78.8)
DMG	35.0000	119.0170	07/21/1952	115214.0	0.0	7.70	0.176	VIII	49.2(79.2)
DMG	35.0000	119.0170	01/12/1954	233349.0	0.0	5.90	0.068	VI	49.2(79.2)
DMG	34.3700	117.6500	12/08/1812	15 0 0.0	0.0	7.00	0.121	VII	49.7(80.0)
DMG	35.0000	119.0330	07/21/1952	12 2 0.0	0.0	5.60	0.058	VI	49.7(80.1)

****

-END OF SEARCH- 60 EARTHQUAKES FOUND WITHIN THE SPECIFIED SEARCH AREA.

TIME PERIOD OF SEARCH: 1800 TO 2000

LENGTH OF SEARCH TIME: 201 years

THE EARTHQUAKE CLOSEST TO THE SITE IS ABOUT 6.1 MILES (9.8 km) AWAY.

LARGEST EARTHQUAKE MAGNITUDE FOUND IN THE SEARCH RADIUS: 7.7

LARGEST EARTHQUAKE SITE ACCELERATION FROM THIS SEARCH: 0.378 g

COEFFICIENTS FOR GUTENBERG & RICHTER RECURRENCE RELATION:
a-value= 1.150
b-value= 0.382
beta-value= 0.879

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TABLE OF MAGNITUDES AND EXCEEDANCES:

Earthquake Magnitude	Number of Times Exceeded	Cumulative No. / Year
4.0	60	0.29851
4.5	60	0.29851
5.0	60	0.29851
5.5	22	0.10945
6.0	11	0.05473
6.5	5	0.02488
7.0	4	0.01990
7.5	1	0.00498

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SUMMARY TABLE OF FRISKSP PARAMETERS AND OUTPUT

```
*****************************************
*                                       *
*        FRISKSP - IBM-PC VERSION       *
*                                       *
*  Modified from *FRISK* (McGuire 1978) *
*   To Perform Probabilistic Earthquake *
*  Hazard Analyses Using Multiple Forms *
* of Ground-Motion-Attenuation Relations *
*                                       *
*   Modifications by:  Thomas F. Blake  *
*             - 1988-2000 -             *
*                                       *
*              VERSION 4.00             *
*            (Visual Fortran)           *
*****************************************
```

```
ANALYSIS PERFORMED FOR NEWHALL LAND
JOB NO:  02-1571-4
DATE:  July 8, 2002
DESCRIPTION:  Summary of FRISKP.Out files for Boore et al. (1997), Sadigh et al. (1997) and Campbell & Bozorgnia (1997)
 IPR_FILE
  1

Note:  Binary file will be generated only for first attenuation problem and first site.

 IPLOT
  0

 SITE CONDITION
  0.00

 BASEMENT      DEPTH (km)
  5.00

 RHGA FACTOR      RHGA DIST (km)
     1.000             0.000

 NFLT  NSITE   NPROB   NATT     LCD
 20      1       2       6       1
Boore et al. 1997
```

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ATT	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14
1	-0.3130	0.5270	0.0000	-0.7780	-0.3710	1396.0000	5.5700	520.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ATT	C15	C16	C17	C18	C19	C20	C21	C22	C23	PER	DSMIN	SIGA	IRELAF	ICHK
1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.5200	35	0

ATT	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14
2	-0.1170	0.5270	0.0000	-0.7780	-0.3710	1396.0000	5.5700	520.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ATT	C15	C16	C17	C18	C19	C20	C21	C22	C23	PER	DSMIN	SIGA	IRELAF	ICHK
2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.5200	35	0

ATT	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14
3	-0.3130	0.5270	0.0000	-0.7780	-0.3710	1396.0000	5.5700	520.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ATT	C15	C16	C17	C18	C19	C20	C21	C22	C23	PER	DSMIN	SIGA	IRELAF	ICHK
3	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.5200	35	0

ATT	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14
4	-0.1170	0.5270	0.0000	-0.7780	-0.3710	1396.0000	5.5700	520.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ATT	C15	C16	C17	C18	C19	C20	C21	C22	C23	PER	DSMIN	SIGA	IRELAF	ICHK
4	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.5200	35	0

ATT	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14
5	-0.1170	0.5270	0.0000	-0.7780	-0.3710	1396.0000	5.5700	520.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ATT	C15	C16	C17	C18	C19	C20	C21	C22	C23	PER	DSMIN	SIGA	IRELAF	ICHK
5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.5200	35	0

ATT	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14
6	-0.1170	0.5270	0.0000	-0.7780	-0.3710	1396.0000	5.5700	520.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ATT	C15	C16	C17	C18	C19	C20	C21	C22	C23	PER	DSMIN	SIGA	IRELAF	ICHK
6	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.5200	35	0

```
 PROBLEM DATA:

 BOORE ET AL(1997) NEHRP C (520)1 AMPLITUDES:
    15        0.100    0.200    0.300    0.400    0.500    0.600    0.700    0.800    0.900    1.000
              1.100    1.200    1.300    1.400    1.500

      MAGNITUDE WEIGHTING FACTORS:     MWF:   0    MWF MAGNITUDE:     0.00

 BOORE ET AL(1997) NEHRP C (520)2 AMPLITUDES:
    15        0.100    0.200    0.300    0.400    0.500    0.600    0.700    0.800    0.900    1.000
              1.100    1.200    1.300    1.400    1.500
```

APPENDIX D

MAGNITUDE WEIGHTING FACTORS: MWF: 2 MWF MAGNITUDE: 7.50

SADIGH ET AL. (1997)

ATT	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14
1	-2.1700	1.0000	1.7000	0.0000	0.0000	0.0000	0.0000	1.5200	0.1600	0.0000	0.0000	0.0000	0.0000	0.0000
ATT	C15	C16	C17	C18	C19	C20	C21	C22	C23	PER	DSMIN	SIGA	IRELAF	ICHK
1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	1.0000	25	0

ATT	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14
2	-1.9200	1.0000	1.7000	0.0000	0.0000	0.0000	0.0000	1.5200	0.1600	0.0000	0.0000	0.0000	0.0000	0.0000
ATT	C15	C16	C17	C18	C19	C20	C21	C22	C23	PER	DSMIN	SIGA	IRELAF	ICHK
2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	1.0000	25	0

ATT	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14
3	-2.1700	1.0000	1.7000	0.0000	0.0000	0.0000	0.0000	1.5200	0.1600	0.0000	0.0000	0.0000	0.0000	0.0000
ATT	C15	C16	C17	C18	C19	C20	C21	C22	C23	PER	DSMIN	SIGA	IRELAF	ICHK
3	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	1.0000	25	0

ATT	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14
4	-1.9200	1.0000	1.7000	0.0000	0.0000	0.0000	0.0000	1.5200	0.1600	0.0000	0.0000	0.0000	0.0000	0.0000
ATT	C15	C16	C17	C18	C19	C20	C21	C22	C23	PER	DSMIN	SIGA	IRELAF	ICHK
4	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	1.0000	25	0

ATT	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14
5	-1.9200	1.0000	1.7000	0.0000	0.0000	0.0000	0.0000	1.5200	0.1600	0.0000	0.0000	0.0000	0.0000	0.0000
ATT	C15	C16	C17	C18	C19	C20	C21	C22	C23	PER	DSMIN	SIGA	IRELAF	ICHK
5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	1.0000	25	0

ATT	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14
6	-1.9200	1.0000	1.7000	0.0000	0.0000	0.0000	0.0000	1.5200	0.1600	0.0000	0.0000	0.0000	0.0000	0.0000
ATT	C15	C16	C17	C18	C19	C20	C21	C22	C23	PER	DSMIN	SIGA	IRELAF	ICHK
6	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	1.0000	25	0

PROBLEM DATA:

SADIGH ET AL. (1997) DEEP SOIL 1 AMPLITUDES:

15	0.100	0.200	0.300	0.400	0.500	0.600	0.700	0.800	0.900	1.000
	1.100	1.200	1.300	1.400	1.500					

MAGNITUDE WEIGHTING FACTORS: MWF: 0 MWF MAGNITUDE: 0.00

APPENDIX D

SADIGH ET AL. (1997) DEEP SOIL 2 AMPLITUDES:

15	0.100	0.200	0.300	0.400	0.500	0.600	0.700	0.800	0.900	1.000
	1.100	1.200	1.300	1.400	1.500					

MAGNITUDE WEIGHTING FACTORS: MWF: 2 MWF MAGNITUDE: 7.50

CAMPBELL AND BOZORGNIA (1997)

ATT	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14
1	-3.5120	0.9040	-1.3280	0.1490	0.6470	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ATT	C15	C16	C17	C18	C19	C20	C21	C22	C23	PER	DSMIN	SIGA	IRELAF	ICHK
1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	3.0000	1.0000	37	0

ATT	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14
2	-3.5120	0.9040	-1.3280	0.1490	0.6470	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ATT	C15	C16	C17	C18	C19	C20	C21	C22	C23	PER	DSMIN	SIGA	IRELAF	ICHK
2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	3.0000	1.0000	37	0

ATT	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14
3	-3.5120	0.9040	-1.3280	0.1490	0.6470	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ATT	C15	C16	C17	C18	C19	C20	C21	C22	C23	PER	DSMIN	SIGA	IRELAF	ICHK
3	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	3.0000	1.0000	37	0

ATT	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14
4	-3.5120	0.9040	-1.3280	0.1490	0.6470	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ATT	C15	C16	C17	C18	C19	C20	C21	C22	C23	PER	DSMIN	SIGA	IRELAF	ICHK
4	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	3.0000	1.0000	37	0

ATT	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14
5	-3.5120	0.9040	-1.3280	0.1490	0.6470	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ATT	C15	C16	C17	C18	C19	C20	C21	C22	C23	PER	DSMIN	SIGA	IRELAF	ICHK
5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	3.0000	1.0000	37	0

APPENDIX D

```
ATT      C1        C2        C3        C4        C5        C6        C7        C8        C9        C10       C11       C12       C13       C14
  6   -3.5120    0.9040   -1.3280    0.1490    0.6470    1.0000    0.0000    0.0000    0.0000    0.0000    0.0000    0.0000    0.0000    0.0000
ATT      C15       C16       C17       C18       C19       C20       C21       C22       C23       PER       DSMIN     SIGA      IRELAF    ICHK
  6    0.0000    0.0000    0.0000    0.0000    0.0000    0.0000    0.0000    0.0000    0.0000    0.0000    3.0000    1.0000    37        0

 PROBLEM DATA:

 CAMP. & BOZ. (1997 Rev.) AL 1    AMPLITUDES:
    15        0.100    0.200    0.300    0.400    0.500    0.600    0.700    0.800    0.900    1.000
              1.100    1.200    1.300    1.400    1.500

     MAGNITUDE WEIGHTING FACTORS:     MWF:   0    MWF MAGNITUDE:     0.00

 CAMP. & BOZ. (1997 Rev.) AL 2    AMPLITUDES:
    15        0.100    0.200    0.300    0.400    0.500    0.600    0.700    0.800    0.900    1.000
              1.100    1.200    1.300    1.400    1.500

     MAGNITUDE WEIGHTING FACTORS:     MWF:   2    MWF MAGNITUDE:     7.50

RISKS SPECIFIED:
   5     0.013900  0.010000  0.005000  0.002105  0.001000

 SITE COORDINATES:
  1    -118.5208   34.4153

 FAULT INFORMATION:

 ------------------------------------------------------------------------

 FAULT  1

 FAULT NAME:  SAN GABRIEL


 NFP    NRL   ATTENUATION CODES:
 10     10      1  3

 AMMIN   AMSTEP  IRATE    RATE   BETA   ECTR   ECDP   COEF
 5.000   0.1000      1  1.0000  2.072  3.600  2.000  1.000

 NMAX AMMAX  PMAX
  1    7.00  1.00
```

APPENDIX D

```
   dmchar ampchar dmpchar
     0.50    6.50    1.00

 Slip Rate (  1.0000 mm/yr) Converted to Activity Rate:
 Input Shear Modulus - dyne/cm**2
0.330E+12
 Input Fault Area    - cm**2
0.936E+13
 LOG10[Mo(m)]        = (1.50)m + (16.05)
   IMAX   AMMAX    PMAX     ARATE = EX-RATE + CH-RATE
      1  7.0000  1.0000   0.00616   0.00445   0.00171


 IND_RL
      2

 RUPTURE AREA VS. MAGNITUDE  A_RA      B_RA    SIG_RA  -3.490     0.910     0.240

 FAULT SEGMENT COORDINATES
  1    -118.2802   34.3179
  2    -118.3118   34.3394
  3    -118.3904   34.3598
  4    -118.4577   34.3853
  5    -118.5587   34.4363
  6    -118.5975   34.4649
  7    -118.6873   34.5536
  8    -118.7026   34.5700
  9    -118.7312   34.5792
 10    -118.8761   34.7139

 NDP
   2
 ORIGINAL FAULT CROSS SECTION
  1       0.0000    0.0000
  2       0.0000   13.0000

 Computed Total Fault Area = 0.93E+03

 ------------------------------------------------------------------------------
```

APPENDIX D

```
FAULT  2

FAULT NAME:  HOLSER


NFP     NRL    ATTENUATION CODES:
 5      10       2  4

AMMIN    AMSTEP  IRATE     RATE    BETA    ECTR    ECDP    COEF
5.000    0.1000       1  0.4000  2.072  1.000  2.000  1.000

NMAX AMMAX   PMAX
 1    6.50  1.00


  dmchar ampchar dmpchar
    0.50    6.00    1.00

 Slip Rate (  0.4000 mm/yr) Converted to Activity Rate:
 Input Shear Modulus - dyne/cm**2
0.330E+12
 Input Fault Area    - cm**2
0.280E+13
 LOG10[Mo(m)]        = (1.50)m + (16.05)
   IMAX    AMMAX     PMAX      ARATE = EX-RATE + CH-RATE
      1  6.5000  1.0000   0.00212   0.00097   0.00115


 IND_RL
      2

 RUPTURE AREA VS. MAGNITUDE  A_RA      B_RA    SIG_RA  -3.490     0.910     0.240

 FAULT SEGMENT COORDINATES
  1     -118.7533   34.4386
  2     -118.7345   34.4386
  3     -118.6741   34.4499
  4     -118.6427   34.4487
  5     -118.5483   34.4172

 NDP
   2
```

APPENDIX D

```
ORIGINAL FAULT CROSS SECTION
 1       0.0000    0.0000
 2       5.9000   12.7000

Computed Total Fault Area = 0.26E+03

--------------------------------------------------------------------------------

FAULT  3

FAULT NAME:  NORTHRIDGE (E. Oak Ridge)


NFP    NRL   ATTENUATION CODES:
 2     10      5  6

AMMIN   AMSTEP  IRATE    RATE   BETA   ECTR   ECDP   COEF
5.000   0.1000      1  1.5000  2.072  1.500  2.000  1.000

NMAX AMMAX  PMAX
 1    6.90  1.00


  dmchar ampchar dmpchar
    0.50    6.40    1.00

Slip Rate (  1.5000 mm/yr) Converted to Activity Rate:
Input Shear Modulus - dyne/cm**2
0.360E+12
Input Fault Area    - cm**2
0.682E+13
LOG10[Mo(m)]        = (1.50)m + (16.05)
   IMAX   AMMAX    PMAX     ARATE = EX-RATE + CH-RATE
      1  6.9000  1.0000   0.00891   0.00602   0.00288
IND_RL
      2

RUPTURE AREA VS. MAGNITUDE  A_RA      B_RA    SIG_RA  -3.490     0.910     0.240

FAULT SEGMENT COORDINATES
 1    -118.7027   34.4057
 2    -118.4078   34.2781
```

APPENDIX D

```
 NDP
   3
 ORIGINAL FAULT CROSS SECTION
  1       0.0000    4.9900
  2       0.0000    5.0000
  3      16.3000   19.7000

 Computed Total Fault Area = 0.67E+03

 ------------------------------------------------------------------------

 FAULT  4

 FAULT NAME:  SANTA SUSANA


 NFP    NRL   ATTENUATION CODES:
  8     10      2  4

 AMMIN   AMSTEP  IRATE    RATE   BETA   ECTR   ECDP   COEF
 5.000   0.1000      1  5.0000  2.072  1.300  2.000  1.000

 NMAX AMMAX  PMAX
  1    6.60  1.00


   dmchar ampchar dmpchar
     0.50    6.10    1.00

 Slip Rate (  5.0000 mm/yr) Converted to Activity Rate:
 Input Shear Modulus - dyne/cm**2
0.330E+12
 Input Fault Area    - cm**2
0.432E+13
 LOG10[Mo(m)]        = (1.50)m + (16.05)
   IMAX   AMMAX    PMAX     ARATE = EX-RATE + CH-RATE
      1  6.6000  1.0000   0.03249   0.01677   0.01573


 IND_RL
      2
```

APPENDIX D

```
RUPTURE AREA VS. MAGNITUDE  A_RA      B_RA    SIG_RA  -3.490     0.910     0.240

FAULT SEGMENT COORDINATES
 1     -118.4950   34.3242
 2     -118.4955   34.3242
 3     -118.5340   34.3030
 4     -118.5811   34.3204
 5     -118.6163   34.3229
 6     -118.6339   34.3330
 7     -118.7081   34.3506
 8     -118.7672   34.3594

NDP
  2
ORIGINAL FAULT CROSS SECTION
 1       0.0000    0.0000
 2       9.2000   13.1000

Computed Total Fault Area = 0.41E+03

--------------------------------------------------------------------------------

FAULT  5

FAULT NAME:  SIERRA MADRE (San Fernando)


NFP    NRL   ATTENUATION CODES:
 8     10       2  4
AMMIN   AMSTEP  IRATE    RATE   BETA   ECTR   ECDP   COEF
5.000   0.1000      1  2.0000  2.072  0.900  2.000  1.000

NMAX AMMAX  PMAX
 1    6.70  1.00


  dmchar ampchar dmpchar
    0.50    6.20    1.00

Slip Rate (  2.0000 mm/yr) Converted to Activity Rate:
Input Shear Modulus - dyne/cm**2
```

APPENDIX D

```
0.330E+12
 Input Fault Area     - cm**2
0.324E+13
 LOG10[Mo(m)]         = (1.50)m + (16.05)
   IMAX   AMMAX     PMAX      ARATE = EX-RATE + CH-RATE
      1  6.7000  1.0000   0.00781   0.00447   0.00334


 IND_RL
      2

 RUPTURE AREA VS. MAGNITUDE  A_RA      B_RA    SIG_RA  -3.490     0.910     0.240

 FAULT SEGMENT COORDINATES
  1    -118.2940   34.2782
  2    -118.2951   34.2782
  3    -118.3196   34.2745
  4    -118.3956   34.2905
  5    -118.4189   34.3039
  6    -118.4520   34.2940
  7    -118.4778   34.3027
  8    -118.4790   34.3027

 NDP
    2
 ORIGINAL FAULT CROSS SECTION
  1       0.0000    0.0000
  2      12.7000   12.7000
Computed Total Fault Area = 0.33E+03

 ------------------------------------------------------------------------------

 FAULT  6

 FAULT NAME:  OAK RIDGE (Onshore)


 NFP    NRL   ATTENUATION CODES:
  9     10      2  4

 AMMIN   AMSTEP  IRATE    RATE   BETA   ECTR   ECDP   COEF
 5.000   0.1000      1  4.0000  2.072  2.500  2.000  1.000
```

APPENDIX D

```
 NMAX AMMAX  PMAX
  1    6.90  1.00


   dmchar ampchar dmpchar
     0.50    6.40    1.00

 Slip Rate (  4.0000 mm/yr) Converted to Activity Rate:
 Input Shear Modulus - dyne/cm**2
0.330E+12
 Input Fault Area    - cm**2
0.700E+13
 LOG10[Mo(m)]        = (1.50)m + (16.05)
   IMAX   AMMAX    PMAX     ARATE = EX-RATE + CH-RATE
      1  6.9000  1.0000   0.02235   0.01511   0.00723


 IND_RL
      2

 RUPTURE AREA VS. MAGNITUDE  A_RA      B_RA    SIG_RA  -3.490     0.910     0.240

 FAULT SEGMENT COORDINATES
  1    -119.2050   34.2481
  2    -119.1582   34.2630
  3    -119.0974   34.3165
  4    -119.0402   34.3522
  5    -118.9589   34.3631
  6    -118.8805   34.3813
  7    -118.8104   34.3850
  8    -118.7742   34.4013
  9    -118.7227   34.3978

 NDP
    3
 ORIGINAL FAULT CROSS SECTION
  1       0.0000    1.0000
  2       0.0000    1.1000
  3       5.9000   13.7000

 Computed Total Fault Area = 0.67E+03
```

APPENDIX D

```
--------------------------------------------------------------------------------

 FAULT  7

 FAULT NAME:  VERDUGO


 NFP    NRL   ATTENUATION CODES:
  7     10      2  4

 AMMIN   AMSTEP  IRATE    RATE   BETA   ECTR   ECDP   COEF
 5.000   0.1000      1  0.5000  2.072  1.400  2.000  1.000

 NMAX AMMAX  PMAX
  1    6.70  1.00


   dmchar ampchar dmpchar
     0.50    6.20    1.00

 Slip Rate (  0.5000 mm/yr) Converted to Activity Rate:
 Input Shear Modulus - dyne/cm**2
0.330E+12
 Input Fault Area    - cm**2
0.522E+13
 LOG10[Mo(m)]        = (1.50)m + (16.05)
   IMAX   AMMAX    PMAX     ARATE = EX-RATE + CH-RATE
      1  6.7000  1.0000   0.00315   0.00180   0.00135


 IND_RL
      2

 RUPTURE AREA VS. MAGNITUDE  A_RA      B_RA    SIG_RA  -3.490     0.910     0.240

 FAULT SEGMENT COORDINATES
  1    -118.1536   34.1313
  2    -118.1865   34.1496
  3    -118.2285   34.1551
  4    -118.2907   34.1971
  5    -118.3657   34.2227
```

APPENDIX D

```
 6    -118.4077   34.2538
 7    -118.4206   34.2612

NDP
  2
ORIGINAL FAULT CROSS SECTION
 1       0.0000    0.0000
 2      12.7000   12.7000

Computed Total Fault Area = 0.52E+03

--------------------------------------------------------------------------------

FAULT  8

FAULT NAME:  SAN CAYETANO


NFP    NRL   ATTENUATION CODES:
 9     10      2  4

AMMIN   AMSTEP  IRATE    RATE   BETA   ECTR   ECDP   COEF
5.000   0.1000      1  6.0000  2.072  2.200  2.000  1.000

NMAX AMMAX  PMAX
 1    6.80  1.00


  dmchar ampchar dmpchar
    0.50    6.30    1.00

 Slip Rate (  6.0000 mm/yr) Converted to Activity Rate:
 Input Shear Modulus - dyne/cm**2
0.330E+12
 Input Fault Area    - cm**2
0.660E+13
 LOG10[Mo(m)]        = (1.50)m + (16.05)
   IMAX    AMMAX     PMAX      ARATE = EX-RATE + CH-RATE
      1  6.8000  1.0000   0.03867   0.02422   0.01445


 IND_RL
```

APPENDIX D

```
     2

RUPTURE AREA VS. MAGNITUDE  A_RA      B_RA    SIG_RA  -3.490     0.910     0.240

FAULT SEGMENT COORDINATES
 1    -118.7621   34.4361
 2    -118.8313   34.4047
 3    -118.9130   34.4172
 4    -118.9281   34.4587
 5    -118.9382   34.4612
 6    -118.9835   34.4348
 7    -119.0690   34.4361
 8    -119.1067   34.4386
 9    -119.1708   34.4625

NDP
  2
ORIGINAL FAULT CROSS SECTION
 1       0.0000    0.0000
 2       7.5000   13.0000
Computed Total Fault Area = 0.60E+03

--------------------------------------------------------------------------------

FAULT  9

FAULT NAME:  SIERRA MADRE


NFP    NRL   ATTENUATION CODES:
12     10      2  4

AMMIN   AMSTEP  IRATE    RATE   BETA   ECTR   ECDP   COEF
5.000   0.1000      1  3.0000  2.072  2.800  2.000  1.000

NMAX AMMAX  PMAX
 1    7.00  1.00


  dmchar ampchar dmpchar
    0.50    6.50    1.00
```

APPENDIX D

```
 Slip Rate (  3.0000 mm/yr) Converted to Activity Rate:
 Input Shear Modulus - dyne/cm**2
0.330E+12
 Input Fault Area    - cm**2
0.103E+14
 LOG10[Mo(m)]        = (1.50)m + (16.05)
   IMAX    AMMAX     PMAX      ARATE = EX-RATE + CH-RATE
      1  7.0000  1.0000    0.02034    0.01469    0.00565


 IND_RL
      2

 RUPTURE AREA VS. MAGNITUDE  A_RA      B_RA     SIG_RA  -3.490      0.910      0.240

 FAULT SEGMENT COORDINATES
  1     -117.7397    34.1231
  2     -117.7691    34.1317
  3     -117.8176    34.1323
  4     -117.8807    34.1470
  5     -117.9402    34.1501
  6     -118.0027    34.1752
  7     -118.0683    34.1758
  8     -118.1118    34.2010
  9     -118.1492    34.2028
 10     -118.2461    34.2279
 11     -118.2896    34.2751
 12     -118.2960    34.2751

 NDP
    2
 ORIGINAL FAULT CROSS SECTION
  1        0.0000     0.0000
  2       12.7000    12.7000

 Computed Total Fault Area = 0.11E+04

 ---------------------------------------------------------------------------

 FAULT 10

 FAULT NAME:  SIMI-SANTA ROSA
```

APPENDIX D

```
 NFP    NRL   ATTENUATION CODES:
  5     10      2  4

 AMMIN   AMSTEP  IRATE    RATE   BETA   ECTR   ECDP   COEF
 5.000   0.1000      1  1.0000  2.072  1.500  2.000  1.000

 NMAX AMMAX  PMAX
  1    6.70  1.00


   dmchar ampchar dmpchar
     0.50    6.20    1.00

 Slip Rate (  1.0000 mm/yr) Converted to Activity Rate:
 Input Shear Modulus - dyne/cm**2
0.330E+12
 Input Fault Area    - cm**2
0.450E+13
 LOG10[Mo(m)]        = (1.50)m + (16.05)
   IMAX   AMMAX    PMAX     ARATE = EX-RATE + CH-RATE
      1  6.7000  1.0000   0.00543   0.00311   0.00232


 IND_RL
      2

 RUPTURE AREA VS. MAGNITUDE  A_RA      B_RA    SIG_RA  -3.490     0.910     0.240

 FAULT SEGMENT COORDINATES
  1     -118.7982   34.2901
  2     -118.9084   34.2578
  3     -118.9364   34.2615
  4     -118.9680   34.2615
  5     -119.1147   34.2261

 NDP
    3
 ORIGINAL FAULT CROSS SECTION
  1        0.0000    1.0000
  2        0.0000    1.1000
```

APPENDIX D

```
 3       7.5000   14.0000

Computed Total Fault Area = 0.45E+03

--------------------------------------------------------------------------------

FAULT 11

FAULT NAME:  SAN ANDREAS - 1857 Rupture


NFP    NRL   ATTENUATION CODES:
12     10      1  3

AMMIN   AMSTEP  IRATE    RATE   BETA   ECTR   ECDP   COEF
5.000   0.1000      1 34.0000  2.072 17.200  2.000  0.500

NMAX AMMAX  PMAX
 1    7.80  1.00


  dmchar ampchar dmpchar
    0.50    7.30    1.00

Slip Rate ( 34.0000 mm/yr) Converted to Activity Rate:
Input Shear Modulus - dyne/cm**2
0.300E+12
Input Fault Area    - cm**2
0.414E+14
LOG10[Mo(m)]        = (1.50)m + (16.05)
  IMAX   AMMAX    PMAX     ARATE = EX-RATE + CH-RATE
     1  7.8000  1.0000   0.22372   0.20895   0.01477


IND_RL
     2

RUPTURE AREA VS. MAGNITUDE  A_RA      B_RA    SIG_RA  -3.490     0.910     0.240

FAULT SEGMENT COORDINATES
 1    -120.5605   36.0019
 2    -120.2928   35.7488
```

APPENDIX D

```
 3    -119.8632   35.3106
 4    -119.8598   35.3072
 5    -119.6673   35.1336
 6    -119.4061   34.9395
 7    -119.2103   34.8639
 8    -118.9010   34.8175
 9    -118.5075   34.7006
10    -118.5024   34.6989
11    -118.0075   34.5116
12    -117.5298   34.3106

NDP
  2
ORIGINAL FAULT CROSS SECTION
 1       0.0000    0.0000
 2       0.0000   12.0000

Computed Total Fault Area = 0.41E+04

--------------------------------------------------------------------------------

FAULT 12

FAULT NAME:  SAN ANDREAS - Mojave


NFP    NRL   ATTENUATION CODES:
 3     10      1  3

AMMIN   AMSTEP  IRATE    RATE   BETA   ECTR   ECDP   COEF
5.000   0.1000      1 30.0000  2.072  4.900  2.000  0.500

NMAX AMMAX  PMAX
 1    7.10  1.00


  dmchar ampchar dmpchar
    0.50    6.60    1.00

Slip Rate ( 30.0000 mm/yr) Converted to Activity Rate:
Input Shear Modulus - dyne/cm**2
0.300E+12
```

APPENDIX D

```
 Input Fault Area     - cm**2
0.119E+14
 LOG10[Mo(m)]         = (1.50)m + (16.05)
   IMAX    AMMAX     PMAX      ARATE = EX-RATE + CH-RATE
      1  7.1000  1.0000    0.17754    0.13551    0.04202


 IND_RL
      2

 RUPTURE AREA VS. MAGNITUDE  A_RA      B_RA    SIG_RA  -3.490      0.910      0.240

 FAULT SEGMENT COORDINATES
  1     -118.5024    34.6989
  2     -118.0075    34.5116
  3     -117.5298    34.3106

 NDP
   2
 ORIGINAL FAULT CROSS SECTION
  1        0.0000     0.0000
  2        0.0000    12.0000

 Computed Total Fault Area = 0.12E+04

 ---------------------------------------------------------------------------

 FAULT 13

 FAULT NAME:  SAN ANDREAS - Carrizo


 NFP     NRL    ATTENUATION CODES:
  6      10       1  3

 AMMIN    AMSTEP  IRATE     RATE    BETA    ECTR    ECDP    COEF
 5.000    0.1000       1 34.0000  2.072  7.200  2.000  0.500

 NMAX AMMAX  PMAX
  1    7.20  1.00
```

APPENDIX D

```
   dmchar ampchar dmpchar
     0.50    6.70    1.00

 Slip Rate ( 34.0000 mm/yr) Converted to Activity Rate:
 Input Shear Modulus - dyne/cm**2
0.300E+12
 Input Fault Area    - cm**2
0.174E+14
 LOG10[Mo(m)]        = (1.50)m + (16.05)
   IMAX   AMMAX    PMAX     ARATE = EX-RATE + CH-RATE
      1  7.2000  1.0000   0.24626   0.19696   0.04930


 IND_RL
      2

 RUPTURE AREA VS. MAGNITUDE  A_RA      B_RA    SIG_RA  -3.490     0.910     0.240

 FAULT SEGMENT COORDINATES
  1     -119.8598   35.3072
  2     -119.6673   35.1336
  3     -119.4061   34.9395
  4     -119.2103   34.8639
  5     -118.9010   34.8175
  6     -118.5075   34.7006

 NDP
   2
 ORIGINAL FAULT CROSS SECTION
  1       0.0000    0.0000
  2       0.0000   12.0000

 Computed Total Fault Area = 0.17E+04

 ------------------------------------------------------------------------------

 FAULT 14

 FAULT NAME:  HOLLYWOOD


 NFP    NRL   ATTENUATION CODES:
```

APPENDIX D

```
 4     10      2  4

AMMIN   AMSTEP  IRATE    RATE   BETA   ECTR   ECDP   COEF
5.000   0.1000      1  1.0000  2.072  0.800  2.000  1.000

NMAX AMMAX  PMAX
 1    6.40  1.00


  dmchar ampchar dmpchar
    0.50    5.90    1.00

Slip Rate (  1.0000 mm/yr) Converted to Activity Rate:
Input Shear Modulus - dyne/cm**2
0.330E+12
Input Fault Area    - cm**2
0.238E+13
LOG10[Mo(m)]        = (1.50)m + (16.05)
  IMAX   AMMAX    PMAX     ARATE = EX-RATE + CH-RATE
     1  6.4000  1.0000   0.00575   0.00229   0.00346


IND_RL
     2

RUPTURE AREA VS. MAGNITUDE  A_RA      B_RA    SIG_RA  -3.490     0.910     0.240

FAULT SEGMENT COORDINATES
 1    -118.2302   34.1192
 2    -118.3170   34.1104
 3    -118.3723   34.0991
 4    -118.4063   34.0827

NDP
  2
ORIGINAL FAULT CROSS SECTION
 1       0.0000    0.0000
 2       4.8000   13.2000

Computed Total Fault Area = 0.25E+03

--------------------------------------------------------------------------
```

APPENDIX D

```
 FAULT 15

 FAULT NAME:  SANTA MONICA
 NFP    NRL   ATTENUATION CODES:
  3     10      2  4

 AMMIN   AMSTEP  IRATE    RATE   BETA   ECTR   ECDP   COEF
 5.000   0.1000      1  1.0000  2.072  1.400  2.000  1.000

 NMAX AMMAX  PMAX
  1    6.60  1.00


   dmchar ampchar dmpchar
     0.50    6.10    1.00

 Slip Rate (  1.0000 mm/yr) Converted to Activity Rate:
 Input Shear Modulus - dyne/cm**2
0.360E+12
 Input Fault Area    - cm**2
0.364E+13
 LOG10[Mo(m)]        = (1.50)m + (16.05)
   IMAX   AMMAX    PMAX     ARATE = EX-RATE + CH-RATE
      1  6.6000  1.0000   0.00597   0.00308   0.00289


 IND_RL
      2

 RUPTURE AREA VS. MAGNITUDE  A_RA      B_RA    SIG_RA  -3.490     0.910     0.240

 FAULT SEGMENT COORDINATES
  1    -118.4085   34.0814
  2    -118.5244   34.0263
  3    -118.6855   33.9896

 NDP
   2
 ORIGINAL FAULT CROSS SECTION
  1       0.0000    0.0000
  2       3.4000   12.6000
```

APPENDIX D

```
Computed Total Fault Area = 0.35E+03
--------------------------------------------------------------------------------

FAULT 16

FAULT NAME:  SANTA YNEZ (East)


NFP    NRL   ATTENUATION CODES:
 6     10      1  3

AMMIN   AMSTEP  IRATE    RATE   BETA   ECTR   ECDP   COEF
5.000   0.1000      1  2.0000  2.072  3.400  2.000  1.000

NMAX AMMAX  PMAX
 1    7.00  1.00


  dmchar ampchar dmpchar
    0.50    6.50    1.00

Slip Rate (  2.0000 mm/yr) Converted to Activity Rate:
Input Shear Modulus - dyne/cm**2
0.330E+12
Input Fault Area    - cm**2
0.884E+13
LOG10[Mo(m)]        = (1.50)m + (16.05)
   IMAX   AMMAX    PMAX     ARATE = EX-RATE + CH-RATE
      1  7.0000  1.0000   0.01164   0.00840   0.00323


IND_RL
     2

RUPTURE AREA VS. MAGNITUDE  A_RA      B_RA    SIG_RA  -3.490     0.910     0.240

FAULT SEGMENT COORDINATES
 1    -119.6298   34.4939
 2    -119.5091   34.4864
 3    -119.3783   34.5065
 4    -119.1972   34.5367
```

APPENDIX D

```
 5    -119.1167   34.5317
 6    -118.9055   34.5870

NDP
  2
ORIGINAL FAULT CROSS SECTION
 1       0.0000    0.0000
 2       2.3000   12.8000

Computed Total Fault Area = 0.89E+03

--------------------------------------------------------------------------------

FAULT 17

FAULT NAME:  MALIBU COAST


NFP    NRL   ATTENUATION CODES:
 4     10      2  4

AMMIN   AMSTEP  IRATE    RATE   BETA   ECTR   ECDP   COEF
5.000   0.1000      1  0.3000  2.072  1.800  2.000  1.000

NMAX AMMAX  PMAX
 1    6.70  1.00


  dmchar ampchar dmpchar
    0.50    6.20    1.00

Slip Rate (  0.3000 mm/yr) Converted to Activity Rate:
Input Shear Modulus - dyne/cm**2
0.330E+12
Input Fault Area    - cm**2
0.481E+13
LOG10[Mo(m)]        = (1.50)m + (16.05)
  IMAX   AMMAX    PMAX     ARATE = EX-RATE + CH-RATE
     1  6.7000  1.0000   0.00174   0.00100   0.00074

IND_RL
     2
```

APPENDIX D

```
RUPTURE AREA VS. MAGNITUDE  A_RA      B_RA    SIG_RA  -3.490     0.910     0.240

FAULT SEGMENT COORDINATES
 1    -118.5333   34.0299
 2    -118.6339   34.0412
 3    -118.6666   34.0387
 4    -118.9332   34.0513

NDP
  2
ORIGINAL FAULT CROSS SECTION
 1       0.0000    0.0000
 2       3.4000   12.6000

Computed Total Fault Area = 0.48E+03

--------------------------------------------------------------------------------

FAULT 18

FAULT NAME:  RAYMOND


NFP    NRL   ATTENUATION CODES:
 4     10       2  4

AMMIN   AMSTEP  IRATE    RATE   BETA   ECTR   ECDP   COEF
5.000   0.1000      1  0.5000  2.072  1.000  2.000  1.000

NMAX AMMAX  PMAX
 1    6.50  1.00


  dmchar ampchar dmpchar
    0.50    6.00    1.00

 Slip Rate (  0.5000 mm/yr) Converted to Activity Rate:
 Input Shear Modulus - dyne/cm**2
0.330E+12
 Input Fault Area    - cm**2
0.273E+13
```

APPENDIX D

```
LOG10[Mo(m)]          = (1.50)m + (16.05)
  IMAX    AMMAX     PMAX      ARATE = EX-RATE + CH-RATE
     1  6.5000  1.0000   0.00259   0.00118   0.00140


IND_RL
     2

RUPTURE AREA VS. MAGNITUDE  A_RA      B_RA    SIG_RA  -3.490     0.910     0.240

FAULT SEGMENT COORDINATES
 1     -118.0051   34.1670
 2     -118.0579   34.1444
 3     -118.1258   34.1293
 4     -118.2227   34.1217

NDP
  2
ORIGINAL FAULT CROSS SECTION
 1        0.0000    0.0000
 2        3.4000   12.6000

Computed Total Fault Area = 0.26E+03

--------------------------------------------------------------------------------

FAULT 19

FAULT NAME:  NEWPORT-INGLEWOOD (L.A.Basin)


NFP    NRL   ATTENUATION CODES:
 5     10       1  3

AMMIN   AMSTEP  IRATE    RATE   BETA   ECTR   ECDP   COEF
5.000   0.1000      1  1.0000  2.072  3.200  2.000  1.000
NMAX AMMAX  PMAX
 1    6.90  1.00


  dmchar ampchar dmpchar
    0.50    6.40    1.00
```

APPENDIX D

```
 Slip Rate (  1.0000 mm/yr) Converted to Activity Rate:
 Input Shear Modulus - dyne/cm**2
0.330E+12
 Input Fault Area    - cm**2
0.832E+13
 LOG10[Mo(m)]         = (1.50)m + (16.05)
   IMAX    AMMAX     PMAX      ARATE = EX-RATE + CH-RATE
      1  6.9000  1.0000    0.00664    0.00449    0.00215


 IND_RL
      2

 RUPTURE AREA VS. MAGNITUDE  A_RA      B_RA    SIG_RA  -3.490      0.910      0.240

 FAULT SEGMENT COORDINATES
  1     -118.3723    34.0337
  2     -118.1862    33.8073
  3     -118.1510    33.7822
  4     -118.1208    33.7746
  5     -117.9246    33.6061

 NDP
   2
 ORIGINAL FAULT CROSS SECTION
  1        0.0000     0.0000
  2        0.0000    13.0000

 Computed Total Fault Area = 0.83E+03

 ------------------------------------------------------------------------------
```

APPENDIX D

```
FAULT 20

 FAULT NAME:  PALOS VERDES


 NFP    NRL   ATTENUATION CODES:
  4     10      1  3

 AMMIN   AMSTEP  IRATE    RATE   BETA   ECTR   ECDP   COEF
 5.000   0.1000      1  3.0000  2.030  4.800  2.000  1.000

 NMAX AMMAX  PMAX
  1    7.10  1.00


   dmchar ampchar dmpchar
     0.50    6.60    1.00

 Slip Rate (  3.0000 mm/yr) Converted to Activity Rate:
 Input Shear Modulus - dyne/cm**2
0.330E+12
 Input Fault Area    - cm**2
0.125E+14
 LOG10[Mo(m)]        = (1.50)m + (16.05)
   IMAX    AMMAX    PMAX     ARATE = EX-RATE + CH-RATE
      1  7.1000  1.0000   0.02038   0.01553   0.00485


 IND_RL
      2

 RUPTURE AREA VS. MAGNITUDE  A_RA      B_RA    SIG_RA  -3.490     0.910     0.240

 FAULT SEGMENT COORDINATES
  1    -117.9388   33.2825
  2    -118.1977   33.6571
  3    -118.2758   33.7560
  4    -118.5568   33.9720
```

APPENDIX D

```
NDP
   2
 ORIGINAL FAULT CROSS SECTION
  1       0.0000    0.0000
  2       0.0000   13.0000

 Computed Total Fault Area = 0.13E+04
```

```
 SITE 1 COORDINATES: -118.5208  34.4153

 BOORE ET AL(1997) NEHRP C (520)1 - Problem #1
      AMPLITUDES (g):     0.1000E+000.2000E+000.3000E+000.4000E+000.5000E+000.6000E+000.7000E+000.8000E+000.9000E+000.1000E+01
    , LN (AMPLITUDE):       -2.30     -1.61     -1.20     -0.92     -0.69     -0.51     -0.36     -0.22     -0.11      0.00
   FAULT   1 E(NO/YR)     0.3754E-020.2167E-020.1351E-020.8559E-030.5437E-030.3466E-030.2223E-030.1439E-030.9404E-040.6214E-04
   FAULT   2 E(NO/YR)     0.1811E-020.1123E-020.6394E-030.3566E-030.1996E-030.1134E-030.6560E-040.3871E-040.2330E-040.1429E-04
   FAULT   3 E(NO/YR)     0.6032E-020.2922E-020.1471E-020.7532E-030.3930E-030.2097E-030.1147E-030.6427E-040.3687E-040.2163E-04
   FAULT   4 E(NO/YR)     0.2802E-010.1846E-010.1149E-010.7003E-020.4250E-020.2592E-020.1597E-020.9968E-030.6308E-030.4048E-03
   FAULT   5 E(NO/YR)     0.6241E-020.3652E-020.2078E-020.1175E-020.6681E-030.3847E-030.2253E-030.1344E-030.8160E-040.5045E-04
   FAULT   6 E(NO/YR)     0.7384E-020.1925E-020.5706E-030.1883E-030.6815E-040.2668E-040.1116E-040.4945E-050.2302E-050.1118E-05
   FAULT   7 E(NO/YR)     0.1423E-020.3920E-030.1145E-030.3677E-040.1294E-040.4935E-050.2016E-050.8736E-060.3985E-060.1901E-06
   FAULT   8 E(NO/YR)     0.1282E-010.2850E-020.7189E-030.2066E-030.6647E-040.2352E-040.9007E-050.3690E-050.1601E-050.7301E-06
   FAULT   9 E(NO/YR)     0.5300E-020.1219E-020.3351E-030.1050E-030.3659E-040.1390E-040.5677E-050.2465E-050.1128E-050.5399E-06
   FAULT  10 E(NO/YR)     0.1588E-020.2751E-030.5590E-040.1345E-040.3731E-050.1162E-050.3982E-060.1477E-060.5863E-070.2465E-07
   FAULT  11 E(NO/YR)     0.9065E-020.2492E-020.8232E-030.2915E-030.1104E-030.4457E-040.1906E-040.8576E-050.4037E-050.1979E-05
   FAULT  12 E(NO/YR)     0.1539E-010.2679E-020.5702E-030.1429E-030.4093E-040.1309E-040.4587E-050.1735E-050.7000E-060.2987E-06
   FAULT  13 E(NO/YR)     0.1059E-010.1504E-020.2886E-030.6781E-040.1859E-040.5752E-050.1964E-050.7273E-060.2884E-060.1212E-06
   FAULT  14 E(NO/YR)     0.1750E-020.2371E-030.3883E-040.7852E-050.1885E-050.5191E-060.1598E-060.5393E-070.1966E-070.7652E-08
   FAULT  15 E(NO/YR)     0.1584E-020.2176E-030.3671E-040.7619E-050.1871E-050.5252E-060.1644E-060.5633E-070.2082E-070.8204E-08
   FAULT  16 E(NO/YR)     0.1110E-020.1153E-030.1685E-040.3180E-050.7278E-060.1934E-060.5789E-070.1909E-070.6827E-080.2614E-08
   FAULT  17 E(NO/YR)     0.4137E-030.5521E-040.9197E-050.1892E-050.4612E-060.1287E-060.4008E-070.1366E-070.5027E-080.1973E-08
   FAULT  18 E(NO/YR)     0.5498E-030.5858E-040.8249E-050.1494E-050.3290E-060.8438E-070.2445E-070.7829E-080.2724E-080.1017E-08
   FAULT  19 E(NO/YR)     0.4756E-030.3637E-040.4307E-050.6953E-060.1406E-060.3373E-070.9252E-080.2828E-080.9450E-090.3405E-09
   FAULT  20 E(NO/YR)     0.1128E-020.9040E-040.1112E-040.1849E-050.3826E-060.9353E-070.2607E-070.8078E-080.2733E-080.9957E-09
   TOTAL     E(NO/YR)     0.1164E+000.4247E-010.2063E-010.1122E-010.6418E-020.3782E-020.2279E-020.1401E-020.8772E-030.5583E-03
   TOTAL RISK             0.1099E+000.4158E-010.2042E-010.1116E-010.6397E-020.3775E-020.2277E-020.1400E-020.8768E-030.5582E-03

      AMPLITUDES (g):     0.1100E+010.1200E+010.1300E+010.1400E+010.1500E+01
      LN (AMPLITUDE):        0.10      0.18      0.26      0.34      0.41
   FAULT   1 E(NO/YR)     0.4152E-040.2804E-040.1914E-040.1320E-040.9198E-05
   FAULT   2 E(NO/YR)     0.8920E-050.5663E-050.3652E-050.2390E-050.1585E-05
```

APPENDIX D

FAULT	3	E(NO/YR)	0.1295E-04	0.7909E-05	0.4916E-05	0.3107E-05	0.1995E-05
FAULT	4	E(NO/YR)	0.2634E-03	0.1737E-03	0.1160E-03	0.7841E-04	0.5362E-04
FAULT	5	E(NO/YR)	0.3173E-04	0.2028E-04	0.1315E-04	0.8656E-05	0.5772E-05
FAULT	6	E(NO/YR)	0.5645E-06	0.2946E-06	0.1585E-06	0.8760E-07	0.4962E-07
FAULT	7	E(NO/YR)	0.9429E-07	0.4844E-07	0.2567E-07	0.1399E-07	0.7823E-08
FAULT	8	E(NO/YR)	0.3477E-06	0.1721E-06	0.8811E-07	0.4651E-07	0.2524E-07
FAULT	9	E(NO/YR)	0.2690E-06	0.1388E-06	0.7388E-07	0.4045E-07	0.2272E-07
FAULT	10	E(NO/YR)	0.1090E-07	0.5037E-08	0.2420E-08	0.1204E-08	0.6176E-09
FAULT	11	E(NO/YR)	0.1005E-05	0.5272E-06	0.2846E-06	0.1577E-06	0.8952E-07
FAULT	12	E(NO/YR)	0.1338E-06	0.6254E-07	0.3036E-07	0.1525E-07	0.7892E-08
FAULT	13	E(NO/YR)	0.5360E-07	0.2477E-07	0.1190E-07	0.5924E-08	0.3041E-08
FAULT	14	E(NO/YR)	0.3153E-08	0.1365E-08	0.6169E-09	0.2899E-09	0.1410E-09
FAULT	15	E(NO/YR)	0.3418E-08	0.1495E-08	0.6827E-09	0.3238E-09	0.1589E-09
FAULT	16	E(NO/YR)	0.1062E-08	0.4538E-09	0.2028E-09	0.9419E-10	0.4520E-10
FAULT	17	E(NO/YR)	0.8191E-09	0.3571E-09	0.1625E-09	0.7683E-10	0.3759E-10
FAULT	18	E(NO/YR)	0.4035E-09	0.1687E-09	0.7388E-10	0.3370E-10	0.1591E-10
FAULT	19	E(NO/YR)	0.1308E-09	0.5300E-10	0.2246E-10	0.9834E-11	0.4375E-11
FAULT	20	E(NO/YR)	0.3863E-09	0.1581E-09	0.6775E-10	0.3008E-10	0.1367E-10
TOTAL		E(NO/YR)	0.3610E-03	0.2368E-03	0.1575E-03	0.1061E-03	0.7237E-04
TOTAL RISK			0.3609E-03	0.2368E-03	0.1575E-03	0.1061E-03	0.7237E-04

SPECIFIED RISKS:	0.013900	0.010000	0.005000	0.002105	0.001000
ESTIMATED LN AMP. :	-1.021	-0.872	-0.608	-0.335	-0.138
ESTIMATED AMP. (g):	0.36026	0.41797	0.54445	**0.71526**	0.87072

BOORE ET AL(1997) NEHRP C (520)2 - Problem 2

AMPLITUDES (g):	0.1000E+00	0.2000E+00	0.3000E+00	0.4000E+00	0.5000E+00	0.6000E+00	0.7000E+00	0.8000E+00	0.9000E+00	0.1000E+01	
LN (AMPLITUDE):	-2.30	-1.61	-1.20	-0.92	-0.69	-0.51	-0.36	-0.22	-0.11	0.00	
FAULT	1	E(NO/YR)	0.2244E-02	0.1304E-02	0.7829E-03	0.4575E-03	0.2650E-03	0.1543E-03	0.9095E-04	0.5443E-04	0.3312E-04	0.2049E-04
FAULT	2	E(NO/YR)	0.1174E-02	0.5199E-03	0.2187E-03	0.9364E-04	0.4172E-04	0.1943E-04	0.9439E-05	0.4768E-05	0.2494E-05	0.1347E-05
FAULT	3	E(NO/YR)	0.3324E-02	0.1527E-02	0.6724E-03	0.2964E-03	0.1345E-03	0.6344E-04	0.3109E-04	0.1579E-04	0.8298E-05	0.4494E-05
FAULT	4	E(NO/YR)	0.1859E-01	0.9788E-02	0.4887E-02	0.2407E-02	0.1204E-02	0.6181E-03	0.3265E-03	0.1775E-03	0.9912E-04	0.5677E-04
FAULT	5	E(NO/YR)	0.3839E-02	0.1885E-02	0.8795E-03	0.4086E-03	0.1945E-03	0.9575E-04	0.4879E-04	0.2569E-04	0.1395E-04	0.7792E-05
FAULT	6	E(NO/YR)	0.3693E-02	0.7716E-03	0.1833E-03	0.5027E-04	0.1560E-04	0.5358E-05	0.2002E-05	0.8028E-06	0.3419E-06	0.1533E-06
FAULT	7	E(NO/YR)	0.6606E-03	0.1209E-03	0.2543E-04	0.6310E-05	0.1800E-05	0.5756E-06	0.2020E-06	0.7666E-07	0.3107E-07	0.1333E-07
FAULT	8	E(NO/YR)	0.5857E-02	0.9103E-03	0.1713E-03	0.3915E-04	0.1046E-04	0.3170E-05	0.1063E-05	0.3875E-06	0.1516E-06	0.6299E-07
FAULT	9	E(NO/YR)	0.2667E-02	0.5238E-03	0.1207E-03	0.3254E-04	0.9994E-05	0.3411E-05	0.1269E-05	0.5078E-06	0.2159E-06	0.9678E-07
FAULT	10	E(NO/YR)	0.6196E-03	0.6413E-04	0.8989E-05	0.1635E-05	0.3629E-06	0.9394E-07	0.2749E-07	0.8890E-08	0.3124E-08	0.1178E-08
FAULT	11	E(NO/YR)	0.6159E-02	0.2332E-02	0.8541E-03	0.3224E-03	0.1283E-03	0.5403E-04	0.2397E-04	0.1114E-04	0.5405E-05	0.2722E-05
FAULT	12	E(NO/YR)	0.7981E-02	0.1174E-02	0.2093E-03	0.4547E-04	0.1161E-04	0.3372E-05	0.1088E-05	0.3831E-06	0.1451E-06	0.5850E-07
FAULT	13	E(NO/YR)	0.5852E-02	0.7421E-03	0.1251E-03	0.2647E-04	0.6657E-05	0.1917E-05	0.6155E-06	0.2160E-06	0.8165E-07	0.3289E-07
FAULT	14	E(NO/YR)	0.4424E-03	0.2525E-04	0.2368E-05	0.3185E-06	0.5548E-07	0.1173E-07	0.2885E-08	0.8008E-09	0.2456E-09	0.8160E-10

APPENDIX D

FAULT 15 E(NO/YR)	0.5044E-03	0.3592E-04	0.3891E-05	0.5822E-06	0.1104E-06	0.2504E-07	0.6540E-08	0.1914E-08	0.6150E-09	0.2139E-09
FAULT 16 E(NO/YR)	0.4962E-03	0.3719E-04	0.4276E-05	0.6745E-06	0.1339E-06	0.3165E-07	0.8571E-08	0.2591E-08	0.8577E-09	0.3064E-09
FAULT 17 E(NO/YR)	0.1433E-03	0.1085E-04	0.1221E-05	0.1877E-06	0.3634E-07	0.8387E-08	0.2222E-08	0.6584E-09	0.2139E-09	0.7511E-10
FAULT 18 E(NO/YR)	0.1374E-03	0.6674E-05	0.5666E-06	0.7092E-07	0.1168E-07	0.2359E-08	0.5580E-09	0.1498E-09	0.4451E-10	0.1430E-10
FAULT 19 E(NO/YR)	0.1744E-03	0.8668E-05	0.7668E-06	0.9984E-07	0.1704E-07	0.3552E-08	0.8646E-09	0.2380E-09	0.7241E-10	0.2386E-10
FAULT 20 E(NO/YR)	0.5309E-03	0.3245E-04	0.3279E-05	0.4707E-06	0.8675E-07	0.1927E-07	0.4952E-08	0.1430E-08	0.4542E-09	0.1562E-09
TOTAL E(NO/YR)	0.6509E-01	0.2182E-01	0.9155E-02	0.4190E-02	0.2025E-02	0.1023E-02	0.5370E-03	0.2917E-03	0.1634E-03	0.9403E-04
TOTAL RISK	0.6301E-01	0.2158E-01	0.9113E-02	0.4181E-02	0.2023E-02	0.1023E-02	0.5369E-03	0.2917E-03	0.1634E-03	0.9403E-04

AMPLITUDES (g):	0.1100E+01	0.1200E+01	0.1300E+01	0.1400E+01	0.1500E+01
LN (AMPLITUDE):	0.10	0.18	0.26	0.34	0.41
FAULT 1 E(NO/YR)	0.1288E-04	0.8224E-05	0.5328E-05	0.3500E-05	0.2329E-05
FAULT 2 E(NO/YR)	0.7488E-06	0.4271E-06	0.2494E-06	0.1488E-06	0.9050E-07
FAULT 3 E(NO/YR)	0.2502E-05	0.1429E-05	0.8349E-06	0.4981E-06	0.3030E-06
FAULT 4 E(NO/YR)	0.3328E-04	0.1993E-04	0.1217E-04	0.7569E-05	0.4786E-05
FAULT 5 E(NO/YR)	0.4465E-05	0.2619E-05	0.1569E-05	0.9591E-06	0.5968E-06
FAULT 6 E(NO/YR)	0.7195E-07	0.3512E-07	0.1776E-07	0.9269E-08	0.4976E-08
FAULT 7 E(NO/YR)	0.6001E-08	0.2821E-08	0.1378E-08	0.6960E-09	0.3624E-09
FAULT 8 E(NO/YR)	0.2757E-07	0.1262E-07	0.6017E-08	0.2972E-08	0.1515E-08
FAULT 9 E(NO/YR)	0.4540E-07	0.2217E-07	0.1122E-07	0.5857E-08	0.3147E-08
FAULT 10 E(NO/YR)	0.4715E-09	0.1989E-09	0.8774E-10	0.4026E-10	0.1904E-10
FAULT 11 E(NO/YR)	0.1418E-05	0.7611E-06	0.4199E-06	0.2375E-06	0.1374E-06
FAULT 12 E(NO/YR)	0.2489E-07	0.1110E-07	0.5161E-08	0.2490E-08	0.1241E-08
FAULT 13 E(NO/YR)	0.1399E-07	0.6239E-08	0.2901E-08	0.1400E-08	0.6978E-09
FAULT 14 E(NO/YR)	0.2887E-10	0.1073E-10	0.4021E-11	0.1296E-11	0.0000E+00
FAULT 15 E(NO/YR)	0.7940E-10	0.3102E-10	0.1256E-10	0.5210E-11	0.2123E-11
FAULT 16 E(NO/YR)	0.1167E-09	0.4685E-10	0.1969E-10	0.8494E-11	0.3718E-11
FAULT 17 E(NO/YR)	0.2817E-10	0.1110E-10	0.4586E-11	0.1953E-11	0.8200E-12
FAULT 18 E(NO/YR)	0.4848E-11	0.1659E-11	0.4899E-12	0.7213E-13	0.0000E+00
FAULT 19 E(NO/YR)	0.8338E-11	0.3010E-11	0.1057E-11	0.3550E-12	0.7740E-13
FAULT 20 E(NO/YR)	0.5726E-10	0.2200E-10	0.8662E-11	0.3571E-11	0.1315E-11
TOTAL E(NO/YR)	0.5548E-04	0.3348E-04	0.2062E-04	0.1294E-04	0.8256E-05
TOTAL RISK	0.5548E-04	0.3348E-04	0.2062E-04	0.1294E-04	0.8256E-05

SPECIFIED RISKS:	0.013900	0.010000	0.005000	0.002105	0.001000
ESTIMATED LN AMP. :	-1.403	-1.248	-0.982	-0.705	-0.506
ESTIMATED AMP. (g):	0.24598	0.28718	0.37444	**0.49394**	0.60320

SITE 1 COORDINATES: -118.5208 34.4153

APPENDIX D

SADIGH ET AL. (1997) DEEP SOIL Problem #1

AMPLITUDES (g):		0.1000E+00	0.2000E+00	0.3000E+00	0.4000E+00	0.5000E+00	0.6000E+00	0.7000E+00	0.8000E+00	0.9000E+00	0.1000E+01
LN (AMPLITUDE):		-2.30	-1.61	-1.20	-0.92	-0.69	-0.51	-0.36	-0.22	-0.11	0.00
FAULT	1 E(NO/YR)	0.3753E-02	0.2544E-02	0.1884E-02	0.1403E-02	0.1016E-02	0.7144E-03	0.4912E-03	0.3331E-03	0.2243E-03	0.1507E-03
FAULT	2 E(NO/YR)	0.1822E-02	0.1359E-02	0.9642E-03	0.6598E-03	0.4430E-03	0.2954E-03	0.1970E-03	0.1320E-03	0.8906E-04	0.6060E-04
FAULT	3 E(NO/YR)	0.5763E-02	0.3510E-02	0.2095E-02	0.1176E-02	0.6363E-03	0.3397E-03	0.1817E-03	0.9809E-04	0.5374E-04	0.2995E-04
FAULT	4 E(NO/YR)	0.2683E-01	0.1805E-01	0.1106E-01	0.6409E-02	0.3638E-02	0.2062E-02	0.1179E-02	0.6834E-03	0.4026E-03	0.2412E-03
FAULT	5 E(NO/YR)	0.6092E-02	0.3939E-02	0.2350E-02	0.1322E-02	0.7254E-03	0.3963E-03	0.2183E-03	0.1219E-03	0.6924E-04	0.4004E-04
FAULT	6 E(NO/YR)	0.7749E-02	0.2753E-02	0.9332E-03	0.3190E-03	0.1134E-03	0.4234E-04	0.1665E-04	0.6881E-05	0.2982E-05	0.1350E-05
FAULT	7 E(NO/YR)	0.1518E-02	0.5638E-03	0.1938E-03	0.6779E-04	0.2492E-04	0.9683E-05	0.3974E-05	0.1716E-05	0.7767E-06	0.3668E-06
FAULT	8 E(NO/YR)	0.1349E-01	0.3877E-02	0.1076E-02	0.3149E-03	0.9922E-04	0.3367E-04	0.1224E-04	0.4739E-05	0.1941E-05	0.8372E-06
FAULT	9 E(NO/YR)	0.5327E-02	0.1526E-02	0.4171E-03	0.1165E-03	0.3447E-04	0.1094E-04	0.3724E-05	0.1358E-05	0.5280E-06	0.2182E-06
FAULT	10 E(NO/YR)	0.1602E-02	0.3209E-03	0.6547E-04	0.1504E-04	0.3911E-05	0.1136E-05	0.3636E-06	0.1266E-06	0.4746E-07	0.1899E-07
FAULT	11 E(NO/YR)	0.8870E-02	0.2990E-02	0.8311E-03	0.2146E-03	0.5627E-04	0.1548E-04	0.4516E-05	0.1397E-05	0.4579E-06	0.1584E-06
FAULT	12 E(NO/YR)	0.1614E-01	0.2880E-02	0.4568E-03	0.7867E-04	0.1547E-04	0.3497E-05	0.9041E-06	0.2654E-06	0.8767E-07	0.3225E-07
FAULT	13 E(NO/YR)	0.9234E-02	0.1185E-02	0.1532E-03	0.2269E-04	0.3953E-05	0.8081E-06	0.1925E-06	0.5303E-07	0.1674E-07	0.5978E-08
FAULT	14 E(NO/YR)	0.1573E-02	0.2267E-03	0.3866E-04	0.8076E-05	0.2000E-05	0.5688E-06	0.1812E-06	0.6349E-07	0.2411E-07	0.9807E-08
FAULT	15 E(NO/YR)	0.1433E-02	0.1912E-03	0.2903E-04	0.5373E-05	0.1185E-05	0.3027E-06	0.8740E-07	0.2800E-07	0.9813E-08	0.3718E-08
FAULT	16 E(NO/YR)	0.8021E-03	0.5007E-04	0.3946E-05	0.4209E-06	0.5886E-07	0.1042E-07	0.2268E-08	0.5919E-09	0.1805E-09	0.6261E-10
FAULT	17 E(NO/YR)	0.3651E-03	0.4316E-04	0.5784E-05	0.9569E-06	0.1914E-06	0.4492E-07	0.1207E-07	0.3642E-08	0.1215E-08	0.4430E-09
FAULT	18 E(NO/YR)	0.4335E-03	0.4149E-04	0.5214E-05	0.8558E-06	0.1737E-06	0.4177E-07	0.1152E-07	0.3559E-08	0.1211E-08	0.4475E-09
FAULT	19 E(NO/YR)	0.2735E-03	0.1150E-04	0.7434E-06	0.7075E-07	0.9213E-08	0.1554E-08	0.3260E-09	0.8227E-10	0.2414E-10	0.7884E-11
FAULT	20 E(NO/YR)	0.5830E-03	0.1904E-04	0.9287E-06	0.6912E-07	0.7457E-08	0.1117E-08	0.2224E-09	0.5551E-10	0.1617E-10	0.4727E-11
TOTAL	E(NO/YR)	0.1137E+00	0.4608E-01	0.2256E-01	0.1214E-01	0.6814E-02	0.3926E-02	0.2310E-02	0.1385E-02	0.8458E-03	0.5255E-03
TOTAL RISK		0.1074E+00	0.4504E-01	0.2231E-01	0.1206E-01	0.6791E-02	0.3919E-02	0.2307E-02	0.1384E-02	0.8454E-03	0.5254E-03

AMPLITUDES (g):		0.1100E+01	0.1200E+01	0.1300E+01	0.1400E+01	0.1500E+01
LN (AMPLITUDE):		0.10	0.18	0.26	0.34	0.41
FAULT	1 E(NO/YR)	0.1014E-03	0.6850E-04	0.4655E-04	0.3185E-04	0.2196E-04
FAULT	2 E(NO/YR)	0.4161E-04	0.2884E-04	0.2017E-04	0.1424E-04	0.1014E-04
FAULT	3 E(NO/YR)	0.1699E-04	0.9811E-05	0.5771E-05	0.3455E-05	0.2104E-05
FAULT	4 E(NO/YR)	0.1470E-03	0.9115E-04	0.5742E-04	0.3674E-04	0.2386E-04
FAULT	5 E(NO/YR)	0.2359E-04	0.1415E-04	0.8633E-05	0.5358E-05	0.3380E-05
FAULT	6 E(NO/YR)	0.6373E-06	0.3125E-06	0.1588E-06	0.8343E-07	0.4524E-07
FAULT	7 E(NO/YR)	0.1801E-06	0.9164E-07	0.4818E-07	0.2611E-07	0.1455E-07
FAULT	8 E(NO/YR)	0.3783E-06	0.1783E-06	0.8743E-07	0.4444E-07	0.2336E-07
FAULT	9 E(NO/YR)	0.9543E-07	0.4402E-07	0.2134E-07	0.1083E-07	0.5739E-08
FAULT	10 E(NO/YR)	0.8059E-08	0.3604E-08	0.1691E-08	0.8285E-09	0.4223E-09
FAULT	11 E(NO/YR)	0.5768E-07	0.2205E-07	0.8828E-08	0.3695E-08	0.1611E-08
FAULT	12 E(NO/YR)	0.1306E-07	0.5750E-08	0.2718E-08	0.1365E-08	0.7201E-09
FAULT	13 E(NO/YR)	0.2378E-08	0.1037E-08	0.4866E-09	0.2421E-09	0.1260E-09
FAULT	14 E(NO/YR)	0.4238E-08	0.1931E-08	0.9225E-09	0.4597E-09	0.2379E-09

APPENDIX D

FAULT	15	E(NO/YR)	0.1509E-08	0.6513E-09	0.2970E-09	0.1423E-09	0.7128E-10
FAULT	16	E(NO/YR)	0.2381E-10	0.9645E-11	0.3931E-11	0.1604E-11	0.5373E-12
FAULT	17	E(NO/YR)	0.1746E-09	0.7376E-10	0.3316E-10	0.1575E-10	0.7761E-11
FAULT	18	E(NO/YR)	0.1778E-09	0.7529E-10	0.3374E-10	0.1590E-10	0.7577E-11
FAULT	19	E(NO/YR)	0.2725E-11	0.8703E-12	0.2555E-12	0.0000E+00	0.0000E+00
FAULT	20	E(NO/YR)	0.1227E-11	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
TOTAL		E(NO/YR)	0.3320E-03	0.2131E-03	0.1389E-03	0.9182E-04	0.6154E-04
TOTAL RISK			0.3319E-03	0.2131E-03	0.1389E-03	0.9182E-04	0.6154E-04

SPECIFIED RISKS:	0.013900	0.010000	0.005000	0.002105	0.001000
ESTIMATED LN AMP. :	-0.983	-0.843	-0.592	-0.333	-0.145
ESTIMATED AMP. (g):	0.37432	0.43021	0.55343	**0.71699**	0.86460

SADIGH ET AL. (1997) DEEP SOIL Problem #2

AMPLITUDES (g):	0.1000E+00	0.2000E+00	0.3000E+00	0.4000E+00	0.5000E+00	0.6000E+00	0.7000E+00	0.8000E+00	0.9000E+00	0.1000E+01	
LN (AMPLITUDE):	-2.30	-1.61	-1.20	-0.92	-0.69	-0.51	-0.36	-0.22	-0.11	0.00	
FAULT 1	E(NO/YR)	0.2530E-02	0.1721E-02	0.1232E-02	0.8297E-03	0.5258E-03	0.3201E-03	0.1906E-03	0.1125E-03	0.6628E-04	0.3921E-04
FAULT 2	E(NO/YR)	0.1356E-02	0.8104E-03	0.4502E-03	0.2429E-03	0.1310E-03	0.7157E-04	0.3983E-04	0.2262E-04	0.1311E-04	0.7748E-05
FAULT 3	E(NO/YR)	0.3705E-02	0.2075E-02	0.1013E-02	0.4529E-03	0.1973E-03	0.8630E-04	0.3845E-04	0.1755E-04	0.8231E-05	0.3965E-05
FAULT 4	E(NO/YR)	0.1856E-01	0.9309E-02	0.4150E-02	0.1791E-02	0.7816E-03	0.3506E-03	0.1625E-03	0.7791E-04	0.3858E-04	0.1969E-04
FAULT 5	E(NO/YR)	0.4085E-02	0.2087E-02	0.9317E-03	0.3954E-03	0.1680E-03	0.7306E-04	0.3276E-04	0.1518E-04	0.7264E-05	0.3585E-05
FAULT 6	E(NO/YR)	0.4643E-02	0.1207E-02	0.2952E-03	0.7559E-04	0.2085E-04	0.6215E-05	0.1992E-05	0.6820E-06	0.2478E-06	0.9497E-07
FAULT 7	E(NO/YR)	0.8524E-03	0.1983E-03	0.4521E-04	0.1126E-04	0.3106E-05	0.9401E-06	0.3091E-06	0.1092E-06	0.4109E-07	0.1634E-07
FAULT 8	E(NO/YR)	0.7304E-02	0.1328E-02	0.2486E-03	0.5247E-04	0.1252E-04	0.3330E-05	0.9736E-06	0.3090E-06	0.1053E-06	0.3820E-07
FAULT 9	E(NO/YR)	0.3126E-02	0.6553E-03	0.1289E-03	0.2688E-04	0.6144E-05	0.1542E-05	0.4223E-06	0.1251E-06	0.3978E-07	0.1347E-07
FAULT 10	E(NO/YR)	0.7126E-03	0.7438E-04	0.9284E-05	0.1449E-05	0.2733E-06	0.6016E-07	0.1504E-07	0.4183E-08	0.1273E-08	0.4180E-09
FAULT 11	E(NO/YR)	0.6675E-02	0.2811E-02	0.8815E-03	0.2509E-03	0.7153E-04	0.2116E-04	0.6567E-05	0.2144E-05	0.7354E-06	0.2642E-06
FAULT 12	E(NO/YR)	0.9329E-02	0.1089E-02	0.1180E-03	0.1468E-04	0.2151E-05	0.3665E-06	0.7123E-07	0.1553E-07	0.3735E-08	0.9783E-09
FAULT 13	E(NO/YR)	0.5475E-02	0.5053E-03	0.4886E-04	0.5651E-05	0.7828E-06	0.1271E-06	0.2364E-07	0.4941E-08	0.1140E-08	0.2860E-09
FAULT 14	E(NO/YR)	0.4215E-03	0.2401E-04	0.2195E-05	0.2863E-06	0.4839E-07	0.9950E-08	0.2386E-08	0.6477E-09	0.1943E-09	0.6321E-10
FAULT 15	E(NO/YR)	0.4729E-03	0.2759E-04	0.2357E-05	0.2807E-06	0.4309E-07	0.8051E-08	0.1759E-08	0.4361E-09	0.1199E-09	0.3590E-10
FAULT 16	E(NO/YR)	0.3377E-03	0.1112E-04	0.5415E-06	0.3862E-07	0.3731E-08	0.4580E-09	0.6794E-10	0.1157E-10	0.1985E-11	0.1073E-12
FAULT 17	E(NO/YR)	0.1279E-03	0.6799E-05	0.5184E-06	0.5536E-07	0.7687E-08	0.1311E-08	0.2632E-09	0.6029E-10	0.1539E-10	0.4266E-11
FAULT 18	E(NO/YR)	0.1053E-03	0.4002E-05	0.2720E-06	0.2802E-07	0.3890E-08	0.6752E-09	0.1392E-09	0.3290E-10	0.8592E-11	0.2221E-11
FAULT 19	E(NO/YR)	0.8770E-04	0.1760E-05	0.6676E-07	0.4103E-08	0.3595E-09	0.4109E-10	0.5643E-11	0.7626E-12	0.0000E+00	0.0000E+00
FAULT 20	E(NO/YR)	0.2435E-03	0.4382E-05	0.1361E-06	0.6758E-08	0.4802E-09	0.4463E-10	0.4913E-11	0.2318E-12	0.0000E+00	0.0000E+00
TOTAL	E(NO/YR)	0.7015E-01	0.2395E-01	0.9558E-02	0.4152E-02	0.1921E-02	0.9354E-03	0.4746E-03	0.2491E-03	0.1346E-03	0.7463E-04
TOTAL RISK		0.6774E-01	0.2367E-01	0.9513E-02	0.4143E-02	0.1919E-02	0.9349E-03	0.4745E-03	0.2491E-03	0.1346E-03	0.7463E-04

AMPLITUDES (g):	0.1100E+01	0.1200E+01	0.1300E+01	0.1400E+01	0.1500E+01
LN (AMPLITUDE):	0.10	0.18	0.26	0.34	0.41
FAULT 1 E(NO/YR)	0.2337E-04	0.1405E-04	0.8537E-05	0.5243E-05	0.3257E-05

APPENDIX D

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   FAULT   2 E(NO/YR)     0.4668E-050.2862E-050.1785E-050.1130E-050.7264E-06
   FAULT   3 E(NO/YR)     0.1961E-050.9945E-060.5166E-060.2744E-060.1489E-06
   FAULT   4 E(NO/YR)     0.1034E-040.5571E-050.3076E-050.1736E-050.1001E-05
   FAULT   5 E(NO/YR)     0.1822E-050.9507E-060.5087E-060.2786E-060.1559E-06
   FAULT   6 E(NO/YR)     0.3819E-070.1604E-070.7004E-080.3170E-080.1483E-08
   FAULT   7 E(NO/YR)     0.6827E-080.2980E-080.1353E-080.6361E-090.3089E-09
   FAULT   8 E(NO/YR)     0.1464E-070.5895E-080.2479E-080.1084E-080.4897E-09
   FAULT   9 E(NO/YR)     0.4828E-080.1820E-080.7187E-090.2956E-090.1260E-09
   FAULT  10 E(NO/YR)     0.1466E-090.5430E-100.2104E-100.8383E-110.3393E-11
   FAULT  11 E(NO/YR)     0.9907E-070.3866E-070.1565E-070.6551E-080.2830E-08
   FAULT  12 E(NO/YR)     0.2749E-090.8153E-100.2474E-100.2815E-110.0000E+00
   FAULT  13 E(NO/YR)     0.7655E-100.2119E-100.5359E-110.1248E-110.0000E+00
   FAULT  14 E(NO/YR)     0.2199E-100.7901E-110.1910E-110.0000E+000.0000E+00
   FAULT  15 E(NO/YR)     0.1129E-100.3279E-110.5399E-120.0000E+000.0000E+00
   FAULT  16 E(NO/YR)     0.0000E+000.0000E+000.0000E+000.0000E+000.0000E+00
   FAULT  17 E(NO/YR)     0.1187E-110.1107E-120.0000E+000.0000E+000.0000E+00
   FAULT  18 E(NO/YR)     0.3431E-120.0000E+000.0000E+000.0000E+000.0000E+00
   FAULT  19 E(NO/YR)     0.0000E+000.0000E+000.0000E+000.0000E+000.0000E+00
   FAULT  20 E(NO/YR)     0.0000E+000.0000E+000.0000E+000.0000E+000.0000E+00
   TOTAL     E(NO/YR)     0.4232E-040.2449E-040.1445E-040.8675E-050.5294E-05
   TOTAL RISK             0.4232E-040.2449E-040.1445E-040.8675E-050.5294E-05

     SPECIFIED RISKS:        0.013900  0.010000  0.005000  0.002105  0.001000
     ESTIMATED LN AMP.  :     -1.373    -1.226    -0.981    -0.720    -0.528
      ESTIMATED AMP. (g):    0.25342   0.29341   0.37480   0.48679   0.58985

SITE 1 COORDINATES: -118.5208  34.4153

 CAMP. & BOZ. (1997 Rev.) AL Problem #1
      AMPLITUDES (g):     0.1000E+000.2000E+000.3000E+000.4000E+000.5000E+000.6000E+000.7000E+000.8000E+000.9000E+000.1000E+01
      LN (AMPLITUDE):       -2.30     -1.61     -1.20     -0.92     -0.69     -0.51     -0.36     -0.22     -0.11      0.00
   FAULT   1 E(NO/YR)     0.3971E-020.2812E-020.2006E-020.1339E-020.8301E-030.4875E-030.2769E-030.1544E-030.8542E-040.4721E-04
   FAULT   2 E(NO/YR)     0.1959E-020.1597E-020.1232E-020.8881E-030.6010E-030.3876E-030.2422E-030.1483E-030.8990E-040.5423E-04
   FAULT   3 E(NO/YR)     0.6099E-020.3763E-020.2350E-020.1368E-020.7447E-030.3891E-030.1991E-030.1012E-030.5155E-040.2644E-04
   FAULT   4 E(NO/YR)     0.2951E-010.2202E-010.1430E-010.8323E-020.4495E-020.2327E-020.1181E-020.5962E-030.3018E-030.1540E-03
   FAULT   5 E(NO/YR)     0.6643E-020.4565E-020.2838E-020.1590E-020.8252E-030.4108E-030.2009E-030.9787E-040.4794E-040.2372E-04
   FAULT   6 E(NO/YR)     0.6855E-020.2327E-020.7001E-030.2001E-030.5778E-040.1731E-040.5433E-050.1790E-050.6183E-060.2234E-06
   FAULT   7 E(NO/YR)     0.1423E-020.4780E-030.1330E-030.3522E-040.9507E-050.2686E-050.8009E-060.2521E-060.8365E-070.2914E-07
   FAULT   8 E(NO/YR)     0.1121E-010.2723E-020.6012E-030.1362E-030.3309E-040.8701E-050.2471E-050.7540E-060.2456E-060.8487E-07
   FAULT   9 E(NO/YR)     0.4419E-020.1210E-020.2996E-030.7313E-040.1858E-040.5012E-050.1441E-050.4411E-060.1431E-060.4905E-07
   FAULT  10 E(NO/YR)     0.1243E-020.2048E-030.3553E-040.7079E-050.1617E-050.4165E-060.1189E-060.3710E-070.1249E-070.4492E-08
   FAULT  11 E(NO/YR)     0.8682E-020.4143E-020.1625E-020.5516E-030.1797E-030.5894E-040.1986E-040.6933E-050.2513E-050.9455E-06
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APPENDIX D

FAULT 12 E(NO/YR)	0.1592E-01	0.3800E-02	0.8035E-03	0.1762E-03	0.4199E-04	0.1093E-04	0.3097E-05	0.9466E-06	0.3097E-06	0.1077E-06
FAULT 13 E(NO/YR)	0.9954E-02	0.1949E-02	0.3810E-03	0.8077E-04	0.1897E-04	0.4921E-05	0.1397E-05	0.4296E-06	0.1419E-06	0.4989E-07
FAULT 14 E(NO/YR)	0.1144E-02	0.1262E-03	0.1810E-04	0.3320E-05	0.7380E-06	0.1908E-06	0.5569E-07	0.1795E-07	0.6287E-08	0.2362E-08
FAULT 15 E(NO/YR)	0.9955E-03	0.1129E-03	0.1642E-04	0.3029E-05	0.6742E-06	0.1741E-06	0.5070E-07	0.1629E-07	0.5682E-08	0.2126E-08
FAULT 16 E(NO/YR)	0.9048E-03	0.1099E-03	0.1662E-04	0.3113E-05	0.6949E-06	0.1787E-06	0.5160E-07	0.1640E-07	0.5652E-08	0.2088E-08
FAULT 17 E(NO/YR)	0.2455E-03	0.2695E-04	0.3871E-05	0.7101E-06	0.1578E-06	0.4077E-07	0.1188E-07	0.3826E-08	0.1338E-08	0.5020E-09
FAULT 18 E(NO/YR)	0.2791E-03	0.2389E-04	0.3061E-05	0.5295E-06	0.1141E-06	0.2899E-07	0.8395E-08	0.2699E-08	0.9465E-09	0.3570E-09
FAULT 19 E(NO/YR)	0.3342E-03	0.3046E-04	0.4071E-05	0.7210E-06	0.1571E-06	0.4014E-07	0.1162E-07	0.3729E-08	0.1302E-08	0.4881E-09
FAULT 20 E(NO/YR)	0.8162E-03	0.7928E-04	0.1091E-04	0.1959E-05	0.4299E-06	0.1102E-06	0.3196E-07	0.1025E-07	0.3576E-08	0.1339E-08
TOTAL E(NO/YR)	0.1126E+00	0.5210E-01	0.2738E-01	0.1478E-01	0.7861E-02	0.4112E-02	0.2135E-02	0.1110E-02	0.5807E-03	0.3071E-03
TOTAL RISK	0.1065E+00	0.5077E-01	0.2701E-01	0.1467E-01	0.7830E-02	0.4104E-02	0.2133E-02	0.1109E-02	0.5805E-03	0.3071E-03

AMPLITUDES (g):	0.1100E+01	0.1200E+01	0.1300E+01	0.1400E+01	0.1500E+01
LN (AMPLITUDE):	0.10	0.18	0.26	0.34	0.41
FAULT 1 E(NO/YR)	0.2618E-04	0.1461E-04	0.8217E-05	0.4665E-05	0.2675E-05
FAULT 2 E(NO/YR)	0.3270E-04	0.1977E-04	0.1200E-04	0.7330E-05	0.4506E-05
FAULT 3 E(NO/YR)	0.1370E-04	0.7188E-05	0.3820E-05	0.2058E-05	0.1124E-05
FAULT 4 E(NO/YR)	0.7947E-04	0.4154E-04	0.2201E-04	0.1183E-04	0.6449E-05
FAULT 5 E(NO/YR)	0.1190E-04	0.6053E-05	0.3128E-05	0.1641E-05	0.8747E-06
FAULT 6 E(NO/YR)	0.8415E-07	0.3296E-07	0.1338E-07	0.5616E-08	0.2431E-08
FAULT 7 E(NO/YR)	0.1063E-07	0.4042E-08	0.1598E-08	0.6549E-09	0.2775E-09
FAULT 8 E(NO/YR)	0.3095E-07	0.1185E-07	0.4742E-08	0.1976E-08	0.8544E-09
FAULT 9 E(NO/YR)	0.1767E-07	0.6666E-08	0.2624E-08	0.1074E-08	0.4554E-09
FAULT 10 E(NO/YR)	0.1712E-08	0.6874E-09	0.2889E-09	0.1265E-09	0.5744E-10
FAULT 11 E(NO/YR)	0.3688E-06	0.1489E-06	0.6207E-07	0.2666E-07	0.1178E-07
FAULT 12 E(NO/YR)	0.3957E-07	0.1527E-07	0.6158E-08	0.2586E-08	0.1126E-08
FAULT 13 E(NO/YR)	0.1856E-07	0.7259E-08	0.2971E-08	0.1266E-08	0.5600E-09
FAULT 14 E(NO/YR)	0.9427E-09	0.3966E-09	0.1747E-09	0.8014E-10	0.3810E-10
FAULT 15 E(NO/YR)	0.8450E-09	0.3540E-09	0.1553E-09	0.7094E-10	0.3360E-10
FAULT 16 E(NO/YR)	0.8187E-09	0.3383E-09	0.1464E-09	0.6594E-10	0.3075E-10
FAULT 17 E(NO/YR)	0.2001E-09	0.8405E-10	0.3698E-10	0.1694E-10	0.8044E-11
FAULT 18 E(NO/YR)	0.1433E-09	0.6066E-10	0.2688E-10	0.1235E-10	0.5789E-11
FAULT 19 E(NO/YR)	0.1946E-09	0.8175E-10	0.3592E-10	0.1639E-10	0.7706E-11
FAULT 20 E(NO/YR)	0.5328E-09	0.2235E-09	0.9808E-10	0.4475E-10	0.2106E-10
TOTAL E(NO/YR)	0.1645E-03	0.8939E-04	0.4928E-04	0.2757E-04	0.1565E-04
TOTAL RISK	0.1645E-03	0.8939E-04	0.4928E-04	0.2757E-04	0.1565E-04

SPECIFIED RISKS:	0.013900	0.010000	0.005000	0.002105	0.001000
ESTIMATED LN AMP. :	-0.897	-0.780	-0.567	-0.354	-0.204
ESTIMATED AMP. (g):	0.40775	0.45837	0.56747	**0.70189**	0.81521

CAMP. & BOZ. (1997 Rev.) AL Problem #2

APPENDIX D

AMPLITUDES (g):	0.1000E+00	0.2000E+00	0.3000E+00	0.4000E+00	0.5000E+00	0.6000E+00	0.7000E+00	0.8000E+00	0.9000E+00	0.1000E+01
LN (AMPLITUDE):	-2.30	-1.61	-1.20	-0.92	-0.69	-0.51	-0.36	-0.22	-0.11	0.00
FAULT 1 E(NO/YR)	0.2739E-02	0.1770E-02	0.1117E-02	0.6236E-03	0.3183E-03	0.1550E-03	0.7397E-04	0.3518E-04	0.1683E-04	0.8146E-05
FAULT 2 E(NO/YR)	0.1526E-02	0.1029E-02	0.6032E-03	0.3112E-03	0.1497E-03	0.6991E-04	0.3239E-04	0.1508E-04	0.7107E-05	0.3401E-05
FAULT 3 E(NO/YR)	0.3812E-02	0.2333E-02	0.1232E-02	0.5647E-03	0.2422E-03	0.1016E-03	0.4266E-04	0.1816E-04	0.7877E-05	0.3492E-05
FAULT 4 E(NO/YR)	0.2098E-01	0.1192E-01	0.5455E-02	0.2162E-02	0.8135E-03	0.3044E-03	0.1157E-03	0.4505E-04	0.1806E-04	0.7457E-05
FAULT 5 E(NO/YR)	0.4428E-02	0.2535E-02	0.1158E-02	0.4552E-03	0.1695E-03	0.6277E-04	0.2360E-04	0.9103E-05	0.3614E-05	0.1479E-05
FAULT 6 E(NO/YR)	0.4169E-02	0.9964E-03	0.2020E-03	0.4129E-04	0.9017E-05	0.2133E-05	0.5460E-06	0.1504E-06	0.4431E-07	0.1386E-07
FAULT 7 E(NO/YR)	0.7920E-03	0.1479E-03	0.2357E-04	0.3939E-05	0.7265E-06	0.1486E-06	0.3351E-07	0.8250E-08	0.2197E-08	0.6274E-09
FAULT 8 E(NO/YR)	0.5942E-02	0.8305E-03	0.1129E-03	0.1725E-04	0.3027E-05	0.6037E-06	0.1350E-06	0.3334E-07	0.8993E-08	0.2620E-08
FAULT 9 E(NO/YR)	0.2673E-02	0.5255E-03	0.9145E-04	0.1657E-04	0.3280E-05	0.7149E-06	0.1708E-06	0.4435E-07	0.1242E-07	0.3723E-08
FAULT 10 E(NO/YR)	0.5252E-03	0.4366E-04	0.4579E-05	0.6203E-06	0.1038E-06	0.2060E-07	0.4700E-08	0.1204E-08	0.3399E-09	0.1043E-09
FAULT 11 E(NO/YR)	0.7091E-02	0.3976E-02	0.1709E-02	0.6339E-03	0.2244E-03	0.7946E-04	0.2871E-04	0.1068E-04	0.4103E-05	0.1629E-05
FAULT 12 E(NO/YR)	0.1040E-01	0.1782E-02	0.2805E-03	0.4865E-04	0.9558E-05	0.2112E-05	0.5186E-06	0.1396E-06	0.4070E-07	0.1274E-07
FAULT 13 E(NO/YR)	0.6750E-02	0.1035E-02	0.1627E-03	0.2892E-04	0.5873E-05	0.1346E-05	0.3430E-06	0.9582E-07	0.2902E-07	0.9430E-08
FAULT 14 E(NO/YR)	0.2674E-03	0.1184E-04	0.9363E-06	0.1105E-06	0.1731E-07	0.3347E-08	0.7614E-09	0.1973E-09	0.5684E-10	0.1751E-10
FAULT 15 E(NO/YR)	0.3105E-03	0.1681E-04	0.1494E-05	0.1908E-06	0.3169E-07	0.6413E-08	0.1514E-08	0.4049E-09	0.1199E-09	0.3858E-10
FAULT 16 E(NO/YR)	0.4733E-03	0.3810E-04	0.4304E-05	0.6464E-06	0.1208E-06	0.2676E-07	0.6794E-08	0.1928E-08	0.6008E-09	0.2025E-09
FAULT 17 E(NO/YR)	0.8513E-04	0.4880E-05	0.4538E-06	0.6024E-07	0.1034E-07	0.2154E-08	0.5222E-09	0.1430E-09	0.4326E-10	0.1422E-10
FAULT 18 E(NO/YR)	0.6560E-04	0.2642E-05	0.2101E-06	0.2564E-07	0.4195E-08	0.8496E-09	0.2026E-09	0.5493E-10	0.1644E-10	0.5284E-11
FAULT 19 E(NO/YR)	0.1428E-03	0.8307E-05	0.8205E-06	0.1158E-06	0.2105E-07	0.4621E-08	0.1175E-08	0.3363E-09	0.1060E-09	0.3615E-10
FAULT 20 E(NO/YR)	0.4473E-03	0.3169E-04	0.3508E-05	0.5346E-06	0.1029E-06	0.2361E-07	0.6226E-08	0.1837E-08	0.5945E-09	0.2079E-09
TOTAL E(NO/YR)	0.7362E-01	0.2904E-01	0.1216E-01	0.4909E-02	0.1950E-02	0.7802E-03	0.3188E-03	0.1337E-03	0.5773E-04	0.2565E-04
TOTAL RISK	0.7098E-01	0.2862E-01	0.1209E-01	0.4897E-02	0.1948E-02	0.7799E-03	0.3187E-03	0.1337E-03	0.5773E-04	0.2565E-04

AMPLITUDES (g):	0.1100E+01	0.1200E+01	0.1300E+01	0.1400E+01	0.1500E+01
LN (AMPLITUDE):	0.10	0.18	0.26	0.34	0.41
FAULT 1 E(NO/YR)	0.3998E-05	0.1993E-05	0.1010E-05	0.5202E-06	0.2724E-06
FAULT 2 E(NO/YR)	0.1656E-05	0.8208E-06	0.4143E-06	0.2128E-06	0.1112E-06
FAULT 3 E(NO/YR)	0.1584E-05	0.7351E-06	0.3488E-06	0.1691E-06	0.8369E-07
FAULT 4 E(NO/YR)	0.3170E-05	0.1387E-05	0.6232E-06	0.2873E-06	0.1356E-06
FAULT 5 E(NO/YR)	0.6234E-06	0.2705E-06	0.1206E-06	0.5518E-07	0.2587E-07
FAULT 6 E(NO/YR)	0.4581E-08	0.1590E-08	0.5771E-09	0.2175E-09	0.8431E-10
FAULT 7 E(NO/YR)	0.1907E-09	0.6132E-10	0.2060E-10	0.7085E-11	0.2416E-11
FAULT 8 E(NO/YR)	0.8176E-09	0.2709E-09	0.9321E-10	0.3195E-10	0.1005E-10
FAULT 9 E(NO/YR)	0.1186E-08	0.3994E-09	0.1412E-09	0.5188E-10	0.1928E-10
FAULT 10 E(NO/YR)	0.3432E-10	0.1185E-10	0.4001E-11	0.1172E-11	0.1600E-12
FAULT 11 E(NO/YR)	0.6675E-06	0.2821E-06	0.1227E-06	0.5486E-07	0.2516E-07
FAULT 12 E(NO/YR)	0.4248E-08	0.1497E-08	0.5540E-09	0.2139E-09	0.8333E-10
FAULT 13 E(NO/YR)	0.3262E-08	0.1193E-08	0.4578E-09	0.1833E-09	0.7535E-10
FAULT 14 E(NO/YR)	0.5506E-11	0.1100E-11	0.0000E+00	0.0000E+00	0.0000E+00
FAULT 15 E(NO/YR)	0.1317E-10	0.4468E-11	0.1052E-11	0.0000E+00	0.0000E+00

APPENDIX D

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  FAULT  16 E(NO/YR)     0.7292E-100.2779E-100.1107E-100.4344E-110.1520E-11
  FAULT  17 E(NO/YR)     0.4994E-110.1816E-110.5749E-120.1307E-120.0000E+00
  FAULT  18 E(NO/YR)     0.1752E-110.5545E-120.0000E+000.0000E+000.0000E+00
  FAULT  19 E(NO/YR)     0.1316E-100.4993E-110.1952E-110.7101E-120.1296E-12
  FAULT  20 E(NO/YR)     0.7761E-100.3056E-100.1253E-100.5222E-110.1990E-11
  TOTAL     E(NO/YR)     0.1171E-040.5493E-050.2641E-050.1300E-050.6543E-06
  TOTAL RISK             0.1171E-040.5493E-050.2641E-050.1300E-050.6543E-06

    SPECIFIED RISKS:        0.013900  0.010000  0.005000  0.002105  0.001000
    ESTIMATED LN AMP.  :     -1.270    -1.144    -0.923    -0.712    -0.560
     ESTIMATED AMP. (g):    0.28095   0.31869   0.39737   0.49069   0.57101
-------------------------------------------------
 CLOSEST DISTANCES BETWEEN SITE AND FAULT RUPTURES
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NO.	FAULT NAME	CD_1DRP	CD_2DRP	CDIST	CLODIS	CD_EPI	CD_HYPO
1	SAN GABRIEL	0.2	0.2	3.0	0.2	0.2	1.3 km
2	HOLSER	2.5	2.5	4.4	2.5	3.7	3.8 km
3	NORTHRIDGE (E. Oak Ridge)	8.7	8.7	10.0	10.0	9.5	11.1 km
4	SANTA SUSANA	10.4	1.0	8.4	8.4	1.6	8.5 km
5	SIERRA MADRE (San Fernando)	13.1	4.0	9.7	9.7	5.1	10.2 km
6	OAK RIDGE (Onshore)	18.6	18.6	19.0	18.6	19.8	19.9 km
7	VERDUGO	19.5	17.3	18.4	18.4	18.4	19.5 km
8	SAN CAYETANO	22.3	22.3	23.5	22.3	23.5	23.5 km
9	SIERRA MADRE	25.8	20.8	23.4	23.4	22.0	24.3 km
10	SIMI-SANTA ROSA	29.0	28.6	29.0	29.0	29.7	30.1 km
11	SAN ANDREAS - 1857 Rupture	29.4	29.4	29.5	29.4	29.4	29.4 km
12	SAN ANDREAS - Mojave	29.4	29.4	29.5	29.4	29.4	29.4 km
13	SAN ANDREAS - Carrizo	31.8	31.8	31.9	31.8	32.1	32.1 km
14	HOLLYWOOD	37.7	32.9	35.4	35.4	33.2	35.4 km
15	SANTA MONICA	38.5	35.2	37.3	37.3	35.8	37.6 km
16	SANTA YNEZ (East)	40.1	38.5	39.8	39.8	39.4	40.6 km
17	MALIBU COAST	42.6	39.2	41.1	41.1	39.5	41.1 km
18	RAYMOND	42.6	39.8	41.6	41.6	40.7	42.2 km
19	NEWPORT-INGLEWOOD (L.A.Basin)	44.6	44.6	44.7	44.6	45.6	45.6 km
20	PALOS VERDES	49.4	49.4	49.5	49.4	50.1	50.1 km

EXPLANATION

APPENDIX D

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CD_1DRP  = Closest distance to projection of rupture area along fault trace.
CD_2DRP  = Closest distance to surface projection of the rupture area.
CDIST    = Closest distance to seismogenic rupture.
CLODIS   = Closest distance to subsurface rupture.
CD_EPI   = Closest epicentral distance.
CD_HYPO  = Closest hypocentral distance.
```

APPENDIX D

SUMMARY OF CALCULATED ACCELERATIONS

Unweighted Accelerations (g)

Attenuation Relationship	Return Period Evaluated				
	72	100	200	475	1000
Boore et al. (1997)	0.36026	0.41797	0.54445	**0.71526**	0.87072
Sadigh et al. (1997)	0.37432	0.43021	0.55343	**0.71699**	0.86460
Campbell & Bozorgnia (1997)	0.40775	0.45837	0.56747	**0.70189**	0.81521
Average	0.38	0.44	0.56	**0.71**	0.85

Accelerations (g) Weighted for a 7.5 Magnitude

Attenuation Relationship	Return Period Evaluated				
	72	100	200	475	1000
Boore et al. (1997)	0.24598	0.28718	0.37444	**0.49394**	0.60320
Sadigh et al. (1997)	0.25342	0.29341	0.37480	**0.48679**	0.58985
Campbell & Bozorgnia (1997)	0.28095	0.31869	0.39737	**049069**	0.57101
Average	0.26	0.30	0.38	**0.49**	0.59

Appendix E

APPENDIX E

RECOMMENDED EARTHWORK SPECIFICATIONS

The following specifications are recommended to provide a basis for quality control during the placement of compacted fill or backfill as applicable.

1. Areas that are to receive compacted fill shall be observed by Allan E. Seward Engineering Geology, Inc. (AES) prior to the placement of fill.

2. All drainage devices shall be properly installed and observed by AES and/or owner's representative(s) prior to placement of backfill.

3. Fill soils shall consist of imported soils or on-site soils free of organics, cobbles, and deleterious material provided each material is approved by AESEGI. AESEGI shall evaluate and/or test the import material for its conformance with the report recommendations prior to its delivery to the site. The contractor shall notify AESEGI 72 hours prior to importing material to the site.

4. Fill shall be placed in controlled layers (lifts), the thickness of which is compatible with the type of compaction equipment used. The fill materials shall be brought to optimum moisture content or above, thoroughly mixed during spreading to obtain a near uniform moisture condition and uniform blend of materials, and then placed in layers with a thickness (loose) not exceeding 8 inches. Each layer shall be compacted to a minimum compaction of 90% relative to the maximum dry density determined per the latest ASTM D1557 test. Density testing shall be performed by AESEGI to verify relative compaction. The contractor shall provide proper access and level areas for testing.

5. Rocks or rock fragments less than eight (8) inches in the largest dimension may be utilized in the fill, provided they are not placed in concentrated pockets, except rocks larger than four (4) inches shall not be placed within three (3) feet of finish grade.

   Rocks greater than eight (8) inches in largest dimension shall be taken offsite, or placed in accordance with the recommendation of the Soils Engineer in areas designated as suitable for rock disposal.

6. Where space limitations do not allow for conventional fill compaction operations, special backfill materials and procedures may be required. Pea gravel or other select

APPENDIX E

fill can be used in areas of limited space. A sand and portland cement slurry (2 sacks per cubic-yard mix) shall be used in limited space areas for shallow backfill near final pad grade, and pea gravel shall be placed in deeper backfill near drainage systems.

7. AES shall observe the placement of fill and conduct in-place field density tests on the compacted fill to check for adequate moisture content and the required relative compaction. Where less than specified relative compaction is indicated, additional compacting effort shall be applied and the soil moisture conditioned as necessary until adequate relative compaction is attained.

8. The Contractor shall comply with the minimum relative compaction out to the finish slope face of fill slopes, buttresses, and stabilization fills as set forth in the specifications for compacted fill. This may be achieved by overbuilding the slope and cutting back as necessary.

9. Any abandoned underground structures such as cesspools, cisterns, mining shafts, tunnels, septic tanks, wells, pipelines or others not discovered prior to grading are to be removed or treated to the satisfaction of the Soils Engineer and/or the controlling agency for the project.

10. The Contractor shall have suitable and sufficient equipment during a particular operation to handle the volume of fill being placed. When necessary, fill placement equipment shall be shut down temporarily in order to permit proper compaction of fills, correction of deficient areas, or to facilitate required field testing.

11. The Contractor shall be responsible for the satisfactory completion of all earthwork in accordance with the project plans and specifications.

12. Final reports shall be submitted after completion of earthwork and after the Soils Engineer and Engineering Geologist have finished their observations of the work. No additional excavation or filling shall be performed without prior notification to the Soils Engineer and/or Engineering Geologist.

13. Whenever the words "supervision", "inspection" or "control" are used, they shall mean observation of the work and/or testing of the compacted fill by AESEGI to assess whether substantial compliance with plans, specifications and design concepts has been achieved, and does not include direction of the actual work of the contractor or the contractor's workmen.

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RECOMMENDED SPECIFICATIONS FOR PLACEMENT OF TRENCH BACKFILL

1. Trench excavations to receive backfill shall be free of trash, debris or other unsatisfactory materials prior to backfill placement, and shall be observed by Allan E. Seward Engineering Geology, Inc. (AESEGI) representative.

2. Except as stipulated herein, soils obtained from the excavation may be used as backfill if they are essentially free of organics and deleterious materials.

   Rocks generated from the trench excavation not exceeding three (3) inches in largest dimension may be used as backfill material. However, such material may not be placed within 12 inches of the top of the pipeline. No more than 30 percent of the backfill volume shall contain particles larger than 1 ½ inches in diameter, and rocks shall be well mixed with finer soil.

3. Soils (other than aggregates) with a Sand Equivalent (SE) greater than or equal to 30, as determined by ASTM D 2419 Standard Test Method or at the discretion of the engineer or representative in the field, may be used for bedding and shading material in the pipe zone areas. These soils are considered satisfactory for compaction by jetting procedures.

4. No jetting will be permitted in utility trenches within the top 2 feet of the subgrade of concrete slabs-on-grade.

5. Trench backfill other than bedding and shading shall be compacted by mechanical methods as tamping sheepsfoot, vibrating or pneumatic rollers or other mechanical tampers to achieve the density specified herein. The backfill materials shall be brought to optimum moisture content or above, thoroughly mixed during spreading to obtain a near uniform moisture condition and uniform blend of materials, and then placed in horizontal layers with a thickness (loose) not exceeding 8 inches. Trench backfills shall be compacted to a minimum compaction of 90 percent relative to the maximum dry density determined per the latest ASTM D1557 test.

6. The contractor shall select the equipment and process to be used to achieve the specified density without damage to the pipeline, the adjacent ground, existing improvements or completed work.

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7. Observations and field tests shall be carried on during construction by AES to confirm that the required degree of compaction has been obtained. Where compaction is less than that specified, additional compaction effort shall be made with adjustment of the moisture content as necessary until the specified compaction is obtained. Field density tests may be omitted at the discretion of the engineer or his representative in the field.

8. Whenever, in the opinion of AES or the Owner's Representative(s), an unstable condition is being created, either by cutting or filling, the work shall not proceed until an investigation has been made and the excavation plan revised, if deemed necessary.

9. Fill material shall not be placed, spread, or rolled during unfavorable weather conditions. When the work is interrupted by heavy rain, fill operations shall not be resumed until field tests by AES indicate the moisture content and density of the fill are as specified.

10. Whenever the words "supervision", "inspection", or "control" are used, they shall mean observation of the work and/or testing of the compacted fill by AESEGI to assess whether substantial compliance with plans, specifications and design concepts has been achieved.

APPENDIX E

DRAINAGE AND EROSION CONTROL RECOMMENDATIONS

Slopes and pads on this project were designed to direct surficial runoff away from structures and reduce water-induced surficial erosion/sloughing. Permanent erosion control measures should be initiated immediately following completion of grading. All constructed slopes will undergo some erosion when subjected to sustained water influx. To maintain appropriate long-term drainage and erosion control, the following points should be considered in slope protection, landscaping, irrigation and modifications to slopes, pads and structures:

1. All interceptor ditches, drainage terraces, down-drains and any other drainage devices should be maintained and kept clear of debris. A qualified Engineer should review any proposed additions or revisions to these systems, to evaluate their impact on slope erosion.

2. Retaining walls should have adequate freeboard to provide a catchment area for minor slope erosion. Periodic inspection, and if necessary, cleanout of deposited soil and debris should be performed; particularly during and after periods of rainfall.

3. The future developers should be made aware of the **potential problems**, which may develop **when drainage is altered** through landscaping and/or construction of retaining walls, and paved walkways. Ponded water, water directed over slope faces, leaking irrigation systems, **overwatering** or other conditions which could lead to excessive soil moisture, **must be avoided**.

4. Slope surficial soils may be subject to water-induced mass erosion. Therefore, a suitable proportion of slope planting should have root systems, which will develop well below three feet. We suggest consideration of drought-resistant shrubs and low trees for this purpose. Intervening areas can then be planted with lightweight surface plants with shallower root systems. All plants should be lightweight and require low moisture. Any loose slough generated during the process of planting should be properly removed from the slope face(s).

5. Construction delays, climate/weather conditions, and plant growth rates may be such that additional short-term, nonplant erosion control measures may be needed; examples would be matting, netting, plastic sheets, deep (5-feet) staking, etc.

APPENDIX E

6. Major erosion can be initiated by seemingly insignificant events; rodent burrowing, human trespass (footprints, etc.), small concentrations of uncontrolled surface/subsurface water; or poor compaction of utility trench backfill on slopes.

7. High and/or fluctuating water content in slope materials is a major factor in slope erosion and/or slope failures. Therefore, all possible precautions should be taken to maintain a moderate and uniform soil moisture. Slope irrigation systems should be properly operated and maintained and system controls should be placed under strict control.

EROSION CONTROL REFERENCES

1. "Slope Protection for Residential Developments", National Academy of Sciences, Washington D.C. (1969).

2. "Guide for Erosion and Debris Control in Hillside Areas", Department of Building and Safety, City of Los Angeles. (1970).

3. "Slope Stability Report", Orange County Department of Building and Safety (1973).

4. "Guides for Erosion and Sediment Control", Soil Conservation Service, Davis, California, U.S. Department of Agriculture (1977).

5. "Rain-Care and Protection of Hillside Homes", brochure undated, published by Building and Safety Division, Los Angeles County Engineer.

6. "Guidelines for Erosion and Sediment Control Planning and Implementation: Office of Research and Monitoring", U.S. Environmental Protection Agency (1972).

7. "Resource Conservation Glossary", Soil Conservation Society of America (1970).

8. "Standards and Specifications for Soil Erosion and Sediment Control Developing Areas", Soil Conservation Service, U.S. Department of Agriculture (1975).

9. "Homeowners Guide for Debris and Erosion Control", Los Angeles County Flood Control District (undated).

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10. "Grading Guidelines (8 pages, stapled sheets)", Building and Safety Division, Department of County Engineer, County of Los Angeles (undated, but probably about 1977).

11. "Biotechnical Slope Protection and Erosion Control", Donald H. Gray and Andrew T. Leiser, Robert E. Krieger Publishing Company, Malabuv, Florida, 1989.

APPENDIX E

CONSTRUCTION DIAGRAMS

Schematic Alluvial/Slopewash Detail	Figure E1
Fill Over Natural Slope	Figure E2
Cut Lot (Transitional) and Cut-Fill Lot (Transitional)	Figure E3
Rock Disposal Windrows	Figure E4
Fill Slope Over Natural Slope	Figure E5
Fill Slope Toeing Out on Flat Alluviated Canyon	Figure E6
Stability/Buttress Fill and Backdrain Detail	Figure E7
Typical Fill Above Cut-Slope	Figure E8
Subdrain Detail	Figure E9
Debris Flow Hazard Control Devices	Figure E10

MINIMUM FOUNDATION AND SLAB RECOMMENDATIONS FOR EXPANSIVE SOILS
(ONE-, TWO-, AND THREE-STORY BUILDINGS)

Minimum Residential Footing Recommendations

Expansion Classification (UBC)	Expansion Index (UBC)	Footing Depths (inches)				Continuous Footing Reinforcement
		One and Two Stories		Three Stories		
		Perimeter	Interior	Perimeter	Interior	
Very Low	0 to 20	18	12	24	18	Per structural requirements
Low	21 to 50	18	12	24	18	One # 4 Rebar Top and Bottom
Medium	51 to 90	24	18	30	24	One # 4 Rebar Top and Bottom
High	91 to 130	30	18	36	30	Two # 4 Rebars Top and Bottom

- Minimum footing widths: 12 inches (one-story); 15 inches (two-story); 18 inches (three-story); 24 inches for individual columns.
- All footing depths are measured below lowest adjacent final grade.
- The base of the garage door grade beam should be at the same elevation as that of the adjoining footings.
- Garage slabs should be isolated from stem wall footings with a minimum 3/8" felt expansion joint.
- Isolated exterior structural column footings should be tied back to the main foundation system in at least two (2) orthogonal directions (conventional foundations only).

Minimum Residential Slab Recommendations

Expansion Classification (UBC)	Expansion Index (UBC)	*Slab Subgrade* Presoaking	*Slab Reinforcement*		*Minimum* Slab Thickness (Ref: PCA)
			Option 1	Option 2	
Very Low	0 to 20	None	#3 Rebar at 24" each way	6-#6 gauge, 10"x10" welded wire mesh or equivalent	4 inches
Low	21 to 50	120 percent of optimum moisture content[1] to 18 inches depth	#3 Rebar at 18" each way		
Medium	51 to 90	130 percent of optimum moisture content to 18 inches depth	#4 Rebar at 18" each way	#6-#6 gauge, 6"x6" welded wire mesh or equivalent	5 inches
High	91 to 130	140 percent of optimum moisture content to 24 inches depth	#4 Rebar at 14" each way		6 inches

- Concrete for floor slabs should conform to the requirements contained in Chapter 19 of the 1997 edition of the Uniform Building Code.

Minimum Residential Slab Recommendations continued on back of this page

[1] Optimum moisture content as determined by ASTM D1557 Test Method on subgrade soils.

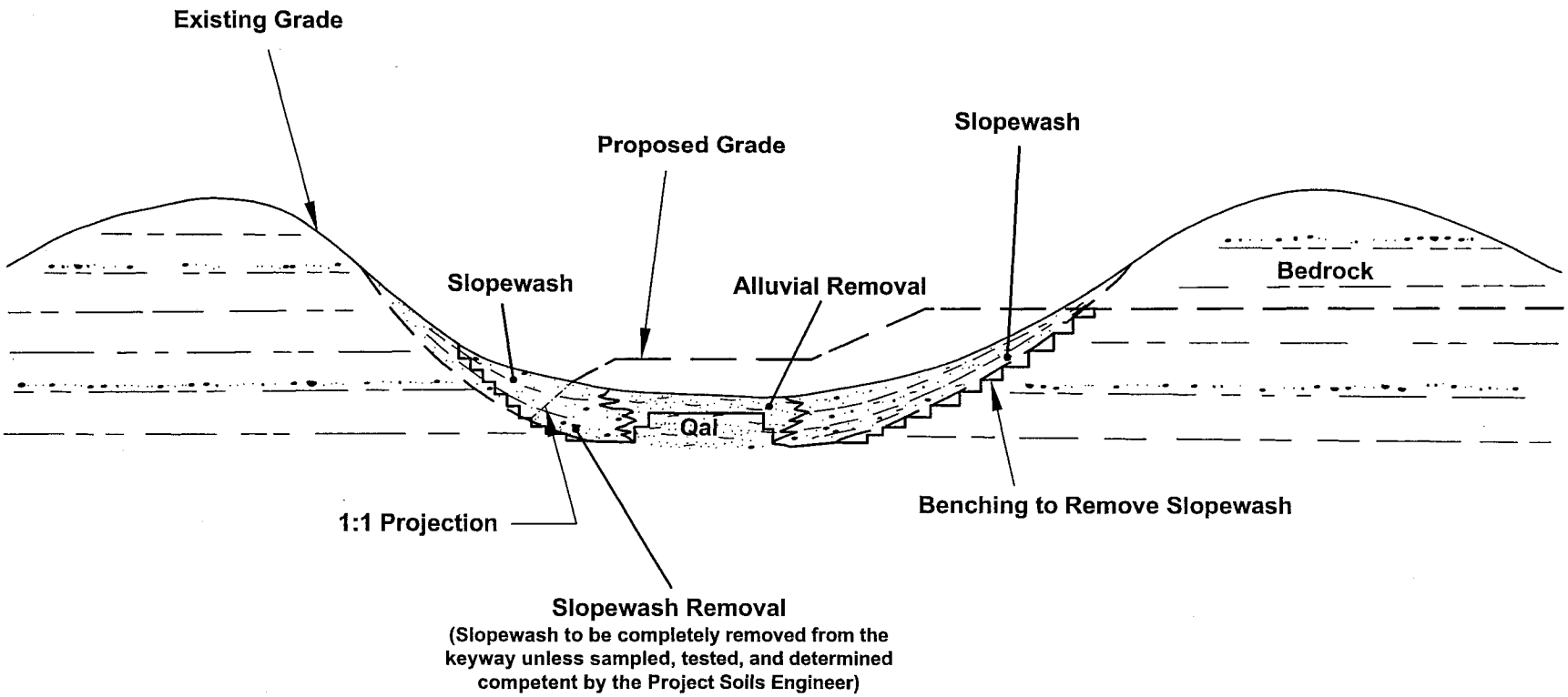
MINIMUM FOUNDATION AND SLAB RECOMMENDATIONS FOR EXPANSIVE SOILS
(ONE-, TWO-, AND THREE-STORY BUILDINGS)

Minimum Residential Slab Recommendations (continued from front side of this page)

- Sand base should have a Sand Equivalent of 30 or greater (e.g., washed concrete sand).
- Interior area slabs, except garages may be tied to the footings as directed by the Structural Engineer. For Medium and High Expansion Potential subgrades, dowels of No. 3 bars should be placed at 36 inches on centers in the footings and bent 3 feet into the slab.
- It has been observed that welded wire-fabric reinforcement seldom stays at the design height within concrete slabs. We recommend the use of No. 3 reinforcing bars instead of 6x6-10/10 WWF and No. 4 reinforcing bars instead of 6x6-6/6 WWF at the center spacings indicated above.
- Vapor barrier for slabs-on-grade: A sheet of 10-mil visqueen sandwiched between two, 2-inch layers of compacted sand. The vapor barrier must be properly lapped and/or sealed, and sealed around all plumbing structures and other openings. Care should be taken to avoid punctures in the vapor barrier resulting from sharp objects in the subgrade and/or structures. Equivalents are acceptable.
- To reduce moisture intrusion beneath slabs on grade, utility trenches should be backfilled with lean concrete or concrete slurry at foundation perimeters. The plug shall be under the full width of the footing and be extended along a minimum of 24-inch of trench length below the slab.
- Materials from foundation and/or utility trench excavations should not be spread on slab-on-grade areas unless it is compacted and tested.
- Foundation excavations should be observed by a representative of this firm prior to placement of forms, reinforcement, or concrete, to verify that the excavations are embedded to the recommended depth into the recommended material. The excavations should be moisture-conditioned and free of all loose or sloughed material prior to placement of concrete.
- Foundations and floor slabs supported on subsoils with an expansion index greater than 130 should be individually engineered based on actual details of the foundation system.

Post-Tensioned Slabs

As an alternative to conventional foundations, buildings may be supported on post-tensioned slabs, to be designed by a structural engineer in consultation with the geotechnical engineer. In addition, a post-tensioned slab is also recommended for VERY HIGH expansion potential soils (Expansion Index greater than 130), if encountered. Post-tensioned slabs should have footings embedded a minimum of 12 inches below the lowest adjacent grade. The slabs should be designed so that they can be deformed approximately 1 inch vertically over a width of 30 feet without distress in the event of shrinkage or swelling of the supporting soils. The slab should be underlain by a vapor barrier sandwiched between two, 2-inch layers of compacted sand.



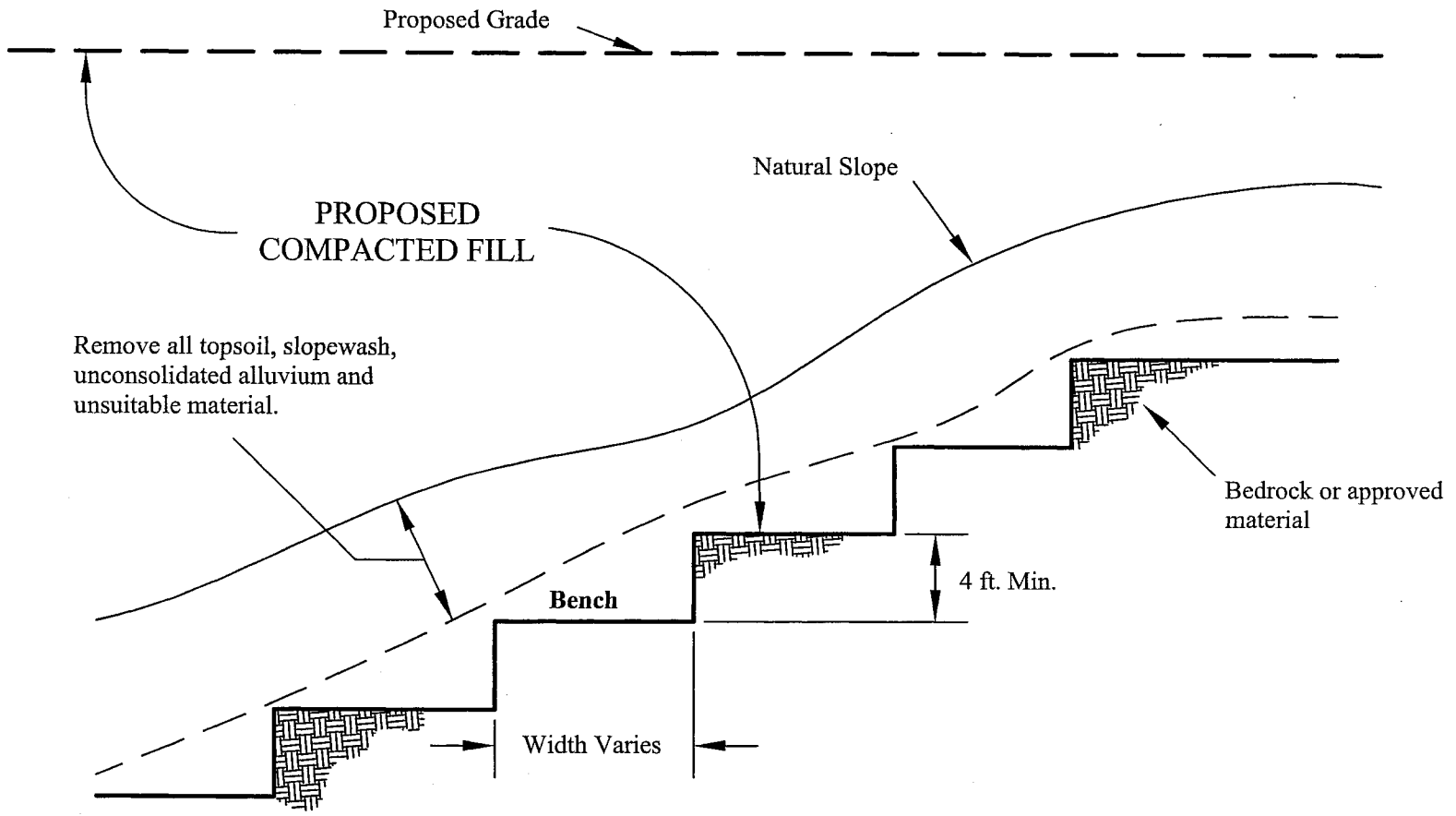
Note: Not to Scale

ALLAN E. SEWARD
ENGINEERING GEOLOGY, INC.
Geological and Geotechnical Consultants

SCHEMATIC ALLUVIAL/ SLOPEWASH DETAIL

Job No.: 03-1571-4

Date: 4/4/03 | *Figure:* E1



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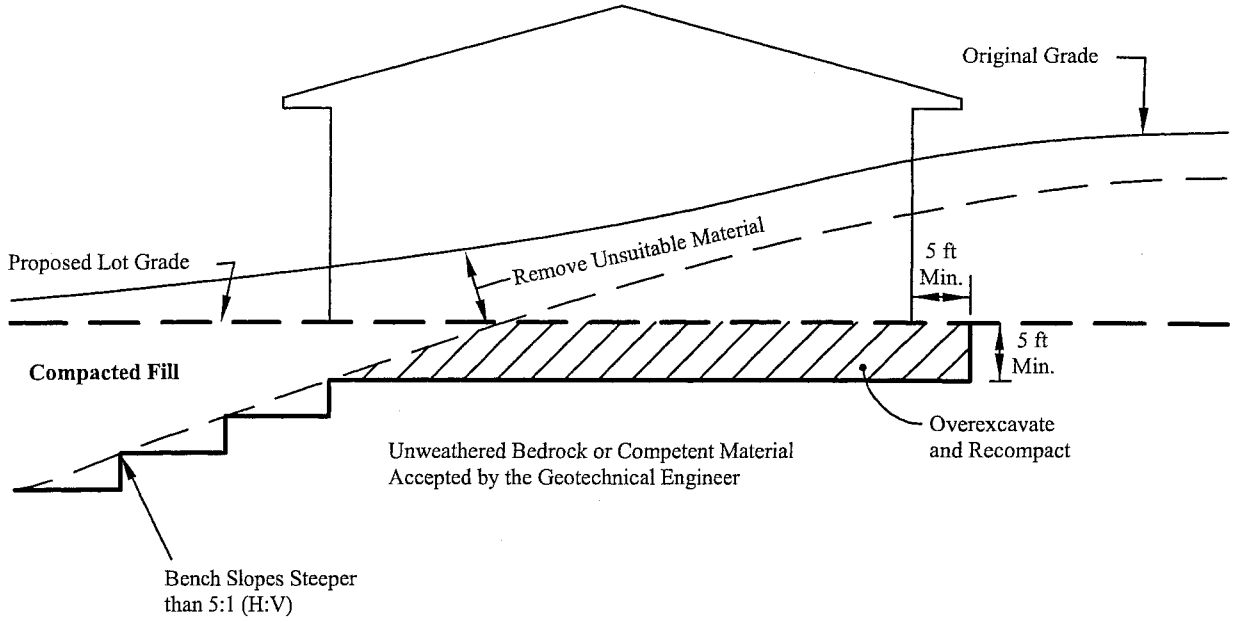
Geological and Geotechnical Consultants

FILL OVER NATURAL SLOPE
5:1 OR STEEPER

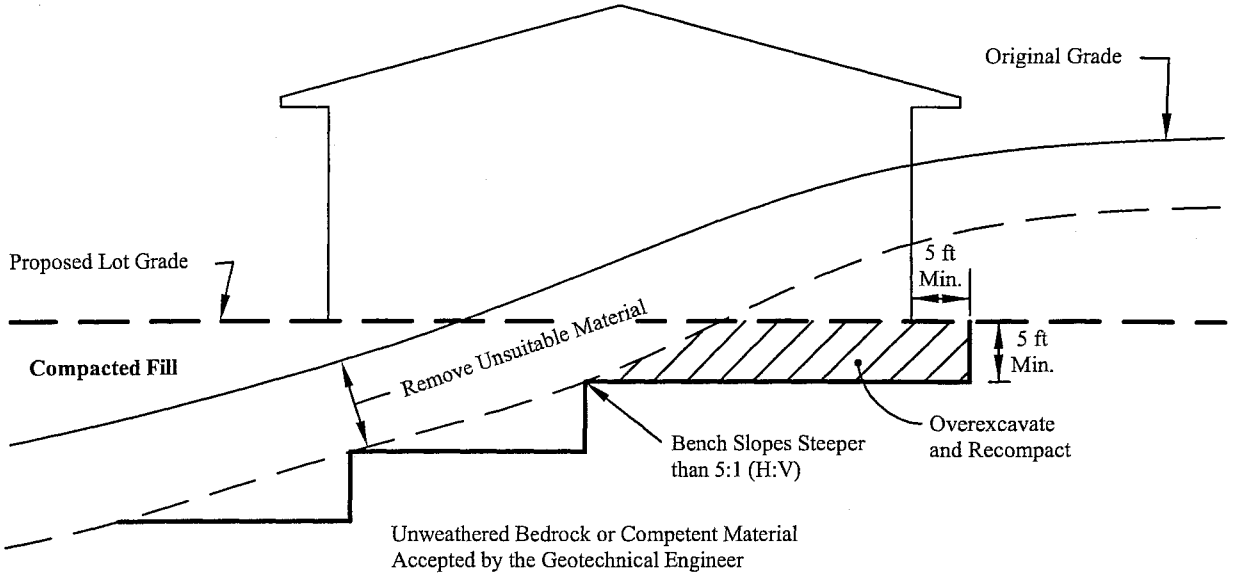
Job No.: 03-1571-4

Date: 4/4/03 | *Figure:* E2

Cut Lot



Cut Fill Lot



NOTE: Deeper Overexcavation and/or Additional Foundation Reinforcement may be Required by the Soils Engineer in Steep Cut/Fill Transition Areas (See Text)

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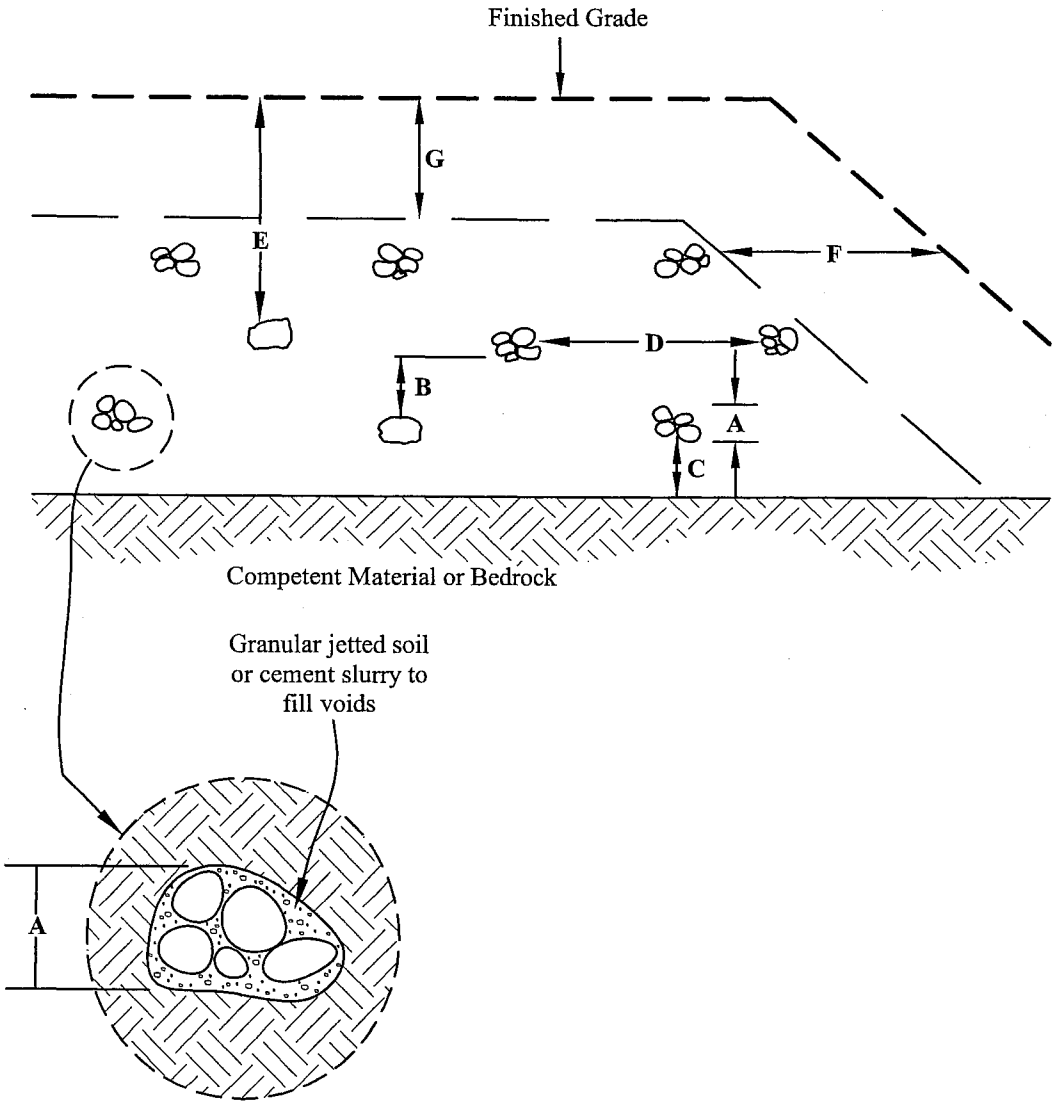
CUT LOT AND CUT FILL LOT(TRANSITIONAL)

Job No.: 03-1571-4

Date: 4/4/03 | *Figure:* E3



EXPLANATION

A) ±4 ft, Height and Width may vary depending on rock size

B) Minimum of 4 ft from stagger windrow

C) Minimum of 5 ft from first set of windrow to competent material or bedrock

D) Minimum of 15 ft between windrows

E) Minimum of 23 ft from oversized rocks (> 4 ft in its largest dimension) to finished subgrade;all oversized rocks must be individually placed

F) Minimum of 25 ft from projected windrow area to finished subgrade

G) Minimum of 15 ft to clear for foundations and pools or 5 ft below the deepest adjacent utility trench, whichever is deepest

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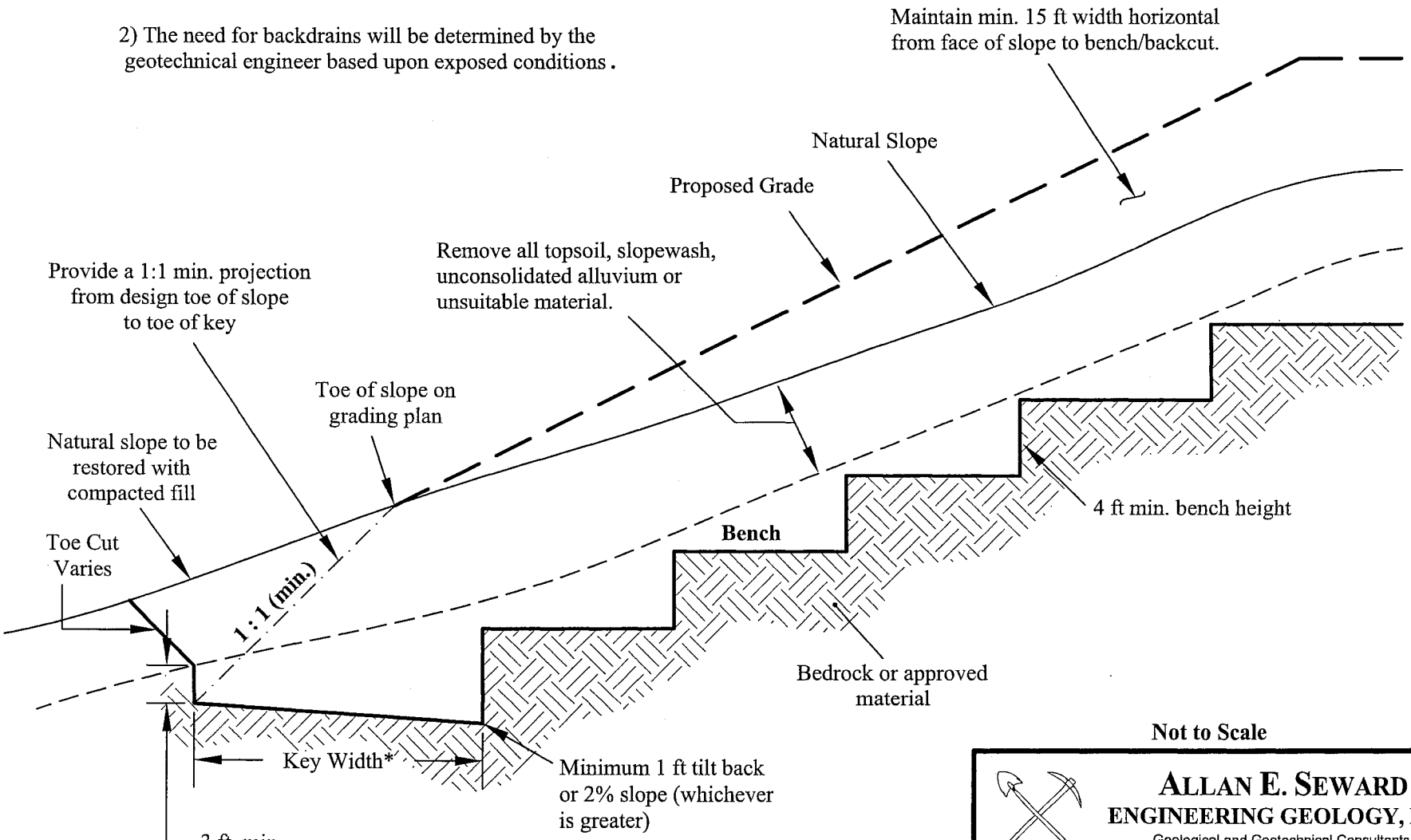
ROCK DISPOSAL (WINDROWS)

Job No.: 03-1571-4

Date: 4/4/03 | *Figure:* E4

NOTE: 1) Where the natural slope approches or exceeds the design slope ratio, special recommendations will be provided by the geotechnical engineer.

2) The need for backdrains will be determined by the geotechnical engineer based upon exposed conditions.



*Keyway width in competent material minimum of 15 ft or as recommended by the Geotechnical Engineer.

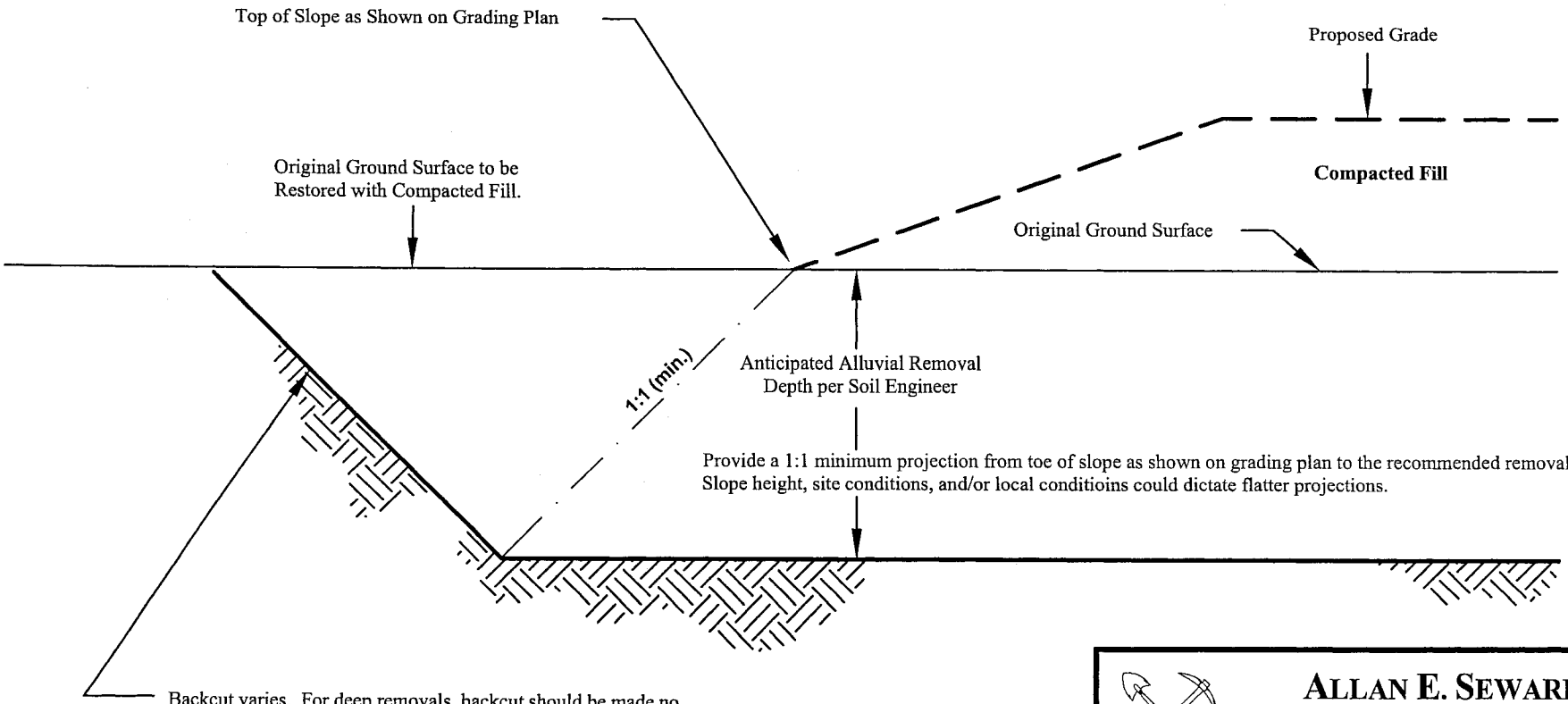
Not to Scale

ALLAN E. SEWARD
ENGINEERING GEOLOGY, INC.
Geological and Geotechnical Consultants

FILL SLOPE OVER NATURAL SLOPE 5:1 OR STEEPER

Job No.: 03-1571-4

Date: 4/4/03 | *Figure:* E5



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ENGINEERING GEOLOGY, INC.
Geological and Geotechnical Consultants

FILL SLOPE TOEING OUT ON FLAT ALLUVIATED CANYON

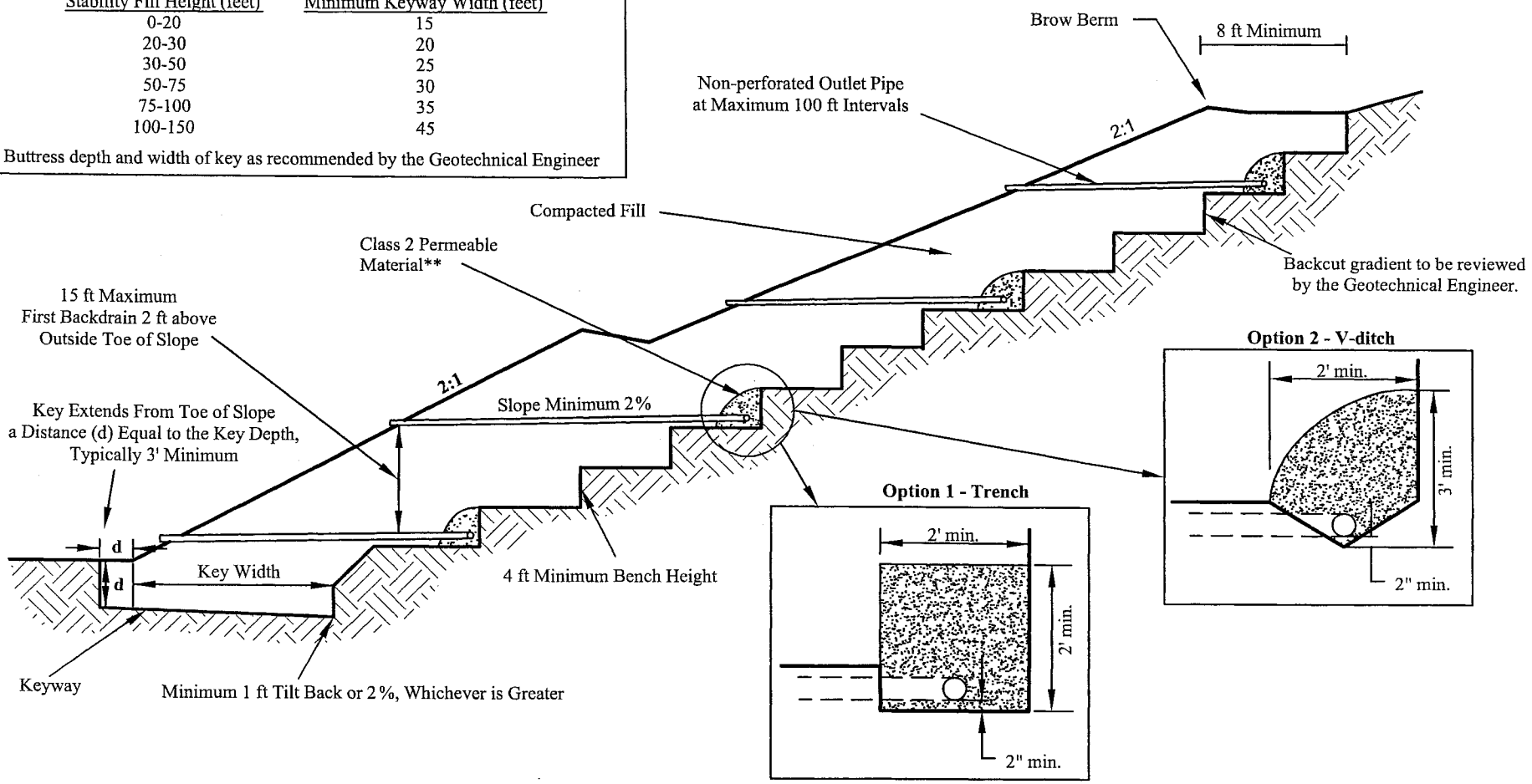
Job No.: 03-1571-4

Date: 4/4/03 | *Figure:* E6

Standard Keyway Width vs. Slope Height for Stability Fill

Stability Fill Height (feet)	Minimum Keyway Width (feet)
0-20	15
20-30	20
30-50	25
50-75	30
75-100	35
100-150	45

Buttress depth and width of key as recommended by the Geotechnical Engineer



**Specifications for CalTrans Class 2 Permeable Material

U.S. Standard Sieve Size	% Passing
1"	100
3/4"	90-100
3/8"	40-100
No. 4	25-40
No. 8	18-33
No. 30	5-15
No. 50	0-7
No. 200	0-3

Sand Equivalent >75

All backdrains and outlet pipes to be 4" diameter PVC pipe (SDR 35 or Schedule 40); Backdrain Perforations positioned down; Upper ends of backdrains to be sealed with an approved cap.

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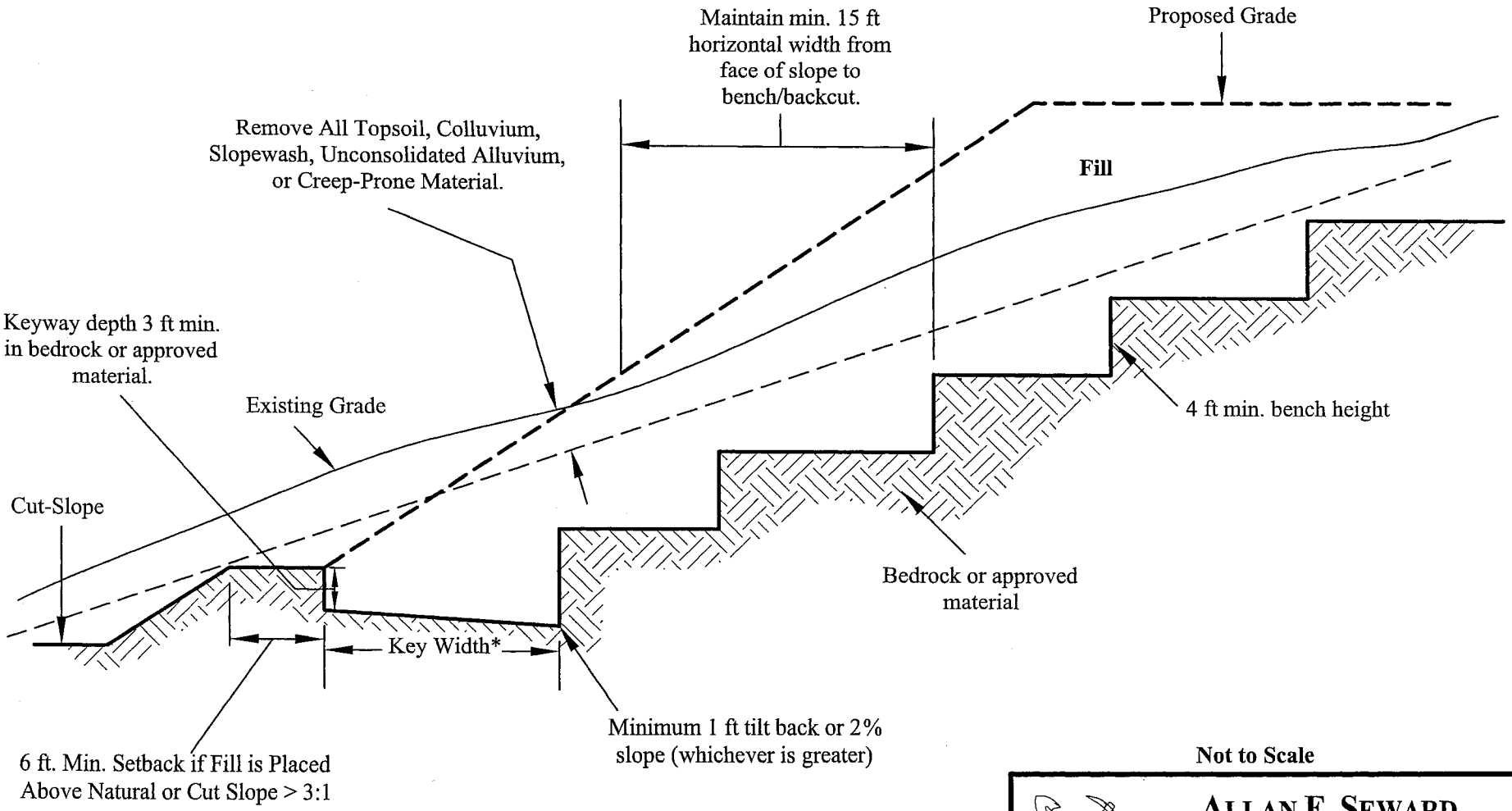
ENGINEERING GEOLOGY, INC.
Geological and Geotechnical Consultants

STABILITY/BUTTRESS FILL AND BACKDRAINS

Job No.: 03-1571-4

Date: 4/4/03 | *Figure:* E7



*Keyway width in competent material minimum of 15 ft. or as recommended by Geotechnical Engineer.

Not to Scale

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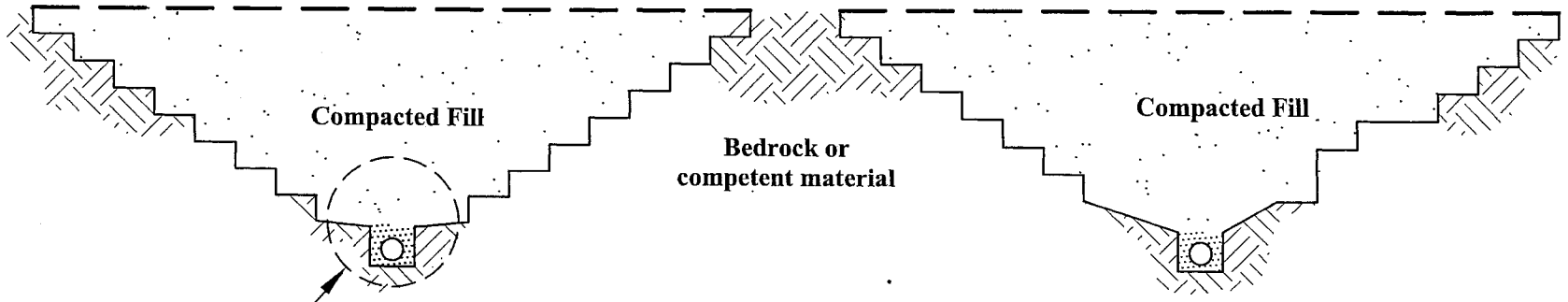
Geological and Geotechnical Consultants

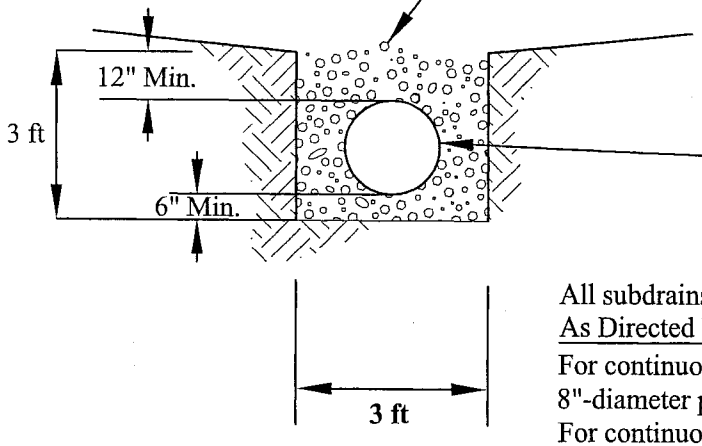
TYPICAL FILL ABOVE CUT-SLOPE

Job No.: 03-1571-4

Date: 4/4/03 | *Figure:* E8



See enlargement
below (typ.)



9 cubic feet per linear foot of perforated pipe of Class 2 Permeable material as specified in Sec. 68-1.025 of the State of California, Dept. of Transportation Standard Spec.

All subdrains to be PVC pipe (SDR 35 or Schedule 40)
As Directed by the Soils Engineer:
For continuous run in excess of 500 ft, use 8"-diameter pipe
For continuous run in excess of 1500 ft, use 10"-diameter pipe

Notes:

Downstream 20 feet minimum of pipe at outlet shall be non-perforated.
Drain pipe perforations shall be 1/4" diameter open holes in two rows along the bottom quarter of pipe.
Center to center spacing between perforations in each row shall not exceed 12 inches.
Subdrain perforations positioned down.
Remove all unsuitable material before placing any fill.
Upslope end of pipe should be capped with an approved cap*.
Minimum 2% gradient.

* Endpoints and long runs should be surveyed

Not to scale

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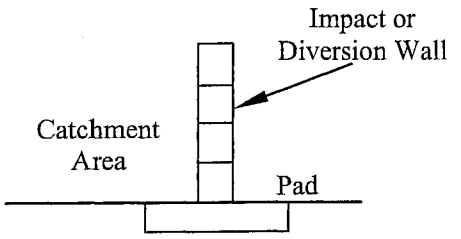
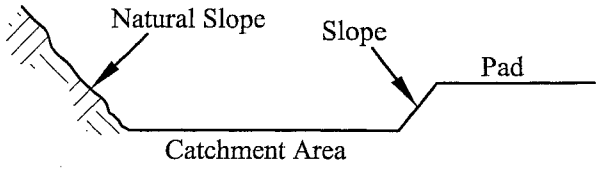
Geological and Geotechnical Consultants

CANYON SUBDRAIN DETAIL

Job No.: 03-1571-4

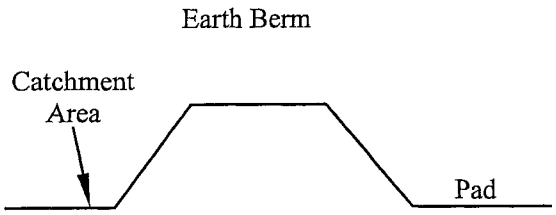
Date: 4/4/03 | *Figure:* E9

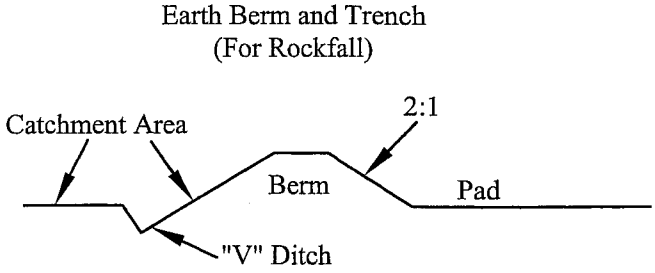




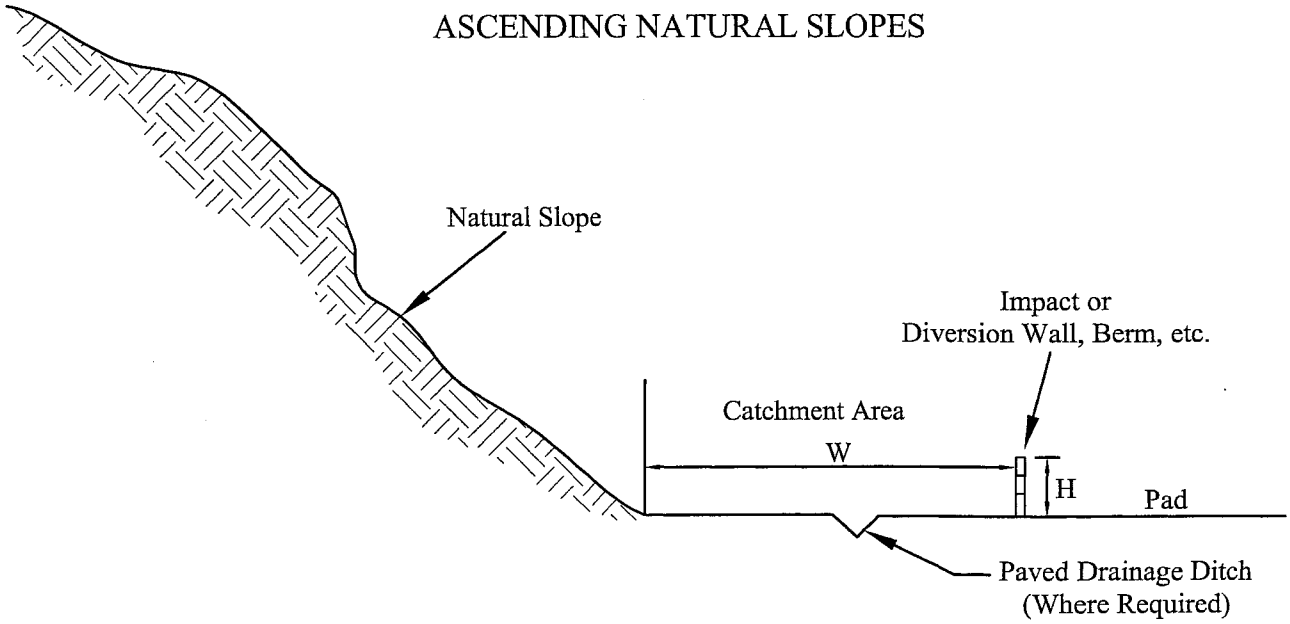
NOTE: Not to scale

ALTERNATIVE DEBRIS CONTROL DEVICES





ASCENDING NATURAL SLOPES



NOTE: W and H will vary according to natural slope height, gradient, and material

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DEBRIS FLOW HAZARD CONTROL DEVICES

Job No.: 03-1571-4

Date: 4/4/03 | *Figure:* E10

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ENGINEERING GEOLOGY, INC.
Geological And Geotechnical Consultants

GEOLOGIC AND GEOTECHNICAL REPORT

Review of Tentative Tract Map (Dated February 25, 2003)

Tentative Tract 53425

River Park

City of Santa Clarita, California

VOLUME II OF II

Prepared for:

Newhall Land
23823 West Valencia Boulevard
Valencia, California 91355

Job No: 03-1571-4
Dated April 4, 2003

27825 Smyth Drive, Valencia, California 91355 661-294-0065 FAX 661-294-0833

Appendix F

APPENDIX F

SLOPE STABILITY ANALYSES

Introduction

Analyses were performed to evaluate the stability of proposed cut and fill slopes, critical natural slopes proposed to remain adjacent to the development and landslide areas which may impact the proposed development. The stability analyses utilized cross sections constructed to illustrate critical structural geometries and maximum slope heights for each analyzed slope. Our evaluation included gross and surficial stability and static and pseudostatic (i.e. with an imposed pseudostatic simulated load) conditions were considered for gross stability. Based on our analyses, the need for stabilization measures was explored and dimensional design of these measures was performed, as needed, in a step-by-step fashion utilizing computer-based numerical slope stability analyses. The results of our stability analyses are summarized in Table F1 along with slope parameters and recommended mitigations. Slope stability diagrams graphically illustrating the results of our analyses for each cross section are attached for review.

Summary of Slope Conditions Analyzed

Natural slopes evaluated for this investigation include ridgelines and riverbank areas proposed to remain above the Santa Clara River. Cross Sections 3-3', 5-5', 6-6' and 7-7', illustrate the anticipated conditions at critical ridgeline areas. Cross Sections 13-13', 16-16' through 18-18', and 23-23' illustrate the anticipated critical conditions where development is proposed along the Santa Clara riverbank. Cross Section 21-21' illustrates the anticipated conditions where the development is proposed above a natural slope area within the proposed park site.

Calculated factors of safety and recommended mitigation measures are presented in **Table F1** for review. For general description of the geologic/geotechnical conditions, see Section 9.2.11 within the text portion of the report. A 20-foot Building Setback, based on geologic and geotechnical judgment is recommended for Lots 388 through 393, adjacent to the steep natural riverbank slope located below proposed cut-slope CS-10.

The three dimensional geometry of critical cut-slopes are illustrated on Cross Sections 1-1', 2-2', 4-4', 8-8', 9-9', 11-11' through 15-15', 17-17', 18-18', 22-22', 23-23', 28-28', through 31-31'. The results of our stability analyses of these cross sections are presented in **Table F1**. Mitigation measures including buttresses and stability fills have been recommended as

APPENDIX F

needed to provide factors of safety which meet City of Santa Clarita standards as summarized in
Table F1.

The highest proposed fill slope is 80 feet in height as illustrated on Cross Section 20-20'. This fill slope calculates as grossly stable per City of Santa Clarita standards.

Fourteen (14) landslides have been mapped on the subject site. The three-dimensional geometry of the anticipated conditions are illustrated on Cross Sections 4-4', 8-8', 9-9', 10-10', 23-23', 24-24', 27-27'and 28-28'. Stability analyses have been performed on Landslides Qls-5b and Qls-6 (Cross Sections 9-9' and 10-10') only. The results of our stability analyses of these cross sections are presented in **Table F1**. Mitigation measures including complete removal, buttress fills, partial removal and placement into a Restricted Use Area are discussed in the Landslide Summary (**Table 1**) located after the References.

Surficial stability analysis of fill slopes utilizing the "infinite slope" method for this site was performed and is included at the end of Table F1. All permanent cut-slopes exposing terrace deposits or alluvium should be constructed as Stability Fills.

Geometry and Groundwater

As shown on the respective cross sections, the analyzed geometries of cut-slopes and natural slopes included removal of vegetation, topsoil, artificial fill, alluvium, landslide debris and bedrock materials and adding certified compacted fill to achieve the proposed grades, or remedial grades as needed on portions of the slopes. Analyses included cross-bedding and potential adverse bedding with dips ranging from neutral to **17 degrees** depending on geologic data obtained near each cross section listed in **Table F1**.

Review of ground water data in the vicinity and trench and boring log data indicates that the proposed cut-slopes in bedrock are above historic high ground water levels. Perched ground water was observed within the terrace deposits and Saugus formation bedrock within our Bucket Auger Borings BA-1 through BA-6, BA-8, BA-12 and BA-13 at the elevated portions of the site. Where appropriate, ground water was modeled in the slope stability analyses. Where rapid drawdown conditions were expectable adjacent to planned debris basins, those conditions were included in the analyses. Backdrains are proposed for all Stability Fill/Buttress slopes.

APPENDIX F

Shear Strength Parameters

A total of 19 direct shear strength tests were performed for this project. Individual Direct Shear test results are presented in **Appendix B**. Data used in our analyses are summarized in the below table:

Table F2 - Summary of Design Shear Strength Values

MATERIAL	PEAK		RESIDUAL		UNIT WT.
	COHESION (psf)	PHI ϕ	COHESION (psf)	PHI ϕ	(PCF)
Landslide Debris (Qls)	100	26°	100	26°	125
Landslide Plane (Qls)	300	8.5°	300	8.5°	130
Bedrock (TQs), Along Siltstone Bedding	500	21°	450	19°	130
Bedrock (TQs), Along Claystone Bedding[1]	450	16°	250	14.5°	130
Bedrock (TQs), Cross-Bedding	500	43°	400	38°	130
Compacted Fill (Cef)	250	29°	250	29°	130
Alluvium (Qal)	50	28°	50	28°	120
Terrace Deposits (Qt)	50	34°	50	34°	120

During our subsurface investigation for the project we encountered an in-place claystone bedding plane within Bucket-Auger Boring BA-7 located within the CLWA property just north of Landslide Qls-5a. This in-place claystone bedding unit is the basal landslide plane for Landslides Qls-5a, Qls-5b, Qls-6 and possibly Qls-9. This claystone bedding plane was hand sampled using industry standard brass rings oriented perpendicular to the bedding plane and sheared down-dip in our laboratory to obtain shear strength values. Projection of this claystone bedding plane unit and review of the Tentative Tract Map design elevations indicates that this unit does not encounter or project into the vicinity of proposed cut-slopes for this project. North of Landslide Qls-9 this claystone unit is interpreted to be above the proposed grade indicated on the Tentative Map. Based on our subsurface borings and test pits, the site is predominantly coarse-grained. However, the conservative residual shear strength along Saugus Formation siltstone bedding is used in our slope stability evaluation of the site.

In our analyses, residual shear strengths of bedrock and recent alluvium were used for static gross stability while peak strengths were used for pseudostatic gross stability. The weighted

[1] This bedding plane strength was not used in the analyses, as discussed (see text).

APPENDIX F

average of peak shear strengths of new compacted fill materials was used for slope stability analyses.

The following attachments are located within this Appendix.

Slope Stability Analyses Results — Table F1
Slope Stability Diagrams and Data Sheets for Runs 1 through 46

APPENDIX F

SLOPE STABILITY ANALYSES RESULTS

Run No.	File Name	Cross Section	Slope Condition Analyzed	Factor of Safety [1]		Comments
				Static	Pseudostatic (Coeff=0.15)	
1	T1S1A	1	CS-1, 86' 2:1 Cut on 120' Bedrock Ridge w RUA	1.76	1.30	Grossly stable as designed
2	T2S1A	2	CS-1 on TQs Ridge with RUA, Cut to Elev 1333 and Fill to El 1210	1.57	~	Grossly stable as designed
3	T3S1A	3	TQs Ridge Cut to Elev 1310 with RUA and Fill to El 1237	1.60	1.32	Grossly stable as designed
4	T4S1A	4	CS-2 on TQs Ridge with RUA, Cut to Elev 1310 and Complete Removal and Replacement of Qls-1 at toe	1.86	~	Grossly stable as designed
5	T5S1A	5	TQs Ridge with RUA, Cut to Elev 1310 and Fill to El 1232	1.67	1.33	Grossly stable as designed
6	T6S1A	6	TQs Ridge with RUA, Cut to Elev 1304 and Removal and Replacement of Qls at toe	1.69	1.36	Grossly stable as designed
7	T7S1A	7	TQs Ridge with RUA, Cut to Elev 1291 and Removal and Replacement of Qls at toe	1.86	1.52	Grossly stable as designed
8	T8S1B	8	CS-6; 20 ft Stability Fill on 28 ft cut	1.84	~	Grossly stable with remedial grading
9	T8S2B	8	CS-7; 20 ft Stability Fill on 21 ft cut	1.87	~	Grossly stable with remedial grading
10	T9S1A	9	Proposed Pad Cut to Elev 1268 in Park Along Canyon Sidewall, at toe of landslide Qls-5b	1.26	0.71	Proposed slope is Grossly Unstable.
11	T9S1C	9	150 ft W x 45 ft D Buttress Below Elev 1268 Cut in Park Site Along Canyon Sidewall, at toe of landslide Qls-5b	2.18	1.11	Grossly stable with remedial grading.

APPENDIX F

SLOPE STABILITY ANALYSES RESULTS

Run No.	File Name	Cross Section	Slope Condition Analyzed	Factor of Safety [1]		Comments
				Static	Pseudostatic (Coeff=0.15)	
12	T10S1A	10	Existing Newhall Ranch Rd Fill on Bedrock Cut Above Unstable Park Site	1.97	1.10	Grossly stable as designed
13	T10S2A	10	Existing Qls-6 Slope across Park Site and into Canyon with Cut for Park Trail	1.58	0.77	Proposed slope is Grossly Unstable Under Pseudo-Static Condition.
14	T11S1A	11	CS-15; As Designed	1.48	~	Proposed slope is Grossly Unstable
15	T11S1B	11	CS-15; 40 ft Buttress on 51 ft cut	1.63	1.31	Grossly stable with remedial grading
16	T11S2B	11	CS-13; 20 ft Stability Fill on 24 ft cut	2.67	~	Grossly stable with remedial grading
17	T11S3B	11	CS-12, 20 ft Stability Fill on TQs cut	1.99	~	Grossly stable with remedial grading
18	T11S4A	11	CS-11 As Designed	1.44	~	Grossly unstable without remedial grading
19	T11S4B	11	CS-11; 80 ft Buttress on 70 ft cut	1.63	1.18	Grossly stable with remedial grading
20	T12S1A	12	CS-15 As Designed	1.60	1.18	Grossly stable as designed
21	T12S1B	12	CS-15; 30 Stability Fill on 54 ft cut	1.81	~	Grossly stable with remedial grading
22	T13S1A	13	CS-15; As Designed	1.08	~	Proposed slope is Grossly Unstable
23	T13S1B	13	CS-15; 95 ft Buttress on 87 ft cut	1.54	1.18	Grossly stable with remedial grading
24	T13S2A	13	Elev 1356 Daylight Cut on Existing Slope with 15 ft Paseo Walkway at toe	1.54	1.17	Grossly stable as designed
25	T14S1B	14	CS-15; 80 ft Buttress on 85 ft cut	1.64	1.20	Grossly stable with remedial grading
26	T14S2A	14	CS-13 As Designed	1.81	~	Grossly stable as designed
27	T14S2B	14	CS-13; 30 ft Stability Fill on 51 ft cut	1.98	~	Grossly stable with remedial grading
28	T15S1A	15	CS-16 As Designed	1.83	~	Grossly stable as designed

APPENDIX F

SLOPE STABILITY ANALYSES RESULTS

Run No.	File Name	Cross Section	Slope Condition Analyzed	Factor of Safety [1]		Comments
				Static	Pseudostatic (Coeff=0.15)	
29	T15S1A	15	CS-16; 25 ft Stability Fill on 33 ft cut with Rapid Drawdown of Adjacent Basin	1.76	1.38	Grossly stable with remedial grading
30	T15S2A	15	CS-17 As Designed	1.39	~	Grossly unstable without remedial grading
31	T15S2B	15	CS-17; 30 ft Buttress on 69 ft Fill over Cut	1.73	1.32	Grossly stable with remedial grading
32	T16SA	16	49 ft River Bank after pad cut to Elev 1268 and Bike Trail cut with Stability Fill on CS-10	1.60	1.39	Grossly stable with structural setback
33	T17S1A	17	44 ft River Bank after pad cut to Elev 1270 and Bike Trail cut with Stability Fill on CS-10	2.08	~	Grossly stable with structural setback
34	T18S1A	18	46 ft River Bank after pad cut to Elev 1265 and Bike Trail cut	1.96	~	Grossly stable with structural setback
35	T20S1A	20	80 ft 2:1 fill slope (highest proposed on site); circular arc search through toe	1.63	1.14	Grossly stable as designed
36	T20S2A	20	25 ft Stability Fill on CS-16	1.65	1.15	Grossly stable with remedial grading
37	T21S1A	21	Elev 1300 Daylight Cut of Qt/TQs above Canyon Sidewall	1.52	1.39	Grossly stable as designed
38	T22S1B	22	CS-7; 25 ft Stability Fill on 33 ft cut	1.80	1.33	Grossly stable with remedial grading
39	T23S1A	23	CS-13 and CS-14 As Designed	1.42	0.94	Grossly Unstable without remedial grading
40	T23S1A	23	CS-13 and CS-14 with 150 ft W x 24 ft D Buttress on 103 ft cut on TQs	1.65	1.13	Grossly stable with remedial grading
41	T28S1A	28	CS-2 and Complete Qls Removal on TQs Ridge with RUA and Elev 1310 Cut	1.80	1.36	Grossly stable as designed

APPENDIX F

SLOPE STABILITY ANALYSES RESULTS

Run No.	File Name	Cross Section	Slope Condition Analyzed	Factor of Safety [1]		Comments
				Static	Pseudostatic (Coeff=0.15)	
42	T29S1A	29	CS-3 on TQs Ridge with RUA and Elev 1333 Cut	1.65	1.32	Grossly stable as designed
43	T30S1A	30	CS-8 As Designed on Qt/TQs Cut	1.89	~	Grossly stable as designed
44	T30S1B	30	CS-8 with 25' Stability Fill on Qt/TQs	1.74	1.28	Grossly stable with remedial grading
45	T31S1A	31	CS-16 on Qt/TQs with Stability Fill on toe of 155' TQs Ridge	1.67	1.20	Grossly stable with remedial grading
46	FILL SLOPE	~	Surficial Stability of Infinite Fill Slope with Surficial Saturation	1.65	~	Surficially stable as designed

The above results for static conditions are based upon site-specific shear strength characteristics tabulated in Table F2. These shear strengths were developed based on the direct shear test results presented on Table B2 of "Summary of Shear Strength Test Data"in Appendix B. Residual shear strength values were used for all existing natural materials under static load. Peak shear strength values were used for bedrock, terrace deposits, landslide debris and recent alluvium for pseudostatic loads and for planned compacted fill under both static and pseudostatic loads.

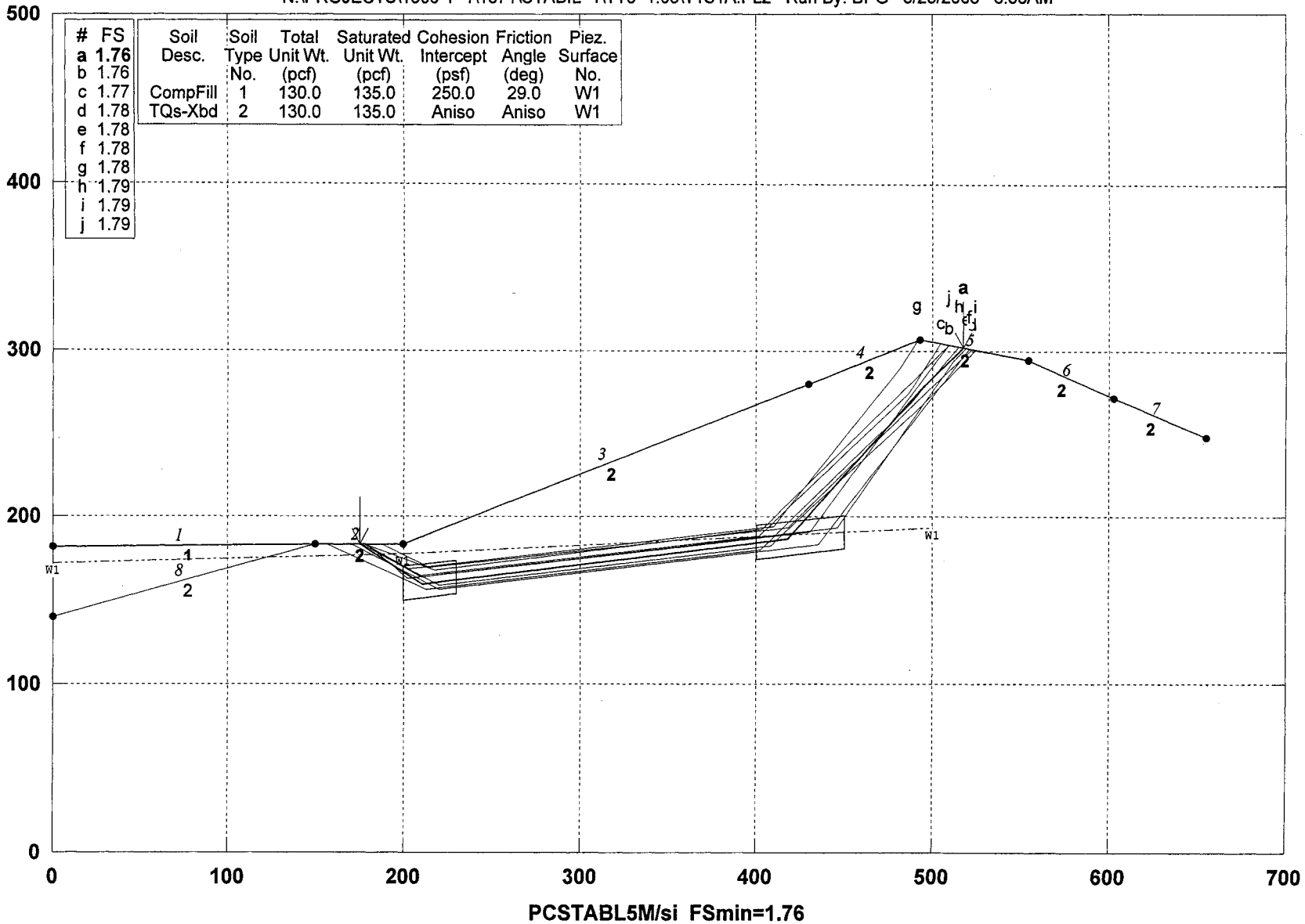
Appendix G

TT53425; 1-1', CS-1; 120' TQs Ridge wit h Elev 1183 Fill+Cut Pad; Static

N:\PROJECTS\1500-1~1\1571\STABIL~1\TT3~1.03\T1S1A.PL2 Run By: BPG 3/25/2003 8:53AM

#	FS
a	**1.76**
b	1.76
c	1.77
d	1.78
e	1.78
f	1.78
g	1.78
h	1.79
i	1.79
j	1.79

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
CompFill	1	130.0	135.0	250.0	29.0	W1
TQs-Xbd	2	130.0	135.0	Aniso	Aniso	W1



PCSTABL5M/si FSmin=1.76

Safety Factors Are Calculated By The Modified Janbu Method for the case of c & phi both > 0

STED

RUN #1

```
                    ** PCSTABL5M **
                          by
                    Purdue University
               --Slope Stability Analysis--
          Simplified Janbu, Simplified Bishop
             or Spencer`s Method of Slices
Run Date:                   3/25/2003
Time of Run:                8:53AM
Run By:                     BPG
Input Data Filename:        N:t1s1a.in
Output Filename:            N:t1s1a.OUT
Unit:                       ENGLISH
Plotted Output Filename:    N:t1s1a.PLT
PROBLEM DESCRIPTION   TT53425; 1-1', CS-1; 120' TQs Ridge wit
                      h Elev 1183 Fill+Cut Pad; Static
BOUNDARY COORDINATES
     Note: User origin value specified.
     Add 0.00 to X-values and 0.00 to Y-values listed.

    7 Top   Boundaries
    8 Total Boundaries
Boundary     X-Left      Y-Left     X-Right     Y-Right     Soil Type
   No.         (ft)        (ft)        (ft)        (ft)     Below Bnd
    1           .00      182.00      150.00      183.00         1
    2        150.00      183.00      200.00      183.00         2
    3        200.00      183.00      430.00      280.00         2
    4        430.00      280.00      493.00      307.00         2
    5        493.00      307.00      554.00      295.00         2
    6        554.00      295.00      603.00      272.00         2
    7        603.00      272.00      655.00      248.00         2
    8           .00      140.00      150.00      183.00         2
ISOTROPIC SOIL PARAMETERS
  2 Type(s) of Soil
Soil  Total  Saturated  Cohesion Friction   Pore   Pressure   Piez.
Type Unit Wt. Unit Wt. Intercept   Angle  Pressure Constant Surface
 No.  (pcf)    (pcf)     (psf)     (deg)  Param.    (psf)     No.
  1   130.0    135.0     250.0     29.0     .00       .0       1
  2   130.0    135.0     400.0     38.0     .00       .0       1
ANISOTROPIC STRENGTH PARAMETERS
    1 soil type(s)
Soil Type  2 Is Anisotropic
Number Of Direction Ranges Specified =  3
Direction    Counterclockwise     Cohesion     Friction
  Range       Direction Limit    Intercept      Angle
   No.            (deg)            (psf)        (deg)
    1              6.5             400.0         38.0
    2              7.5             450.0         19.0
    3             90.0             400.0         38.0
1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED
Unit Weight of Water =  62.40
Piezometric Surface No.  1 Specified by  3 Coordinate Points
  Point      X-Water     Y-Water
   No.         (ft)        (ft)
    1           .00      172.00
    2        200.00      178.00
    3        500.00      193.00
Janbus Empirical Coef is being used for the case of  c & phi both > 0
A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Sliding Block Surfaces, Has Been
Specified.
500 Trial Surfaces Have Been Generated.
2 Boxes Specified For Generation Of Central Block Base
Length Of Line Segments For Active And Passive Portions Of
Sliding Block Is 120.0
Box        X-Left      Y-Left     X-Right     Y-Right      Height
No.          (ft)        (ft)        (ft)        (ft)        (ft)
 1        200.00      160.00      230.00      163.68      20.00
```

RUN # 1

2 400.00 184.56 450.00 190.70 20.00
Factor Of Safety Calculation Has Gone Through Ten Iterations
The Trial Failure Surface In Question Is Defined
By The Following 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	183.96	183.00
2	214.90	165.88
3	439.94	193.04
4	442.93	285.54

Factor Of Safety For The Preceding Specified Surface = 3.728
Factor Of Safety Calculation Has Gone Through Ten Iterations
The Trial Failure Surface In Question Is Defined
By The Following 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	196.42	183.00
2	224.92	157.70
3	405.86	185.38
4	408.89	271.10

Factor Of Safety For The Preceding Specified Surface = 5.909
Factor Of Safety Calculation Has Gone Through Ten Iterations
The Trial Failure Surface In Question Is Defined
By The Following 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	161.36	183.00
2	217.37	162.95
3	407.54	188.41
4	409.92	271.53

Factor Of Safety For The Preceding Specified Surface = 6.368
Factor Of Safety Calculation Has Gone Through Ten Iterations
The Trial Failure Surface In Question Is Defined
By The Following 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	198.95	183.00
2	228.63	163.31
3	432.26	187.64
4	435.07	282.17

Factor Of Safety For The Preceding Specified Surface = 4.090
Factor Of Safety Calculation Has Gone Through Ten Iterations
The Trial Failure Surface In Question Is Defined
By The Following 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	192.43	183.00
2	229.81	160.08
3	443.31	199.10
4	444.95	286.41

Factor Of Safety For The Preceding Specified Surface = 5.692
Factor Of Safety Calculation Has Gone Through Ten Iterations
The Trial Failure Surface In Question Is Defined
By The Following 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	173.85	183.00
2	213.66	157.35
3	431.14	192.29
4	434.20	281.80

Factor Of Safety For The Preceding Specified Surface = 5.442
Factor Of Safety Calculation Has Gone Through Ten Iterations
The Trial Failure Surface In Question Is Defined
By The Following 5 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	70.99	182.47

RUN #1

2	106.35	174.79
3	224.91	156.23
4	449.89	192.09
5	450.97	288.99

Factor Of Safety For The Preceding Specified Surface = 6.935
Factor Of Safety Calculation Has Gone Through Ten Iterations
The Trial Failure Surface In Question Is Defined
By The Following 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	198.46	183.00
2	221.14	160.33
3	431.70	179.97
4	434.97	282.13

Factor Of Safety For The Preceding Specified Surface = 7.003
Factor Of Safety Calculation Has Gone Through Ten Iterations
The Trial Failure Surface In Question Is Defined
By The Following 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	208.63	186.64
2	225.98	170.94
3	421.40	178.25
4	422.01	276.63

Factor Of Safety For The Preceding Specified Surface = 16.298
Factor Of Safety Calculation Has Gone Through Ten Iterations
The Trial Failure Surface In Question Is Defined
By The Following 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	200.66	183.28
2	228.75	166.84
3	427.77	186.23
4	432.29	280.98

Factor Of Safety For The Preceding Specified Surface = 6.089
Following Are Displayed The Ten Most Critical Of The Trial Failure Surfaces Examined. They Are Ordered - Most Critical First.
* * Safety Factors Are Calculated By The Modified Janbu Method * *
Failure Surface Specified By 5 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	175.46	183.00
2	210.08	159.68
3	418.15	186.90
4	495.18	278.91
5	517.08	302.26

*** 1.763 ***

Individual data on the 9 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	8.2	2910.4	.0	.0	.0	.0	.0	.0	.0
2	16.4	23918.1	.0	7099.8	.0	.0	.0	.0	.0
3	10.1	29665.7	.0	11496.5	.0	.0	.0	.0	.0
4	208.1	********	.0	*******	.0	.0	.0	.0	.0
5	1.8	19898.8	.0	170.1	.0	.0	.0	.0	.0
6	10.1	108783.9	.0	.0	.0	.0	.0	.0	.0
7	63.0	448959.6	.0	.0	.0	.0	.0	.0	.0
8	2.2	8283.9	.0	.0	.0	.0	.0	.0	.0
9	21.9	39371.0	.0	.0	.0	.0	.0	.0	.0

RUN #1

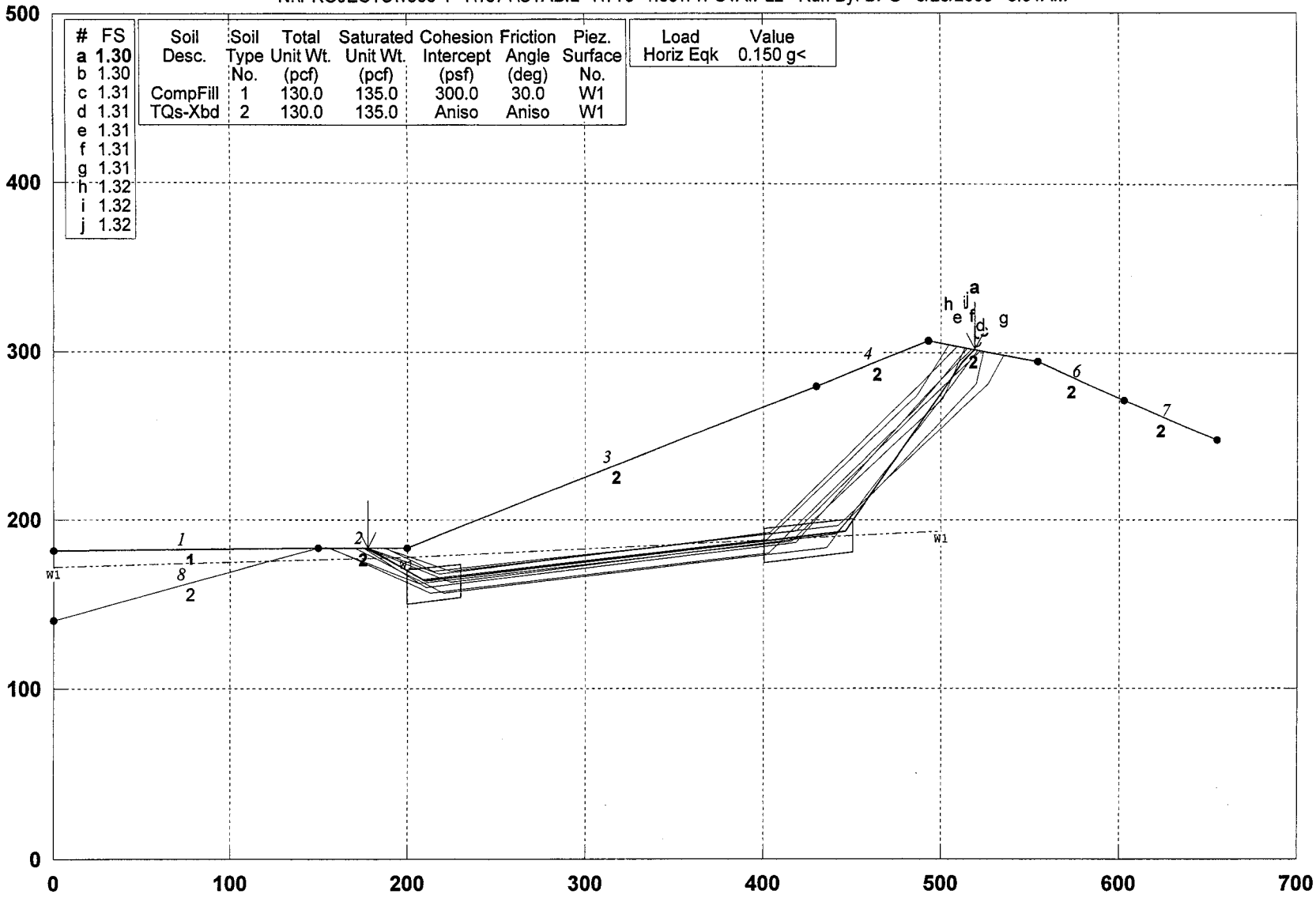
TT53425; 1-1', CS-1; 120' TQs Ridge wit h Elev 1183 Fill+Cut Pad; Pseudo-Static

N:\PROJECTS\1500-1~1\1571\STABIL~1\TT3~1.03\T1PS1A.PL2 Run By: BPG 3/25/2003 8:51AM

#	FS
a	**1.30**
b	1.30
c	1.31
d	1.31
e	1.31
f	1.31
g	1.31
h	1.32
i	1.32
j	1.32

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
CompFill	1	130.0	135.0	300.0	30.0	W1
TQs-Xbd	2	130.0	135.0	Aniso	Aniso	W1

Load	Value
Horiz Eqk	0.150 g<



PCSTABL5M/si FSmin=1.30

Safety Factors Are Calculated By The Modified Janbu Method for the case of c & phi both > 0

STED

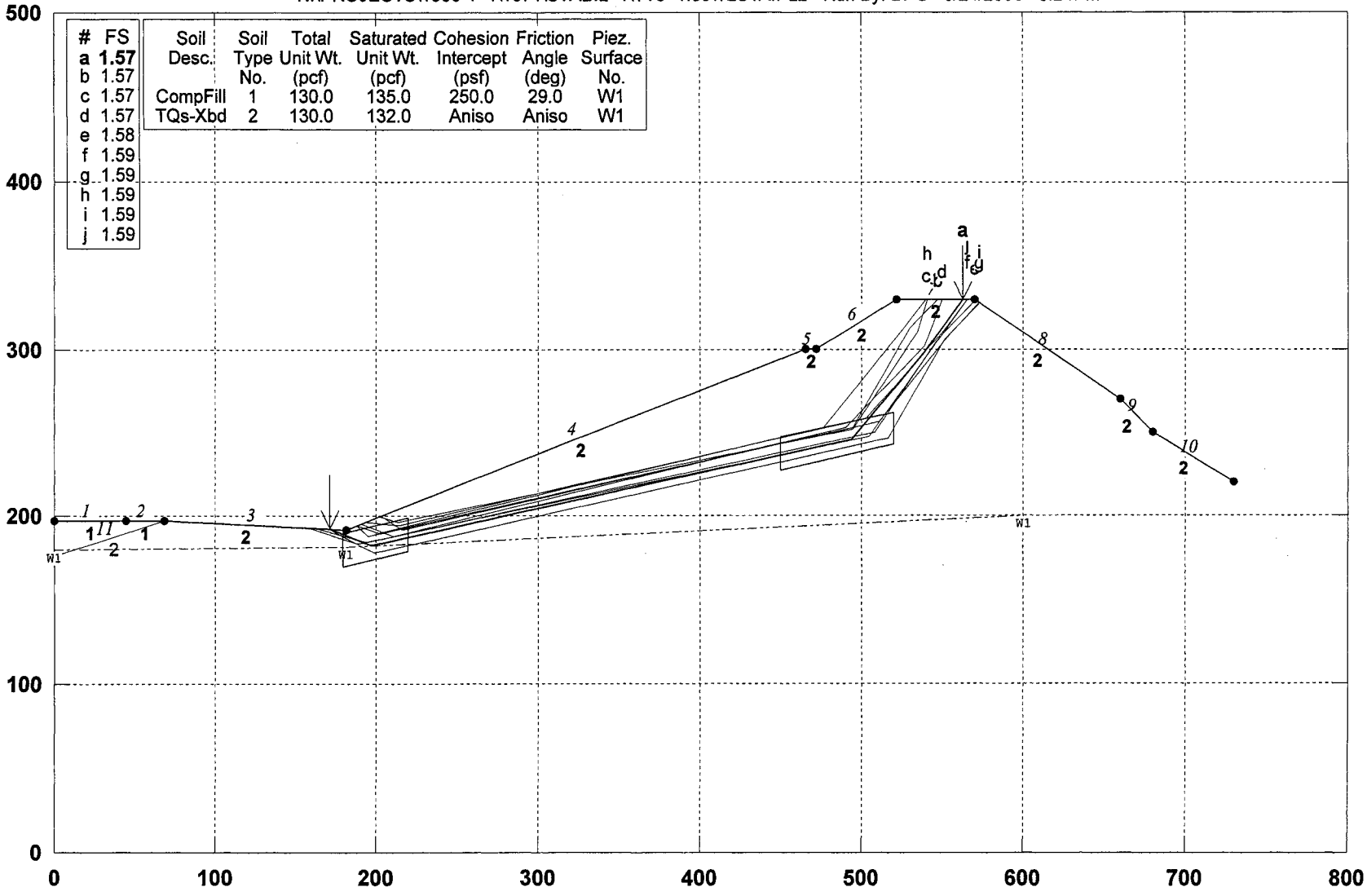
RUN #1

TT 53425; 2-2', CS-1, w Ridge Cut to El 1330 Above w RUA; Static

N:\PROJECTS\1500-1~1\1571\STABIL~1\TT3~1.03\T2S1A.PL2 Run By: BPG 3/24/2003 6:24PM

#	FS
a	1.57
b	1.57
c	1.57
d	1.57
e	1.58
f	1.59
g	1.59
h	1.59
i	1.59
j	1.59

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
CompFill	1	130.0	135.0	250.0	29.0	W1
TQs-Xbd	2	130.0	132.0	Aniso	Aniso	W1



PCSTABL5M/si FSmin=1.57

Safety Factors Are Calculated By The Modified Janbu Method

STED

RUN #2

** PCSTABL5M **
by
Purdue University
--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer`s Method of Slices

Run Date: 3/24/2003
Time of Run: 6:24PM
Run By: BPG
Input Data Filename: N:t2s1a.in
Output Filename: N:t2s1a.OUT
Unit: ENGLISH
Plotted Output Filename: N:t2s1a.PLT
PROBLEM DESCRIPTION TT 53425; 2-2', CS-1, w Ridge Cut to El 1330 Above w RUA; Static

BOUNDARY COORDINATES
Note: User origin value specified.
Add 0.00 to X-values and 0.00 to Y-values listed.

10 Top Boundaries
11 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	.00	197.00	45.00	197.00	1
2	45.00	197.00	68.00	197.00	1
3	68.00	197.00	182.00	192.00	2
4	182.00	192.00	465.00	300.00	2
5	465.00	300.00	472.00	300.00	2
6	472.00	300.00	522.00	330.00	2
7	522.00	330.00	570.00	330.00	2
8	570.00	330.00	660.00	270.00	2
9	660.00	270.00	680.00	250.00	2
10	680.00	250.00	730.00	220.00	2
11	.00	176.00	68.00	197.00	2

ISOTROPIC SOIL PARAMETERS
2 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	130.0	135.0	250.0	29.0	.00	.0	1
2	130.0	132.0	400.0	38.0	.00	.0	1

ANISOTROPIC STRENGTH PARAMETERS
1 soil type(s)
Soil Type 2 Is Anisotropic
Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	11.0	400.0	38.0
2	13.0	450.0	19.0
3	90.0	400.0	38.0

1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED
Unit Weight of Water = 62.40
Piezometric Surface No. 1 Specified by 3 Coordinate Points

Point No.	X-Water (ft)	Y-Water (ft)
1	.00	180.00
2	182.00	182.00
3	600.00	200.00

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Sliding Block Surfaces, Has Been Specified.
300 Trial Surfaces Have Been Generated.
2 Boxes Specified For Generation Of Central Block Base Length Of Line Segments For Active And Passive Portions Of Sliding Block Is 70.0

Box	X-Left	Y-Left	X-Right	Y-Right	Height

RUN #2

No.	(ft)	(ft)	(ft)	(ft)	(ft)
1	180.00	180.00	220.00	188.50	20.00
2	450.00	237.39	520.00	252.27	20.00

Following Are Displayed The Ten Most Critical Of The Trial Failure Surfaces Examined. They Are Ordered - Most Critical First.

* * Safety Factors Are Calculated By The Modified Janbu Method * *

Failure Surface Specified By 5 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	171.88	192.44
2	196.90	182.32
3	493.76	245.30
4	538.96	298.75
5	562.90	330.00

*** 1.566 ***

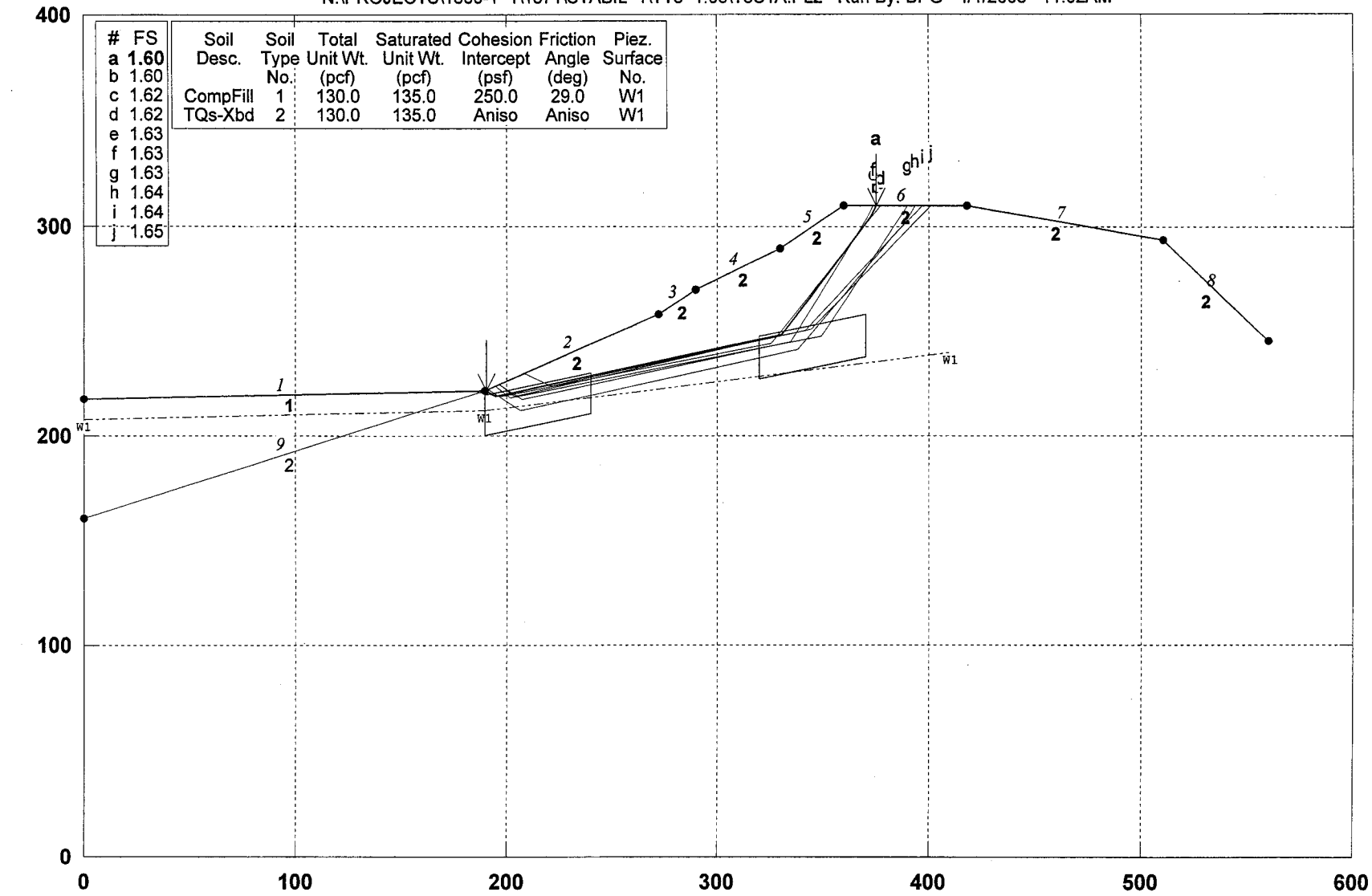
Individual data on the 10 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	10.1	2402.2	.0	.0	.0	.0	.0	.0	.0
2	14.2	17014.7	.0	.0	.0	.0	.0	.0	.0
3	.7	1405.7	.0	7.7	.0	.0	.0	.0	.0
4	1.9	3830.7	.0	19.4	.0	.0	.0	.0	.0
5	266.2	********	.0	.0	.0	.0	.0	.0	.0
6	7.0	54658.3	.0	.0	.0	.0	.0	.0	.0
7	21.8	179771.3	.0	.0	.0	.0	.0	.0	.0
8	28.2	218544.0	.0	.0	.0	.0	.0	.0	.0
9	17.0	91002.9	.0	.0	.0	.0	.0	.0	.0
10	23.9	48636.7	.0	.0	.0	.0	.0	.0	.0

RUN #2

TT 53425; 3-3' w TQs Ridge Cut to El 1310 + El 1222 Fill Pad + RUA; Static

N:\PROJECTS\1500-1~1\1571\STABIL~1\TT3~1.03\T3S1A.PL2 Run By: BPG 4/1/2003 11:02AM



PCSTABL5M/si FSmin=1.60

Safety Factors Are Calculated By The Modified Janbu Method for the case of c & phi both > 0

STED

RUN #3

** PCSTABL5M **
by
Purdue University
--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer`s Method of Slices

Run Date: 4/1/2003
Time of Run: 11:02AM
Run By: BPG
Input Data Filename: N:t3s1a.in
Output Filename: N:t3s1a.OUT
Unit: ENGLISH
Plotted Output Filename: N:t3s1a.PLT
PROBLEM DESCRIPTION TT 53425; 3-3' w TQs Ridge Cut to El 131
0 + El 1222 Fill Pad + RUA; Static

BOUNDARY COORDINATES
Note: User origin value specified.
Add 0.00 to X-values and 0.00 to Y-values listed.

8 Top Boundaries
9 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	.00	218.00	190.00	222.00	1
2	190.00	222.00	272.00	258.00	2
3	272.00	258.00	290.00	270.00	2
4	290.00	270.00	330.00	290.00	2
5	330.00	290.00	360.00	310.00	2
6	360.00	310.00	418.00	310.00	2
7	418.00	310.00	510.00	294.00	2
8	510.00	294.00	560.00	246.00	2
9	.00	160.00	190.00	222.00	2

ISOTROPIC SOIL PARAMETERS
2 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	130.0	135.0	250.0	29.0	.00	.0	1
2	130.0	135.0	400.0	38.0	.00	.0	1

ANISOTROPIC STRENGTH PARAMETERS
1 soil type(s)
Soil Type 2 Is Anisotropic
Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	11.0	400.0	38.0
2	13.0	450.0	19.0
3	90.0	400.0	38.0

1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED
Unit Weight of Water = 62.40
Piezometric Surface No. 1 Specified by 3 Coordinate Points

Point No.	X-Water (ft)	Y-Water (ft)
1	.00	208.00
2	190.00	212.00
3	410.00	240.00

Janbus Empirical Coef is being used for the case of c & phi both > 0
A Critical Failure Surface Searching Method, Using A Random Technique For Generating Sliding Block Surfaces, Has Been Specified.
800 Trial Surfaces Have Been Generated.
2 Boxes Specified For Generation Of Central Block Base
Length Of Line Segments For Active And Passive Portions Of Sliding Block Is 70.0

Box No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Height (ft)

RUN #3

1	190.00	210.00	240.00	220.63	20.00
2	320.00	237.63	370.00	248.26	20.00

Factor Of Safety Calculation Has Gone Through Ten Iterations

RUN #3

** PCSTABL5M **

Factor Of Safety Calculation Has Gone Through Ten Iterations
The Trial Failure Surface In Question Is Defined
By The Following 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	216.84	233.79
2	237.71	219.94
3	352.26	243.61
4	354.12	306.08

Factor Of Safety For The Preceding Specified Surface = 3.421
Following Are Displayed The Ten Most Critical Of The Trial Failure Surfaces Examined. They Are Ordered - Most Critical First.
* * Safety Factors Are Calculated By The Modified Janbu Method * *
Failure Surface Specified By 5 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	190.27	222.12
2	194.93	219.45
3	330.08	248.40
4	372.16	304.34
5	375.38	310.00

*** 1.603 ***

Individual data on the 8 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	4.7	1428.9	.0	.0	.0	.0	.0	.0	.0
2	77.1	134033.1	.0	.0	.0	.0	.0	.0	.0
3	18.0	61105.3	.0	.0	.0	.0	.0	.0	.0
4	40.0	186687.7	.0	.0	.0	.0	.0	.0	.0
5	.1	432.8	.0	.0	.0	.0	.0	.0	.0
6	29.9	123440.6	.0	.0	.0	.0	.0	.0	.0
7	12.2	21707.7	.0	.0	.0	.0	.0	.0	.0
8	3.2	1185.5	.0	.0	.0	.0	.0	.0	.0

RUN #3

TT 53425; 3-3' w El 1310 TQs Ridge Cut +El 1222 Fill Pad + RUA; Pseudo-Static

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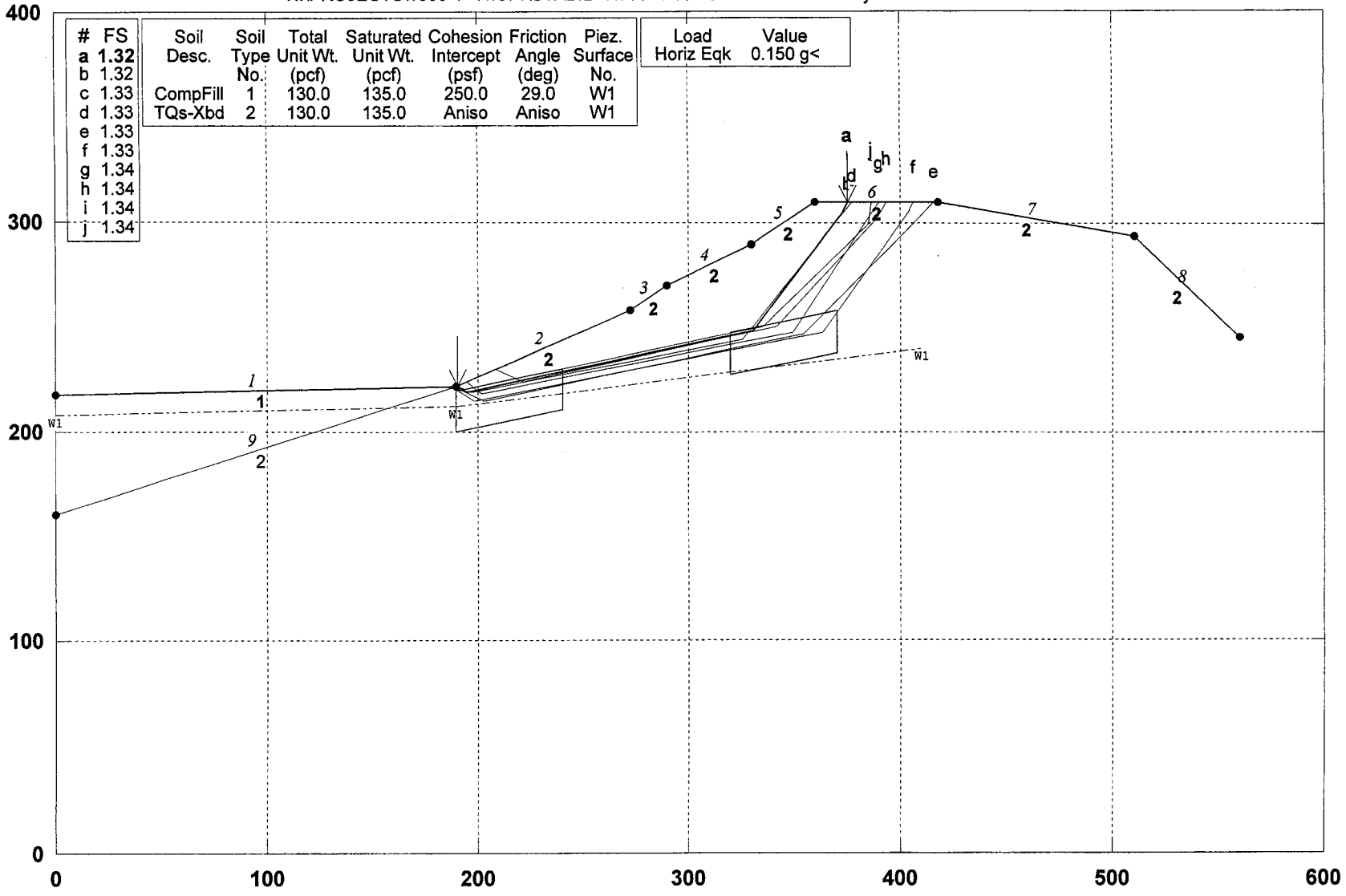


PCSTABL5M/si FSmin=1.32

Safety Factors Are Calculated By The Modified Janbu Method for the case of c & phi both > 0

STED

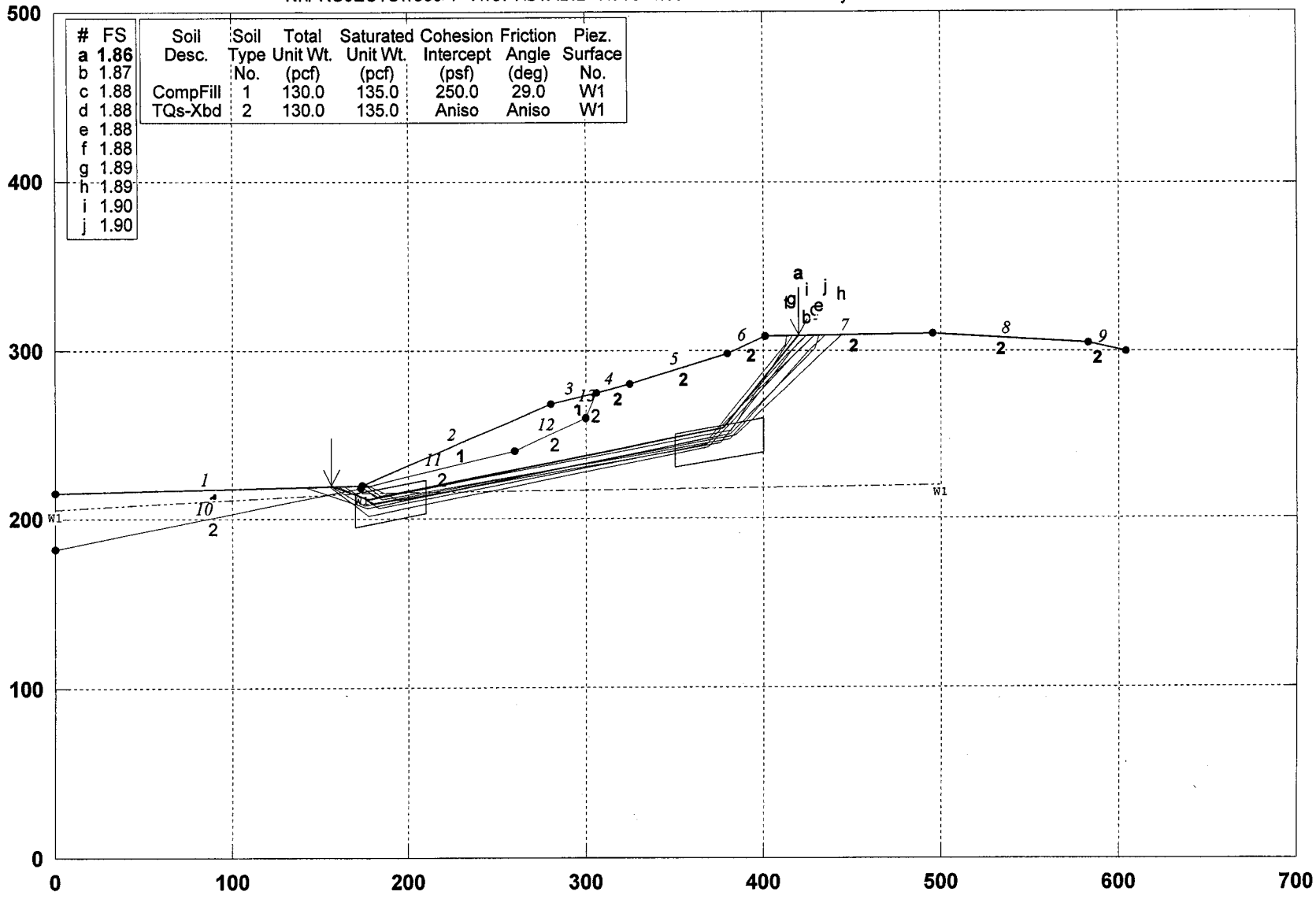
RUN #3

TT 53425; 4-4', CS-2 w El 1310 TQs Ridge Cut + Qls-1 OX/Replace + RUA; Static

N:\PROJECTS\1500-1~1\1571\STABIL~1\TT3~1.03\T4S1A.PL2 Run By: BPG 4/1/2003 11:21AM

#	FS
a	1.86
b	1.87
c	1.88
d	1.88
e	1.88
f	1.88
g	1.89
h	1.89
i	1.90
j	1.90

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
CompFill	1	130.0	135.0	250.0	29.0	W1
TQs-Xbd	2	130.0	135.0	Aniso	Aniso	W1



PCSTABL5M/si FSmin=1.86

STED

Safety Factors Are Calculated By The Modified Janbu Method for the case of c & phi both > 0

RUN # 4

** PCSTABL5M **
by
Purdue University
--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer`s Method of Slices

Run Date: 4/1/2003
Time of Run: 11:21AM
Run By: BPG
Input Data Filename: N:t4s1a.in
Output Filename: N:t4s1a.OUT
Unit: ENGLISH
Plotted Output Filename: N:t4s1a.PLT
PROBLEM DESCRIPTION TT 53425; 4-4', CS-2 w El 1310 TQs Ridg
e Cut + Qls-1 OX/Replace + RUA; Static

BOUNDARY COORDINATES
Note: User origin value specified.
Add 0.00 to X-values and 0.00 to Y-values listed.

9 Top Boundaries
13 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	.00	215.00	174.00	220.00	1
2	174.00	220.00	280.00	268.00	1
3	280.00	268.00	306.00	275.00	1
4	306.00	275.00	325.00	280.00	2
5	325.00	280.00	380.00	298.00	2
6	380.00	298.00	401.00	309.00	2
7	401.00	309.00	495.00	310.00	2
8	495.00	310.00	583.00	305.00	2
9	583.00	305.00	604.00	300.00	2
10	.00	182.00	173.00	218.00	2
11	173.00	218.00	260.00	240.00	2
12	260.00	240.00	300.00	260.00	2
13	300.00	260.00	306.00	275.00	2

ISOTROPIC SOIL PARAMETERS
2 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	130.0	135.0	250.0	29.0	.00	.0	1
2	130.0	135.0	400.0	38.0	.00	.0	1

ANISOTROPIC STRENGTH PARAMETERS
1 soil type(s)
Soil Type 2 Is Anisotropic
Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	10.0	400.0	38.0
2	12.0	450.0	19.0
3	90.0	400.0	38.0

1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED
Unit Weight of Water = 62.40
Piezometric Surface No. 1 Specified by 3 Coordinate Points

Point No.	X-Water (ft)	Y-Water (ft)
1	.00	205.00
2	174.00	215.00
3	500.00	220.00

Janbus Empirical Coef is being used for the case of c & phi both > 0
A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Sliding Block Surfaces, Has Been
Specified.
400 Trial Surfaces Have Been Generated.
2 Boxes Specified For Generation Of Central Block Base

RUN #4

Length Of Line Segments For Active And Passive Portions Of Sliding Block Is 70.0

Box No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Height (ft)
1	170.00	205.00	210.00	212.78	20.00
2	350.00	239.99	400.00	249.71	20.00

Following Are Displayed The Ten Most Critical Of The Trial Failure Surfaces Examined. They Are Ordered - Most Critical First.

* * Safety Factors Are Calculated By The Modified Janbu Method * *

Failure Surface Specified By 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	156.31	219.49
2	177.24	211.58
3	377.68	253.34
4	419.55	309.20

*** 1.860 ***

Individual data on the 15 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	8.5	1897.8	.0	.0	.0	.0	.0	.0	.0
2	4.2	2333.1	.0	.0	.0	.0	.0	.0	.0
3	4.0	3153.6	.0	236.9	.0	.0	.0	.0	.0
4	1.0	918.9	.0	131.7	.0	.0	.0	.0	.0
5	3.2	3648.3	.0	613.0	.0	.0	.0	.0	.0
6	18.0	28414.8	.0	1989.1	.0	.0	.0	.0	.0
7	64.8	186968.0	.0	.0	.0	.0	.0	.0	.0
8	20.0	84670.5	.0	.0	.0	.0	.0	.0	.0
9	20.0	92608.9	.0	.0	.0	.0	.0	.0	.0
10	6.0	28399.8	.0	.0	.0	.0	.0	.0	.0
11	19.0	91669.2	.0	.0	.0	.0	.0	.0	.0
12	52.7	279192.3	.0	.0	.0	.0	.0	.0	.0
13	2.3	12873.8	.0	.0	.0	.0	.0	.0	.0
14	21.0	90242.9	.0	.0	.0	.0	.0	.0	.0
15	18.5	29594.9	.0	.0	.0	.0	.0	.0	.0

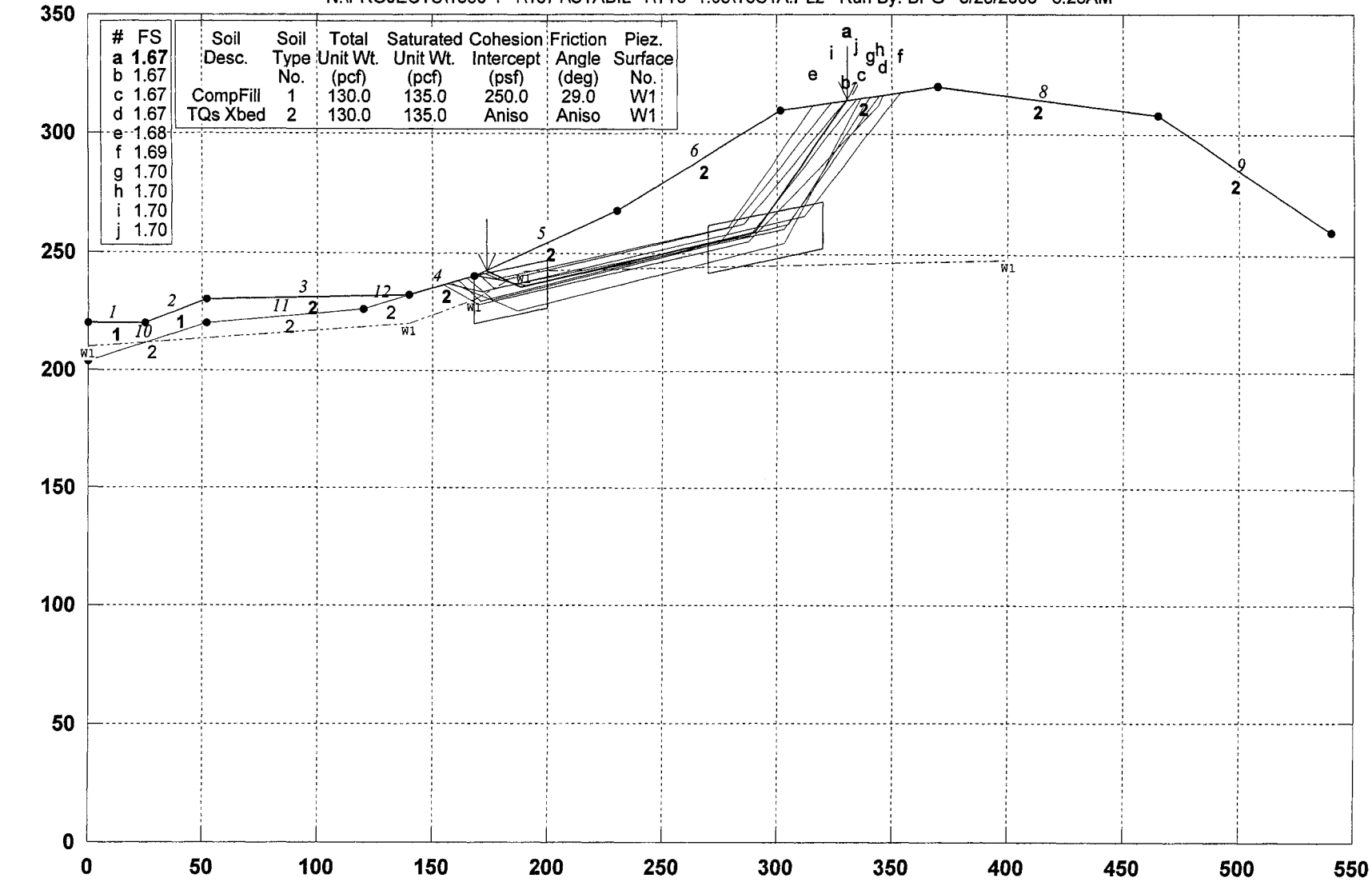
RUN #4

TT 53425; 5-5' Ridge Cut El 1320, El 1220 Fill Pad + RUA; Static

N:\PROJECTS\1500-1~1\1571\STABIL~1\TT3~1.03\T5S1A.PL2 Run By: BPG 3/25/2003 8:25AM

#	FS
a	1.67
b	1.67
c	1.67
d	1.67
e	1.68
f	1.69
g	1.70
h	1.70
i	1.70
j	1.70

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
CompFill	1	130.0	135.0	250.0	29.0	W1
TQs Xbed	2	130.0	135.0	Aniso	Aniso	W1



PCSTABL5M/si FSmin=1.67

Safety Factors Are Calculated By The Modified Janbu Method for the case of c & phi both > 0

STED

RUN #5

** PCSTABL5M **
by
Purdue University
--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer`s Method of Slices

Run Date: 3/25/2003
Time of Run: 8:25AM
Run By: BPG
Input Data Filename: N:t5s1a.in
Output Filename: N:t5s1a.OUT
Unit: ENGLISH
Plotted Output Filename: N:t5s1a.PLT
PROBLEM DESCRIPTION TT 53425; 5-5' Ridge Cut El 1320, El 122
0 Fill Pad + RUA; Static

BOUNDARY COORDINATES
Note: User origin value specified.
Add 0.00 to X-values and 0.00 to Y-values listed.

9 Top Boundaries
12 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	.00	220.00	25.00	220.00	1
2	25.00	220.00	52.00	230.00	1
3	52.00	230.00	140.00	232.00	2
4	140.00	232.00	168.00	240.00	2
5	168.00	240.00	230.00	268.00	2
6	230.00	268.00	302.00	310.00	2
7	302.00	310.00	370.00	320.00	2
8	370.00	320.00	465.00	308.00	2
9	465.00	308.00	540.00	260.00	2
10	.00	204.00	52.00	220.00	2
11	52.00	220.00	120.00	226.00	2
12	120.00	226.00	140.00	232.00	2

ISOTROPIC SOIL PARAMETERS
2 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	130.0	135.0	250.0	29.0	.00	.0	1
2	130.0	135.0	400.0	38.0	.00	.0	1

ANISOTROPIC STRENGTH PARAMETERS
1 soil type(s)
Soil Type 2 Is Anisotropic
Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	11.0	400.0	38.0
2	14.0	450.0	19.0
3	90.0	400.0	38.0

1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED
Unit Weight of Water = 62.40
Piezometric Surface No. 1 Specified by 5 Coordinate Points

Point No.	X-Water (ft)	Y-Water (ft)
1	.00	210.00
2	140.00	220.00
3	168.00	230.00
4	190.00	242.00
5	400.00	248.00

Janbus Empirical Coef is being used for the case of c & phi both > 0
A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Sliding Block Surfaces, Has Been
Specified.
400 Trial Surfaces Have Been Generated.

RUN #5

2 Boxes Specified For Generation Of Central Block Base
Length Of Line Segments For Active And Passive Portions Of
Sliding Block Is 80.0

Box No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Height (ft)
1	168.00	230.00	200.00	236.80	20.00
2	270.00	251.68	320.00	262.31	20.00

Factor Of Safety Calculation Has Gone Through Ten Iterations
The Trial Failure Surface In Question Is Defined
By The Following 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	182.91	246.73
2	195.77	235.41
3	289.15	256.38
4	289.86	302.92

Factor Of Safety For The Preceding Specified Surface = 3.872
Factor Of Safety Calculation Has Gone Through Ten Iterations
The Trial Failure Surface In Question Is Defined
By The Following 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	166.36	239.53
2	175.78	230.13
3	313.87	257.84
4	314.76	311.88

Factor Of Safety For The Preceding Specified Surface = 3.223
Factor Of Safety Calculation Has Gone Through Ten Iterations
The Trial Failure Surface In Question Is Defined
By The Following 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	165.80	239.37
2	178.42	227.46
3	281.47	250.29
4	282.08	298.38

Factor Of Safety For The Preceding Specified Surface = 3.733
Factor Of Safety Calculation Has Gone Through Ten Iterations
The Trial Failure Surface In Question Is Defined
By The Following 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	168.27	240.12
2	190.37	237.21
3	308.44	262.65
4	308.66	310.98

Factor Of Safety For The Preceding Specified Surface = 3.379
Following Are Displayed The Ten Most Critical Of The Trial Failure Surfaces Examined. They Are Ordered - Most Critical First.
* * Safety Factors Are Calculated By The Modified Janbu Method * *
Failure Surface Specified By 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	173.72	242.58
2	188.44	235.25
3	290.00	259.45
4	330.99	314.26

*** 1.667 ***
Individual data on the 8 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	9.1	5077.8	.0	.0	.0	.0	.0	.0	.0
2	5.7	8378.6	.0	1029.5	.0	.0	.0	.0	.0
3	1.6	2905.2	.0	542.7	.0	.0	.0	.0	.0

RUN #5

4	30.4	69919.4	.0	6220.0	.0	.0	.0	.0	.0
5	9.6	27185.7	.0	.0	.0	.0	.0	.0	.0
6	60.0	258991.5	.0	.0	.0	.0	.0	.0	.0
7	12.0	60869.7	.0	.0	.0	.0	.0	.0	.0
8	29.0	65040.5	.0	.0	.0	.0	.0	.0	.0

RUN #5

TT 53425; 5-5' Ridge Cut El 1320, El 1220 Fill Pad + RUA; PseudoStatic

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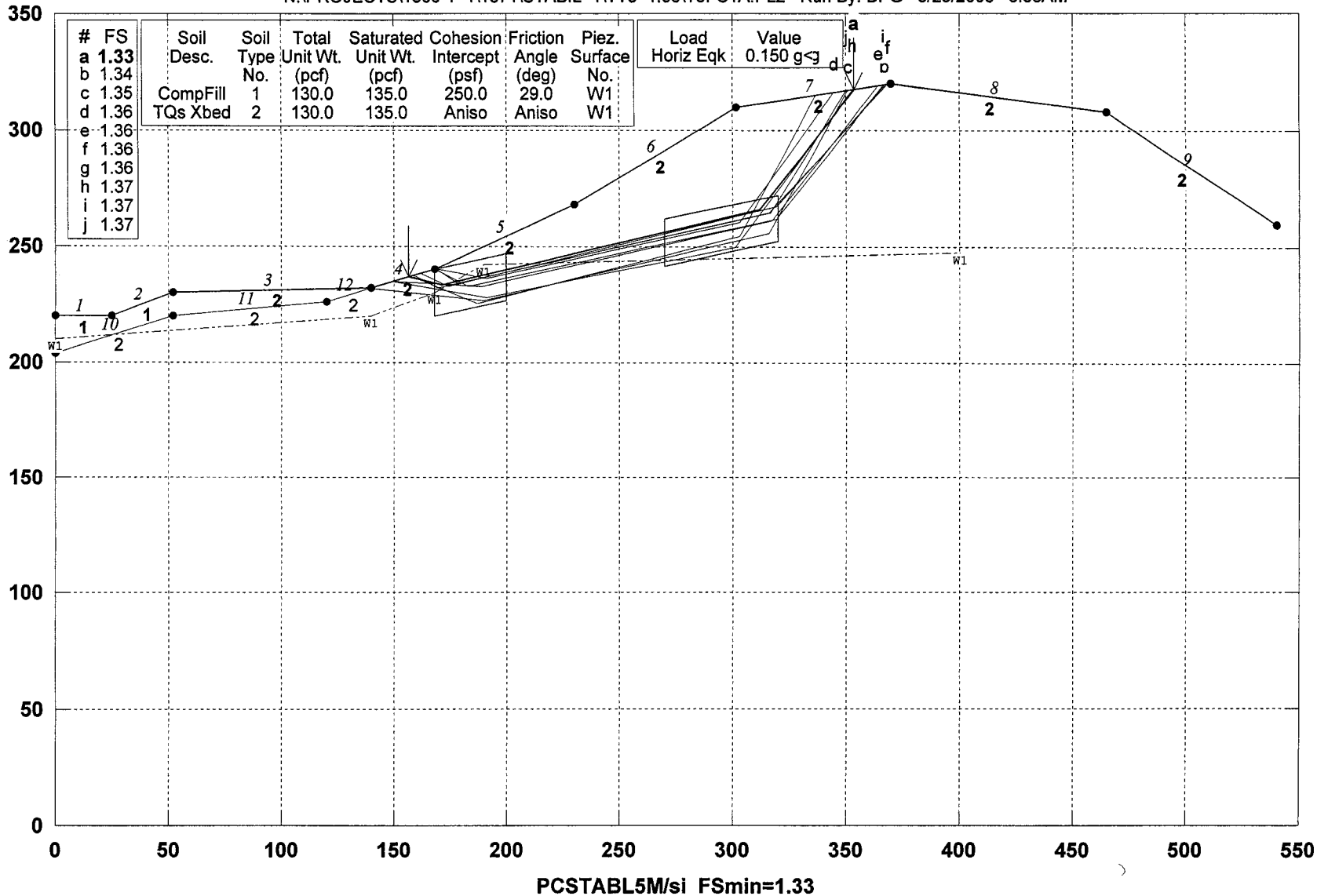


PCSTABL5M/si FSmin=1.33

Safety Factors Are Calculated By The Modified Janbu Method for the case of c & phi both > 0

STED

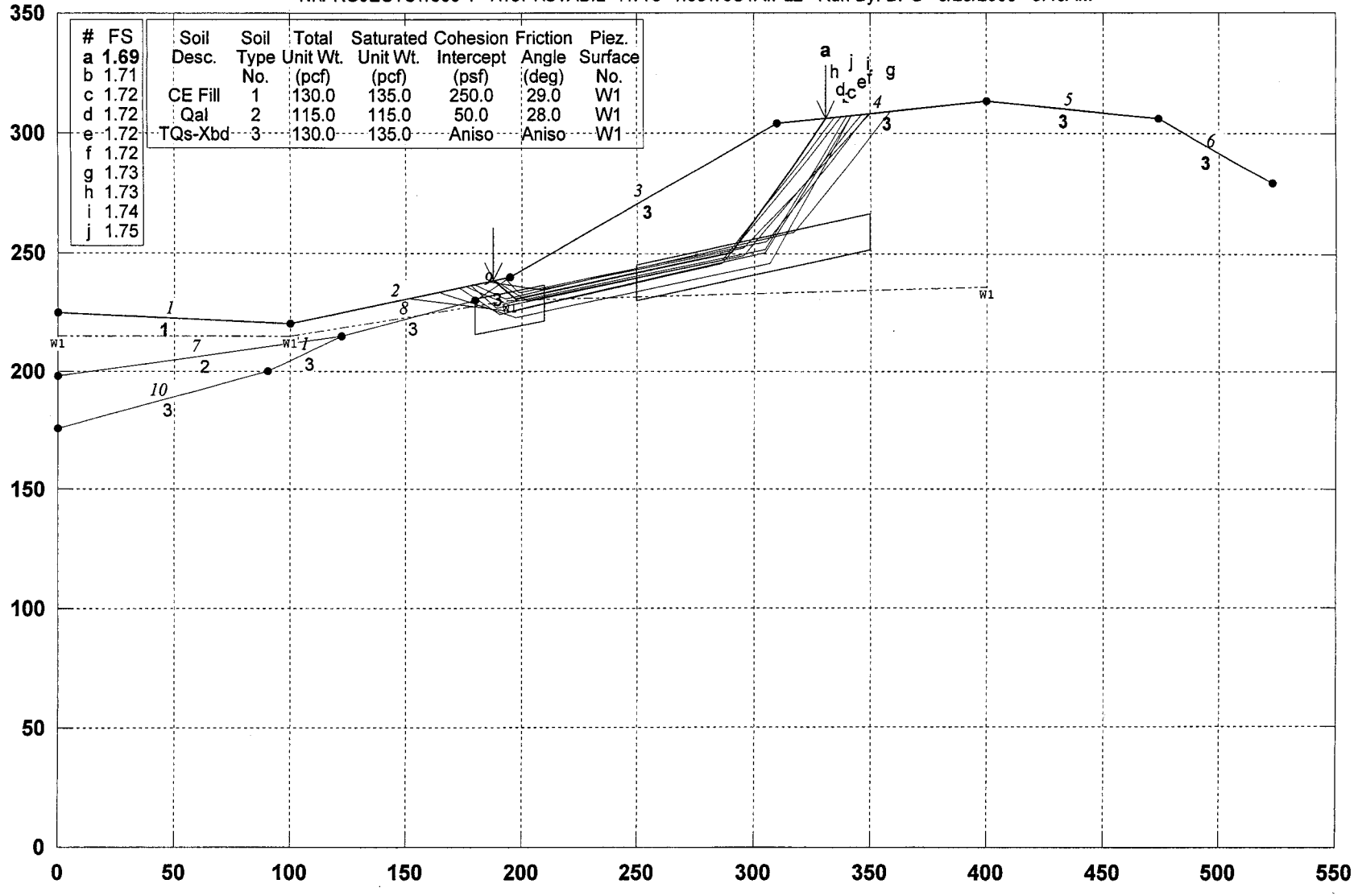
RUN # 5

TT 53425; 6-6'; El 1220 Fill Pad + El 1312 Ridge Cut + RUA; Static

N:\PROJECTS\1500-1~1\1571\STABIL~1\TT3~1.03\T6S1A.PL2 Run By: BPG 3/25/2003 8:40AM

#	FS
a	1.69
b	1.71
c	1.72
d	1.72
e	1.72
f	1.72
g	1.73
h	1.73
i	1.74
j	1.75

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
CE Fill	1	130.0	135.0	250.0	29.0	W1
Qal	2	115.0	115.0	50.0	28.0	W1
TQs-Xbd	3	130.0	135.0	Aniso	Aniso	W1



PCSTABL5M/si FSmin=1.69

Safety Factors Are Calculated By The Modified Janbu Method for the case of c & phi both > 0

STED

RUN #6

** PCSTABL5M **
by
Purdue University
--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer`s Method of Slices

Run Date: 3/25/2003
Time of Run: 8:40AM
Run By: BPG
Input Data Filename: N:t6s1a.in
Output Filename: N:t6s1a.OUT
Unit: ENGLISH
Plotted Output Filename: N:t6s1a.PLT
PROBLEM DESCRIPTION TT 53425; 6-6'; El 1220 Fill Pad + El 13
12 Ridge Cut + RUA; Static

BOUNDARY COORDINATES
Note: User origin value specified.
Add 0.00 to X-values and 0.00 to Y-values listed.

6 Top Boundaries
11 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	.00	225.00	100.00	220.00	1
2	100.00	220.00	195.00	240.00	1
3	195.00	240.00	310.00	304.00	3
4	310.00	304.00	400.00	313.00	3
5	400.00	313.00	474.00	306.00	3
6	474.00	306.00	523.00	280.00	3
7	.00	198.00	122.00	215.00	2
8	122.00	215.00	180.00	230.00	3
9	180.00	230.00	195.00	240.00	3
10	.00	176.00	90.00	200.00	3
11	90.00	200.00	122.00	215.00	3

ISOTROPIC SOIL PARAMETERS
3 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	130.0	135.0	250.0	29.0	.00	.0	1
2	115.0	115.0	50.0	28.0	.00	.0	1
3	130.0	135.0	400.0	38.0	.00	.0	1

ANISOTROPIC STRENGTH PARAMETERS
1 soil type(s)
Soil Type 3 Is Anisotropic
Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	11.0	400.0	38.0
2	13.0	450.0	19.0
3	90.0	400.0	38.0

1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED
Unit Weight of Water = 62.40
Piezometric Surface No. 1 Specified by 4 Coordinate Points

Point No.	X-Water (ft)	Y-Water (ft)
1	.00	215.00
2	100.00	215.00
3	195.00	230.00
4	400.00	236.00

Janbus Empirical Coef is being used for the case of c & phi both > 0
A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Sliding Block Surfaces, Has Been
Specified.
400 Trial Surfaces Have Been Generated.
2 Boxes Specified For Generation Of Central Block Base

RUN #6

Length Of Line Segments For Active And Passive Portions Of
Sliding Block Is 80.0

Box No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Height (ft)
1	180.00	223.00	210.00	229.38	15.00
2	250.00	237.88	350.00	259.13	15.00

Factor Of Safety Calculation Has Gone Through Ten Iterations
The Trial Failure Surface In Question Is Defined
By The Following 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	162.73	233.21
2	201.08	231.97
3	317.89	253.76
4	319.06	304.91

Factor Of Safety For The Preceding Specified Surface = 5.522
Factor Of Safety Calculation Has Gone Through Ten Iterations
The Trial Failure Surface In Question Is Defined
By The Following 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	184.20	237.73
2	200.02	221.91
3	286.81	238.94
4	289.59	292.64

Factor Of Safety For The Preceding Specified Surface = 3.590
Factor Of Safety Calculation Has Gone Through Ten Iterations
The Trial Failure Surface In Question Is Defined
By The Following 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	177.35	236.28
2	196.07	226.93
3	251.97	233.56
4	252.80	272.17

Factor Of Safety For The Preceding Specified Surface = 10.582
Factor Of Safety Calculation Has Gone Through Ten Iterations
The Trial Failure Surface In Question Is Defined
By The Following 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	174.75	235.74
2	192.36	222.28
3	299.16	244.32
4	300.64	298.79

Factor Of Safety For The Preceding Specified Surface = 3.475
Factor Of Safety Calculation Has Gone Through Ten Iterations
The Trial Failure Surface In Question Is Defined
By The Following 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	166.05	233.91
2	200.97	229.30
3	326.87	256.32
4	327.11	305.71

Factor Of Safety For The Preceding Specified Surface = 3.235
Factor Of Safety Calculation Has Gone Through Ten Iterations
The Trial Failure Surface In Question Is Defined
By The Following 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	173.10	235.39
2	197.25	224.65
3	274.07	245.83
4	274.47	284.22

Factor Of Safety For The Preceding Specified Surface = 5.821
Factor Of Safety Calculation Has Gone Through Ten Iterations

RUN #6

The Trial Failure Surface In Question Is Defined
By The Following 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	106.82	221.43
2	186.06	216.86
3	320.14	250.65
4	321.14	305.11

Factor Of Safety For The Preceding Specified Surface = 4.606
Factor Of Safety Calculation Has Gone Through Ten Iterations
The Trial Failure Surface In Question Is Defined
By The Following 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	169.88	234.71
2	184.76	231.48
3	307.03	255.93
4	307.55	302.63

Factor Of Safety For The Preceding Specified Surface = 3.548
Following Are Displayed The Ten Most Critical Of The Trial Failure Surfaces Examined. They Are Ordered - Most Critical First.
* * Safety Factors Are Calculated By The Modified Janbu Method * *
Failure Surface Specified By 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	187.53	238.43
2	197.69	230.88
3	290.37	250.63
4	330.51	306.05

*** 1.687 ***

Individual data on the 6 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	2.4	362.5	.0	.0	.0	.0	.0	.0	.0
2	5.1	3095.7	.0	.0	.0	.0	.0	.0	.0
3	2.7	3105.2	.0	.0	.0	.0	.0	.0	.0
4	92.7	319681.2	.0	.0	.0	.0	.0	.0	.0
5	19.6	87660.6	.0	.0	.0	.0	.0	.0	.0
6	20.5	35023.0	.0	.0	.0	.0	.0	.0	.0

RUN #6

TT 53425, 6-6'; El 1220 Fill Pad + El 1312 TQs Ridge Cut + RUA ; Pseudo-Static

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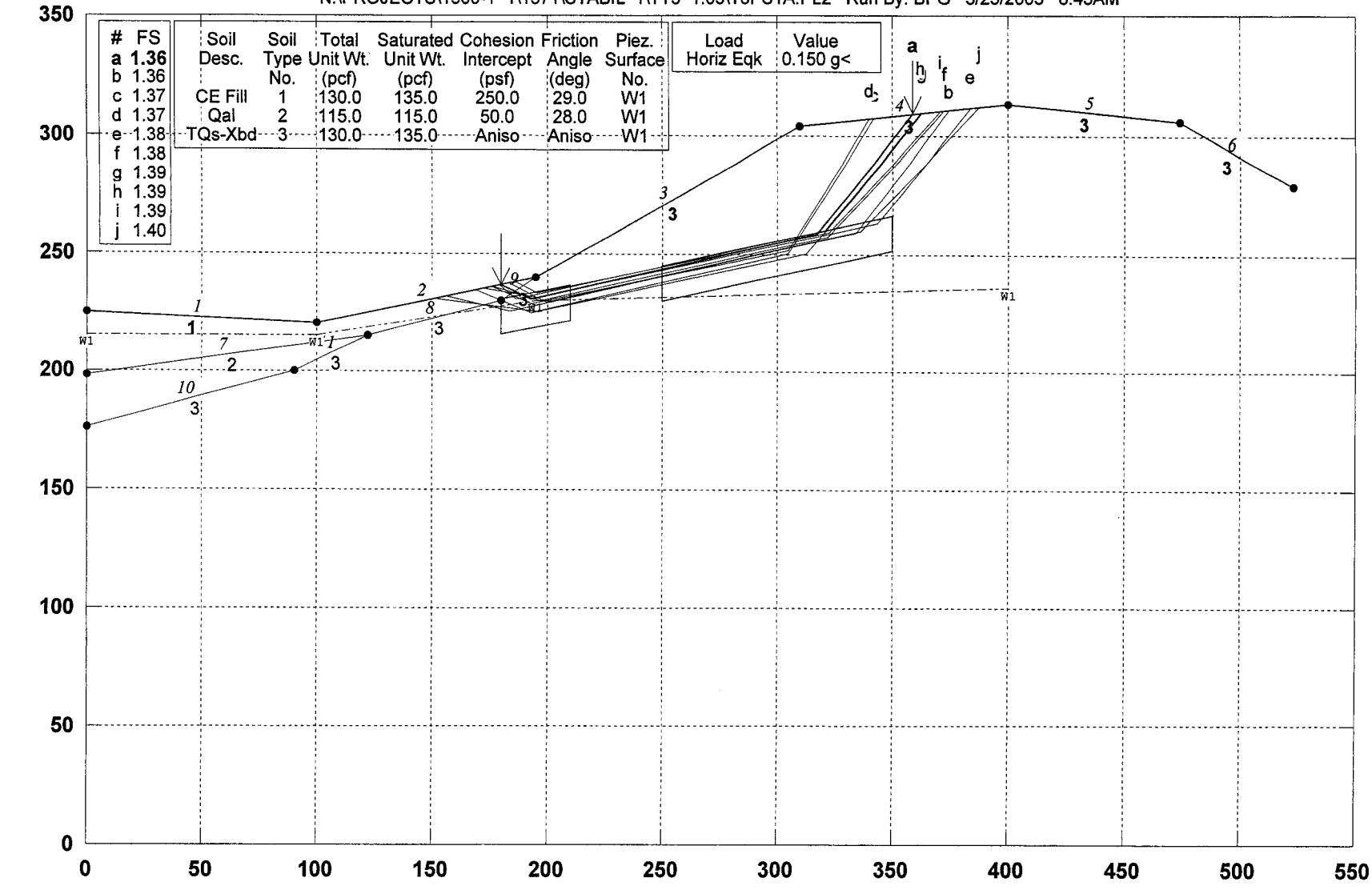


PCSTABL5M/si FSmin=1.36

Safety Factors Are Calculated By The Modified Janbu Method for the case of c & phi both > 0

STED

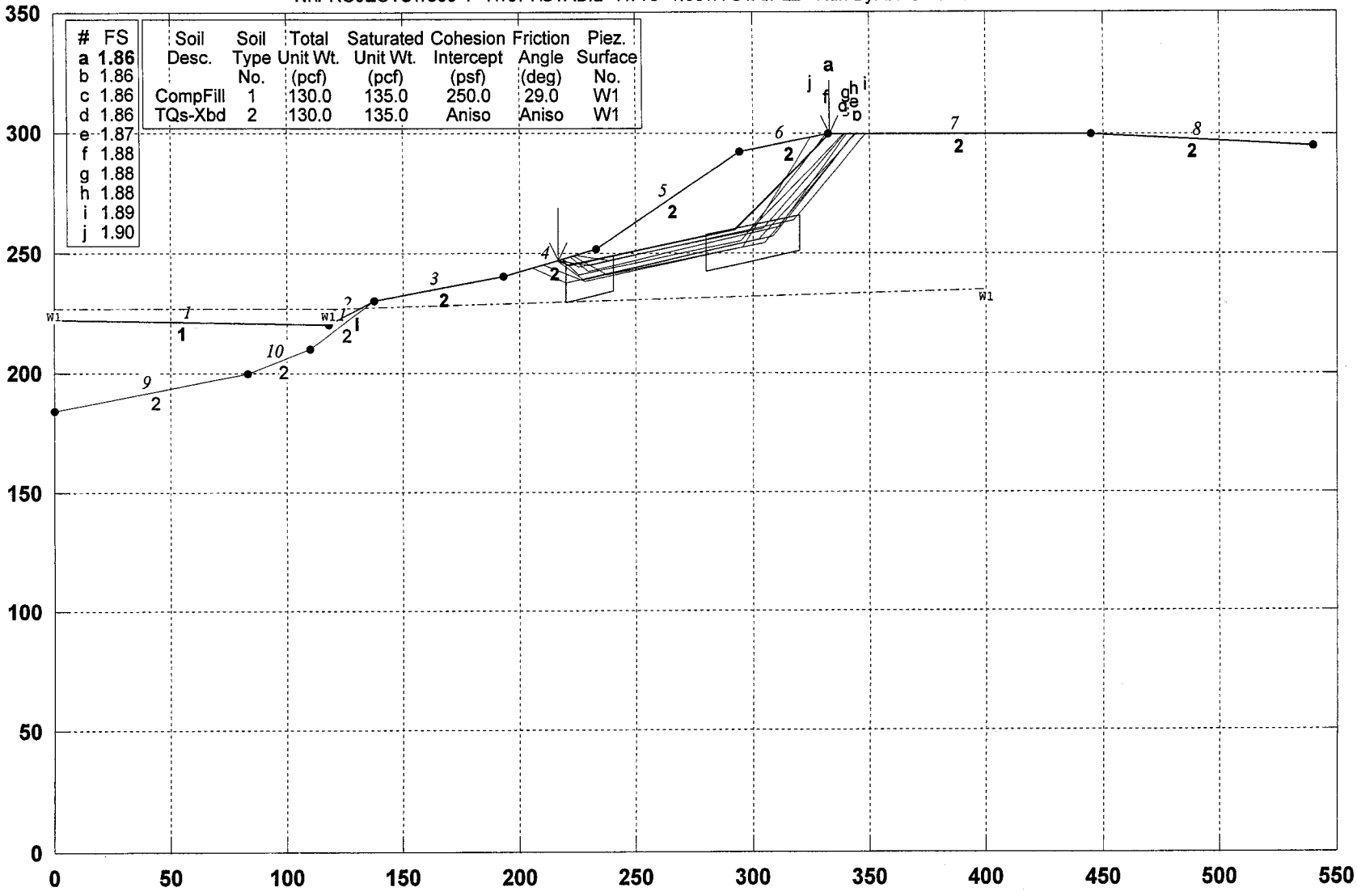
RUN #6

TT 53425, 7-7'; El 1220 Basin BLo El 1300 TQs Ridge Cut + RUA; Static

N:\PROJECTS\1500-1~1\1571\STABIL~1\TT3~1.03\T7S1A.PL2 Run By: BPG 3/25/2003 8:59AM

#	FS
a	1.86
b	1.86
c	1.86
d	1.86
e	1.87
f	1.88
g	1.88
h	1.88
i	1.89
j	1.90

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
CompFill	1	130.0	135.0	250.0	29.0	W1
TQs-Xbd	2	130.0	135.0	Aniso	Aniso	W1



PCSTABL5M/si FSmin=1.86

Safety Factors Are Calculated By The Modified Janbu Method for the case of c & phi both > 0

STED

RUN # 7

** PCSTABL5M **
by
Purdue University
--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer`s Method of Slices

Run Date: 3/25/2003
Time of Run: 8:59AM
Run By: BPG
Input Data Filename: N:t7s1a.in
Output Filename: N:t7s1a.OUT
Unit: ENGLISH
Plotted Output Filename: N:t7s1a.PLT
PROBLEM DESCRIPTION TT 53425, 7-7'; El 1220 Basin BLo El 130
0 TQs Ridge Cut + RUA; Static

BOUNDARY COORDINATES
Note: User origin value specified.
Add 0.00 to X-values and 0.00 to Y-values listed.

8 Top Boundaries
11 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	.00	222.00	118.00	220.00	1
2	118.00	220.00	138.00	230.00	1
3	138.00	230.00	193.00	240.00	2
4	193.00	240.00	233.00	252.00	2
5	233.00	252.00	294.00	292.00	2
6	294.00	292.00	332.00	300.00	2
7	332.00	300.00	445.00	300.00	2
8	445.00	300.00	540.00	295.00	2
9	.00	184.00	83.00	200.00	2
10	83.00	200.00	110.00	210.00	2
11	110.00	210.00	138.00	230.00	2

ISOTROPIC SOIL PARAMETERS
2 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	130.0	135.0	250.0	29.0	.00	.0	1
2	130.0	135.0	400.0	38.0	.00	.0	1

ANISOTROPIC STRENGTH PARAMETERS
1 soil type(s)
Soil Type 2 Is Anisotropic
Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	11.0	400.0	38.0
2	13.0	450.0	19.0
3	90.0	400.0	38.0

1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED
Unit Weight of Water = 62.40
Piezometric Surface No. 1 Specified by 3 Coordinate Points

Point No.	X-Water (ft)	Y-Water (ft)
1	.00	227.00
2	118.00	227.00
3	400.00	235.00

Janbus Empirical Coef is being used for the case of c & phi both > 0
A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Sliding Block Surfaces, Has Been
Specified.
400 Trial Surfaces Have Been Generated.
2 Boxes Specified For Generation Of Central Block Base
Length Of Line Segments For Active And Passive Portions Of
Sliding Block Is 60.0

RUN #7

Box No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Height (ft)
1	220.00	237.27	240.00	241.52	15.00
2	280.00	250.13	320.00	258.63	15.00

Factor Of Safety Calculation Has Gone Through Ten Iterations
The Trial Failure Surface In Question Is Defined
By The Following 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	218.23	247.57
2	227.53	240.69
3	287.23	254.44
4	289.16	288.82

Factor Of Safety For The Preceding Specified Surface = 3.443
Factor Of Safety Calculation Has Gone Through Ten Iterations
The Trial Failure Surface In Question Is Defined
By The Following 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	231.10	251.43
2	235.00	247.68
3	308.81	249.00
4	311.05	295.59

Factor Of Safety For The Preceding Specified Surface = 8.358
Factor Of Safety Calculation Has Gone Through Ten Iterations
The Trial Failure Surface In Question Is Defined
By The Following 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	224.61	249.48
2	236.69	239.43
3	281.09	249.79
4	282.95	284.76

Factor Of Safety For The Preceding Specified Surface = 5.608
Factor Of Safety Calculation Has Gone Through Ten Iterations
The Trial Failure Surface In Question Is Defined
By The Following 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	214.48	246.44
2	226.51	235.09
3	289.18	249.21
4	289.68	289.17

Factor Of Safety For The Preceding Specified Surface = 5.396
Factor Of Safety Calculation Has Gone Through Ten Iterations
The Trial Failure Surface In Question Is Defined
By The Following 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	210.34	245.20
2	233.98	242.09
3	310.75	258.77
4	310.92	295.56

Factor Of Safety For The Preceding Specified Surface = 4.124
Factor Of Safety Calculation Has Gone Through Ten Iterations
The Trial Failure Surface In Question Is Defined
By The Following 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	219.51	247.95
2	226.47	241.26
3	290.97	257.42
4	291.09	290.09

Factor Of Safety For The Preceding Specified Surface = 7.550
Factor Of Safety Calculation Has Gone Through Ten Iterations
The Trial Failure Surface In Question Is Defined
By The Following 4 Coordinate Points

RUN # 7

Point No.	X-Surf (ft)	Y-Surf (ft)
1	201.03	242.41
2	223.13	236.58
3	304.61	254.12
4	304.69	294.25

Factor Of Safety For The Preceding Specified Surface = 4.574

Following Are Displayed The Ten Most Critical Of The Trial Failure Surfaces Examined. They Are Ordered - Most Critical First.

* * Safety Factors Are Calculated By The Modified Janbu Method * *

Failure Surface Specified By 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	216.86	247.16
2	221.44	244.83
3	292.32	259.82
4	332.50	300.00

*** 1.859 ***

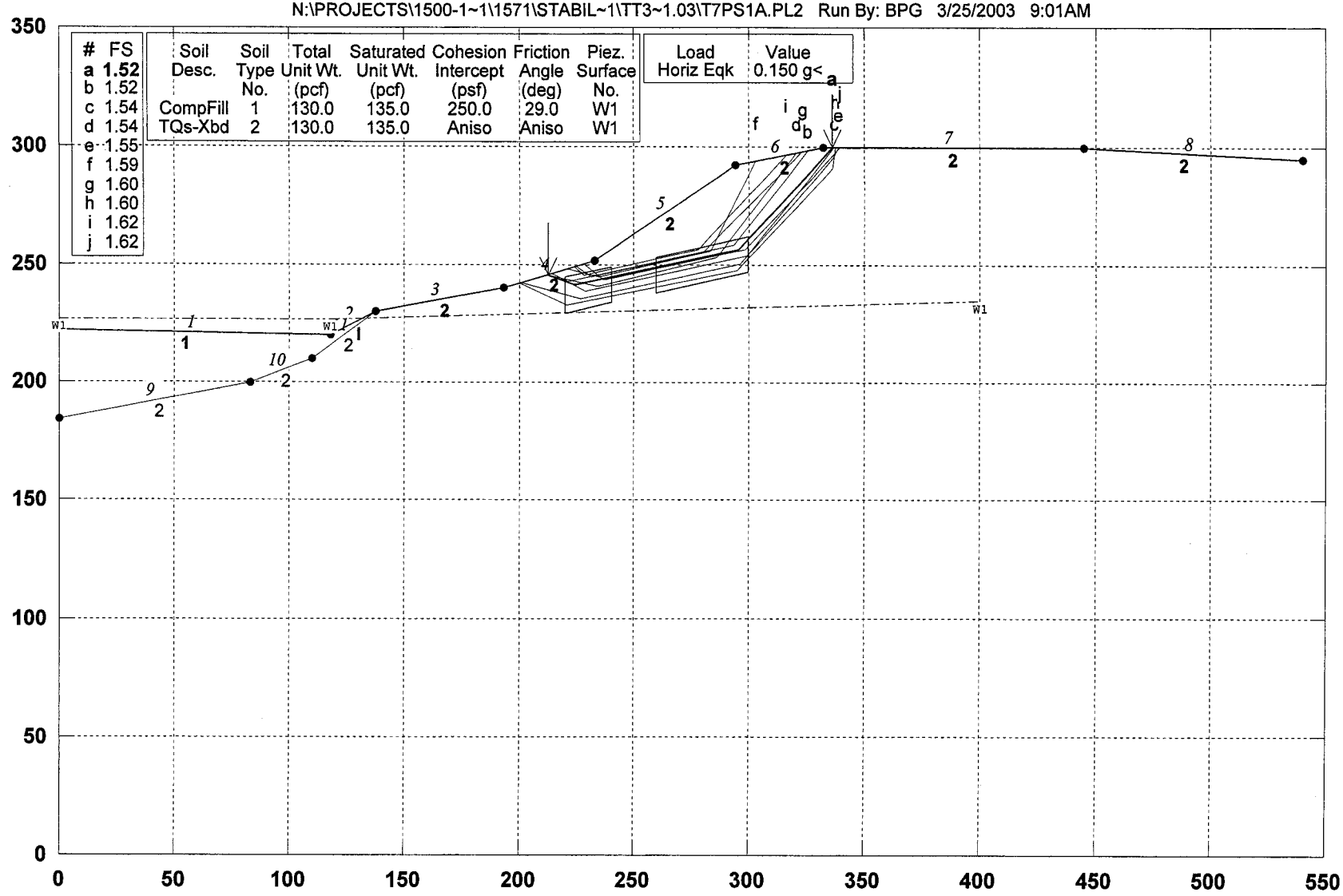
Individual data on the 6 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	4.6	1103.0	.0	.0	.0	.0	.0	.0	.0
2	11.6	6330.8	.0	.0	.0	.0	.0	.0	.0
3	59.3	138065.7	.0	.0	.0	.0	.0	.0	.0
4	1.7	6717.8	.0	.0	.0	.0	.0	.0	.0
5	38.0	76583.1	.0	.0	.0	.0	.0	.0	.0
6	.5	16.4	.0	.0	.0	.0	.0	.0	.0

RUN #7

TT 53425, 7-7'; El 1220 Basin BLo El 1300 TQs Ridge Cut + RUA; Pseudo-Static

N:\PROJECTS\1500-1~1\1571\STABIL~1\TT3~1.03\T7PS1A.PL2 Run By: BPG 3/25/2003 9:01AM



PCSTABL5M/si FSmin=1.52

Safety Factors Are Calculated By The Modified Janbu Method for the case of c & phi both > 0

STED

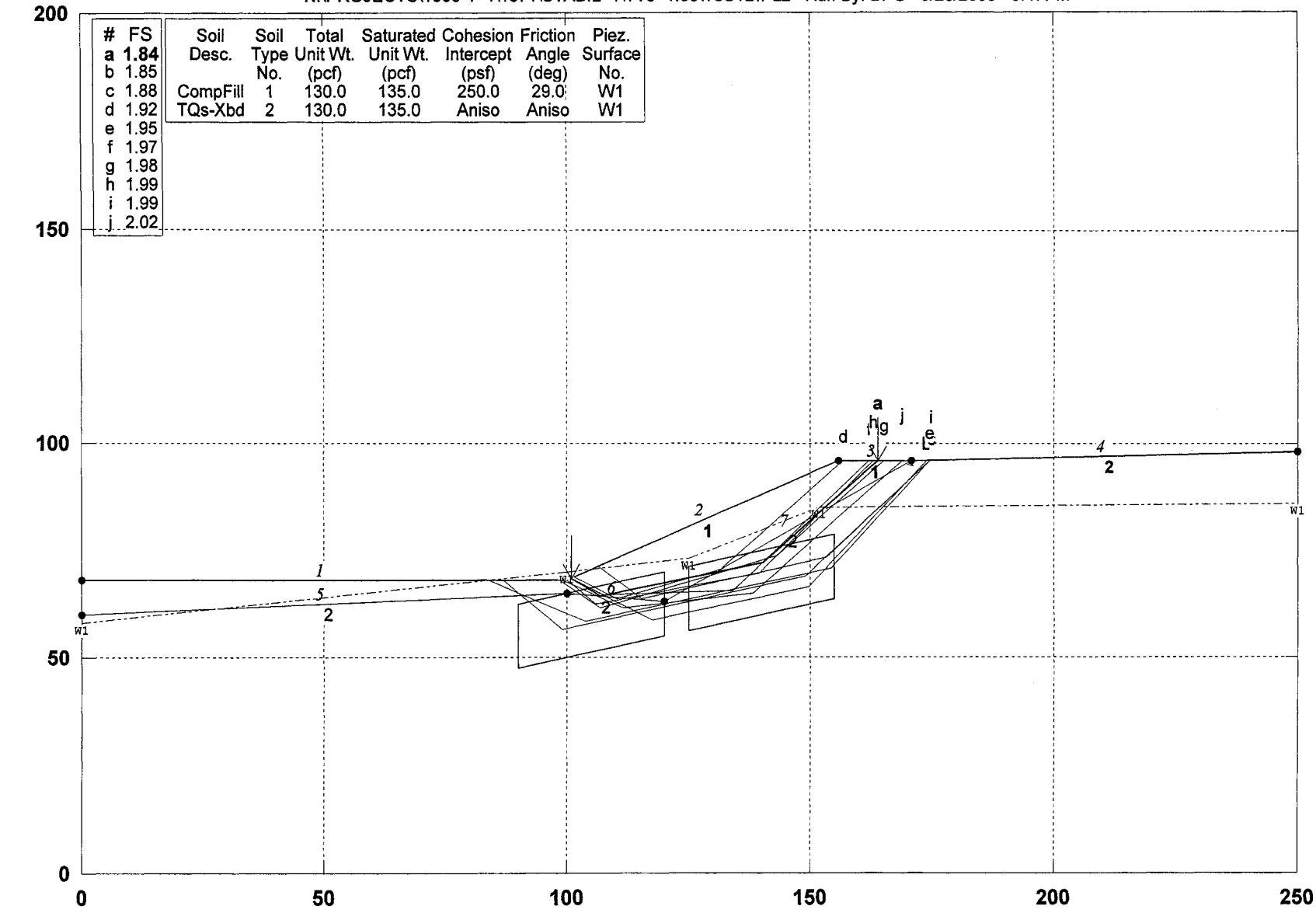
RUN #1

TT 53425; 8-8', CS-6 w 20' StabFill BLo Newhall Ranch Rd; Static

N:\PROJECTS\1500-1~1\1571\STABIL~1\TT3~1.03\T8S1B.PL2 Run By: BPG 3/26/2003 6:47PM

#	FS
a	**1.84**
b	1.85
c	1.88
d	1.92
e	1.95
f	1.97
g	1.98
h	1.99
i	1.99
j	2.02

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
CompFill	1	130.0	135.0	250.0	29.0	W1
TQs-Xbd	2	130.0	135.0	Aniso	Aniso	W1



PCSTABL5M/si FSmin=1.84

Safety Factors Are Calculated By The Modified Janbu Method for the case of c & phi both > 0

STED

RUN # 8

** PCSTABL5M **
by
Purdue University
--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer`s Method of Slices

Run Date: 3/26/2003
Time of Run: 6:47PM
Run By: BPG
Input Data Filename: N:t8s1b.in
Output Filename: N:t8s1b.OUT
Unit: ENGLISH
Plotted Output Filename: N:t8s1b.PLT
PROBLEM DESCRIPTION TT 53425; 8-8', CS-6 w 20' StabFill BLo
Newhall Ranch Rd; Static

BOUNDARY COORDINATES
Note: User origin value specified.
Add 0.00 to X-values and 0.00 to Y-values listed.

4 Top Boundaries
7 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	.00	68.00	100.00	68.00	1
2	100.00	68.00	156.00	96.00	1
3	156.00	96.00	171.00	96.00	1
4	171.00	96.00	250.00	98.00	2
5	.00	60.00	100.00	65.00	2
6	100.00	65.00	120.00	63.00	2
7	120.00	63.00	171.00	96.00	2

ISOTROPIC SOIL PARAMETERS
2 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	130.0	135.0	250.0	29.0	.00	.0	1
2	130.0	135.0	350.0	32.0	.00	.0	1

ANISOTROPIC STRENGTH PARAMETERS
1 soil type(s)
Soil Type 2 Is Anisotropic
Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	13.5	350.0	32.0
2	14.5	450.0	19.0
3	90.0	350.0	32.0

1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED
Unit Weight of Water = 62.40
Piezometric Surface No. 1 Specified by 5 Coordinate Points

Point No.	X-Water (ft)	Y-Water (ft)
1	.00	58.00
2	100.00	70.00
3	125.00	73.00
4	152.00	85.00
5	250.00	86.00

Janbus Empirical Coef is being used for the case of c & phi both > 0
A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Sliding Block Surfaces, Has Been
Specified.
400 Trial Surfaces Have Been Generated.
2 Boxes Specified For Generation Of Central Block Base
Length Of Line Segments For Active And Passive Portions Of
Sliding Block Is 60.0

Box No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Height (ft)

RUN #8

1	90.00	55.00	120.00	62.48	15.00
2	125.00	63.73	155.00	71.21	15.00

Factor Of Safety Calculation Has Gone Through Ten Iterations
The Trial Failure Surface In Question Is Defined
By The Following 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	105.52	70.76
2	113.56	62.93
3	125.93	64.93
4	126.24	81.12

Factor Of Safety For The Preceding Specified Surface = 20.584
Factor Of Safety Calculation Has Gone Through Ten Iterations
The Trial Failure Surface In Question Is Defined
By The Following 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	105.24	70.62
2	116.04	61.12
3	136.49	67.07
4	136.79	86.39

Factor Of Safety For The Preceding Specified Surface = 10.459
Factor Of Safety Calculation Has Gone Through Ten Iterations
The Trial Failure Surface In Question Is Defined
By The Following 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	92.17	68.00
2	106.19	62.19
3	152.90	65.30
4	154.07	95.04

Factor Of Safety For The Preceding Specified Surface = 5.301
Factor Of Safety Calculation Has Gone Through Ten Iterations
The Trial Failure Surface In Question Is Defined
By The Following 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	79.44	68.00
2	104.84	52.92
3	150.31	65.55
4	150.96	93.48

Factor Of Safety For The Preceding Specified Surface = 4.515
Factor Of Safety Calculation Has Gone Through Ten Iterations
The Trial Failure Surface In Question Is Defined
By The Following 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	89.61	68.00
2	100.00	59.20
3	126.49	59.94
4	127.56	81.78

Factor Of Safety For The Preceding Specified Surface = 8.820
Factor Of Safety Calculation Has Gone Through Ten Iterations
The Trial Failure Surface In Question Is Defined
By The Following 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	110.96	73.48
2	118.57	68.15
3	145.70	76.05
4	146.01	91.01

Factor Of Safety For The Preceding Specified Surface = 6.028
Factor Of Safety Calculation Has Gone Through Ten Iterations
The Trial Failure Surface In Question Is Defined
By The Following 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)

RUN #8

1	67.82	68.00
2	92.22	56.63
3	132.89	64.95
4	133.01	84.50

Factor Of Safety For The Preceding Specified Surface = 13.313
Factor Of Safety Calculation Has Gone Through Ten Iterations
The Trial Failure Surface In Question Is Defined
By The Following 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	83.16	68.00
2	107.25	57.28
3	132.22	68.37
4	132.38	84.19

Factor Of Safety For The Preceding Specified Surface = 6.058
Factor Of Safety Calculation Has Gone Through Ten Iterations
The Trial Failure Surface In Question Is Defined
By The Following 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	91.43	68.00
2	99.71	60.04
3	133.23	70.74
4	133.28	84.64

Factor Of Safety For The Preceding Specified Surface = 7.233
Factor Of Safety Calculation Has Gone Through Ten Iterations
The Trial Failure Surface In Question Is Defined
By The Following 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	44.67	68.00
2	94.70	54.82
3	143.46	67.09
4	143.50	89.75

Factor Of Safety For The Preceding Specified Surface = 7.759
Factor Of Safety Calculation Has Gone Through Ten Iterations
The Trial Failure Surface In Question Is Defined
By The Following 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	92.57	68.00
2	101.01	60.47
3	137.16	63.65
4	137.41	86.71

Factor Of Safety For The Preceding Specified Surface = 12.669
Following Are Displayed The Ten Most Critical Of The Trial Failure Surfaces Examined. They Are Ordered - Most Critical First.
* * Safety Factors Are Calculated By The Modified Janbu Method * *
Failure Surface Specified By 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	100.86	68.43
2	106.90	64.29
3	140.31	72.32
4	163.96	96.00

*** 1.837 ***
Individual data on the 11 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	6.0	2882.8	211.0	1844.7	.0	.0	.0	.0	.0
2	.0	39.8	.0	20.3	.0	.0	.0	.0	.0
3	.1	68.9	.0	29.7	.0	.0	.0	.0	.0
4	18.0	22805.5	.0	6258.8	.0	.0	.0	.0	.0
5	5.9	9831.8	.0	1727.0	.0	.0	.0	.0	.0

RUN #8

6	9.4	18141.2	.0	3612.5	.0	.0	.0	.0	.0
7	10.8	18641.2	.0	3917.7	.0	.0	.0	.0	.0
8	.9	1204.2	.0	89.8	.0	.0	.0	.0	.0
9	1.0	1244.9	.0	42.2	.0	.0	.0	.0	.0
10	3.0	3422.5	.0	.0	.0	.0	.0	.0	.0
11	8.0	4122.2	.0	.0	.0	.0	.0	.0	.0

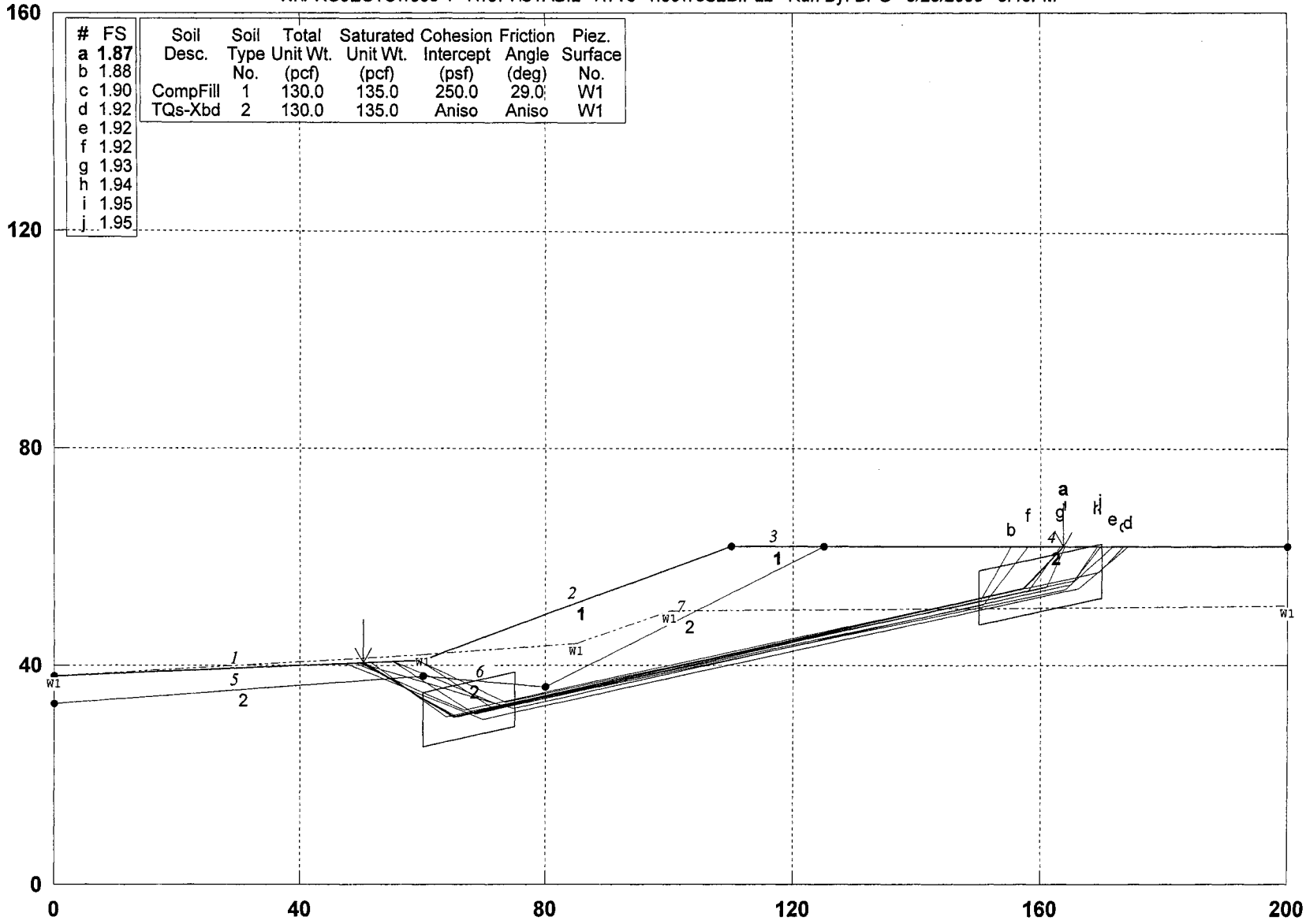
RUN #8

TT 53425; 8-8'; CS-7 w 20' StabFill at Toe of Qls-5b in TQs; Static

N:\PROJECTS\1500-1~1\1571\STABIL~1\TT3~1.03\T8S2B.PL2 Run By: BPG 3/26/2003 6:46PM

#	FS
a	**1.87**
b	1.88
c	1.90
d	1.92
e	1.92
f	1.92
g	1.93
h	1.94
i	1.95
j	1.95

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
CompFill	1	130.0	135.0	250.0	29.0	W1
TQs-Xbd	2	130.0	135.0	Aniso	Aniso	W1



PCSTABL5M/si FSmin=1.87

Safety Factors Are Calculated By The Modified Janbu Method

STED

RUN #9

** PCSTABL5M **
by
Purdue University
--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer`s Method of Slices

Run Date: 3/26/2003
Time of Run: 6:46PM
Run By: BPG
Input Data Filename: N:T8S2B.IN
Output Filename: N:T8S2B.OUT
Unit: ENGLISH
Plotted Output Filename: N:T8S2B.PLT
PROBLEM DESCRIPTION TT 53425; 8-8'; CS-7 w 20' StabFill at T
oe of Qls-5b in TQs; Static

BOUNDARY COORDINATES
Note: User origin value specified.
Add 0.00 to X-values and 0.00 to Y-values listed.

4 Top Boundaries
7 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	.00	38.00	60.00	41.00	1
2	60.00	41.00	110.00	62.00	1
3	110.00	62.00	125.00	62.00	1
4	125.00	62.00	200.00	62.00	2
5	.00	33.00	60.00	38.00	2
6	60.00	38.00	80.00	36.00	2
7	80.00	36.00	125.00	62.00	2

ISOTROPIC SOIL PARAMETERS
2 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	130.0	135.0	250.0	29.0	.00	.0	1
2	130.0	135.0	400.0	38.0	.00	.0	1

ANISOTROPIC STRENGTH PARAMETERS
1 soil type(s)
Soil Type 2 Is Anisotropic
Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	13.5	400.0	38.0
2	14.5	300.0	8.5
3	90.0	400.0	38.0

1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED
Unit Weight of Water = 62.40
Piezometric Surface No. 1 Specified by 5 Coordinate Points

Point No.	X-Water (ft)	Y-Water (ft)
1	.00	38.00
2	60.00	42.00
3	85.00	44.00
4	100.00	50.00
5	200.00	51.00

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Sliding Block Surfaces, Has Been Specified.
400 Trial Surfaces Have Been Generated.
2 Boxes Specified For Generation Of Central Block Base
Length Of Line Segments For Active And Passive Portions Of Sliding Block Is 30.0

Box No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Height (ft)
1	60.00	30.00	75.00	33.74	10.00

RUN #9

2 150.00 52.44 170.00 57.43 10.00

Following Are Displayed The Ten Most Critical Of The Trial Failure Surfaces Examined. They Are Ordered - Most Critical First.

* * Safety Factors Are Calculated By The Modified Janbu Method * *

Failure Surface Specified By 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	50.15	40.51
2	65.04	30.48
3	157.26	54.31
4	163.70	62.00

*** 1.871 ***

Individual data on the 12 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	4.4	944.4	238.2	813.2	.0	.0	.0	.0	.0
2	5.4	3790.7	320.4	2498.3	.0	.0	.0	.0	.0
3	5.0	6725.3	37.9	3790.0	.0	.0	.0	.0	.0
4	15.0	27714.0	.0	10175.8	.0	.0	.0	.0	.0
5	5.0	10267.7	.0	2829.6	.0	.0	.0	.0	.0
6	15.0	33953.7	.0	8482.9	.0	.0	.0	.0	.0
7	4.3	10643.7	.0	2761.3	.0	.0	.0	.0	.0
8	5.7	14641.6	.0	3196.6	.0	.0	.0	.0	.0
9	15.0	35491.5	.0	5935.2	.0	.0	.0	.0	.0
10	17.2	31075.9	.0	2372.6	.0	.0	.0	.0	.0
11	15.0	18840.5	.0	.0	.0	.0	.0	.0	.0
12	6.4	3218.9	.0	.0	.0	.0	.0	.0	.0

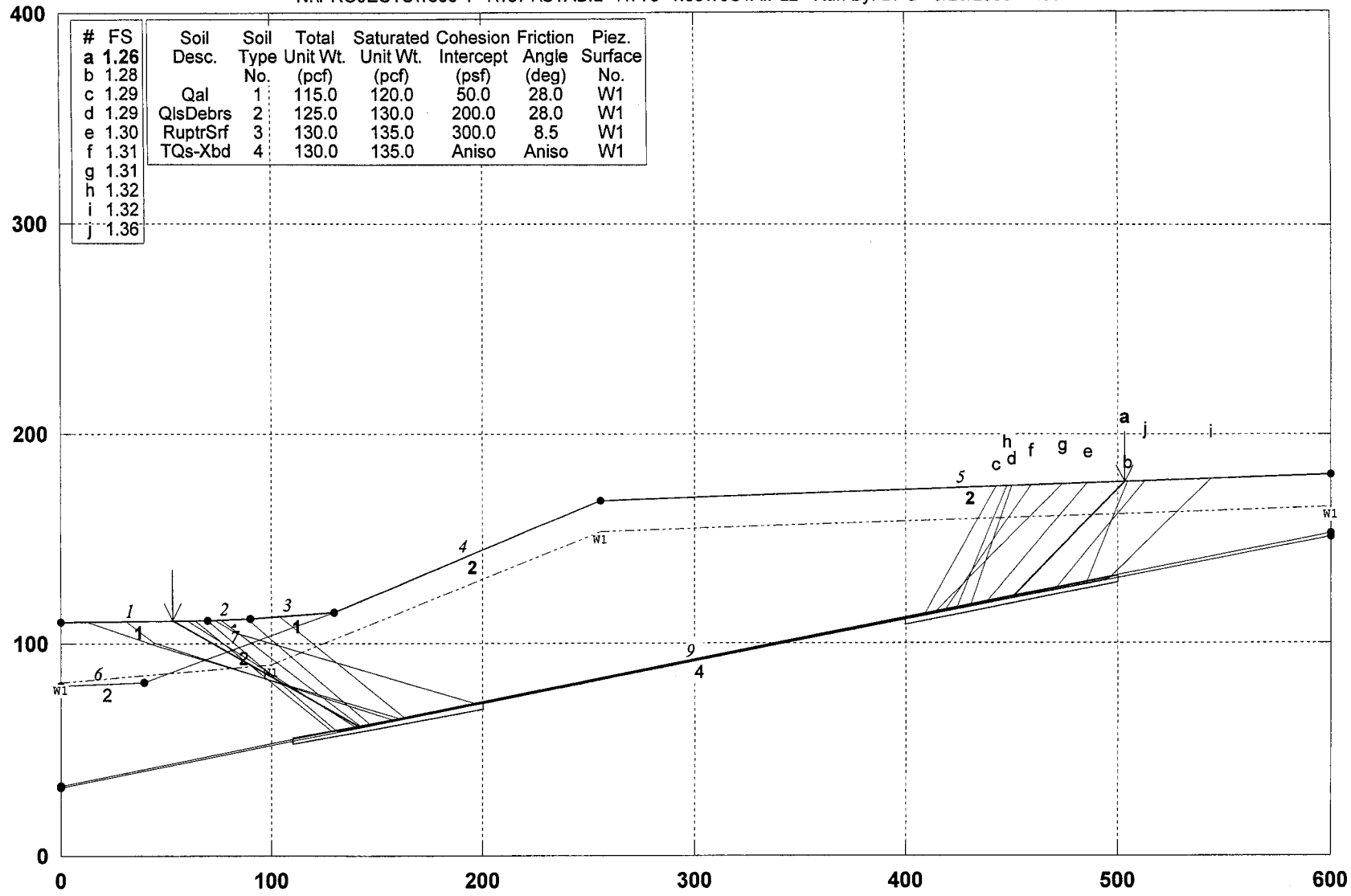
RUN #9

TT 53425; 9-9'; El 1268 Top Cut of Qls-5b w Bike Trail @ El 1211; Static

N:\PROJECTS\1500-1~1\1571\STABIL~1\TT3~1.03\T9S1A.PL2 Run By: BPG 3/26/2003 1:50PM

#	FS
a	1.26
b	1.28
c	1.29
d	1.29
e	1.30
f	1.31
g	1.31
h	1.32
i	1.32
j	1.36

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
Qal	1	115.0	120.0	50.0	28.0	W1
QlsDebrs	2	125.0	130.0	200.0	28.0	W1
RuptrSrf	3	130.0	135.0	300.0	8.5	W1
TQs-Xbd	4	130.0	135.0	Aniso	Aniso	W1



PCSTABL5M/si FSmin=1.26

Safety Factors Are Calculated By The Modified Janbu Method

STED

RUN #10

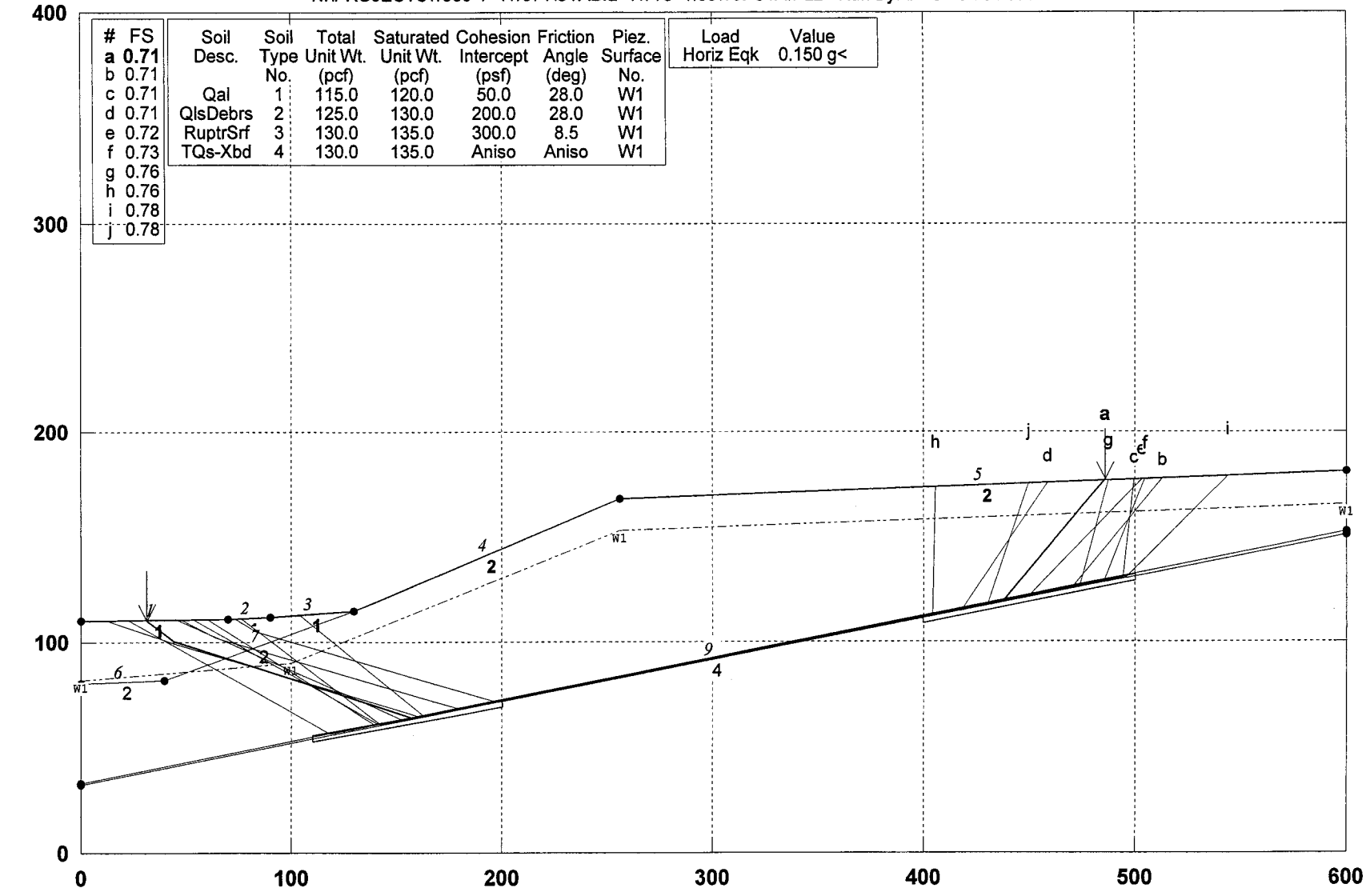
TT 53425; 9-9'; El 1268 Top Cut of Qls- 5b w Bike Trail @ El 1211; Pseudo-Static

N:\PROJECTS\1500-1~1\1571\STABIL~1\TT3~1.03\T9PS1A.PL2 Run By: BPG 3/26/2003 1:52PM

#	FS
a	**0.71**
b	0.71
c	0.71
d	0.71
e	0.72
f	0.73
g	0.76
h	0.76
i	0.78
j	0.78

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
Qal	1	115.0	120.0	50.0	28.0	W1
QlsDebrs	2	125.0	130.0	200.0	28.0	W1
RuptrSrf	3	130.0	135.0	300.0	8.5	W1
TQs-Xbd	4	130.0	135.0	Aniso	Aniso	W1

Load	Value
Horiz Eqk	0.150 g<



PCSTABL5M/si FSmin=0.71

Safety Factors Are Calculated By The Modified Janbu Method

STED

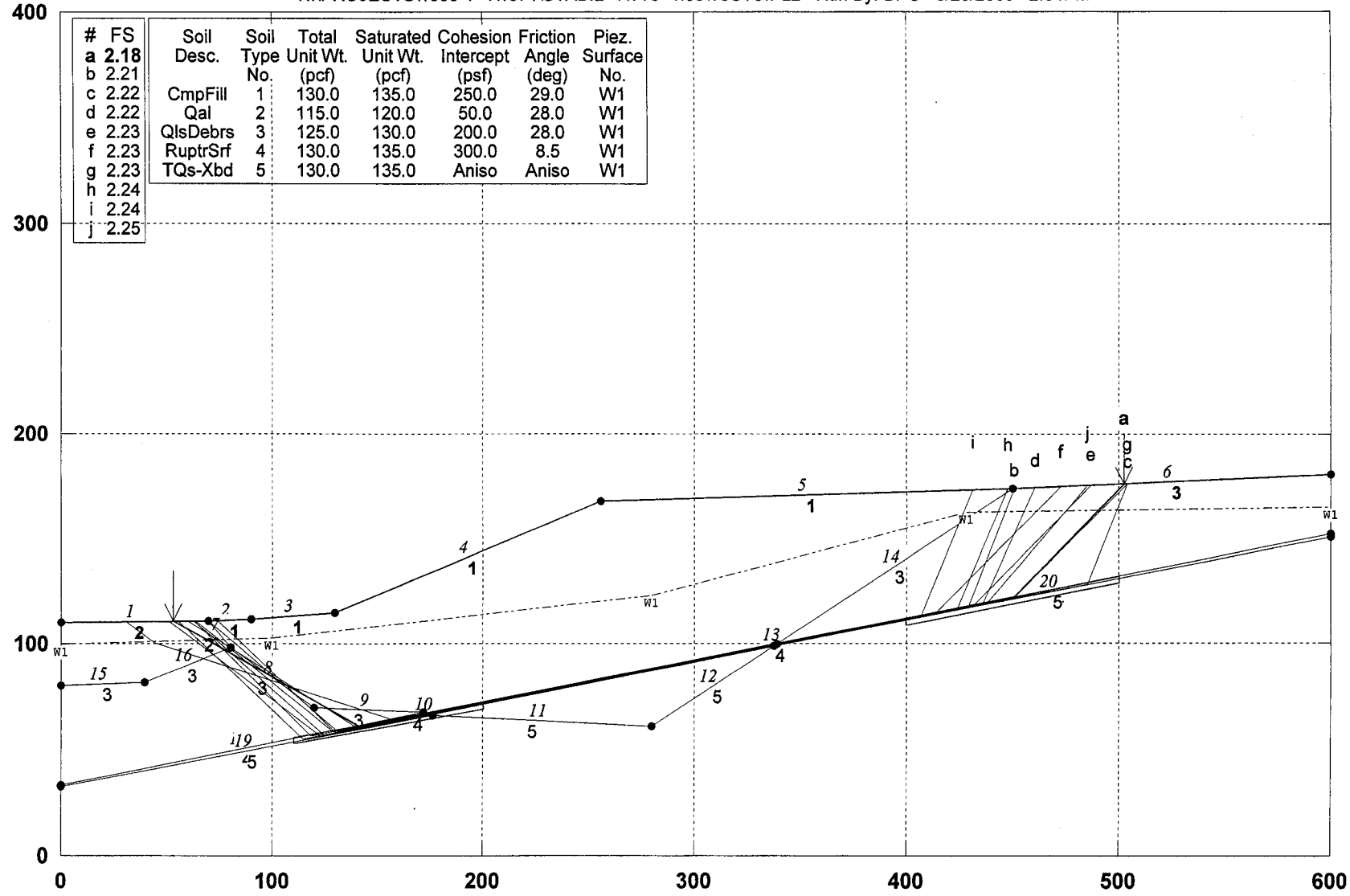
RUN #10

TT 53425; 9-9'; 150'W x 45'D Buttress + El 1268 Top Cut of Qls-5b; Static

N:\PROJECTS\1500-1~1\1571\STABIL~1\TT3~1.03\T9S1C.PL2 Run By: BPG 3/26/2003 2:04PM

#	FS
a	2.18
b	2.21
c	2.22
d	2.22
e	2.23
f	2.23
g	2.23
h	2.24
i	2.24
j	2.25

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
CmpFill	1	130.0	135.0	250.0	29.0	W1
Qal	2	115.0	120.0	50.0	28.0	W1
QlsDebrs	3	125.0	130.0	200.0	28.0	W1
RuptrSrf	4	130.0	135.0	300.0	8.5	W1
TQs-Xbd	5	130.0	135.0	Aniso	Aniso	W1



PCSTABL5M/si FSmin=2.18

Safety Factors Are Calculated By The Modified Janbu Method

STED

RUN #11

** PCSTABL5M **
by
Purdue University
--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer`s Method of Slices

Run Date: 3/26/2003
Time of Run: 2:04PM
Run By: BPG
Input Data Filename: N:t9s1c.in
Output Filename: N:t9s1c.OUT
Unit: ENGLISH
Plotted Output Filename: N:t9s1c.PLT
PROBLEM DESCRIPTION TT 53425; 9-9'; 150'W x 45'D Buttress +
El 1268 Top Cut of Qls-5b; Static

BOUNDARY COORDINATES
Note: User origin value specified.
Add 0.00 to X-values and 0.00 to Y-values listed.

6 Top Boundaries
20 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	.00	110.00	70.00	111.00	2
2	70.00	111.00	90.00	112.00	1
3	90.00	112.00	130.00	115.00	1
4	130.00	115.00	256.00	168.00	1
5	256.00	168.00	449.70	174.00	1
6	449.70	174.00	600.00	181.00	3
7	70.00	111.00	80.00	98.00	2
8	80.00	98.00	120.00	70.00	3
9	120.00	70.00	172.00	67.26	3
10	172.00	67.26	176.00	66.26	4
11	176.00	66.26	280.00	60.81	5
12	280.00	60.81	337.20	98.98	5
13	337.20	98.98	338.70	100.00	4
14	338.70	100.00	449.70	174.00	3
15	.00	80.00	40.00	82.00	3
16	40.00	82.00	80.00	98.00	3
17	.00	33.20	172.00	67.26	4
18	338.70	100.00	600.00	152.00	4
19	.00	32.20	176.00	66.26	5
20	337.20	98.98	600.00	151.00	5

ISOTROPIC SOIL PARAMETERS
5 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	130.0	135.0	250.0	29.0	.00	.0	1
2	115.0	120.0	50.0	28.0	.00	.0	1
3	125.0	130.0	200.0	28.0	.00	.0	1
4	130.0	135.0	300.0	8.5	.00	.0	1
5	130.0	135.0	350.0	32.0	.00	.0	1

ANISOTROPIC STRENGTH PARAMETERS
1 soil type(s)
Soil Type 5 Is Anisotropic
Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	9.5	400.0	38.0
2	10.5	450.0	19.0
3	90.0	400.0	38.0

1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED
Unit Weight of Water = 62.40
Piezometric Surface No. 1 Specified by 5 Coordinate Points

Point	X-Water	Y-Water

RUN #11

No.	(ft)	(ft)
1	.00	100.00
2	100.00	103.00
3	280.00	123.00
4	428.00	163.00
5	600.00	165.00

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Sliding Block Surfaces, Has Been Specified.

400 Trial Surfaces Have Been Generated.

2 Boxes Specified For Generation Of Central Block Base Length Of Line Segments For Active And Passive Portions Of Sliding Block Is 120.0

Box No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Height (ft)
1	110.00	54.00	200.00	70.68	3.00
2	400.00	110.42	500.00	130.22	3.00

Following Are Displayed The Ten Most Critical Of The Trial Failure Surfaces Examined. They Are Ordered - Most Critical First.

* * Safety Factors Are Calculated By The Modified Janbu Method * *

Failure Surface Specified By 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	53.04	110.76
2	142.12	60.46
3	451.07	121.93
4	502.70	176.47

*** 2.182 ***

Individual data on the 25 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	15.4	7910.5	.0	.0	.0	.0	.0	.0	.0
2	1.5	1672.8	.0	51.1	.0	.0	.0	.0	.0
3	6.7	9691.0	.0	1395.0	.0	.0	.0	.0	.0
4	.8	1349.3	.0	275.4	.0	.0	.0	.0	.0
5	2.6	5026.6	.0	1118.8	.0	.0	.0	.0	.0
6	10.0	25154.8	.0	7048.4	.0	.0	.0	.0	.0
7	8.2	27066.7	.0	8991.3	.0	.0	.0	.0	.0
8	1.8	6604.7	.0	2316.4	.0	.0	.0	.0	.0
9	25.8	126562.8	.0	50380.5	.0	.0	.0	.0	.0
10	4.2	26329.4	.0	11361.3	.0	.0	.0	.0	.0
11	11.0	77702.5	.0	33356.5	.0	.0	.0	.0	.0
12	1.2	9128.2	.0	3866.9	.0	.0	.0	.0	.0
13	29.9	250796.3	.0	86747.3	.0	.0	.0	.0	.0
14	1.9	16903.8	.0	5368.5	.0	.0	.0	.0	.0
15	82.1	825433.6	.0	*******	.0	.0	.0	.0	.0
16	24.0	262861.3	.0	54882.5	.0	.0	.0	.0	.0
17	57.8	581480.3	.0	*******	.0	.0	.0	.0	.0
18	.9	8427.3	.0	2156.8	.0	.0	.0	.0	.0
19	89.3	746067.6	.0	*******	.0	.0	.0	.0	.0
20	5.3	38273.3	.0	15207.4	.0	.0	.0	.0	.0
21	16.4	114187.2	.0	45025.7	.0	.0	.0	.0	.0
22	1.4	9220.6	.0	3609.4	.0	.0	.0	.0	.0
23	.5	3397.2	.0	1892.7	.0	.0	.0	.0	.0
24	39.1	159766.9	.0	72349.8	.0	.0	.0	.0	.0
25	12.1	9180.2	.0	.0	.0	.0	.0	.0	.0

RUN #11

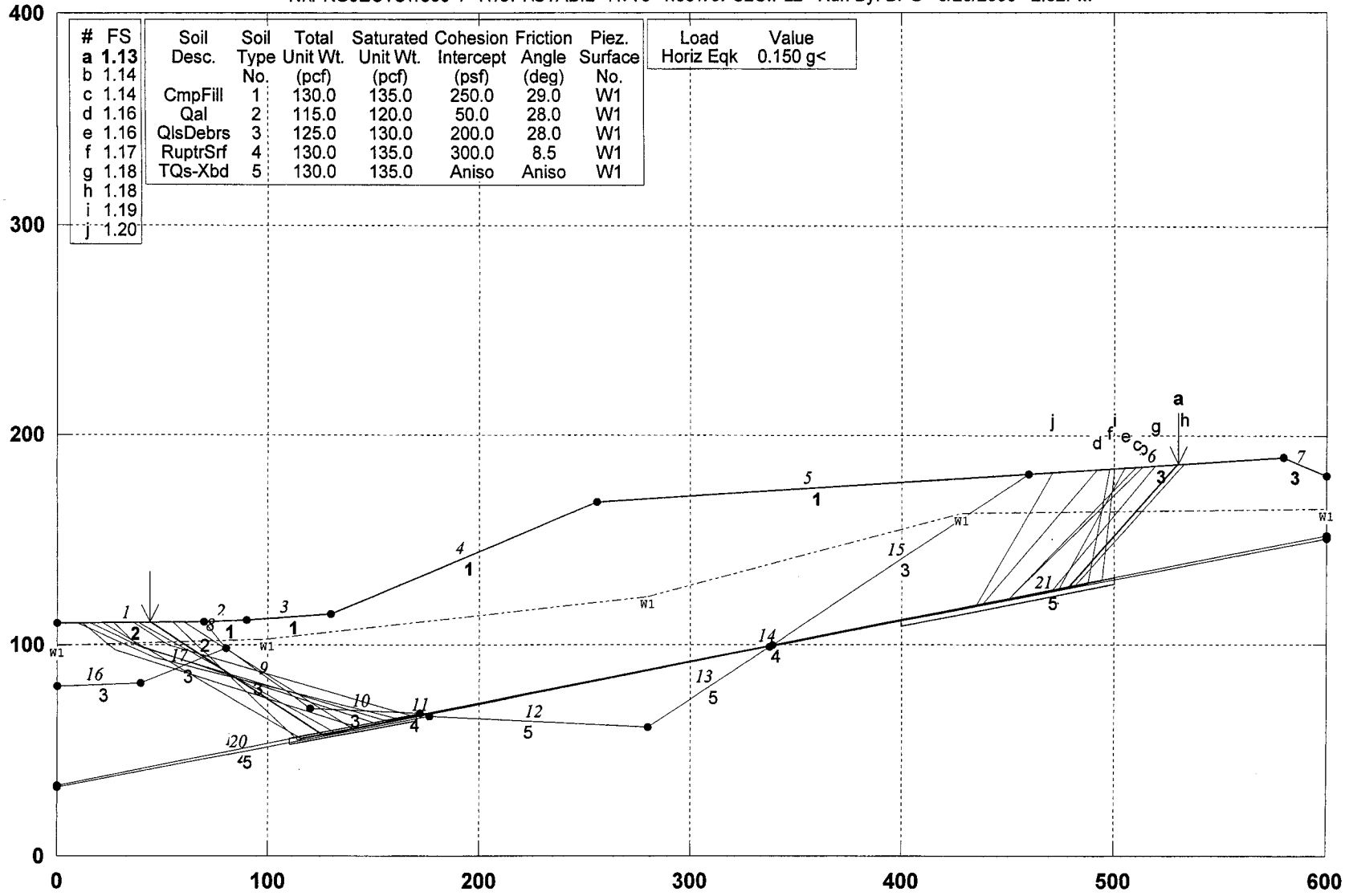
TT 53425; 9-9'; 150'W x 45'D Buttress + El 1268 Top Cut of Qls-5b; PseudoStatic

N:\PROJECTS\1500-1~1\1571\STABIL~1\TT3~1.03\T9PS2C.PL2 Run By: BPG 3/26/2003 2:02PM

#	FS
a	1.13
b	1.14
c	1.14
d	1.16
e	1.16
f	1.17
g	1.18
h	1.18
i	1.19
j	1.20

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
CmpFill	1	130.0	135.0	250.0	29.0	W1
Qal	2	115.0	120.0	50.0	28.0	W1
QlsDebrs	3	125.0	130.0	200.0	28.0	W1
RuptrSrf	4	130.0	135.0	300.0	8.5	W1
TQs-Xbd	5	130.0	135.0	Aniso	Aniso	W1

Load	Value
Horiz Eqk	0.150 g<



PCSTABL5M/si FSmin=1.13

Safety Factors Are Calculated By The Modified Janbu Method for the case of c & phi both > 0

STED

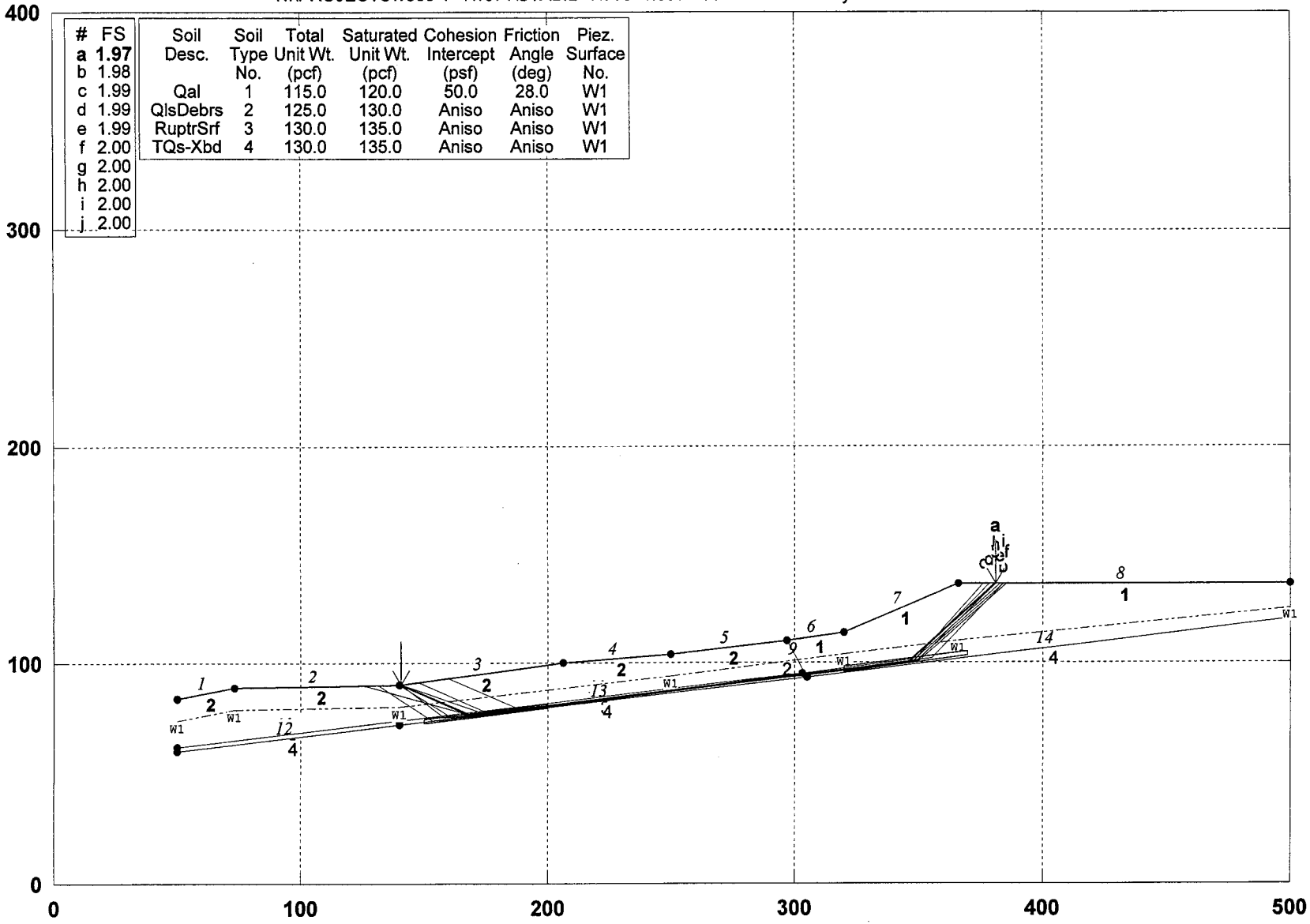
RUN #11

TT 53425; 10-10'; Qls-6 Slope from Newhall Ranch Rd into Park Site; Static

N:\PROJECTS\1500-1~1\1571\STABIL~1\TT3~1.03\T10S1A.PL2 Run By: BPG 3/26/2003 2:13PM

#	FS
a	1.97
b	1.98
c	1.99
d	1.99
e	1.99
f	2.00
g	2.00
h	2.00
i	2.00
j	2.00

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
Qal	1	115.0	120.0	50.0	28.0	W1
QlsDebrs	2	125.0	130.0	Aniso	Aniso	W1
RuptrSrf	3	130.0	135.0	Aniso	Aniso	W1
TQs-Xbd	4	130.0	135.0	Aniso	Aniso	W1



PCSTABL5M/si FSmin=1.97

Safety Factors Are Calculated By The Modified Janbu Method

STED

RUN #12

** PCSTABL5M **
by
Purdue University
--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer`s Method of Slices

Run Date: 3/26/2003
Time of Run: 2:13PM
Run By: BPG
Input Data Filename: N:t10s1a.in
Output Filename: N:t10s1a.OUT
Unit: ENGLISH
Plotted Output Filename: N:t10s1a.PLT
PROBLEM DESCRIPTION TT 53425; 10-10'; Qls-6 Slope from Newha
ll Ranch Rd into Park Site; Static

BOUNDARY COORDINATES
Note: User origin value specified.
Add 0.00 to X-values and 0.00 to Y-values listed.

8 Top Boundaries
14 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	50.00	84.00	73.00	89.00	2
2	73.00	89.00	140.00	90.00	2
3	140.00	90.00	206.00	100.00	2
4	206.00	100.00	250.00	104.00	2
5	250.00	104.00	297.00	110.00	2
6	297.00	110.00	320.00	114.00	1
7	320.00	114.00	366.00	136.00	1
8	366.00	136.00	500.00	136.00	1
9	297.00	110.00	305.00	93.00	2
10	50.00	62.00	140.00	73.60	3
11	140.00	73.60	303.00	95.00	3
12	50.00	60.00	140.00	71.60	4
13	140.00	71.60	305.00	93.00	4
14	305.00	93.00	500.00	120.10	4

ISOTROPIC SOIL PARAMETERS
4 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	115.0	120.0	50.0	28.0	.00	.0	1
2	125.0	130.0	100.0	26.0	.00	.0	1
3	130.0	135.0	300.0	8.5	.00	.0	1
4	130.0	135.0	400.0	38.0	.00	.0	1

ANISOTROPIC STRENGTH PARAMETERS
3 soil type(s)
Soil Type 2 Is Anisotropic
Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	9.0	100.0	26.0
2	11.0	450.0	19.0
3	90.0	100.0	26.0

Soil Type 3 Is Anisotropic
Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	7.5	200.0	24.0
2	8.5	300.0	8.5
3	90.0	200.0	24.0

Soil Type 4 Is Anisotropic
Number Of Direction Ranges Specified = 3

Direction	Counterclockwise	Cohesion	Friction

RUN #12

Range No.	Direction Limit (deg)	Intercept (psf)	Angle (deg)
1	9.5	400.0	38.0
2	10.5	450.0	19.0
3	90.0	400.0	38.0

1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED
Unit Weight of Water = 62.40
Piezometric Surface No. 1 Specified by 7 Coordinate Points

Point No.	X-Water (ft)	Y-Water (ft)
1	50.00	74.00
2	73.00	79.00
3	140.00	80.00
4	250.00	94.00
5	320.00	104.00
6	366.00	110.00
7	500.00	125.00

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Sliding Block Surfaces, Has Been Specified.
800 Trial Surfaces Have Been Generated.
2 Boxes Specified For Generation Of Central Block Base Length Of Line Segments For Active And Passive Portions Of Sliding Block Is 80.0

Box No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Height (ft)
1	150.00	73.29	200.00	80.24	2.00
2	320.00	96.92	370.00	103.87	2.00

Factor Of Safety Calculation Has Gone Through Ten Iterations
The Trial Failure Surface In Question Is Defined By The Following 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	153.07	91.98
2	174.53	77.58
3	366.68	102.89
4	366.84	136.00

Factor Of Safety For The Preceding Specified Surface = 3.903
Following Are Displayed The Ten Most Critical Of The Trial Failure Surfaces Examined. They Are Ordered - Most Critical First.
* * Safety Factors Are Calculated By The Modified Janbu Method * *
Failure Surface Specified By 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	140.42	90.06
2	168.36	76.35
3	346.24	100.02
4	381.45	136.00

*** 1.970 ***
Individual data on the 14 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	16.2	10530.9	.0	.0	.0	.0	.0	.0	.0
2	10.2	17559.7	.0	2208.9	.0	.0	.0	.0	.0
3	1.6	3460.6	.0	729.4	.0	.0	.0	.0	.0
4	37.6	87583.6	.0	16804.1	.0	.0	.0	.0	.0
5	44.0	99113.9	.0	18991.8	.0	.0	.0	.0	.0
6	47.0	99678.2	.0	20545.9	.0	.0	.0	.0	.0
7	4.1	8472.8	.0	1853.7	.0	.0	.0	.0	.0
8	1.9	3841.1	.0	866.2	.0	.0	.0	.0	.0
9	1.3	2619.1	.0	601.6	.0	.0	.0	.0	.0
10	15.7	31496.8	.0	7224.1	.0	.0	.0	.0	.0
11	26.2	67357.2	.0	12179.9	.0	.0	.0	.0	.0
12	8.3	23325.4	.0	2717.9	.0	.0	.0	.0	.0

RUN #12

13	11.5	24901.5	.0	.0	.0	.0	.0	.0	.0
14	15.4	14025.2	.0	.0	.0	.0	.0	.0	.0

RUN # 12

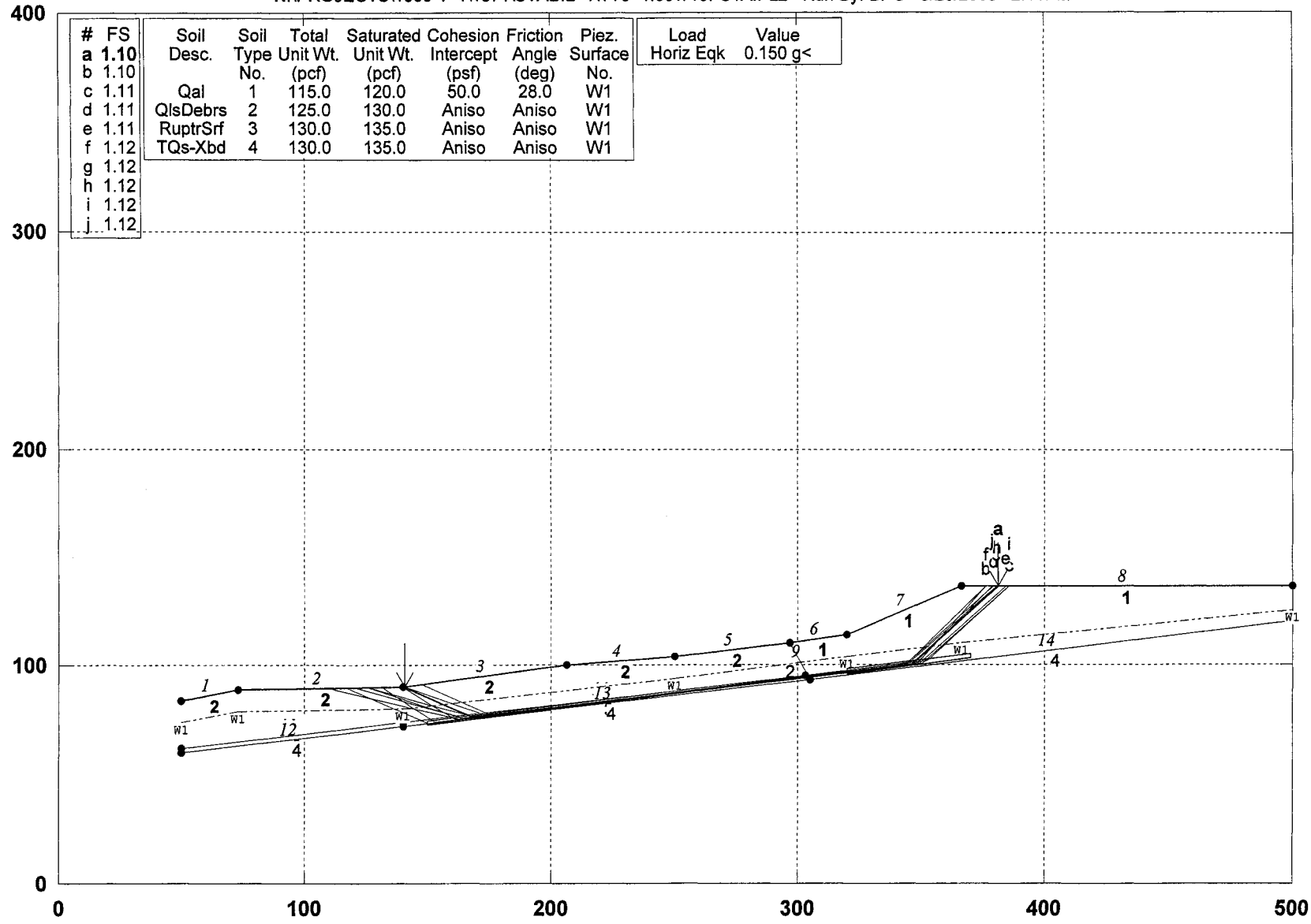
TT 53425; 10-10'; Qls-6 Slope from Newhall Ranch Rd into Park Site; PseudoStatic

N:\PROJECTS\1500-1~1\1571\STABIL~1\TT3~1.03\T10PS1A.PL2 Run By: BPG 3/26/2003 2:11PM

#	FS
a	1.10
b	1.10
c	1.11
d	1.11
e	1.11
f	1.12
g	1.12
h	1.12
i	1.12
j	1.12

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
Qal	1	115.0	120.0	50.0	28.0	W1
QlsDebrs	2	125.0	130.0	Aniso	Aniso	W1
RuptrSrf	3	130.0	135.0	Aniso	Aniso	W1
TQs-Xbd	4	130.0	135.0	Aniso	Aniso	W1

Load	Value
Horiz Eqk	0.150 g<



PCSTABL5M/si FSmin=1.10

Safety Factors Are Calculated By The Modified Janbu Method

STED

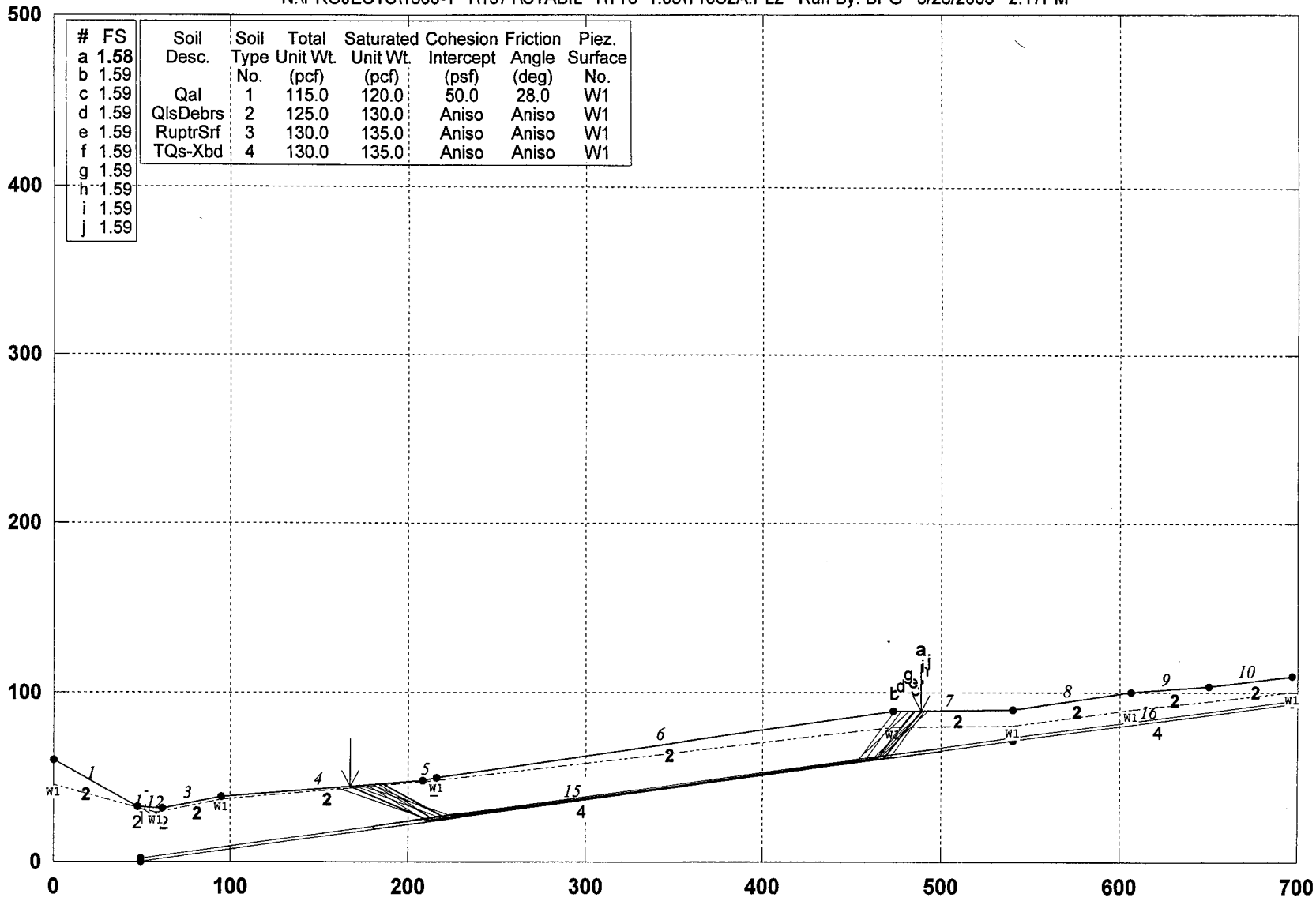
RUN #12

TT 53425; 10-10'; Qls-6 Slope thru Park into Canyon w Trail Cuts; Static

N:\PROJECTS\1500-1~1\1571\STABIL~1\TT3~1.03\T10S2A.PL2 Run By: BPG 3/26/2003 2:17PM

#	FS
a	**1.58**
b	1.59
c	1.59
d	1.59
e	1.59
f	1.59
g	1.59
h	1.59
i	1.59
j	1.59

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
Qal	1	115.0	120.0	50.0	28.0	W1
QlsDebrs	2	125.0	130.0	Aniso	Aniso	W1
RuptrSrf	3	130.0	135.0	Aniso	Aniso	W1
TQs-Xbd	4	130.0	135.0	Aniso	Aniso	W1



PCSTABL5M/si FSmin=1.58

Safety Factors Are Calculated By The Modified Janbu Method

STED

RUN #13

** PCSTABL5M **
by
Purdue University
--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer`s Method of Slices

Run Date: 3/26/2003
Time of Run: 2:17PM
Run By: BPG
Input Data Filename: N:t10s2a.in
Output Filename: N:t10s2a.OUT
Unit: ENGLISH
Plotted Output Filename: N:t10s2a.PLT
PROBLEM DESCRIPTION TT 53425; 10-10'; Qls-6 Slope thru Park into Canyon w Trail Cuts; Static

BOUNDARY COORDINATES
Note: User origin value specified.
Add 0.00 to X-values and 0.00 to Y-values listed.

10 Top Boundaries
16 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	.00	60.00	48.00	32.00	2
2	48.00	32.00	62.00	31.00	1
3	62.00	31.00	95.00	38.00	2
4	95.00	38.00	208.00	48.00	2
5	208.00	48.00	216.00	50.00	2
6	216.00	50.00	473.00	89.00	2
7	473.00	89.00	540.00	90.00	2
8	540.00	90.00	606.00	100.00	2
9	606.00	100.00	650.00	104.00	2
10	650.00	104.00	697.00	110.00	2
11	48.00	32.00	58.00	26.00	2
12	58.00	26.00	62.00	31.00	2
13	50.00	2.00	540.00	73.60	3
14	540.00	73.60	697.00	95.00	3
15	50.00	.00	540.00	71.60	4
16	540.00	71.60	697.00	93.00	4

ISOTROPIC SOIL PARAMETERS
4 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	115.0	120.0	50.0	28.0	.00	.0	1
2	125.0	130.0	100.0	26.0	.00	.0	1
3	130.0	135.0	300.0	8.5	.00	.0	1
4	130.0	135.0	334.0	49.0	.00	.0	1

ANISOTROPIC STRENGTH PARAMETERS
3 soil type(s)
Soil Type 2 Is Anisotropic
Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	9.0	100.0	26.0
2	11.0	450.0	19.0
3	90.0	100.0	26.0

Soil Type 3 Is Anisotropic
Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	7.5	200.0	28.0
2	8.5	300.0	8.5
3	90.0	200.0	28.0

Soil Type 4 Is Anisotropic

RUN #13

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	9.5	334.0	49.0
2	10.5	1982.0	24.3
3	90.0	334.0	49.0

1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED

Unit Weight of Water = 62.40

Piezometric Surface No. 1 Specified by 8 Coordinate Points

Point No.	X-Water (ft)	Y-Water (ft)
1	.00	45.00
2	58.00	29.00
3	95.00	37.00
4	216.00	48.00
5	473.00	79.00
6	540.00	80.00
7	606.00	90.00
8	697.00	100.00

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Sliding Block Surfaces, Has Been Specified.

800 Trial Surfaces Have Been Generated.

2 Boxes Specified For Generation Of Central Block Base Length Of Line Segments For Active And Passive Portions Of Sliding Block Is 80.0

Box No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Height (ft)
1	180.00	20.17	230.00	27.36	2.00
2	450.00	59.39	500.00	66.34	2.00

Following Are Displayed The Ten Most Critical Of The Trial Failure Surfaces Examined. They Are Ordered - Most Critical First.

* * Safety Factors Are Calculated By The Modified Janbu Method * *

Failure Surface Specified By 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	167.36	44.40
2	212.04	24.04
3	467.76	61.17
4	488.92	89.24

*** 1.583 ***

Individual data on the 10 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	1.5	77.6	.0	.0	.0	.0	.0	.0	.0
2	39.1	58177.9	.0	28576.7	.0	.0	.0	.0	.0
3	1.3	3885.1	.0	1968.8	.0	.0	.0	.0	.0
4	2.7	8467.7	.0	4237.4	.0	.0	.0	.0	.0
5	4.0	12955.2	.0	5840.4	.0	.0	.0	.0	.0
6	251.8	852377.8	.0	*******	.0	.0	.0	.0	.0
7	1.6	5324.4	.0	2658.1	.0	.0	.0	.0	.0
8	3.7	10746.9	.0	4916.2	.0	.0	.0	.0	.0
9	8.3	16235.9	.0	4677.3	.0	.0	.0	.0	.0
10	7.6	4765.4	.0	.0	.0	.0	.0	.0	.0

RUN #13

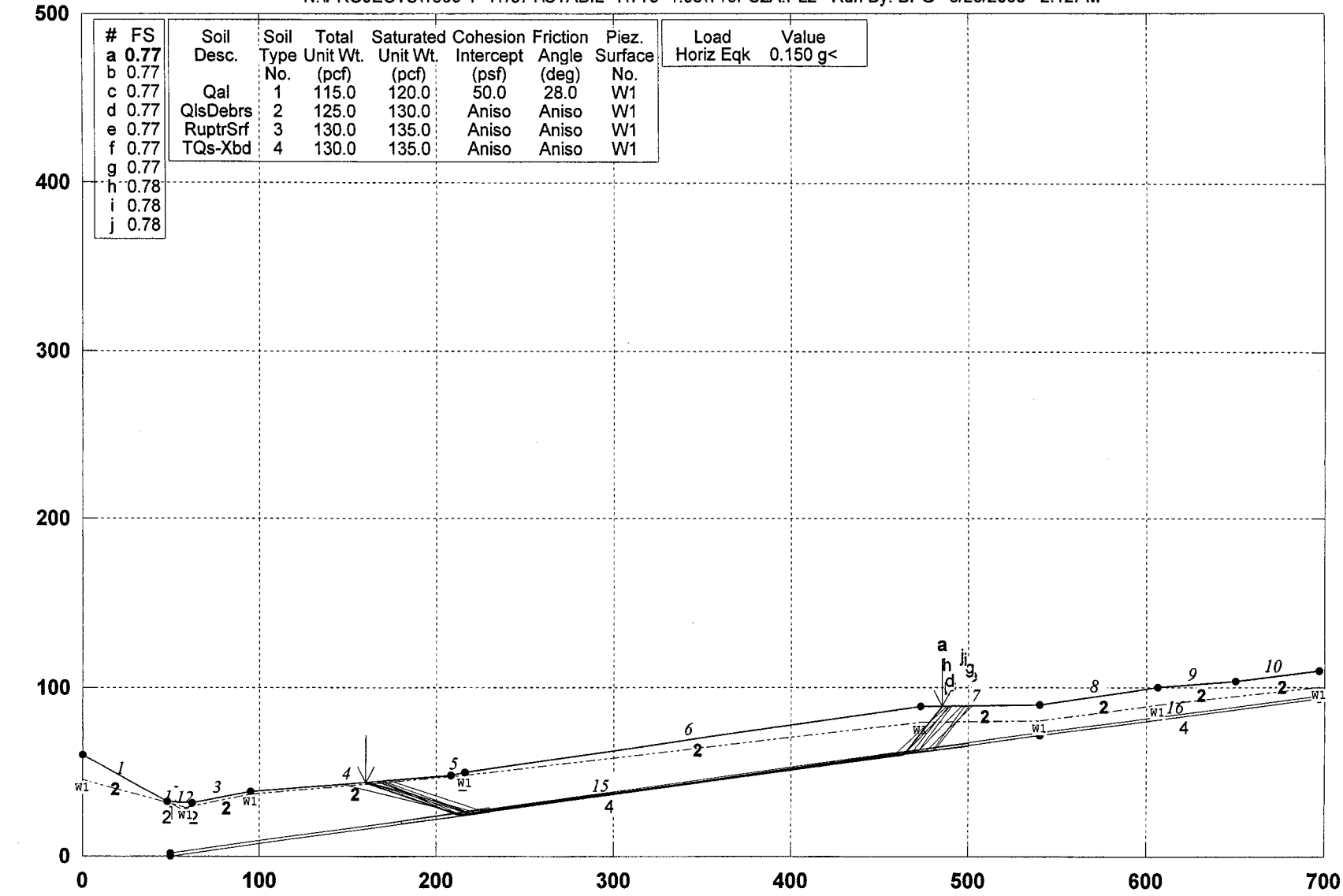
TT 53425; 10-10'; Qls-6 Slope into Canyon w Park Trail; Pseudo-Static

N:\PROJECTS\1500-1~1\1571\STABIL~1\TT3~1.03\T10PS2A.PL2 Run By: BPG 3/26/2003 2:12PM

#	FS
a	**0.77**
b	0.77
c	0.77
d	0.77
e	0.77
f	0.77
g	0.77
h	0.78
i	0.78
j	0.78

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
Qal	1	115.0	120.0	50.0	28.0	W1
QlsDebrs	2	125.0	130.0	Aniso	Aniso	W1
RuptrSrf	3	130.0	135.0	Aniso	Aniso	W1
TQs-Xbd	4	130.0	135.0	Aniso	Aniso	W1

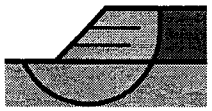
Load	Value
Horiz Eqk	0.150 g<



PCSTABL5M/si FSmin=0.77

Safety Factors Are Calculated By The Modified Janbu Method

STED



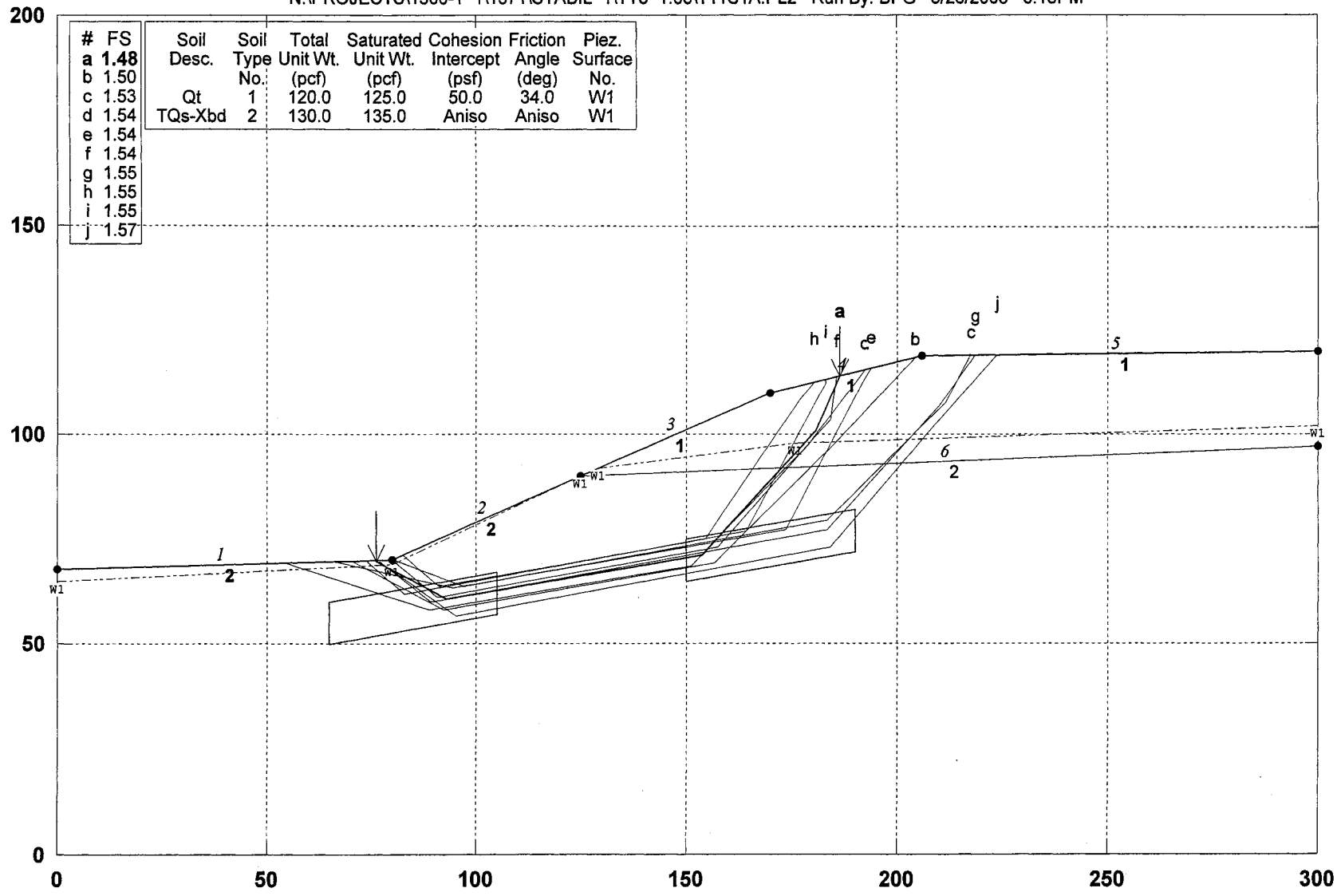
RUN #13

TT 53425; 11-11', CS-15; Qt/TQs Cut As Designed; Static

N:\PROJECTS\1500-1~1\1571\STABIL~1\TT3~1.03\T11S1A.PL2 Run By: BPG 3/26/2003 3:15PM

#	FS
a	**1.48**
b	1.50
c	1.53
d	1.54
e	1.54
f	1.54
g	1.55
h	1.55
i	1.55
j	1.57

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
Qt	1	120.0	125.0	50.0	34.0	W1
TQs-Xbd	2	130.0	135.0	Aniso	Aniso	W1



PCSTABL5M/si FSmin=1.48

Safety Factors Are Calculated By The Modified Janbu Method for the case of 1 soil type(s)

STED

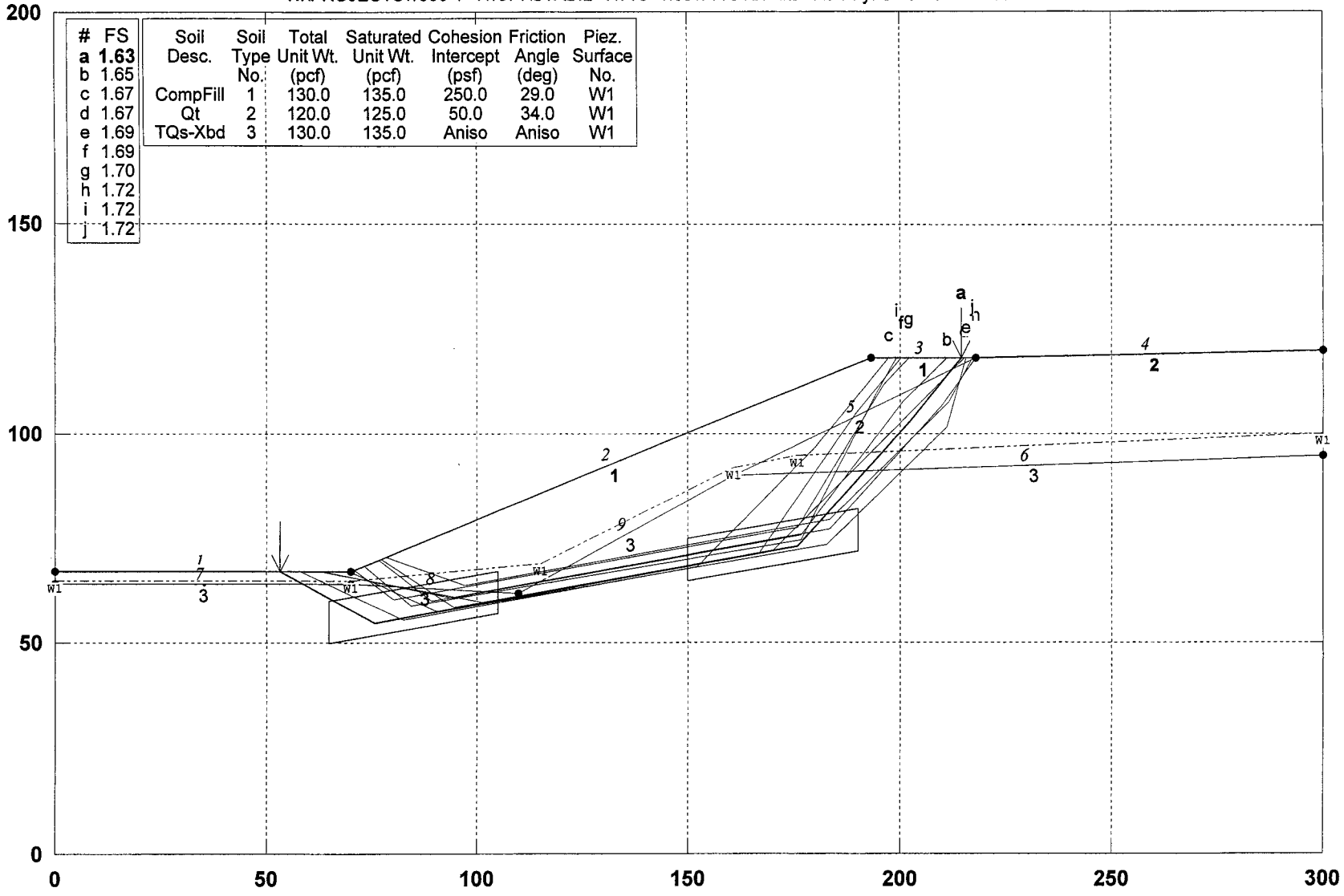
RUN # 14

TT 53425; 11-11', CS-15; Qt/TQs Cut w 40' Buttress; Static

N:\PROJECTS\1500-1~1\1571\STABIL~1\TT3~1.03\T11S1B.PL2 Run By: BPG 3/25/2003 5:52PM

#	FS
a	**1.63**
b	1.65
c	1.67
d	1.67
e	1.69
f	1.69
g	1.70
h	1.72
i	1.72
j	1.72

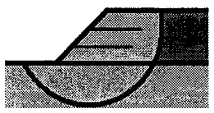
Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
CompFill	1	130.0	135.0	250.0	29.0	W1
Qt	2	120.0	125.0	50.0	34.0	W1
TQs-Xbd	3	130.0	135.0	Aniso	Aniso	W1



PCSTABL5M/si FSmin=1.63

Safety Factors Are Calculated By The Modified Janbu Method

STED



RUN #15

** PCSTABL5M **
by
Purdue University
--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer`s Method of Slices

Run Date: 3/25/2003
Time of Run: 5:52PM
Run By: BPG
Input Data Filename: N:t11s1b.in
Output Filename: N:t11s1b.OUT
Unit: ENGLISH
Plotted Output Filename: N:t11s1b.PLT
PROBLEM DESCRIPTION TT 53425; 11-11', CS-15; Qt/TQs Cut w 40 ' Buttress; Static

BOUNDARY COORDINATES
Note: User origin value specified.
Add 0.00 to X-values and 0.00 to Y-values listed.

4 Top Boundaries
9 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	.00	67.00	70.00	67.00	1
2	70.00	67.00	193.00	118.00	1
3	193.00	118.00	218.00	118.00	1
4	218.00	118.00	300.00	120.00	2
5	161.00	90.00	218.00	118.00	2
6	161.00	90.00	300.00	95.00	3
7	.00	64.00	70.00	64.00	3
8	70.00	64.00	110.00	62.00	3
9	110.00	62.00	161.00	90.00	3

ISOTROPIC SOIL PARAMETERS
3 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	130.0	135.0	250.0	29.0	.00	.0	1
2	120.0	125.0	50.0	34.0	.00	.0	1
3	130.0	135.0	400.0	38.0	.00	.0	1

ANISOTROPIC STRENGTH PARAMETERS
1 soil type(s)
Soil Type 3 Is Anisotropic
Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	9.5	400.0	38.0
2	10.5	450.0	19.0
3	90.0	400.0	38.0

1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED
Unit Weight of Water = 62.40
Piezometric Surface No. 1 Specified by 6 Coordinate Points

Point No.	X-Water (ft)	Y-Water (ft)
1	.00	65.00
2	70.00	65.00
3	115.00	69.00
4	161.00	92.00
5	176.00	95.00
6	300.00	100.00

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Sliding Block Surfaces, Has Been Specified.
400 Trial Surfaces Have Been Generated.
2 Boxes Specified For Generation Of Central Block Base
Length Of Line Segments For Active And Passive Portions Of

RUN #15

Sliding Block Is 40.0

Box No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Height (ft)
1	65.00	55.00	105.00	62.05	10.00
2	150.00	69.98	190.00	77.03	10.00

Factor Of Safety Calculation Has Gone Through Ten Iterations
The Trial Failure Surface In Question Is Defined
By The Following 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	67.19	67.00
2	88.16	59.49
3	156.03	72.51
4	156.91	103.03

Factor Of Safety For The Preceding Specified Surface = 4.774
Factor Of Safety Calculation Has Gone Through Ten Iterations
The Trial Failure Surface In Question Is Defined
By The Following 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	89.31	75.01
2	104.82	66.11
3	182.85	75.17
4	183.94	114.24

Factor Of Safety For The Preceding Specified Surface = 5.436
Factor Of Safety Calculation Has Gone Through Ten Iterations
The Trial Failure Surface In Question Is Defined
By The Following 5 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	83.58	72.63
2	94.69	61.53
3	185.99	72.35
4	186.47	112.34
5	186.69	115.38

Factor Of Safety For The Preceding Specified Surface = 6.142
Factor Of Safety Calculation Has Gone Through Ten Iterations
The Trial Failure Surface In Question Is Defined
By The Following 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	44.87	67.00
2	67.97	56.24
3	160.52	71.33
4	160.72	104.62

Factor Of Safety For The Preceding Specified Surface = 6.250
Factor Of Safety Calculation Has Gone Through Ten Iterations
The Trial Failure Surface In Question Is Defined
By The Following 5 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	48.51	67.00
2	48.65	66.86
3	87.47	57.20
4	176.98	72.48
5	177.12	111.41

Factor Of Safety For The Preceding Specified Surface = 3.355
Factor Of Safety Calculation Has Gone Through Ten Iterations
The Trial Failure Surface In Question Is Defined
By The Following 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	74.73	68.96
2	88.08	63.60
3	157.83	68.04
4	158.53	103.71

Factor Of Safety For The Preceding Specified Surface = 7.359

RUN # 15

Following Are Displayed The Ten Most Critical Of The Trial Failure Surfaces Examined. They Are Ordered - Most Critical First.

* * Safety Factors Are Calculated By The Modified Janbu Method * *

Failure Surface Specified By 5 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	53.11	67.00
2	75.77	54.77
3	176.06	73.24
4	202.47	103.28
5	214.49	118.00

*** 1.635 ***

Individual data on the 16 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	3.7	481.7	.0	.0	.0	.0	.0	.0	.0
2	1.9	606.7	.0	65.7	.0	.0	.0	.0	.0
3	11.3	9156.0	.0	3261.6	.0	.0	.0	.0	.0
4	5.8	9159.1	.0	3639.2	.0	.0	.0	.0	.0
5	34.2	84181.6	.0	19716.2	.0	.0	.0	.0	.0
6	5.0	15188.0	.0	2289.3	.0	.0	.0	.0	.0
7	46.0	176166.5	.0	37485.1	.0	.0	.0	.0	.0
8	6.9	31917.7	.0	9226.0	.0	.0	.0	.0	.0
9	8.1	39351.8	.0	10985.6	.0	.0	.0	.0	.0
10	.1	306.7	.0	85.6	.0	.0	.0	.0	.0
11	15.7	64852.4	.0	19498.2	.0	.0	.0	.0	.0
12	1.2	4009.8	.0	448.3	.0	.0	.0	.0	.0
13	2.9	8643.7	.0	434.4	.0	.0	.0	.0	.0
14	6.6	15172.0	.0	.0	.0	.0	.0	.0	.0
15	9.7	10719.3	.0	.0	.0	.0	.0	.0	.0
16	2.3	439.4	.0	.0	.0	.0	.0	.0	.0

RUN#15

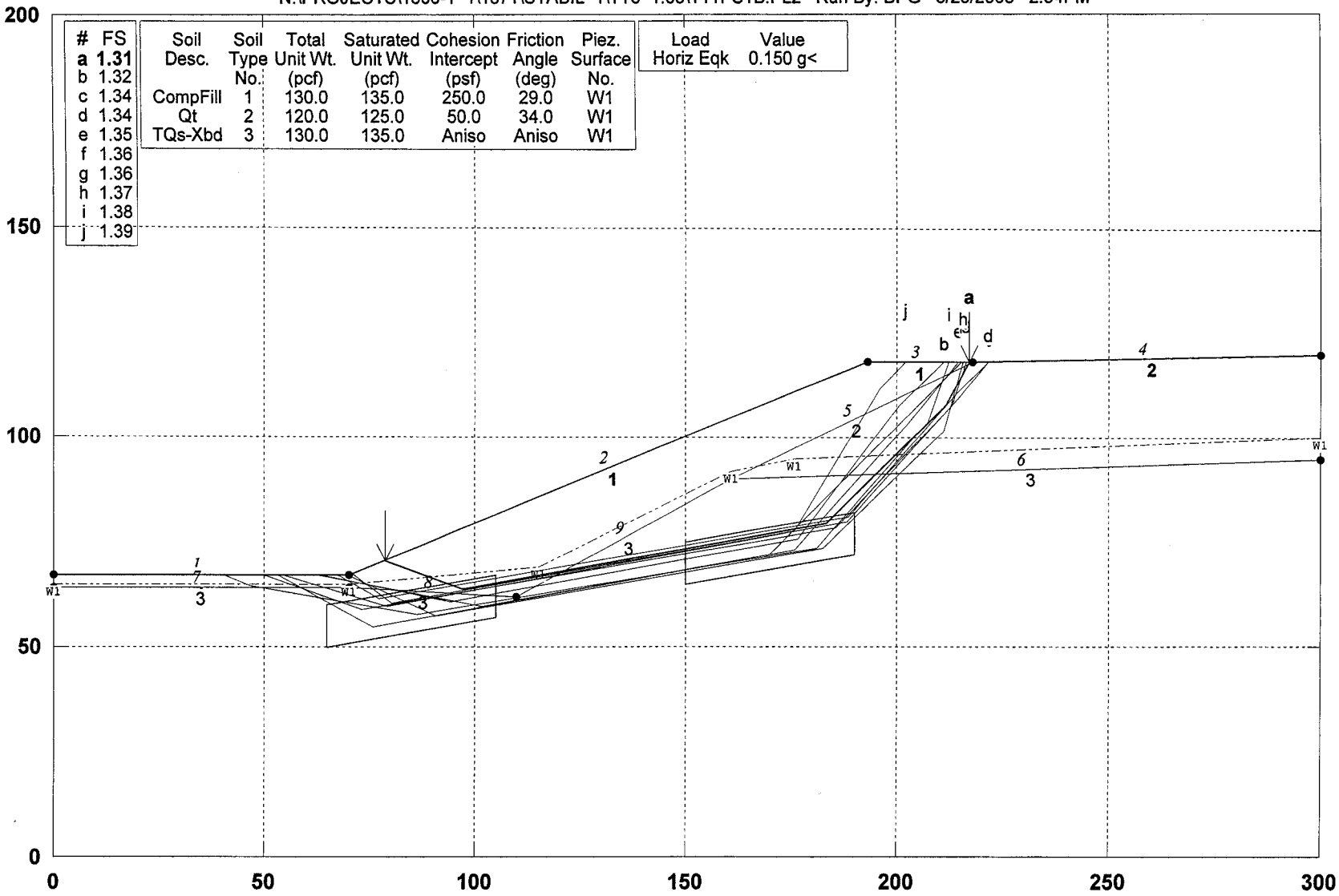
TT 53425; 11-11', CS-15; Qt/TQs Cut w 40' Buttress; PseudoStatic

N:\PROJECTS\1500-1~1\1571\STABIL~1\TT3~1.03\T11PS1B.PL2 Run By: BPG 3/25/2003 2:34PM

#	FS
a	**1.31**
b	1.32
c	1.34
d	1.34
e	1.35
f	1.36
g	1.36
h	1.37
i	1.38
j	1.39

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
CompFill	1	130.0	135.0	250.0	29.0	W1
Qt	2	120.0	125.0	50.0	34.0	W1
TQs-Xbd	3	130.0	135.0	Aniso	Aniso	W1

Load	Value
Horiz Eqk	0.150 g<



PCSTABL5M/si FSmin=1.31

Safety Factors Are Calculated By The Modified Janbu Method for the case of c & phi both > 0

STED

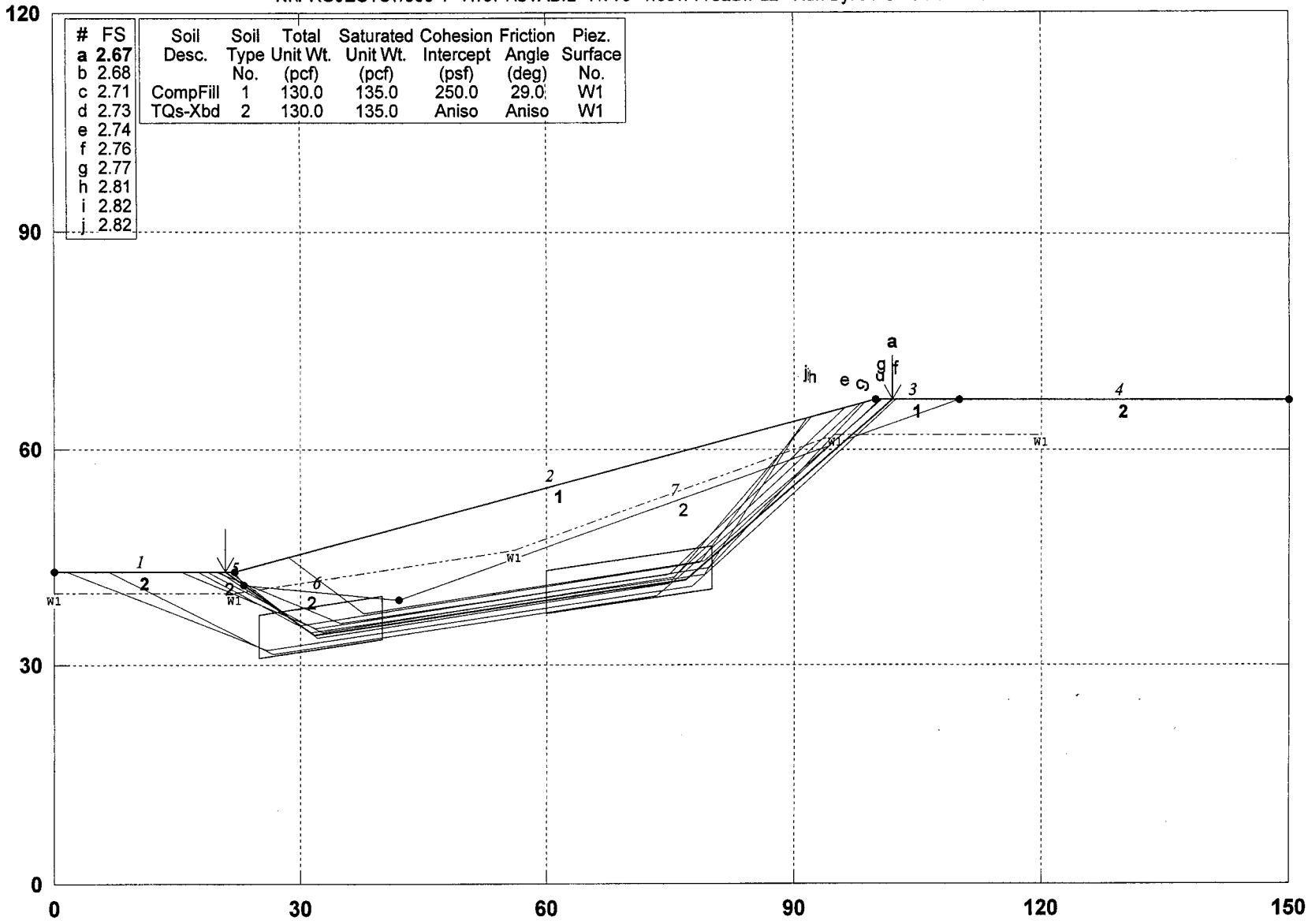
RUN #15

TT 53425; 11-11', CS-13 w 20' StabFill for TQs Cut BLo El 1367; Static

N:\PROJECTS\1500-1~1\1571\STABIL~1\TT3~1.03\T11S2B.PL2 Run By: BPG 3/26/2003 3:46PM

#	FS
a	**2.67**
b	2.68
c	2.71
d	2.73
e	2.74
f	2.76
g	2.77
h	2.81
i	2.82
j	2.82

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
CompFill	1	130.0	135.0	250.0	29.0	W1
TQs-Xbd	2	130.0	135.0	Aniso	Aniso	W1



PCSTABL5M/si FSmin=2.67

Safety Factors Are Calculated By The Modified Janbu Method

STED

RUN #1/2

** PCSTABL5M **
by
Purdue University
--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer`s Method of Slices

Run Date: 3/26/2003
Time of Run: 3:46PM
Run By: BPG
Input Data Filename: N:t11s2b.in
Output Filename: N:t11s2b.OUT
Unit: ENGLISH
Plotted Output Filename: N:t11s2b.PLT
PROBLEM DESCRIPTION TT 53425; 11-11', CS-13 w 20' StabFill f
or TQs Cut BLo El 1367; Static

BOUNDARY COORDINATES
Note: User origin value specified.
Add 0.00 to X-values and 0.00 to Y-values listed.

4 Top Boundaries
7 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	.00	43.00	22.00	43.00	2
2	22.00	43.00	100.00	67.00	1
3	100.00	67.00	110.00	67.00	1
4	110.00	67.00	150.00	67.00	2
5	22.00	43.00	23.00	41.00	2
6	23.00	41.00	42.00	39.00	2
7	42.00	39.00	110.00	67.00	2

ISOTROPIC SOIL PARAMETERS
2 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	130.0	135.0	250.0	29.0	.00	.0	1
2	130.0	135.0	400.0	38.0	.00	.0	1

ANISOTROPIC STRENGTH PARAMETERS
1 soil type(s)
Soil Type 2 Is Anisotropic
Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	9.5	400.0	38.0
2	10.5	450.0	19.0
3	90.0	400.0	38.0

1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED
Unit Weight of Water = 62.40
Piezometric Surface No. 1 Specified by 5 Coordinate Points

Point No.	X-Water (ft)	Y-Water (ft)
1	.00	40.00
2	22.00	40.00
3	56.00	46.00
4	95.00	62.00
5	120.00	62.00

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Sliding Block Surfaces, Has Been Specified.
400 Trial Surfaces Have Been Generated.
2 Boxes Specified For Generation Of Central Block Base
Length Of Line Segments For Active And Passive Portions Of Sliding Block Is 40.0

Box No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Height (ft)
1	25.00	33.88	40.00	36.53	6.00

RUN #16

2 60.00 40.05 80.00 43.58 6.00

Factor Of Safety Calculation Has Gone Through Ten Iterations
The Trial Failure Surface In Question Is Defined
By The Following 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	26.03	44.24
2	36.16	34.16
3	77.10	43.55
4	77.45	60.06

Factor Of Safety For The Preceding Specified Surface = 8.592
Factor Of Safety Calculation Has Gone Through Ten Iterations
The Trial Failure Surface In Question Is Defined
By The Following 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	20.54	43.00
2	32.45	36.41
3	75.98	43.94
4	76.49	59.77

Factor Of Safety For The Preceding Specified Surface = 6.120
Factor Of Safety Calculation Has Gone Through Ten Iterations
The Trial Failure Surface In Question Is Defined
By The Following 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	28.00	44.85
2	38.02	36.03
3	67.66	41.59
4	67.90	57.12

Factor Of Safety For The Preceding Specified Surface = 16.054
Factor Of Safety Calculation Has Gone Through Ten Iterations
The Trial Failure Surface In Question Is Defined
By The Following 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	13.18	43.00
2	33.69	35.66
3	63.02	41.46
4	63.42	55.75

Factor Of Safety For The Preceding Specified Surface = 10.748
Factor Of Safety Calculation Has Gone Through Ten Iterations
The Trial Failure Surface In Question Is Defined
By The Following 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	23.81	43.56
2	32.36	37.82
3	78.67	41.81
4	78.77	60.47

Factor Of Safety For The Preceding Specified Surface = 19.011
Factor Of Safety Calculation Has Gone Through Ten Iterations
The Trial Failure Surface In Question Is Defined
By The Following 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	19.69	43.00
2	28.65	34.07
3	77.55	42.20
4	77.84	60.18

Factor Of Safety For The Preceding Specified Surface = 9.280
Factor Of Safety Calculation Has Gone Through Ten Iterations
The Trial Failure Surface In Question Is Defined
By The Following 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	7.86	43.00

RUN #16

2	26.29	31.70
3	79.87	42.48
4	80.22	60.91

Factor Of Safety For The Preceding Specified Surface = 7.727
Factor Of Safety Calculation Has Gone Through Ten Iterations
The Trial Failure Surface In Question Is Defined
By The Following 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	16.24	43.00
2	33.83	35.32
3	78.52	40.55
4	79.23	60.61

Factor Of Safety For The Preceding Specified Surface = 8.326
Factor Of Safety Calculation Has Gone Through Ten Iterations
The Trial Failure Surface In Question Is Defined
By The Following 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	7.88	43.00
2	26.11	34.51
3	65.26	40.68
4	65.35	56.34

Factor Of Safety For The Preceding Specified Surface = 19.515
Factor Of Safety Calculation Has Gone Through Ten Iterations
The Trial Failure Surface In Question Is Defined
By The Following 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	14.73	43.00
2	33.63	34.60
3	64.81	42.03
4	64.96	56.22

Factor Of Safety For The Preceding Specified Surface = 13.073
Factor Of Safety Calculation Has Gone Through Ten Iterations
The Trial Failure Surface In Question Is Defined
By The Following 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	1.09	43.00
2	27.38	37.29
3	71.41	44.44
4	71.56	58.25

Factor Of Safety For The Preceding Specified Surface = 12.536
Factor Of Safety Calculation Has Gone Through Ten Iterations
The Trial Failure Surface In Question Is Defined
By The Following 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	22.45	43.14
2	30.50	35.94
3	68.11	40.24
4	68.29	57.24

Factor Of Safety For The Preceding Specified Surface = 18.382
Factor Of Safety Calculation Has Gone Through Ten Iterations
The Trial Failure Surface In Question Is Defined
By The Following 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	26.78	44.47
2	39.26	35.28
3	74.70	42.64
4	74.89	59.27

Factor Of Safety For The Preceding Specified Surface = 12.316
Following Are Displayed The Ten Most Critical Of The Trial Failure Surfaces Examined. They Are Ordered - Most Critical First.

RUN #16

* * Safety Factors Are Calculated By The Modified Janbu Method * *
Failure Surface Specified By 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	20.86	43.00
2	31.68	34.13
3	76.95	41.86
4	102.09	67.00
***	2.666	***

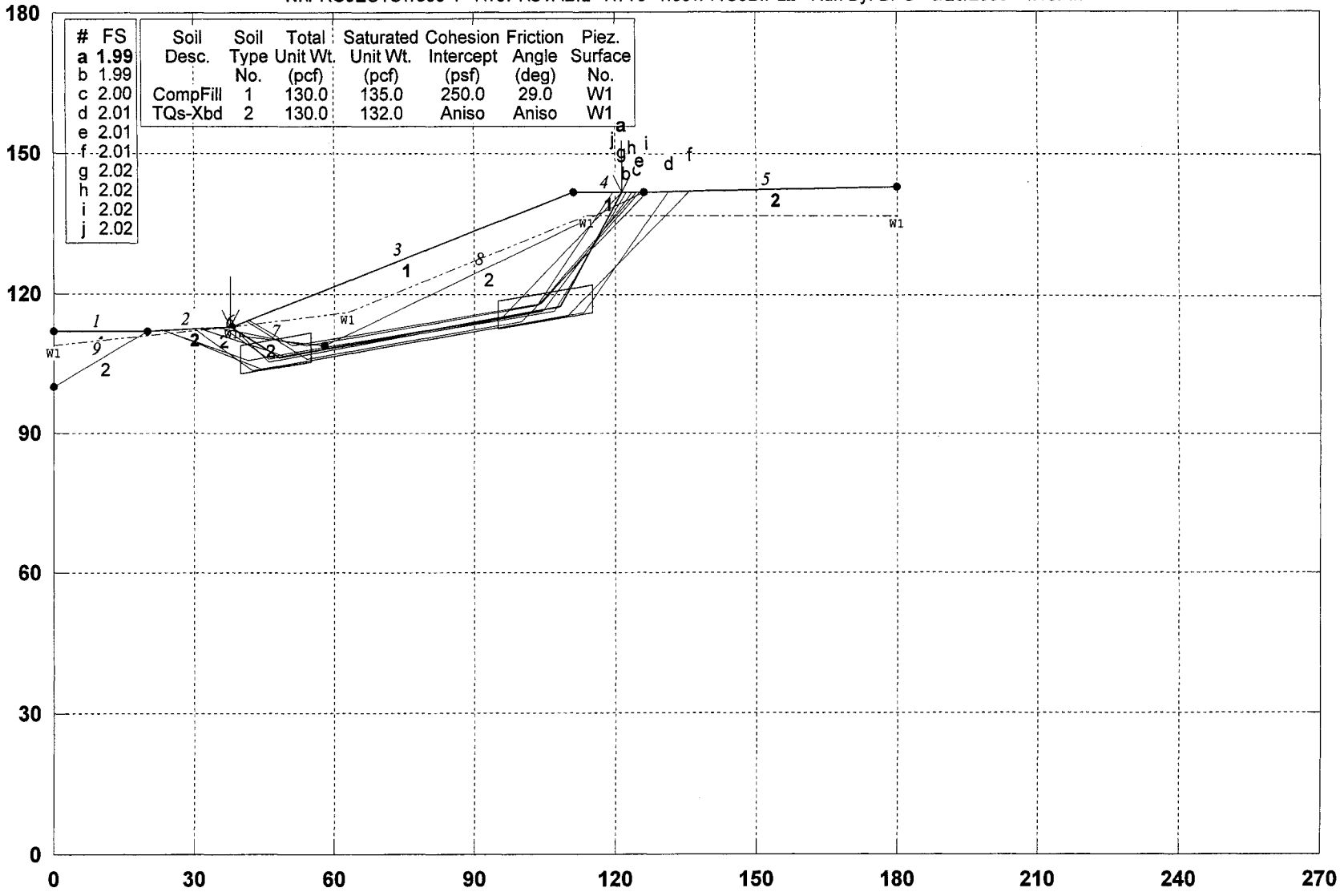
Individual data on the 14 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	1.1	69.8	.0	.0	.0	.0	.0	.0	.0
2	.8	143.3	.0	.0	.0	.0	.0	.0	.0
3	.5	151.4	.0	.0	.0	.0	.0	.0	.0
4	.7	271.7	.0	.0	.0	.0	.0	.0	.0
5	1.9	1048.4	.0	135.9	.0	.0	.0	.0	.0
6	5.8	6578.1	.0	2157.7	.0	.0	.0	.0	.0
7	10.3	17232.9	.0	4896.8	.0	.0	.0	.0	.0
8	14.0	26417.4	.0	6704.6	.0	.0	.0	.0	.0
9	20.9	46241.2	.0	12586.4	.0	.0	.0	.0	.0
10	18.1	28313.5	.0	10958.7	.0	.0	.0	.0	.0
11	1.5	1020.3	.0	179.6	.0	.0	.0	.0	.0
12	.5	300.9	.0	12.8	.0	.0	.0	.0	.0
13	2.9	1171.9	.0	.0	.0	.0	.0	.0	.0
14	2.1	283.3	.0	.0	.0	.0	.0	.0	.0

RUN #16

TT 53425; 11-11', CS-12; TQs Cut w 20' StabFill BLo El 1342; Static

N:\PROJECTS\1500-1~1\1571\STABIL~1\TT3~1.03\T11S3B.PL2 Run By: BPG 3/26/2003 4:15PM



PCSTABL5M/si FSmin=1.99

Safety Factors Are Calculated By The Modified Janbu Method

STED

RUN #17

** PCSTABL5M **
by
Purdue University
--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer`s Method of Slices

Run Date: 3/26/2003
Time of Run: 4:15PM
Run By: BPG
Input Data Filename: N:t11s3b.in
Output Filename: N:t11s3b.OUT
Unit: ENGLISH
Plotted Output Filename: N:t11s3b.PLT
PROBLEM DESCRIPTION TT 53425; 11-11', CS-12; TQs Cut w 20' S
tabFill BLo El 1342; Static

BOUNDARY COORDINATES
Note: User origin value specified.
Add 0.00 to X-values and 0.00 to Y-values listed.

5 Top Boundaries
9 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	.00	112.00	20.00	112.00	1
2	20.00	112.00	38.00	113.00	2
3	38.00	113.00	111.00	142.00	1
4	111.00	142.00	126.00	142.00	1
5	126.00	142.00	180.00	143.00	2
6	38.00	113.00	39.00	111.00	2
7	39.00	111.00	58.00	109.00	2
8	58.00	109.00	126.00	142.00	2
9	.00	100.00	20.00	112.00	2

ISOTROPIC SOIL PARAMETERS
2 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	130.0	135.0	250.0	29.0	.00	.0	1
2	130.0	132.0	400.0	38.0	.00	.0	1

ANISOTROPIC STRENGTH PARAMETERS
1 soil type(s)
Soil Type 2 Is Anisotropic
Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	9.5	400.0	38.0
2	10.5	450.0	19.0
3	90.0	400.0	38.0

1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED
Unit Weight of Water = 62.40
Piezometric Surface No. 1 Specified by 5 Coordinate Points

Point No.	X-Water (ft)	Y-Water (ft)
1	.00	109.00
2	38.00	113.00
3	63.00	116.00
4	114.00	137.00
5	180.00	137.00

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Sliding Block Surfaces, Has Been Specified.
400 Trial Surfaces Have Been Generated.
2 Boxes Specified For Generation Of Central Block Base
Length Of Line Segments For Active And Passive Portions Of Sliding Block Is 40.0

Box	X-Left	Y-Left	X-Right	Y-Right	Height

RUN #17

No.	(ft)	(ft)	(ft)	(ft)	(ft)
1	40.00	105.88	55.00	108.53	6.00
2	95.00	115.58	115.00	119.11	6.00

Factor Of Safety Calculation Has Gone Through Ten Iterations
The Trial Failure Surface In Question Is Defined
By The Following 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	36.77	112.93
2	43.65	106.07
3	112.55	117.73
4	112.95	142.00

Factor Of Safety For The Preceding Specified Surface = 3.511
Factor Of Safety Calculation Has Gone Through Ten Iterations
The Trial Failure Surface In Question Is Defined
By The Following 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	39.90	113.75
2	45.56	109.01
3	101.31	115.19
4	101.99	138.42

Factor Of Safety For The Preceding Specified Surface = 6.103
Factor Of Safety Calculation Has Gone Through Ten Iterations
The Trial Failure Surface In Question Is Defined
By The Following 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	46.40	116.34
2	54.28	110.81
3	108.80	120.88
4	109.22	141.29

Factor Of Safety For The Preceding Specified Surface = 3.967
Factor Of Safety Calculation Has Gone Through Ten Iterations
The Trial Failure Surface In Question Is Defined
By The Following 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	33.28	112.74
2	44.60	107.32
3	95.74	114.68
4	96.29	136.16

Factor Of Safety For The Preceding Specified Surface = 6.185
Factor Of Safety Calculation Has Gone Through Ten Iterations
The Trial Failure Surface In Question Is Defined
By The Following 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	39.01	113.40
2	44.86	107.78
3	100.49	118.53
4	100.56	137.85

Factor Of Safety For The Preceding Specified Surface = 6.628
Factor Of Safety Calculation Has Gone Through Ten Iterations
The Trial Failure Surface In Question Is Defined
By The Following 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	18.64	112.00
2	42.35	105.75
3	107.30	117.25
4	107.35	140.55

Factor Of Safety For The Preceding Specified Surface = 4.296
Factor Of Safety Calculation Has Gone Through Ten Iterations
The Trial Failure Surface In Question Is Defined
By The Following 4 Coordinate Points

Point	X-Surf	Y-Surf

RUN #17

No.	(ft)	(ft)
1	42.40	114.75
2	52.40	105.41
3	99.14	116.60
4	99.50	137.43

Factor Of Safety For The Preceding Specified Surface = 5.775

Following Are Displayed The Ten Most Critical Of The Trial Failure Surfaces Examined. They Are Ordered - Most Critical First.

* * Safety Factors Are Calculated By The Modified Janbu Method * *

Failure Surface Specified By 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	37.79	112.99
2	48.03	106.18
3	108.23	117.19
4	121.46	142.00

*** 1.989 ***

Individual data on the 14 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	.0	.0	.0	.0	.0	.0	.0	.0	.0
2	.2	2.1	.0	1.1	.0	.0	.0	.0	.0
3	.1	3.3	.0	1.7	.0	.0	.0	.0	.0
4	3.0	748.4	.0	316.5	.0	.0	.0	.0	.0
5	6.9	6552.2	.0	2731.6	.0	.0	.0	.0	.0
6	10.0	15701.7	.0	4843.0	.0	.0	.0	.0	.0
7	5.0	8913.3	.0	2279.5	.0	.0	.0	.0	.0
8	45.2	112200.2	.0	32617.8	.0	.0	.0	.0	.0
9	2.8	7876.0	.0	5247.3	.0	.0	.0	.0	.0
10	3.0	6615.6	.0	4127.2	.0	.0	.0	.0	.0
11	1.7	2761.8	.0	1664.6	.0	.0	.0	.0	.0
12	3.1	3197.1	.0	1191.2	.0	.0	.0	.0	.0
13	1.1	559.9	.0	.0	.0	.0	.0	.0	.0
14	1.6	306.5	.0	.0	.0	.0	.0	.0	.0

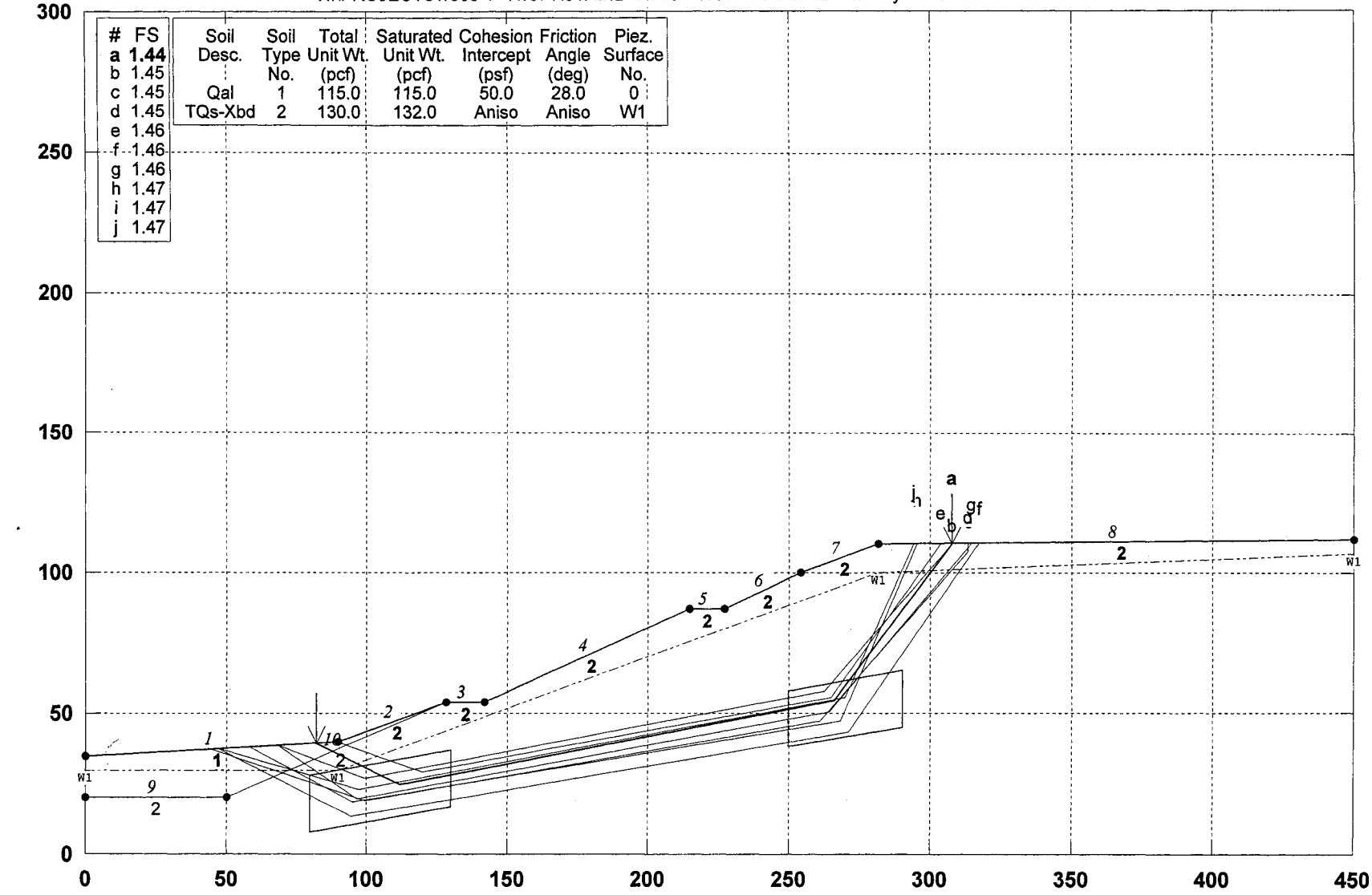
RUN #17

TT 53425; 11-11', CS-11; Design TQs Cut BLo Elev 1310; Static

N:\PROJECTS\1500-1~1\1571\STABIL~1\TT3~1.03\T11S4A.PL2 Run By: BPG 3/25/2003 5:27PM

#	FS
a	1.44
b	1.45
c	1.45
d	1.45
e	1.46
f	1.46
g	1.46
h	1.47
i	1.47
j	1.47

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
Qal	1	115.0	115.0	50.0	28.0	0
TQs-Xbd	2	130.0	132.0	Aniso	Aniso	W1



PCSTABL5M/si FSmin=1.44

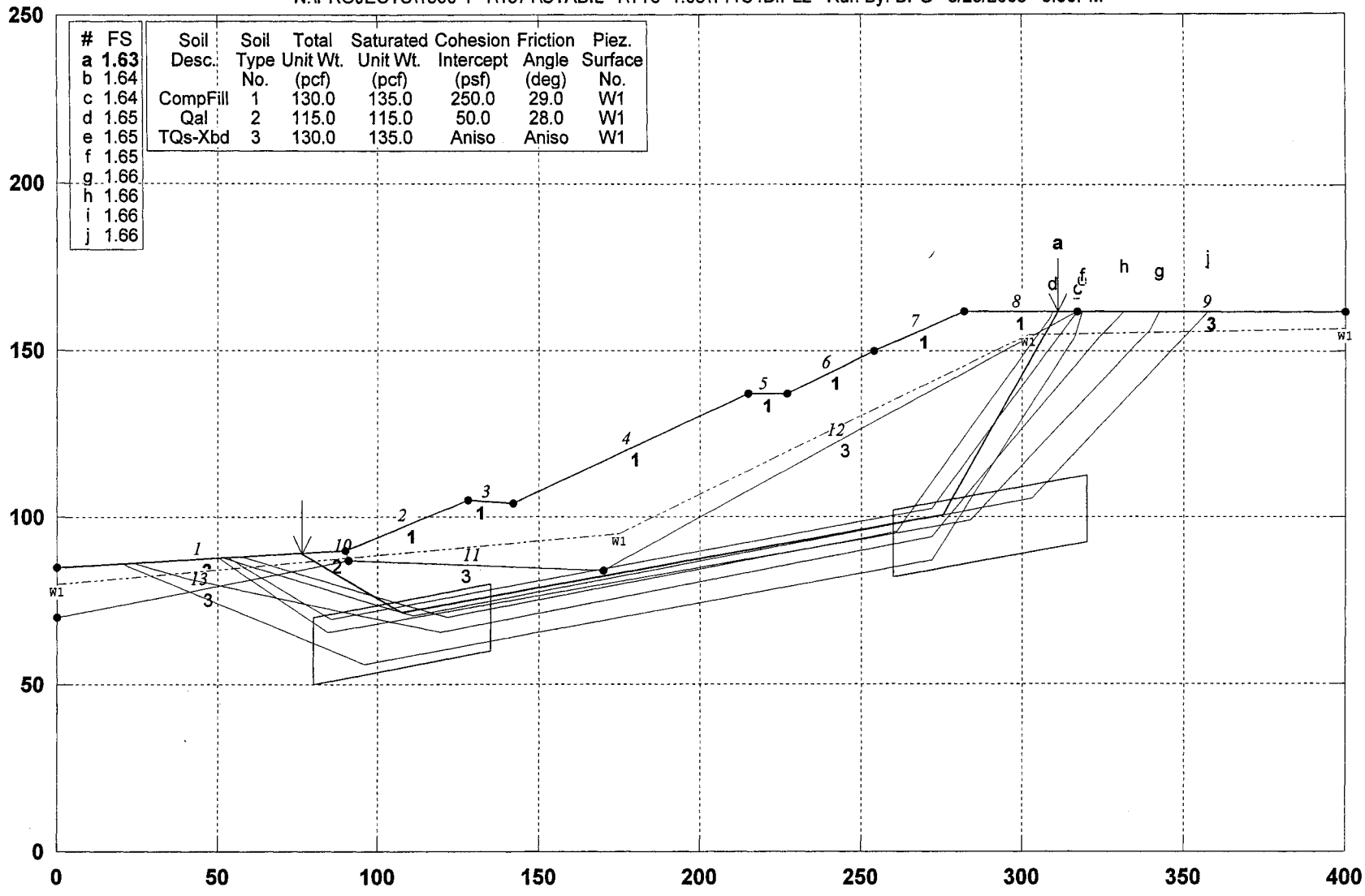
Safety Factors Are Calculated By The Modified Janbu Method

STED

RUN #18

TT 53425, 11-11', CS-11 w 80' Buttress for TQs Cut BLo Elev 1310; Static

N:\PROJECTS\1500-1~1\1571\STABIL~1\TT3~1.03\T11S4B.PL2 Run By: BPG 3/25/2003 5:30PM



PCSTABL5M/si FSmin=1.63

Safety Factors Are Calculated By The Modified Janbu Method for the case of c & phi both > 0

STED

RUN #19

** PCSTABL5M **
by
Purdue University
--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer`s Method of Slices

Run Date: 3/25/2003
Time of Run: 5:30PM
Run By: BPG
Input Data Filename: N:t11s4b.in
Output Filename: N:t11s4b.OUT
Unit: ENGLISH
Plotted Output Filename: N:t11s4b.PLT
PROBLEM DESCRIPTION TT 53425, 11-11', CS-11 w 80' Buttress
for TQs Cut BLo Elev 1310; Static

BOUNDARY COORDINATES
Note: User origin value specified.
Add 0.00 to X-values and 0.00 to Y-values listed.

9 Top Boundaries
13 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	.00	85.00	90.00	90.00	2
2	90.00	90.00	128.00	105.00	1
3	128.00	105.00	142.00	104.00	1
4	142.00	104.00	215.00	137.00	1
5	215.00	137.00	227.00	137.00	1
6	227.00	137.00	254.00	150.00	1
7	254.00	150.00	282.00	162.00	1
8	282.00	162.00	317.00	162.00	1
9	317.00	162.00	400.00	162.00	3
10	90.00	90.00	91.00	87.00	2
11	91.00	87.00	170.00	84.00	3
12	170.00	84.00	317.00	162.00	3
13	.00	70.00	91.00	87.00	3

ISOTROPIC SOIL PARAMETERS
3 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	130.0	135.0	250.0	29.0	.00	.0	1
2	115.0	115.0	50.0	28.0	.00	.0	1
3	130.0	135.0	400.0	38.0	.00	.0	1

ANISOTROPIC STRENGTH PARAMETERS
1 soil type(s)
Soil Type 3 Is Anisotropic
Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	9.5	400.0	38.0
2	10.5	450.0	19.0
3	90.0	400.0	38.0

1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED
Unit Weight of Water = 62.40
Piezometric Surface No. 1 Specified by 4 Coordinate Points

Point No.	X-Water (ft)	Y-Water (ft)
1	.00	80.00
2	175.00	95.00
3	302.00	155.00
4	400.00	157.00

Janbus Empirical Coef is being used for the case of c & phi both > 0
A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Sliding Block Surfaces, Has Been
Specified.

RUN #19

800 Trial Surfaces Have Been Generated.
2 Boxes Specified For Generation Of Central Block Base
Length Of Line Segments For Active And Passive Portions Of
Sliding Block Is 80.0

Box No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Height (ft)
1	80.00	60.13	135.00	69.82	20.00
2	260.00	91.86	320.00	102.44	20.00

Factor Of Safety Calculation Has Gone Through Ten Iterations
The Trial Failure Surface In Question Is Defined
By The Following 5 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	14.03	85.78
2	22.81	77.10
3	100.84	59.45
4	275.32	86.53
5	275.72	159.31

Factor Of Safety For The Preceding Specified Surface = 4.770
Following Are Displayed The Ten Most Critical Of The Trial Failure Surfaces Examined. They Are Ordered - Most Critical First.
* * Safety Factors Are Calculated By The Modified Janbu Method * *
Failure Surface Specified By 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	76.30	89.24
2	107.70	71.69
3	275.66	100.39
4	310.81	162.00

*** 1.628 ***

Individual data on the 20 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	4.2	619.3	.0	.0	.0	.0	.0	.0	.0
2	2.5	959.5	.0	143.3	.0	.0	.0	.0	.0
3	7.0	5420.1	.0	1934.6	.0	.0	.0	.0	.0
4	.7	842.8	.0	336.2	.0	.0	.0	.0	.0
5	.3	318.2	.0	123.6	.0	.0	.0	.0	.0
6	16.7	38641.8	.0	14462.8	.0	.0	.0	.0	.0
7	20.3	74450.9	.0	21356.8	.0	.0	.0	.0	.0
8	14.0	52287.0	.0	13437.5	.0	.0	.0	.0	.0
9	28.0	112478.3	.0	23715.9	.0	.0	.0	.0	.0
10	5.0	23065.9	.0	3791.8	.0	.0	.0	.0	.0
11	40.0	218270.0	.0	41055.6	.0	.0	.0	.0	.0
12	12.0	73081.2	.0	17729.2	.0	.0	.0	.0	.0
13	27.0	176272.5	.0	49024.4	.0	.0	.0	.0	.0
14	21.7	161761.2	.0	48459.6	.0	.0	.0	.0	.0
15	6.3	46205.7	.0	27661.0	.0	.0	.0	.0	.0
16	20.0	87634.7	.0	48605.6	.0	.0	.0	.0	.0
17	1.9	3434.1	.0	1611.4	.0	.0	.0	.0	.0
18	3.0	3740.4	.0	975.1	.0	.0	.0	.0	.0
19	1.2	942.5	.0	.0	.0	.0	.0	.0	.0
20	2.7	823.6	.0	.0	.0	.0	.0	.0	.0

RUN #19

TT 53425, 11-11', CS-11 w 80' Buttress for TQs Cut BLo Elev 1310; PseudoStatic

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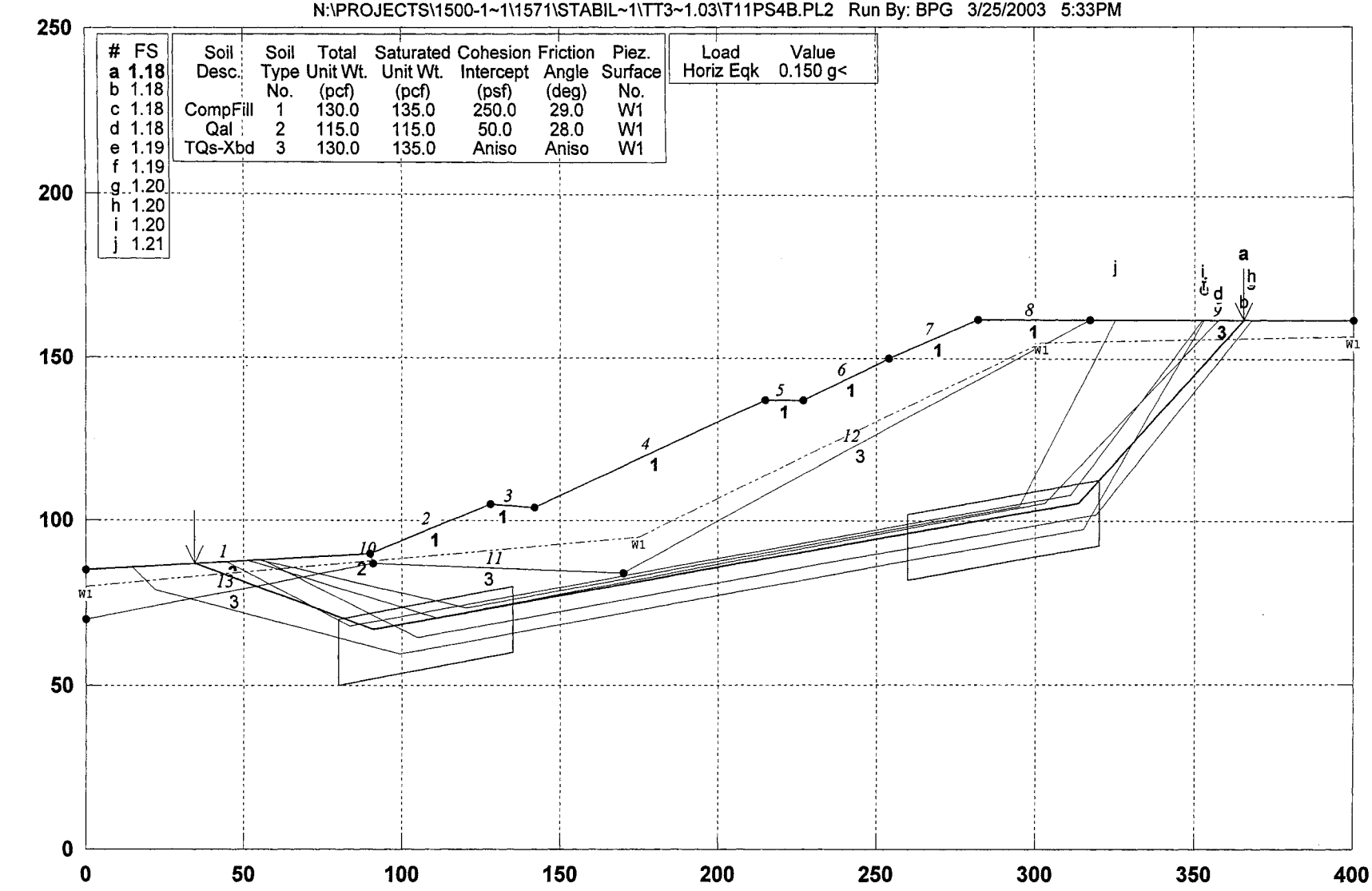


PCSTABL5M/si FSmin=1.18

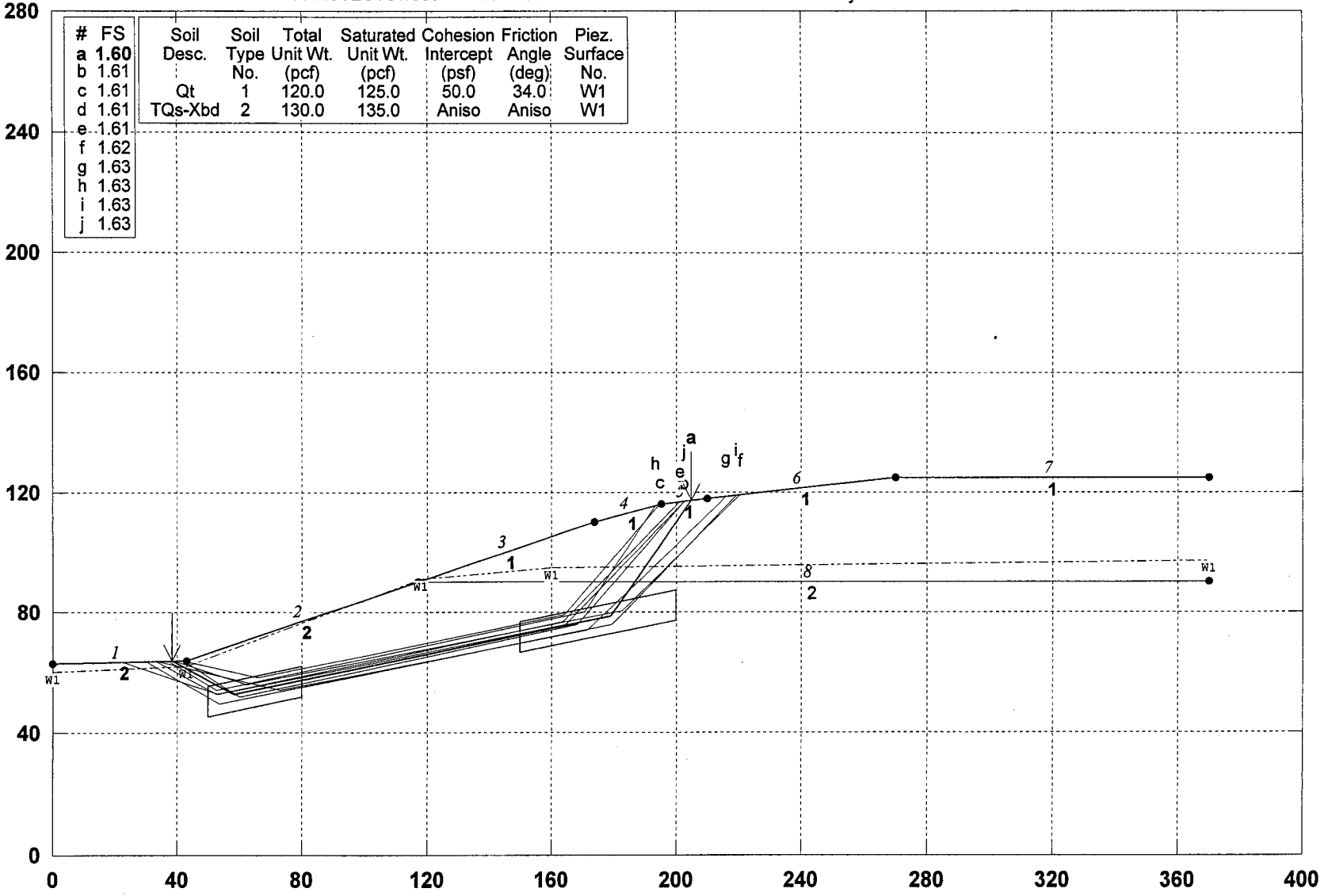
Safety Factors Are Calculated By The Modified Janbu Method for the case of c & phi both > 0

STED

RUN #19

River Park, TT 53425; 12-12', CS-15; Qt/TQs Cut As Designed; Static

N:\PROJECTS\1500-1~1\1571\STABIL~1\TT3~1.03\T12S1A.PL2 Run By: BPG 3/26/2003 2:44PM



PCSTABL5M/si FSmin=1.60

Safety Factors Are Calculated By The Modified Janbu Method

STED

RUN #20

River Park, TT 53425; 12-12', CS-15; Qt/TQs Cut As Designed; PseudoStatic

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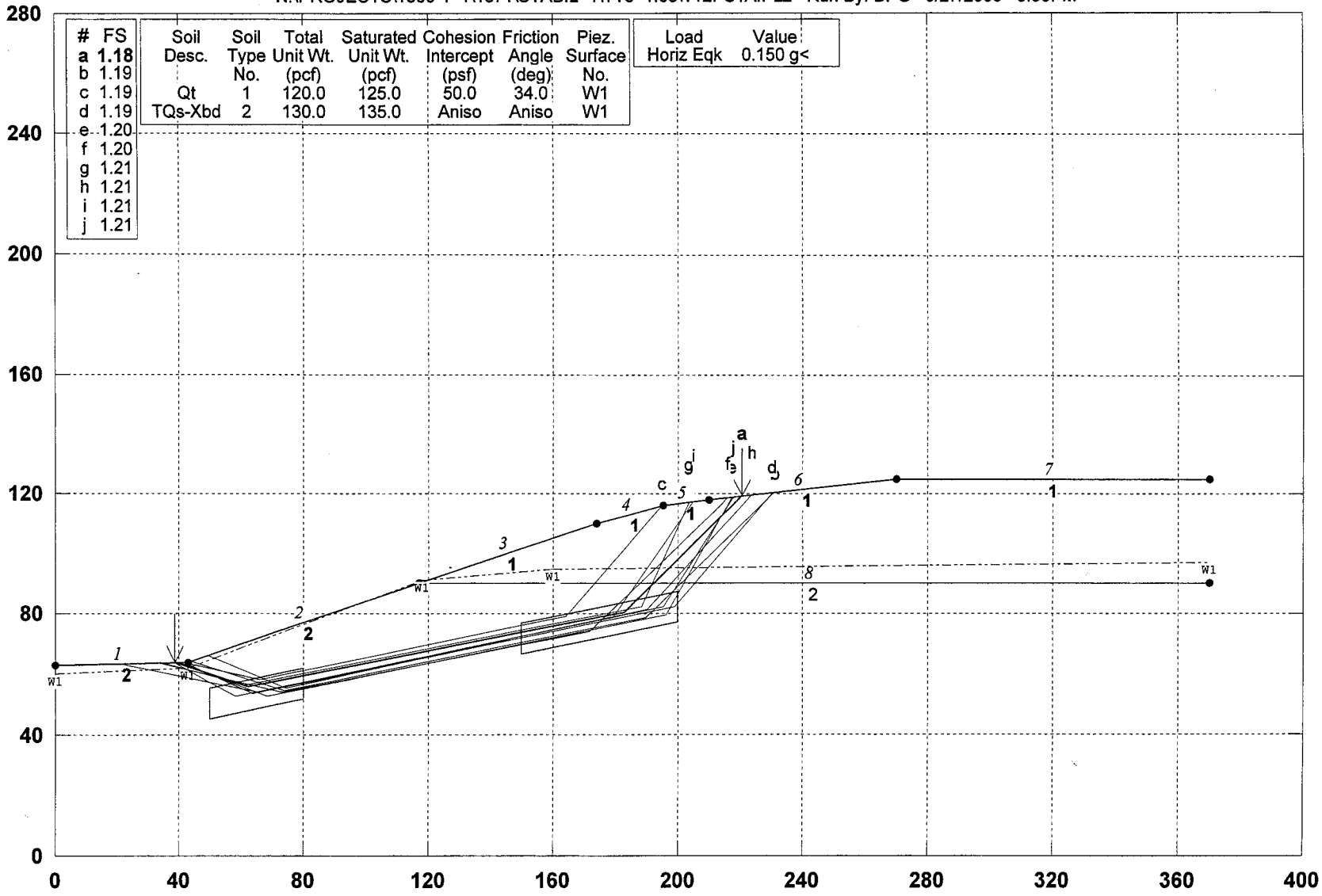


PCSTABL5M/si FSmin=1.18

Safety Factors Are Calculated By The Modified Janbu Method

STED

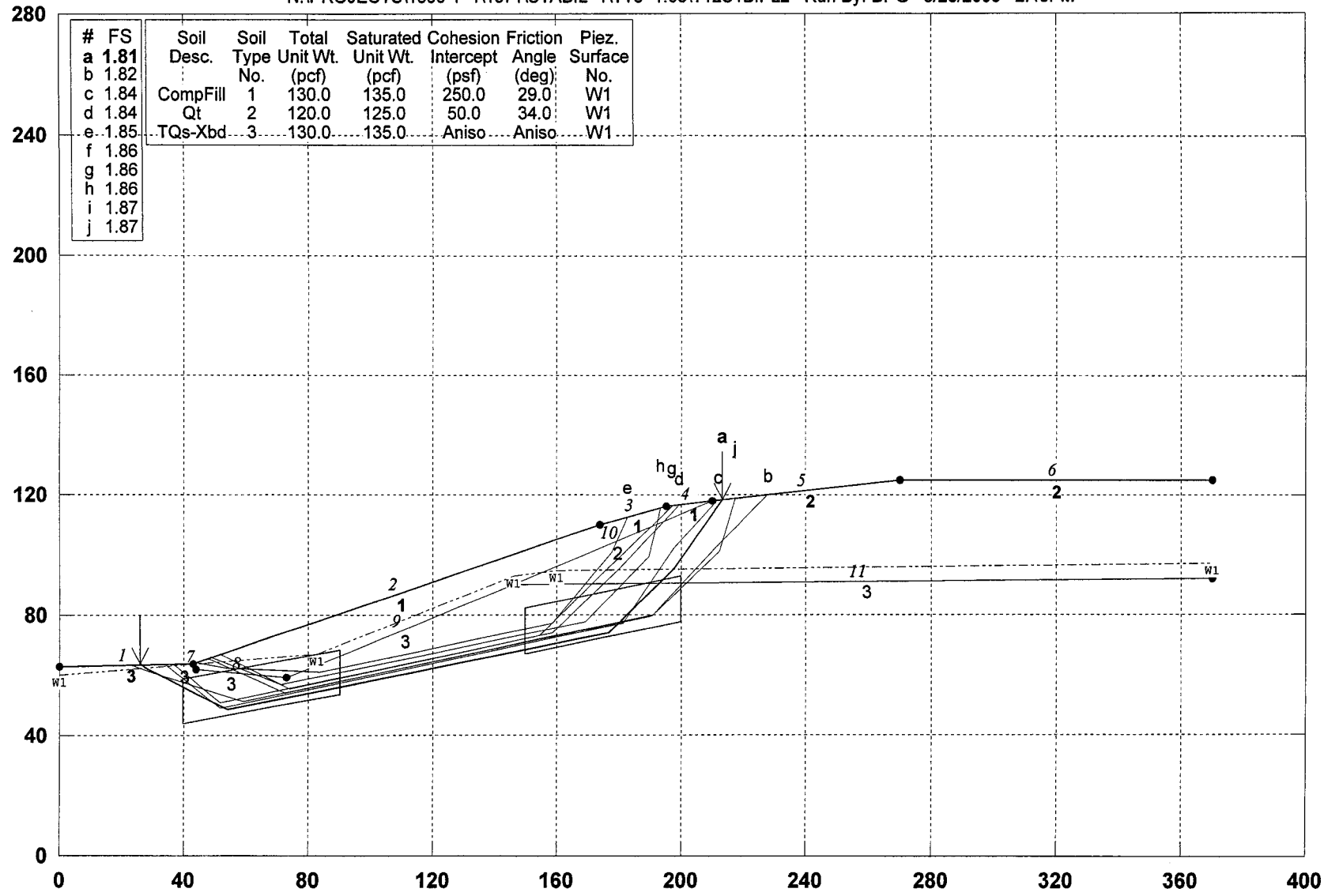
RUN #20

River Park, TT 53425, 12-12', CS-15; Qt/TQs Cut w 30' Stab Fill; Static

N:\PROJECTS\1500-1~1\1571\STABIL~1\TT3~1.03\T12S1B.PL2 Run By: BPG 3/26/2003 2:48PM

#	FS
a	1.81
b	1.82
c	1.84
d	1.84
e	1.85
f	1.86
g	1.86
h	1.86
i	1.87
j	1.87

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
CompFill	1	130.0	135.0	250.0	29.0	W1
Qt	2	120.0	125.0	50.0	34.0	W1
TQs-Xbd	3	130.0	135.0	Aniso	Aniso	W1



PCSTABL5M/si FSmin=1.81

Safety Factors Are Calculated By The Modified Janbu Method for the case of c & phi both > 0

STED

RUN #21

** PCSTABL5M **
by
Purdue University
--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer`s Method of Slices

Run Date: 3/26/2003
Time of Run: 2:48PM
Run By: BPG
Input Data Filename: N:t12s1b.in
Output Filename: N:t12s1b.OUT
Unit: ENGLISH
Plotted Output Filename: N:t12s1b.PLT
PROBLEM DESCRIPTION River Park, TT 53425, 12-12', CS-15; Qt/ TQs Cut w 30' Stab Fill; Static

BOUNDARY COORDINATES
Note: User origin value specified.
Add 0.00 to X-values and 0.00 to Y-values listed.

6 Top Boundaries
11 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	.00	63.00	43.00	64.00	3
2	43.00	64.00	174.00	110.00	1
3	174.00	110.00	195.00	116.00	1
4	195.00	116.00	210.00	118.00	1
5	210.00	118.00	270.00	125.00	2
6	270.00	125.00	370.00	125.00	2
7	43.00	64.00	44.00	62.00	3
8	44.00	62.00	73.00	59.00	3
9	73.00	59.00	146.20	90.00	3
10	146.20	90.00	210.00	118.00	2
11	146.20	90.00	370.00	92.00	3

ISOTROPIC SOIL PARAMETERS
3 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	130.0	135.0	250.0	29.0	.00	.0	1
2	120.0	125.0	50.0	34.0	.00	.0	1
3	130.0	135.0	400.0	38.0	.00	.0	1

ANISOTROPIC STRENGTH PARAMETERS
1 soil type(s)
Soil Type 3 Is Anisotropic
Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	11.5	400.0	38.0
2	12.5	450.0	19.0
3	90.0	400.0	38.0

1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED
Unit Weight of Water = 62.40
Piezometric Surface No. 1 Specified by 5 Coordinate Points

Point No.	X-Water (ft)	Y-Water (ft)
1	.00	60.00
2	83.00	67.00
3	146.20	93.00
4	160.00	95.00
5	370.00	97.00

Janbus Empirical Coef is being used for the case of c & phi both > 0
A Critical Failure Surface Searching Method, Using A Random Technique For Generating Sliding Block Surfaces, Has Been Specified.
800 Trial Surfaces Have Been Generated.

RUN #21

2 Boxes Specified For Generation Of Central Block Base
Length Of Line Segments For Active And Passive Portions Of
Sliding Block Is 30.0

Box No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Height (ft)
1	40.00	51.40	90.00	61.00	15.00
2	150.00	74.78	200.00	85.41	15.00

Factor Of Safety Calculation Has Gone Through Ten Iterations
The Trial Failure Surface In Question Is Defined
By The Following 5 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	67.23	72.51
2	85.36	57.21
3	180.20	74.25
4	180.33	104.25
5	187.56	113.87

Factor Of Safety For The Preceding Specified Surface = 5.543
Factor Of Safety Calculation Has Gone Through Ten Iterations
The Trial Failure Surface In Question Is Defined
By The Following 5 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	65.63	71.95
2	77.11	60.48
3	194.99	78.38
4	195.35	108.38
5	195.90	116.12

Factor Of Safety For The Preceding Specified Surface = 5.515
Factor Of Safety Calculation Has Gone Through Ten Iterations
The Trial Failure Surface In Question Is Defined
By The Following 5 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	56.45	68.72
2	68.85	63.74
3	159.79	71.88
4	160.37	101.87
5	163.40	106.28

Factor Of Safety For The Preceding Specified Surface = 6.018
Factor Of Safety Calculation Has Gone Through Ten Iterations
The Trial Failure Surface In Question Is Defined
By The Following 5 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	73.25	74.62
2	83.30	65.53
3	171.40	72.63
4	171.58	102.63
5	180.88	111.96

Factor Of Safety For The Preceding Specified Surface = 7.831
Factor Of Safety Calculation Has Gone Through Ten Iterations
The Trial Failure Surface In Question Is Defined
By The Following 5 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	35.01	63.81
2	45.77	59.87
3	171.96	78.45
4	172.08	108.45
5	172.84	109.59

Factor Of Safety For The Preceding Specified Surface = 5.441
Following Are Displayed The Ten Most Critical Of The Trial
Failure Surfaces Examined. They Are Ordered - Most Critical
First.
* * Safety Factors Are Calculated By The Modified Janbu Method * *
Failure Surface Specified By 6 Coordinate Points

RUN #21

Point No.	X-Surf (ft)	Y-Surf (ft)
1	25.68	63.60
2	27.54	62.33
3	54.27	48.70
4	176.55	73.89
5	197.71	95.16
6	213.19	118.37
***	1.808	***

Individual data on the 19 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	1.9	158.8	.0	.0	.0	.0	.0	.0	.0
2	.0	1.4	.0	.0	.0	.0	.0	.0	.0
3	15.4	11272.8	.0	4951.4	.0	.0	.0	.0	.0
4	.2	232.7	.0	115.5	.0	.0	.0	.0	.0
5	.8	1112.9	.0	546.2	.0	.0	.0	.0	.0
6	10.3	20461.7	.0	9193.8	.0	.0	.0	.0	.0
7	18.7	51589.4	.0	17530.5	.0	.0	.0	.0	.0
8	10.0	30162.4	.0	8248.2	.0	.0	.0	.0	.0
9	63.2	235704.6	.0	70493.1	.0	.0	.0	.0	.0
10	10.2	45278.0	.0	16121.3	.0	.0	.0	.0	.0
11	3.6	16298.0	.0	5581.5	.0	.0	.0	.0	.0
12	14.0	65194.9	.0	20642.2	.0	.0	.0	.0	.0
13	2.5	12120.6	.0	3491.9	.0	.0	.0	.0	.0
14	16.4	64450.2	.0	19031.0	.0	.0	.0	.0	.0
15	2.0	5990.4	.0	692.6	.0	.0	.0	.0	.0
16	2.7	7400.9	.0	370.6	.0	.0	.0	.0	.0
17	.1	347.7	.0	1.5	.0	.0	.0	.0	.0
18	12.2	18779.9	.0	.0	.0	.0	.0	.0	.0
19	3.2	845.6	.0	.0	.0	.0	.0	.0	.0

RUN #21

River Park, TT 53425, 13-13', CS-15, As Designed on Qt/TQs Cut; Static

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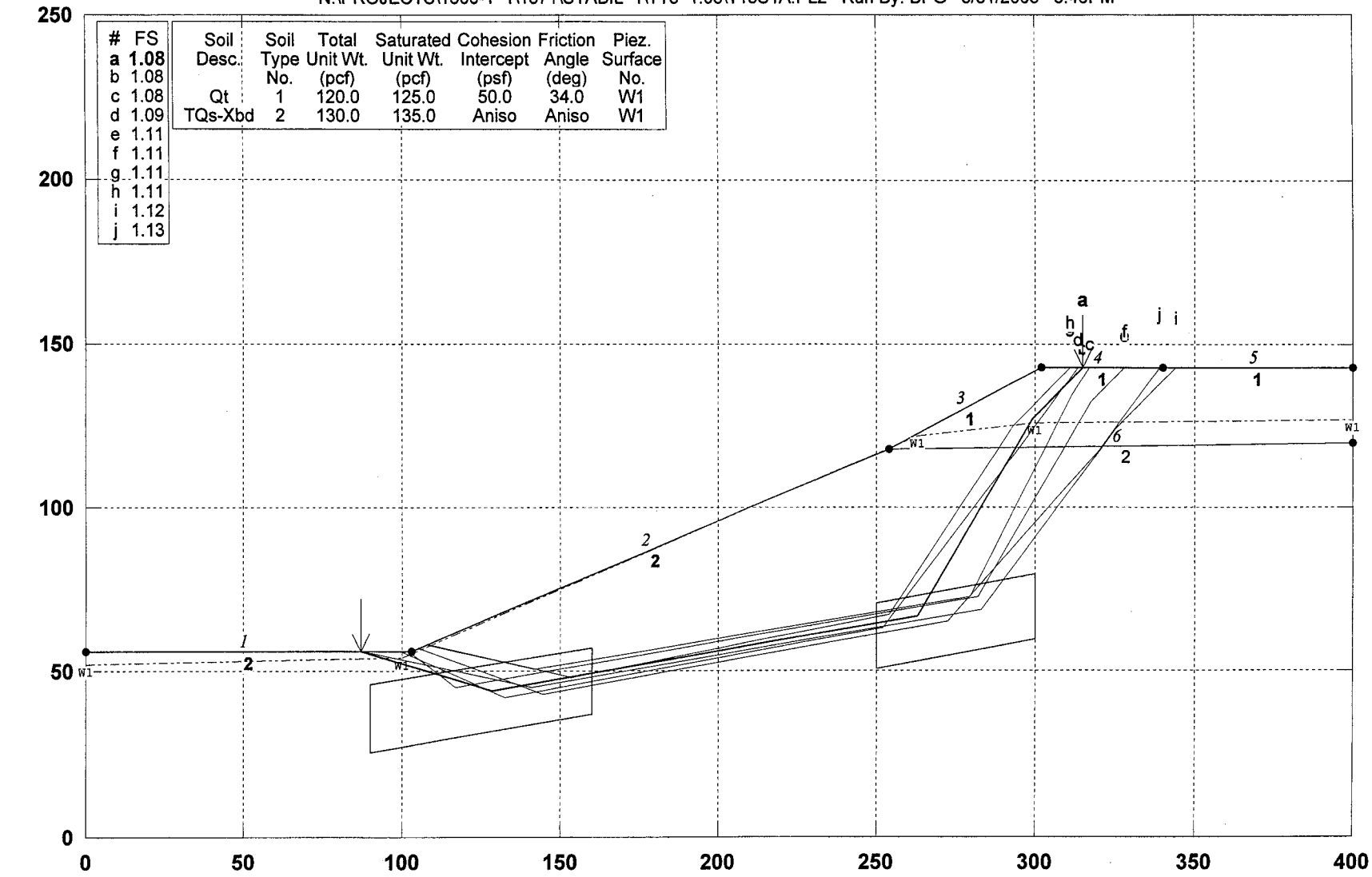


PCSTABL5M/si FSmin=1.08

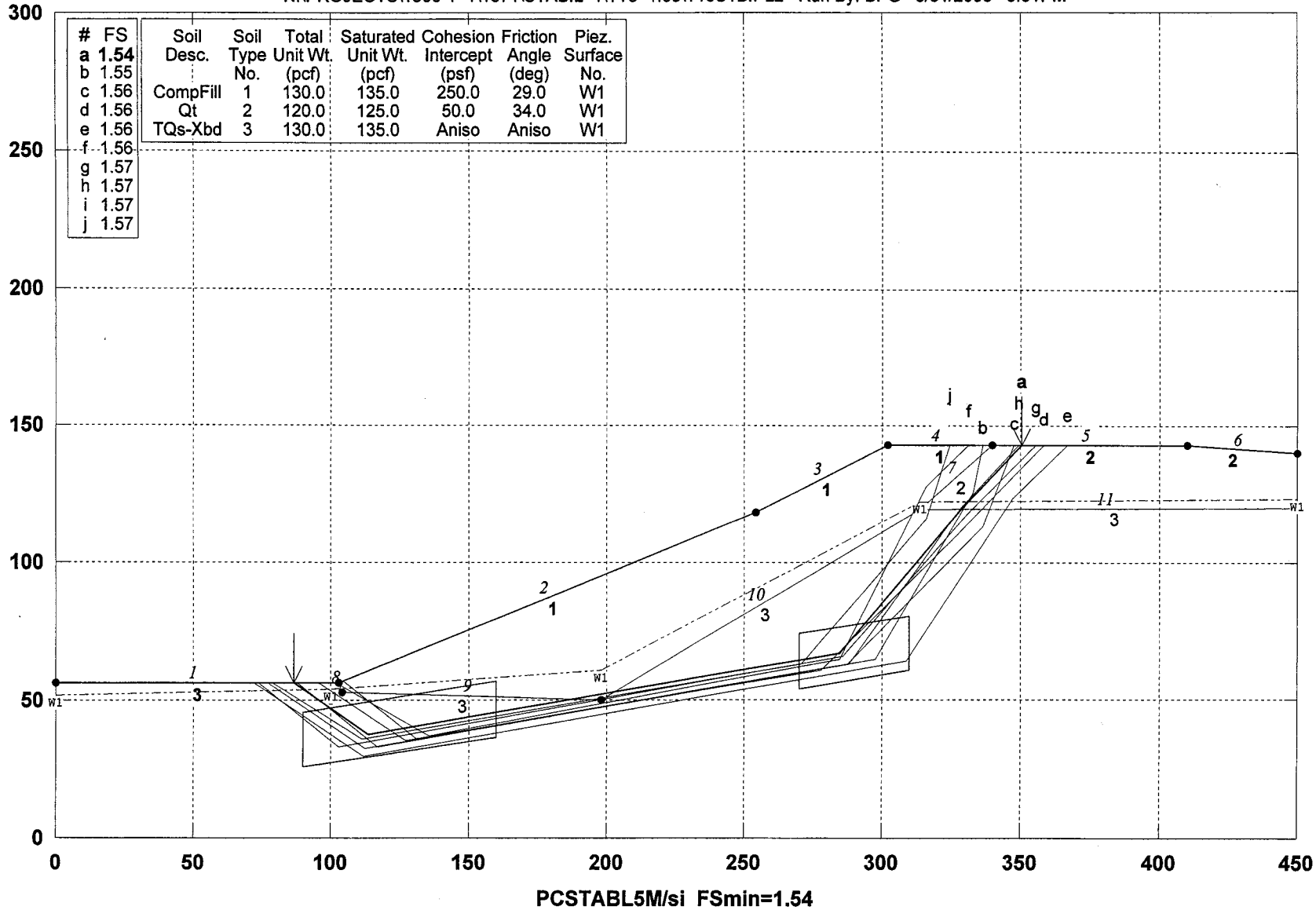
Safety Factors Are Calculated By The Modified Janbu Method

STED

RUN #22

River Park, TT 53425, 13-13', CS-15, w 95' Buttress on Qt/TQs Cut; Static

N:\PROJECTS\1500-1~1\1571\STABIL~1\TT3~1.03\T13S1B.PL2 Run By: BPG 3/31/2003 3:31PM



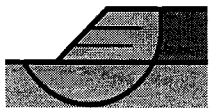
#	FS
a	1.54
b	1.55
c	1.56
d	1.56
e	1.56
f	1.56
g	1.57
h	1.57
i	1.57
j	1.57

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
CompFill	1	130.0	135.0	250.0	29.0	W1
Qt	2	120.0	125.0	50.0	34.0	W1
TQs-Xbd	3	130.0	135.0	Aniso	Aniso	W1

PCSTABL5M/si FSmin=1.54

Safety Factors Are Calculated By The Modified Janbu Method for the case of c & phi both > 0

STED



Run #23

** PCSTABL5M **
by
Purdue University
--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer`s Method of Slices

Run Date: 3/31/2003
Time of Run: 3:31PM
Run By: BPG
Input Data Filename: N:t13s1b.in
Output Filename: N:t13s1b.OUT
Unit: ENGLISH
Plotted Output Filename: N:t13s1b.PLT
PROBLEM DESCRIPTION River Park, TT 53425, 13-13', CS-15, w 9
5' Buttress on Qt/TQs Cut; Static

BOUNDARY COORDINATES
Note: User origin value specified.
Add 0.00 to X-values and 0.00 to Y-values listed.

6 Top Boundaries
11 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	.00	56.00	103.00	56.00	3
2	103.00	56.00	254.00	118.00	1
3	254.00	118.00	302.00	143.00	1
4	302.00	143.00	340.00	143.00	1
5	340.00	143.00	410.00	143.00	2
6	410.00	143.00	450.00	140.00	2
7	314.00	119.00	340.00	143.00	2
8	103.00	56.00	104.00	53.00	3
9	104.00	53.00	198.00	50.00	3
10	198.00	50.00	314.00	119.00	3
11	314.00	119.00	450.00	120.00	3

ISOTROPIC SOIL PARAMETERS
3 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	130.0	135.0	250.0	29.0	.00	.0	1
2	120.0	125.0	50.0	34.0	.00	.0	1
3	130.0	135.0	400.0	38.0	.00	.0	1

ANISOTROPIC STRENGTH PARAMETERS
1 soil type(s)
Soil Type 3 Is Anisotropic
Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	9.5	400.0	38.0
2	10.5	450.0	19.0
3	90.0	400.0	38.0

1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED
Unit Weight of Water = 62.40
Piezometric Surface No. 1 Specified by 5 Coordinate Points

Point No.	X-Water (ft)	Y-Water (ft)
1	.00	52.00
2	100.00	54.00
3	198.00	61.00
4	314.00	122.00
5	450.00	123.00

Janbus Empirical Coef is being used for the case of c & phi both > 0
A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Sliding Block Surfaces, Has Been
Specified.
800 Trial Surfaces Have Been Generated.

RUN #23

2 Boxes Specified For Generation Of Central Block Base
Length Of Line Segments For Active And Passive Portions Of
Sliding Block Is 70.0

Box No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Height (ft)
1	90.00	35.75	160.00	46.84	20.00
2	270.00	64.26	310.00	70.59	20.00

Factor Of Safety Calculation Has Gone Through Ten Iterations

RUN #23

River Park, TT 53425; 13-13'; 99' TQs River Bank w 15' Paseo Toe Berm; Static

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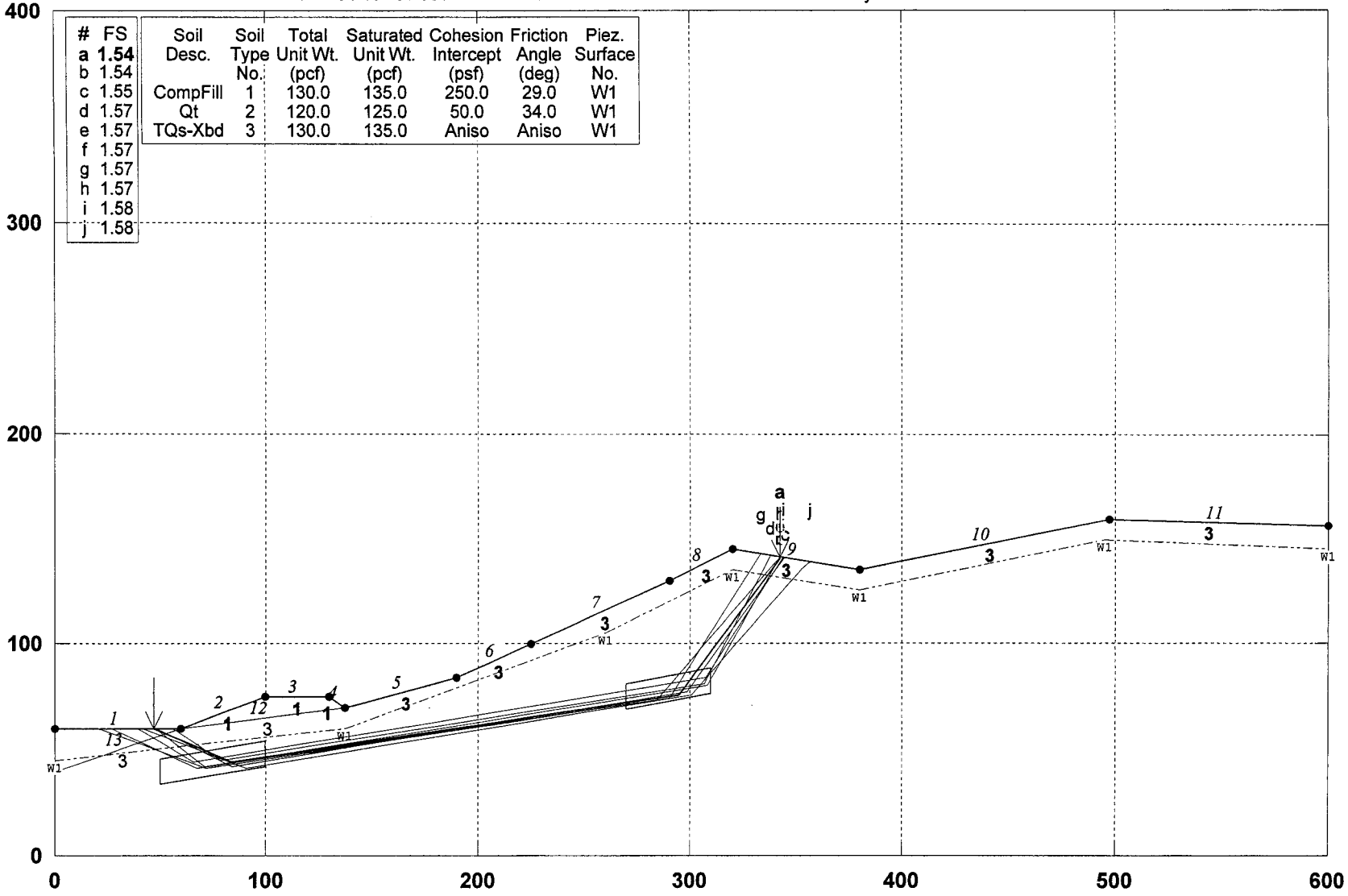

PCSTABL5M/si FSmin=1.54

Safety Factors Are Calculated By The Modified Janbu Method

STED

RUN #24

** PCSTABL5M **
by
Purdue University
--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer`s Method of Slices

Run Date: 3/25/2003
Time of Run: 4:19PM
Run By: BPG
Input Data Filename: N:t13s2a.in
Output Filename: N:t13s2a.OUT
Unit: ENGLISH
Plotted Output Filename: N:t13s2a.PLT
PROBLEM DESCRIPTION River Park, TT 53425; 13-13'; 99' TQs Ri
ver Bank w 15' Paseo Toe Berm; Static
BOUNDARY COORDINATES
Note: User origin value specified.
Add 0.00 to X-values and 0.00 to Y-values listed.

11 Top Boundaries
13 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	.00	60.00	60.00	60.00	2
2	60.00	60.00	100.00	75.00	1
3	100.00	75.00	130.00	75.00	1
4	130.00	75.00	137.00	70.00	1
5	137.00	70.00	190.00	84.00	3
6	190.00	84.00	225.00	100.00	3
7	225.00	100.00	290.00	130.00	3
8	290.00	130.00	320.00	145.00	3
9	320.00	145.00	380.00	135.00	3
10	380.00	135.00	497.00	159.00	3
11	497.00	159.00	600.00	156.00	3
12	60.00	60.00	137.00	70.00	3
13	.00	40.00	60.00	60.00	3

ISOTROPIC SOIL PARAMETERS
3 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	130.0	135.0	250.0	29.0	.00	.0	1
2	120.0	125.0	50.0	34.0	.00	.0	1
3	130.0	135.0	400.0	38.0	.00	.0	1

ANISOTROPIC STRENGTH PARAMETERS
1 soil type(s)
Soil Type 3 Is Anisotropic
Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	8.5	400.0	38.0
2	9.5	450.0	19.0
3	90.0	400.0	38.0

1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED
Unit Weight of Water = 62.40
Piezometric Surface No. 1 Specified by 7 Coordinate Points

Point No.	X-Water (ft)	Y-Water (ft)
1	.00	45.00
2	137.00	60.00
3	260.00	105.00
4	320.00	135.00
5	380.00	125.00
6	495.00	149.00
7	600.00	145.00

A Critical Failure Surface Searching Method, Using A Random

RUN #24

Technique For Generating Sliding Block Surfaces, Has Been Specified.
800 Trial Surfaces Have Been Generated.
2 Boxes Specified For Generation Of Central Block Base Length Of Line Segments For Active And Passive Portions Of Sliding Block Is 80.0

Box No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Height (ft)
1	50.00	40.00	100.00	47.92	12.00
2	270.00	74.85	310.00	82.76	12.00

Following Are Displayed The Ten Most Critical Of The Trial Failure Surfaces Examined. They Are Ordered - Most Critical First.
* * Safety Factors Are Calculated By The Modified Janbu Method * *
Failure Surface Specified By 5 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	47.53	60.00
2	83.91	43.89
3	294.84	75.93
4	342.44	140.23
5	342.50	141.25

*** 1.540 ***

Individual data on the 16 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	5.4	762.0	.0	.0	.0	.0	.0	.0	.0
2	7.1	3566.0	.0	.0	.0	.0	.0	.0	.0
3	5.3	5254.7	.0	.0	.0	.0	.0	.0	.0
4	18.6	42770.5	.0	6510.7	.0	.0	.0	.0	.0
5	16.1	57006.3	.0	10050.9	.0	.0	.0	.0	.0
6	30.0	104244.7	.0	16897.8	.0	.0	.0	.0	.0
7	7.0	19464.2	.0	3598.2	.0	.0	.0	.0	.0
8	53.0	148239.3	.0	43167.3	.0	.0	.0	.0	.0
9	35.0	137282.8	.0	48074.8	.0	.0	.0	.0	.0
10	35.0	187475.0	.0	63640.3	.0	.0	.0	.0	.0
11	30.0	200961.2	.0	67451.8	.0	.0	.0	.0	.0
12	4.8	36016.0	.0	12552.8	.0	.0	.0	.0	.0
13	25.2	153801.3	.0	84977.5	.0	.0	.0	.0	.0
14	16.5	49466.2	.0	21449.5	.0	.0	.0	.0	.0
15	5.9	4238.1	.0	.0	.0	.0	.0	.0	.0
16	.1	3.8	.0	.0	.0	.0	.0	.0	.0

RUN#24

River Park, Tr 53425 - X-Section 13; 99'TQs River Bank w 15' Toe Berm; Pseudost

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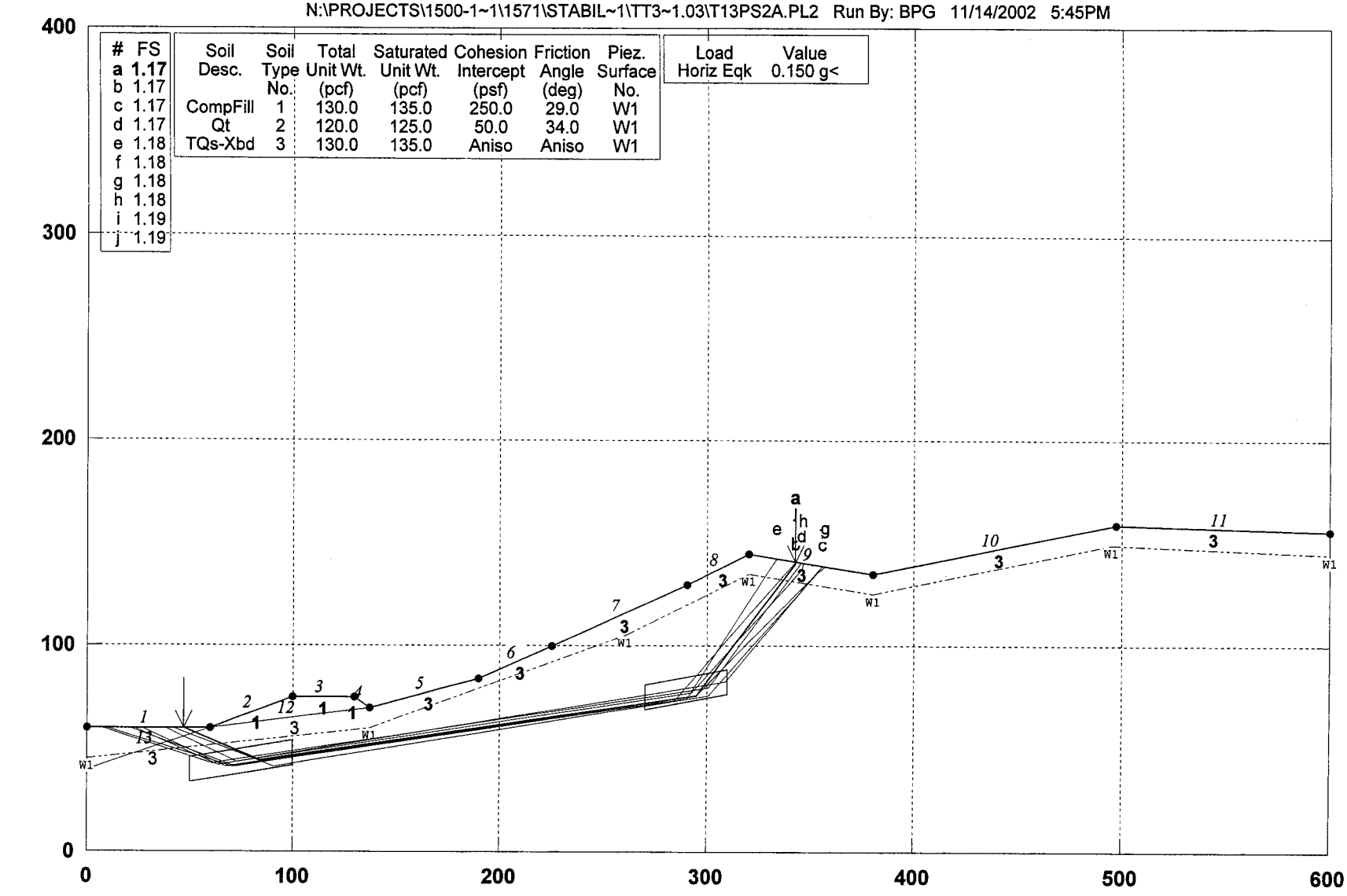


PCSTABL5M/si FSmin=1.17

Safety Factors Are Calculated By The Modified Janbu Method

STED

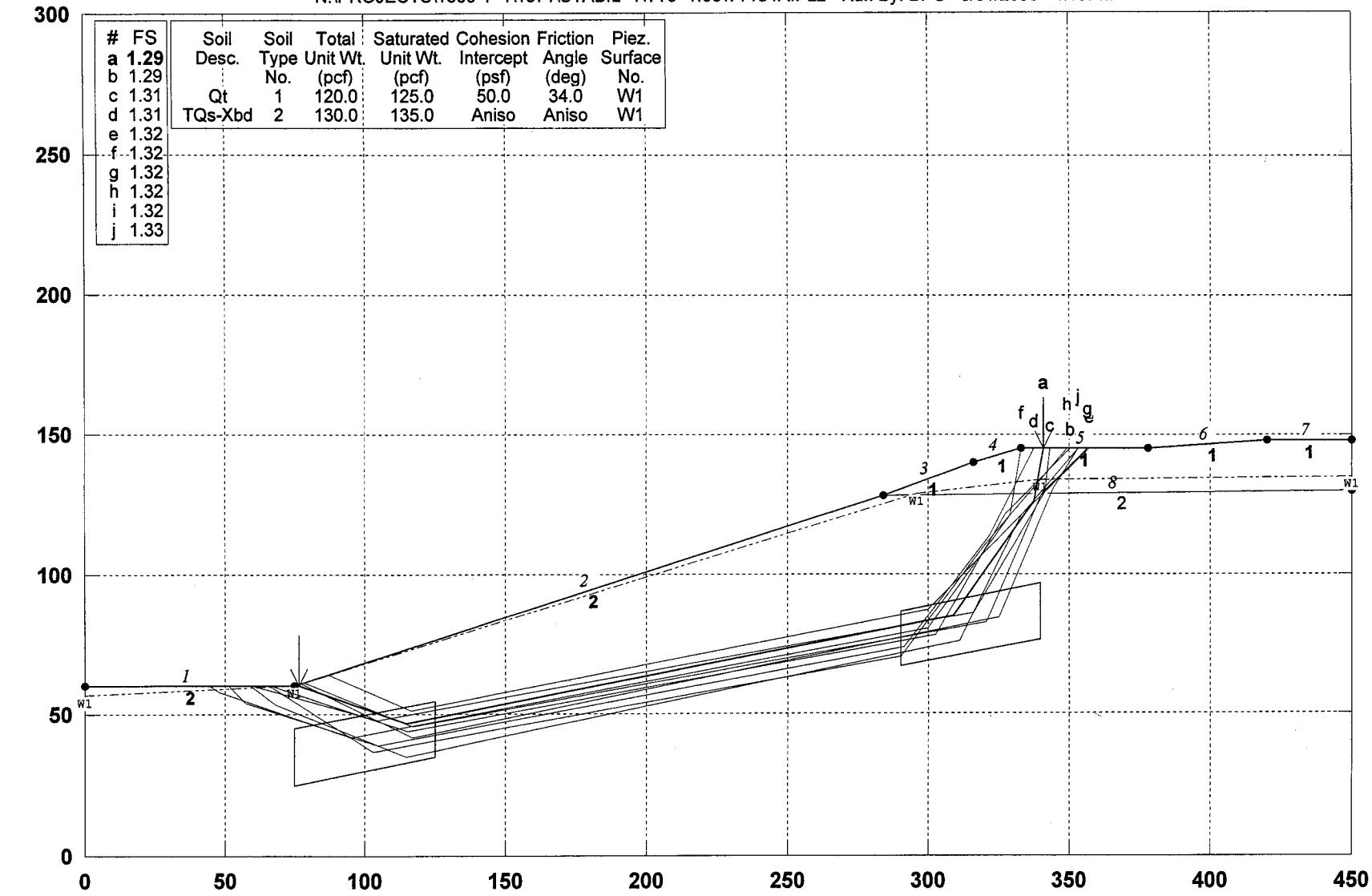
RUN #24

TT 53425, 14-14', CS-15 w Qt/QTs Cut As Designed, Abve Newhall Rnch Rd; Static

N:\PROJECTS\1500-1~1\1571\STABIL~1\TT3~1.03\T14S1A.PL2 Run By: BPG 3/31/2003 4:19PM

#	FS
a	1.29
b	1.29
c	1.31
d	1.31
e	1.32
f	1.32
g	1.32
h	1.32
i	1.32
j	1.33

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
Qt	1	120.0	125.0	50.0	34.0	W1
TQs-Xbd	2	130.0	135.0	Aniso	Aniso	W1



PCSTABL5M/si FSmin=1.29

Safety Factors Are Calculated By The Modified Janbu Method

STED

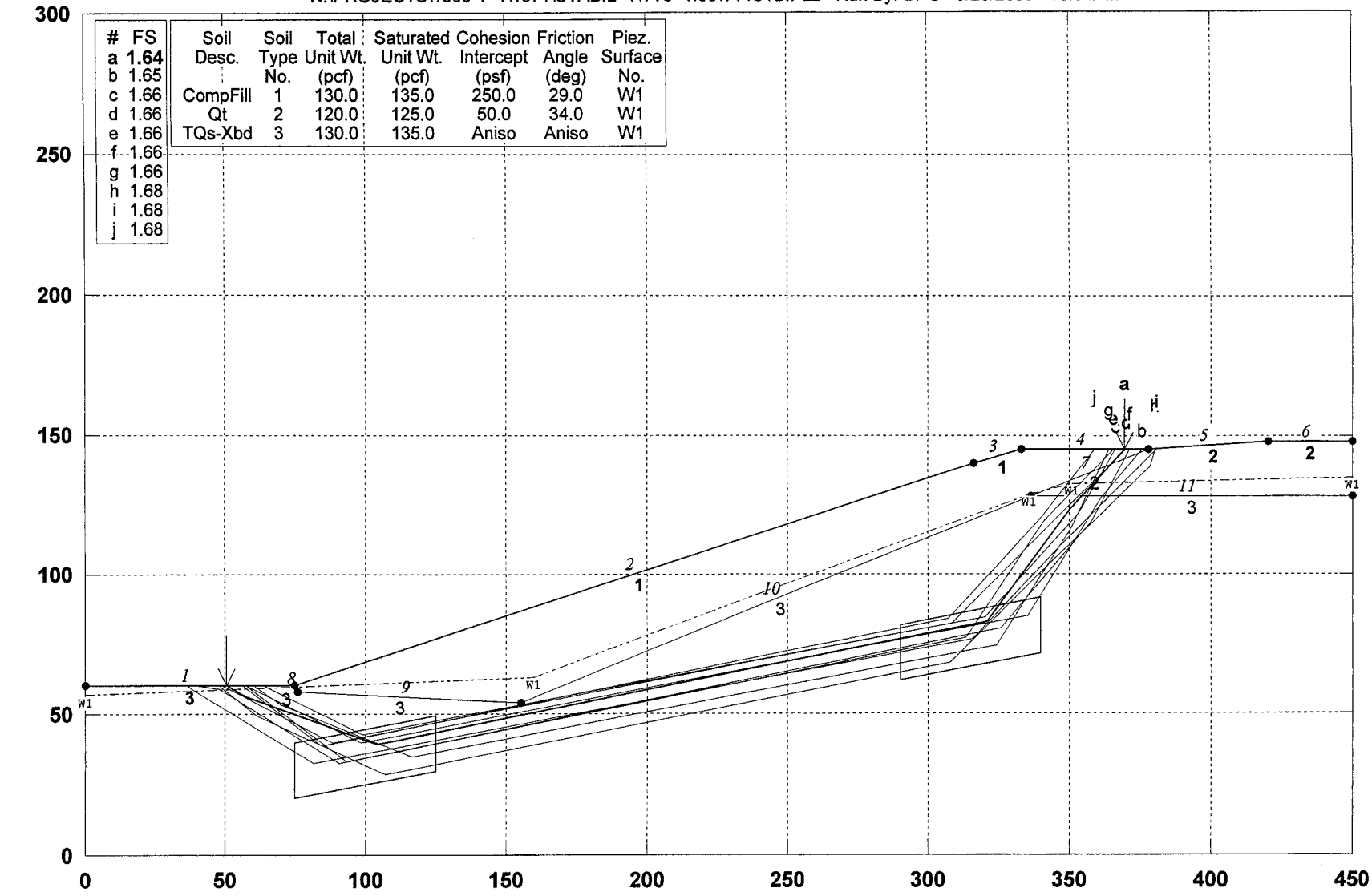
RUN #25

TT 53425, 14-14', CS-15 w Qt/QTs Cut + 80' Buttress Abve Newhall Rnch Rd; Static

N:\PROJECTS\1500-1~1\1571\STABIL~1\TT3~1.03\T14S1B.PL2 Run By: BPG 3/25/2003 10:34AM

#	FS
a	1.64
b	1.65
c	1.66
d	1.66
e	1.66
f	1.66
g	1.66
h	1.68
i	1.68
j	1.68

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
CompFill	1	130.0	135.0	250.0	29.0	W1
Qt	2	120.0	125.0	50.0	34.0	W1
TQs-Xbd	3	130.0	135.0	Aniso	Aniso	W1



PCSTABL5M/si FSmin=1.64

Safety Factors Are Calculated By The Modified Janbu Method for the case of c & phi both > 0

STED

RUN #26

** PCSTABL5M **
by
Purdue University
--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer`s Method of Slices

Run Date: 3/25/2003
Time of Run: 10:33AM
Run By: BPG
Input Data Filename: N:t14s1b.in
Output Filename: N:t14s1b.OUT
Unit: ENGLISH
Plotted Output Filename: N:t14s1b.PLT
PROBLEM DESCRIPTION Tr 53425, 14-14', CS-15 w Qt/QTs Cut + 8 0' Buttress Abve Newhall Rnch Rd; Static

BOUNDARY COORDINATES
Note: User origin value specified.
Add 0.00 to X-values and 0.00 to Y-values listed.

6 Top Boundaries
11 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	.00	60.00	75.00	60.00	3
2	75.00	60.00	316.00	140.00	1
3	316.00	140.00	333.00	145.00	1
4	333.00	145.00	378.00	145.00	1
5	378.00	145.00	420.00	148.00	2
6	420.00	148.00	450.00	148.00	2
7	336.34	128.00	378.00	145.00	2
8	75.00	60.00	76.00	58.00	3
9	76.00	58.00	155.00	54.00	3
10	155.00	54.00	336.34	128.00	3
11	336.34	128.00	450.00	128.00	3

ISOTROPIC SOIL PARAMETERS
3 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	130.0	135.0	250.0	29.0	.00	.0	1
2	120.0	125.0	50.0	34.0	.00	.0	1
3	130.0	135.0	400.0	38.0	.00	.0	1

ANISOTROPIC STRENGTH PARAMETERS
1 soil type(s)
Soil Type 3 Is Anisotropic
Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	10.5	400.0	38.0
2	11.5	450.0	19.0
3	90.0	400.0	38.0

1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED
Unit Weight of Water = 62.40
Piezometric Surface No. 1 Specified by 5 Coordinate Points

Point No.	X-Water (ft)	Y-Water (ft)
1	.00	57.00
2	160.00	63.00
3	336.00	129.00
4	351.00	133.00
5	450.00	135.00

Janbus Empirical Coef is being used for the case of c & phi both > 0
A Critical Failure Surface Searching Method, Using A Random Technique For Generating Sliding Block Surfaces, Has Been Specified.
400 Trial Surfaces Have Been Generated.

RUN #26

2 Boxes Specified For Generation Of Central Block Base
Length Of Line Segments For Active And Passive Portions Of
Sliding Block Is 50.0

Box No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Height (ft)
1	75.00	30.00	125.00	39.72	20.00
2	290.00	71.79	340.00	81.51	20.00

Following Are Displayed The Ten Most Critical Of The Trial Failure Surfaces Examined. They Are Ordered - Most Critical First.

* * Safety Factors Are Calculated By The Modified Janbu Method * *

Failure Surface Specified By 6 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	50.71	60.00
2	57.32	56.25
3	104.31	39.14
4	320.65	82.86
5	349.91	123.41
6	369.40	145.00

*** 1.640 ***

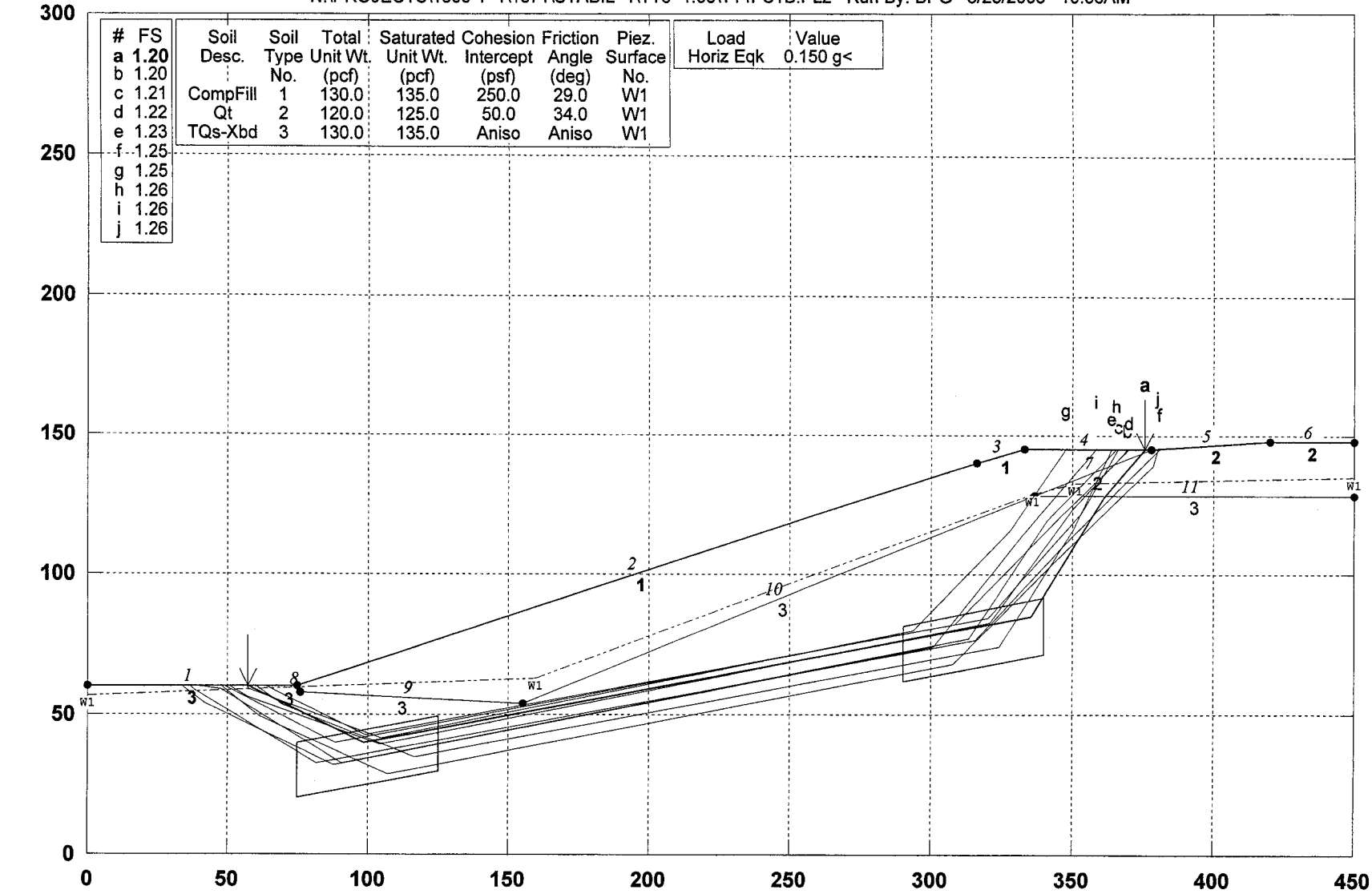
Individual data on the 20 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	1.8	121.6	.0	.0	.0	.0	.0	.0	.0
2	4.8	1526.0	.0	499.1	.0	.0	.0	.0	.0
3	17.7	16588.5	.0	7568.1	.0	.0	.0	.0	.0
4	.1	126.9	.0	61.2	.0	.0	.0	.0	.0
5	.9	1293.8	.0	615.8	.0	.0	.0	.0	.0
6	28.3	78573.7	.0	30214.2	.0	.0	.0	.0	.0
7	50.7	227710.8	.0	56748.3	.0	.0	.0	.0	.0
8	5.0	24695.4	.0	4139.3	.0	.0	.0	.0	.0
9	156.0	991447.4	.0	*******	.0	.0	.0	.0	.0
10	4.6	36098.8	.0	11101.9	.0	.0	.0	.0	.0
11	12.4	85088.3	.0	42191.1	.0	.0	.0	.0	.0
12	3.0	17117.8	.0	7918.5	.0	.0	.0	.0	.0
13	.3	1836.2	.0	864.8	.0	.0	.0	.0	.0
14	7.7	35771.3	.0	16035.6	.0	.0	.0	.0	.0
15	5.9	19611.8	.0	7585.9	.0	.0	.0	.0	.0
16	1.1	2968.9	.0	870.6	.0	.0	.0	.0	.0
17	3.0	7309.0	.0	1907.4	.0	.0	.0	.0	.0
18	4.7	8525.6	.0	1096.7	.0	.0	.0	.0	.0
19	5.7	6307.6	.0	.0	.0	.0	.0	.0	.0
20	5.0	1812.8	.0	.0	.0	.0	.0	.0	.0

RUN #26

TT 53425; 14-14', CS-7 w Qt/TQs Cut+ 80'Buttress Abv Newhall Rnch Rd; PseudoSt

N:\PROJECTS\1500-1~1\1571\STABIL~1\TT3~1.03\T14PS1B.PL2 Run By: BPG 3/25/2003 10:36AM



PCSTABL5M/si FSmin=1.20

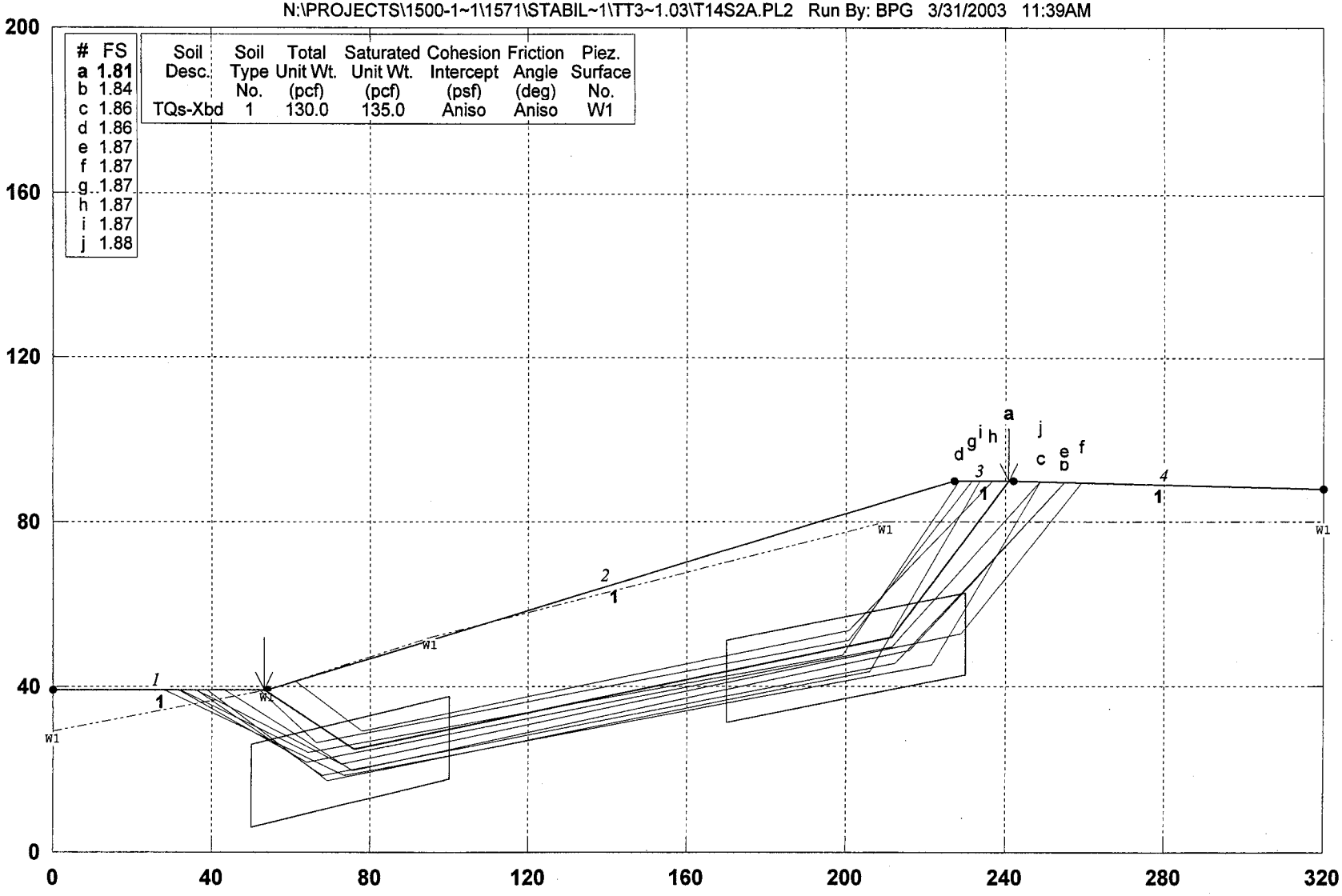
Safety Factors Are Calculated By The Modified Janbu Method for the case of c & phi both > 0

STED

RUN #26

TT 53425; 14-14', CS-13; TQs Cut As Designed; Static

N:\PROJECTS\1500-1~1\1571\STABIL~1\TT3~1.03\T14S2A.PL2 Run By: BPG 3/31/2003 11:39AM



PCSTABL5M/si FSmin=1.81

Safety Factors Are Calculated By The Modified Janbu Method for the case of c & phi both > 0

STED

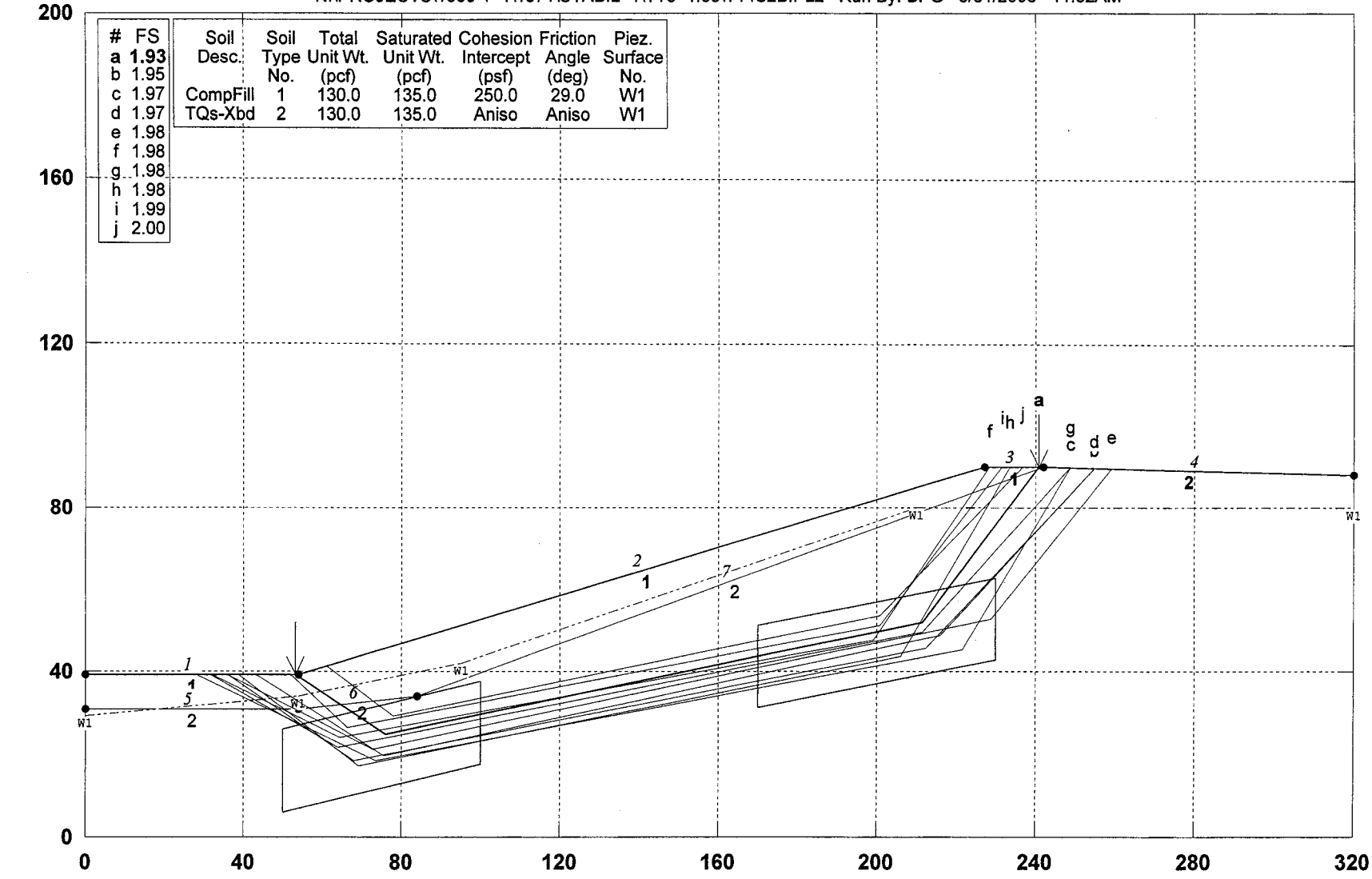
RUN #21

TT 53425; 14-14', CS-13, TQs Cut w 30' Stability Fill; Static

N:\PROJECTS\1500-1~1\1571\STABIL~1\TT3~1.03\T14S2B.PL2 Run By: BPG 3/31/2003 11:32AM

#	FS
a	1.93
b	1.95
c	1.97
d	1.97
e	1.98
f	1.98
g	1.98
h	1.98
i	1.99
j	2.00

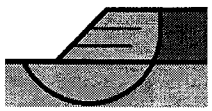
Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
CompFill	1	130.0	135.0	250.0	29.0	W1
TQs-Xbd	2	130.0	135.0	Aniso	Aniso	W1



PCSTABL5M/si FSmin=1.93

Safety Factors Are Calculated By The Modified Janbu Method for the case of c & phi both > 0

STED



RUN #28

```
                    ** PCSTABL5M **
                         by
                    Purdue University
                --Slope Stability Analysis--
            Simplified Janbu, Simplified Bishop
               or Spencer`s Method of Slices
 Run Date:                  3/31/2003
 Time of Run:               11:32AM
 Run By:                    BPG
 Input Data Filename:       N:t14s2b.in
 Output Filename:           N:t14s2b.OUT
 Unit:                      ENGLISH
 Plotted Output Filename:   N:t14s2b.PLT
 PROBLEM DESCRIPTION    TT 53425; 14-14', CS-13, TQs Cut w 30' S
                        tability Fill; Static
 BOUNDARY COORDINATES
      Note: User origin value specified.
      Add 0.00 to X-values and 0.00 to Y-values listed.

     4 Top   Boundaries
     7 Total Boundaries
 Boundary     X-Left     Y-Left    X-Right    Y-Right    Soil Type
    No.         (ft)       (ft)       (ft)       (ft)    Below Bnd
     1           .00      39.00      54.00      39.00        1
     2         54.00      39.00     227.00      90.00        1
     3        227.00      90.00     242.00      90.00        1
     4        242.00      90.00     320.00      88.00        2
     5           .00      31.00      54.00      31.00        2
     6         54.00      31.00      84.00      34.00        2
     7         84.00      34.00     242.00      90.00        2
 ISOTROPIC SOIL PARAMETERS
   2 Type(s) of Soil
 Soil  Total  Saturated  Cohesion Friction   Pore   Pressure   Piez.
 Type Unit Wt. Unit Wt. Intercept   Angle  Pressure Constant Surface
  No.  (pcf)    (pcf)     (psf)     (deg)   Param.    (psf)    No.
   1   130.0    135.0     250.0     29.0     .00        .0      1
   2   130.0    135.0     400.0     38.0     .00        .0      1
 ANISOTROPIC STRENGTH PARAMETERS
     1 soil type(s)
 Soil Type  2 Is Anisotropic
 Number Of Direction Ranges Specified =  3
 Direction    Counterclockwise     Cohesion     Friction
   Range       Direction Limit    Intercept       Angle
    No.            (deg)            (psf)         (deg)
     1              10.0             400.0         38.0
     2              12.0             450.0         19.0
     3              90.0             400.0         38.0
 1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED
 Unit Weight of Water =  62.40
 Piezometric Surface No.  1 Specified by  5 Coordinate Points
   Point      X-Water     Y-Water
    No.         (ft)        (ft)
     1           .00       29.00
     2         54.00       34.00
     3         95.00       42.00
     4        210.00       80.00
     5        320.00       80.00
 Janbus Empirical Coef is being used for the case of  c & phi both > 0
 A Critical Failure Surface Searching Method, Using A Random
 Technique For Generating Sliding Block Surfaces, Has Been
 Specified.
 400 Trial Surfaces Have Been Generated.
 2 Boxes Specified For Generation Of Central Block Base
 Length Of Line Segments For Active And Passive Portions Of
 Sliding Block Is  80.0
 Box        X-Left     Y-Left     X-Right    Y-Right      Height
 No.          (ft)       (ft)       (ft)       (ft)        (ft)
```

RUN #28

1	50.00	16.00	100.00	27.66	20.00
2	170.00	41.27	230.00	52.93	20.00

Factor Of Safety Calculation Has Gone Through Ten Iterations
The Trial Failure Surface In Question Is Defined
By The Following 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	59.47	40.61
2	74.53	30.50
3	226.01	47.02
4	226.23	89.77

Factor Of Safety For The Preceding Specified Surface = 5.851
Following Are Displayed The Ten Most Critical Of The Trial Failure Surfaces Examined. They Are Ordered - Most Critical First.
* * Safety Factors Are Calculated By The Modified Janbu Method * *
Failure Surface Specified By 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	53.21	39.00
2	76.14	24.88
3	211.54	52.12
4	240.92	90.00

*** 1.933 ***

Individual data on the 13 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	.8	24.7	.0	.0	.0	.0	.0	.0	.0
2	5.6	2186.6	.0	.0	.0	.0	.0	.0	.0
3	4.9	5050.5	.0	709.5	.0	.0	.0	.0	.0
4	11.6	23721.3	.0	7300.5	.0	.0	.0	.0	.0
5	7.9	21975.4	.0	6583.8	.0	.0	.0	.0	.0
6	11.0	32031.0	.0	9180.1	.0	.0	.0	.0	.0
7	115.0	426871.9	.0	*******	.0	.0	.0	.0	.0
8	1.5	6869.5	.0	2746.8	.0	.0	.0	.0	.0
9	2.2	9702.0	.0	6045.7	.0	.0	.0	.0	.0
10	13.2	43205.4	.0	22152.9	.0	.0	.0	.0	.0
11	6.2	11318.0	.0	2493.2	.0	.0	.0	.0	.0
12	7.3	5027.3	.0	.0	.0	.0	.0	.0	.0
13	.4	14.1	.0	.0	.0	.0	.0	.0	.0

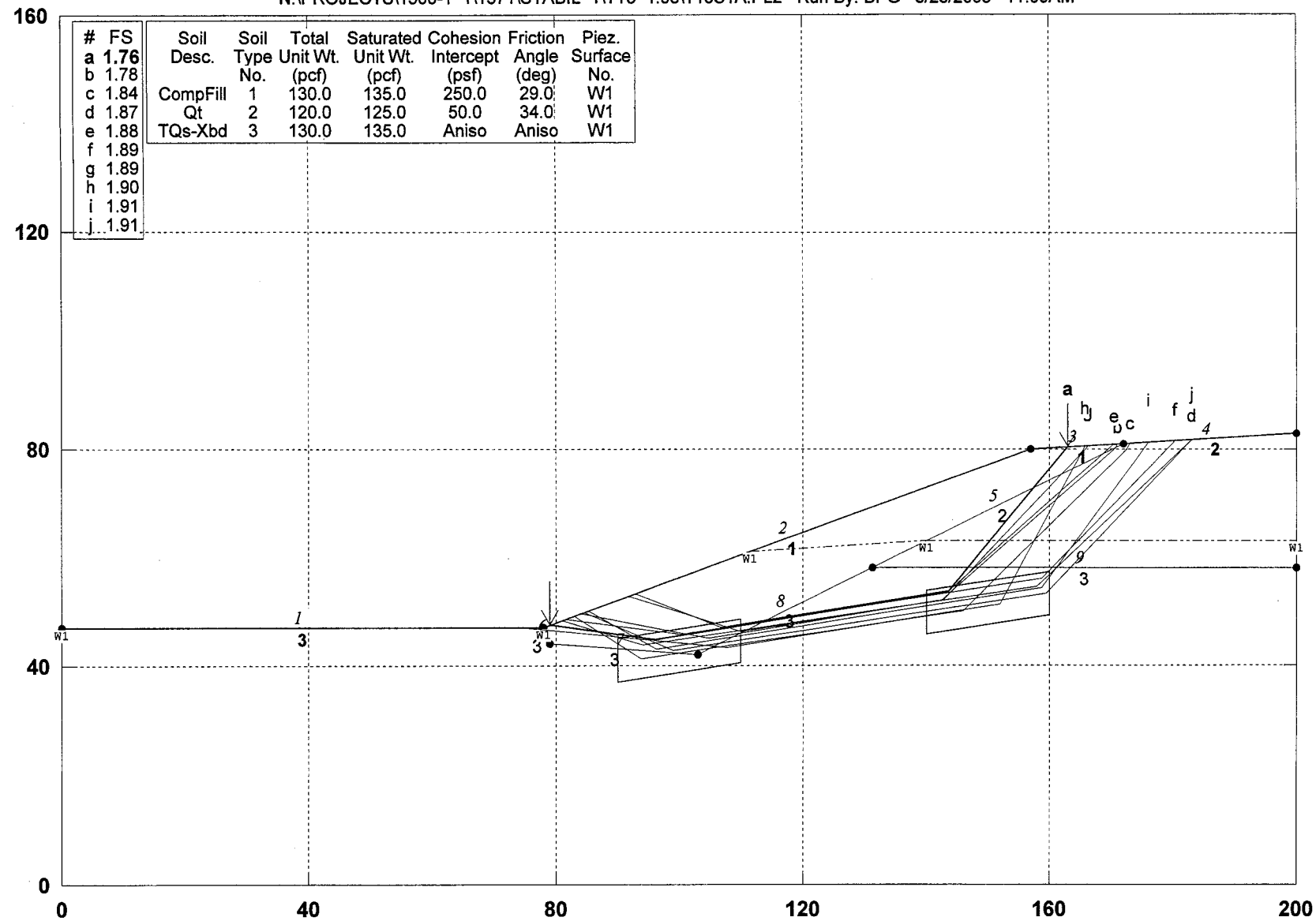
RUN #28

TT 53425, 15-15', CS-16, 25' Stab Fill on Qt/TQs Cut; Static + Rapid Drawdown

N:\PROJECTS\1500-1~1\1571\STABIL~1\TT3~1.03\T15S1A.PL2 Run By: BPG 3/25/2003 11:09AM

#	FS
a	1.76
b	1.78
c	1.84
d	1.87
e	1.88
f	1.89
g	1.89
h	1.90
i	1.91
j	1.91

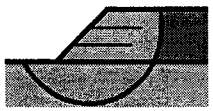
Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
CompFill	1	130.0	135.0	250.0	29.0	W1
Qt	2	120.0	125.0	50.0	34.0	W1
TQs-Xbd	3	130.0	135.0	Aniso	Aniso	W1



PCSTABL5M/si FSmin=1.76

Safety Factors Are Calculated By The Modified Janbu Method for the case of c & phi both > 0

STED



RUN #29

** PCSTABL5M **
by
Purdue University
--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer`s Method of Slices

Run Date: 3/25/2003
Time of Run: 11:09AM
Run By: BPG
Input Data Filename: N:t15s1a.in
Output Filename: N:t15s1a.OUT
Unit: ENGLISH
Plotted Output Filename: N:t15s1a.PLT
PROBLEM DESCRIPTION TT 53425, 15-15', CS-16, 25' Stab Fill
on Qt/TQs Cut; Static + Rapid Drawdown

BOUNDARY COORDINATES
Note: User origin value specified.
Add 0.00 to X-values and 0.00 to Y-values listed.

4 Top Boundaries
9 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	.00	47.00	78.00	47.00	3
2	78.00	47.00	157.00	80.00	1
3	157.00	80.00	172.00	81.00	1
4	172.00	81.00	200.00	83.00	2
5	131.31	58.00	172.00	81.00	2
6	78.00	47.00	79.00	44.00	3
7	79.00	44.00	103.00	42.00	3
8	103.00	42.00	131.31	58.00	3
9	131.31	58.00	200.00	58.00	3

ISOTROPIC SOIL PARAMETERS
3 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	130.0	135.0	250.0	29.0	.00	.0	1
2	120.0	125.0	50.0	34.0	.00	.0	1
3	130.0	135.0	400.0	38.0	.00	.0	1

ANISOTROPIC STRENGTH PARAMETERS
1 soil type(s)
Soil Type 3 Is Anisotropic
Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	9.5	400.0	38.0
2	10.5	450.0	19.0
3	90.0	400.0	38.0

1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED
Unit Weight of Water = 62.40
Piezometric Surface No. 1 Specified by 5 Coordinate Points

Point No.	X-Water (ft)	Y-Water (ft)
1	.00	47.00
2	78.00	47.00
3	111.50	61.00
4	140.00	63.00
5	200.00	63.00

Janbus Empirical Coef is being used for the case of c & phi both > 0
A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Sliding Block Surfaces, Has Been
Specified.
400 Trial Surfaces Have Been Generated.
2 Boxes Specified For Generation Of Central Block Base
Length Of Line Segments For Active And Passive Portions Of

RUN #29

Sliding Block Is 40.0

Box No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Height (ft)
1	90.00	41.00	110.00	44.53	8.00
2	140.00	49.82	160.00	53.34	8.00

Factor Of Safety Calculation Has Gone Through Ten Iterations
The Trial Failure Surface In Question Is Defined
By The Following 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	95.49	54.31
2	107.36	43.87
3	147.66	51.42
4	148.04	76.26

Factor Of Safety For The Preceding Specified Surface = 8.000
Factor Of Safety Calculation Has Gone Through Ten Iterations
The Trial Failure Surface In Question Is Defined
By The Following 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	88.75	51.49
2	98.20	43.96
3	150.73	53.75
4	151.16	77.56

Factor Of Safety For The Preceding Specified Surface = 5.525
Factor Of Safety Calculation Has Gone Through Ten Iterations
The Trial Failure Surface In Question Is Defined
By The Following 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	85.82	50.27
2	94.86	41.25
3	157.55	51.64
4	158.02	80.07

Factor Of Safety For The Preceding Specified Surface = 5.854
Factor Of Safety Calculation Has Gone Through Ten Iterations
The Trial Failure Surface In Question Is Defined
By The Following 5 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	51.44	47.00
2	59.53	43.58
3	99.29	39.25
4	143.19	48.13
5	143.58	74.39

Factor Of Safety For The Preceding Specified Surface = 5.929
Factor Of Safety Calculation Has Gone Through Ten Iterations
The Trial Failure Surface In Question Is Defined
By The Following 5 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	45.48	47.00
2	55.78	41.64
3	95.63	38.27
4	154.80	48.76
5	155.32	79.30

Factor Of Safety For The Preceding Specified Surface = 4.254
Factor Of Safety Calculation Has Gone Through Ten Iterations
The Trial Failure Surface In Question Is Defined
By The Following 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	87.41	50.93
2	96.67	43.09
3	140.99	47.78
4	142.27	73.85

Factor Of Safety For The Preceding Specified Surface = 5.631

RUN # 29

Factor Of Safety Calculation Has Gone Through Ten Iterations
The Trial Failure Surface In Question Is Defined
By The Following 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	85.87	50.29
2	96.51	40.25
3	144.59	49.10
4	144.92	74.95

Factor Of Safety For The Preceding Specified Surface = 4.957
Following Are Displayed The Ten Most Critical Of The Trial Failure Surfaces Examined. They Are Ordered - Most Critical First.
* * Safety Factors Are Calculated By The Modified Janbu Method * *
Failure Surface Specified By 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	78.97	47.41
2	96.02	44.78
3	143.43	53.56
4	163.12	80.41

*** 1.763 ***

Individual data on the 12 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	17.0	11180.4	.0	4855.0	.0	.0	.0	.0	.0
2	15.5	24056.5	.0	10501.0	.0	.0	.0	.0	.0
3	2.2	4089.5	.0	1866.0	.0	.0	.0	.0	.0
4	17.6	37409.7	.0	13445.9	.0	.0	.0	.0	.0
5	8.7	21663.5	.0	5815.4	.0	.0	.0	.0	.0
6	.2	404.6	.0	99.3	.0	.0	.0	.0	.0
7	3.3	8647.2	.0	2024.6	.0	.0	.0	.0	.0
8	3.3	7996.7	.0	2477.6	.0	.0	.0	.0	.0
9	3.7	7387.0	.0	967.3	.0	.0	.0	.0	.0
10	6.6	9368.6	.0	.0	.0	.0	.0	.0	.0
11	.6	558.7	.0	.0	.0	.0	.0	.0	.0
12	5.5	2594.3	.0	.0	.0	.0	.0	.0	.0

RUN #29

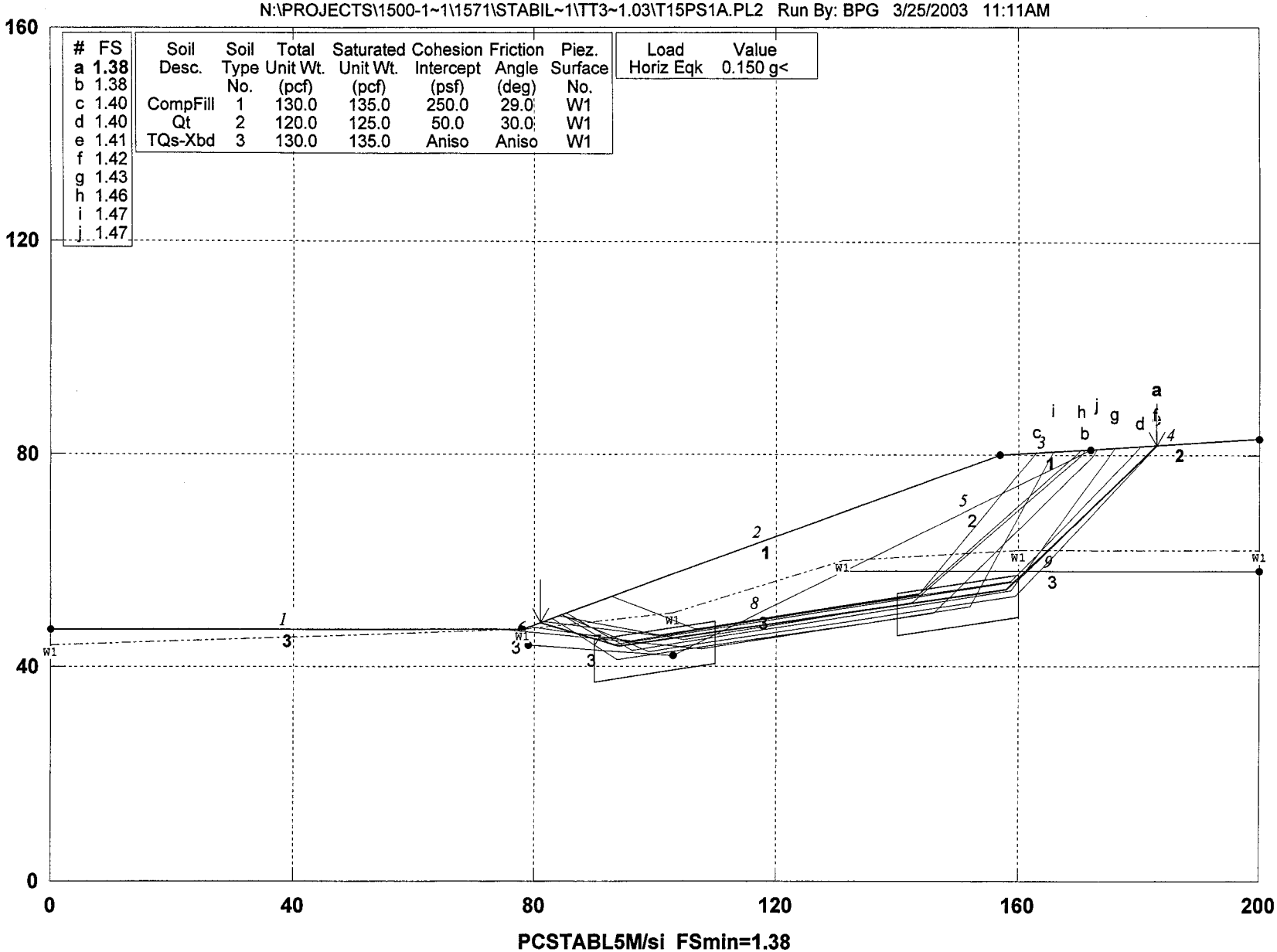
TT 53425, 15-15', CS-13 w 25' Stab Fill on Qt over TQs; Pseudo-Static

N:\PROJECTS\1500-1~1\1571\STABIL~1\TT3~1.03\T15PS1A.PL2 Run By: BPG 3/25/2003 11:11AM

#	FS
a	**1.38**
b	1.38
c	1.40
d	1.40
e	1.41
f	1.42
g	1.43
h	1.46
i	1.47
j	1.47

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
CompFill	1	130.0	135.0	250.0	29.0	W1
Qt	2	120.0	125.0	50.0	30.0	W1
TQs-Xbd	3	130.0	135.0	Aniso	Aniso	W1

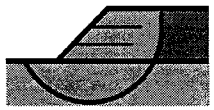
Load	Value
Horiz Eqk	0.150 g<



PCSTABL5M/si FSmin=1.38

Safety Factors Are Calculated By The Modified Janbu Method for the case of c & phi both > 0

STED



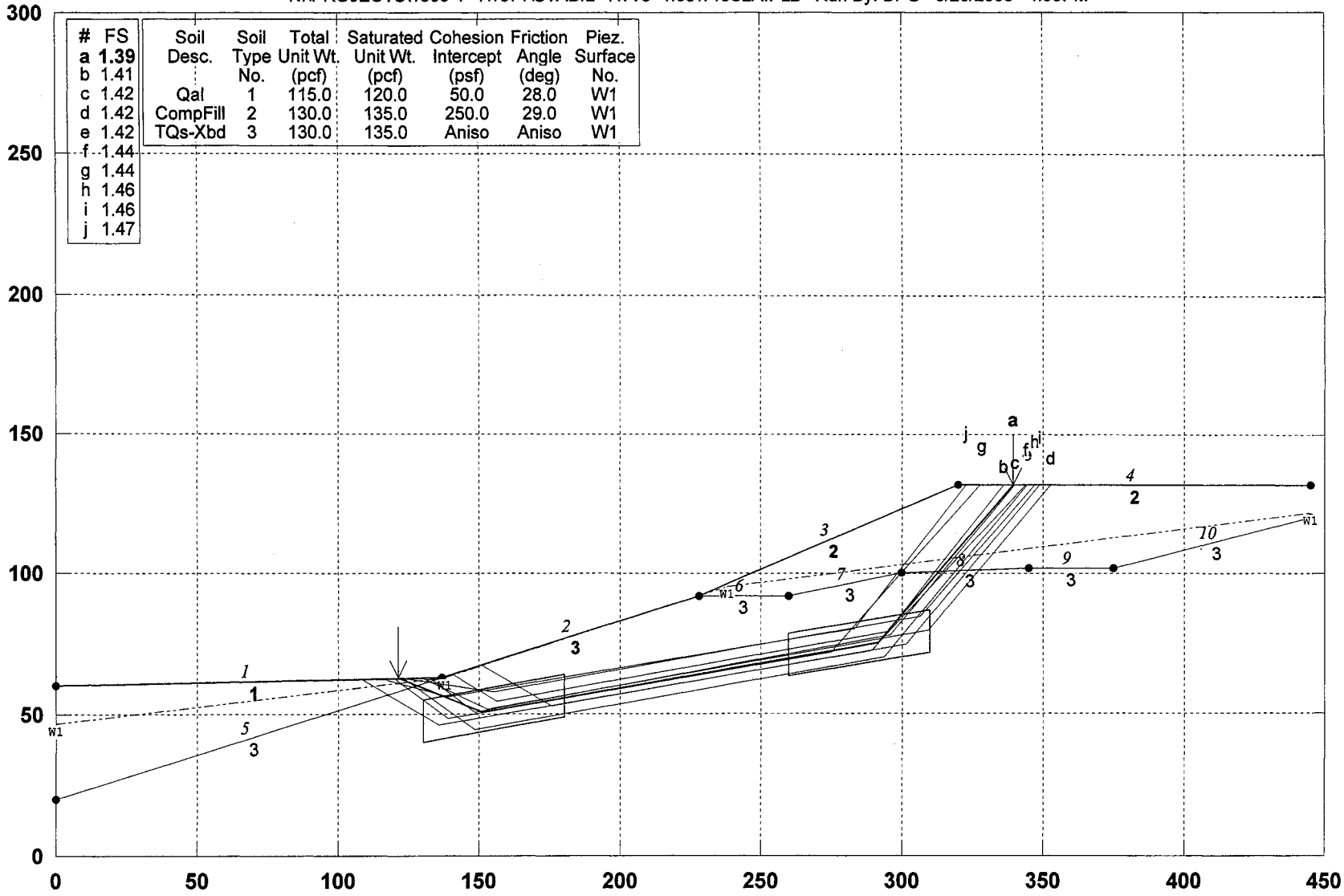
RUN # 29

TT 53425, 15-15', CS-17 Fill Over TQs Cut As Designed; Static

N:\PROJECTS\1500-1~1\1571\STABIL~1\TT3~1.03\T15S2A.PL2 Run By: BPG 3/26/2003 4:59PM

#	FS
a	1.39
b	1.41
c	1.42
d	1.42
e	1.42
f	1.44
g	1.44
h	1.46
i	1.46
j	1.47

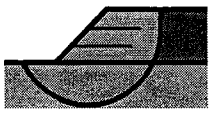
Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
Qal	1	115.0	120.0	50.0	28.0	W1
CompFill	2	130.0	135.0	250.0	29.0	W1
TQs-Xbd	3	130.0	135.0	Aniso	Aniso	W1



PCSTABL5M/si FSmin=1.39

Safety Factors Are Calculated By The Modified Janbu Method

STED



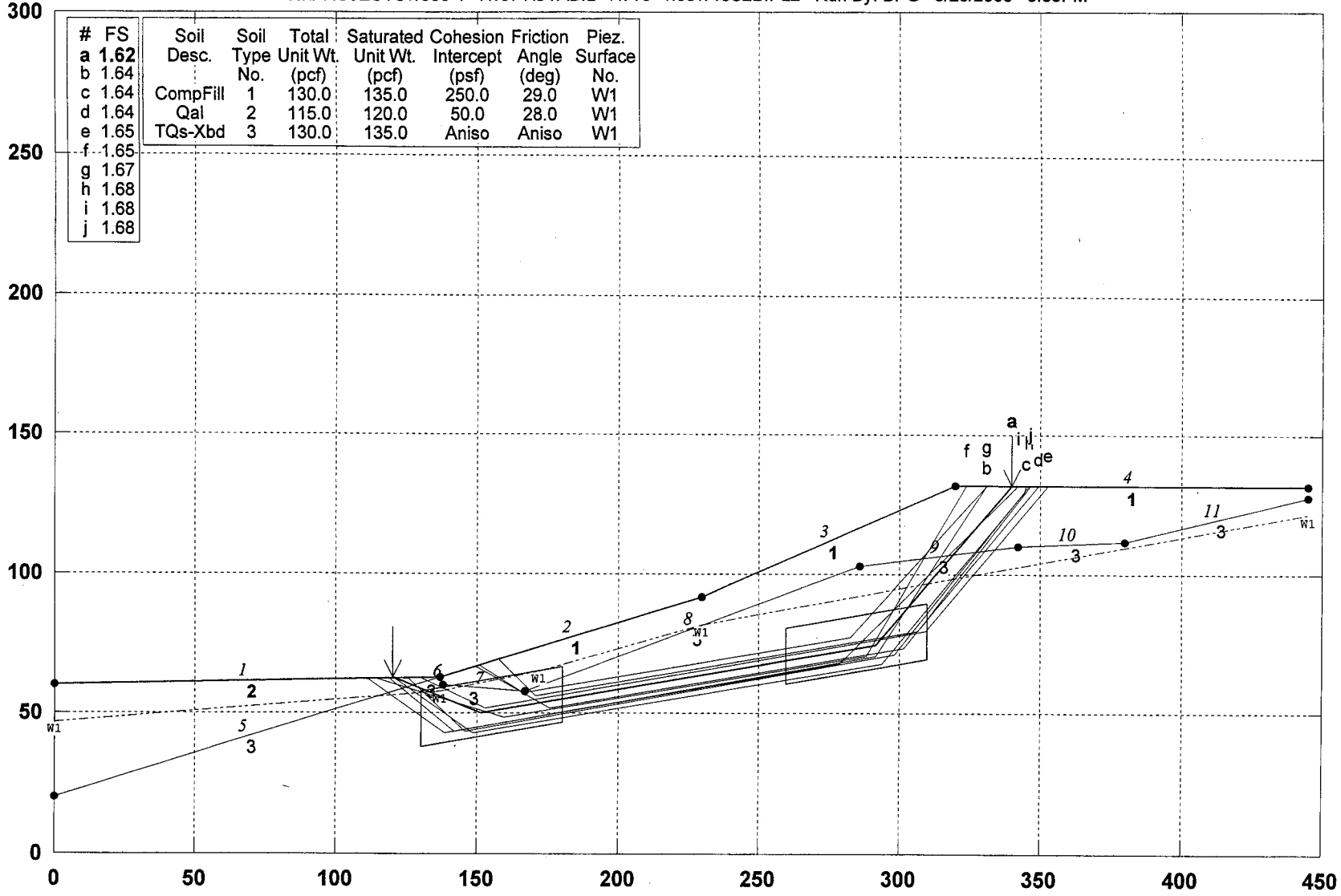
RUN #30

TT 53425; 15-15', CS-17 with 30' Buttress on Fill over TQs Slope; Static

N:\PROJECTS\1500-1~1\1571\STABIL~1\TT3~1.03\T15S2B.PL2 Run By: BPG 3/26/2003 5:33PM

#	FS
a	1.62
b	1.64
c	1.64
d	1.64
e	1.65
f	1.65
g	1.67
h	1.68
i	1.68
j	1.68

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
CompFill	1	130.0	135.0	250.0	29.0	W1
Qal	2	115.0	120.0	50.0	28.0	W1
TQs-Xbd	3	130.0	135.0	Aniso	Aniso	W1



PCSTABL5M/si FSmin=1.62

Safety Factors Are Calculated By The Modified Janbu Method

STED

RUN #31

```
                    ** PCSTABL5M **
                          by
                   Purdue University
              --Slope Stability Analysis--
            Simplified Janbu, Simplified Bishop
              or Spencer`s Method of Slices
Run Date:                   3/26/2003
Time of Run:                5:33PM
Run By:                     BPG
Input Data Filename:        N:T15S2B.IN
Output Filename:            N:T15S2B.OUT
Unit:                       ENGLISH
Plotted Output Filename:    N:T15S2B.PLT
PROBLEM DESCRIPTION   TT 53425; 15-15', CS-17 with 30' Buttres
                      s on Fill over TQs Slope; Static
BOUNDARY COORDINATES
     Note: User origin value specified.
     Add 0.00 to X-values and 0.00 to Y-values listed.

    4 Top   Boundaries
   11 Total Boundaries
Boundary     X-Left     Y-Left    X-Right    Y-Right    Soil Type
   No.         (ft)       (ft)       (ft)       (ft)    Below Bnd
    1          .00      60.00     137.00      63.00        2
    2       137.00      63.00     230.00      92.00        1
    3       230.00      92.00     320.00     132.00        1
    4       320.00     132.00     445.00     132.00        1
    5          .00      20.00     137.00      63.00        3
    6       137.00      63.00     138.00      60.00        3
    7       138.00      60.00     167.00      58.00        3
    8       167.00      58.00     286.00     103.00        3
    9       286.00     103.00     342.00     110.00        3
   10       342.00     110.00     380.00     112.00        3
   11       380.00     112.00     445.00     128.00        3
ISOTROPIC SOIL PARAMETERS
  3 Type(s) of Soil
Soil  Total  Saturated  Cohesion Friction   Pore   Pressure   Piez.
Type Unit Wt. Unit Wt. Intercept   Angle  Pressure Constant Surface
 No.  (pcf)    (pcf)     (psf)     (deg)   Param.    (psf)    No.
  1   130.0    135.0     250.0     29.0     .00        .0      1
  2   115.0    120.0      50.0     28.0     .00        .0      1
  3   130.0    135.0     400.0     38.0     .00        .0      1
ANISOTROPIC STRENGTH PARAMETERS
    1 soil type(s)
Soil Type  3 Is Anisotropic
Number Of Direction Ranges Specified =  3
Direction    Counterclockwise     Cohesion     Friction
  Range       Direction Limit    Intercept      Angle
   No.            (deg)            (psf)        (deg)
    1              9.5             400.0         38.0
    2             10.5             450.0         19.0
    3             90.0             400.0         38.0
1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED
Unit Weight of Water =  62.40
Piezometric Surface No.  1 Specified by  5 Coordinate Points
  Point      X-Water     Y-Water
   No.         (ft)        (ft)
    1          .00       46.48
    2       137.00       58.00
    3       172.00       65.00
    4       230.00       82.00
    5       445.00      122.00
A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Sliding Block Surfaces, Has Been
Specified.
400 Trial Surfaces Have Been Generated.
2 Boxes Specified For Generation Of Central Block Base
```

RUN #31

Length Of Line Segments For Active And Passive Portions Of
Sliding Block Is 80.0

Box No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Height (ft)
1	130.00	47.76	180.00	56.58	20.00
2	260.00	70.68	310.00	79.50	20.00

Factor Of Safety Calculation Has Gone Through Ten Iterations
The Trial Failure Surface In Question Is Defined
By The Following 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	160.83	70.43
2	167.50	64.01
3	296.01	67.36
4	298.66	122.52

Factor Of Safety For The Preceding Specified Surface = 5.830
Factor Of Safety Calculation Has Gone Through Ten Iterations
The Trial Failure Surface In Question Is Defined
By The Following 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	137.07	63.02
2	156.79	53.17
3	260.99	64.53
4	261.88	106.17

Factor Of Safety For The Preceding Specified Surface = 6.246
Factor Of Safety Calculation Has Gone Through Ten Iterations
The Trial Failure Surface In Question Is Defined
By The Following 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	137.74	63.23
2	152.47	52.12
3	297.88	72.56
4	298.22	122.32

Factor Of Safety For The Preceding Specified Surface = 5.951
Factor Of Safety Calculation Has Gone Through Ten Iterations
The Trial Failure Surface In Question Is Defined
By The Following 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	159.76	70.10
2	169.46	60.98
3	307.06	79.41
4	308.83	127.04

Factor Of Safety For The Preceding Specified Surface = 4.836
Factor Of Safety Calculation Has Gone Through Ten Iterations
The Trial Failure Surface In Question Is Defined
By The Following 5 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	39.06	60.86
2	64.37	47.68
3	144.08	40.94
4	297.01	68.05
5	297.92	122.19

Factor Of Safety For The Preceding Specified Surface = 3.387
Factor Of Safety Calculation Has Gone Through Ten Iterations
The Trial Failure Surface In Question Is Defined
By The Following 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	128.34	62.81
2	146.28	45.88
3	271.47	68.88
4	272.00	110.67

Factor Of Safety For The Preceding Specified Surface = 3.355

RUN #31

Factor Of Safety Calculation Has Gone Through Ten Iterations
The Trial Failure Surface In Question Is Defined
By The Following 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	117.91	62.58
2	164.95	56.38
3	298.44	80.26
4	298.64	122.50

Factor Of Safety For The Preceding Specified Surface = 3.384
Factor Of Safety Calculation Has Gone Through Ten Iterations
The Trial Failure Surface In Question Is Defined
By The Following 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	130.18	62.85
2	158.76	50.14
3	272.03	76.59
4	272.39	110.84

Factor Of Safety For The Preceding Specified Surface = 4.651
Following Are Displayed The Ten Most Critical Of The Trial Failure Surfaces Examined. They Are Ordered - Most Critical First.
* * Safety Factors Are Calculated By The Modified Janbu Method * *
Failure Surface Specified By 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	120.42	62.64
2	151.13	50.22
3	291.26	74.80
4	339.62	132.00

*** 1.620 ***

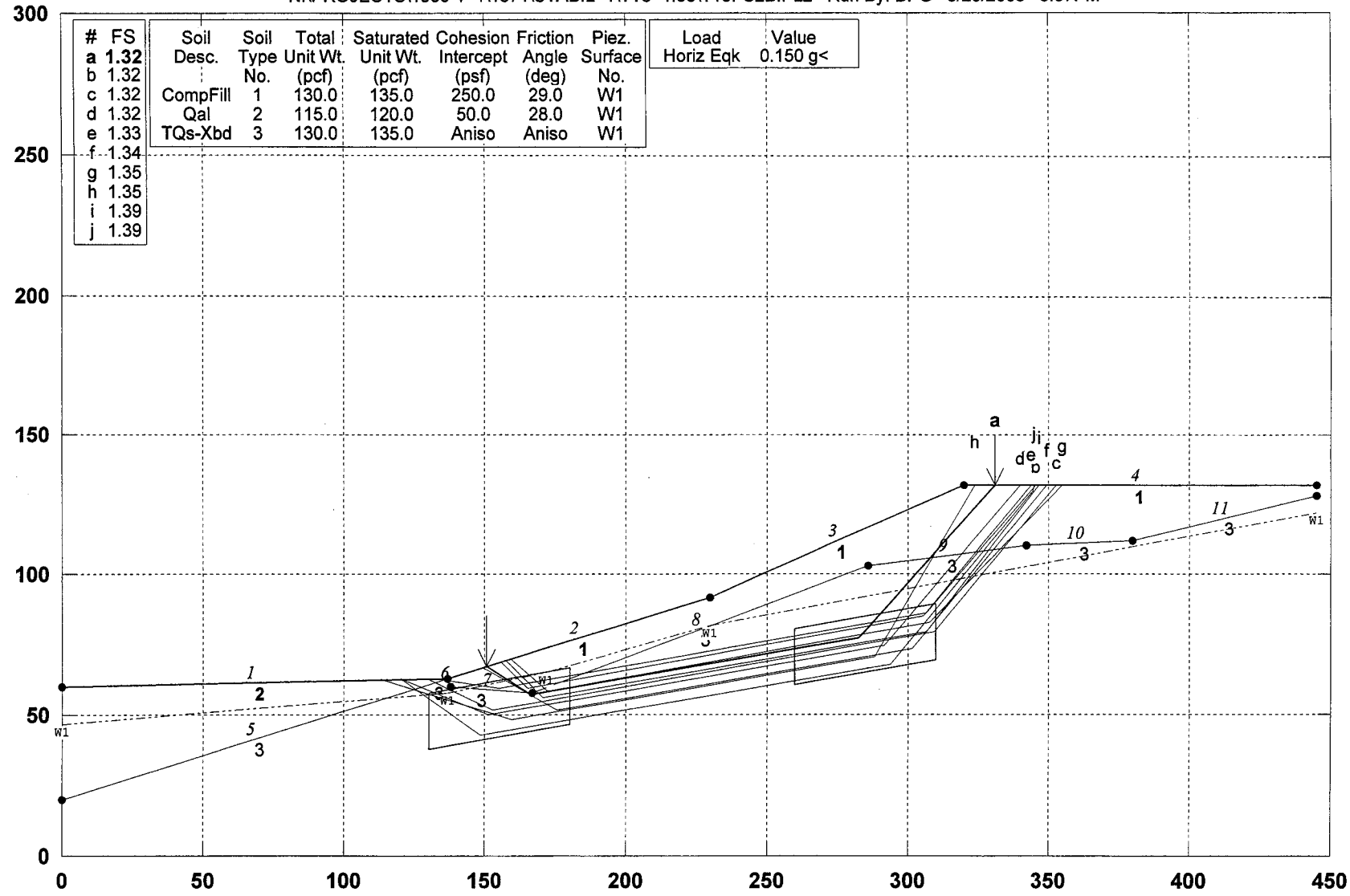
Individual data on the 16 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	6.7	1113.0	.0	.0	.0	.0	.0	.0	.0
2	5.6	2791.8	.0	.0	.0	.0	.0	.0	.0
3	4.2	3377.0	.0	293.8	.0	.0	.0	.0	.0
4	1.0	977.2	.0	156.5	.0	.0	.0	.0	.0
5	6.7	9012.8	.0	2074.9	.0	.0	.0	.0	.0
6	6.4	12724.9	.0	3680.8	.0	.0	.0	.0	.0
7	15.9	38544.0	.0	10655.8	.0	.0	.0	.0	.0
8	5.0	13073.3	.0	3436.4	.0	.0	.0	.0	.0
9	58.0	184954.3	.0	51298.4	.0	.0	.0	.0	.0
10	.9	3433.5	.0	1027.4	.0	.0	.0	.0	.0
11	55.1	259898.9	.0	62625.0	.0	.0	.0	.0	.0
12	5.3	30372.8	.0	6084.6	.0	.0	.0	.0	.0
13	18.7	91930.9	.0	16494.0	.0	.0	.0	.0	.0
14	8.6	30792.3	.0	.0	.0	.0	.0	.0	.0
15	1.5	4493.0	.0	.0	.0	.0	.0	.0	.0
16	19.6	29607.2	.0	.0	.0	.0	.0	.0	.0

RUN #31

TT 53425 15-15', CS-17 Fill Over TQs Slope w 30' Buttress; Pseudo-Static

N:\PROJECTS\1500-1~1\1571\STABIL~1\TT3~1.03\T15PS2B.PL2 Run By: BPG 3/26/2003 5:37PM



PCSTABL5M/si FSmin=1.32

Safety Factors Are Calculated By The Modified Janbu Method for the case of c & phi both > 0

STED

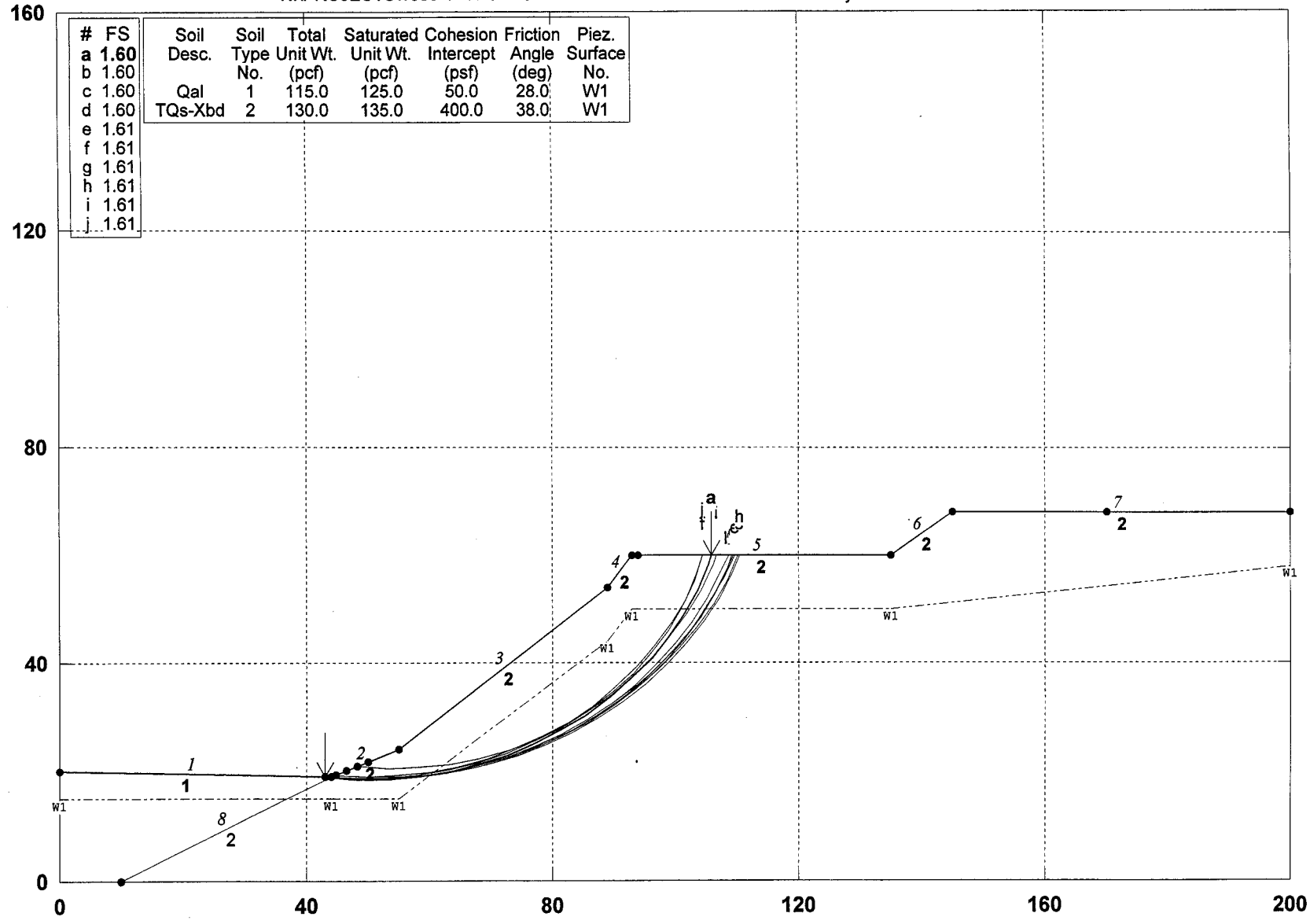
RUN #31

TTr 53425, 16-16', 49' TQs River Bank Cut 10' for Bike Path; Static

N:\PROJECTS\1500-1~1\1571\STABIL~1\TT3~1.03\T16S1A.PL2 Run By: BPG 3/26/2003 5:43PM

#	FS
a	1.60
b	1.60
c	1.60
d	1.60
e	1.61
f	1.61
g	1.61
h	1.61
i	1.61
j	1.61

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
Qal	1	115.0	125.0	50.0	28.0	W1
TQs-Xbd	2	130.0	135.0	400.0	38.0	W1



PCSTABL5M/si FSmin=1.60

Safety Factors Are Calculated By The Modified Janbu Method for the case of c & phi both > 0

STED

RUN #32

** PCSTABL5M **
by
Purdue University
--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer`s Method of Slices

Run Date: 3/26/2003
Time of Run: 5:43PM
Run By: BPG
Input Data Filename: N:t16s1a.in
Output Filename: N:t16s1a.OUT
Unit: ENGLISH
Plotted Output Filename: N:t16s1a.PLT
PROBLEM DESCRIPTION TTr 53425, 16-16', 49' TQs River Bank Cu
t 10' for Bike Path; Static

BOUNDARY COORDINATES
Note: User origin value specified.
Add 0.00 to X-values and 0.00 to Y-values listed.

7 Top Boundaries
8 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	.00	20.00	44.00	19.00	1
2	44.00	19.00	55.00	24.00	2
3	55.00	24.00	89.00	54.00	2
4	89.00	54.00	93.00	60.00	2
5	93.00	60.00	135.00	60.00	2
6	135.00	60.00	145.00	68.00	2
7	145.00	68.00	200.00	68.00	2
8	10.00	.00	44.00	19.00	2

ISOTROPIC SOIL PARAMETERS
2 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	115.0	125.0	50.0	28.0	.00	.0	1
2	130.0	135.0	400.0	38.0	.00	.0	1

1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED
Unit Weight of Water = 62.40
Piezometric Surface No. 1 Specified by 7 Coordinate Points

Point No.	X-Water (ft)	Y-Water (ft)
1	.00	15.00
2	44.00	15.00
3	55.00	15.00
4	89.00	44.00
5	93.00	50.00
6	135.00	50.00
7	200.00	58.00

A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Circular Surfaces, Has Been Specified.
Janbus Empirical Coef. is being used for the case of c & phi both > 0
500 Trial Surfaces Have Been Generated.
100 Surfaces Initiate From Each Of 5 Points Equally Spaced
Along The Ground Surface Between X = 43.00 ft.
and X = 50.00 ft.
Each Surface Terminates Between X = 94.00 ft.
and X = 170.00 ft.
Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is Y = 10.00 ft.
5.00 ft. Line Segments Define Each Trial Failure Surface.
Restrictions Have Been Imposed Upon The Angle Of Initiation.
The Angle Has Been Restricted Between The Angles Of -5.0
And 40.0 deg.
Following Are Displayed The Ten Most Critical Of The Trial
Failure Surfaces Examined. They Are Ordered - Most Critical

RUN #32

First.
* * Safety Factors Are Calculated By The Modified Janbu Method * *
Failure Surface Specified By 18 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	43.00	19.02
2	47.98	18.59
3	52.98	18.59
4	57.96	19.01
5	62.89	19.87
6	67.72	21.14
7	72.43	22.83
8	76.98	24.91
9	81.32	27.38
10	85.44	30.22
11	89.30	33.40
12	92.87	36.89
13	96.13	40.69
14	99.05	44.75
15	101.61	49.04
16	103.79	53.54
17	105.57	58.21
18	106.08	60.00

*** 1.602 ***

Individual data on the 24 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	.9	3.0	.0	.0	.0	.0	.0	.0	.0
2	.1	.7	.0	.0	.0	.0	.0	.0	.0
3	4.0	591.4	.0	.0	.0	.0	.0	.0	.0
4	5.0	2183.3	.0	.0	.0	.0	.0	.0	.0
5	2.0	1277.6	.0	.0	.0	.0	.0	.0	.0
6	3.0	2473.9	.0	.0	.0	.0	.0	.0	.0
7	2.2	2379.8	.0	.0	.0	.0	.0	.0	.0
8	2.7	3617.5	.0	127.6	.0	.0	.0	.0	.0
9	4.8	7975.7	.0	809.6	.0	.0	.0	.0	.0
10	4.7	9482.7	.0	1447.1	.0	.0	.0	.0	.0
11	4.5	10488.8	.0	1954.3	.0	.0	.0	.0	.0
12	4.3	10991.7	.0	2327.4	.0	.0	.0	.0	.0
13	4.1	11009.6	.0	2563.7	.0	.0	.0	.0	.0
14	3.6	9746.7	.0	2451.7	.0	.0	.0	.0	.0
15	.3	835.6	.0	175.3	.0	.0	.0	.0	.0
16	3.6	10350.6	.0	2445.6	.0	.0	.0	.0	.0
17	.1	378.7	.0	101.5	.0	.0	.0	.0	.0
18	3.1	8781.3	.0	3341.0	.0	.0	.0	.0	.0
19	2.9	6664.6	.0	2272.3	.0	.0	.0	.0	.0
20	2.6	4399.0	.0	968.8	.0	.0	.0	.0	.0
21	.5	632.8	.0	31.8	.0	.0	.0	.0	.0
22	1.7	1835.4	.0	.0	.0	.0	.0	.0	.0
23	1.8	956.0	.0	.0	.0	.0	.0	.0	.0
24	.5	59.3	.0	.0	.0	.0	.0	.0	.0

RUN #32

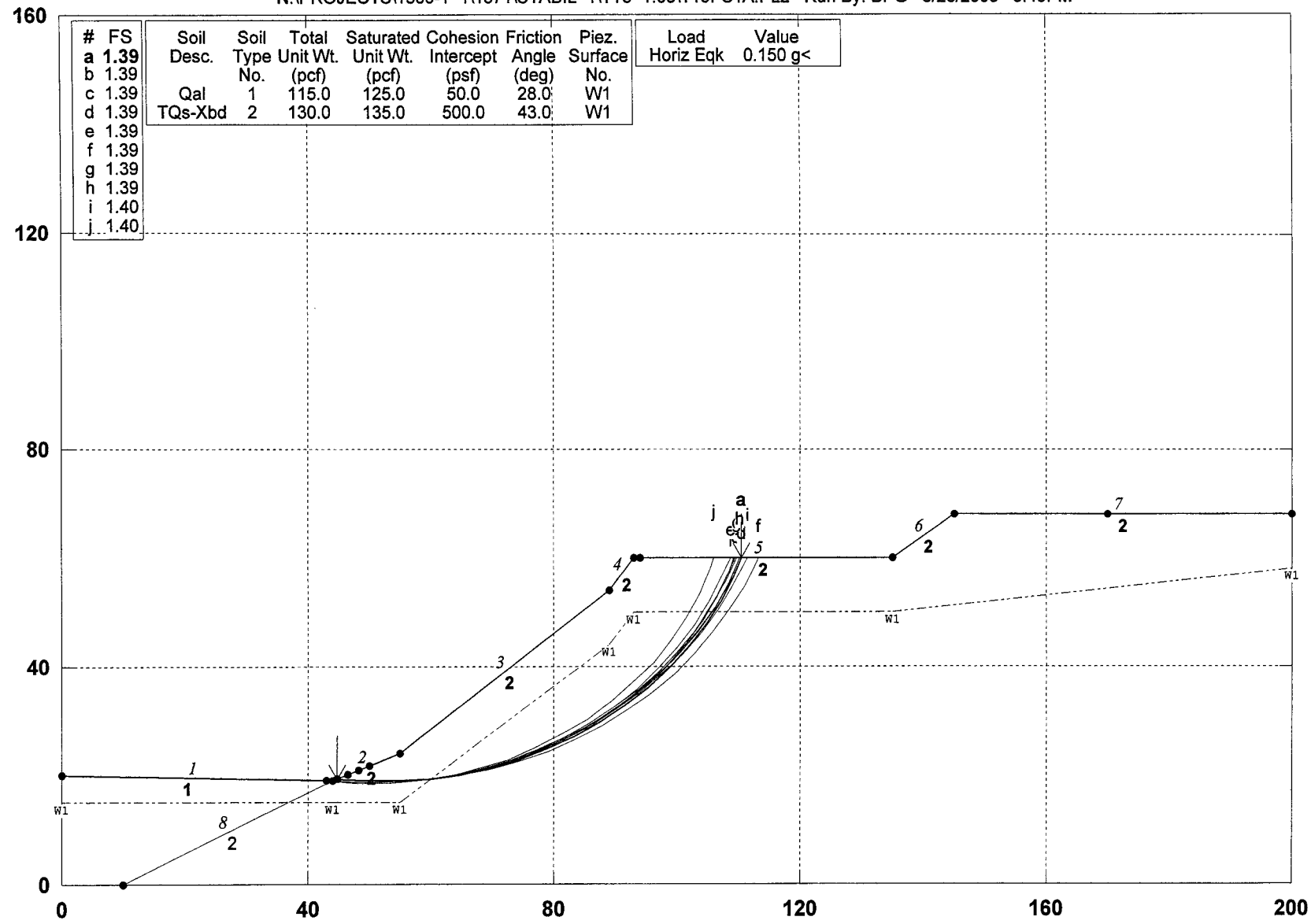
TTr 53425 - X-Section 16; 49' River Bankw Bike Path, TQs Sideslope; PseudoStatc

N:\PROJECTS\1500-1~1\1571\STABIL~1\TT3~1.03\T16PS1A.PL2 Run By: BPG 3/26/2003 5:45PM

#	FS
a	1.39
b	1.39
c	1.39
d	1.39
e	1.39
f	1.39
g	1.39
h	1.39
i	1.40
j	1.40

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
Qal	1	115.0	125.0	50.0	28.0	W1
TQs-Xbd	2	130.0	135.0	500.0	43.0	W1

Load	Value
Horiz Eqk	0.150 g<



PCSTABL5M/si FSmin=1.39

Safety Factors Are Calculated By The Modified Janbu Method

STED

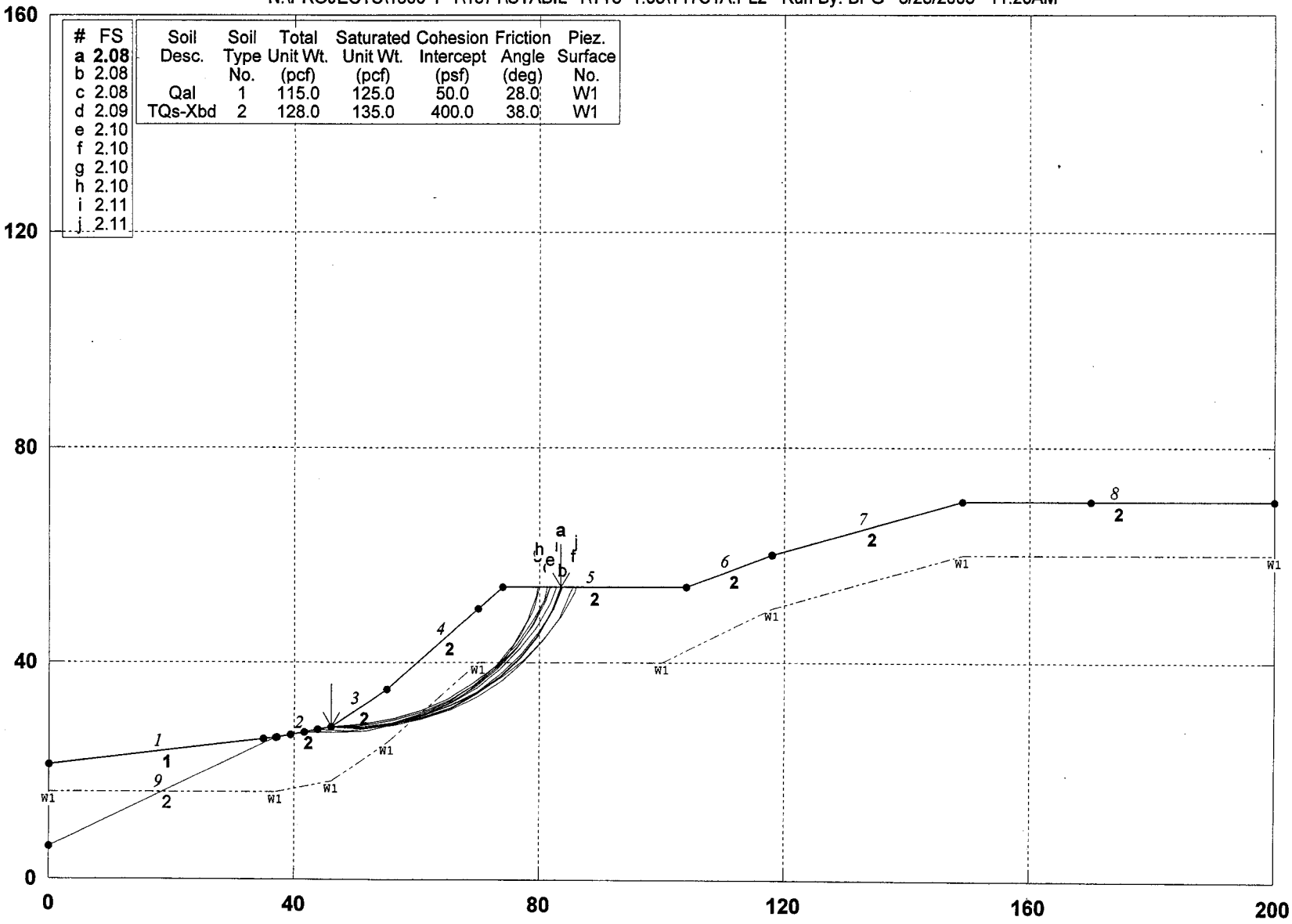
RUN #2.1

TT 53425, 17-17', 49' TQs River Bank w 16' Cut for Bike Path; Static

N:\PROJECTS\1500-1~1\1571\STABIL~1\TT3~1.03\T17S1A.PL2 Run By: BPG 3/25/2003 11:20AM

#	FS
a	2.08
b	2.08
c	2.08
d	2.09
e	2.10
f	2.10
g	2.10
h	2.10
i	2.11
j	2.11

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
Qal	1	115.0	125.0	50.0	28.0	W1
TQs-Xbd	2	128.0	135.0	400.0	38.0	W1



PCSTABL5M/si FSmin=2.08

Safety Factors Are Calculated By The Modified Janbu Method for the case of c & phi both > 0

STED

RUN #33

```
                    ** PCSTABL5M **
                          by
                    Purdue University
               --Slope Stability Analysis--
          Simplified Janbu, Simplified Bishop
             or Spencer`s Method of Slices
Run Date:                   3/25/2003
Time of Run:                11:20AM
Run By:                     BPG
Input Data Filename:        N:t17s1a.in
Output Filename:            N:t17s1a.OUT
Unit:                       ENGLISH
Plotted Output Filename:    N:t17s1a.PLT
PROBLEM DESCRIPTION    TT 53425, 17-17', 49' TQs River Bank w
                       16' Cut for Bike Path; Static
BOUNDARY COORDINATES
     Note: User origin value specified.
     Add 0.00 to X-values and 0.00 to Y-values listed.

    8 Top   Boundaries
    9 Total Boundaries
Boundary     X-Left      Y-Left     X-Right     Y-Right     Soil Type
   No.        (ft)        (ft)        (ft)        (ft)     Below Bnd
    1          .00       21.00       37.00       26.00         1
    2        37.00       26.00       46.00       28.00         2
    3        46.00       28.00       55.00       35.00         2
    4        55.00       35.00       74.00       54.00         2
    5        74.00       54.00      104.00       54.00         2
    6       104.00       54.00      118.00       60.00         2
    7       118.00       60.00      149.00       70.00         2
    8       149.00       70.00      200.00       70.00         2
    9          .00        6.00       37.00       26.00         2
ISOTROPIC SOIL PARAMETERS
  2 Type(s) of Soil
Soil  Total  Saturated  Cohesion Friction   Pore   Pressure   Piez.
Type Unit Wt. Unit Wt. Intercept   Angle  Pressure Constant Surface
 No.  (pcf)     (pcf)     (psf)     (deg)   Param.     (psf)    No.
  1   115.0    125.0      50.0      28.0     .00        .0       1
  2   128.0    135.0     400.0      38.0     .00        .0       1
1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED
Unit Weight of Water =  62.40
Piezometric Surface No.  1 Specified by  9 Coordinate Points
  Point      X-Water     Y-Water
   No.         (ft)        (ft)
    1          .00       16.00
    2        37.00       16.00
    3        46.00       18.00
    4        55.00       25.00
    5        70.00       40.00
    6       100.00       40.00
    7       118.00       50.00
    8       149.00       60.00
    9       200.00       60.00
A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Circular Surfaces, Has Been Specified.
Janbus Empirical Coef. is being used for the case of  c & phi both > 0
600 Trial Surfaces Have Been Generated.
100 Surfaces Initiate From Each Of  6 Points Equally Spaced
Along The Ground Surface Between  X =  35.00 ft.
                                  and  X =  46.00 ft.
Each Surface Terminates Between   X =  70.00 ft.
                                  and  X = 170.00 ft.
Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is  Y =  1.00 ft.
 5.00 ft. Line Segments Define Each Trial Failure Surface.
Restrictions Have Been Imposed Upon The Angle Of Initiation.
The Angle Has Been Restricted Between The Angles Of  -2.0
```

RUN #33

And 15.0 deg.
Following Are Displayed The Ten Most Critical Of The Trial Failure Surfaces Examined. They Are Ordered - Most Critical First.
* * Safety Factors Are Calculated By The Modified Janbu Method * *
Failure Surface Specified By 11 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	46.00	28.00
2	51.00	27.83
3	55.97	28.38
4	60.81	29.63
5	65.42	31.56
6	69.71	34.13
7	73.59	37.28
8	76.97	40.96
9	79.80	45.09
10	82.01	49.57
11	83.44	54.00
***	2.081	***

Individual data on the 15 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	5.0	1297.5	.0	.0	.0	.0	.0	.0	.0
2	4.0	2763.4	.0	.0	.0	.0	.0	.0	.0
3	1.0	887.1	.0	.0	.0	.0	.0	.0	.0
4	3.2	3655.1	.0	.0	.0	.0	.0	.0	.0
5	1.6	2166.9	.0	45.6	.0	.0	.0	.0	.0
6	4.6	7455.3	.0	590.6	.0	.0	.0	.0	.0
7	4.3	8190.8	.0	1105.7	.0	.0	.0	.0	.0
8	.3	587.0	.0	98.0	.0	.0	.0	.0	.0
9	3.6	7441.2	.0	1206.4	.0	.0	.0	.0	.0
10	.4	865.5	.0	94.6	.0	.0	.0	.0	.0
11	2.1	4067.2	.0	218.7	.0	.0	.0	.0	.0
12	.9	1530.1	.0	.0	.0	.0	.0	.0	.0
13	2.8	3970.7	.0	.0	.0	.0	.0	.0	.0
14	2.2	1884.8	.0	.0	.0	.0	.0	.0	.0
15	1.4	407.2	.0	.0	.0	.0	.0	.0	.0

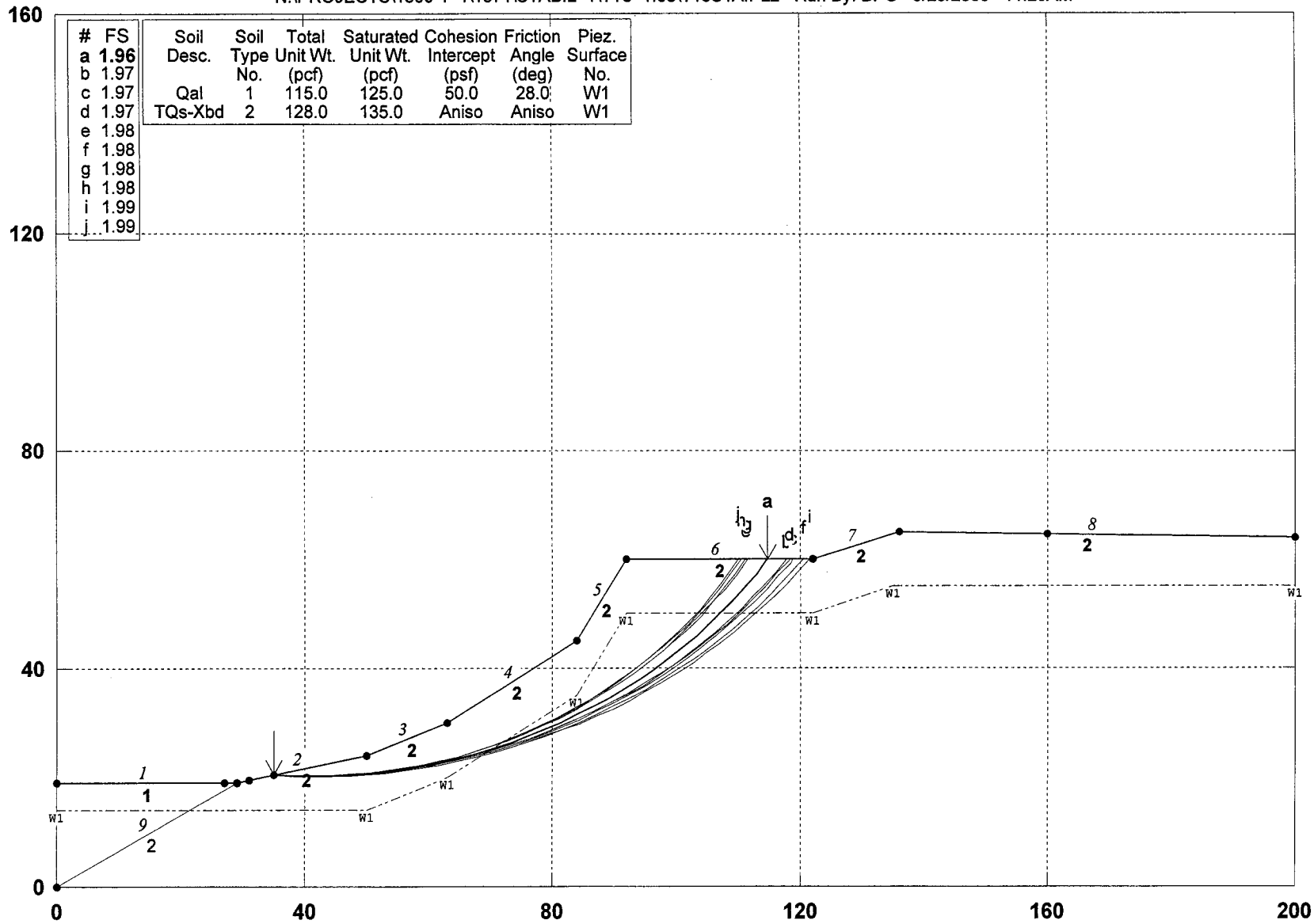
DWN #33

TTr 53425 - X-Section 18'; 45' TQs RiverBank Slope w Bike Path; Static

N:\PROJECTS\1500-1~1\1571\STABIL~1\TT3~1.03\T18S1A.PL2 Run By: BPG 3/25/2003 11:25AM

#	FS
a	1.96
b	1.97
c	1.97
d	1.97
e	1.98
f	1.98
g	1.98
h	1.98
i	1.99
j	1.99

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
Qal	1	115.0	125.0	50.0	28.0	W1
TQs-Xbd	2	128.0	135.0	Aniso	Aniso	W1



PCSTABL5M/si FSmin=1.96

Safety Factors Are Calculated By The Modified Janbu Method for the case of c & phi both > 0

STED

RUN #34

** PCSTABL5M **
by
Purdue University
--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer`s Method of Slices

Run Date: 3/25/2003
Time of Run: 11:25AM
Run By: BPG
Input Data Filename: N:t18s1a.in
Output Filename: N:t18s1a.OUT
Unit: ENGLISH
Plotted Output Filename: N:t18s1a.PLT
PROBLEM DESCRIPTION TTr 53425 - X-Section 18'; 45' TQs River Bank Slope w Bike Path; Static

BOUNDARY COORDINATES
Note: User origin value specified.
Add 0.00 to X-values and 0.00 to Y-values listed.

8 Top Boundaries
9 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	.00	19.00	29.00	19.00	1
2	29.00	19.00	50.00	24.00	2
3	50.00	24.00	63.00	30.00	2
4	63.00	30.00	84.00	45.00	2
5	84.00	45.00	92.00	60.00	2
6	92.00	60.00	122.00	60.00	2
7	122.00	60.00	136.00	65.00	2
8	136.00	65.00	200.00	64.00	2
9	.00	.00	29.00	19.00	2

ISOTROPIC SOIL PARAMETERS
2 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	115.0	125.0	50.0	28.0	.00	.0	1
2	128.0	135.0	400.0	38.0	.00	.0	1

ANISOTROPIC STRENGTH PARAMETERS
1 soil type(s)
Soil Type 2 Is Anisotropic
Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	2.5	400.0	38.0
2	3.5	450.0	19.0
3	90.0	400.0	38.0

1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED
Unit Weight of Water = 62.40
Piezometric Surface No. 1 Specified by 8 Coordinate Points

Point No.	X-Water (ft)	Y-Water (ft)
1	.00	14.00
2	50.00	14.00
3	63.00	20.00
4	84.00	35.00
5	92.00	50.00
6	122.00	50.00
7	135.00	55.00
8	200.00	55.00

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Circular Surfaces, Has Been Specified.
Janbus Empirical Coef. is being used for the case of c & phi both > 0
900 Trial Surfaces Have Been Generated.
300 Surfaces Initiate From Each Of 3 Points Equally Spaced

RUN #34

Along The Ground Surface Between X = 27.00 ft.
and X = 35.00 ft.
Each Surface Terminates Between X = 92.00 ft.
and X = 160.00 ft.
Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is Y = 1.00 ft.
3.00 ft. Line Segments Define Each Trial Failure Surface.
Restrictions Have Been Imposed Upon The Angle Of Initiation.
The Angle Has Been Restricted Between The Angles Of -3.0
And 20.0 deg.
Following Are Displayed The Ten Most Critical Of The Trial Failure Surfaces Examined. They Are Ordered - Most Critical First.
* * Safety Factors Are Calculated By The Modified Janbu Method * *
Failure Surface Specified By 33 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	35.00	20.43
2	38.00	20.27
3	41.00	20.22
4	44.00	20.27
5	46.99	20.42
6	49.98	20.67
7	52.96	21.03
8	55.93	21.48
9	58.87	22.04
10	61.80	22.69
11	64.70	23.45
12	67.58	24.30
13	70.43	25.25
14	73.24	26.30
15	76.01	27.44
16	78.75	28.68
17	81.44	30.00
18	84.08	31.42
19	86.67	32.93
20	89.22	34.52
21	91.70	36.20
22	94.13	37.97
23	96.49	39.81
24	98.80	41.73
25	101.03	43.74
26	103.20	45.81
27	105.29	47.96
28	107.31	50.18
29	109.25	52.46
30	111.12	54.82
31	112.90	57.23
32	114.60	59.70
33	114.79	60.00
***	1.961	***

Individual data on the 38 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	3.0	166.5	.0	.0	.0	.0	.0	.0	.0
2	3.0	480.6	.0	.0	.0	.0	.0	.0	.0
3	3.0	755.6	.0	.0	.0	.0	.0	.0	.0
4	3.0	990.1	.0	.0	.0	.0	.0	.0	.0
5	3.0	1183.2	.0	.0	.0	.0	.0	.0	.0
6	.0	8.0	.0	.0	.0	.0	.0	.0	.0
7	3.0	1451.6	.0	.0	.0	.0	.0	.0	.0
8	3.0	1819.9	.0	.0	.0	.0	.0	.0	.0
9	2.9	2133.6	.0	.0	.0	.0	.0	.0	.0
10	2.9	2399.8	.0	.0	.0	.0	.0	.0	.0
11	1.2	1054.8	.0	.0	.0	.0	.0	.0	.0

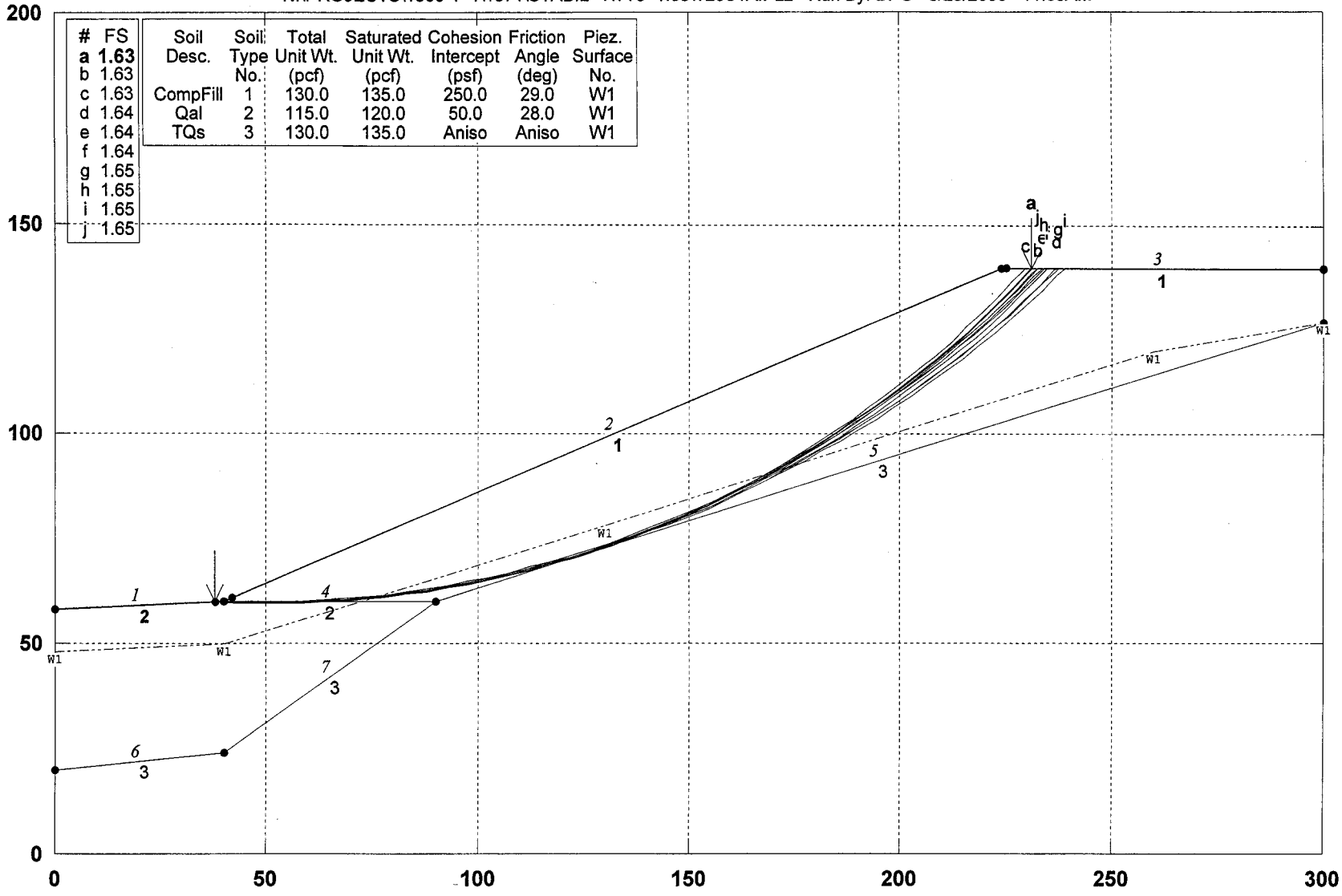
RUN #34

12	1.7	1610.3	.0	.0	.0	.0	.0	.0	.0
13	2.9	3080.9	.0	.0	.0	.0	.0	.0	.0
14	2.7	3290.2	.0	.0	.0	.0	.0	.0	.0
15	.1	173.7	.0	.2	.0	.0	.0	.0	.0
16	2.8	3799.1	.0	82.8	.0	.0	.0	.0	.0
17	2.8	4083.3	.0	223.0	.0	.0	.0	.0	.0
18	2.7	4308.8	.0	344.2	.0	.0	.0	.0	.0
19	2.7	4476.4	.0	446.3	.0	.0	.0	.0	.0
20	2.6	4445.6	.0	512.0	.0	.0	.0	.0	.0
21	.1	141.5	.0	12.7	.0	.0	.0	.0	.0
22	2.6	5175.6	.0	618.2	.0	.0	.0	.0	.0
23	2.5	6167.5	.0	991.3	.0	.0	.0	.0	.0
24	2.5	7043.6	.0	1342.9	.0	.0	.0	.0	.0
25	.3	913.1	.0	188.9	.0	.0	.0	.0	.0
26	2.1	6403.2	.0	2102.1	.0	.0	.0	.0	.0
27	2.4	6576.9	.0	2080.1	.0	.0	.0	.0	.0
28	2.3	5813.3	.0	1727.3	.0	.0	.0	.0	.0
29	2.2	5052.5	.0	1359.9	.0	.0	.0	.0	.0
30	2.2	4299.8	.0	978.3	.0	.0	.0	.0	.0
31	2.1	3560.1	.0	582.9	.0	.0	.0	.0	.0
32	1.9	2631.9	.0	175.5	.0	.0	.0	.0	.0
33	.2	206.8	.0	.0	.0	.0	.0	.0	.0
34	1.9	2158.2	.0	.0	.0	.0	.0	.0	.0
35	1.9	1517.5	.0	.0	.0	.0	.0	.0	.0
36	1.8	908.0	.0	.0	.0	.0	.0	.0	.0
37	1.7	334.3	.0	.0	.0	.0	.0	.0	.0
38	.2	3.7	.0	.0	.0	.0	.0	.0	.0

RUN #34

TT 53425; 20-20'; 80' 2:1 Fill Slope, Highest Planned; Static

N:\PROJECTS\1500-1~1\1571\STABIL~1\TT3~1.03\T20S1A.PL2 Run By: BPG 3/25/2003 11:35AM



PCSTABL5M/si FSmin=1.63

Safety Factors Are Calculated By The Modified Janbu Method for the case of c & phi both > 0

STED

RUN #35

```
                    ** PCSTABL5M **
                          by
                    Purdue University
               --Slope Stability Analysis--
           Simplified Janbu, Simplified Bishop
              or Spencer`s Method of Slices
 Run Date:                    3/25/2003
 Time of Run:                 11:35AM
 Run By:                      BPG
 Input Data Filename:         N:t20s1a.in
 Output Filename:             N:t20s1a.OUT
 Unit:                        ENGLISH
 Plotted Output Filename:     N:t20s1a.PLT
 PROBLEM DESCRIPTION    TT 53425; 20-20'; 80' 2:1 Fill Slope, Hi
                        ghest Planned; Static
 BOUNDARY COORDINATES
      Note: User origin value specified.
      Add 0.00 to X-values and 0.00 to Y-values listed.

     3 Top   Boundaries
     7 Total Boundaries
 Boundary     X-Left      Y-Left     X-Right     Y-Right     Soil Type
    No.         (ft)        (ft)        (ft)        (ft)     Below Bnd
     1           .00       58.00       40.00       60.00         2
     2         40.00       60.00      224.00      140.00         1
     3        224.00      140.00      300.00      140.00         1
     4         40.00       60.00       90.00       60.00         2
     5         90.00       60.00      300.00      127.00         3
     6           .00       20.00       40.00       24.00         3
     7         40.00       24.00       90.00       60.00         3
ISOTROPIC SOIL PARAMETERS
  3 Type(s) of Soil
 Soil  Total  Saturated  Cohesion Friction   Pore   Pressure   Piez.
 Type Unit Wt. Unit Wt. Intercept   Angle  Pressure Constant Surface
  No.  (pcf)    (pcf)     (psf)     (deg)   Param.    (psf)    No.
   1   130.0    135.0     250.0     29.0     .00        .0      1
   2   115.0    120.0      50.0     28.0     .00        .0      1
   3   130.0    135.0     400.0     38.0     .00        .0      1
ANISOTROPIC STRENGTH PARAMETERS
     1 soil type(s)
 Soil Type  3 Is Anisotropic
 Number Of Direction Ranges Specified =  3
 Direction    Counterclockwise     Cohesion     Friction
   Range       Direction Limit    Intercept      Angle
    No.            (deg)            (psf)        (deg)
     1              8.5             400.0         38.0
     2              9.5             450.0         19.0
     3             90.0             400.0         38.0
 1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED
 Unit Weight of Water =  62.40
 Piezometric Surface No.  1 Specified by  5 Coordinate Points
   Point      X-Water     Y-Water
    No.         (ft)        (ft)
     1           .00       48.00
     2         40.00       50.00
     3        130.00       78.00
     4        260.00      120.00
     5        300.00      127.00
 A Critical Failure Surface Searching Method, Using A Random
 Technique For Generating Circular Surfaces, Has Been Specified.
 Janbus Empirical Coef. is being used for the case of  c & phi both > 0
1200 Trial Surfaces Have Been Generated.
 400 Surfaces Initiate From Each Of  3 Points Equally Spaced
 Along The Ground Surface Between  X =  38.00 ft.
                                and  X =  42.00 ft.
 Each Surface Terminates Between   X = 225.00 ft.
                                and  X = 300.00 ft.
```

RUN #35

Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is Y = 50.00 ft.
5.00 ft. Line Segments Define Each Trial Failure Surface.
Restrictions Have Been Imposed Upon The Angle Of Initiation.
The Angle Has Been Restricted Between The Angles Of -5.0
And 24.0 deg.
Following Are Displayed The Ten Most Critical Of The Trial
Failure Surfaces Examined. They Are Ordered - Most Critical
First.
* * Safety Factors Are Calculated By The Modified Janbu Method * *
Failure Surface Specified By 45 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	38.00	59.90
2	43.00	59.69
3	47.99	59.58
4	52.99	59.57
5	57.99	59.67
6	62.99	59.87
7	67.98	60.17
8	72.96	60.58
9	77.94	61.09
10	82.90	61.70
11	87.85	62.42
12	92.78	63.23
13	97.70	64.15
14	102.59	65.17
15	107.46	66.29
16	112.31	67.51
17	117.14	68.83
18	121.93	70.25
19	126.69	71.77
20	131.43	73.39
21	136.12	75.10
22	140.78	76.91
23	145.41	78.82
24	149.99	80.82
25	154.53	82.92
26	159.02	85.10
27	163.47	87.39
28	167.87	89.76
29	172.22	92.22
30	176.52	94.77
31	180.77	97.42
32	184.96	100.14
33	189.09	102.96
34	193.17	105.86
35	197.18	108.84
36	201.13	111.90
37	205.02	115.05
38	208.84	118.27
39	212.59	121.58
40	216.28	124.96
41	219.89	128.41
42	223.43	131.94
43	226.90	135.54
44	230.29	139.21
45	230.99	140.00

*** 1.631 ***

Individual data on the 50 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	2.0	21.3	.0	.0	.0	.0	.0	.0	.0
2	3.0	339.4	.0	.0	.0	.0	.0	.0	.0
3	5.0	1763.7	.0	.0	.0	.0	.0	.0	.0

RIIN #35

4	5.0	3210.2	.0	.0	.0	.0	.0	.0	.0
5	5.0	4596.0	.0	.0	.0	.0	.0	.0	.0
6	5.0	5918.9	.0	.0	.0	.0	.0	.0	.0
7	2.1	2925.7	.0	.0	.0	.0	.0	.0	.0
8	2.9	4247.2	.0	.0	.0	.0	.0	.0	.0
9	5.0	8339.2	.0	.0	.0	.0	.0	.0	.0
10	1.6	2832.3	.0	.0	.0	.0	.0	.0	.0
11	3.4	6600.4	.0	73.1	.0	.0	.0	.0	.0
12	5.0	10464.7	.0	351.7	.0	.0	.0	.0	.0
13	4.9	11416.0	.0	613.8	.0	.0	.0	.0	.0
14	4.9	12284.5	.0	843.9	.0	.0	.0	.0	.0
15	4.9	13069.3	.0	1042.1	.0	.0	.0	.0	.0
16	4.9	13769.7	.0	1208.3	.0	.0	.0	.0	.0
17	4.9	14385.4	.0	1342.4	.0	.0	.0	.0	.0
18	4.8	14916.3	.0	1444.3	.0	.0	.0	.0	.0
19	4.8	15362.4	.0	1514.0	.0	.0	.0	.0	.0
20	4.8	15724.0	.0	1551.5	.0	.0	.0	.0	.0
21	4.8	16001.8	.0	1556.7	.0	.0	.0	.0	.0
22	3.3	11288.9	.0	1073.4	.0	.0	.0	.0	.0
23	1.4	4907.5	.0	455.6	.0	.0	.0	.0	.0
24	4.7	16309.6	.0	1479.1	.0	.0	.0	.0	.0
25	4.7	16342.3	.0	1404.5	.0	.0	.0	.0	.0
26	4.6	16295.7	.0	1297.8	.0	.0	.0	.0	.0
27	4.6	16171.1	.0	1158.9	.0	.0	.0	.0	.0
28	4.5	15970.5	.0	987.9	.0	.0	.0	.0	.0
29	4.5	15696.0	.0	784.9	.0	.0	.0	.0	.0
30	4.4	15349.9	.0	550.0	.0	.0	.0	.0	.0
31	4.4	14934.5	.0	283.2	.0	.0	.0	.0	.0
32	2.0	6565.9	.0	32.0	.0	.0	.0	.0	.0
33	2.4	7890.1	.0	.0	.0	.0	.0	.0	.0
34	4.3	13931.1	.0	.0	.0	.0	.0	.0	.0
35	4.2	13349.4	.0	.0	.0	.0	.0	.0	.0
36	4.2	12711.8	.0	.0	.0	.0	.0	.0	.0
37	4.1	12021.6	.0	.0	.0	.0	.0	.0	.0
38	4.1	11282.2	.0	.0	.0	.0	.0	.0	.0
39	4.0	10497.2	.0	.0	.0	.0	.0	.0	.0
40	4.0	9670.3	.0	.0	.0	.0	.0	.0	.0
41	3.9	8805.4	.0	.0	.0	.0	.0	.0	.0
42	3.8	7906.5	.0	.0	.0	.0	.0	.0	.0
43	3.8	6977.8	.0	.0	.0	.0	.0	.0	.0
44	3.7	6023.5	.0	.0	.0	.0	.0	.0	.0
45	3.6	5047.8	.0	.0	.0	.0	.0	.0	.0
46	3.5	4055.3	.0	.0	.0	.0	.0	.0	.0
47	.6	564.5	.0	.0	.0	.0	.0	.0	.0
48	2.9	2248.4	.0	.0	.0	.0	.0	.0	.0
49	3.4	1156.6	.0	.0	.0	.0	.0	.0	.0
50	.7	35.6	.0	.0	.0	.0	.0	.0	.0

RUN #35

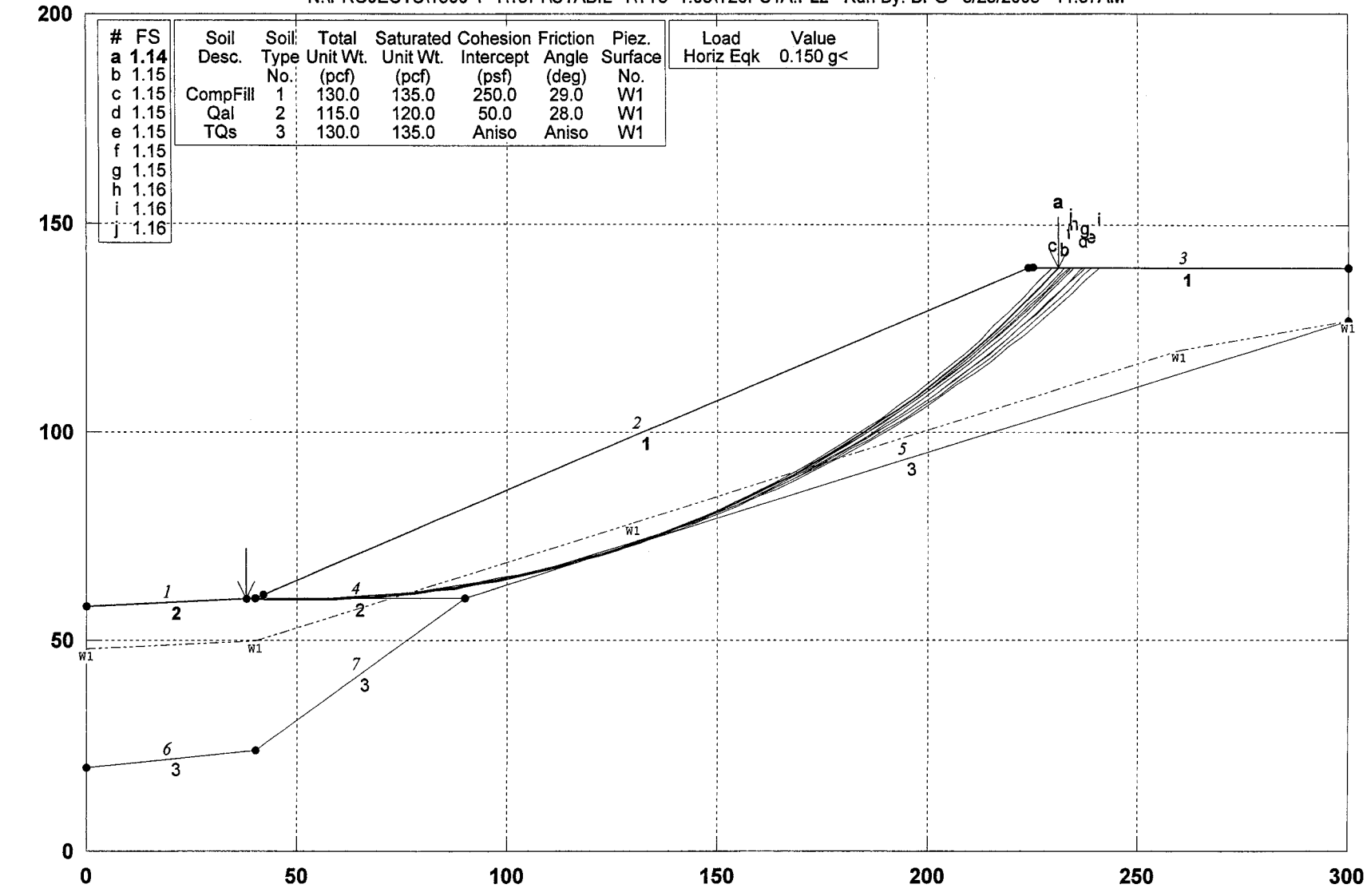
TT 53425; 20-20'; 80' 2:1 Fill Slope, Highest Planned; Pseudo-Static

N:\PROJECTS\1500-1~1\1571\STABIL~1\TT3~1.03\T20PS1A.PL2 Run By: BPG 3/25/2003 11:37AM

#	FS
a	1.14
b	1.15
c	1.15
d	1.15
e	1.15
f	1.15
g	1.15
h	1.16
i	1.16
j	1.16

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
CompFill	1	130.0	135.0	250.0	29.0	W1
Qal	2	115.0	120.0	50.0	28.0	W1
TQs	3	130.0	135.0	Aniso	Aniso	W1

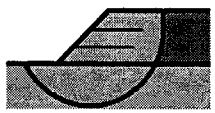
Load	Value
Horiz Eqk	0.150 g<



PCSTABL5M/si FSmin=1.14

Safety Factors Are Calculated By The Modified Janbu Method for the case of c & phi both > 0

STED



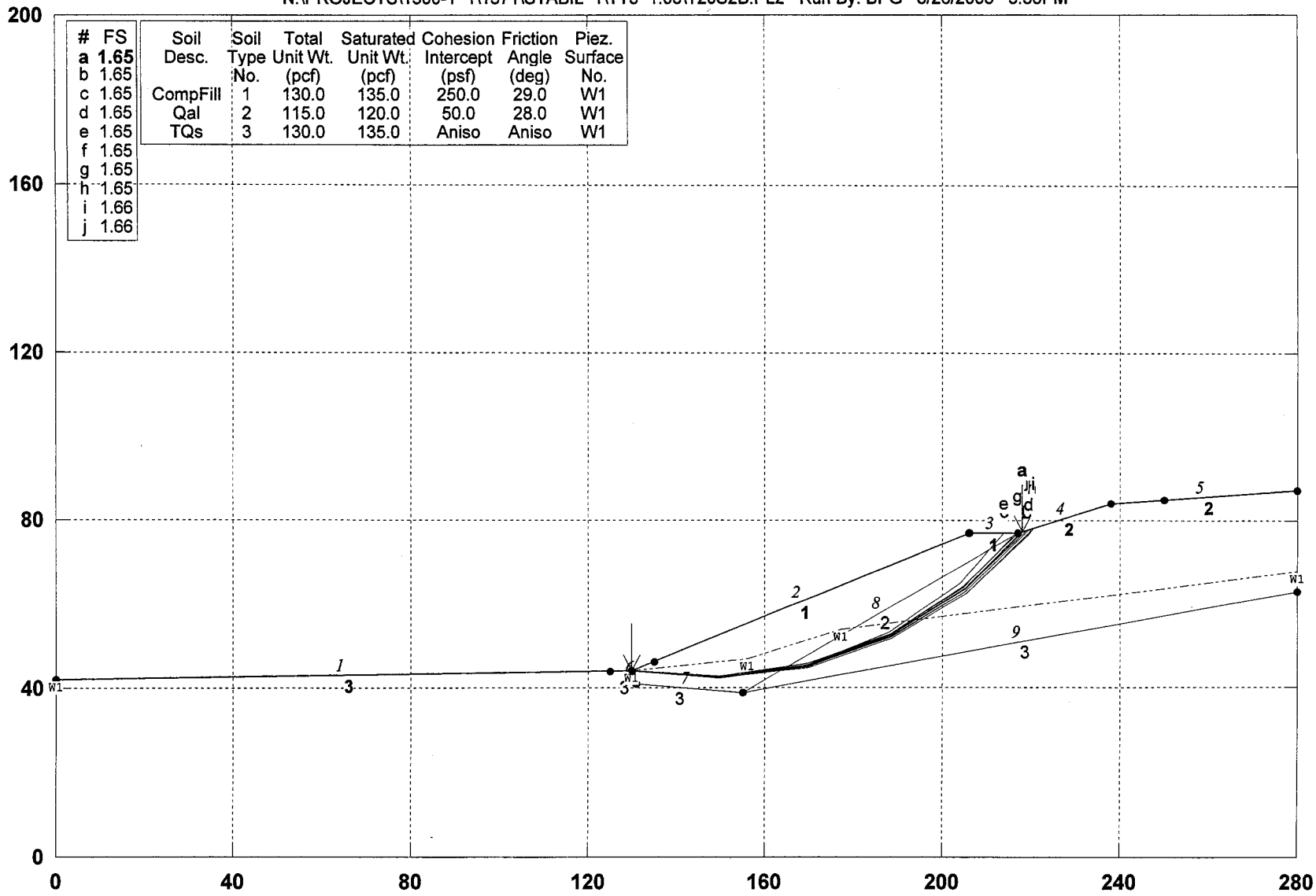
RUN #95

TT 53425, 20-20', CS-16, 25' Stab Fill on Qt over TQs Cut; Static

N:\PROJECTS\1500-1~1\1571\STABIL~1\TT3~1.03\T20S2B.PL2 Run By: BPG 3/26/2003 5:58PM

#	FS
a	**1.65**
b	1.65
c	1.65
d	1.65
e	1.65
f	1.65
g	1.65
h	1.65
i	1.66
j	1.66

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
CompFill	1	130.0	135.0	250.0	29.0	W1
Qal	2	115.0	120.0	50.0	28.0	W1
TQs	3	130.0	135.0	Aniso	Aniso	W1



PCSTABL5M/si FSmin=1.65

Safety Factors Are Calculated By The Modified Janbu Method for the case of c & phi both > 0

STED

RUN #96

** PCSTABL5M **
by
Purdue University
--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer`s Method of Slices

Run Date: 3/26/2003
Time of Run: 5:58PM
Run By: BPG
Input Data Filename: N:t20s2b.in
Output Filename: N:t20s2b.OUT
Unit: ENGLISH
Plotted Output Filename: N:t20s2b.PLT
PROBLEM DESCRIPTION TT 53425, 20-20', CS-16, 25' Stab Fill o
n Qt over TQs Cut; Static

BOUNDARY COORDINATES
Note: User origin value specified.
Add 0.00 to X-values and 0.00 to Y-values listed.

5 Top Boundaries
9 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	.00	42.00	130.00	44.00	3
2	130.00	44.00	206.00	77.00	1
3	206.00	77.00	217.00	77.00	1
4	217.00	77.00	238.00	84.00	2
5	238.00	84.00	280.00	87.00	2
6	130.00	44.00	131.00	41.00	3
7	131.00	41.00	155.00	39.00	3
8	155.00	39.00	217.00	77.00	2
9	155.00	39.00	280.00	63.00	3

ISOTROPIC SOIL PARAMETERS
3 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	130.0	135.0	250.0	29.0	.00	.0	1
2	115.0	120.0	50.0	28.0	.00	.0	1
3	130.0	135.0	400.0	38.0	.00	.0	1

ANISOTROPIC STRENGTH PARAMETERS
1 soil type(s)
Soil Type 3 Is Anisotropic
Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	8.5	400.0	38.0
2	9.5	450.0	19.0
3	90.0	400.0	38.0

1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED
Unit Weight of Water = 62.40
Piezometric Surface No. 1 Specified by 5 Coordinate Points

Point No.	X-Water (ft)	Y-Water (ft)
1	.00	42.00
2	130.00	44.00
3	156.00	47.00
4	177.00	54.00
5	280.00	68.00

A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Circular Surfaces, Has Been Specified.
Janbus Empirical Coef. is being used for the case of c & phi both > 0
1200 Trial Surfaces Have Been Generated.
400 Surfaces Initiate From Each Of 3 Points Equally Spaced
Along The Ground Surface Between X = 125.00 ft.
and X = 135.00 ft.

RUN #36

Each Surface Terminates Between X = 206.00 ft.
and X = 250.00 ft.
Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is Y = 35.00 ft.
20.00 ft. Line Segments Define Each Trial Failure Surface.
Restrictions Have Been Imposed Upon The Angle Of Initiation.
The Angle Has Been Restricted Between The Angles Of -5.0
And 24.0 deg.
Following Are Displayed The Ten Most Critical Of The Trial
Failure Surfaces Examined. They Are Ordered - Most Critical
First.
* * Safety Factors Are Calculated By The Modified Janbu Method * *
Failure Surface Specified By 6 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	130.00	44.00
2	149.93	42.38
3	169.73	45.23
4	188.40	52.39
5	205.02	63.53
6	218.08	77.36

*** 1.646 ***

Individual data on the 12 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	19.9	13506.4	.0	2428.8	.0	.0	.0	.0	.0
2	6.1	8910.6	.0	1455.6	.0	.0	.0	.0	.0
3	7.8	13444.0	.0	2083.0	.0	.0	.0	.0	.0
4	6.0	11804.8	.0	2068.4	.0	.0	.0	.0	.0
5	7.3	15131.2	.0	2845.9	.0	.0	.0	.0	.0
6	3.2	6663.6	.0	1176.6	.0	.0	.0	.0	.0
7	8.2	17330.4	.0	2274.3	.0	.0	.0	.0	.0
8	5.9	11930.6	.0	693.9	.0	.0	.0	.0	.0
9	10.7	18884.4	.0	.0	.0	.0	.0	.0	.0
10	1.0	1537.8	.0	.0	.0	.0	.0	.0	.0
11	11.0	8919.3	.0	.0	.0	.0	.0	.0	.0
12	1.1	49.1	.0	.0	.0	.0	.0	.0	.0

RUN #36

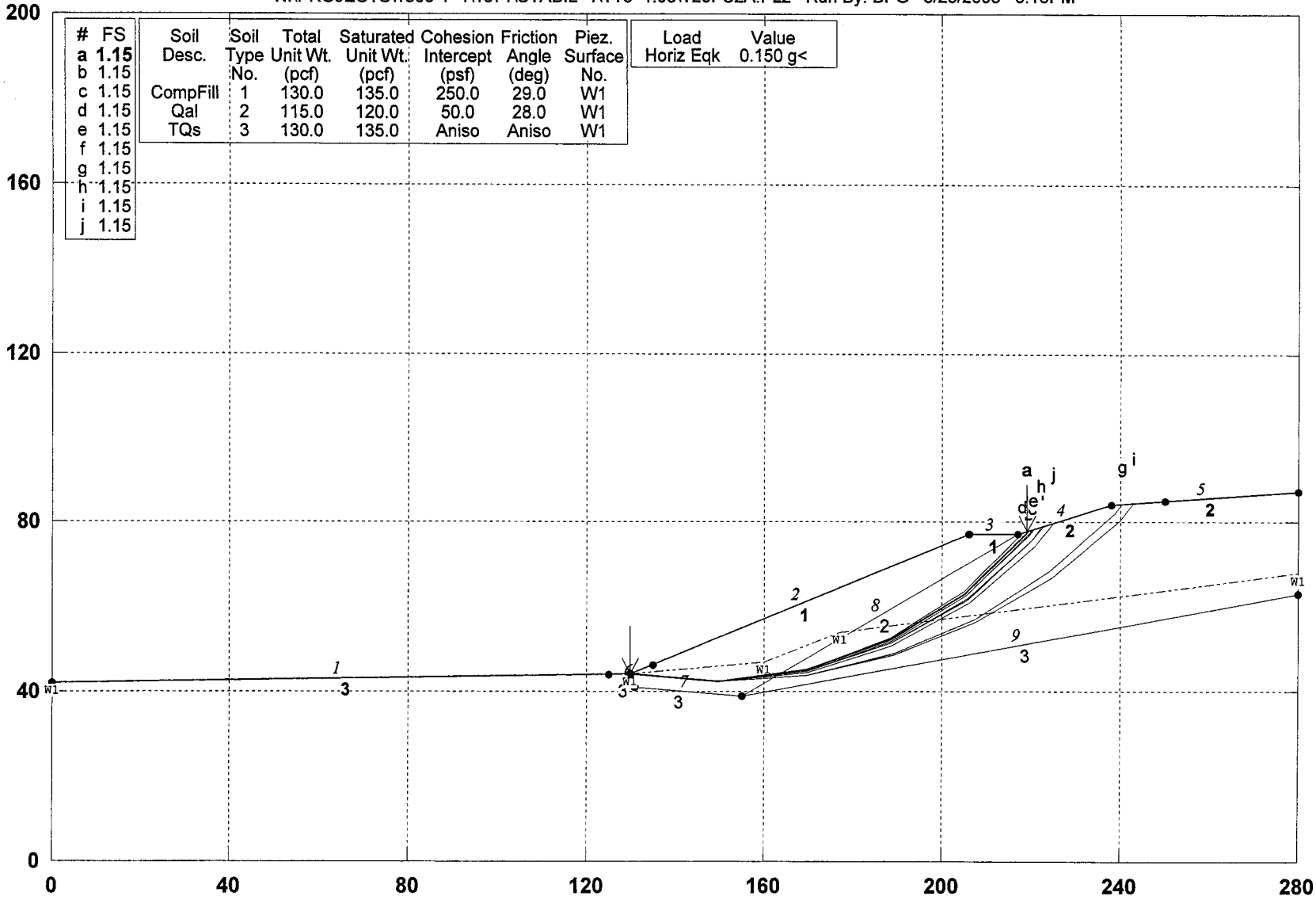
TT 53425, 20-20', CS-16, 25' Stab Fill on Qt over TQs Cut; Pseudo-Static

N:\PROJECTS\1500-1~1\1571\STABIL~1\TT3~1.03\T20PS2A.PL2 Run By: BPG 3/26/2003 6:16PM

#	FS
a	**1.15**
b	1.15
c	1.15
d	1.15
e	1.15
f	1.15
g	1.15
h	1.15
i	1.15
j	1.15

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
CompFill	1	130.0	135.0	250.0	29.0	W1
Qal	2	115.0	120.0	50.0	28.0	W1
TQs	3	130.0	135.0	Aniso	Aniso	W1

Load	Value
Horiz Eqk	0.150 g<



PCSTABL5M/si FSmin=1.15

Safety Factors Are Calculated By The Modified Janbu Method for the case of c & phi both > 0

STED

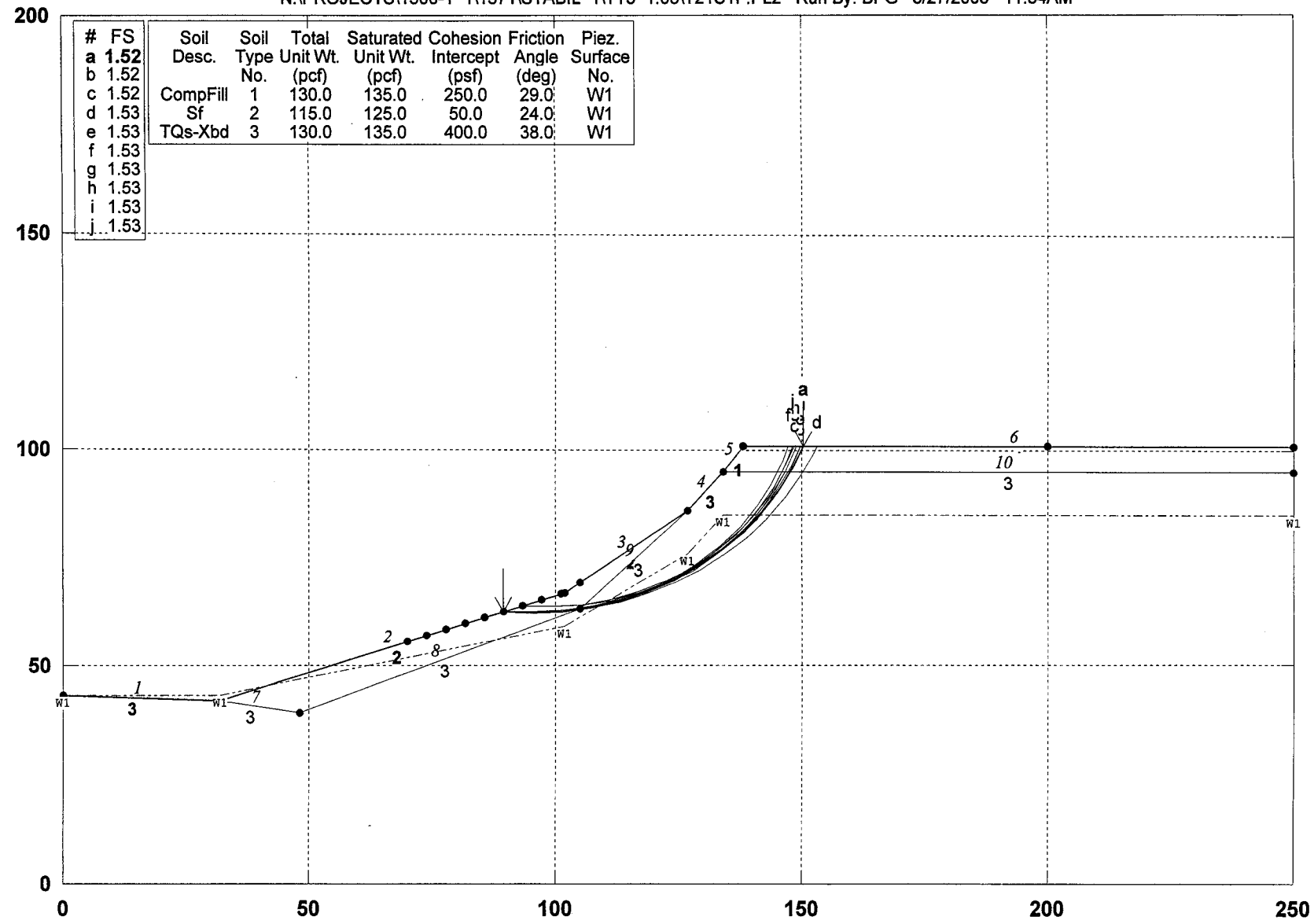
RUN #36

TT 53425; 21-21'; 59' Existing Canyon TQs Side Slope; Static

N:\PROJECTS\1500-1~1\1571\STABIL~1\TT3~1.03\T21S1F.PL2 Run By: BPG 3/27/2003 11:54AM

#	FS
a	1.52
b	1.52
c	1.52
d	1.53
e	1.53
f	1.53
g	1.53
h	1.53
i	1.53
j	1.53

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
CompFill	1	130.0	135.0	250.0	29.0	W1
Sf	2	115.0	125.0	50.0	24.0	W1
TQs-Xbd	3	130.0	135.0	400.0	38.0	W1



PCSTABL5M/si FSmin=1.52

Safety Factors Are Calculated By The Modified Janbu Method

STED

RUN #34

** PCSTABL5M **
by
Purdue University
--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer`s Method of Slices

Run Date: 3/27/2003
Time of Run: 11:54AM
Run By: BPG
Input Data Filename: N:T21S1F.IN
Output Filename: N:T21S1F.OUT
Unit: ENGLISH
Plotted Output Filename: N:T21S1F.PLT
PROBLEM DESCRIPTION TT 53425; 21-21'; 59' Existing Canyon TQ s Side Slope; Static

BOUNDARY COORDINATES

Note: User origin value specified.
Add 0.00 to X-values and 0.00 to Y-values listed.

6 Top Boundaries
10 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	.00	43.00	32.00	42.00	3
2	32.00	42.00	102.00	67.00	2
3	102.00	67.00	127.00	86.00	2
4	127.00	86.00	134.00	95.00	3
5	134.00	95.00	138.00	101.00	1
6	138.00	101.00	250.00	101.00	1
7	32.00	42.00	48.00	39.00	3
8	48.00	39.00	105.00	63.00	3
9	105.00	63.00	127.00	86.00	3
10	134.00	95.00	250.00	95.00	3

ISOTROPIC SOIL PARAMETERS

3 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	130.0	135.0	250.0	29.0	.00	.0	1
2	115.0	125.0	50.0	24.0	.00	.0	1
3	130.0	135.0	400.0	38.0	.00	.0	1

1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED
Unit Weight of Water = 62.40
Piezometric Surface No. 1 Specified by 6 Coordinate Points

Point No.	X-Water (ft)	Y-Water (ft)
1	.00	43.00
2	32.00	43.00
3	102.00	59.00
4	127.00	76.00
5	134.00	85.00
6	250.00	85.00

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Circular Surfaces, Has Been Specified.
3000 Trial Surfaces Have Been Generated.
300 Surfaces Initiate From Each Of 10 Points Equally Spaced Along The Ground Surface Between X = 70.00 ft.
and X = 105.00 ft.
Each Surface Terminates Between X = 138.00 ft.
and X = 200.00 ft.
Unless Further Limitations Were Imposed, The Minimum Elevation At Which A Surface Extends Is Y = 1.00 ft.
6.00 ft. Line Segments Define Each Trial Failure Surface.
Restrictions Have Been Imposed Upon The Angle Of Initiation.
The Angle Has Been Restricted Between The Angles Of -3.0
And 16.0 deg.
Following Are Displayed The Ten Most Critical Of The Trial

RUN #37

Failure Surfaces Examined. They Are Ordered - Most Critical First.

* * Safety Factors Are Calculated By The Modified Janbu Method * *

Failure Surface Specified By 14 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	89.44	62.52
2	95.44	62.22
3	101.43	62.55
4	107.36	63.48
5	113.16	65.02
6	118.77	67.14
7	124.13	69.83
8	129.19	73.06
9	133.89	76.79
10	138.19	80.98
11	142.03	85.58
12	145.38	90.56
13	148.20	95.86
14	150.29	101.00

*** 1.519 ***

Individual data on the 21 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	6.0	838.7	.0	.0	.0	.0	.0	.0	.0
2	6.0	2302.9	.0	.0	.0	.0	.0	.0	.0
3	.6	282.8	.0	.0	.0	.0	.0	.0	.0
4	3.1	1905.0	.0	.0	.0	.0	.0	.0	.0
5	2.2	1809.6	.0	.0	.0	.0	.0	.0	.0
6	2.0	1965.6	.0	.0	.0	.0	.0	.0	.0
7	3.8	4434.6	.0	160.8	.0	.0	.0	.0	.0
8	5.6	8201.0	.0	760.2	.0	.0	.0	.0	.0
9	5.4	9224.4	.0	1177.5	.0	.0	.0	.0	.0
10	2.9	5318.0	.0	764.6	.0	.0	.0	.0	.0
11	2.2	4319.7	.0	562.8	.0	.0	.0	.0	.0
12	4.7	10450.8	.0	1782.3	.0	.0	.0	.0	.0
13	.1	259.7	.0	53.0	.0	.0	.0	.0	.0
14	4.0	10084.3	.0	2146.7	.0	.0	.0	.0	.0
15	.2	489.2	.0	66.6	.0	.0	.0	.0	.0
16	3.4	7890.1	.0	657.8	.0	.0	.0	.0	.0
17	.5	994.9	.0	.0	.0	.0	.0	.0	.0
18	3.3	5628.7	.0	.0	.0	.0	.0	.0	.0
19	2.4	2526.1	.0	.0	.0	.0	.0	.0	.0
20	.5	331.0	.0	.0	.0	.0	.0	.0	.0
21	2.1	700.0	.0	.0	.0	.0	.0	.0	.0

RUN #37

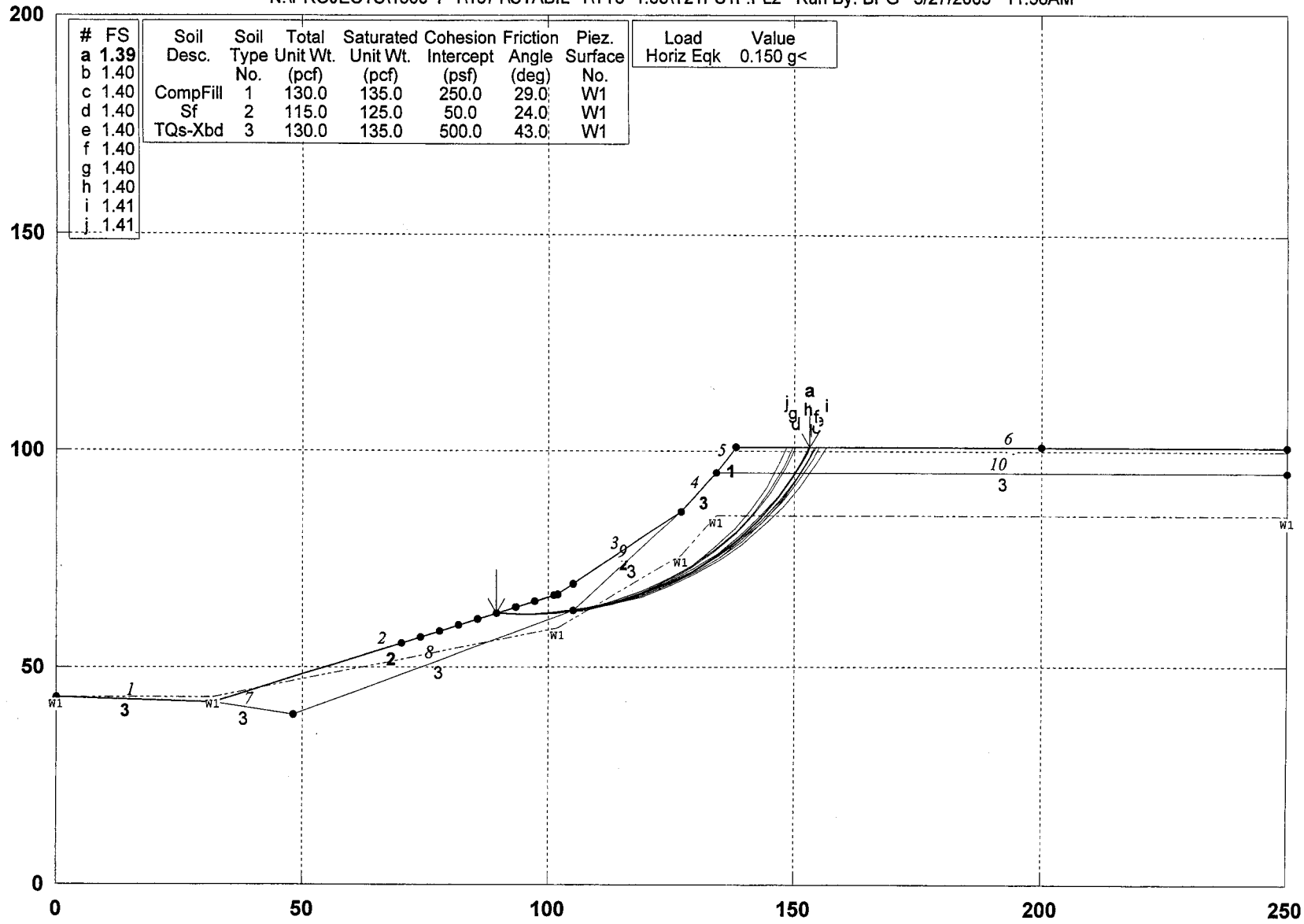
TT 53425; 21-21'; 59' Existing Canyon TQs Side Slope; PseudoStatic

N:\PROJECTS\1500-1~1\1571\STABIL~1\TT3~1.03\T21PS1F.PL2 Run By: BPG 3/27/2003 11:58AM

#	FS
a	**1.39**
b	1.40
c	1.40
d	1.40
e	1.40
f	1.40
g	1.40
h	1.40
i	1.41
j	1.41

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
CompFill	1	130.0	135.0	250.0	29.0	W1
Sf	2	115.0	125.0	50.0	24.0	W1
TQs-Xbd	3	130.0	135.0	500.0	43.0	W1

Load	Value
Horiz Eqk	0.150 g<



PCSTABL5M/si FSmin=1.39

Safety Factors Are Calculated By The Modified Janbu Method

STED

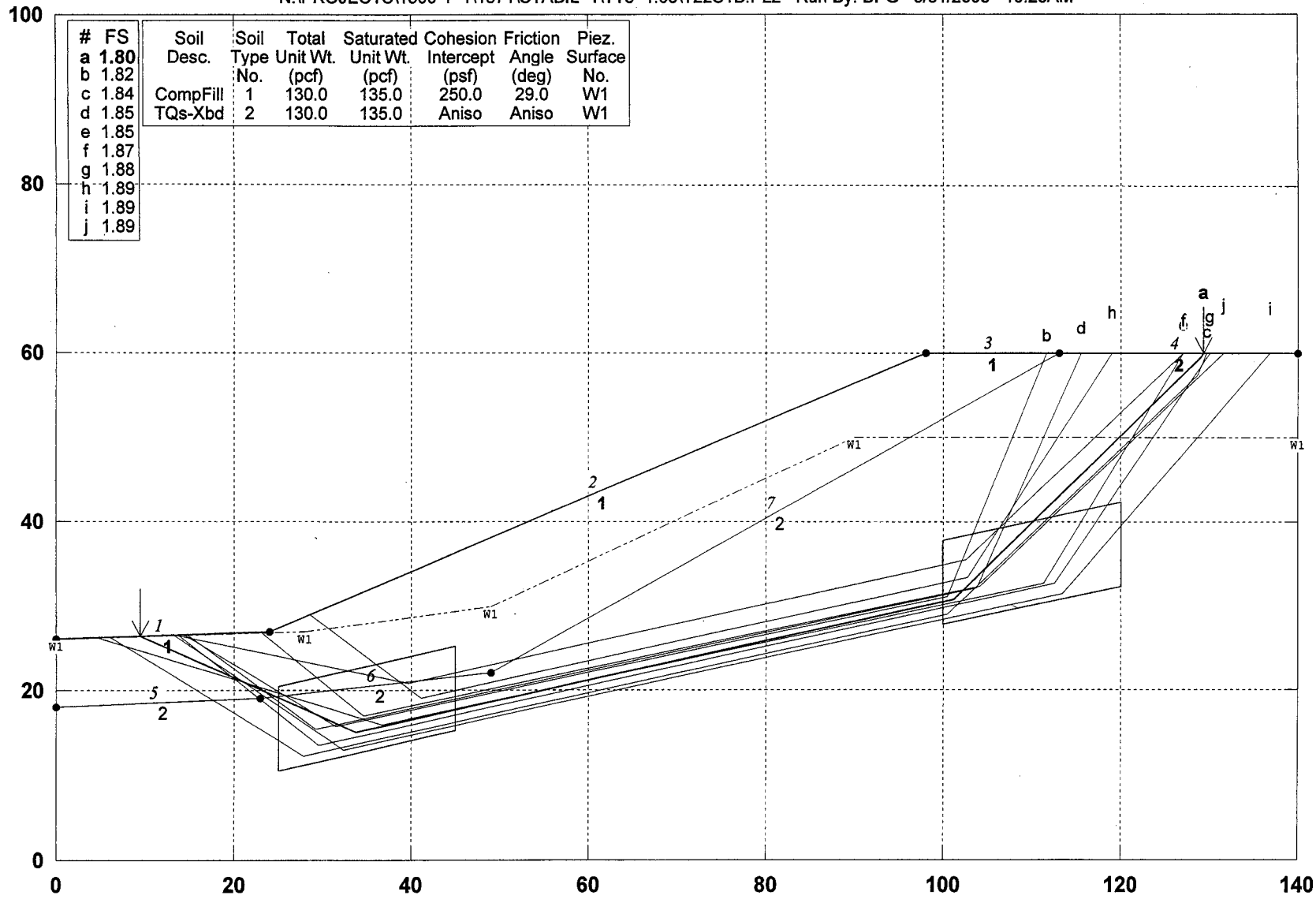
RUN #37

TT 53425; 22-22', CS-7, 2:1 TQs Cut w 25' Stability Fill; Static

N:\PROJECTS\1500-1~1\1571\STABIL~1\TT3~1.03\T22S1B.PL2 Run By: BPG 3/31/2003 10:28AM

#	FS
a	1.80
b	1.82
c	1.84
d	1.85
e	1.85
f	1.87
g	1.88
h	1.89
i	1.89
j	1.89

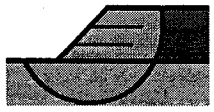
Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
CompFill	1	130.0	135.0	250.0	29.0	W1
TQs-Xbd	2	130.0	135.0	Aniso	Aniso	W1



PCSTABL5M/si FSmin=1.80

Safety Factors Are Calculated By The Modified Janbu Method

STED



AIN #239

** PCSTABL5M **
by
Purdue University
--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer`s Method of Slices

Run Date: 3/31/2003
Time of Run: 10:28AM
Run By: BPG
Input Data Filename: N:t22s1b.in
Output Filename: N:t22s1b.OUT
Unit: ENGLISH
Plotted Output Filename: N:t22s1b.PLT
PROBLEM DESCRIPTION TT 53425; 22-22', CS-7, 2:1 TQs Cut w 25
' Stability Fill; Static

BOUNDARY COORDINATES
Note: User origin value specified.
Add 0.00 to X-values and 0.00 to Y-values listed.

4 Top Boundaries
7 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	.00	26.00	24.00	27.00	1
2	24.00	27.00	98.00	60.00	1
3	98.00	60.00	113.00	60.00	1
4	113.00	60.00	140.00	60.00	2
5	.00	18.00	23.00	19.00	2
6	23.00	19.00	49.00	22.00	2
7	49.00	22.00	113.00	60.00	2

ISOTROPIC SOIL PARAMETERS
2 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	130.0	135.0	250.0	29.0	.00	.0	1
2	130.0	135.0	400.0	38.0	.00	.0	1

ANISOTROPIC STRENGTH PARAMETERS
1 soil type(s)
Soil Type 2 Is Anisotropic
Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	12.5	400.0	38.0
2	13.5	450.0	19.0
3	90.0	400.0	38.0

1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED
Unit Weight of Water = 62.40
Piezometric Surface No. 1 Specified by 5 Coordinate Points

Point No.	X-Water (ft)	Y-Water (ft)
1	.00	26.00
2	28.00	27.00
3	49.00	30.00
4	90.00	50.00
5	140.00	50.00

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Sliding Block Surfaces, Has Been Specified.
400 Trial Surfaces Have Been Generated.
2 Boxes Specified For Generation Of Central Block Base
Length Of Line Segments For Active And Passive Portions Of Sliding Block Is 40.0

Box No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Height (ft)
1	25.00	15.47	45.00	20.28	10.00

RUN #38

2 100.00 32.78 120.00 37.40 10.00

Factor Of Safety Calculation Has Gone Through Ten Iterations
The Trial Failure Surface In Question Is Defined
By The Following 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	21.94	26.91
2	33.99	17.83
3	115.15	33.88
4	115.33	60.00

Factor Of Safety For The Preceding Specified Surface = 4.838
Factor Of Safety Calculation Has Gone Through Ten Iterations
The Trial Failure Surface In Question Is Defined
By The Following 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	26.90	28.29
2	40.67	14.73
3	101.52	28.99
4	101.83	60.00

Factor Of Safety For The Preceding Specified Surface = 3.402
Factor Of Safety Calculation Has Gone Through Ten Iterations
The Trial Failure Surface In Question Is Defined
By The Following 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	30.35	29.83
2	39.84	20.34
3	118.00	32.96
4	118.32	60.00

Factor Of Safety For The Preceding Specified Surface = 5.888
Factor Of Safety Calculation Has Gone Through Ten Iterations
The Trial Failure Surface In Question Is Defined
By The Following 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	20.71	26.86
2	32.58	15.12
3	105.11	29.94
4	105.27	60.00

Factor Of Safety For The Preceding Specified Surface = 4.906
Following Are Displayed The Ten Most Critical Of The Trial Failure Surfaces Examined. They Are Ordered - Most Critical First.
* * Safety Factors Are Calculated By The Modified Janbu Method * *
Failure Surface Specified By 5 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	9.39	26.39
2	33.84	15.01
3	101.13	30.85
4	128.96	59.58
5	129.29	60.00

*** 1.804 ***

Individual data on the 14 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	.1	.4	.0	.0	.0	.0	.0	.0	.0
2	14.5	7299.2	.0	3623.2	.0	.0	.0	.0	.0
3	.8	860.1	.0	421.3	.0	.0	.0	.0	.0
4	3.2	4105.4	.0	1853.4	.0	.0	.0	.0	.0
5	5.8	10724.2	.0	4392.5	.0	.0	.0	.0	.0
6	15.2	36332.5	.0	11662.3	.0	.0	.0	.0	.0
7	41.0	130389.0	.0	39425.7	.0	.0	.0	.0	.0
8	6.2	23746.5	.0	8308.8	.0	.0	.0	.0	.0

RUN #38

9	1.8	7296.8	.0	2374.4	.0	.0	.0	.0	.0
10	3.1	12324.5	.0	3919.1	.0	.0	.0	.0	.0
11	11.9	36298.7	.0	13867.4	.0	.0	.0	.0	.0
12	6.7	11790.2	.0	2065.7	.0	.0	.0	.0	.0
13	9.3	6282.8	.0	.0	.0	.0	.0	.0	.0
14	.3	9.1	.0	.0	.0	.0	.0	.0	.0

RUN #38

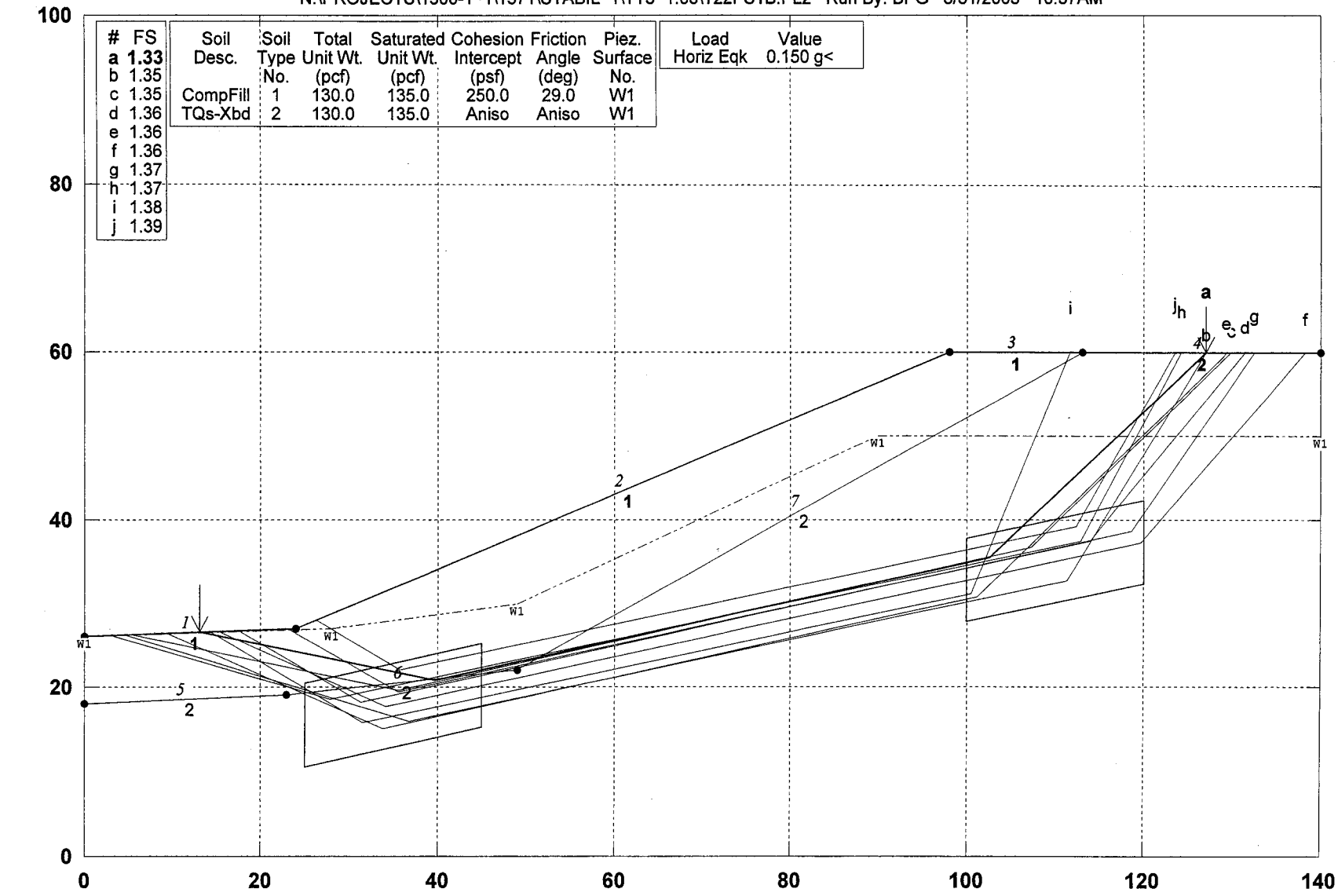
TT 53425; 22-22', CS-7, 2:1 TQs Cut w 25' Stability Fill; PseudoStatic

N:\PROJECTS\1500-1~1\1571\STABIL~1\TT3~1.03\T22PS1B.PL2 Run By: BPG 3/31/2003 10:37AM

#	FS
a	**1.33**
b	1.35
c	1.35
d	1.36
e	1.36
f	1.36
g	1.37
h	1.37
i	1.38
j	1.39

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
CompFill	1	130.0	135.0	250.0	29.0	W1
TQs-Xbd	2	130.0	135.0	Aniso	Aniso	W1

Load	Value
Horiz Eqk	0.150 g<



PCSTABL5M/si FSmin=1.33

Safety Factors Are Calculated By The Modified Janbu Method

STED

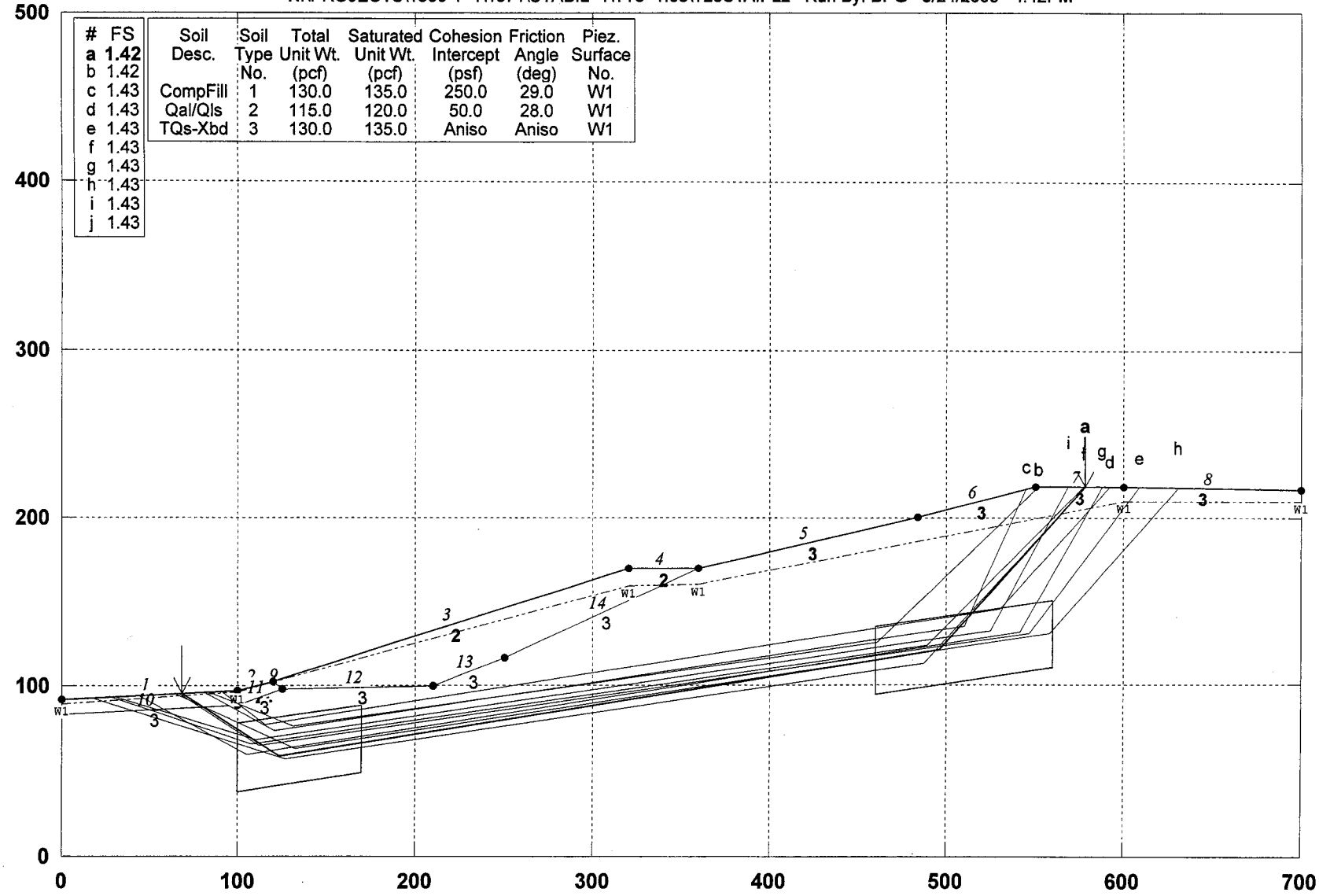
RUN # 28

TT 53425; 23-23', CS-13 + CS-14, Qls R&R/TQs Cut; Static

N:\PROJECTS\1500-1~1\1571\STABIL~1\TT3~1.03\T23S1A.PL2 Run By: BPG 3/24/2003 4:42PM

#	FS
a	**1.42**
b	1.42
c	1.43
d	1.43
e	1.43
f	1.43
g	1.43
h	1.43
i	1.43
j	1.43

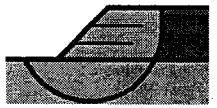
Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
CompFill	1	130.0	135.0	250.0	29.0	W1
Qal/Qls	2	115.0	120.0	50.0	28.0	W1
TQs-Xbd	3	130.0	135.0	Aniso	Aniso	W1



PCSTABL5M/si FSmin=1.42

Safety Factors Are Calculated By The Modified Janbu Method

STED



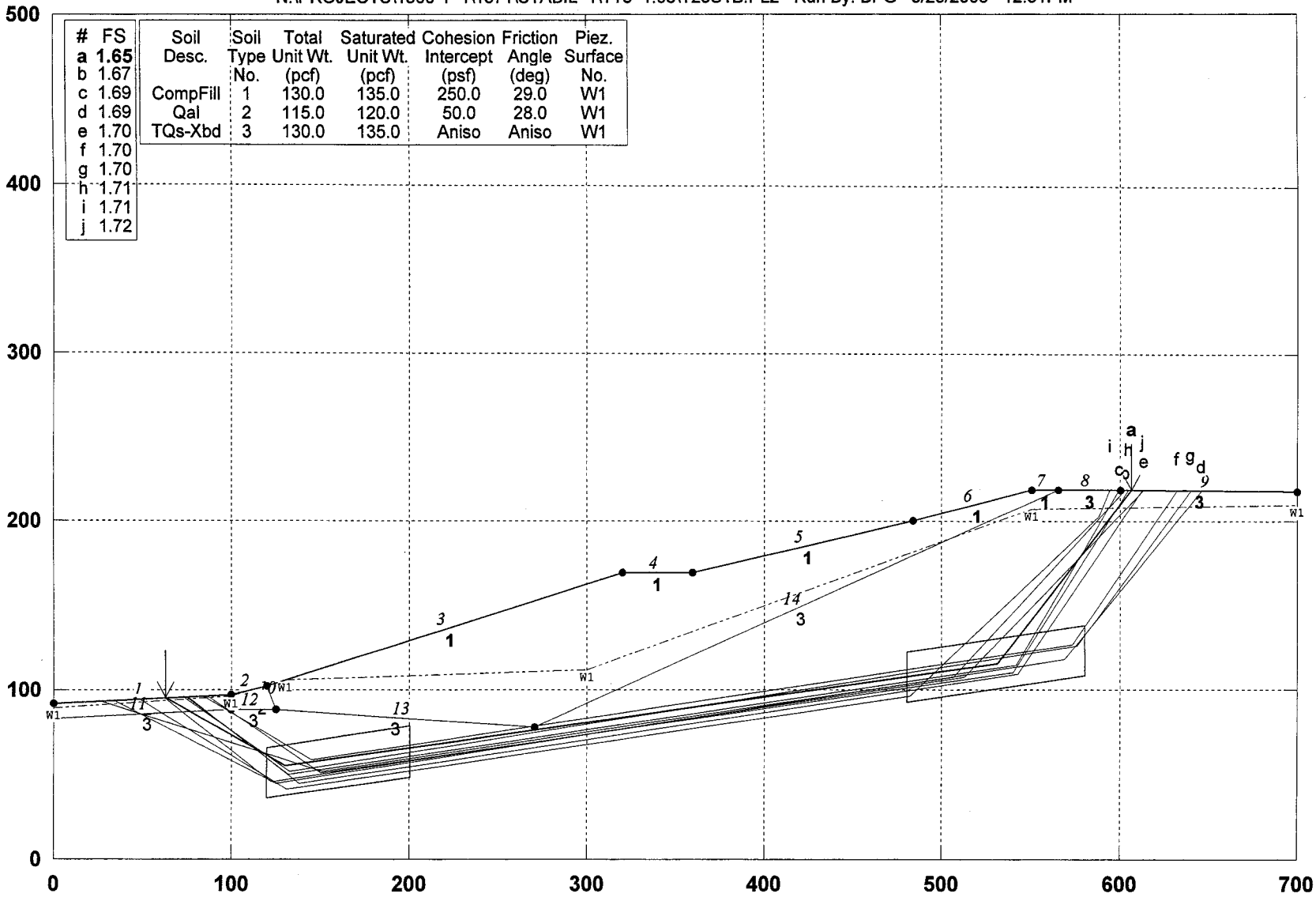
RUN #39

TT 53425; 23-23', CS-13 + CS-14, Qls R&R/TQs Cut w 150' x 24' Buttress; Static

N:\PROJECTS\1500-1~1\1571\STABIL~1\TT3~1.03\T23S1B.PL2 Run By: BPG 3/25/2003 12:31PM

#	FS
a	1.65
b	1.67
c	1.69
d	1.69
e	1.70
f	1.70
g	1.70
h	1.71
i	1.71
j	1.72

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
CompFill	1	130.0	135.0	250.0	29.0	W1
Qal	2	115.0	120.0	50.0	28.0	W1
TQs-Xbd	3	130.0	135.0	Aniso	Aniso	W1



PCSTABL5M/si FSmin=1.65

Safety Factors Are Calculated By The Modified Janbu Method for the case of c & phi both > 0

STED

RUN #470

** PCSTABL5M **
by
Purdue University
--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer`s Method of Slices

Run Date: 3/25/2003
Time of Run: 12:31PM
Run By: BPG
Input Data Filename: N:t23s1b.in
Output Filename: N:t23s1b.OUT
Unit: ENGLISH
Plotted Output Filename: N:t23s1b.PLT
PROBLEM DESCRIPTION TT 53425; 23-23', CS-13 + CS-14, Qls R&R /TQs Cut w 150' x 24' Buttress; Static

BOUNDARY COORDINATES
Note: User origin value specified.
Add 0.00 to X-values and 0.00 to Y-values listed.

9 Top Boundaries
14 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	.00	92.00	100.00	97.00	2
2	100.00	97.00	120.00	102.00	2
3	120.00	102.00	320.00	170.00	1
4	320.00	170.00	360.00	170.00	1
5	360.00	170.00	484.00	200.00	1
6	484.00	200.00	550.00	219.00	1
7	550.00	219.00	565.00	219.00	1
8	565.00	219.00	600.00	218.50	3
9	600.00	218.50	700.00	217.50	3
10	120.00	102.00	125.00	88.00	2
11	.00	83.00	100.00	88.00	3
12	100.00	88.00	125.00	88.00	3
13	125.00	88.00	270.00	78.00	3
14	270.00	78.00	565.00	219.00	3

ISOTROPIC SOIL PARAMETERS
3 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	130.0	135.0	250.0	29.0	.00	.0	1
2	115.0	120.0	50.0	28.0	.00	.0	1
3	130.0	135.0	400.0	38.0	.00	.0	1

ANISOTROPIC STRENGTH PARAMETERS
1 soil type(s)
Soil Type 3 Is Anisotropic
Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	8.5	400.0	38.0
2	9.5	450.0	19.0
3	90.0	400.0	38.0

1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED
Unit Weight of Water = 62.40
Piezometric Surface No. 1 Specified by 6 Coordinate Points

Point No.	X-Water (ft)	Y-Water (ft)
1	.00	89.00
2	100.00	96.00
3	130.00	106.00
4	300.00	112.00
5	550.00	207.00
6	700.00	210.00

Janbus Empirical Coef is being used for the case of c & phi both > 0

RUN #40

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Sliding Block Surfaces, Has Been Specified.
400 Trial Surfaces Have Been Generated.
2 Boxes Specified For Generation Of Central Block Base
Length Of Line Segments For Active And Passive Portions Of Sliding Block Is 150.0

Box No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Height (ft)
1	120.00	50.76	200.00	63.43	30.00
2	480.00	107.77	580.00	123.61	30.00

Following Are Displayed The Ten Most Critical Of The Trial Failure Surfaces Examined. They Are Ordered - Most Critical First.
* * Safety Factors Are Calculated By The Modified Janbu Method * *
Failure Surface Specified By 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	63.28	95.16
2	130.72	54.73
3	531.24	115.27
4	606.79	218.43

*** 1.648 ***

Individual data on the 19 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	2.6	250.6	.0	.0	.0	.0	.0	.0	.0
2	11.3	7130.4	.0	3083.2	.0	.0	.0	.0	.0
3	22.9	47471.1	.0	25221.0	.0	.0	.0	.0	.0
4	20.0	83718.0	.0	44491.5	.0	.0	.0	.0	.0
5	5.0	28593.7	.0	15153.5	.0	.0	.0	.0	.0
6	5.0	32283.4	.0	16765.8	.0	.0	.0	.0	.0
7	.7	4901.2	21.7	2665.5	.0	.0	.0	.0	.0
8	139.3	********	.0	*******	.0	.0	.0	.0	.0
9	30.0	317215.0	.0	63239.4	.0	.0	.0	.0	.0
10	20.0	223594.0	.0	40175.2	.0	.0	.0	.0	.0
11	40.0	442573.3	.0	96587.2	.0	.0	.0	.0	.0
12	124.0	********	.0	*******	.0	.0	.0	.0	.0
13	16.7	207753.1	.0	74713.8	.0	.0	.0	.0	.0
14	30.5	393792.8	.0	*******	.0	.0	.0	.0	.0
15	18.8	221786.7	.0	*******	.0	.0	.0	.0	.0
16	15.0	136546.5	.0	88730.8	.0	.0	.0	.0	.0
17	34.1	155135.6	.0	82767.9	.0	.0	.0	.0	.0
18	.9	1119.5	.0	.0	.0	.0	.0	.0	.0
19	6.8	4116.2	.0	.0	.0	.0	.0	.0	.0

RUN # 40

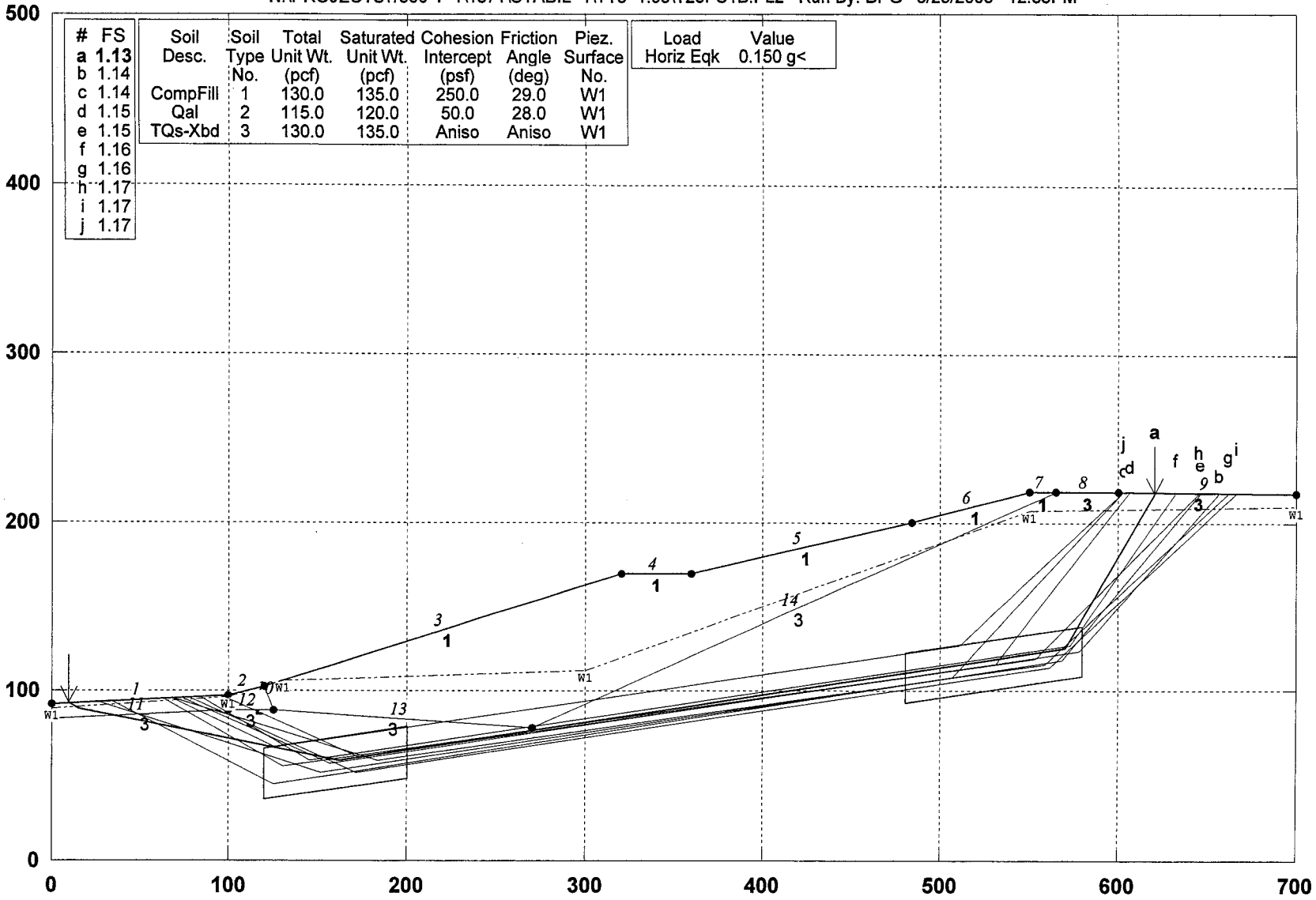
TT 53425; 23-23', CS-13 + CS-14, Qls R&R/TQs Cut w 150' x 24' Buttress; PseudoSt

N:\PROJECTS\1500-1~1\1571\STABIL~1\TT3~1.03\T23PS1B.PL2 Run By: BPG 3/25/2003 12:33PM

#	FS
a	1.13
b	1.14
c	1.14
d	1.15
e	1.15
f	1.16
g	1.16
h	1.17
i	1.17
j	1.17

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
CompFill	1	130.0	135.0	250.0	29.0	W1
Qal	2	115.0	120.0	50.0	28.0	W1
TQs-Xbd	3	130.0	135.0	Aniso	Aniso	W1

Load	Value
Horiz Eqk	0.150 g<



PCSTABL5M/si FSmin=1.13

Safety Factors Are Calculated By The Modified Janbu Method for the case of c & phi both > 0

STED

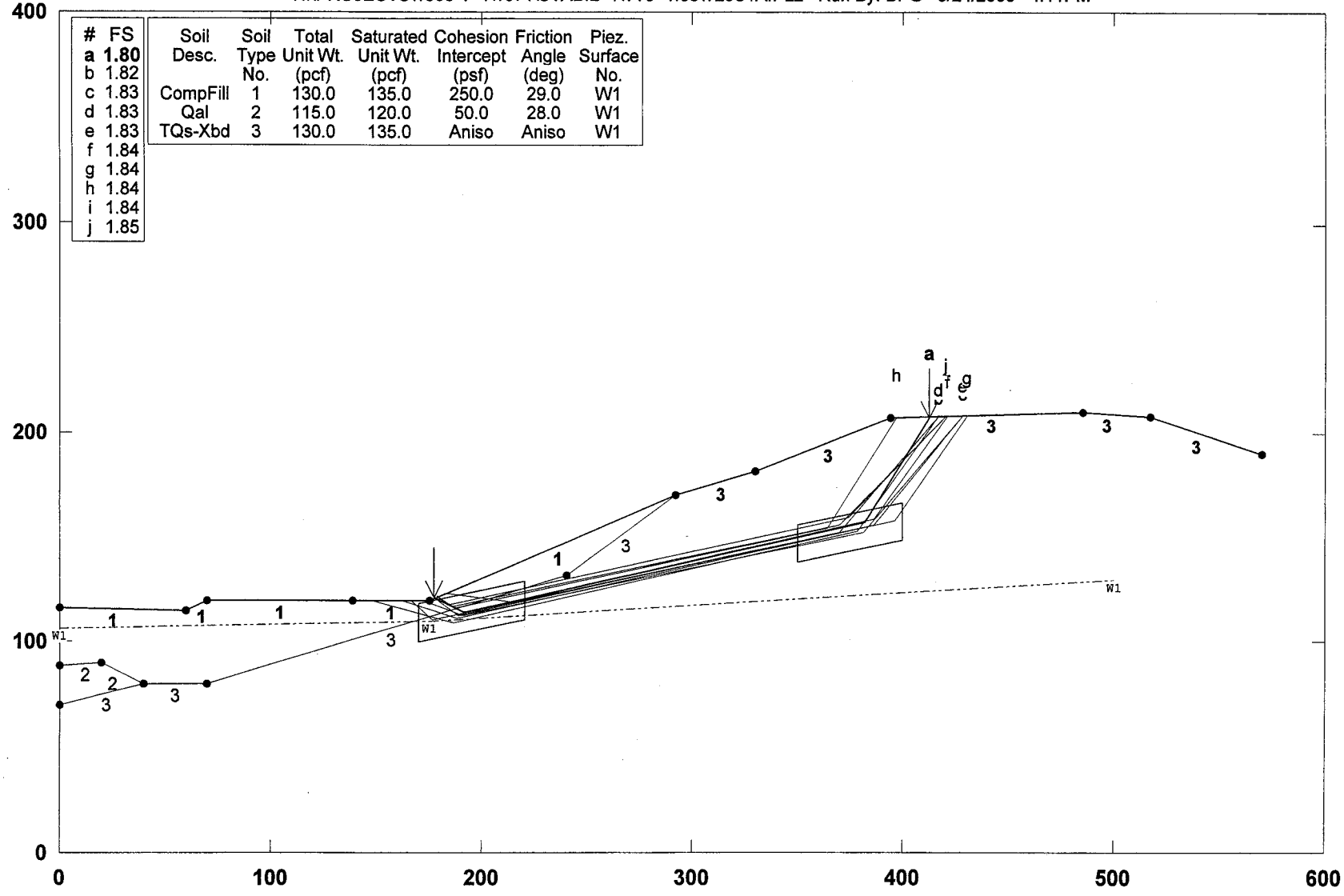
RUN #40

TT 53425; 28-28', CS-2, Qls R&R/TQs Cut w RUA, Above Daylight Fill Pad; Static

N:\PROJECTS\1500-1~1\1571\STABIL~1\TT3~1.03\T28S1A.PL2 Run By: BPG 3/24/2003 4:11PM

#	FS
a	**1.80**
b	1.82
c	1.83
d	1.83
e	1.83
f	1.84
g	1.84
h	1.84
i	1.84
j	1.85

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
CompFill	1	130.0	135.0	250.0	29.0	W1
Qal	2	115.0	120.0	50.0	28.0	W1
TQs-Xbd	3	130.0	135.0	Aniso	Aniso	W1



PCSTABL5M/si FSmin=1.80

Safety Factors Are Calculated By The Modified Janbu Method for the case of c & phi both > 0

STED

RUN # 41

** PCSTABL5M **
by
Purdue University
--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer`s Method of Slices

Run Date: 3/24/2003
Time of Run: 4:11PM
Run By: BPG
Input Data Filename: N:t28s1a.in
Output Filename: N:t28s1a.OUT
Unit: ENGLISH
Plotted Output Filename: N:t28s1a.PLT
PROBLEM DESCRIPTION TT 53425; 28-28', CS-2, Qls R&R/TQs Cut w RUA, Above Daylight Fill Pad; Static

BOUNDARY COORDINATES
Note: User origin value specified.
Add 0.00 to X-values and 0.00 to Y-values listed.

10 Top Boundaries
16 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	.00	116.00	60.00	115.00	1
2	60.00	115.00	70.00	120.00	1
3	70.00	120.00	139.00	120.00	1
4	139.00	120.00	175.00	120.00	1
5	175.00	120.00	292.00	170.00	1
6	292.00	170.00	330.00	182.00	3
7	330.00	182.00	394.00	207.00	3
8	394.00	207.00	485.00	210.00	3
9	485.00	210.00	517.00	208.00	3
10	517.00	208.00	570.00	190.00	3
11	.00	88.00	20.00	90.00	2
12	20.00	90.00	40.00	80.00	2
13	.00	70.00	40.00	80.00	3
14	40.00	80.00	70.00	80.00	3
15	70.00	80.00	240.00	132.00	3
16	240.00	132.00	292.00	170.00	3

ISOTROPIC SOIL PARAMETERS
3 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	130.0	135.0	250.0	29.0	.00	.0	1
2	115.0	120.0	50.0	28.0	.00	.0	1
3	130.0	135.0	400.0	38.0	.00	.0	1

ANISOTROPIC STRENGTH PARAMETERS
1 soil type(s)
Soil Type 3 Is Anisotropic
Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	11.0	400.0	38.0
2	13.0	450.0	19.0
3	90.0	400.0	38.0

1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED
Unit Weight of Water = 62.40
Piezometric Surface No. 1 Specified by 3 Coordinate Points

Point No.	X-Water (ft)	Y-Water (ft)
1	.00	106.00
2	175.00	110.00
3	500.00	130.00

Janbus Empirical Coef is being used for the case of c & phi both > 0
A Critical Failure Surface Searching Method, Using A Random

RUN #41

Technique For Generating Sliding Block Surfaces, Has Been Specified.
400 Trial Surfaces Have Been Generated.
2 Boxes Specified For Generation Of Central Block Base
Length Of Line Segments For Active And Passive Portions Of Sliding Block Is 150.0

Box No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Height (ft)
1	170.00	109.00	220.00	119.63	18.00
2	350.00	147.26	400.00	157.89	18.00

Factor Of Safety Calculation Has Gone Through Ten Iterations
The Trial Failure Surface In Question Is Defined
By The Following 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	179.62	121.98
2	196.60	112.10
3	355.48	143.51
4	355.63	192.01

Factor Of Safety For The Preceding Specified Surface = 3.540
Factor Of Safety Calculation Has Gone Through Ten Iterations
The Trial Failure Surface In Question Is Defined
By The Following 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	181.69	122.86
2	196.79	115.31
3	350.99	141.78
4	352.03	190.61

Factor Of Safety For The Preceding Specified Surface = 6.137
Factor Of Safety Calculation Has Gone Through Ten Iterations
The Trial Failure Surface In Question Is Defined
By The Following 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	181.19	122.64
2	192.47	114.14
3	387.88	150.99
4	388.25	204.75

Factor Of Safety For The Preceding Specified Surface = 5.996
Factor Of Safety Calculation Has Gone Through Ten Iterations
The Trial Failure Surface In Question Is Defined
By The Following 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	196.95	129.38
2	207.11	119.23
3	394.99	149.67
4	395.68	207.06

Factor Of Safety For The Preceding Specified Surface = 6.737
Following Are Displayed The Ten Most Critical Of The Trial Failure Surfaces Examined. They Are Ordered - Most Critical First.
* * Safety Factors Are Calculated By The Modified Janbu Method * *
Failure Surface Specified By 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	177.54	121.08
2	191.64	114.01
3	381.97	157.52
4	412.81	207.62

*** 1.804 ***
Individual data on the 8 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)

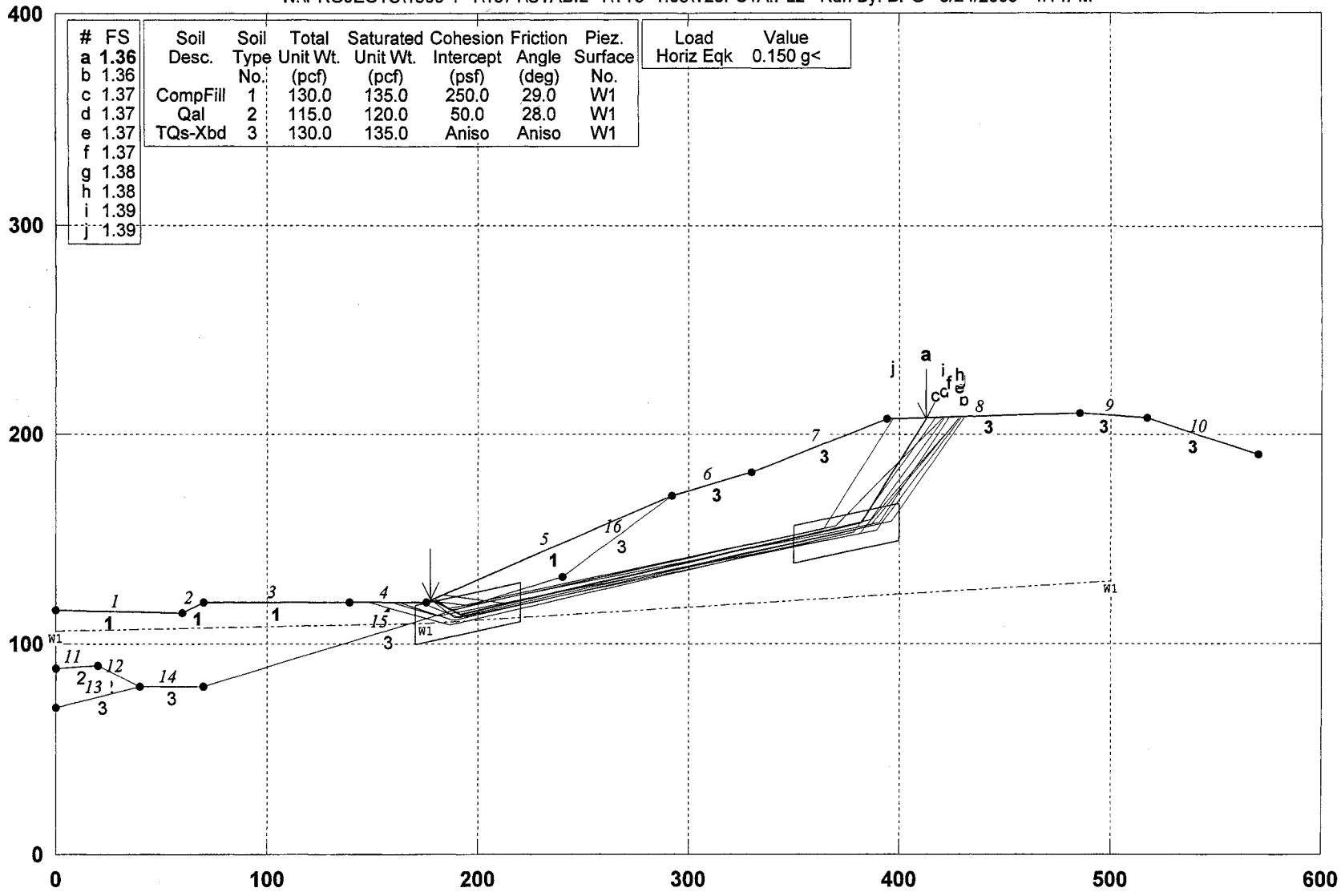
RUN #41

1	10.1	6213.5	.0	.0	.0	.0	.0	.0	.0
2	4.0	5792.7	.0	.0	.0	.0	.0	.0	.0
3	48.4	112563.1	.0	.0	.0	.0	.0	.0	.0
4	52.0	188461.2	.0	.0	.0	.0	.0	.0	.0
5	38.0	171436.8	.0	.0	.0	.0	.0	.0	.0
6	52.0	274088.2	.0	.0	.0	.0	.0	.0	.0
7	12.0	58439.0	.0	.0	.0	.0	.0	.0	.0
8	18.8	36601.6	.0	.0	.0	.0	.0	.0	.0

RUN #41

TT 53425; 28-28', CS-2, Qls R&R/TQs Cut w RUA, Above Daylight Fill Pad; PseudoSt

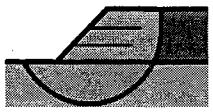
N:\PROJECTS\1500-1~1\1571\STABIL~1\TT3~1.03\T28PS1A.PL2 Run By: BPG 3/24/2003 4:14PM



PCSTABL5M/si FSmin=1.36

Safety Factors Are Calculated By The Modified Janbu Method for the case of c & phi both > 0

STED



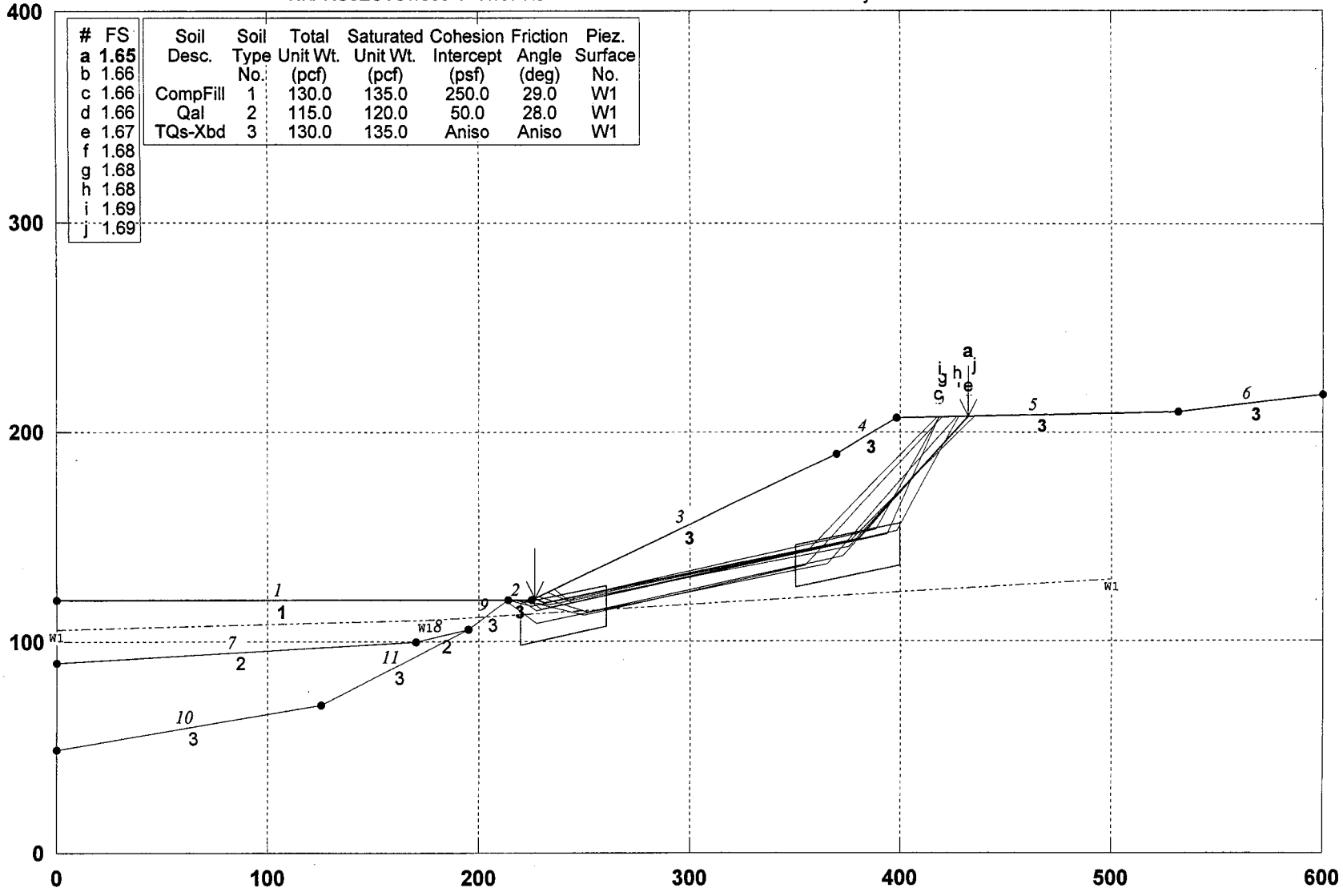
RUN #41

TT 53425; 29-29', CS-3, TQs Cut w RUA over Daylight Fill Pad; Static

N:\PROJECTS\1500-1~1\1571\STABIL~1\TT3~1.03\T29S1A.PL2 Run By: BPG 3/24/2003 2:06PM

#	FS
a	1.65
b	1.66
c	1.66
d	1.66
e	1.67
f	1.68
g	1.68
h	1.68
i	1.69
j	1.69

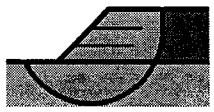
Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
CompFill	1	130.0	135.0	250.0	29.0	W1
Qal	2	115.0	120.0	50.0	28.0	W1
TQs-Xbd	3	130.0	135.0	Aniso	Aniso	W1



PCSTABL5M/si FSmin=1.65

Safety Factors Are Calculated By The Modified Janbu Method for the case of c & phi both > 0

STED



RUN #42

```
                    ** PCSTABL5M **
                          by
                    Purdue University
                --Slope Stability Analysis--
            Simplified Janbu, Simplified Bishop
               or Spencer`s Method of Slices
Run Date:                   3/24/2003
Time of Run:                2:06PM
Run By:                     BPG
Input Data Filename:        N:t29s1a.in
Output Filename:            N:t29s1a.OUT
Unit:                       ENGLISH
Plotted Output Filename:    N:t29s1a.PLT
PROBLEM DESCRIPTION   TT 53425; 29-29', CS-3, TQs Cut w RUA ov
                      er Daylight Fill Pad; Static
BOUNDARY COORDINATES
     Note: User origin value specified.
     Add 0.00 to X-values and 0.00 to Y-values listed.

    6 Top   Boundaries
   11 Total Boundaries
Boundary     X-Left     Y-Left     X-Right    Y-Right    Soil Type
   No.        (ft)       (ft)       (ft)       (ft)     Below Bnd
    1          .00     120.00     214.00     120.00         1
    2       214.00     120.00     225.00     120.00         3
    3       225.00     120.00     370.00     190.00         3
    4       370.00     190.00     398.00     207.00         3
    5       398.00     207.00     532.00     210.00         3
    6       532.00     210.00     600.00     218.00         3
    7          .00      90.00     170.00     100.00         2
    8       170.00     100.00     195.00     106.00         2
    9       195.00     106.00     214.00     120.00         3
   10          .00      49.00     125.00      70.00         3
   11       125.00      70.00     195.00     106.00         3
ISOTROPIC SOIL PARAMETERS
  3 Type(s) of Soil
Soil  Total  Saturated  Cohesion Friction   Pore   Pressure   Piez.
Type Unit Wt. Unit Wt. Intercept   Angle  Pressure Constant Surface
 No.   (pcf)    (pcf)     (psf)     (deg)   Param.    (psf)     No.
  1   130.0    135.0     250.0     29.0     .00        .0       1
  2   115.0    120.0      50.0     28.0     .00        .0       1
  3   130.0    135.0     400.0     38.0     .00        .0       1
ANISOTROPIC STRENGTH PARAMETERS
     1 soil type(s)
 Soil Type  3 Is Anisotropic
 Number Of Direction Ranges Specified =  3
 Direction    Counterclockwise     Cohesion      Friction
   Range       Direction Limit    Intercept       Angle
    No.            (deg)            (psf)         (deg)
     1              11.0             400.0         38.0
     2              13.0             450.0         19.0
     3              90.0             400.0         38.0
 1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED
 Unit Weight of Water =  62.40
 Piezometric Surface No.  1 Specified by  3 Coordinate Points
   Point      X-Water     Y-Water
    No.         (ft)        (ft)
     1           .00      106.00
     2        175.00      110.00
     3        500.00      130.00
 Janbus Empirical Coef is being used for the case of  c & phi both > 0
 A Critical Failure Surface Searching Method, Using A Random
 Technique For Generating Sliding Block Surfaces, Has Been
 Specified.
 400 Trial Surfaces Have Been Generated.
 2 Boxes Specified For Generation Of Central Block Base
 Length Of Line Segments For Active And Passive Portions Of
```

RUN #42

Sliding Block Is 150.0

Box No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Height (ft)
1	220.00	108.50	260.00	117.00	20.00
2	350.00	136.13	400.00	146.76	20.00

Factor Of Safety Calculation Has Gone Through Ten Iterations
The Trial Failure Surface In Question Is Defined
By The Following 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	226.29	120.62
2	229.65	117.27
3	396.12	153.19
4	396.50	206.09

Factor Of Safety For The Preceding Specified Surface = 2.968
Factor Of Safety Calculation Has Gone Through Ten Iterations
The Trial Failure Surface In Question Is Defined
By The Following 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	229.49	122.17
2	238.13	116.27
3	383.38	137.56
4	384.93	199.07

Factor Of Safety For The Preceding Specified Surface = 6.138
Factor Of Safety Calculation Has Gone Through Ten Iterations
The Trial Failure Surface In Question Is Defined
By The Following 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	244.77	129.54
2	250.00	124.51
3	386.01	134.11
4	389.26	201.69

Factor Of Safety For The Preceding Specified Surface = 6.454
Factor Of Safety Calculation Has Gone Through Ten Iterations
The Trial Failure Surface In Question Is Defined
By The Following 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	222.35	120.00
2	229.88	112.60
3	389.38	140.47
4	391.54	203.08

Factor Of Safety For The Preceding Specified Surface = 5.067
Factor Of Safety Calculation Has Gone Through Ten Iterations
The Trial Failure Surface In Question Is Defined
By The Following 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	197.10	120.00
2	246.31	108.17
3	379.64	145.56
4	379.97	196.05

Factor Of Safety For The Preceding Specified Surface = 4.612
Factor Of Safety Calculation Has Gone Through Ten Iterations
The Trial Failure Surface In Question Is Defined
By The Following 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	229.64	122.24
2	241.59	117.29
3	396.49	138.84
4	399.19	207.03

Factor Of Safety For The Preceding Specified Surface = 5.404
Factor Of Safety Calculation Has Gone Through Ten Iterations
The Trial Failure Surface In Question Is Defined

RUN #42

By The Following 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	230.33	122.57
2	234.83	118.80
3	365.78	134.47
4	367.35	188.72

Factor Of Safety For The Preceding Specified Surface = 6.808
Factor Of Safety Calculation Has Gone Through Ten Iterations
The Trial Failure Surface In Question Is Defined
By The Following 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	215.40	120.00
2	244.73	111.21
3	368.59	133.11
4	369.59	189.80

Factor Of Safety For The Preceding Specified Surface = 6.293
Factor Of Safety Calculation Has Gone Through Ten Iterations
The Trial Failure Surface In Question Is Defined
By The Following 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	233.23	123.97
2	251.34	106.14
3	353.79	128.65
4	354.33	182.44

Factor Of Safety For The Preceding Specified Surface = 4.636
Factor Of Safety Calculation Has Gone Through Ten Iterations
The Trial Failure Surface In Question Is Defined
By The Following 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	218.74	120.00
2	233.02	106.52
3	361.47	134.74
4	362.13	186.20

Factor Of Safety For The Preceding Specified Surface = 3.375
Following Are Displayed The Ten Most Critical Of The Trial Failure Surfaces Examined. They Are Ordered - Most Critical First.
* * Safety Factors Are Calculated By The Modified Janbu Method * *
Failure Surface Specified By 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	226.24	120.60
2	230.85	118.30
3	380.33	149.48
4	431.83	207.76

*** 1.648 ***

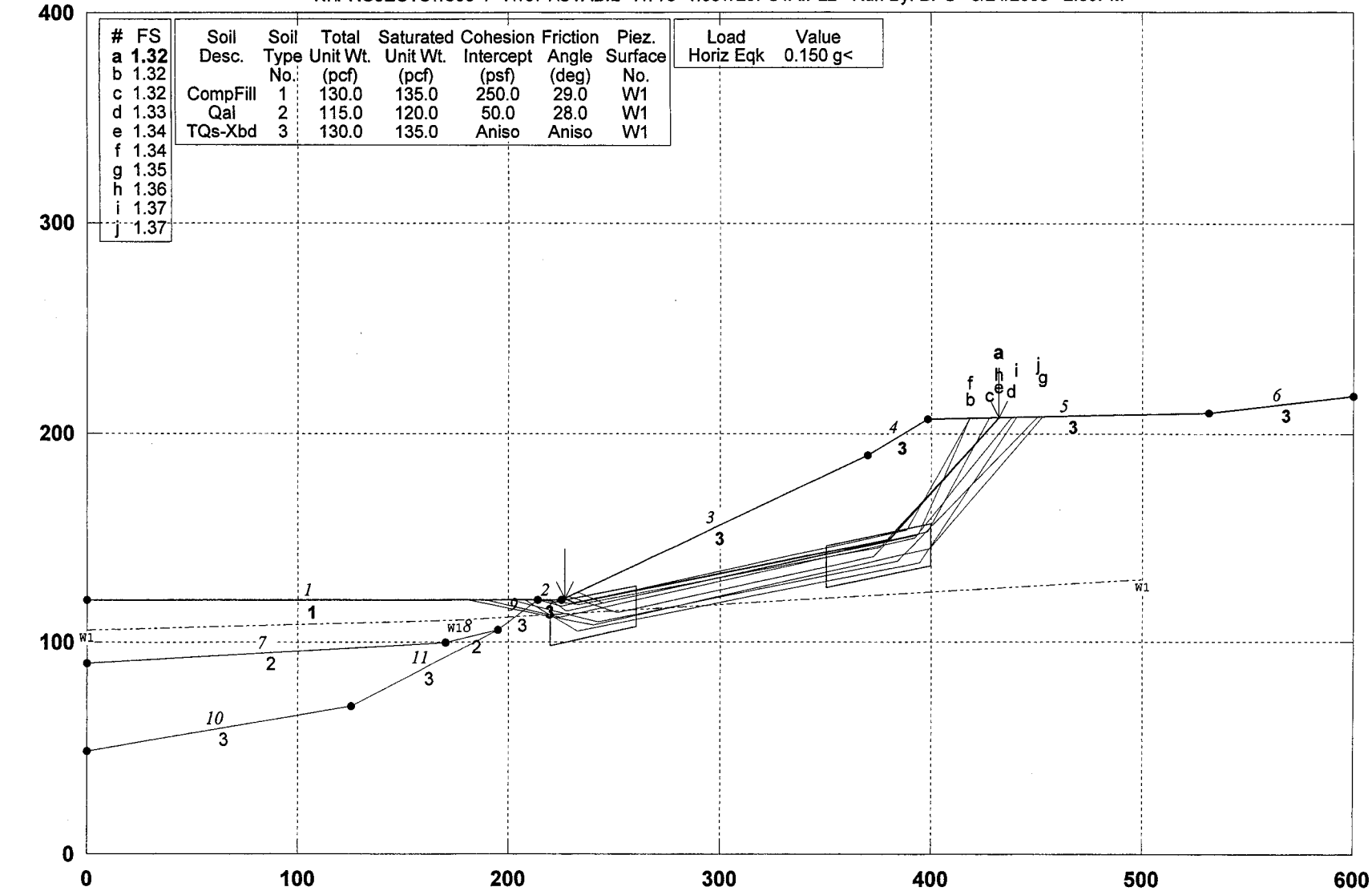
Individual data on the 5 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	4.6	1352.8	.0	.0	.0	.0	.0	.0	.0
2	139.2	426850.6	.0	.0	.0	.0	.0	.0	.0
3	10.3	60079.1	.0	.0	.0	.0	.0	.0	.0
4	17.7	96832.7	.0	.0	.0	.0	.0	.0	.0
5	33.8	82511.8	.0	.0	.0	.0	.0	.0	.0

RUN #12

TT 53425; 29-29', CS-3, TQs Cut w RUA over Daylight Fill Pad; PseudoStatic

N:\PROJECTS\1500-1~1\1571\STABIL~1\TT3~1.03\T29PS1A.PL2 Run By: BPG 3/24/2003 2:09PM



PCSTABL5M/si FSmin=1.32

Safety Factors Are Calculated By The Modified Janbu Method for the case of c & phi both > 0

STED

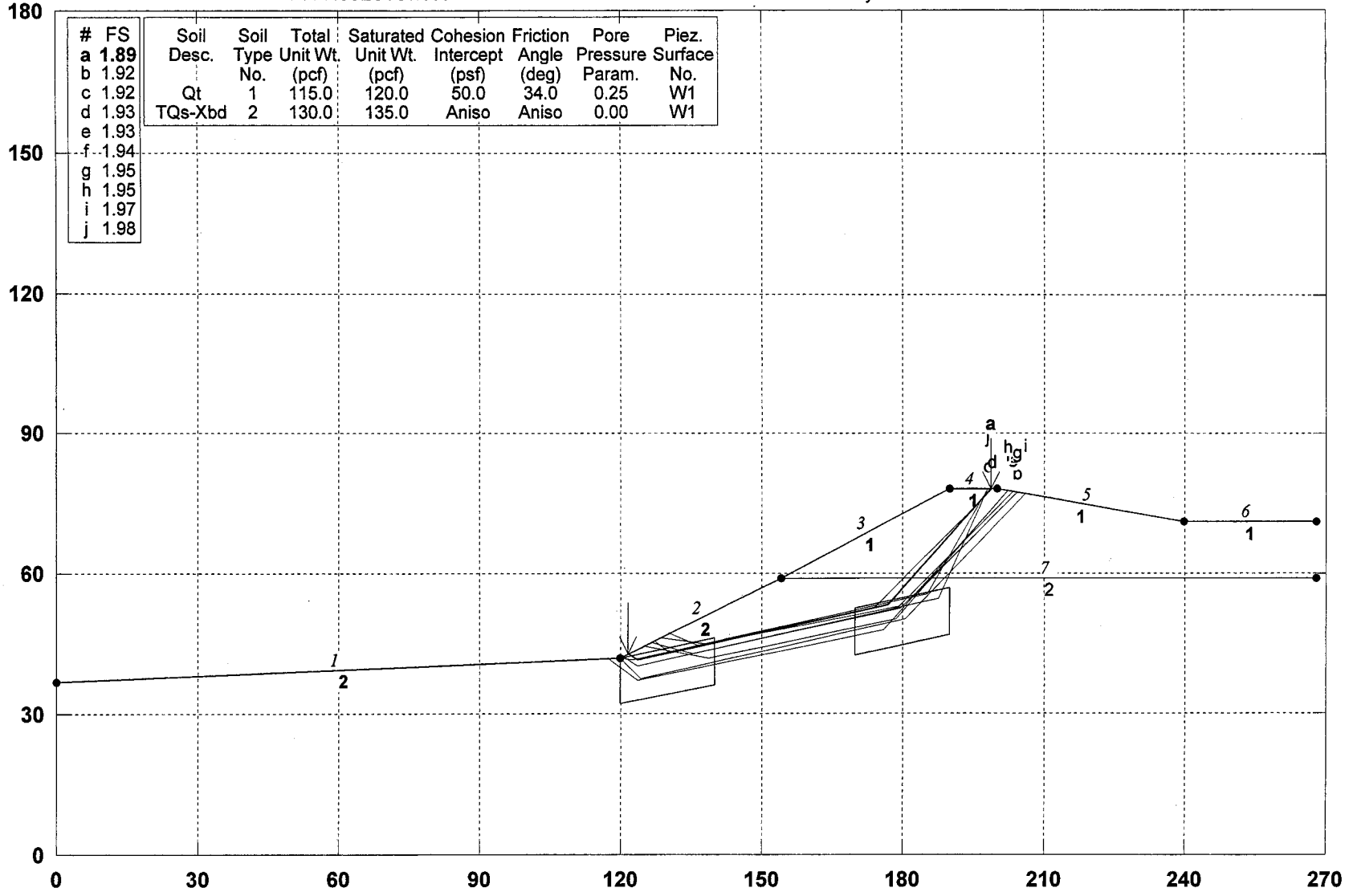
RUN #42

TT 53425; 30-30', CS-8, Qt/TQs Cut, As Designed; Static

N:\PROJECTS\1500-1~1\1571\STABIL~1\TT3~1.03\T30S1A.PL2 Run By: BPG 3/31/2003 9:27AM

#	FS
a	**1.89**
b	1.92
c	1.92
d	1.93
e	1.93
f	1.94
g	1.95
h	1.95
i	1.97
j	1.98

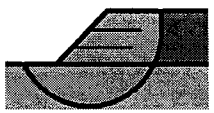
Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Piez. Surface No.
Qt	1	115.0	120.0	50.0	34.0	0.25	W1
TQs-Xbd	2	130.0	135.0	Aniso	Aniso	0.00	W1



PCSTABL5M/si FSmin=1.89

Safety Factors Are Calculated By The Modified Janbu Method for the case of c & phi both > 0

STED



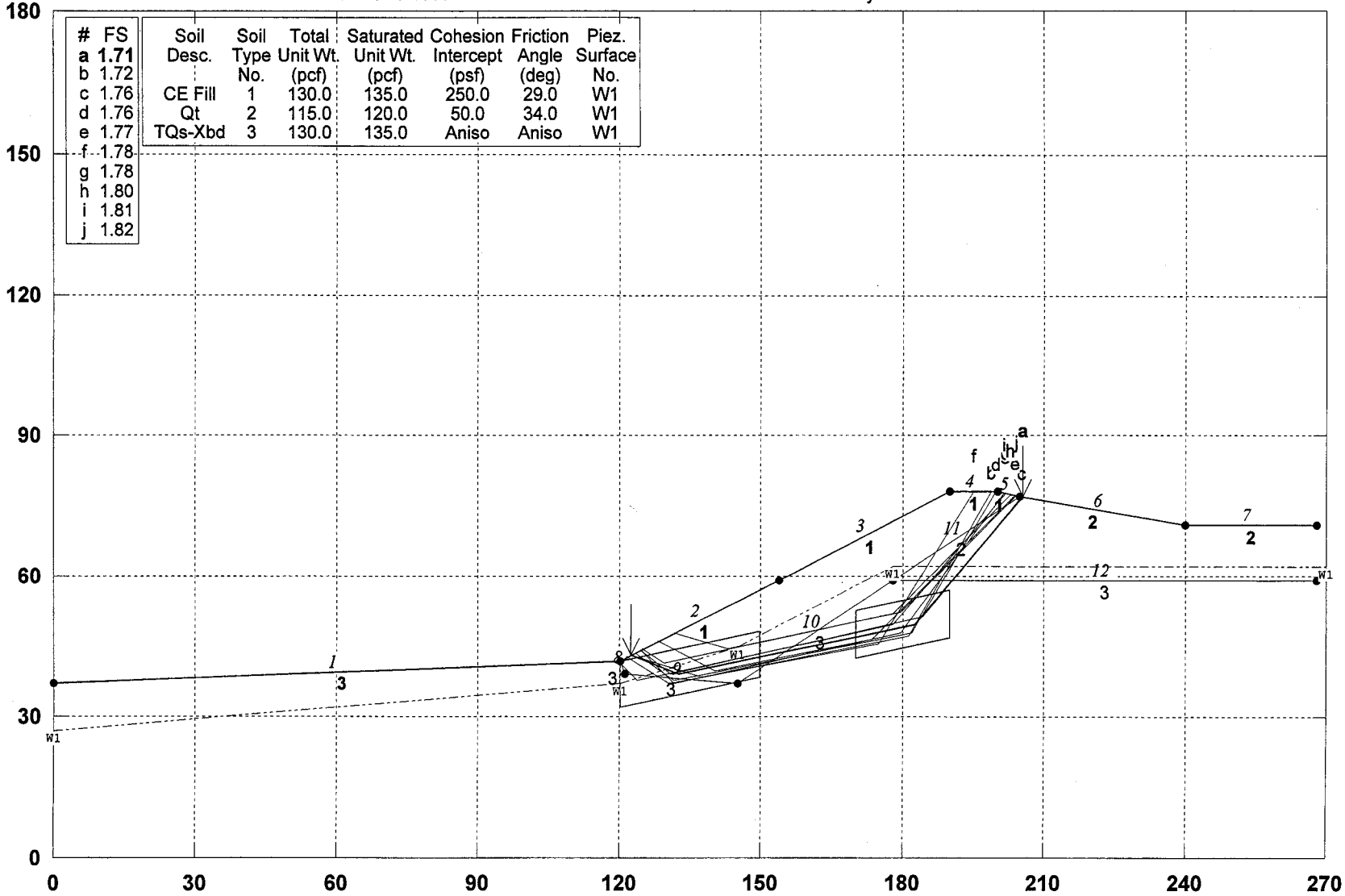
RUN #23

TT 53425; 30-30', CS-8, Qt/TQs Cut with 25' Stability Fill; Static

N:\PROJECTS\1500-1~1\1571\STABIL~1\TT3~1.03\T30S1B.PL2 Run By: BPG 3/31/2003 9:54AM

#	FS
a	**1.71**
b	1.72
c	1.76
d	1.76
e	1.77
f	1.78
g	1.78
h	1.80
i	1.81
j	1.82

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
CE Fill	1	130.0	135.0	250.0	29.0	W1
Qt	2	115.0	120.0	50.0	34.0	W1
TQs-Xbd	3	130.0	135.0	Aniso	Aniso	W1



PCSTABL5M/si FSmin=1.71

STED

Safety Factors Are Calculated By The Modified Janbu Method for the case of c & phi both > 0

RUN # 47

** PCSTABL5M **
by
Purdue University
--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer`s Method of Slices

Run Date: 3/31/2003
Time of Run: 9:54AM
Run By: BPG
Input Data Filename: N:T30S1B.IN
Output Filename: N:T30S1B.OUT
Unit: ENGLISH
Plotted Output Filename: N:T30S1B.PLT
PROBLEM DESCRIPTION TT 53425; 30-30', CS-8, Qt/TQs Cut with 25' Stability Fill; Static

BOUNDARY COORDINATES
Note: User origin value specified.
Add 0.00 to X-values and 0.00 to Y-values listed.

7 Top Boundaries
12 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	.00	37.00	120.00	42.00	3
2	120.00	42.00	154.00	59.00	1
3	154.00	59.00	190.00	78.00	1
4	190.00	78.00	200.00	78.00	1
5	200.00	78.00	205.00	77.00	1
6	205.00	77.00	240.00	71.00	2
7	240.00	71.00	268.00	71.00	2
8	120.00	42.00	121.00	39.00	3
9	121.00	39.00	145.00	37.00	3
10	145.00	37.00	178.00	59.00	3
11	178.00	59.00	205.00	77.00	2
12	178.00	59.00	268.00	59.00	3

ISOTROPIC SOIL PARAMETERS
3 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	130.0	135.0	250.0	29.0	.00	.0	1
2	115.0	120.0	50.0	34.0	.00	.0	1
3	130.0	135.0	400.0	38.0	.00	.0	1

ANISOTROPIC STRENGTH PARAMETERS
1 soil type(s)
Soil Type 3 Is Anisotropic
Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	11.0	400.0	38.0
2	13.0	450.0	19.0
3	90.0	400.0	38.0

1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED
Unit Weight of Water = 62.40
Piezometric Surface No. 1 Specified by 5 Coordinate Points

Point No.	X-Water (ft)	Y-Water (ft)
1	.00	27.00
2	120.00	37.00
3	145.00	45.00
4	178.00	62.00
5	270.00	62.00

Janbus Empirical Coef is being used for the case of c & phi both > 0
A Critical Failure Surface Searching Method, Using A Random Technique For Generating Sliding Block Surfaces, Has Been Specified.

RUN #44

400 Trial Surfaces Have Been Generated.
2 Boxes Specified For Generation Of Central Block Base
Length Of Line Segments For Active And Passive Portions Of
Sliding Block Is 50.0

Box No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Height (ft)
1	120.00	37.00	150.00	43.38	10.00
2	170.00	47.63	190.00	51.88	10.00

Factor Of Safety Calculation Has Gone Through Ten Iterations

RUN #44

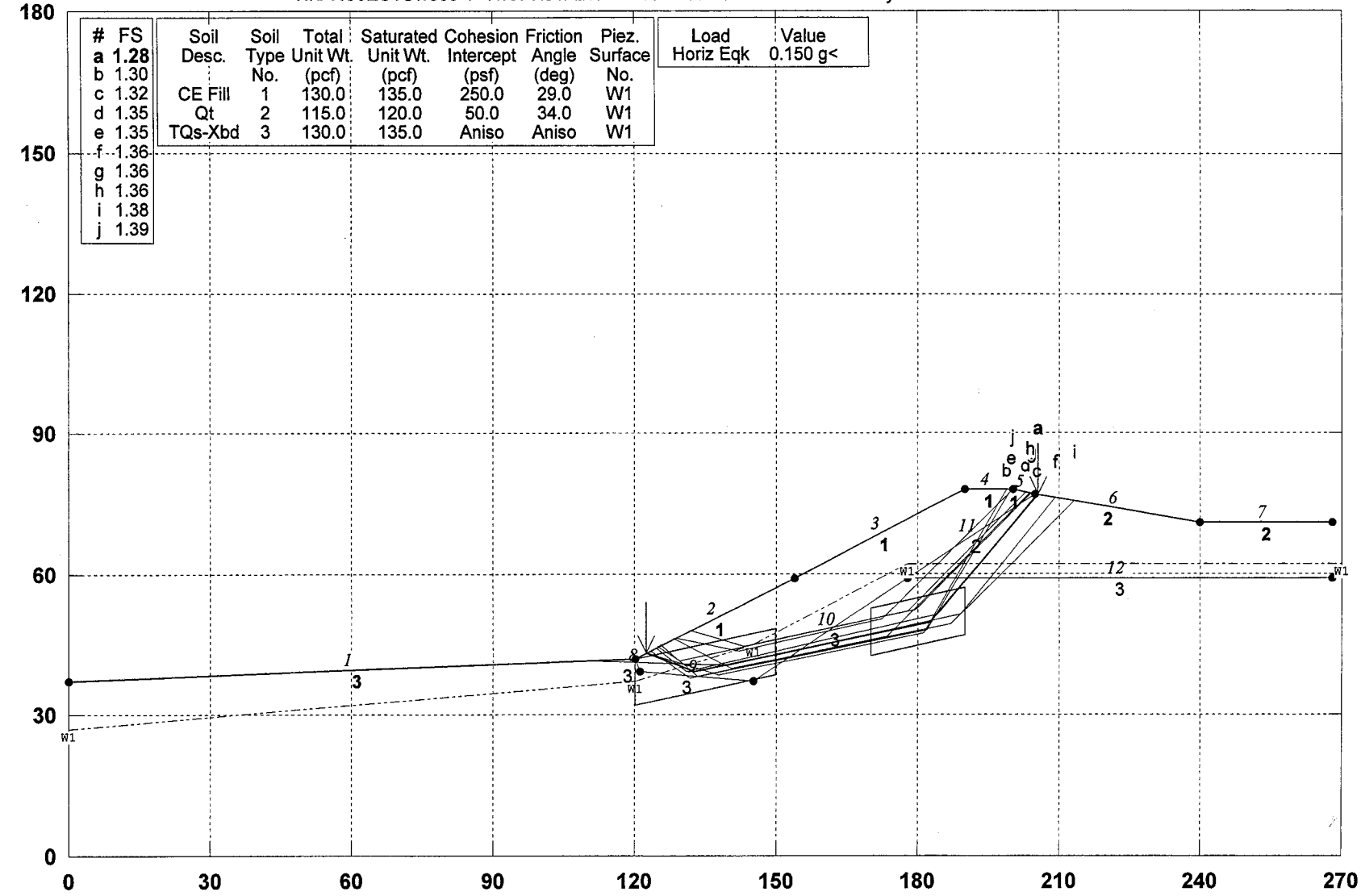
TT 53425; 30-30', CS-8, Qt/TQs Cut with 25' Stability Fill; PseudoStatic

N:\PROJECTS\1500-1~1\1571\STABIL~1\TT3~1.03\T30PS1B.PL2 Run By: BPG 3/31/2003 9:58AM

#	FS
a	**1.28**
b	1.30
c	1.32
d	1.35
e	1.35
f	1.36
g	1.36
h	1.36
i	1.38
j	1.39

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
CE Fill	1	130.0	135.0	250.0	29.0	W1
Qt	2	115.0	120.0	50.0	34.0	W1
TQs-Xbd	3	130.0	135.0	Aniso	Aniso	W1

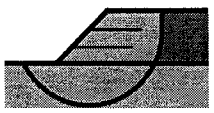
Load	Value
Horiz Eqk	0.150 g<



PCSTABL5M/si FSmin=1.28

Safety Factors Are Calculated By The Modified Janbu Method for the case of c & phi both > 0

STED



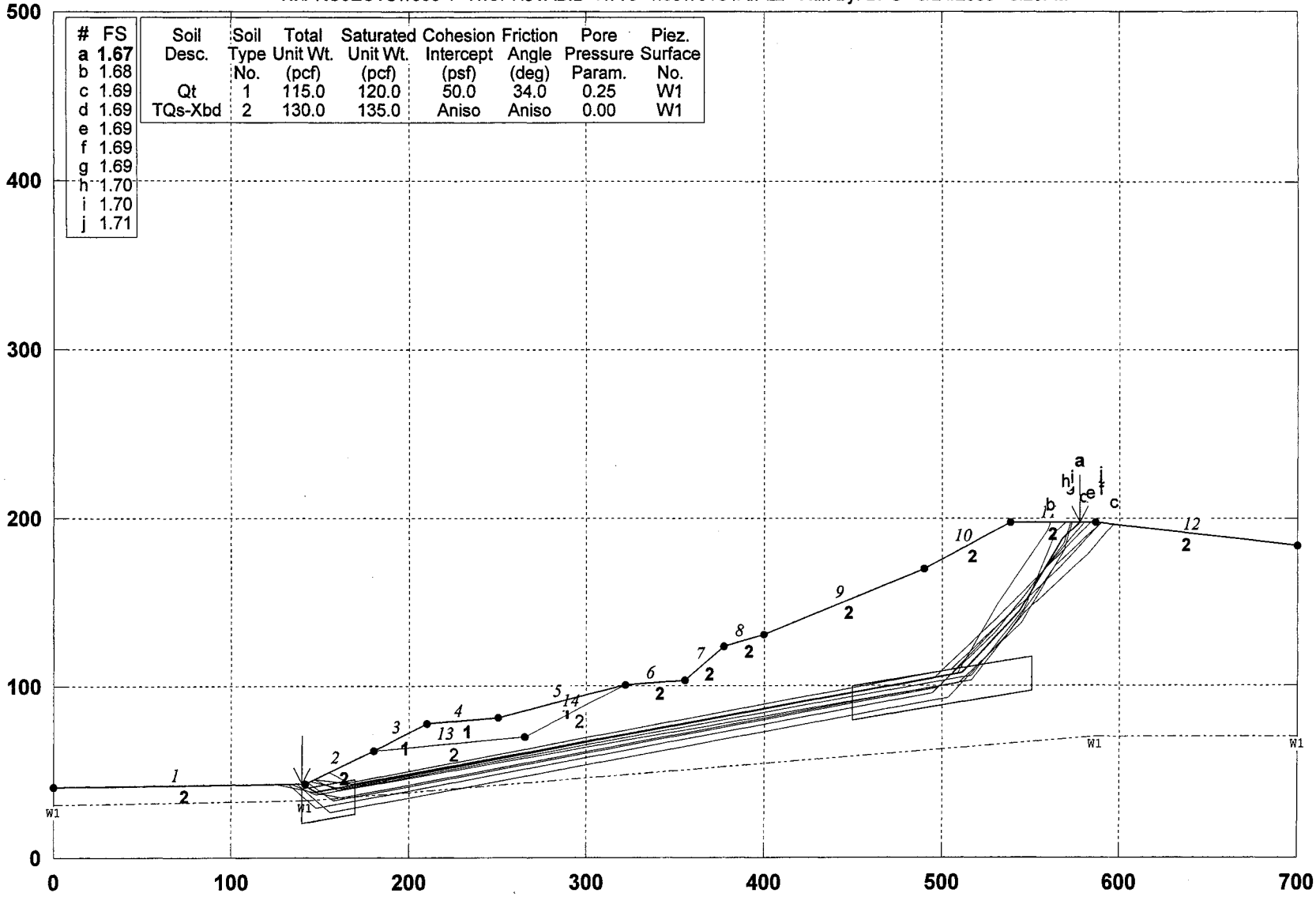
RUN #44

TT 53425; 31-31', CS-16, Qt/TQs Cut on Toe of TQs Ridge w LA Aqueduct; Static

N:\PROJECTS\1500-1~1\1571\STABIL~1\TT3~1.03\T31S1A.PL2 Run By: BPG 3/24/2003 3:23PM

#	FS
a	1.67
b	1.68
c	1.69
d	1.69
e	1.69
f	1.69
g	1.69
h	1.70
i	1.70
j	1.71

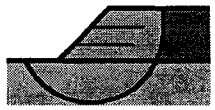
Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Piez. Surface No.
Qt	1	115.0	120.0	50.0	34.0	0.25	W1
TQs-Xbd	2	130.0	135.0	Aniso	Aniso	0.00	W1



PCSTABL5M/si FSmin=1.67

Safety Factors Are Calculated By The Modified Janbu Method for the case of c & phi both > 0

STED



** PCSTABL5M **
by
Purdue University
--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer`s Method of Slices

Run Date: 3/24/2003
Time of Run: 3:23PM
Run By: BPG
Input Data Filename: N:T31S1A.IN
Output Filename: N:T31S1A.OUT
Unit: ENGLISH
Plotted Output Filename: N:T31S1A.PLT
PROBLEM DESCRIPTION TT 53425; 31-31', CS-16, Qt/TQs Cut on T
oe of TQs Ridge w LA Aqueduct; Static

BOUNDARY COORDINATES
Note: User origin value specified.
Add 0.00 to X-values and 0.00 to Y-values listed.

12 Top Boundaries
14 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	.00	41.00	142.00	43.00	2
2	142.00	43.00	180.00	62.00	2
3	180.00	62.00	210.00	78.00	1
4	210.00	78.00	250.00	81.00	1
5	250.00	81.00	322.00	101.00	1
6	322.00	101.00	355.00	103.00	2
7	355.00	103.00	377.00	123.00	2
8	377.00	123.00	400.00	130.00	2
9	400.00	130.00	490.00	170.00	2
10	490.00	170.00	538.00	198.00	2
11	538.00	198.00	586.00	198.00	2
12	586.00	198.00	700.00	184.00	2
13	180.00	62.00	265.00	70.00	2
14	265.00	70.00	322.00	101.00	2

ISOTROPIC SOIL PARAMETERS
2 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	115.0	120.0	50.0	34.0	.25	.0	1
2	130.0	135.0	400.0	38.0	.00	.0	1

ANISOTROPIC STRENGTH PARAMETERS
1 soil type(s)
Soil Type 2 Is Anisotropic
Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	9.0	400.0	38.0
2	11.0	450.0	19.0
3	90.0	400.0	38.0

1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED
Unit Weight of Water = 62.40
Piezometric Surface No. 1 Specified by 4 Coordinate Points

Point No.	X-Water (ft)	Y-Water (ft)
1	.00	31.00
2	142.00	33.00
3	586.00	70.00
4	700.00	70.00

Janbus Empirical Coef is being used for the case of c & phi both > 0
A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Sliding Block Surfaces, Has Been
Specified.

RUN #45

400 Trial Surfaces Have Been Generated.
2 Boxes Specified For Generation Of Central Block Base
Length Of Line Segments For Active And Passive Portions Of
Sliding Block Is 50.0

Box No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Height (ft)
1	140.00	30.00	170.00	35.29	20.00
2	450.00	89.66	550.00	107.29	20.00

Following Are Displayed The Ten Most Critical Of The Trial Failure Surfaces Examined. They Are Ordered - Most Critical First.
* * Safety Factors Are Calculated By The Modified Janbu Method * *
Failure Surface Specified By 6 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	140.03	42.97
2	148.14	38.93
3	510.66	107.26
4	543.77	144.72
5	568.11	188.40
6	577.70	198.00

*** 1.670 ***

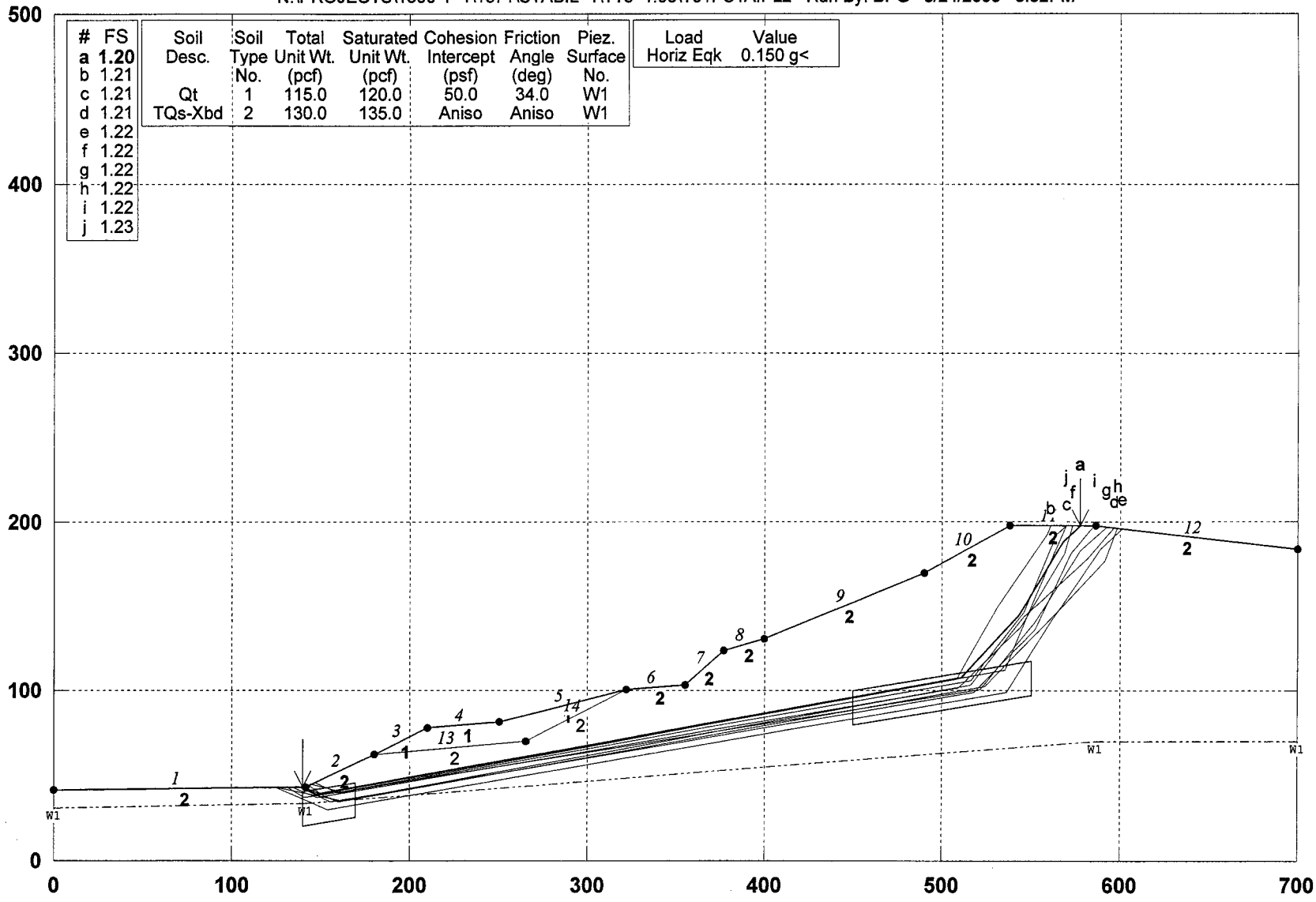
Individual data on the 16 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	2.0	129.0	.0	.0	.0	.0	.0	.0	.0
2	6.1	3247.4	.0	.0	.0	.0	.0	.0	.0
3	31.9	50114.0	.0	.0	.0	.0	.0	.0	.0
4	30.0	83748.8	.0	.0	.0	.0	.0	.0	.0
5	40.0	123040.4	.0	.0	.0	.0	.0	.0	.0
6	15.0	42797.2	.0	.0	.0	.0	.0	.0	.0
7	57.0	191759.9	.0	.0	.0	.0	.0	.0	.0
8	33.0	116641.5	.0	.0	.0	.0	.0	.0	.0
9	22.0	94398.0	.0	.0	.0	.0	.0	.0	.0
10	23.0	126374.7	.0	.0	.0	.0	.0	.0	.0
11	90.0	644873.3	.0	.0	.0	.0	.0	.0	.0
12	20.7	189954.8	.0	.0	.0	.0	.0	.0	.0
13	27.3	239176.5	.0	.0	.0	.0	.0	.0	.0
14	5.8	42426.3	.0	.0	.0	.0	.0	.0	.0
15	24.3	99456.3	.0	.0	.0	.0	.0	.0	.0
16	9.6	5981.8	.0	.0	.0	.0	.0	.0	.0

RUN #45

TT 53425; 31-31', CS-16, Qt/TQs Cut on Toe of TQs Ridge w LA Aqueduct; PseudoStc

N:\PROJECTS\1500-1~1\1571\STABIL~1\TT3~1.03\T31PS1A.PL2 Run By: BPG 3/24/2003 3:32PM



PCSTABL5M/si FSmin=1.20

Safety Factors Are Calculated By The Modified Janbu Method

STED

RUN #5

INFINITE SLOPE STABILITY ANALYSIS

ALLAN E. SEWARD ENGINEERING GEOLOGY AND SOILS, INC.

Baylor Gibson — Spreadsheet Written 14-Mar-02

CLIENT Newhall Land — PROJECT NAME River Park

PROJECT ANALYSIS DATE: 20-May-02 — PROJECT NUMBER: 02-1571-4

OBJECTIVE: To determine the surficial stability of the given slope.

GIVEN: This 2H: 1V slope consists of certified engineered general fill.

Slope inclination, i, deg =	26.57	Fill Angle of Internal Friction, Φ', deg. =	29
Fill Total Density, γ_t, pcf =	130	Fill Cohesion, c, psf =	250
Fill Bouyant Density, γ_b, pcf =	67.6	Depth of Interest, d, ft =	4

REFERENCE: Lambe and Whitman, *Soil Mechanics* , John Wiley and Sons, Inc., 1969

ANALYSIS: per Figures 24.1, 24.2 and 24.3 of Lambe and Whitman,

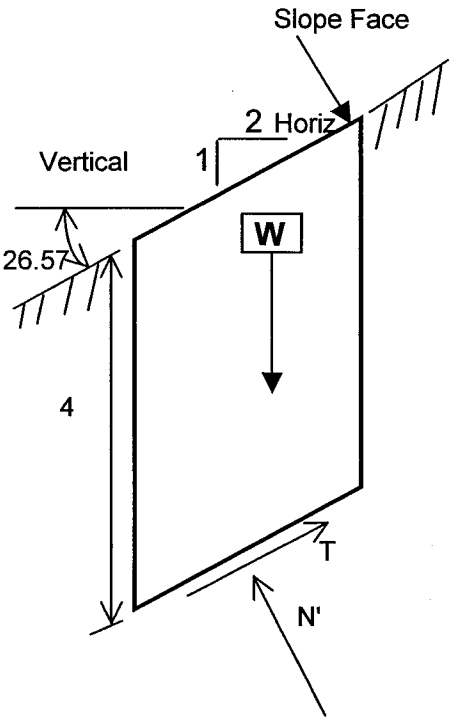
for a 4 ft deep slice of the given slope with unit width and length,

$N' = \gamma_b \, ad \cos i$

$T = \gamma_t \, ad \sin i$

$$FS = \frac{c + N' \tan \Phi'}{T}$$

FS = 1.65



RUN #46

Appendix 4.1

See Geologic/Geotechnical Maps in Map Box

(DEIR Map 19)

Appendix 4.1

See Geologic/Geotechnical Maps in Map Box

(DEIR Map 20)

Appendix 4.1

See Geologic/Geotechnical Maps in Map Box

(DEIR Map 21)

Appendix 4.1

See Geologic/Geotechnical Maps in Map Box

(DEIR Map 22)

Appendix 4.1

See Geologic/Geotechnical Maps in Map Box

(DEIR Map 23)

Appendix 4.1

See Geologic/Geotechnical Maps in Map Box

(DEIR Map 24)

Appendix 4.1

See Geologic/Geotechnical Maps in Map Box

(DEIR Map 25)

Appendix 4.1

See Geologic/Geotechnical Maps in Map Box

(DEIR Map 26)

Appendix 4.1

See Geologic/Geotechnical Maps in Map Box

(DEIR Map 27)

Appendix 4.1

See Geologic/Geotechnical Maps in Map Box

(DEIR Map 28)

Appendix 4.1

See Geologic/Geotechnical Maps in Map Box

(DEIR Map 29)

ALLAN E. SEWARD
ENGINEERING GEOLOGY, INC.
Geological And Geotechnical Consultants

GEOLOGIC AND GEOTECHNICAL REPORT - Addendum No. 1
Revised Tentative Tract Map (Revised June 11, 2003)
Tentative Tract No. 53425
River Park Development
City of Santa Clarita, California

Prepared for:

Newhall Land
23823 West Valencia Boulevard
Valencia, California 91355

Job No: 03-1571-4
Dated June 30, 2003

27825 Smyth Drive, Valencia, California 91355 661-294-0065 FAX 661-294-0833

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References
City of Santa Clarita Geologic and Geotechnical Review Sheet (dated 6/18/03)
Summary of Landslides **Table 1**
Summary of Cut-Slopes **Table 2**

ALLAN E. SEWARD
ENGINEERING GEOLOGY, INC.
Geological And Geotechnical Consultants

June 30, 2003 Job No: 03-1571-4

Newhall Land
23823 West Valencia Boulevard
Valencia, California 91355

Attention: Mr. Glenn Adamick

Subject: **GEOLOGIC AND GEOTECHNICAL REPORT - Addendum No. 1**
Review of Tentative Tract Map (Revised June 11, 2003)

Project: Tentative Tract 53425
River Park
City of Santa Clarita,
California

References: At end of text

Gentlemen:

This report presents our opinions on the existing geologic and geotechnical conditions on TT 53245 relative to the revised map dated June 11, 2003 and their effects on the proposed development. This report supplements and updates our April 4, 2003 report for TT 53425, hereinafter called "Previous Report", and the conclusions and recommendations presented therein are still applicable except where they are superseded in this report.

1.0 SCOPE OF WORK FOR REVISED TT 53425 (06/11/03)

1. Geologic/Geotechnical Review of revised Tentative Tract Map 53425 dated June 11, 2003.

2. Coordination with the Supervising Civil Engineer, Psomas.

3. Review of the geologic and geotechnical review sheet dated June 18, 2003 prepared for the City of Santa Clarita Transportation and Engineering Services by their reviewing

geologic and geotechnical consultant Arroyo Geotechnical. This review sheet is presented after the text portion of this report.

4. Geologic and geotechnical engineering analyses and preparation of Conclusions and Recommendations based on the existing site conditions and future use intended.

5. Geologic Preparation of the Revised Geologic/Geotechnical Maps, Revised Recommendations and Removal Maps, Revised Geologic Legend, Geotechnical Cross Sections (slope stability analysis), revised Cross Sections and this report.

2.0 BACKGROUND

Geologic and geotechnical aspects of the February 25, 2003 Tentative Map for TT 53425 were previously addressed in our report dated April 4, 2003. This report was reviewed and approved from a geologic and geotechnical standpoint within the City of Santa Clarita Transportation and Engineering Services review sheet dated June 18, 2003. This review sheet was prepared by Arroyo Geotechnical, the City of Santa Clarita geologic and geotechnical reviewing consultant, and is included after the text portion of this report. A revised Tentative Tract Map dated June 11, 2003 has been prepared by Psomas and is attached as the base map for our 100-Scale and 200-Scale Geologic/Geotechnical Maps (Sheets 1 through 4 of 5) as well as our Removal Map (**Plate I**).

3.0 REVISIONS TTM 53425

We have reviewed the latest revised Tentative Tract Map dated June 11, 2003. Lot locations and numbering designations have been revised relative to the original February 25, 2003 Tentative Tract Map design. A total of 439 Single Family Residential Lots, 5 Apartment Lots, 3 Recreation Lots, 2 Commercial Lots, 1 Private Street Lot, 67 Home Owners Association Lots and 28 Lots dedicated to the City of Santa Clarita. The 28 Lots dedicated to the City consist of 1 Park Site, 10 River Trail Lots, 2 Bridge Lots, 1 Water Quality Basin Lot, 8 Maintained Slope Lots and 6 Open Space Lots. In general only minor revisions to the proposed grades and cut-slopes are proposed relative to the original February 25, 2003 Tentative Map. Since relatively minor revisions to the cut-slopes greater than 25 feet in height are proposed, cut-slope designations have remained the same (CS-1 through CS-19). In general the cut-slope locations and orientations, gradients, slope heights, have remained the same with the exception of proposed cut-slopes CS-6 and CS-7. A discussion of these Cut-Slopes is presented in Section 8.1 Stability of Proposed Slopes and Proposed Grades as

well as presented within the Summary of Cut-Slopes Table 1. The proposed bridge abutments for Newhall Ranch Road spanning the Santa Clara River are now included on the Tentative Map.

4.0 FIELD EXPLORATION

Additional field mapping was performed in the vicinity of the proposed bridge abutments and we have revised our Geologic/Geotechnical maps (Sheets 1-4 of 5) and Removal Map (**Plate I**) accordingly.

5.0 GEOLOGY

For specific details on the existing site geologic and geotechnical conditions see our previous report dated April 4, 2003.

6.0 GENERALLIZED GEOLOGIC/GEOTECHNICAL SUBSURFACE CONDITIONS AND SOIL PROPERTIES

The specific details of the site geologic/geotechnical subsurface conditions and soil properties are addressed within our previous report dated 4/4/03.

7.0 GENERAL CONSLUSIONS AND RECOMMENDATIONS

7.1 Feasibility of Development

Tentative Tract 53425 is feasible for development from the standpoint of geology/geotechnical conditions provided our recommendations are followed and implemented during construction. The conclusions and recommendations presented within our 4/4/03 report are still applicable, except where they are superceded in this report.

8.0 GENERAL DESIGN CONSIDERATIONS & RECOMMENDATIONS

8.1 Stability of Proposed Slopes

Since relatively minor revisions to the proposed cut-slopes greater than 25± feet in height are indicated on the revised Tentative Tract Map, cut-slope designations have remained

the same (CS-1 through CS-19). We have revised Cross Sections 8-8', 9-9' and 22-22' (see **Plate II**) based on the new revised design grades presented on the Tentative Tract Map. The tentative tract map indicates designated Cut-Slopes, CS-6 and CS-7 within area A1 have been revised relative to the original 2/25/03 Tentative Tract Map. The revisions to these slopes are discussed below. We have revised our Summary of Landslides Table 1 and Summary of Cut-Slopes Table 2 relative to the revised Lot number designations.

Proposed Cut-Slope CS-6 was originally designed (2/25/03) to be a maximum 30 feet high south and west facing slope with a 2:1 gradient. This slope has been lowered 5 feet to 25 feet in height and the west-facing portion of the slope has been eliminated. Slope stability analysis performed on Cross Section 8-8' for Cut-Slope CS-6 within our previous 4/4/03 report indicate that a 30 feet high slope satisfies the City of Santa Clarita Factor of Safety requirement, therefore the current design (25 feet high) proposed Cut-Slope CS-6 is still considered to be grossly stable as designed. A Stability Fill is recommended for this slope due to the anticipated water seepage from the adjacent Castaic Lake Water Agency water pipeline located within Newhall Ranch Road.

Proposed Cut –Slope CS-7 has been lowered approximately 5 feet to 25 feet in height and has minor changes in orientation relative to the original 2/25/03 Tentative Map design. Previously performed slope stability analysis on Cross Sections 8-8' and 22-22' for the previous design indicate that this slope satisfies the City of Santa Clarita Factor of Safety requirement for slope stability. However, a Stability Fill is recommended for this slope due to anticipated seepage and surficial stability due to the adjacent CLWA pipelines located within Newhall Ranch Road.

8.2 Proposed Removals

Only minor vertical grade changes (0 to 5 feet) are indicated on the revised Tentative Tract Map, therefore our previous removal recommendations still apply. Due to the addition of the proposed bridge abutments for Newhall Ranch Road spanning the Santa Clara River, we have revised our Removal limits. For details, see the Removal Map **Plate I.**

9.0 LIMITATIONS

This report has been prepared for the exclusive use of Newhall Land and their design consultants for the specific site discussed herein. This report should not be considered transferable. Prior to use by others, we should be notified, as additional work may be required to update this report.

In the event that any modifications in the design or location of the proposed development, as discussed herein, are planned, the conclusions and recommendations contained in this report will require a written review by this firm with respect to the planned modifications.

In performing these professional services, we have used the degree of care and skill ordinarily exercised, under similar circumstances, by reputable engineering geologists and geotechnical engineers practicing in this or similar localities.

The analyses and interpretations presented in this report have been based on the results of pertinent field and laboratory soil investigations. It should be recognized that subsurface conditions can vary in time and laterally and with depth at a given site. Our conclusions and recommendations are based on the data available and our interpretation of the data based on our experience and background. Hence, our **conclusions** and **recommendations** are **professional opinions** and are **not meant** to be a control of nature; therefore, **no warranty** is herein **expressed** or **implied**.

It should be noted that faulting is normally confined to the area immediately adjacent to a known fault, or within a few feet of the last fault movement. Regardless of what criteria is used however, absolute assurance against future fault displacement or strong ground motion cannot be obtained in tectonically active areas. New faults can form, as the orientation and magnitude of deformational forces in the earth's crust change with time. Therefore, the location of new breaks or ground motions during a seismic event cannot be located or anticipated.

This report may not be duplicated without the written consent of this firm.

This opportunity to be of service is appreciated. Please contact us if you would like to discuss this report further.

Respectfully submitted,

Allan E. Seward, CEG 246
Principal Engineering Geologist
President

Baylor P. Gibson, RCE 41568, RGE 2061
Principal Geotechnical Engineer

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Exp. 12/31/03
GEOTECHNICAL
STATE OF CALIFORNIA

The following attachments and appendices complete this report.

References
City of Santa Clarita Geologic and Geotechnical Review Sheet (6/18/03)
Summary of Landslides Table 1
Summary of Cut-Slopes Table 2

APPENDIX A - Maps and Cross Sections

- **Maps** (In pockets)
  Geologic and Geotechnical Maps (1"=100') Sheets 2-4 of 5
  Geologic and Geotechnical Map (1"=200') Sheet 1 of 5
  Geologic and Geotechnical Removal Map (1"=200') **Plate I**
- **Cross Sections** (In pockets)
  Revised Geologic Cross Sections 1-1' to 4-4' and 7-7' **Plate II**

Distribution: (4) Newhall Land
Attn: Glenn Adamick
(2) Psomas
1 - Attn: Jeannine Giem – Santa Clarita Office
1 - Attn: Matt Heideman – Costa Mesa Office
(3) City of Santa Clarita
(2) Castaic Lake Water Agency c/o Kennedy/Jenks Consultants
Attn: Lynn Takaichi
(1) Impact Sciences
Attn: Ms. Susan Tebo

REFERENCES

Reports by: Allan E. Seward Engineering Geology, Inc.

(1) **Geologic and Geotechnical Report**
Review of Tentative Tract Map (Dated February 25, 2003)
Tentative Tract 53425
River Park
City of Santa Clarita, California
Dated April 4, 2003 - JN: 03-1571-4

Published

Blake, T.F., 1998, FRISKSP - Version 4.00: A computer program for the probabilistic estimation of peak acceleration and uniform hazard spectra using 3-D faults as earthquake sources: Thomas F. Blake, Computer Services & Software.

Blake, T.F., 1999, EQSEARCH - Version 3.00: A computer program for the estimation of peak horizontal acceleration from California historical earthquake catalogs: Thomas F. Blake, Computer Services & Software.

Boore, D.M., Joyner, W.B., and Fumal, T.E., 1997, Equations for estimating horizontal response spectra and peak acceleration from western North American earthquakes: A summary of recent work: Seismological Research Letters, v. 68, no. 1, p. 128-153.

Campbell, K.W., 1997, Empirical near-source attenuation relationships for horizontal and vertical components of peak ground acceleration, peak ground velocity, and pseudo-absolute acceleration response spectra: Seismological Research Letters, v. 68, no. 1., p. 154-179.

CDCDMG, 1995, Checklists for the review of geologic/seismic reports for California public schools, hospitals, and essential services buildings: CDMG Note 48, 3 p.

CDCDMG, 1997, Guidelines for evaluating and mitigating seismic hazards in California: California Department of Conservation Division of Mines and Geology Special Publication 117.

CDCDMG, 1998, Seismic Hazard Zones Map for the Newhall Quadrangle Released February 1, 1998, California

CDCDMG, 1997, Seismic Hazard Evaluation of the Newhall 7.5-Minute Quadrangle, Los Angeles County, California: Open-File Report 97-11.

Dibblee, T.W., Jr., 1996, Geologic Map of the Newhall Quadrangle, Los Angeles County, California: Dibblee Geological Foundation, Map DF-56.

Golden Software, Inc., 1998, Grapher™, Golden Software, Inc.

REFERENCES

Hart, E.W., 1997, Fault-rupture hazard zones in California: California Division of Mines and Geology Special Publication 42, 24 p.

Jennings, C.W., 1988, Fault map of California with locations of volcanoes, thermal springs, and thermal wells: California Division of Mines and Geology, Geologic Data Map No. 1, 4th Printing.

Kew, W.S.W., 1924, Geology and oil resources of a part of Los Angeles and Ventura Counties, California: U.S. Geological Survey Bulletin 753, 202 p.

Martin, G.R., and Lew, M., 1999, Recommended procedures for implementation of DMG Special Publication 117 - Guidelines for analyzing and mitigating liquefaction hazards in California: Southern California Earthquake Center, 63p.

Morton, D.M., 1976, Reconnaissance surficial geologic maps of the Newhall, Oat Mountain, Santa Susana and Val Verde 7.5' Quadrangles, Los Angeles and Ventura Counties, southern California: U.S. Geological Survey Open File Map 76-211.

Peabody, A.W., 1969, Principles of cathodic protection, Chapter 5, NACE Corrosion Course: National Academy of Corrosion Engineers

Petersen, M.D., Bryant, W.A., Cramer, C.H., Cao, T., Reichle, M.S., Frankel, A.D., Lienkaemper, J.J., McCrory, P.A., and Schwartz, D.P., 1996, Probabilistic seismic hazard assessment for the State of California: California Department of Conservation Division of Mines and Geology Open-File Report 96-08, 33 p.

Real, C.R., Toppozada, T.R., and Parke, D.L., 1978, Earthquake epicenter map of California, showing events from 1900 through 1974 equal to or greater than magnitude 4.0 or intensity V: California Division of Mines and Geology Map Sheet 39.

Robson, S.G., 1972, Water-Resources Investigation Using Analog Model Techniques in the Saugus-Newhall Area, Los Angeles County, California.

Sadigh, K., Chang, C.Y., Egan, J.A., Makdisi, F., and Youngs, R.R., 1997, Attenuation relations for shallow crustal earthquakes based on California strong motion data: Seismological Research Letters, v. 68, no. 1, p. 180-189.

Stein, R.S., and Yeats, R.S., 1989, Hidden earthquakes, Scientific American, v. 260, no. 6, p. 48-57.

Stewart, J.P. et al., 1994, Preliminary report on the principal geotechnical aspects of the January 17, 1994 Northridge Earthquake: EERC, U.C. Berkeley, Report No. UCB/EERC-94/08, 245 pages.

REFERENCES

Treiman, J., and Saul, R., 1986, The mid-Pleistocene inception of the Santa Susana Mountains: in Ehlig, P.L. (trip leader): Neotectonics in the area between the central and western Transverse Ranges, southern California: Geological Society of America Field Trip Number 10, p. 7-12.

Uniform Building Code (UBC), 1997.

Wells, D.L., and Coppersmith, K.J., 1994, New empirical relationships among magnitude, rupture length, rupture area, and surface displacement: Bulletin of the Seismological Society of America, v. 84, no. 4, p. 974-1002.

Winterer, E.L., and Durham, D.L., 1962, Geology of southeastern Ventura Basin, Los Angeles County, California: U.S. Geological Survey Professional Paper 334-H, p. 275-366.

Youd, T.L, and Idriss, I.M., eds., 1997, Proceedings of the NCEER workshop on evaluation of liquefaction resistance of soils: National Center for Earthquake Engineering Research Technical Report NCEER-97-0022, 276 p.

Ziony, J.I., and Jones, L.M., 1989, Map showing late Quaternary faults and 1978-84 Seismicity of the Los Angeles region, California: Miscellaneous Field Studies Map, MF 1964, scale 1:250,000.

SUMMARY OF LANDSLIDES

LANDSLIDE NO.	SHEET NO.	MITIGATION
1	2 of 5	It is recommended that this landslide be **completely removed** and reconstructed to its approximate original configuration using Certified Engineered Fill utilizing a keyway and backdrains designed by the soils engineer. The design of this keyway will be based on the configuration of the future removal. It is anticipated that the removal depth will range up to 35 feet. In areas to receive fill the removal bottoms should be surveyed in order to document the removal for future reference.
2 and 3	2 of 5	These landslides are located partially within existing cut-slopes and will be subject to periodic maintenance. These landslides are located in an area where they do not impact the proposed development and are safe for the use intended. At the completion of grading, these landslides will be designated as **Restricted Use Areas** on the Final Map.
4	2 of 5	Located in the vicinity of Lots 83 and 84 within a proposed fill area. It is recommended that this landslide be **completely removed** under the continuous observation of the Project Engineering Geologist. It is anticipated that the removal depth will range up to 25 feet below native grade. In areas to receive fill, the removal bottoms should be surveyed in order to document the removal for future reference and/or later additional grading.
5a	3 of 5	This landslide is located north of Newhall Ranch Road and was buttressed during the grading and construction of the CLWA facility and associated water line. This landslide is located in an area where it does not impact the proposed development and is safe for the use intended. At the completion of grading, this landslide will be designated as a **Restricted Use Area** on the **Final Map**.

SUMMARY OF LANDSLIDES

LANDSLIDE NO.	SHEET NO.	MITIGATION
5b	3 of 54	This large landslide is located south of Newhall Ranch Road. Stability calculations performed at Cross Section 9-9' indicate this landslide at the proposed Tentative Map grading configuration does not satisfy the City of Santa Clarita requirements for factor of safety. Due to the large size of this landslide, mitigation options are provided. Option 1 - construct a designed buttress utilizing a 150-foot wide by 45-foot deep keyway (at the toe). Option 2 – Construct a designed shear keyway located within the landslide mass. This shear keyway would be based on additional subsurface exploration and analysis. Option 3 – redesign such that proposed structures are not proposed on this landslide (avoidance). At the completion of grading, this landslide would be designated as a **Restricted Use Area** on the Final Map. Option 4 – completely remove the landslide and replace it with certified engineered fill. In areas to receive fill, the removal bottoms should be surveyed in order to document the removal for future reference. If complete removal is performed, it is anticipated that removals will range up to 106 feet deep.
6	3 of 5	This landslide is located east of Landslide Qls-5b. Stability evaluation on Cross Section 10-10' indicates that previous grading for Newhall Ranch Road is grossly stable but the landslide mass south of Newhall Ranch Road does not satisfy the City of Santa Clarita factor of safety requirement. This area will be subject to deformation and settlement in the event that the landslide moves. A park trail with grading is currently proposed. It is recommended that grading be performed such that the existing topography is only minimally altered. It is recommended that this trail not be paved and that minimal watering be performed. At the completion of grading, this landslide would be designated as a **Restricted Use Area** on the **Final Map**.
7	2 of 5	This landslide is located in the vicinity of Lot 130 in a proposed fill area. It is recommended that this landslide be **completely removed** under the continuous observation of the Project Engineering Geologist. The removal bottoms should be surveyed in order to document the removal for future reference and/or later additional grading. It is anticipated that the removal will range up to 24 feet.

SUMMARY OF LANDSLIDES

LANDSLIDE NO.	SHEET NO.	MITIGATION
8	3 of 5	This landslide is located beneath proposed Santa Clarita Parkway mostly within a proposed fill area. It is recommended that this landslide be **completely removed** under the continuous observation of the Project Engineering Geologist. The removal bottoms should be surveyed in order to document the removal for future reference and/or later additional grading. It is anticipated that the removal will range up to 24 feet.
9	3 of 5	This landslide is located in a proposed cut and proposed fill area. It is recommended that this landslide be **completely removed** under the continuous observation of the Project Engineering Geologist. The removal bottoms should be surveyed in order to document the removal for future reference and/or later additional grading. It is anticipated that the removal will range up to 45 feet.
10	3 of 5	This landslide is located in a proposed cut and proposed fill area. It is recommended that this landslide be **completely removed** under the continuous observation of the Project Engineering Geologist. The removal bottoms should be surveyed in order to document the removal for future reference and/or later additional grading. It is anticipated that the removal will range up to 35 feet.
11	3 of 5	This landslide is located in proposed cut and proposed fill areas in the vicinity of proposed cut-slopes CS-13 and CS-14. Slope stability analysis on cross section 23-23' indicates this slope/area does not satisfy the city of Santa Clarita factor of safety requirement for slope stability. A remedial buttress fill utilizing a 150 feet wide keyway is required to obtain slope stability factor of safety requirement. Prior to construction of the remedial buttress, it is recommended that this landslide be **completely removed.** It is anticipated that the removal will range up to 40 feet. In areas to receive fill, the removal bottoms should be surveyed in order to document the removal for future reference.
12	3 of 4	It is recommended that the portions of this landslide located beneath the proposed bike trail be **completely removed** during the grading operations and replaced with Certified Engineered Fill. It is anticipated that the removal will range up to 24 feet. At the completion of grading, the remaining portion of this landslide will be designated as a **Restricted Use Area** on the **Final Map.**

SUMMARY OF LANDSLIDES

LANDSLIDE NO.	SHEET NO.	MITIGATION
13	4 of 5	This landslide is located in the vicinity between proposed cut-slopes CS-16 and CS-19. A portion of this landslide is located in an area where grading is proposed. It is recommended that the portion of this landslide within the graded area be **removed** under the continuous observation of the Project Engineering Geologist prior to placing certified engineered fill. It is anticipated that the removal will range up to 35 feet. In areas to receive fill, the removal bottoms should be surveyed in order to document the removal for future reference and/or later additional grading.
14	4 of 5	This landslide is located in the vicinity of proposed Cut-Slope CS-19. It is recommended that this landslide be **completely removed** under the continuous observation of the Project Engineering Geologist. The removal bottoms should be surveyed in order to document the removal for future reference and/or later additional grading. It is anticipated that the removal will range up to 24 feet.

SUMMARY OF CUT-SLOPES

Proposed Cut-Slope CS-1

Location: Sheet 2 of 5 – Vicinity of Lot 525 within Area D

Direction Slope Faces: Semicircular facing west to southwest to south

Slope Parameters: 120± feet high with a 2:1 gradient

Cross Sections: 1-1', 2-2'

Anticipated Geologic Conditions: West facing portion - TQs bedrock anticipated to be dipping 4 - 15° towards the south which is neutral to the proposed slope face; Southwesterly facing portion – TQs bedding anticipated to be oriented such that the bedding planes are dipping out of the proposed slope face. Slope stability analysis of this slope indicates this slope has a safety factor greater than the City of Santa Clarita requirements for slope stability and therefore **grossly stable as designed.**

Mitigation Measures: **Not required**

Proposed Cut-Slope CS-2

Location: Sheet 2 of 5 – Vicinity of Lot 524 within Area D

Direction Slope Faces: Southwest

Slope Parameters: 60± feet high with a 2:1 gradient

Cross Sections: 4-4', 28-28'

Anticipated Geologic Conditions: The eastern portion of the slope is anticipated to expose landslide (Qls-1) material within the proposed cut-slope face; **grossly unstable** due to fractured and broken nature of the landslide material. The western portion of the slope is anticipated to expose Saugus Formation bedrock bedding planes dipping out of the proposed slope face. Slope stability analysis performed on Cross Sections 4-4' and 28-28' indicate this slope has a safety factor greater than the City of Santa Clarita requirements for slope stability and therefore **grossly stable as designed.**

Mitigation Measures: It is recommended that this landslide be **completely removed** from the proposed cut-slope face and replaced using Certified Engineered Fill utilizing a keyway and backdrains designed by the soils engineer. The design of this keyway will be based on the configuration of the future removal. It is anticipated that the removal depth will range up to 35 feet. In areas to receive fill the removal bottoms should be surveyed in order to document the removal for future reference. A Restricted Use Area has been recommended in order to permanently limit groundwater levels to those found to be necessary for stability. Within this Restricted Use Area, it is recommended that no permanent piped water be allowed above elevation 1250 on the existing natural ridge north of Lot 513.

SUMMARY OF CUT-SLOPES

Proposed Cut-Slope CS-3

Location: Sheet 2 of 5 - Lot 524 just westerly of the existing water tank
Direction Slope Faces: South
Slope Parameters: 55± feet high with a 2:1 gradient
Cross Sections: 29-29'
Anticipated Geologic Conditions: TQs bedding anticipated to be dipping out of the proposed slope face. Slope stability analysis indicates this slope has a safety factor greater than the City of Santa Clarita requirements for slope stability. **Grossly stable as designed.**
Mitigation Measures: **No mitigation required.**

Proposed Cut-Slope CS-4

Location: Sheet 2 of 5 - Northeast of Lot 524 just westerly of the existing water tank
Direction Slope Faces: Westerly
Slope Parameters: 35± feet high with a 2:1 gradient
Cross Sections: None
Anticipated Geologic Conditions: TQs bedrock is anticipated to be oriented neutral to the proposed cut-slope face. **Grossly stable**
Mitigation Measures: **No mitigation required.** A Restricted Use Area has been recommended in order to permanently limit groundwater levels to those found to be necessary for stability. Within this Restricted Use Area it is recommended that no permanent piped water be allowed above elevation 1250 on the existing natural ridge north of Lot 513.

Proposed Cut-Slope CS-5

Location: Sheet 2 of 5 – Vicinity of Lots 60-73 within Area A1
Direction Slope Faces: Southerly
Slope Parameters: 25± feet high with a 2:1 gradient
Cross Sections: None; see section 8-8' for cut-slope CS-6 for similar configuration
Anticipated Geologic Conditions: TQs bedrock anticipated to be dipping out of the proposed slope face. Slope stability analysis on cross section 8-8', which depicts similar geologic conditions, indicates this slope satisfies the City of Santa Clarita factor of safety requirement for slope stability. However, due to anticipated seepage from the existing adjacent CLWA pipelines, this slope may be subject to surficial instability. **Grossly stable but surficially unstable**
Mitigation Measures: **Stability fill required** utilizing a 20 feet wide keyway for the south facing portion of the slope.

SUMMARY OF CUT-SLOPES

Proposed Cut-Slope CS-6

Location: Sheet 2 of 5 – Vicinity of Lots 158-176 within Area A1
Direction Slope Faces: South
Slope Parameters: 25± feet high with a 2:1 gradient
Cross Sections: 8-8'
Anticipated Geologic Conditions:

- West facing portion - TQs bedrock anticipated to be oriented neutral to the proposed cut-slope face with the exception of a small portion of the slope which may expose landslide (Qls-5b) material. The portion of the slope exposing the TQs bedrock is anticipated to be **grossly stable**; the portion of the slope exposing the landslide material will be **grossly unstable**.
- South facing portion - TQs bedrock anticipated to be dipping out of the proposed slope face. Slope stability analysis performed on the previous design (4/4/03) indicates this slope will satisfy the City of Santa Clarita factor of safety requirement for slope stability. However, due to potential seepage from the existing adjacent CLWA pipelines, this slope may be subject to surficial instability. **Grossly stable but surficially unstable**

Mitigation Measures: All landslide material exposed within the slope will require complete removal and replacement with certified engineered fill. **Stability fill required** utilizing a 20 feet wide keyway for the south-facing portion of the proposed cut-slope. See landslide summary (Table 1) for mitigation options for landslide Qls-5b.

Proposed Cut-Slope CS-7

Location: Sheet 2 of 5 – Vicinity of Lots 181-194 within Area A1
Direction Slope Faces: Southeast
Slope Parameters: 25± feet high with a 2:1 gradient
Cross Sections: 8-8', 22-22'
Anticipated Geologic Conditions: TQs bedrock anticipated to be dipping out of the proposed cut-slope face with the exception of a small portion of the slope, which may expose landslide (Qls-5b) material. Slope stability analysis performed for the previous design of this cut-slope, at 30 feet high, indicates this slope will satisfy the City of Santa Clarita factor of safety requirement for slope stability. However, due to anticipated seepage from the existing adjacent CLWA pipelines, this slope may be subject to surficial instability. **Grossly stable but surficially unstable**
Mitigation Measures: All landslide material exposed within the slope will require complete removal and replacement with certified engineered fill. **Stability fill**

SUMMARY OF CUT-SLOPES

required utilizing a 20 feet wide keyway for the remaining portion of the proposed cut-slope exposing TQs material. See landslide summary (Table 1) for mitigation options for landslide Qls-5b.

Proposed Cut-Slope CS-8

Location: Sheet 3 of 5 – Vicinity of Lots 276 and 277 Area A2
Direction Slope Faces: Semicircular – south to east to northeast
Slope Parameters: 35± feet high with a 2:1 gradient
Cross Sections: 30-30'
Anticipated Geologic Conditions: Anticipated to expose Quaternary Terrace Deposits over TQs bedrock dipping up to 12 degrees out of the south to southeast facing portion of the proposed slope face and oriented neutral to the east facing portion of the proposed slope face. Quaternary Terrace Deposits are subject to surficial instability due to their friable nature. Slope stability analysis of this slope indicates this slope satisfies the City of Santa Clarita factor of safety requirement for slope stability. **Grossly stable but surficially unstable**
Mitigation Measures: **Stability fill required** utilizing a 25 feet wide keyway.

Proposed Cut-Slope CS-9

Location: Sheet 3 of 5 – Vicinity of Santa Clarita Parkway and Lot 260 Area A2
Direction Slope Faces: Westerly
Slope Parameters: 32± feet high with a 2:1 gradient
Cross Sections: None
Anticipated Geologic Conditions: Anticipated to expose crudely bedded horizontally oriented Quaternary Terrace Deposits. Quaternary Terrace Deposits are subject to surficial instability due to their friable nature. **Grossly stable but surficially unstable**
Mitigation Measures: **Stability fill required.**

Proposed Cut-Slope CS-10

Location: Sheet 3 of 5 – Lots 388 – 397 Area B
Direction Slope Faces: Southeast
Slope Parameters: 50± feet high with a 2:1 gradient
Cross Sections: 16-16', 17-17', 18-18' & 19-19'
Anticipated Geologic Conditions: Anticipated to expose Quaternary Terrace Deposits over TQs bedrock dipping neutral to 3 degrees out of the proposed slope face. Quaternary Terrace Deposits are subject to surficial instability due to their

SUMMARY OF CUT-SLOPES

friable nature. Slope stability analysis of this slope performed on Cross Sections 16-16', 17-17' and 18-18' indicates this slope satisfies the City of Santa Clarita factor of safety requirement for slope stability. **Grossly stable but surficially unstable**
Mitigation Measures: **Stability fill required.**

Proposed Cut-Slope CS-11

Location: Sheet 3 of 5 – South of Lots 466 and 467 within Area B
Direction Slope Faces: Southeast
Slope Parameters: 70± feet high with a 2:1 gradient
Cross Sections: 11-11'
Anticipated Geologic Conditions: Anticipated to expose TQs bedrock dipping out of the proposed slope face. Slope stability analysis of this slope indicates this slope does not satisfy the City of Santa Clarita factor of safety requirement for slope stability. **Grossly unstable.**
Mitigation Measures: **Buttress fill required** utilizing an 80 feet wide keyway.

Proposed Cut-Slope CS-12

Location: Sheet 3 of 5 – Vicinity of Lots 403-420 within Area B
Direction Slope Faces: South to southeast
Slope Parameters: 30± feet high with a 2:1 gradient
Cross Sections: 11-11', 27-27'
Anticipated Geologic Conditions: Anticipated to expose landslide (Qls-9) material within the proposed slope face in the vicinity of Lots 407-414 and TQs bedrock dipping out of the proposed slope face in the vicinity of Lots 415-420. Subsurface exploration indicates that perched ground water conditions exist in this vicinity. Slope stability analyses performed on Cross Section 11-11' indicate that this slope satisfies the City of Santa Clarita factor of safety requirement for slope stability. Thus, proposed cut-slope CS-12 is considered to be **grossly stable but surficially unstable** due to anticipated surficial instability due to the anticipated elevated ground water conditions.
Mitigation Measures: **Remove landslide Qls-9** and replace with certified engineered fill. The remaining bedrock portions will require a Stability fill utilizing a 20 feet wide keyway.

Proposed Cut-Slope CS-13

Location: Sheet 4 of 5 – Vicinity of Lots 475 and 420- 429 – Area B
Direction Slope Faces: South to southeast

SUMMARY OF CUT-SLOPES

Slope Parameters: 50± feet high with a 2:1 to 3:1 gradient
Cross Sections: 11-11', 14-14' & 23-23'
Anticipated Geologic Conditions: Anticipated to expose TQs Bedrock dipping out of the proposed cut-slope face. Landslide Qls-11 material is anticipated to be exposed within the eastern portion of the slope. Subsurface exploration indicates perched ground water conditions exist in this vicinity. Slope stability analysis indicates the western portion of this slope satisfies the City of Santa Clarita factor of safety requirement and is considered grossly stable as designed, but potentially **surficially unstable** due to expected surficial instability due to the anticipated perched ground water conditions. Slope stability analysis performed on the eastern portion of this slope indicates this portion of the slope does not satisfy the factor of safety requirement for slope stability. This portion of the slope is considered **grossly unstable** as designed.
Mitigation Measures: Remove entire landslide Qls-11. **Stability fill required** utilizing a 20 to 30 feet wide keyway is proposed for the western portion of this slope. The eastern portion requires **buttress fill** utilizing a 150 feet wide and 24 feet deep keyway constructed at the toe of proposed cut-slope CS-14 in the vicinity of the proposed bike trail. This designed keyway and backcut at the toe of proposed cut-slope CS-14 encompasses the eastern portion of cut-slope CS-13.

Proposed Cut-Slope CS-14

Location: Sheet 4 of 5 – East of Lot 475 adjacent to the Pedestrian/Bike Trail easement.
Direction Slope Faces: Southeast
Slope Parameters: 25± feet high with a 2:1 gradient
Cross Sections: 23-23'
Anticipated Geologic Conditions: Anticipated to expose landslide Qls-11 material within the proposed cut-slope face. The underlying geologic structure of the Saugus Formation bedrock is dipping towards the proposed cut-slope face. Perched groundwater conditions were encountered within bucket auger boring BA-6. Slope stability analysis of this slope indicates this slope does not satisfy the City of Santa Clarita factor of safety requirement for slope stability. **Grossly unstable.**
Mitigation Measures: Remove entire landslide Qls-11 and construct a **Buttress fill** utilizing a 150 feet wide keyway starting from the toe of proposed cut-slope CS-14. This buttress fill encompasses portions of proposed cut-slope CS-13.

SUMMARY OF CUT-SLOPES

Proposed Cut-Slope CS-15

Location: Within the CLWA property north of Newhall Ranch Road Sheets 3 and 4 of 5

Direction Slope Faces: Southeast

Slope Parameters: 95± feet high with a 2:1 gradient

Cross Sections: 11-11', 12-12', 13-13' & 14-14'

Anticipated Geologic Conditions: Quaternary Terrace Deposits over TQs bedrock. The TQs bedrock is anticipated to be dipping out of the proposed cut-slope face. Subsurface exploration indicates perched ground water conditions exist in this vicinity. Slope stability analysis of this slope indicates this slope does not satisfy the City of Santa Clarita factor of safety requirement for slope stability. **Grossly unstable**

Mitigation Measures: **Buttress fill required** utilizing a designed keyway. This keyway is proposed to be 40 feet wide along the western portion and 95 feet wide along the eastern portion of the slope.

Proposed Cut-Slope CS-16

Location: Sheet 4 of 5 – North of Lot 521 in the vicinity of the proposed debris basin within Area C.

Direction Slope Faces: Southeast

Slope Parameters: 50± feet high with a 2:1 gradient

Cross Sections: 15-15', 20-20', & 31-31'

Anticipated Geologic Conditions: An anticlinal axial trace within the Saugus Formation bedrock is anticipated to be exposed within the northern portion of the proposed cut-slope face. South of the axial trace, the TQs bedrock is anticipated to be dipping out of the proposed slope face. North of the axial trace, the TQs bedrock is anticipated to be dipping into the proposed slope face. Local deformation including faulting and fracturing may be present within the core of the anticline axis and may be subject to surficial failures. Quaternary Terrace Deposits are also anticipated to be exposed within the proposed cut-slope and are also subject to surficial failures. Slope stability analysis utilizing rapid drawdown condition indicates this slope satisfies the City of Santa Clarita factor of safety requirement for slope stability and is **grossly stable but surficially unstable.**

Mitigation Measures: **Stability fill required** utilizing a 25 feet wide keyway.

SUMMARY OF CUT-SLOPES

Proposed Cut-Slope CS-17

Location: Sheet 4 of 5 – South of Newhall Ranch Road within open space Lot 515
Direction Slope Faces: Southeast
Slope Parameters: 65± feet high with a 2:1 gradient
Cross Sections: 15-15'
Anticipated Geologic Conditions: Anticipated to expose TQs bedrock dipping out of the proposed slope face as well as a fill over bedrock situation. Slope stability analysis of this slope indicates this slope does not satisfy the City of Santa Clarita factor of safety requirement for slope stability. **Grossly unstable.**
Mitigation Measures: **Buttress fill required** utilizing a 30 feet wide keyway.

Proposed Cut-Slope CS-18

Location: Sheet 4 of 5 – Vicinity of Lot 509 within Area C.
Direction Slope Faces: South
Slope Parameters: 28± feet high with a 2:1 gradient
Cross Sections: None
Anticipated Geologic Conditions: An anticlinal axial trace within the Saugus Formation bedrock is anticipated to be exposed within the western portion of the proposed cut-slope face. South of the axial trace, the TQs bedrock is anticipated to be dipping out of the proposed slope face. North of the axial trace, the TQs bedrock is anticipated to be dipping into the proposed slope face. Local deformation including faulting and fracturing may be present within the core of the anticline axis and may be subject to surficial failures. Quaternary Terrace Deposits are also anticipated to be exposed within the upper portion of the proposed cut-slope and are also subject to surficial failures. **Grossly stable but surficially unstable.**
Mitigation Measures: **Stability fill required** utilizing a 20 feet wide keyway.

Proposed Cut-Slope CS-19

Location: Sheet 4 of 5 –Lot 520 within Area C
Direction Slope Faces: South to southeast
Slope Parameters: 30± feet high with a 2:1 gradient
Cross Sections: 24-24'
Anticipated Geologic Conditions: Anticipated to expose Quaternary Terrace Deposits over TQs bedrock dipping into the proposed slope face. Quaternary Terrace Deposits are subject to surficial instability due to their friable nature. Landslide Qls-14 anticipated to be exposed within the lower portion of the proposed cut-slope. Potential minor faults and fractures may be present due to a mapped minor fault zone

SUMMARY OF CUT-SLOPES

located in this vicinity. Lower portion of the cut-slope **grossly unstable** due to the presence of landslide material and **surficially unstable** due to the Qt deposits and potential minor fault zone located in this vicinity.

Mitigation Measures: Remove landslide Qls-14 and construct a **Stability fill.**

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Santa Clarita, CA 91355
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CITY OF SANTA CLARITA
TRANSPORTATION AND ENGINEERING SERVICES

Geology/Geotechnical Engineering Review Sheet

Project Address:	Vacant Land		
Tentative Tract:	53425 River Park	**Lots:**	524
Owner/Developer:	Newhall Land		
Geologist:	Allen E. Seward, Inc.	**Geology Report Dated:**	4/4/03
Soils Engineer:	Allen E. Seward, Inc.	**Soils Report Dated:**	4/4/03
Review Sheet No.:	1	**Review Date:**	6/18/03
City Representative:	Hoon Hahn		

Recommended Action: *Report approved from a geotechnical standpoint for environmental document*

The consultant has produced a comprehensive document related to this project. On several pages of Volume I it has been indicated that additional recommendations will be forthcoming at the grading plan stage. That is acceptable. In addition we offer several comments to be addressed at the grading plan stage. They are:

1. In several cross-sections it is called for slope toe protection at the edge of the Santa Clara River. Please provide recommendations and details.
2. On page 25 of Volume I it is stated fill slopes were analyzed under rapid draw down conditions. Where are the calculations?
3. The liquefaction evaluation, which has been provided, is for the uphill property. Describe the liquefaction potential for the Santa Clara River bed with high water conditions.
4. Page C-5 of Volume I stated no lateral spreading is expected, as there is no free-face toward which liquefied soils could move. If there is a liquefaction potential in the riverbed, doesn't that create a weakened free-face?

Leonard T. Evans, Jr., Ph.D., GE 302
Vice President

REGISTERED PROFESSIONAL ENGINEER
LEONARD T. EVANS, JR.
No. 302
Exp. 3/31/05
GEOTECHNICAL
STATE OF CALIFORNIA

Appendix A

Appendix 4.1

See Geologic/Geotechnical Maps in Map Box

(DEIR Maps 7 through 10)

Appendix 4.1

See Geologic/Geotechnical Maps in Map Box

(DEIR Map 30)

Appendix 4.1

See Geologic/Geotechnical Maps in Map Box

(DEIR Map 31)

APPENDIX 4.2
Flood

FLOOD
TECHNICAL REPORT

For:
Riverpark

Prepared for:
Impact Sciences, Inc.
30343 Canwood Street
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Prepared by:
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Suite 750
West Los Angeles, CA 90064
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Date: February 2004

Psomas Job No: 1VAL021505

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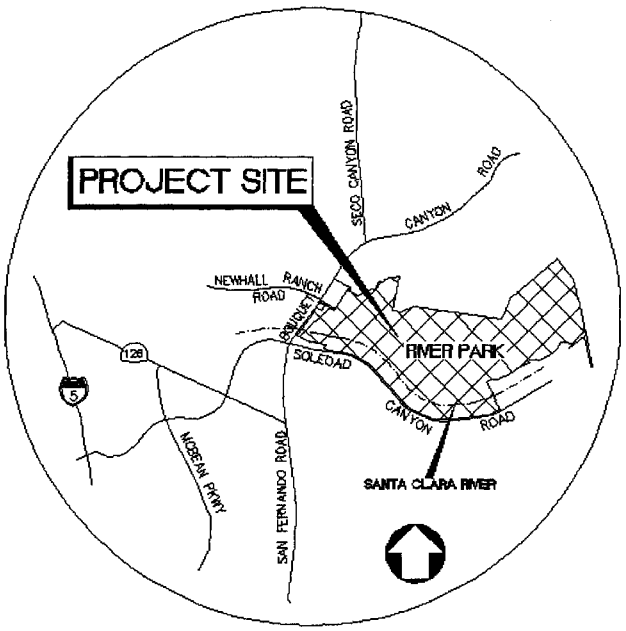
1 INTRODUCTION

1.1 PROJECT DESCRIPTION

1.1.1 Project Site

The Riverpark project lies in the center of the City of Santa Clarita, and within the watershed of an unnamed and roughly 835-acre tributary of the 1,634 square-mile Santa Clara River Basin Watershed (see Vicinity Map). The Santa Clara River flows through and adjacent to the project. The project site is located north of Soledad Canyon Road, east of Bouquet Canyon Road, and west of Golden Valley Road.



VICINITY MAP
NOT TO SCALE

The site is currently vacant except for a small portion that is being used by a contractor as a temporary storage yard with several temporary buildings. The proposed Riverpark project lies within the Valley Center Concept ("VCC") area of the City's General Plan, which specifically outlines the type and intensity of development in the core of the City of Santa Clarita. The proposed project consists of 744 apartment units, 439 single-family detached units, and a maximum of 40,000 square feet of retail commercial. Site preparation will include a cut and fill grading operation totaling 5.2 million cubic yards for both project development and construction of master-planned roadways (Newhall Ranch Road and Santa Clarita Parkway) within the project boundaries. Additional remedial grading is proposed. Earthwork is proposed to be balanced onsite. The project also includes buried bank stabilization, erosion protection, and the construction of the Newhall Ranch Road/Golden Valley Road Bridge over the Santa Clara River. The bridge would include abutments and bank stabilization on the north and south side of the bridge, as well as piers within the River. The project does not include the Santa Clarita Parkway Bridge, which is part of the City's General Plan and is expected to be constructed in the future; however, this latter bridge is included in the cumulative analysis because it is a City-planned improvement and much of its construction would occur within the project site boundaries.

1.1.2 Proposed Improvements

The proposed improvements on the project site that would provide flood and erosion control, and which would occur in and adjacent to the Santa Clara River, include buried bank stabilization, and erosion protection. The Newhall Ranch Road/Golden Valley Road Bridge over the Santa Clara River would also affect the hydraulics of the river.

At project buildout, runoff from the seven drainage areas would continue to flow through the site, but would be channeled through a storm system that would be constructed from the developed upland areas of the site down to the Santa Clara River. As required in the Los Angeles County Department of PublicWorks memorandum entitled, "Level of Flood Protection and Drainage Protection Standards," all on-site drainage systems carrying runoff from developed areas will be designed for the 25-year Design Storm (Urban Flood), while storm drains under major and secondary highways, open channels (main channels), debris carrying systems, and sumps will be designed for the 50-year Capital Flood. The City of Santa Clarita conforms to these Los Angeles County guidelines.

Runoff through the site would be controlled through a combination of grading, storm drainpipes, channels, catch basins, outlet structures, and bank stabilization along the river. The proposed drainage improvements are described below and their locations are illustrated in **Figure 1, Drainage Concept Map**, which also illustrates the post-development drainage patterns for the project site.

Project facilities are described below:

- *Storm Drains*
  Storm drains (pipes and reinforced concrete boxes) designed for either the 25-year or 50-year Capital storm would consist of both privately (Homeowner's Associations, Assessment Districts etc.)- and publicly (City of Santa Clarita and County of Los Angeles)-maintained systems. The minimum publicly-maintained mainline pipe size would be 18-inch connector pipes for clear flows.

- *Open Channels*
  Small open channels would consist of rectangular and trapezoidal concrete channels and would be designed for either the 25-year or 50-year Capital storm, depending on the source of the runoff. The channels sized for the 50-year Capital storm will have greater capacity than those sized for the 25-year storm.

- *Low Flow Pipes and Outlets*
  To reduce pollution impacts from the low flow runoff, a series of pipes and outlets will be provided to intercept first flush runoff from paved project areas. Pollutants expected to be generated on the project site, their potential water quality impacts, and water quality control are addressed in the Water Quality Technical Report.

- *Catch Basins*
  Catch basins would be provided to intercept flows beyond the 10- and 25-year storms and at strategic locations to minimize flooding at street intersections and at sump locations.

- *Debris Basins*
  To reduce debris being discharged through and from the site, debris basins are proposed to intercept flows from undeveloped upland areas prior to their discharge into the on-site storm system.

- *Energy Dissipaters*
  To reduce storm flow velocities and to prevent erosion at stormwater discharge points into the river, energy dissipaters consisting of either rip-rap or larger standard impact type energy dissipaters would be constructed wherever necessary at storm system outlets into the river. These energy dissipaters would slow the rate of flow of runoff into the river in order to prevent erosion of the stream channel.

- *Bank Stabilization*
  The project would include bank stabilization along the Santa Clara River totaling approximately 6,000 linear feet for residential, park and commercial project development (not including approximately 1,500 feet of toe protection [e.g. A-Jacks™, soil cement or equivalent]), and approximately 3,000 linear feet to allow for the construction of Newhall Ranch Road.

- The Newhall Ranch Road/Golden Valley Road bridge, including bridge abutments (on both the north and south side), and piers is also analyzed.

Improvements along the Santa Clara River were analyzed and approved in the Natural River Management Plan (NRMP). Differences between the project improvements and those permitted under the NRMP are illustrated in **Figure 2, Bank Stabilization.**

Figure 1, Drainage Concept Map

(Please see Map Box for Drainage Concept Map)

VICINITY MAP

LEGEND:

- PROJECT BOUNDARY
- TOP OF BANK LINING PER NRMP
- RIVER PARK TOP OF BANK LINING
- TOE PROTECTION
- AREA SETBACK/PROJECT TOP OF BANK LINING VS. NRMP TOP OF BANK LINING (576,740 SF. = 13.2 AC.)
- AREA ENCROACHMENT/PROJECT TOP OF BANK LINING VS. NRMP TOP OF BANK LINING (120,555 SF. = 2.8 AC.)

River Park VTTM 53425

AERIAL PHOTO WITH RIVER PARK TOP OF BANK LINING VS. NRMP TOP OF BANK LINING

Figure 2

PSOMAS

NEWHALL LAND

RP102-01.DWG

1.2 MATERIALS AND DOCUMENTS INCORPORATED BY REFERENCE

The following list of references identified in this report is provided for convenience. The portions of documents referred to, referenced or cited in this report are incorporated by reference and are available for review at the City of Santa Clarita, Planning and Building Services Department, Suite 302, Santa Clarita, CA 91355.

- Center for Watershed Protection. The Practice of Watershed Protection (2000).
- Chow, VT. Open Channel Hydraulics (pg 165 and pg 185). McGraw Hill Civil Engineering Series (1959).
- *Federal Emergency Management Agency (FEMA) Flood Insurance Map 060729 0345C (September 9, 1989).*
- John M. Tettemer & Associates, Natural River Management Plan for Santa Clara River from Castaic Creek to One-Half Mile Above the Los Angeles Aqueduct and Portions of the San Francisquito Creek and the Santa Clara River, South Fork [of the Santa Clara River] (May 1997).
- Los Angeles County Department of Public Works Hydrology Manual (December 1991) and Sedimentation Manual (June 1993)
- *Los Angeles County Department of Public Works, Hydrology Manual & Appendix, 1991*
- Los Angeles County of Public Works. Development Planning for Storm Water Management, A Manual for the Standard Urban Storm Water Mitigation Plan (SUSMP) (September 2002).
- Los Angeles County of Public Works, "Level of Flood Protection and Drainage Protection Standards" (1986).
- *Psomas. Surveyed topography data for Riverpark, November 20, 1998*
- *Psomas/CH2MHill. City of Santa Clarita Project Study Report Equivalent Cross Valley Connector Between Soledad Canyon Road and Bouquet Canyon Road (PSRE) (February 1, 2001, Revised in February, 2003).*
- United States Army Corps of Engineers. Santa Clara River Adopted Discharge Frequency Values (adopted May 3, 1994 by the United States Army Corps of Engineers, the Ventura County Flood Control Department and the Los Angeles County Department of Public Works).
- Valencia Company, Natural River Management Plan (Permitted Projects and Activities under the United States Corps of Engineers 404 Permit, California Department of Fish and Game 1603 Agreement and 2081 Permit (November 1998).

1.3 DEFINITIONS

The following are definitions to several acronyms and terms, which will be frequently used in this section of the Flood Technical Report.

100-year storm	Precipitation event corresponding to a flood that has a 1/100, or one percent, chance of occurring in any given year.
ACOE	Army Corps of Engineers
Burned and Bulked	

Runoff (Qbb)	Runoff from burned areas that are laden with burned vegetation, fines, rocks, mud and other debris.
Capital Flood (Qcap)	The runoff resulting from a theoretical storm based on Los Angeles County Department of Public Works methodology. The "model" storm is derived from 50-year frequency rainfall values, which occur in a time sequence patterned after actual major extra-tropical storms occurring in the Los Angeles Region. The calculations of runoff are also based on the soil types and amount of impervious surfaces in a watershed area, and on the assumption that undeveloped portions of the watershed are burned, resulting in significant amounts of debris and sediment being added to the runoff.
CDFG	California Department of Fish and Game
Clear Runoff (Qc)	Runoff that is absent of fines (finely crushed or powdered material), mud, rocks, vegetation, and other debris.
Coefficient of Runoff	Variable in the rational and modified rational method runoff formula, which is dependent upon soil type, rainfall intensity, and the percent of imperviousness.
CWA	Federal Clean Water Act
Detention Basin	Physical flood control structure that captures storm flows and temporarily stores these flows in man-made surface depressions and, therefore, not available for producing surface runoff during storm events. See also Water Quality Detention Basins.
Depression Storage	Upstream runoff that is captured by and settles in a natural or manmade depression and does not continue downstream.
Erosion	The wearing away of land surfaces by water, wind, and ice
First Flush	First flush is defined in Los Angeles County as the runoff volume generated from 0.75-inches of rainfall in a 24 hour period.
Floodplain	Nearly level land situated on either or both sides of a channel that is subject to flooding during infrequent events.
Impervious	A description of a substance that will not permit water to flow through it.
Infiltration	The penetration of water through the ground surface into sub-surface soil or the penetration of water from the soil into sewer or other pipes through defective joints, connections, or manhole walls.

Interception	That portion of precipitation intercepted by vegetation. Intercepted precipitation is disposed of by drip, stem flow, or evaporation (or sometimes sublimation, in the case of snow, sleet, hail, or freezing rain).
LACDPW	Los Angeles County Department of Public Works
Peak Flow	Peak runoff rate measured in cubic feet per second (cfs).
Percolation	The downward flow or filtering of water through pores or spaces in rock or soil.
Q	Runoff rates measured in cubic feet per second.
Q50bb	Peak runoff from a 50-year rainfall intensity storm from undeveloped areas that is laden with burned vegetation, fines, rocks, and other debris.
Q50c	Peak runoff from a 50-year rainfall intensity storm from developed areas or from undeveloped areas that are not assumed to be burned or bulked.
Runoff	The portion of rainfall, melted snow, or irrigation water that flows across the ground surface rather than filtrating into the soil.
RWQCBLAR	Regional Water Quality Control Board, Los Angeles Region
Sedimentation	Deposition of waterborne sediments due to a decrease in water velocity and a corresponding reduction in the size and amount of sediment, which can be carried by the flowing water.
Sump	An area from which there is no surface flow outlet.
SWRCB	State Water Resources Control Board
Transpiration	The process by which water vapor is lost to the atmosphere from living plants.
Velocity	The rate or speed at which surface runoff water flows either over land or through a channel, measured in feet per second (fps).
Watershed	All land and water within the confines of a drainage divide.
Waters of the U.S.	Although the definition may change in 2003 to exclude non-navigable, isolated water bodies, in 1986 (U.S. Federal Register), Waters of the U.S. was defined as follows:

All waters which are currently used, or were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide; all interstate waters including interstate wetlands; all other waters, such as interstate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds, the use, degradation, or destruction of which could affect interstate or foreign commerce including any such waters: (1) which are or could be used by interstate or foreign travelers for recreational or other purposes; or (2) from which fish or shellfish are or could be taken and sold in interstate or foreign commerce; or (3) which are used or could be used for industrial purposes by industries in interstate commerce. Also included are all impoundments of waters otherwise defined as waters of the United States under the definition; tributaries of waters identified above; the territorial seas; and wetlands adjacent to waters (other than the waters that are themselves wetlands) identified above.[1]

By United States Army Corps of Engineers definition, "Waters of the United States" are defined by the "ordinary high water mark," which can be identified by physical characteristics, such as channel scouring, bank "shelving," areas cleared of terrestrial vegetation, litter and debris, or other indications that may be appropriate.

Wetlands[2] Those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.

2 METHODOLOGY

Three development scenarios are addressed in this report:

1. Existing,
2. Existing With Project, and
3. Cumulative Buildout.

Brief summaries of hydrologic and hydraulic methodology are presented in this section to provide the reader with background information and understanding of the methodology used to calculate pre- and post-development runoff quantities, the capacities of proposed improvements, and the effects of development on the Santa Clara River.

1 33 C.F.R. §328.3(a)(2004)

2 33 C.F.R. §328.3(b)(2004)

2.1 HYDROLOGY BACKGROUND AND METHODOLOGY

2.1.1 City of Santa Clarita and Los Angeles County Criteria

The City of Santa Clarita and the Flood Control Division of the Los Angeles County Department of Public Works (LACDPW) regulates storm runoff,. The LACDPW issued a memorandum in 1986 entitled "Level of Flood Protection and Drainage Protection Standards" for development projects in Los Angeles County. The memorandum established Los Angeles County policy on levels of flood protection and requires that the following facilities be designed for the Capital Flood: all facilities not under State of California jurisdiction that intercept flood waters from natural drainage courses, all areas mapped as floodways, all facilities that are constructed to drain natural depressions or sumps, and all culverts under major and secondary highways. All facilities in developed areas that are not covered by the Capital Flood protection conditions must be designed for the Urban Flood, or runoff from a 25-year frequency design storm. Because the project would also intercept flood flows from natural areas, its storm drainage facilities that accept these flows must be sized and designed for the Capital Flood.

In addition to meeting this required level of flood protection, all development in the Santa Clara River watershed must meet standards adopted by the LACDPW for the Santa Clara River and its major tributaries in the County Sedimentation Manual (pp. 2-2 to 2-6). Further, properties owned by The Newhall Land & Farming Company (including the Riverpark project site) adjacent to the Santa Clara River that include improvements along and across a segment of the river must also meet standards outlined in the EIS/EIR for the Natural River Management Plan, which addresses potential impacts associated with such development .

2.1.2 Explanation of the County Capital Flood

In 1931, the Los Angeles County Flood Control District (LACFCD) (now the Flood Control Division of the County's Department of Public Works) began development of a Comprehensive Plan of flood control facilities to collect and convey flows from the mountainous canyons, the alluvial fans, and the urbanized coastal plain.

The major needs in designing the system were: the reduction of damage due to high canyon flows, the conveyance of large volumes of water in a major storm, and the ability to meet future flood control needs. The design of the flood protection system for the County is based upon the Department of Public Works' Capital Flood hydrology.

The Department's 50-year Capital Flood (or Qcap) hydrology is based on a "design," or theoretical storm event that is derived from 50-year frequency rainfall values and is patterned after actual major extra-tropical storms observed in the Los Angeles region. The 50-year frequency design storm is assumed to occur over a period of four days, with the maximum rainfall falling on the fourth day.

Analysis of recorded major storms reveals that, during the twenty-four-hour period of maximum rainfall, rainfall intensity typically increases during the first 70 to 90 percent of the period and decreases in the remaining time. Furthermore, approximately 80 percent of the amount of the twenty-four-hour rainfall occurs within the same 70 to 90 percent of the period. In developing

the Capital Flood (or Qcap), the 50-year frequency design storm is assumed to fall on saturated soils. In converting rainfall to runoff, rainfall that is not lost due to the hydrologic processes of interception, evaporation, transpiration, depression storage, infiltration, or percolation is assumed to be surface runoff. The effect of snowfall or snow melt on rainfall-runoff relationships is a consideration in only a very limited portion of the County (i.e., the higher elevations) where snowfall accumulates in winter.

Another assumption made in developing a Capital Flood design flow rate is that natural portions of the watershed have been burned by fire. When a watershed burns, the soil infiltration rate decreases due to the loss of vegetation and physical changes in the soil. The County has run field infiltrometer tests in order to quantify the effect that burning has on the coefficient of runoff. The effect of burning the watershed can increase the design runoff rate from 10 percent to 20 percent.

The final factor in adjusting the Capital Flood design flow rate is referred to as a bulking factor. In the area where a watershed is burned, the runoff would carry with it a large layer of eroded topsoil. This sediment, along with the associated burned trees and brush, is referred to as debris. In order to account for these quantities of debris, the design flow rate is artificially increased using a prescribed bulking factor, which is a function of not only soil type, but also the steepness of the terrain and the size of the drainage basin. The bulking factors for larger drainage basins range from about 1.20 to 1.50, or from 20 percent to 50 percent over and above the burned flow rate.

In summary, the County's Qcap is based on a theoretical four-day storm event occurring right after the watershed has been burned with the resulting flow rate being increased again by a bulking factor, thereby yielding a peak flow rate that is 32 to 80 percent higher than a 50-year storm over an unburned-unbulked drainage basin. The probability of all of the theoretical assumptions identified in the County's Capital Flood happening at the same time is extremely small, and yields greater design flows than the Federal Insurance Administration's methodology for calculating the 100-year and 500-year floods. As a result, the County's methodology is more conservative than that of the Federal Emergency Management Agency. The City has adopted the County's Qcap requirements for projects within its jurisdiction.

2.1.3 Method of Drainage Analysis

The engineering term for the methods used to properly size pipes and channels is "hydraulic analysis." To determine the proper sizes of pipes and channels, assumptions must be made regarding the amount of rainfall to design for and the amount and type of development that would take place in a drainage basin. An estimate must also be made as to how often that amount of rainfall could occur. This is referred to as the storm recurrence interval, or its reciprocal value – storm frequency. For example, a storm that has a 10 percent recurrence interval is a storm that has a 10 percent chance of occurring in any given year. The reciprocal of this number (1/10) is also known as a 10-year frequency. The most important concept to keep in mind is that a pipe or channel is "designed" for a rate of flow (measured in cubic feet per second), not a volume of flow (measured in cubic feet or acre-feet). A dam or a lake is designed for storing or containing a fixed volume of water. A pipe of a fixed size, on the other hand, can carry different flow rates, depending on the pressure placed on the water.

In designing a storm drain system, the size of a pipe that would safely carry a predicted rate of flow (expressed in cubic feet per second - cfs) must be calculated. A 1-foot square box which is 1-foot deep (a cubic-foot) can hold 7.5 gallons of water. From this fact, the amount of storm water passing through a pipe or channel in one second can, very simply put, be calculated by multiplying the cross sectional area of the flow in the pipe (in square feet) by the rate of storm flows through the pipe in feet per second. This three-dimensional rate of flow is referred to as "cubic feet per second."

With the above concepts in mind, the effects of development on natural ground can be considered. Buildings, driveways, patios, sidewalks, and roads all create new impervious covers to the natural ground, and prevent water from being absorbed into the ground. The water that would normally infiltrate into the ground, therefore, runs off at higher than normal flow rates, referred to as "Q." Therefore, the flow rates from developed areas are greater than from undeveloped areas.

2.1.4 Explanation of Design Hydrology

The following provides a more discussion of the effects of soil type, imperviousness, and burning and bulking on storm runoff quantities.

(a) Effects of Soil Type and Amount of Imperviousness on Runoff Rates

The rate of runoff in undeveloped areas is directly related to the type of soil. Certain soil types accept water faster (are more pervious) than other soils. Therefore, the types of soils present on a site are used in the calculations of runoff. Different soil types have very different water infiltration (or absorption) rates. If a sandy soil (highly pervious) is paved over, the coefficient of runoff (C) would greatly increase, whereas if a clay soil (not highly pervious) is paved over, runoff values would go up, but not as high as in the case of sandy soil because the sandy soil absorbs water faster. In small storms, some soils can absorb 100 percent of the rainfall. For example, soil type 015, Tujunga Fine Sandy Loam, can completely absorb a 0.5-inch per hour (in/hr) storm and almost completely absorb a 1.0 in/hr storm, thereby yielding extremely low runoff rates. For a 200-acre parcel with soil types 015 (Tujunga Fine Sandy Loam) and 012 (Ramona Clay Loam), radically different runoff quantities for the same rainfall events occur. For an intense storm, I = 1.0 inch per hour, and the very pervious soil type 015 (Tujunga Fine Sandy Loam), the runoff rate would be 20 cfs. For the same size parcel on a very impervious soil, such as soil type 012 (Ramona Clay Loam), the runoff rate would be 168 cfs.

(b) Effects of Burning and Bulking

In an undeveloped watershed, Capital Flood flow rates assume a burned condition, which causes the coefficient of runoff to increase. Further, after increasing the coefficient of runoff for burning, the flow rate is then multiplied by a bulking factor, which is used to account for the amount of mud, and debris that would be contained within the flow from the burned watershed. In the case of the project, the increase in runoff, or flow rates, due to an increase in the coefficient of runoff (C) to account for burning is from 10 to 20 percent. Application of the

bulking factor to account for debris production would increase runoff quantities by 20 to 50 percent over and above the burned flow rate.

(c) Effects of Development

As previously mentioned, development places impervious materials over soils that had previously absorbed storm water. Once the impervious materials are placed over the soil, no direct percolation occurs and runoff takes place. Because development does not typically completely over cover the ground surface, portions of each developed parcel (e.g., front, side, and rear yards, landscaping, open space, etc.) remain pervious to infiltration by storm water. Percent imperviousness for each land use existing on or proposed for the site is presented in **Table 1, Percent Imperviousness for Selected Land Uses.**

Table 1
Percent Imperviousness for Selected Land Uses

Land Use	Percent Imperviousness (%)
Agricultural[3]	10[2]
Transportation	100[2]
Single Family Residential	42[1]
Multi Family Residential	68[1]
Commercial	92[1]
Open Space	10[2]

[1] *Values are from the Los Angeles County Hydrology Manual (Appendix F).*
[2] *Values are from GeoSyntec Consultants (2002).*
[3] *Values are presented for non-irrigated and grassland agricultural use.*

2.2 SANTA CLARA RIVER HYDRAULICS

The floodplain conditions of the Santa Clara River were modeled using River Analysis System (RAS) software developed by the United States Army Corps of Engineers (U.S. ACOE) Hydrologic Engineering Center (HEC). Inputs to the HEC-RAS model include channel geometry, boundary conditions, hydraulic roughness, and hydrology. HEC-GeoRAS is a HEC-developed pre-/post-processor to the hydraulic model HEC-RAS and was used to compile and store a three dimensional representation of the land surface for defining channel and floodplain geometry. A Triangular Irregular Network (TIN) was created from surveyed 2-foot topographic data using the ArcInfo program Topogrid. The TIN was used to extract geometric data for hydraulic analysis. The geometric data were then imported to the hydraulic model HEC-RAS. The modeling prepared for the Riverpark project is consistent with that prepared for the NRMP.

The project and cumulative condition models for the river were created by modifying existing cross section geometrics of the river to simulate the hydraulic effects of the proposed project bank stabilization, erosion protection and Newhall Ranch Road, including the Newhall Ranch Road/Golden Valley Road bridge (project scenario) and Santa Clarita Parkway Bridges (cumulative scenario) on the river. The encroachment due to the bank stabilization was conservatively approximated with levees in the hydraulic model (model levees set at equivalent elevation on slope of channel invert). The proposed Newhall Ranch Road/Golden Valley Road Bridge is modeled on the conservative assumption that the bridge span, bank stabilization and

abutment locations are consistent with the Vesting Tentative Tract Map and the pier spacing is conservatively modeled from the City of Santa Clarita Project Study Report Equivalent Cross Valley Connector Between Soledad Canyon Road and Bouquet Canyon Road configuration that would have the greatest impact on river hydraulics.

Existing Santa Clara River discharge rates for the 2-, 5-, 10-, 20-, 50-, and 100-year storm events were obtained from a 1994 U.S. ACOE study entitled, Santa Clara River Adopted Discharge Frequency Values. This study is based upon a frequency analysis of stream flow data along the Santa Clara River and, therefore, approximates river flows from observed data.

Using the Los Angeles County Flood Control District formula provided below the increase in flow resulting from development was estimated for each storm frequency in the proposed scenario.

$$Q_y = \left(\frac{y}{x}\right)^{0.223} \cdot Q_x \text{ where,}$$

Qy = target flow

Qx = known flow

y = target storm event frequency

x = known storm event frequency

These calculated increases in flow were then added to the Santa Clara River existing discharge rates in order to approximate the proposed discharge rates. Because the calculations for the proposed clear flows do not account for proposed debris collection facilities, these increases in flows represent a conservative upper limit used for impact analysis.

Six of the seven recurrence intervals included in the analysis were obtained from this Los Angeles County study; the seventh, the Los Angeles County Capital flood, is referenced from the NRMP. Because the NRMP flow represents the full-buildout of the drainage area (i.e. cumulative development), this flow represents a upper limit and therefore is conservative when used for the existing and proposed scenarios.

The following parameters apply to all three model settings: Existing, Proposed, and Cumulative.

- Bank stations
- Hydraulic roughness
- Boundary conditions

The bank station locations are approximated as the water surface elevation level of the runoff from an existing scenario 2-year storm event. The 2-year return interval approximates typical bankfull conditions.

Hydraulic roughness is estimated by coefficients in the Manning's equation (metric units) below:

$$Q = \frac{1}{n} \bullet A \bullet R^{\frac{2}{3}} \bullet S^{\frac{1}{2}}, where$$

n is the Manning's Roughness Coefficient
A is the cross-sectional area
R is the ration of A divided by the wetted perimeter and,
S is the energy slope

For this report, the Manning's roughness coefficients were estimated from local condition observations of in-stream and floodplain vegetation, mapped by field biologists (Impact Sciences, 2002). The following **Table 2, Hydraulic Roughness Coefficients** shows the variation of Manning's roughness coefficients based on vegetation and how those compare to published values.

Table 2.
Hydraulic Roughness Coefficients

Vegetation/Land Use	Manning's Roughness Coefficient [used in this study]	Reference Manning's Coefficient (Chow 1959)
Sand with no vegetation	0.025	0.025-0.033
Sand with Sporadic Growth/Grass Pasture	0.035	0.03-0.05
Scattered Brush/Heavy Weeds/Light Brush and Trees	0.050	0.035-0.07

Boundary conditions represent the flow conditions at the limits of the hydraulic analysis. Model reach limits were established such that the boundary conditions do not affect model results. In this study, boundary conditions reflect normal depth and an approximate channel slope of 1 percent at the upstream boundary and critical depth at the downstream boundary. The input hydrology is the flow rate data for the seven return periods as documented in **Table 3, Existing Drainages and Runoff Quantities.**

The proposed project and cumulative condition models were created by modifying existing condition cross section geometries to simulate the proposed project bank stabilization and bridges. The encroachment due to the bank stabilization was approximated with levees in the hydraulic model (model levees set at equivalent elevation on slope of channel invert). The Newhall Ranch Road Bridge is modeled on the conservative assumption that the bridge span is consistent with the Vesting Tentative Tract Map and the pier spacing is modeled from the Project Study Report Equivalent Cross Valley Connector between Soledad Canyon Road and Bouquet Canyon Road (PSRE) configuration that results in the most severe impacts to flood waters.

3 EXISTING CONDITIONS

3.1 DRAINAGE AREAS AND WATERCOURSES

The Santa Clara River traverses the southern portion of the site, which is located within an unnamed approximately 834-acre tributary watershed of the 1,634 square mile Santa Clara River

basin. The area of this tributary watershed represents 0.08 percent of the Santa Clara River basin and consists primarily of open space and vacant land. Annual rainfall in the tributary area is typically low (an annual average of 17 inches) and generally occurs in the winter months. Runoff flows to and through eight drainage areas on the site via sheet flows and natural concentrated flows.

3.1.1 Santa Clara River

The reach of the Santa Clara River at the Project site has intermittent low surface flows created by larger storm events. Downstream of the project site, flows are created by tertiary treated effluent discharges from two downstream water reclamation plants operated by the County Sanitation Districts of Los Angeles County and storm water runoff. Completely natural flows in the river only occur in the winter due to storm runoff. The flows vary significantly from year-to-year. In addition, there are short-term releases from Castaic Lake during summer months that reach the river via Castaic Creek, which joins the river several miles downstream of the Project site.

The reach of the river within and adjacent to the site has multiple channels (braided). This kind of system is characterized by high sediment loads, high bank erodibility, and intense and intermittent runoff conditions. Combined with the relatively flat gradient of the river at this point (less than one percent), it has a high potential to aggrade (deposit sediment) at low flow velocities.

Flows eventually discharge from the project to the Santa Clara River from the eight areas. The acreage for each of the drainage areas is provided in **Table 3, Existing Drainages and Runoff Quantities.** There are currently no existing drainage or erosion/sedimentation control improvements located within the site.

Capital Flood runoff quantities for each of the eight drainage areas and are provided in **Table 3, Existing Drainages and Runoff Quantities.** Under existing conditions, combined clear flows total 1,396 cubic feet per second (cfs), while burned and bulked flows total 2,225 cfs. The calculated total debris volume is 31,770 cubic yards (cy).

Table 3
Existing Drainages and Runoff Quantities

Drainage Area	Acreage	Q50c[1] (cfs)	Q50bb[2] (cfs)	Debris Volume (cy)
100 series[3]	49.2	103	163	1,270
200 series	22.5	46	72	581
300/400 series	263.3	406	640	12,722
500 series	101.3	193	306	5,572
600 series	351.7	509	840	10,107
700 series	6.3	22	34	347
800 series	17.5	41	64	962
900 series	22.2	76	106	209
Totals	**834**	**1,396**	**2,225**	**31,770**

[1] *Q50c - 50-year rainfall intensity clear flow.*
[2] Q50bb - 50-year rainfall intensity burned and bulked flow.
[3] *"Series" is intended to represent that there is more than one number in succession. For example in the 100 series there is 100, 101, 102, etc that as a whole make up the 100 series drainage area. Instead of listing each individual number of the subarea only the series is listed. It should be noted that series designations for existing and proposed conditions do not represent identical drainage conditions*

Existing flow rates from observed data for the Santa Clara River during 2-, 5-, 10-, 20-, 50-, and 100-year storm events are compiled in **Table 4, Existing River Flows upstream of confluence at Bouquet Canyon.**

Table 4
Existing River Flows upstream of confluence at Bouquet Canyon.

Recurrence Interval	Flow (Discharge) Rate (cfs)
2-Year[1]	1,300
5-Year[1]	4,100
10-Year[1]	7,400
20-Year[1]	12,100
50-Year[1]	21,400
100-Year[1]	31,300
Capital Flood[2]	52,100

[1] *Existing flows from United States Army Corps of Engineers, Santa Clara River Adopted Discharge Frequency Values. Adopted May 3, 1994 by the United States Army Corps of Engineers, the Ventura County Flood Control Department and the Los Angeles County Department of Public Works.*
[2] *United States Army Corps of Engineers & California Department of Fish and Game. Final Environmental Impact Statement/Environmental Impact Report. 404 1603 Streambed Alteration Agreement for Portions of the Santa Clara River and its Tributaries Los Angeles County, Natural River Management Plan. Applicant, Valencia Company. August 1998.*

3.1.2 On-Site Drainages

The total tributary area that drains through the project site and to the river at the project boundaries is approximately 834 acres. This runoff flows to and through the site via sheet flows and natural concentrated flows. When compared with the Capital Flood on the Santa Clara River, the project peak (burned and bulked) flow rate represents approximately 5 percent of the Santa Clara River peak discharge rate.

There are a total of seven jurisdictional drainages located on-site, excluding the Santa Clara River.

3.2 FLOOD HAZARDS

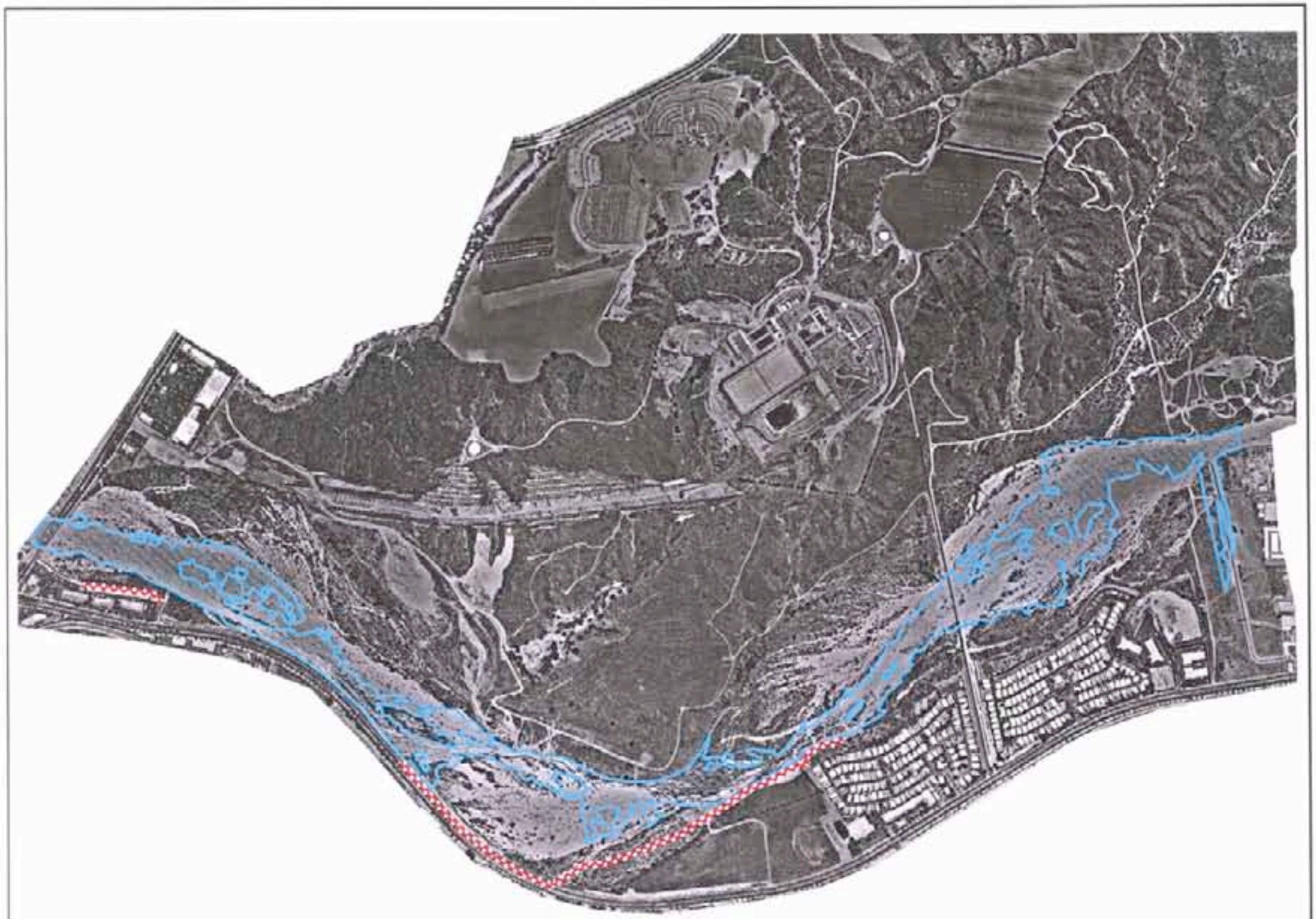
A portion of the site lies within the 100-year floodplain of the Santa Clara River and within the Federal Emergency Management Administration (FEMA) 100-year floodplain. Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) number 060729 0345C dated September 9, 1989 for the Unincorporated Areas of Los Angeles County, California. The map is included in the Appendix. The 100-year floodplain boundaries are based

on historical runoff records as actually measured with stream gauges. Mapping the 100-year floodplain is important because FEMA and the Federal Insurance Administration (FIA) uses it to establish standards for flood insurance coverage. Under FIA criteria, the 100-year flood elevation is the "base flood" and any land that is outside of this 100-year, or base flood, elevation would be considered reasonably safe and free from flood hazard.

Table 5, Existing Floodplain/Stream Area Within the Project Tributary Watershed, shows the areas of each existing floodplain and stream for seven storm events. The existing floodplains for the seven storm events are shown in **Figures 3** through **9**.

Table 5
Existing Floodplain/Stream Area
Within the Project Tributary Watershed

Storm Event	Study Area Floodplain (acres)
2-Year	109.4
5-Year	187.6
10-Year	266.0
20-Year	300.5
50-Year	325.0
100-Year	337.4
Capital Flood	355.5



Topography & Aerial photo flown November 20, 1998
Habitat survey completed April 27, 2002

NEWHALL LAND
RIVERPARK

Legend

Approximate Location of Existing Bank Stabilization

2 Year Flood Levels

N
W E
S

500 0 500 1000 Feet

PSOMAS

Figure 3

Santa Clara River
Existing Conditions
2 Year Flood Event

M:/northriv-mp/54325mp/engr/exhib/gis/floodplain.apr Jan 27, 2004

Topography & Aerial photo flown November 20, 1998
Habitat survey completed April 27, 2002

NEWHALL LAND
RIVERPARK

Legend

Approximate Location of Existing Bank Stabilization

5 Year Flood Levels

N
W E
S

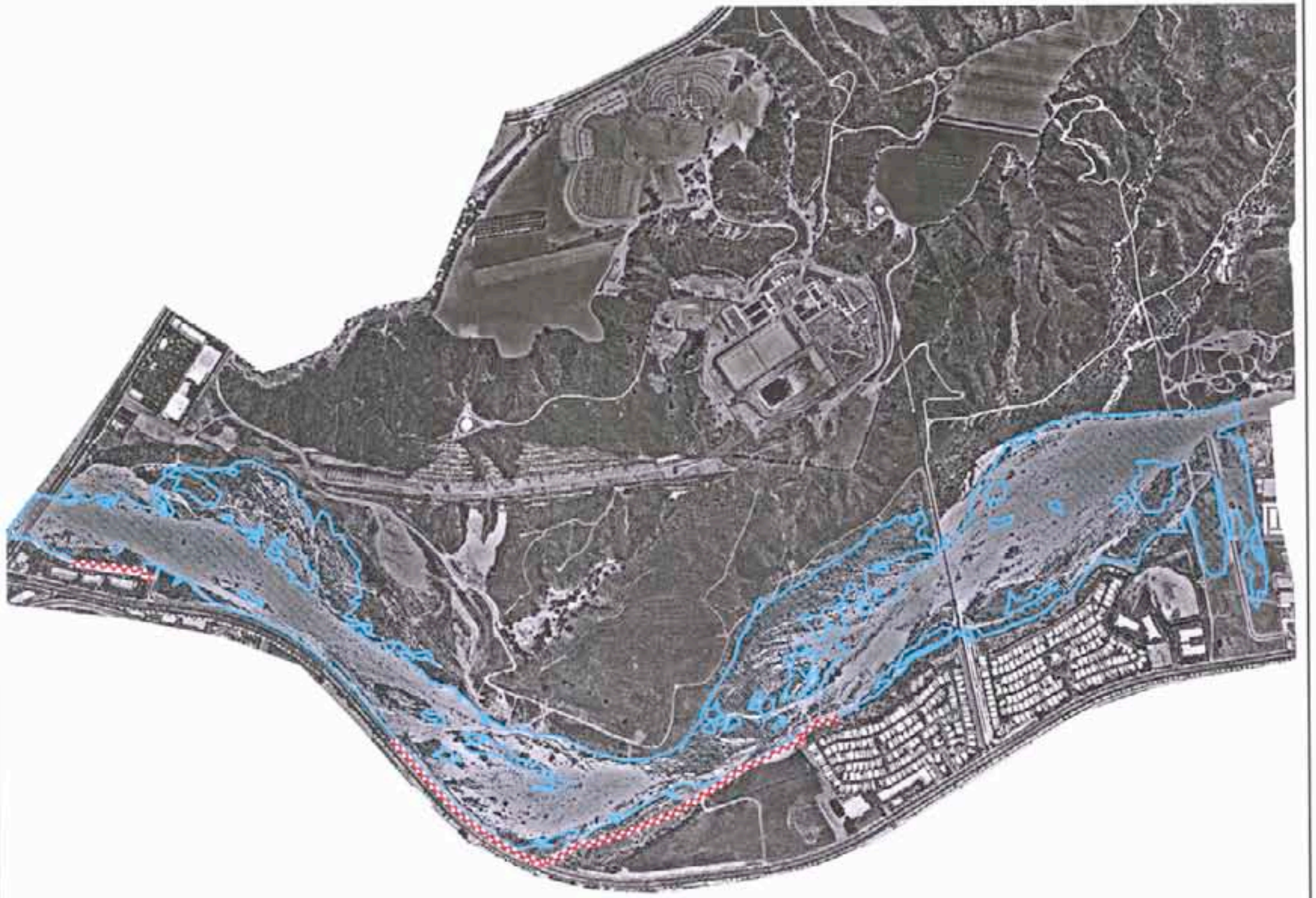
500 0 500 1000 Feet

PSOMAS

Figure 4

Santa Clara River
Existing Conditions
5 Year Flood Event

M:/northriv-mp/54325mp/engr/exhib/gis/floodplain.apr Jan 27, 2004



Topography & Aerial photo flown November 20, 1998
Habitat survey completed April 27, 2002

NEWHALL LAND
RIVERPARK

Legend

Approximate Location of Existing Bank Stabilization

10 Year Flood Levels

N
W E
S

500 0 500 1000 Feet

PSOMAS

Figure 5

Santa Clara River
Existing Conditions
10 Year Flood Event

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NEWHALL LAND
RIVERPARK

Legend

Approximate Location of Existing Bank Stabilization

20 Year Flood Levels

N
W E
S

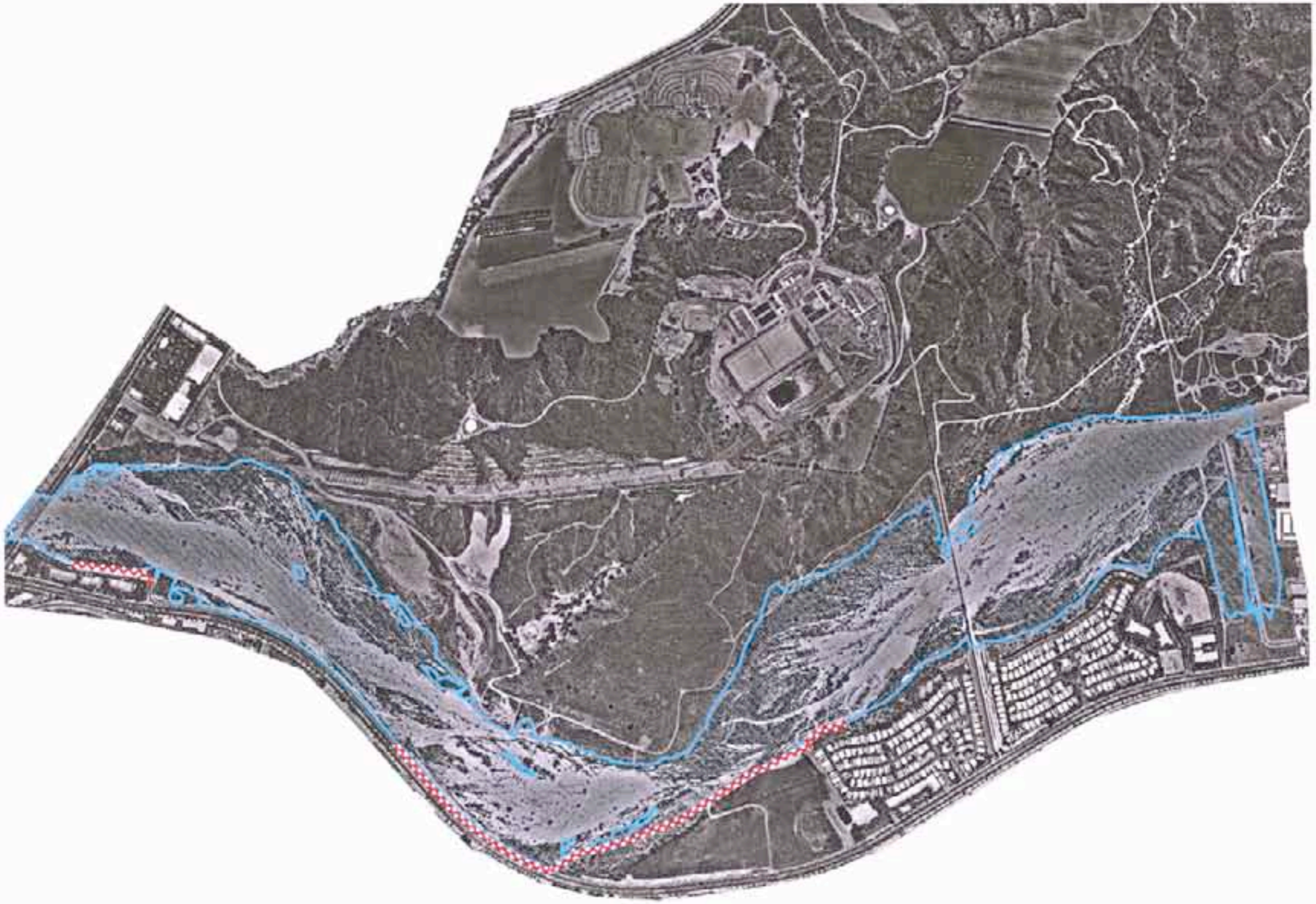
500 0 500 1000 Feet

PSOMAS

Figure 6

Santa Clara River
Existing Conditions
20 Year Flood Event

M:/northriv-mp/54325mp/engr/exhib/gis/floodplain.apr Jan 27, 2004



Topography & Aerial photo flown November 20, 1998
Habitat survey completed April 27, 2002

NEWHALL LAND
RIVERPARK

Legend

Approximate Location of Existing Bank Stabilization

50 Year Flood Levels

N

500 0 500 1000 Feet

PSOMAS

Figure 7

Santa Clara River
Existing Conditions
50 Year Flood Event

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NEWHALL LAND
RIVERPARK

Legend

Approximate Location of Existing Bank Stabilization

100 Year Flood Levels

N

500 0 500 1000 Feet

PSOMAS

Figure 8

Santa Clara River
Existing Conditions
100 Year Flood Event

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Habitat survey completed April 27, 2002

NEWHALL LAND
RIVERPARK

Legend

Approximate Location of Existing Bank Stabilization

Capital Flood Levels

N
W E
S

500 0 500 1000 Feet

PSOMAS

Figure 9

Santa Clara River
Existing Conditions
Capital Flood Event

M:/northriv-mp/54325mp/engr/exhib/gis/floodplain.apr Jan 27, 2004

4 PROJECT CONDITIONS

The impacts of project implementation are discussed below. In summary, the project includes the construction of approximately 9,000 linear feet of bank stabilization which is necessary to protect Newhall Ranch Road and the residential and commercial development. In addition, approximately, 1,500 linear feet of toe or erosion protection would be installed adjacent to the project's Area B. The impacts of installing bank protection, bridge piers and abutments (Newhall Ranch Road/Golden Valley Road Bridge) and erosion protection on the Santa Clara River are analyzed in this section This project condition analysis focuses only on the potential hydrologic and hydraulic impacts of the project.

4.1 ALTERATION OF EXISTING DRAINAGE PATTERNS

4.1.1 Santa Clara River

The Santa Clara River will be altered with the placement of the bank stabilization, erosion protection, bridge abutments and piers, storm drain outlets and energy dissipators as proposed by the project.

Impacts associated with erosion and sediment deposition and therefore streambed modification within the river are evaluated as a function of in-stream velocities, which are indicators for potential riverbed scouring. While this is discussed in Section 4.5, in summary, there would be no increases in velocity during the 5- and 10-year storm events, and decreases in river velocity for the 20- to 100-year storm events. **Table 11, Pre- and Post-Development River Velocities**, indicates that increases in areas of the floodplain that would be subject to velocities over 4 feet/second during a 2-year storm event would be minimal, localized, and would be caused only by the smallest event scenario.

Additionally, **Table 6, Summary of Water Surface Elevations** shows that there are no significant increases in water surface elevation due to project improvements.

Table 6.
Summary of Water Surface Elevations

Storm Event	Modeled Scenario	Cross-Section (XS) Location (approximate distance in feet upstream from Bouquet Canyon Bridge)										
		Proposed Newhall Ranch Road/ Golden Valley Road Bridge						Between Areas A-2 and B.		Existing Bouquet Canyon Bridge		
		XS 11101	**XS 10215**	**XS 8293**	**XS 7349**	**XS 6229**	**XS 5812**	**XS 5243**	**XS 3206**	**XS 2183**	**XS 1187**	**XS 13**
	Existing	1252.1	1241.5	1224.2	1216.5	1206.7	1204.1	1198.9	1179.4	1171.6	1163.1	1151
2YEAR	Proposed	1252.1	1241.7	1224.2	1216.6	1206.6	1204.1	1198.9	1179.5	1171.6	1163.2	1151.1
	Difference	0	0.2	0	0.1	-0.1	0	0	0.1	0	0.1	0.1
		XS 11101	**XS 10215**	**XS 8293**	**XS 7349**	**XS 6229**	**XS 5812**	**XS 5243**	**XS 3206**	**XS 2183**	**XS 1187**	**XS 13**
	Existing	1252.3	1242.2	1225.7	1217.5	1207.2	1204.6	1199.3	1180.7	1172.6	1163.9	1152.1
5YEAR	Proposed	1252.3	1242.2	1225.7	1217.5	1207.2	1204.6	1199.3	1180.7	1172.6	1163.9	1152.1
	Difference	0	0	0	0	0	0	0	0	0	0	0
		XS 11101	**XS 10215**	**XS 8293**	**XS 7349**	**XS 6229**	**XS 5812**	**XS 5243**	**XS 3206**	**XS 2183**	**XS 1187**	**XS 13**
	Existing	1252.6	1242.6	1225.8	1217.7	1207.8	1205.1	1199.7	1181.1	1173.2	1164.5	1152.7
10YEAR	Proposed	1252.6	1242.6	1225.5	1217.7	1207.8	1205.1	1199.7	1181.1	1173	1164.5	1152.9
	Difference	0	0	-0.3	0	0	0	0	0	-0.2	0	0.2
		XS 11101	**XS 10215**	**XS 8293**	**XS 7349**	**XS 6229**	**XS 5812**	**XS 5243**	**XS 3206**	**XS 2183**	**XS 1187**	**XS 13**
	Existing	1252.7	1243.1	1226.9	1218.5	1208.4	1205.4	1200.1	1181.7	1173.5	1165.4	1153.3
20YEAR	Proposed	1252.7	1243.1	1227.2	1218.5	1208.4	1205.4	1200.1	1181.7	1173.5	1165.4	1153.4
	Difference	0	0	0.3	0	0	0	0	0	0	0	0.1
		XS 11101	**XS 10215**	**XS 8293**	**XS 7349**	**XS 6229**	**XS 5812**	**XS 5243**	**XS 3206**	**XS 2183**	**XS 1187**	**XS 13**
	Existing	1253.4	1243.7	1227.4	1219.4	1209.3	1206	1200.4	1182.5	1174.2	1166.1	1154.3
50YEAR	Proposed	1253.4	1243.7	1227.4	1219.4	1209.3	1206	1200.4	1182.5	1174.2	1166.2	1154.2
	Difference	0	0	0	0	0	0	0	0	0	0.1	-0.1
		XS 11101	**XS 10215**	**XS 8293**	**XS 7349**	**XS 6229**	**XS 5812**	**XS 5243**	**XS 3206**	**XS 2183**	**XS 1187**	**XS 13**
	Existing	1254	1244.5	1228.3	1220.3	1210	1206.7	1201.1	1183.2	1174.8	1166.8	1155.1
100YEAR	Proposed	1254	1246.2	1228.3	1220.3	1210.1	1206.8	1201.1	1183.2	1174.9	1166.8	1155
	Difference	0	1.7	0	0	0.1	0.1	0	0	0.1	0	-0.1

4.1.2 On-site drainage

Implementation of the project (with the associated storm drain system) would affect the natural tributary drainage channels described previously. While existing discharges from the project site are not concentrated into centralized outlet structures (as proposed by the project), surface water flows will naturally form paths of least resistance and will either concentrate at existing topographic depressions or cut channels that serve as concentrated discharge locations. Therefore, while the project includes development of the storm drain system and will have pre-defined outlets, this will not significantly alter drainage patterns. Further, the project includes

the use of energy dissipators at the storm drain outlets to the Santa Clara River. The installation of these improvements will dissipate the energy that could cause erosion at the project outlet.

4.2 WHETHER RUNOFF VOLUMES WOULD EXCEED EXISTING OR PLANNED SYSTEMS

The Riverpark project would increase the amount of runoff from those areas of the site that would be covered by roads, buildings, paved parking areas, and other relatively impermeable or impervious features (see **Table 1, Percent Imperviousness for Selected Land Uses**, for the assumed percent imperviousness for each land use proposed for the site). Specifically, impervious surfaces on the site would increase the amount of clear flow runoff from the site. Burned and bulked runoff and debris volumes, however, would be reduced because the developed portions of the site would be covered with impervious surfaces and non-erodable vegetation, and because debris basins that would reduce the amount of debris and sediment in the runoff are proposed at upstream locations.

The post-development runoff quantities provided in **Table 7, Post-Development Runoff Quantities**, would total 1,687 cfs for the tributary area during a 50-year storm. A comparison of this table with **Table 3, Existing Drainages and Runoff Quantities**, demonstrates that clear flows would increase over existing conditions. Burned and bulked flows being discharged from the site would total 2,112 cfs, which is a 5.0 percent reduction in Capital Flood flows, from the site [(2,225 – 2,112)/2,225 = 0.05], when compared to pre-development conditions. This reduction in burned and bulked flows is largely due to project debris basins that would capture upstream bulk flows and allow debris to settle out from the runoff before it enters the storm system through the developed portion of the site.

The County and City-defined criteria for design of flood control systems establish the more severe hydrologic conditions (i.e., burned and bulked)as the basis of impact evaluation (see Sections 2.1.1 and 2.1.2 of this report). Therefore, because the 50-year Capital Flood burned and bulked runoff from the project would decrease, the project would not result in downstream flooding.

Table 7
Post-Development Runoff Quantities

Drainage Area[4]	Acreage	Q50c[2] (cfs)	Q50bb[3] (cfs)	Debris Volume (cy)
100 series	34.8	108	111	363
200 series	79.6	180	187	902
300 series	201	440	510	2668
400 series	17.2	34	34	0
500 series	116.5	281	295	1424
600 series	356.5	538	854	9982
700 series	2.1	7	11	116
800 series	4.0	14	25	103
900 series	22.2	85	85	0
Totals[1]	**833.9**	**1,687**	**2,112**	**15,558**

[1] *Slight reduction (about 2 acres) in total area from existing conditions is due to on-site grading and rounding of numbers.*
[2] *Q50c - 50-year rainfall intensity clear flow.*
[3] *Q50bb - 50-year Capital Flood burned and bulked flow.*
[4] *When compared to the pre-development conditions, typically more drainage areas are called out because the proposed project provides detail on how the hydrologic would be addressed*
[5] *When compared to pre-development conditions the acreage of the drainage area actually changes due to several factors: rounding of numbers and by altering some of the slopes on the site, some of drainage areas causing them to drain away from the river instead of toward the river.*
Note.Drainage conditions for specific areas should not be compared with existing-condition series, but should be reviewed as a whole. Changes to series-specific flows are largely a function of modifications to drainage subareas.

4.3 HOUSING OR STRUCTURES WITHIN A 100-YEAR FLOOD HAZARD AREA

The project encroaches upon the existing FEMA flood hazard area, and residential lots 338 through 352 along the southern site boundary would be located within the 100-year flood hazard area. As previously indicated, the project proposes buried bank stabilization which would protect the affected residential units from flood waters.

The bank stabilization improvements and the proposed Newhall Ranch Road/Golden Valley Road Bridge would be placed within the 100-year flood hazard area of the Santa Clara River. The Santa Clara River will be slightly altered by the placement of the bank stabilization, erosion protection and the Newhall Ranch/Golden Valley Road Bridge. The bank stabilization and erosion protection would provide adequate protection to the developed areas from flood danger; therefore, a modification to the FEMA flood hazard boundary will be necessary and appropriate to correspond to the location of the bank stabilization improvements. As shown above, their locations and dimensions are such that neither the bank stabilization, erosion protection nor the bridge would impede or redirect flood flows within the river. .

4.4 EXPOSURE TO SIGNIFICANT RISK OF LOSS, INJURY, OR DEATH

The project site is located inland from the Pacific Ocean and not in proximity to any large, continuously-filled bodies of surface water; therefore, it is not subject to seiche or tsunamis. There are no dams upstream of the Riverpark site. There is no indication that the proposed project, or other existing or planned projects in the project area, would be at risk due to a failure of a dam. Furthermore, although the site is subject to some debris and mud flows, adequate

building setbacks from natural slopes and debris control facilities proposed in upstream areas of the site would protect the project development from debris and mudflow hazards. Therefore, the following impact analysis focuses on potential impacts associated with flooding within the river.

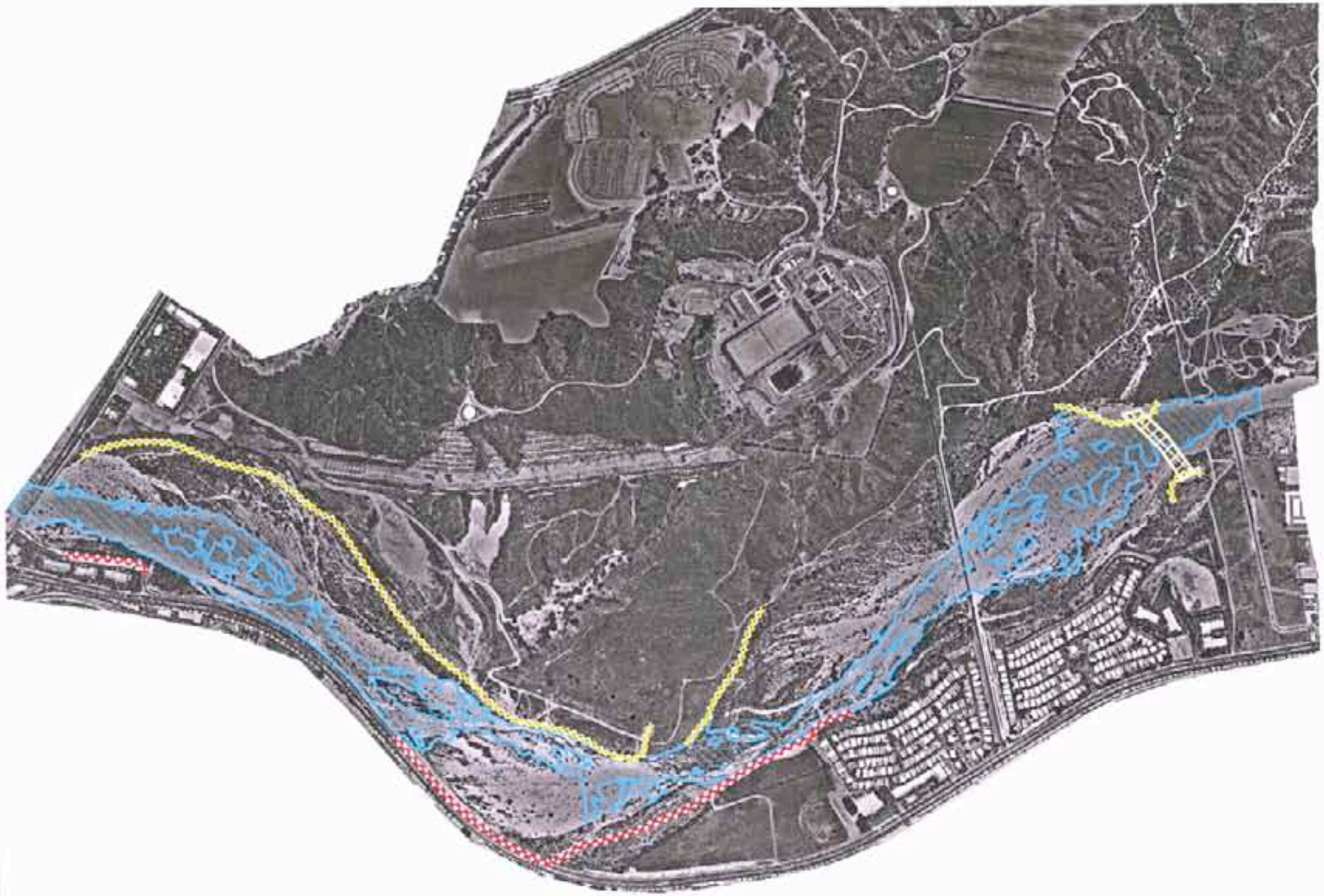
As designed, the proposed bank stabilization will protect the development areas on the site from the 100-year and 50-year Capital Flood events in the Santa Clara River and would only slightly increase the water surface elevation of the river on-site (by less than a foot).

Under both existing and developed conditions, floodplain areas would be inundated during extreme events (i.e., the 50-Year, 100-Year and Capital floods). **Table 8, Pre- and Post-Development Floodplain/Stream Area,** compares the pre- and post-development acreages of the floodplain for the seven storm events. The floodplain of the river in this analysis begins at the Bouquet Canyon Road Bridge and ends 3,040 feet upstream of the California Aqueduct pipeline crossing, or directly north of the Newhall Ranch Road/Golden Valley Road Bridge. As shown, the acreage within the river study area that would be subject to flooding would decrease with project development by as much as 42.3 acres. As indicated the project includes bank stabilization and erosion protection, which would protect the development areas from flood waters.

Table 8
Pre- and Post-Development Floodplain/Stream Area

Storm Event	Existing Conditions Acreage	Post Development Acreage	Difference
2-Year	109.4	105.0	-4.4
5-Year	187.6	179.3	-8.3
10-Year	266.0	250.8	-15.2
20-Year	300.5	278.7	-21.8
50-Year	325.0	295.2	-29.8
100-Year	337.4	303.7	-33.7
Capital Flood	355.5	313.2	-42.3

Figures 10 through 16 graphically illustrate the effects of the installation of the proposed bank stabilization, erosion protection and the Newhall Ranch Road/Golden Valley Road Bridge. Water surface elevations on-site would increase slightly with construction of the proposed bank stabilization, but would dissipate. These increases are not considered significant as they are less than one foot and would not expose people or structures to a significant risk of loss, injury or death involving flooding.



Topography & Aerial photo flown November 20, 1998
Habitat survey completed April 27, 2002

NEWHALL LAND
RIVERPARK

Legend

- Project Bank Stabilization
- Approximate Location of Existing Bank Stabilization
- Newhall Ranch Road Bridge
- 2 Year Flood Levels

N
W E
S

500 0 500 1000 Feet

PSOMAS

Figure 10

Santa Clara River
Proposed Conditions
2 Year Flood Event

M:/northriv-mp/54325mp/engr/exhib/gis/floodplain.apr Jan 27, 2004

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NEWHALL LAND
RIVERPARK

Legend

- Project Bank Stabilization
- Approximate Location of Existing Bank Stabilization
- Newhall Ranch Road Bridge
- 5 Year Flood Levels

N
W E
S

500 0 500 1000 Feet

PSOMAS

Figure 11

Santa Clara River
Proposed Conditions
5 Year Flood Event

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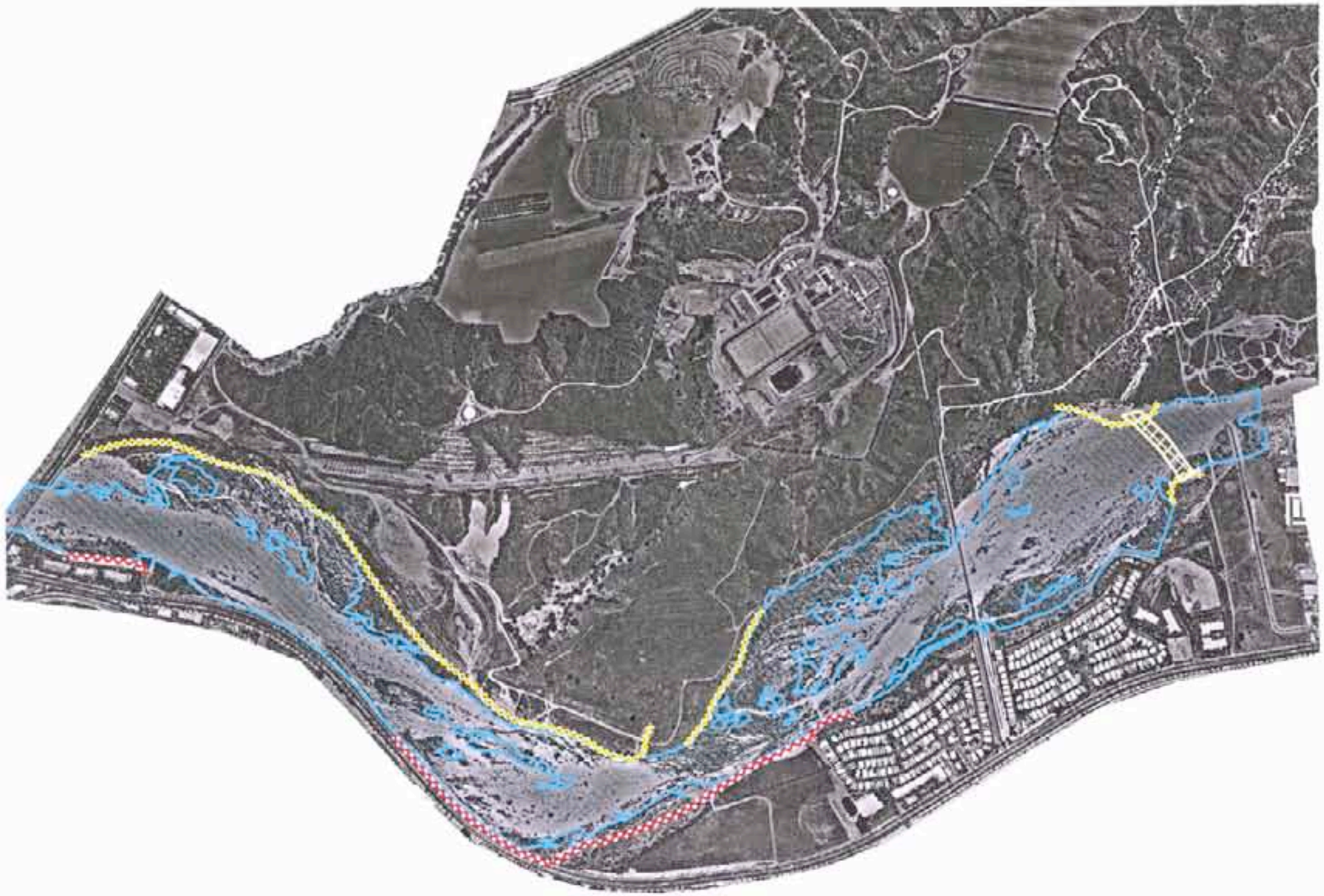

Topography & Aerial photo flown November 20, 1998
Habitat survey completed April 27, 2002

NEWHALL LAND
RIVERPARK

Legend

- Project Bank Stabilization
- Approximate Location of Existing Bank Stabilization
- Newhall Ranch Road Bridge
- 10 Year Flood Levels

N
W E
S

500 0 500 1000 Feet

PSOMAS

Figure 12

Santa Clara River
Proposed Conditions
10 Year Flood Event

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NEWHALL LAND
RIVERPARK

Legend

- Project Bank Stabilization
- Approximate Location of Existing Bank Stabilization
- Newhall Ranch Road Bridge
- 20 Year Flood Levels

N
W E
S

500 0 500 1000 Feet

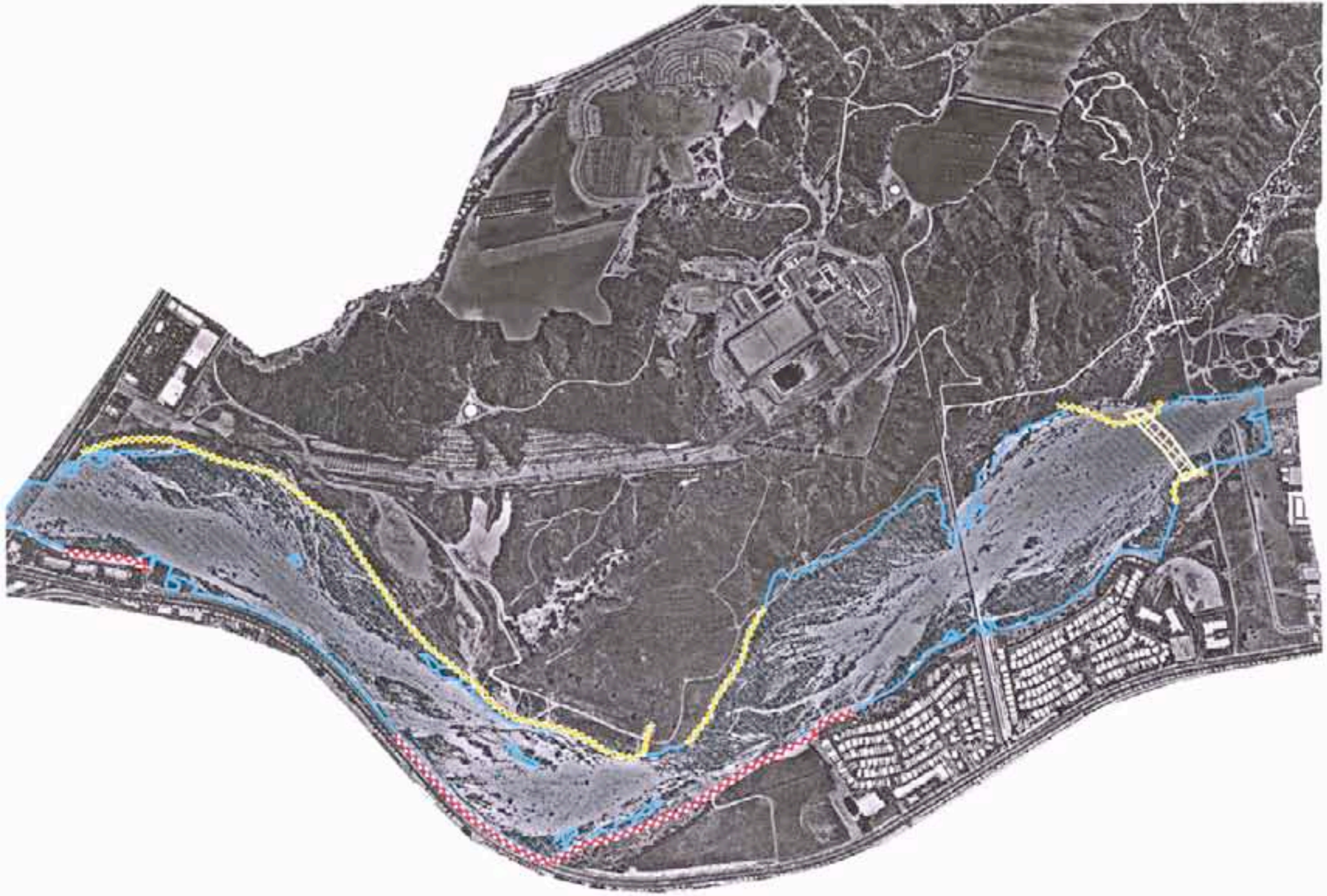
PSOMAS

Figure 13

Santa Clara River
Proposed Conditions
20 Year Flood Event

Topography & Aerial photo flown November 20, 1998
Habitat survey completed April 27, 2002

M:/northriv-mp/54325mp/engr/exhib/gis/floodplain.apr Jan 27, 2004



Topography & Aerial photo flown November 20, 1998
Habitat survey completed April 27, 2002

NEWHALL LAND
RIVERPARK

Legend

- Project Bank Stabilization
- Approximate Location of Existing Bank Stabilization
- Newhall Ranch Road Bridge
- 50 Year Flood Levels

N
W E
S

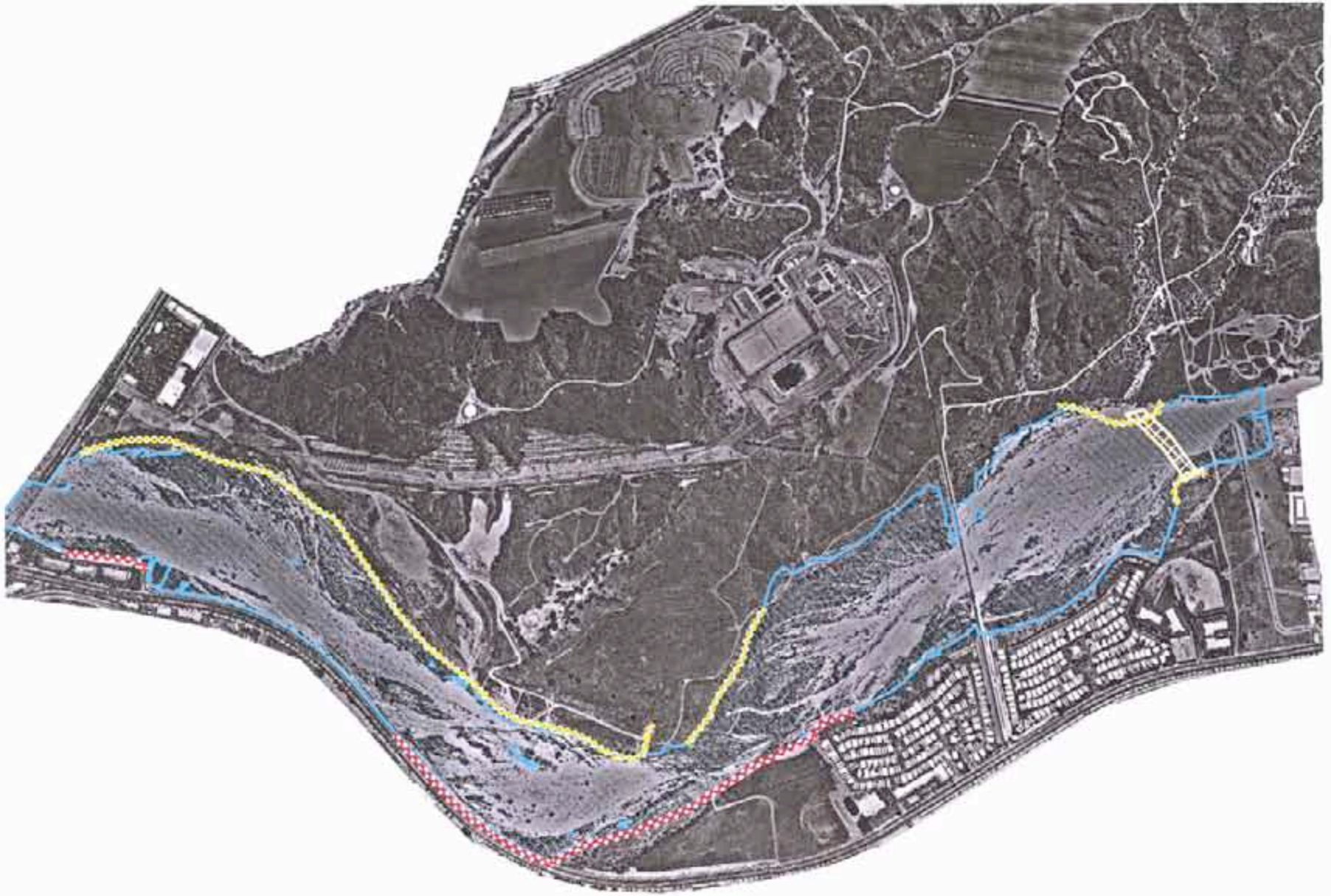
500 0 500 1000 Feet

PSOMAS

Figure 14

Santa Clara River
Proposed Conditions
50 Year Flood Event

M:/northriv-mp/54325mp/engr/exhib/gis/floodplain.apr Jan 27, 2004



NEWHALL LAND
RIVERPARK

Legend

- Project Bank Stabilization
- Approximate Location of Existing Bank Stabilization
- Newhall Ranch Road Bridge
- 100 Year Flood Levels

N
W E
S

500 0 500 1000 Feet

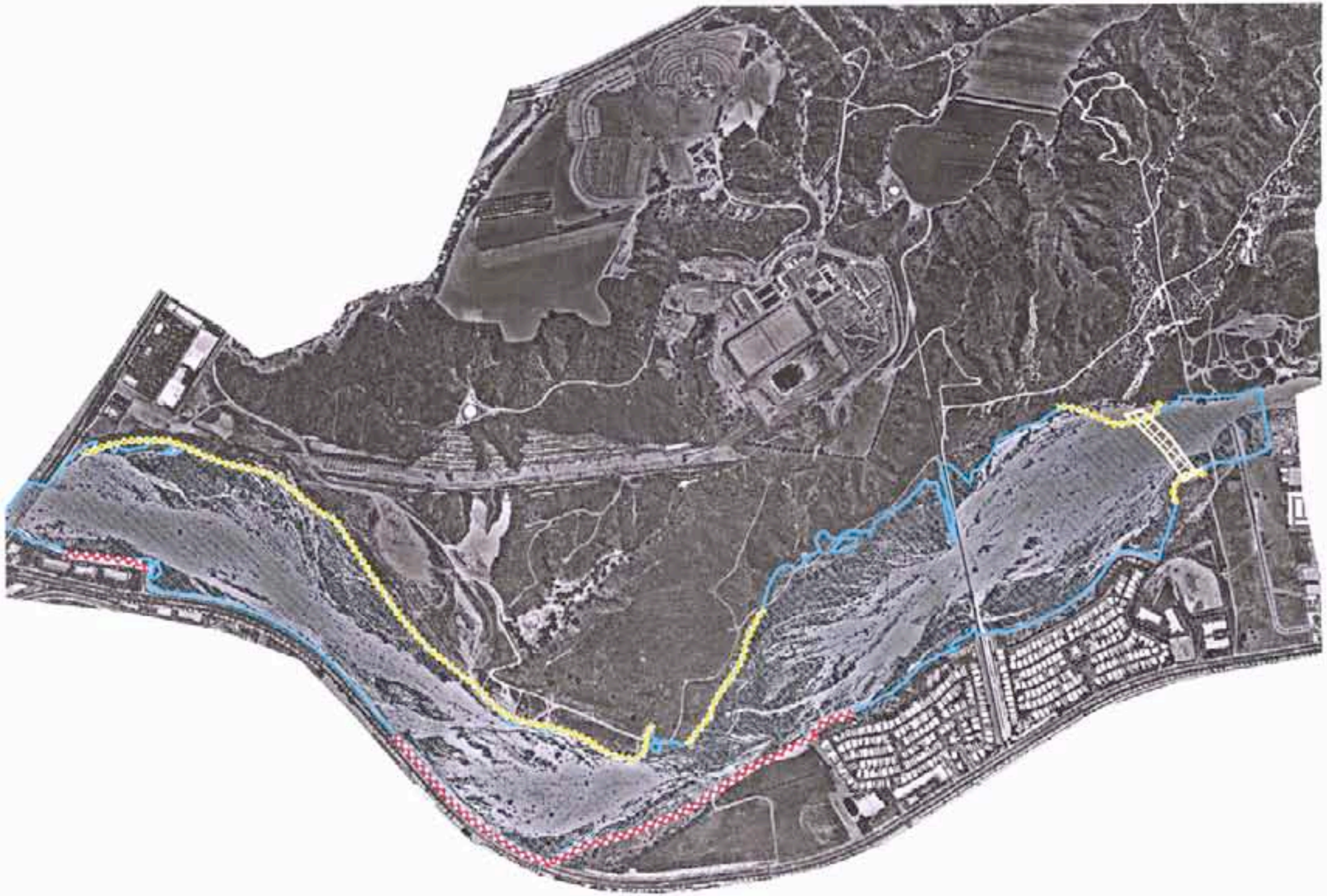
PSOMAS

Figure 15

Santa Clara River
Proposed Conditions
100 Year Flood Event

Topography & Aerial photo flown November 20, 1998
Habitat survey completed April 27, 2002

M:/northriv-mp/54325mp/engr/exhib/gis/floodplain.apr Jan 27, 2004



Topography & Aerial photo flown November 20, 1998
Habitat survey completed April 27, 2002

NEWHALL LAND
RIVERPARK

Legend

- Project Bank Stabilization
- Approximate Location of Existing Bank Stabilization
- Newhall Ranch Road Bridge
- Capital Flood Levels

N
W E
S

500 0 500 1000 Feet

PSOMAS

Figure 16

Santa Clara River
Proposed Conditions
Capital Flood Event

M:/northriv-mp/54325mp/engr/exhib/gis/floodplain.apr Jan 27, 2004

4.5 WHETHER SUBSTANTIAL ALTERATION OF AN EXISTING DRAINAGE PATTERN WOULD RESULT IN SUBSTANTIAL EROSION OR SILTATION AND HARMFUL INCREASES IN EROSION

4.5.1 Santa Clara River

Erosion is not anticipated to be a concern on developed portions on the site. Potential for erosion within the river can be evaluated by reviewing changes to hydraulic shear stress or flow velocities, in conjunction with potentially erodible materials. In Los Angeles County, velocities are the preferred indicator for potential streambed erosion. Because the Santa Clara Riverbed is composed of alluvial materials such as alluvial silts, sands, and gravels, the nonerodible velocities (velocities below which no erosion would occur) range from 2.5 feet per second (fine gravels under clear flow conditions) to 5.0 feet per second (alluvial silts transporting colloidal materials) (Chow, 1959). Therefore, a representative velocity of 4.0 feet per second was determined to be the appropriate indicator for potential erosion.

If a significant amount of floodplain area were in the 0-4-foot/second range, but as a result of the project (including the Newhall Ranch Road/Golden Valley Road Bridge), would be subjected to velocities greater than 4 feet/second, it would be considered potentially significant. However, **Table 9, Pre- and Post-Development River Velocities**, indicates that increases in areas of the river that would be subject to velocities over 4 feet/second during a 2-year storm event would be minimal (increase of two acres), localized (in the immediate vicinity of the abutments and piers), and would be caused only by the smallest event scenario. There would be no net increases in areas affected by velocity during the 5- and 10-year storm events, and, decreases in river velocity for the 20- to 100-year storm events.

Table 9
Pre- and Post-Development River Velocities

	Area (acres) with Velocities Greater than 4 ft/sec		Impacts
Storm Event	Existing Scenario	Post-Development	(Percent Increase from Existing)
2-Year	32	34	6%
5-Year	86	86	0%
10-Year	137	137	0%
20-Year	174	168	-3%
50-Year	228	223	-2%
100-Year	276	264	-4%

4.5.2 Siltation

A comparison between **Table 3, Existing Drainages and Runoff Quantities**, and **Table 7, Post-Development Runoff Quantities**, demonstrates that total debris volume from the approximately 835-acre tributary watershed would decrease from 31,770 cy to 15,688 cy, which is approximately a 50 percent decrease . This reduction in sedimentation and debris production is a result of reduced erosion of the site due to coverage of much of the development area with pavement, roofs, vegetation, and other non-erosive surfaces. It is also a result of the proposed debris basins that would capture sediment and debris from project runoff.

With these improvements in place, the project would reduce post-construction impacts on on- and off-site erosion, downstream sedimentation, and debris production and transport.

4.5.3 On-Site Drainage Discharge Points

The Los Angeles MS4 Permit notes that increased volume, velocity, and discharge duration of storm water runoff from developed areas could potentially accelerate downstream erosion and impair stream habitat. As a result, the Permit stipulates that "Permittees shall control post-peak storm water runoff in Natural Drainage Systems to prevent accelerated stream erosion and protect stream habitat." The following discussion supports the conclusion that there are no significant downstream impacts potentially accelerating erosion and stream habitat:

- In smaller natural riverine systems, frequent discharges (on the order of the average annual and 2-year flows) dictate stream geomorphology. Extended and frequent discharges at these critical flow rates would potentially impact stream health. The project proposes water quality basins, which will capture small, frequent storms and release flows at non-erosive rates.
- To reduce storm flow velocities during smaller, more frequent flows (i.e., 2-year storm events) and to prevent erosion at stormwater discharge points into the river, the project has incorporated energy dissipaters consisting of either rip-rap or larger standard impact type energy dissipaters would be constructed at affected storm system outlets in the River.. These energy dissipaters would slow the rate of flow of runoff into the river in order to prevent erosion of the stream channel.

5 CUMULATIVE ANALYSIS

It has been estimated that approximately 4 percent of that portion of the Santa Clara River watershed found in Los Angeles County would be developed and approximately 2.5 percent of the portion of the watershed found in Ventura County would be developed.[3] Each development project in the Santa Clara River watershed (1,634 sq. miles) will be of varying character and size, will have its own unique topographic and geologic characteristics, will have flood impacts that will be unique to the geologic/soil conditions of the site and the tributary watershed in which it is located, and will be subject to the development criteria of the jurisdiction in which it is located.

All development within the portion of the watershed of the Santa Clara River located in Los Angeles County, including that within the City of Santa Clarita, is required to comply with the LACFWD Qcap requirements to ensure that upstream or downstream flooding does not occur. Compliance with these requirements ensures consistency with the County's Qcap model. Pursuant to LACDPW requirements, all drainage systems in developments that carry runoff from developed areas must be designed for the 25-year Urban Design storm, while storm drains under major and secondary highways, open channels (main channels), debris carrying systems, and sumps must be designed for the 50-year Capital Flood storm. LACDPW also prohibits significant increases in off-site post-development storm flows and significant increases in storm

[3] Alex Sheydayi, Deputy Director, Ventura County Public Works Agency, Flood Control Department, statement made at the Santa Clara River Enhancement and Management Plan Steering Committee Meeting, May 30, 1995.

flow velocities. Development in the Los Angeles County portion of the watershed must also comply with LACDPW design criteria. As a result of compliance, overall storm runoff discharge quantities from the watershed under post-development runoff conditions would be less than or equal to existing conditions largely because the runoff would be free of the debris that is typical of undeveloped watersheds and flow velocities would not increase significantly. Because on-site facilities would already have been built for burned and bulked flows from undeveloped areas, they would have more than adequate capacity to accommodate off-site flows as the off-site portions of the drainage areas develop.

As the analysis of project development demonstrates, development in minor drainage courses within the portions of the watershed located in Los Angeles County in compliance with these requirements would experience a decrease in burned and bulked runoff as the hillsides of the watershed develop.[4] Discharge quantities into the Santa Clara River from these minor drainages under post-development conditions would be less than under existing conditions because the runoff would be free of the debris that is typical of undeveloped watersheds. As a policy, both the City of Santa Clarita and the LACDPW prohibit significant increases in flow velocity from a project site; therefore, adherence to this policy would result in no significant cumulative increases in velocity or erosion/sedimentation impacts along that portion of the Santa Clara River which drains to this watershed.

Other projects within the City of Santa Clarita and Los Angeles County would be subject not only to the same general requirements as the proposed Riverpark project, but also to such other requirements as the City of Santa Clarita (as applicable) and LACDPW would specifically identify for them based on their unique topographic and geologic characteristics.

The analysis of project conditions, above, demonstrates that project development, which must comply with all of these City and County requirements, would not create any significant impacts. Compliance with the applicable regulations results in the less discharge from the project post-development as compared to pre-development levels, and thus runoff from the project causes no incremental increase in the cumulative impact of watershed-wide development.

The City of Santa Clarita General Plan provides for additional development within this tributary watershed. However, the only probable future development within the approximate 835-acre tributary drainage in which the project is located is the Santa Clarita Parkway Bridge. As shown by the analysis below, the addition of that Bridge to the tributary drainage also would not cause any significant impacts. Therefore, cumulative development within this tributary drainage would not cause any cumulative impacts.

Because the cumulative project drainage improvements in the City of Santa Clarita and Los Angeles County would be required to conform to the requirements of the City of Santa Clarita Department of Engineering Services and the LACDPW in order to handle the Capital Flood from the affected watershed, no potentially significant cumulative project flooding impacts are expected to occur from the incremental impacts of the project. The development criteria of each jurisdiction will ensure that no potentially significant cumulative impacts will occur.

[4] **See sections 2.1.1 amd 2.1.2 for reference discussion.**

5.1 LACDPW DESIGN CRITERIA

Because on-site drainage facilities would have adequate capacity to capture and convey off-site flows from developed upstream areas and because the storm drainage improvements in the remainder of the watershed would be required to comply with LACDPW design criteria, no significant increases in velocity and related scouring, and no potentially significant cumulative project flooding impacts are expected to occur downstream of the site as the watershed builds out.

5.2 FLOODPLAIN

Table 10, Pre-, Post-Development, and Cumulative Floodplain/Stream Area, compares the pre- and post-development acreages of the floodplain for seven storm events. As shown, the acreage subject to flooding under would decrease with cumulative project development for all storm events except the 2-year. In the cumulative scenario, the already constructed bank stabilization associated with Tract 20838 would protect Soledad Canyon Road from flooding in all storm events.

Table 10
Pre-, Post-Development, and Cumulative Floodplain/Stream Area

Storm Event	Pre-Development (acres)	Post-Development (acres)	Cumulative (including Santa Clarita Parkway Bridge) (acres)
2-Year	109.4	105	106.2
5-Year	187.6	179.3	178.4
10-Year	266.0	250.8	250.7
20-Year	300.5	278.7	278.3
50-Year	325	295.2	295.1
100-Year	337.4	303.7	302.9
Capital Flood	355.5	313.2	310.7

As shown in **Table 11,** there would be no significant increases in water surface elevation in the Santa Clara River under the cumulative impacts scenario, which assumes full buildout upstream from the project site. No potentially significant floodplain impacts are anticipated as a result of cumulative buildout.

Table 11
Water Surface Elevation at Selected River Locations from Upstream to Downstream

Storm Event	Modeled Scenario	Cross-Section (XS) and station (approximate distance in feet upstream from Bouquet Canyon Bridge)														
		Proposed Newhall Ranch Rd/Golden Valley Road Br							Future Santa Clarita Parkway Bridge							Existing Bouquet Canyon Bridge
		XS 12207	**XS 11101**	**XS 10215**	**XS 9100**	**XS 8293**	**XS 7349**	**XS 6229**	**XS 5812**	**XS 5243**	**XS 4198**	**XS 3206**	**XS 2183**	**XS 1187**	**XS 342**	**XS 13**
2YEAR	Existing	1261.6	1252.1	1241.5	1231.6	1224.2	1216.5	1206.7	1204.1	1198.9	1189.2	1179.4	1171.6	1163.1	1155.4	1151.0
	Proposed	1262.9	1252.1	1241.7	1231.6	1224.2	1216.6	1206.6	1204.1	1198.9	1189.2	1179.5	1171.6	1163.2	1155.1	1151.1
	Cumulative	1262.9	1252.1	1241.7	1231.6	1224.2	1216.6	1206.8	1204.1	1198.9	1189.2	1179.5	1171.6	1163.2	1155.1	1151.1
Difference between Existing and Cumulative		0	0	0	0	0	0	0.2	0	0	0	0	0	0	0	0
		XS 12207	**XS 11101**	**XS 10215**	**XS 9100**	**XS 8293**	**XS 7349**	**XS 6229**	**XS 5812**	**XS 5243**	**XS 4198**	**XS 3206**	**XS 2183**	**XS 1187**	**XS 342**	**XS 13**
5YEAR	Existing	1262.5	1252.3	1242.2	1232.7	1225.7	1217.5	1207.2	1204.6	1199.3	1189.8	1180.7	1172.6	1163.9	1156.1	1152.1
	Proposed	1264.4	1252.3	1242.2	1232.8	1225.7	1217.5	1207.2	1204.6	1199.3	1189.8	1180.7	1172.6	1163.9	1156.1	1152.1
	Cumulative	1264.1	1252.3	1242.2	1232.8	1225.7	1217.5	1207.2	1204.6	1199.3	1189.8	1180.7	1172.6	1163.9	1156.1	1152.1
Difference between Existing and Cumulative		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		XS 12207	**XS 11101**	**XS 10215**	**XS 9100**	**XS 8293**	**XS 7349**	**XS 6229**	**XS 5812**	**XS 5243**	**XS 4198**	**XS 3206**	**XS 2183**	**XS 1187**	**XS 342**	**XS 13**
10YEAR	Existing	1262.7	1252.6	1242.6	1233.0	1225.8	1217.7	1207.8	1205.1	1199.7	1190.4	1181.1	1173.2	1164.5	1156.7	1152.7
	Proposed	1264.7	1252.6	1242.6	1233.0	1225.5	1217.7	1207.8	1205.1	1199.7	1190.5	1181.1	1173.0	1164.5	1156.7	1152.9
	Cumulative	1264.7	1252.6	1242.6	1233.0	1225.5	1217.7	1207.8	1205.1	1199.7	1190.5	1181.1	1173.0	1164.5	1156.7	1152.9
Difference between Existing and Cumulative		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		XS 12207	**XS 11101**	**XS 10215**	**XS 9100**	**XS 8293**	**XS 7349**	**XS 6229**	**XS 5812**	**XS 5243**	**XS 4198**	**XS 3206**	**XS 2183**	**XS 1187**	**XS 342**	**XS 13**
20YEAR	Existing	1263.3	1252.7	1243.1	1233.5	1226.9	1218.5	1208.4	1205.4	1200.1	1191.0	1181.7	1173.5	1165.4	1157.3	1153.3
	Proposed	1265.6	1252.7	1243.1	1233.5	1227.2	1218.5	1208.4	1205.4	1200.1	1191.1	1181.7	1173.5	1165.4	1157.3	1153.4
	Cumulative	1265.6	1252.7	1243.1	1233.5	1227.2	1218.5	1208.4	1205.5	1200.1	1191.1	1181.7	1173.5	1165.4	1157.3	1153.4
Difference between Existing and Cumulative		0	0	0	0	0.2	0	0	0.1	0	0	0	0	0	0	0
		XS 12207	**XS 11101**	**XS 10215**	**XS 9100**	**XS 8293**	**XS 7349**	**XS 6229**	**XS 5812**	**XS 5243**	**XS 4198**	**XS 3206**	**XS 2183**	**XS 1187**	**XS 342**	**XS 13**
50YEAR	Existing	1264.1	1253.4	1243.7	1234.1	1227.4	1219.4	1209.3	1206.0	1200.4	1191.6	1182.5	1174.2	1166.1	1158.5	1154.3
	Proposed	1265.9	1253.4	1243.7	1234.2	1227.4	1219.4	1209.3	1206.0	1200.4	1191.6	1182.5	1174.2	1166.2	1158.5	1154.2
	Cumulative	1265.9	1253.4	1243.7	1234.2	1227.4	1219.4	1209.3	1206.2	1200.4	1191.9	1182.5	1174.2	1166.2	1158.5	1154.2

Difference between Existing and Cumulative	0	0	0	0	0	0	0	0.2	0	0.3	0	0	0	0	0
	XS 12207	**XS 11101**	**XS 10215**	**XS 9100**	**XS 8293**	**XS 7349**	**XS 6229**	**XS 5812**	**XS 5243**	**XS 4198**	**XS 3206**	**XS 2183**	**XS 1187**	**XS 342**	**XS 13**
100YR Existing	1264.6	1254.0	1244.5	1234.8	1228.3	1220.3	1210.0	1206.7	1201.1	1192.8	1183.2	1174.8	1166.8	1159.4	1155.1
Proposed	1266.9	1254.0	1246.2	1234.8	1228.3	1220.3	1210.1	1206.8	1201.1	1192.8	1183.2	1174.9	1166.8	1159.4	1155.0
Cumulative	1266.9	1254.0	1244.5	1234.8	1228.3	1220.3	1210.1	1206.7	1201.1	1192.8	1183.2	1174.9	1166.8	1159.4	1155.0
Difference between Existing and Cumulative	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

5.3 STREAM EROSION AND DEBRIS DEPOSITION

Using the benchmark of increases in areas with velocities of 4 feet/second, **Table 12, Cumulative Impacts on Erosion**, demonstrates no appreciable increases in potentially eroded areas due to buildout of the study area during the 2- and 5-year storm events, and a decrease in area during the 10-year and greater storm events. Any increase is for relatively small storm events and local mitigation measures would be required in specific locations. Unlike larger storm events, which would transport sediment downstream, for smaller storms it is probable that many of these localized conditions will equilibrate. Therefore no potentially significant stream erosion and debris deposition impacts are anticipated due to the project, subject to mitigation.

Table 12
Cumulative Impacts on Erosion

Storm Event	Area (acres) with Velocities Greater than 4 ft/sec		Difference in Acreage
	Existing Conditions	Cumulative Conditions (including Santa Clarita Parkway Bridge)	
2-Year	31	35	+4
5-Year	85	86	+1
10-Year	136	133	-3
20-Year	176	172	-4
50-Year	229	223	-6
100-Year	286	267	-19

Because the cumulative project drainage improvements in the City of Santa Clarita and Los Angeles County would be required to conform to the requirements of the City of Santa Clarita Department of Engineering Services and the LACDPW in order to handle the Capital Flood from the affected watershed, no potentially significant cumulative project flooding impacts are expected to occur when the watershed reaches buildout. Erosion and sedimentation, when controlled as required by the City and County, would also not result in potentially significant cumulative impacts.

5.4 CONCLUSION

Other projects within Santa Clarita and Los Angeles County would not only be subject to the same general requirements as the proposed Riverpark project, but to other requirements that the City of Santa Clarita (as applicable) and LACDPW would specifically identify for them. All development within the watershed of the Santa Clara River within the City of Santa Clarita is already required to comply with the City of Santa Clarita Department of Engineering Services' requirements and locations within the unincorporated Los Angeles County would comply with the Los Angeles County. Department of Public Works Flood Control Division requirements have been established specifically to ensure that upstream or downstream flooding does not occur.. Erosion and sedimentation, when controlled as required by the City and County, would also not result in potentially significant cumulative impacts.
Therefore no unavoidable potential significant cumulative flooding, erosion and sedimentation impacts would be created. Compliance with these requirements ensures consistency with the County's Qcap model.

APPENDIX

- FEMA MAP

APPENDIX 4.3
Traffic and Circulation Report

RIVERPARK - VTTM 53425

Traffic Impact Analysis

February 2004

AUSTIN-FOUST ASSOCIATES, INC.

RIVERPARK - VTTM 53425

TRAFFIC IMPACT ANALYSIS

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February 5, 2004

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1.0 INTRODUCTION

This report presents the results of a traffic study carried out to evaluate the Riverpark project (VTTM 53425) and associated entitlements located in the City of Santa Clarita. It provides the traffic and circulation material for the Environmental Impact Report (EIR) prepared for this project.

1.1 PROJECT DESCRIPTION

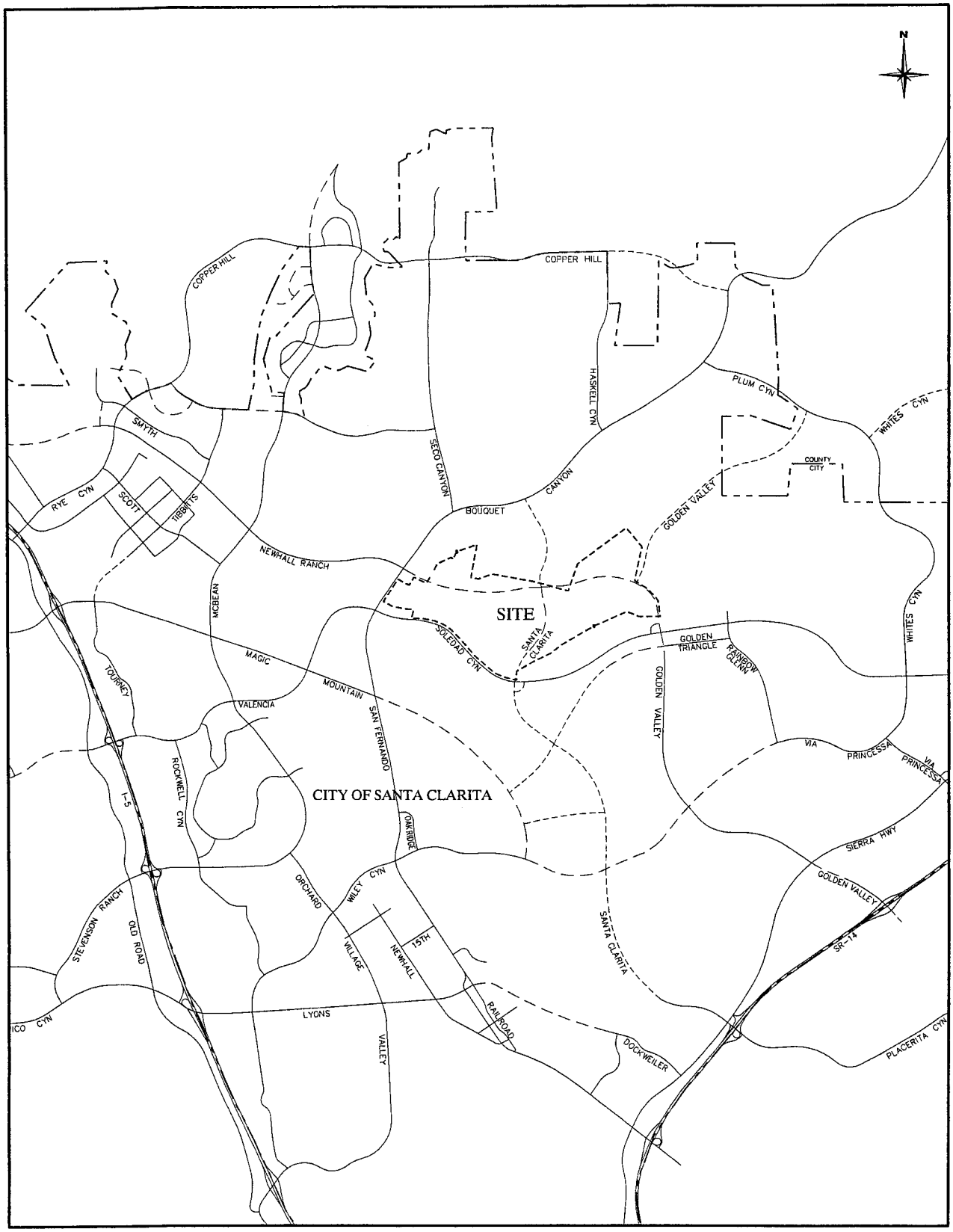
A detailed description of this project and the resulting California Environmental Quality Act (CEQA) requirements addressed here can be found in the Notice of Preparation and in the EIR itself. The proposed project is located on an approximately 695 acre site and consists of 1,183 residential dwelling units, a maximum of 40,000 square feet of retail commercial uses and a neighborhood park. The site is generally bounded by Bouquet Canyon Road to the west and the Santa Clara River to the south. Newhall Ranch Road will bisect the site and will provide the primary means of access. Figure 1-1 illustrates the location of the site in relation to the surrounding roadway system.

1.2 STUDY AREA

The study area includes the roadways and intersections near to the project site and those locations where project generated traffic could cause a significant impact. Figure 1-2 illustrates the intersections selected for study through consultations with City Transportation and Engineering Services staff.

1.3 METHODOLOGY

The traffic analysis evaluates the proposed project for both interim year and long-range timeframes using the Santa Clarita Valley Consolidated Traffic Model (SCVCTM). The SCVCTM was developed jointly by the City of Santa Clarita and the County of Los Angeles and is the primary tool used for forecasting traffic volumes for the Santa Clarita Valley.

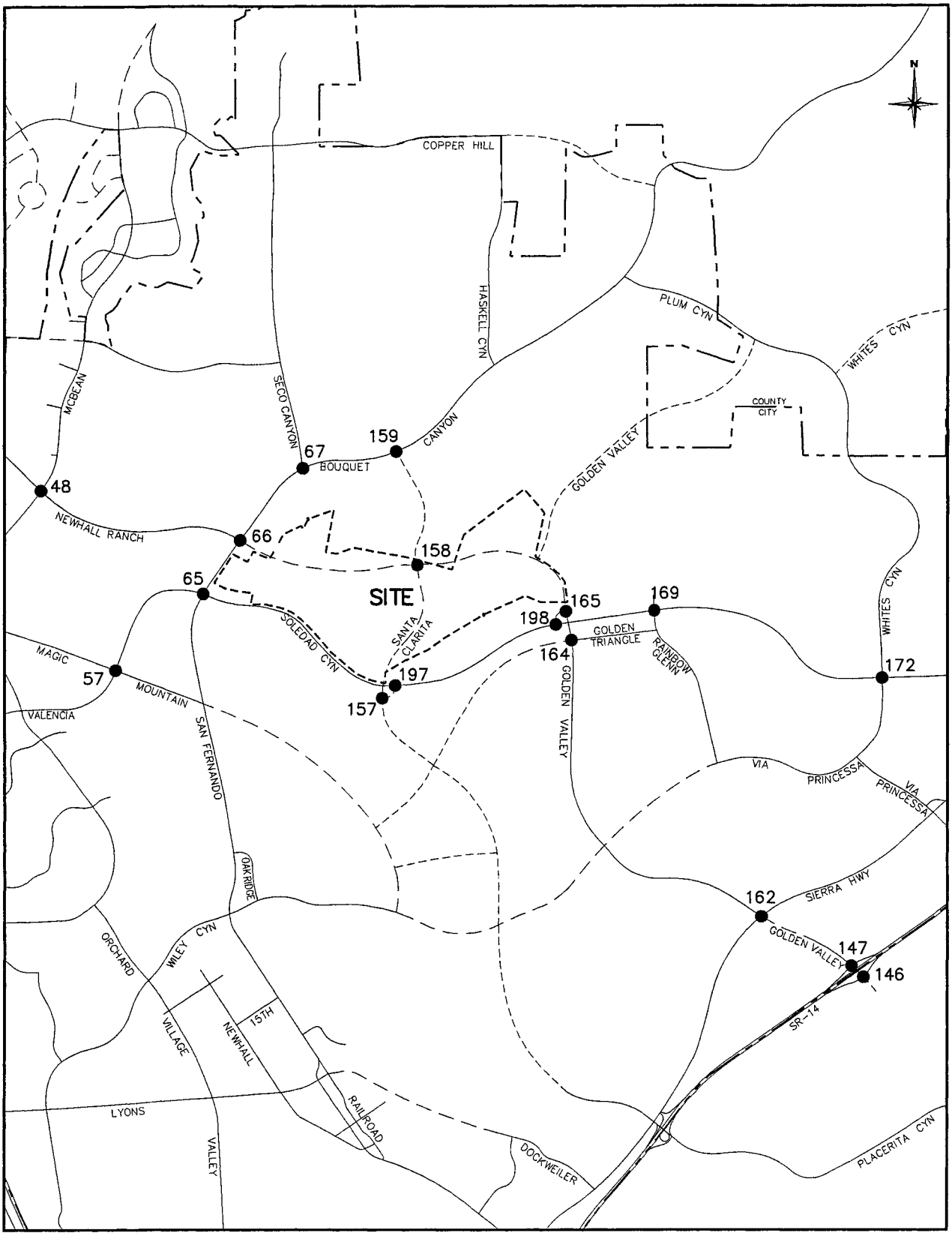


Legend

- Existing Roadway
- Interim Year Roadway
- Long-Range/Buildout Roadway
- City Boundary

Figure 1-1

PROJECT SITE LOCATION



Legend

- Study Location
- Site Boundary
- Existing Roadway
- Interim Year Roadway
- Long-Range Roadway
- City Boundary

Figure 1-2

INTERSECTION STUDY LOCATIONS

The SCVCTM has the ability to provide traffic volume forecasts for two future scenarios; Interim Year which generally corresponds to a horizon of ten years in the future and Long-Range Cumulative which represents buildout conditions. As part of the development of this traffic impact analysis, an update to the traffic model was prepared which involved a review of current related project information from both the City and County. The SCVCTM land use database was then updated where necessary in order to include the most current information (see Section 2.2 for related project information).

The development of the full project (i.e., 1,183 residential dwelling units, a maximum of 40,000 square feet of retail commercial uses and a neighborhood park) includes the planned extension of Newhall Ranch Road over the Santa Clara River to connect with the planned and substantially funded extension of Golden Valley Road (referred to collectively as segments of the Cross-Valley Connector). Planned for completion in 2006/2007, the Cross-Valley Connector will provide a continuous route from the State Route 14 (SR-14) freeway at Golden Valley Road to Interstate 5 (I-5) at the SR-126 interchange. Since this major infrastructure improvement will result in significant and complex changes to existing travel patterns, an analysis scenario in which project traffic is added to existing conditions would not adequately analyze reasonably foreseeable future conditions and potential impacts. Therefore, this analysis adds project traffic to background conditions that include the future traffic patterns that will occur as a result of this new roadway.

An analysis of a partial occupancy of the project (occupancy of a maximum of 500 residential units) is also provided for a scenario with assumptions that do not include the completion of the Cross-Valley Connector.

The impact analysis is based on specific performance criteria which are outlined in the following section. Where appropriate, mitigation measures are identified for those scenarios in which one or more locations do not meet the performance criteria.

1.4 PERFORMANCE CRITERIA

For CEQA purposes, defined performance criteria are utilized to determine if a proposed project causes a significant impact. In most traffic studies, performance criteria are based on two primary measures. The first is "capacity" which establishes the vehicle carrying ability of a roadway and the second is "volume." The volume measure is either a traffic count (in the case of existing volumes) or a forecast for a future point in time. The ratio between the volume and the capacity gives a

volume/capacity (V/C) ratio and based on that V/C ratio, a corresponding level of service (LOS) is defined. The end of this chapter contains level of service descriptions for arterial roadways and freeways as contained in the 2000 Highway Capacity Manual (see Reference 1 at the end of this chapter and referred to as "HCM 2000" in this report).

Table 1-1 summarizes the V/C ranges that correspond to LOS "A" through "F" for arterial roads and freeway segments. The V/C ranges listed for arterial roads within the study area are designated in the General Plan for the City of Santa Clarita (see Reference 10 at the end of this chapter). The V/C ranges listed for freeway segments are based on the V/C and LOS relationships specified in the HCM 2000 for basic freeway sections.

Both the V/C ratio and the LOS are used in determining impact significance. Certain LOS values are deemed unacceptable by the City and increases in the V/C ratio which cause or contribute to the LOS being unacceptable are defined as a significant impact.

In establishing V/C based performance criteria, there are certain items that need to be addressed to obtain suitable V/C estimates and relate them to LOS. For instance, while average daily traffic (ADT) is a useful measure to show general levels of traffic on a facility and to provide data for other related aspects such as noise and air quality, highway congestion is largely a peak hour or peak period occurrence and ADT does not reflect peak period conditions very effectively. Because of this, ADT is not used here as the basis for capacity evaluation but instead this evaluation focuses on those parts of the day when such congestion can occur, specifically the AM and PM peak hours.

The performance criteria are based on defined criteria for three fundamental components of the circulation system; freeway mainline segments, arterial roads (including intersections), and freeway ramps. Peak hour data (AM and PM) is used in each case to establish V/C and LOS measures and to define what constitutes a significant impact. The following section outlines the impact criteria for the facilities within the project study area.

1.4.1 Freeways

The impact analysis for freeway mainline segments uses peak hour volumes by direction as the basis for the analysis. Capacities for calculating peak hour V/C ratios for freeway mainline segments are based on information contained in the July 1995 Caltrans Highway Design Manual (see Reference 3 in

Table 1-1

VOLUME/CAPACITY RATIO LEVEL OF SERVICE RANGES

VOLUME/CAPACITY (V/C) RATIO RANGE	LEVEL OF SERVICE (LOS)
ARTERIAL ROADS	
0.00 – 0.60	A
0.61 – 0.70	B
0.71 – 0.80	C
0.81 – 0.90	D
0.91 – 1.00	E
Above 1.00	F
FREEWAY SEGMENTS	
0.00 – 0.30	A
0.31 – 0.50	B
0.51 – 0.71	C
0.72 – 0.89	D
0.90 – 1.00	E
Above 1.00	F

Section 1.7) and have been verified through discussions with Caltrans staff (see Appendix F). A capacity of 2,000 vehicles per hour per lane (vphpl) is used for mixed-flow (general purpose) mainline freeway lanes, a capacity that corresponds to LOS E conditions. HOV capacities used for this analysis are lower than the capacity for a mixed-flow freeway lane and reflect the objective for HOV facilities to operate better than LOS E. Consistent with this objective, a desirable operating capacity of 1,600 vphpl is applied for a one-lane "buffer-separated" HOV facility.

For this analysis, any additional mainline capacity that may be realized due to the existence of an auxiliary lane (the portion of the roadway for weaving, truck climbing, speed change, or for other purposes supplementary to through traffic movement) was not included in order to provide a conservative estimate of overall capacity. The capacity of a freeway auxiliary lane is difficult to define since auxiliary lanes are typically implemented to preserve standard freeway capacities at locations where the geometric design is below standard (for example, between interchanges that are spaced less than one mile apart or where heavy on/off ramp volumes occur between interchanges). While an auxiliary lane can increase the overall capacity of a mainline freeway segment, the practical increase depends on such key factors as the length of the auxiliary lane and the on/off ramp volumes at the beginning and end of the auxiliary lane.

The capacity assumptions for freeway mixed-flow and HOV lanes are summarized in Table 1-2 together with the overall impact criteria for analyzing freeway mainline segments within the traffic analysis study area. The LOS E performance standard listed here had been established by Caltrans (see Appendix F) as the operating standard for freeway mainline segments and is also consistent with Los Angeles County Congestion Management Program (CMP) requirements (see Reference 9 in Section 1.7).

1.4.2 Arterial Roads

For the arterial system, the peak hour is the accepted time period used for impact evaluation and a number of techniques are available to establish suitable V/C ratios and define the corresponding LOS. These definitions and procedures are established by individual local jurisdictions and by regional programs such as the CMP.

The analysis of the arterial road system is based on intersection capacity since this is the defining capacity limitation on an arterial highway system. Levels of service for arterial roadway intersections are determined based on operating conditions during the AM and PM peak hours. The intersection capacity

Table 1-2

FREEWAY MAINLINE PERFORMANCE CRITERIA

V/C Calculation Methodology

Level of service to be based on peak hour volume/capacity (V/C) ratios calculated using the following capacities:

2,000 vehicles per hour per lane (vphpl) for mixed-flow (general purpose) lanes under stable flow conditions.

1,600 vphpl for a one-lane high occupancy vehicle (HOV) facility under stable flow conditions.

Performance Standard

Level of Service E (peak hour V/C less than or equal to 1.00).

Threshold of Significance

If based on a comparison with existing conditions, a project related V/C increase is greater than or equal to .02 (the impact threshold specified in the CMP) for a freeway mainline segment that is forecast to operate worse than the performance standard, then the impact of that project scenario or alternative is considered significant.

Abbreviations: CMP – Los Angeles County Congestion Management Program

utilization (ICU) methodology is applied using peak hour volumes and the geometric configuration of the intersection. This methodology sums the V/C ratios for the critical movements of an intersection and is the preferred procedure for intersection analysis by the City of Santa Clarita (see Reference 5 in Section 1.7). The ICU methodology is comparable to the intersection capacity analysis methodology outlined in the HCM 2000.

The ICU calculation methodology and associated impact criteria proposed for the study area arterial system are summarized in Table 1-3. The City utilizes LOS D (ICU not to exceed 0.90) as the accepted standard and target level of service for future intersections. The City's *General Plan Circulation Element*, updated in December 1997 (see Reference 10 in Section 1.7), establishes the basis for the thresholds of significance for traffic impacts used in this analysis. These thresholds supercede the thresholds specified in the 1990 *Preliminary Traffic Impact Report Guidelines* (see Reference 5 in Section 1.7). Discussions with City staff in the Transportation and Engineering Services Department provided the detailed impact thresholds listed in the previously referenced Table 1-3.

1.4.3 Freeway Ramps

Similar to the arterial system evaluation, the peak hour is also the accepted time period used for impact evaluation of freeway interchange ramps. For this study, levels of service for freeway ramps within the traffic analysis study area are based on AM and PM peak hour V/C ratios. Capacities for the various ramp configurations that either exist or are anticipated on the freeway system within the traffic analysis study area are based on information contained in the July 1995 *Caltrans Highway Design Manual* and the January 2000 *Caltrans Ramp Meter Design Manual* (see References 3 and 4, respectively, in Section 1.7) and have been verified through discussions with Caltrans staff (see Appendix F).

The capacities for calculating ramp V/C ratios are summarized in Table 1-4 together with the overall impact criteria for freeway ramps within the study area. The LOS E performance standard listed in the table has been established by Caltrans as the operating standard for freeway ramps.

1.5 LEVEL OF SERVICE DESCRIPTIONS

Tables 1-5, 1-6, and 1-7 summarize the level of service descriptions for arterial highways, intersections and freeways, respectively. These descriptions are taken from material contained in HCM 2000.

1.6 DEFINITIONS

Certain terms used throughout this report are defined below to clarify their intended meaning:

ADT — Average Daily Traffic. Generally used to measure the total two-directional traffic volumes passing a given point on a roadway.

CMP — Congestion Management Program. A state mandated program administered by the Los Angeles County Metropolitan Transportation Authority (MTA) that provides a mechanism for coordinating land use and development decisions.

ICU — Intersection Capacity Utilization. A measure of the volume to capacity ratio for an intersection. Typically used to determine the peak hour level of service for a given set of intersection volumes.

LOS — Level of Service. A scale used to evaluate circulation system performance based on intersection ICU values or volume/capacity ratios of arterial segments.

Peak Hour — This refers to the hour during the AM peak period (typically 7 AM - 9 AM) or the PM peak period (typically 3 PM - 6 PM) in which the greatest number of vehicle trips are generated by a given land use or are traveling on a given roadway.

Tripend — A trip generation measure which represents the total trips entering and leaving a location.

V/C — Volume to Capacity Ratio. This is typically used to describe the percentage of capacity utilized by existing or projected traffic on a segment of an arterial or intersection.

Table 1-3

ARTERIAL INTERSECTION PERFORMANCE CRITERIA

ICU Calculation Methodology

Level of service to be based on peak hour ICU values calculated using the following assumptions:

Saturation Flow Rate: 1,750 vehicles/hour/lane
Clearance Interval: .10
RTOR Allowed: Yes*
RTOR Saturation Factor: .75
No minimum volume/capacity assumed

Performance Standard

LOS D

Thresholds of Significance

A significant impact occurs when any of the following conditions are met:

With-Project ICU	Project Increment
.81-.90 (LOS D)	greater than or equal to .02
.91 or more (LOS E or F)	greater than or equal to .01

Mitigation must be identified that results in an ICU less than or equal to pre-project conditions.

Sources: City of Santa Clarita Traffic Impact Report Guidelines and December 1997 City of Santa Clarita General Plan Circulation Element (See Reference 5 & 10, respectively, in Section 1.7), and the City Transportation and Engineering Services Department.

* "De facto" right-turn lane is used in the ICU calculation if 19 feet from edge of pavement to inside of through-lane exists and parking is prohibited during peak hours.

Abbreviations: ICU – Intersection Capacity Utilization
RTOR – Right-turn On Red
LOS – Level of Service

Table 1-4

FREEWAY RAMP PERFORMANCE CRITERIA

V/C Calculation Methodology

Level of service to be based on peak hour volume/capacity (V/C) ratios calculated using the following ramp capacities:

Freeway to Arterial Road Interchanges

Metered On-Ramps

A maximum capacity of 900 vehicles per hour (vph) for a one-lane metered on-ramp with only one mixed-flow lane at the meter.

A maximum capacity of 1,080 (20 percent greater than 900) vph for a one-lane metered on-ramp with one mixed-flow lane at the meter plus one HOV preferential lane at the meter.

A maximum capacity of 1,500 vph for a one-lane metered on-ramp with two mixed-flow lanes at the meter.

A maximum capacity of 1,800 vph for a two-lane metered on-ramp with two mixed-flow lanes at the meter.

Non-Metered On-Ramps and Off-Ramps

A maximum capacity of 1,500 vph for a one-lane ramp.

A maximum capacity of 2,250 (50 percent greater than 1,500) vph for a two-lane on-ramp that tapers to one merge lane at or beyond the freeway mainline gore point and for a two-lane off-ramp with only one auxiliary lane.

A maximum capacity of 3,000 vph for a two-lane on-ramp that does not taper to one merge lane and for a two-lane off-ramp with two auxiliary lanes.

Performance Standard

Level of Service E (peak hour V/C less than or equal to 1.00).

Thresholds of Significance

If based on a comparison with existing conditions, a project related V/C increase is greater than or equal to .02 (the impact threshold specified in the CMP) for a freeway ramp that is forecast to operate worse than the performance standard, then the impact of that project scenario or alternative is considered significant.

Abbreviations: V/C – Volume to Capacity Ratio
VPH – Vehicles per Hour

Table 1-5

LEVEL OF SERVICE DESCRIPTIONS – URBAN STREETS

The average travel speed along an urban street is the determinant of the operating level of service (LOS). The travel speed along a segment, section, or entire length of an urban street is dependent on the running speed between signalized intersections and the amount of control delay incurred at signalized intersections. The following general statements characterize LOS along urban streets and show the relationship to free flow speeds (FFS)

LOS	DESCRIPTION	PERCENT OF FFS
A	LOS A describes primarily free-flow operations at average travel speeds, usually about 90 percent of the FFS for the given street class. Vehicles are completely unimpeded in their ability to maneuver within the traffic stream. Control delay at signalized intersections is normal.	90
B	LOS B describes reasonably unimpeded operations at average travel speeds, usually about 70 percent of the FFS for the street class. Vehicles are completely unimpeded in their ability to maneuver with the traffic stream. Control delay at signalized intersections is minimal.	70
C	LOS C describes stable operations; however, ability to maneuver and change lanes in midblock locations may be more restricted that at LOS B, and longer queues, adverse signal coordination, or both may contribute to lower average travel speeds of about 50 percent of the FFS for the street class.	50
D	LOS D borders on a range in which small increases in flow may cause substantial increases in delay and decreases in travel speed. LOS D may be due to adverse signal progression, inappropriate signal timing, high volumes, or a combination of these factors. Average travel speeds are about 40 percent of FFS	40
E	LOS E is characterized by significant delays and average travel speeds of 33 percent or less of the FFS. Such operations are caused by a combination of adverse progression, high signal density, high volumes, extensive delays at critical intersections, and inappropriate signal timing.	33
F	LOS F is characterized by urban street flow at extremely low speeds, typically one-third to one-fourth of the FFS. Intersection congestion is likely at critical signalized locations, with high delays, high volumes, and extensive queuing.	25

Source: Highway Capacity Manual 2000, Transportation Research Board, National Research Council

Table 1-6

LEVEL OF SERVICE DESCRIPTIONS – SIGNALIZED INTERSECTIONS

Levels of service (LOS) for signalized intersections are defined in terms of control delay as follows:

LOS	DESCRIPTION	DELAY PER VEHICLE (sec)	ICU RANGE
A	LOS A describes operations with low control delay, up to 10 seconds per vehicle. This LOS occurs when progression is extremely favorable and most vehicles arrive during the green phase. Many vehicles do not stop at all. Short cycle lengths may tend to contribute to low delay values.	< 10	.00-.60
B	LOS B describes operations with control delay greater than 10 and up to 20 seconds per vehicle. This level generally occurs with good progression, short cycle lengths, or both. More vehicles stop than the LOS A, causing higher levels of delay.	10 – 20	.61-.70
C	LOS C describes operations with control delay greater than 20 and up to 35 seconds per vehicle. These higher delays may result from only fair progression, longer cycle lengths, or both. Individual cycle failures may begin to appear at this level. Cycle failure occurs when a given green phase does not serve queued vehicles, and overflows occur. The number of vehicles stopping is significant at this level, though many still pass through the intersection without stopping.	20 – 35	.71-.80
D	LOS D describes operations with control delay greater than 35 and up to 55 seconds per vehicle. At LOS D, the influence of congestion becomes more noticeable. Longer delays may result from some combination of unfavorable progression, long cycle lengths, and high V/C ratios. Many vehicles stop, and the proportion of vehicles not stopping declines. Individual cycle failures are noticeable.	35 – 55	.81-.90
E	LOS E describes operations with control delay greater than 55 and up to 80 seconds per vehicle. These high delay values generally indicate poor progression, long cycle lengths, and high V/C ratios. Individual cycle failures are frequent.	55 – 80	.91-1.00
F	LOS F describes operations with control delay in excess of 80 seconds per vehicle. This level, considered unacceptable to most drivers, often occurs with oversaturation, that is, when arrival flow rates exceed the capacity of lane groups. It may also occur at high V/C ratios with many individual cycle failures. Poor progression and long cycle lengths may also contribute significantly to high delay levels.	> 80	>1.00

Source: Highway Capacity Manual 2000, Transportation Research Board, National Research Council

Table 1-7

LEVEL OF SERVICE DESCRIPTIONS – FREEWAYS

LOS	DESCRIPTION
A	LOS A describes free-flow operations. Free-flow speeds (FFS) prevail. Vehicles are almost completely unimpeded in their ability to maneuver with the traffic stream. The effects of incidents or point breakdowns are easily absorbed at this level.
B	LOS B represents reasonably free-flow, and FFS are maintained. The ability to maneuver with the traffic stream is only slightly restricted, and the general level of physical and psychological comfort provided to drivers is still high. The effects of minor incidents and point breakdowns are still easily absorbed.
C	LOS C provides for flow with speeds at or near the FFS of the freeway. Freedom to maneuver within the traffic stream is noticeably restricted, and lane changes require more care and vigilance on the part of the driver. Minor incidents may still be absorbed, but the local deterioration in service will be substantial. Queues may be expected to form behind any significant blockage.
D	LOS D is the level at which speeds begin to decline slightly with increasing flows and density begins to increase somewhat more quickly. Freedom to maneuver within the traffic stream is more noticeably limited, and the driver experiences reduced physical and psychological comfort levels. Even minor incidents can be expected to create queuing, because the traffic stream has little space to absorb disruptions.
E	At its highest density value, LOS E describes operation at capacity. Operations at this level are volatile, because there are virtually no usable gaps in the traffic stream. Vehicles are closely spaces, leaving little room to maneuver with the traffic stream at speeds that still exceed 49 miles per hour. Any disruption of the traffic stream, such as vehicles entering from a ramp or a vehicle changing lanes, can establish a disruption wave that propagates throughout the upstream traffic flow. At capacity, the traffic stream has no ability to dissipate even the most minor disruption, and any incident can be expected to produce a serious breakdown with extensive queuing. Maneuverability with the traffic stream is extremely limited, and the level of physical and psychological comfort afforded the driver is poor.
F	LOS F describes breakdowns in vehicular flow. Such conditions generally exist within queues forming behind breakdown points, and are the result of a bottleneck downstream point. LOS F is also used to describe conditions at the point of the breakdown or bottleneck and the queue discharge flow that occurs at speeds lower than the lowest speed for LOS E, as well as the operations within the queue that forms upstream. Whenever LOS F conditions exist, they have the potential to extend upstream for significant distances.

Source: Highway Capacity Manual 2000, Transportation Research Board, National Research Council

VPH Vehicles Per Hour. Used for roadway volumes (counts or forecasts) and trip generation estimates. Measures the number of vehicles in a one hour period, typically the AM or PM peak hour.

VPHPL Vehicles Per Hour Per Lane. Similar to VPH but with the roadway volume averaged to the total number of roadway lanes.

1.7 REFERENCES

Copies of the references used in this report are available for review at the City of Santa Clarita Planning and Building Services Department located at 23920 West Valencia Blvd, Suite 302, Santa Clarita, CA 91355

1. "Highway Capacity Manual 2000," Transportation Research Board, National Research Council, 2000.

2. "Trip Generation 6th Edition," Institute of Transportation Engineers, 1997.

3. "Caltrans Highway Design Manual," Caltrans, July 1995.

4. "Caltrans Ramp Meter Design Manual," Caltrans, January 2000.

5. "Preliminary Traffic Impact Report Guidelines," City of Santa Clarita, August 1990.

6. "Santa Clarita Valley Consolidated Traffic Model Report," County of Los Angeles Department of Public Works, 1994.

7. "Santa Clarita Valley Consolidated Traffic Model 1995 Update and Validation," City of Santa Clarita and County of Los Angeles Department of Public Works, April 1995.

8. "Draft Santa Clarita Valley Consolidated Traffic Model Version 3.3," City of Santa Clarita and County of Los Angeles Department of Public Works, March 2003.

9. "2002 Congestion Management Program for Los Angeles County," Los Angeles County Metropolitan Transportation Authority, June 2002.

10. "City of Santa Clarita General Plan Circulation Element," City of Santa Clarita, December 1997.

2.0 TRANSPORTATION SETTING

This chapter describes the transportation setting for the traffic analysis. Existing conditions are first discussed, followed by a description of the future circulation system as outlined in the City's Circulation Element.

2.1 EXISTING CONDITIONS

The following section describes existing traffic conditions in the study area. It includes a description of the study area roadway system, existing traffic volumes and corresponding levels of service as defined by the performance criteria outlined in the previous chapter.

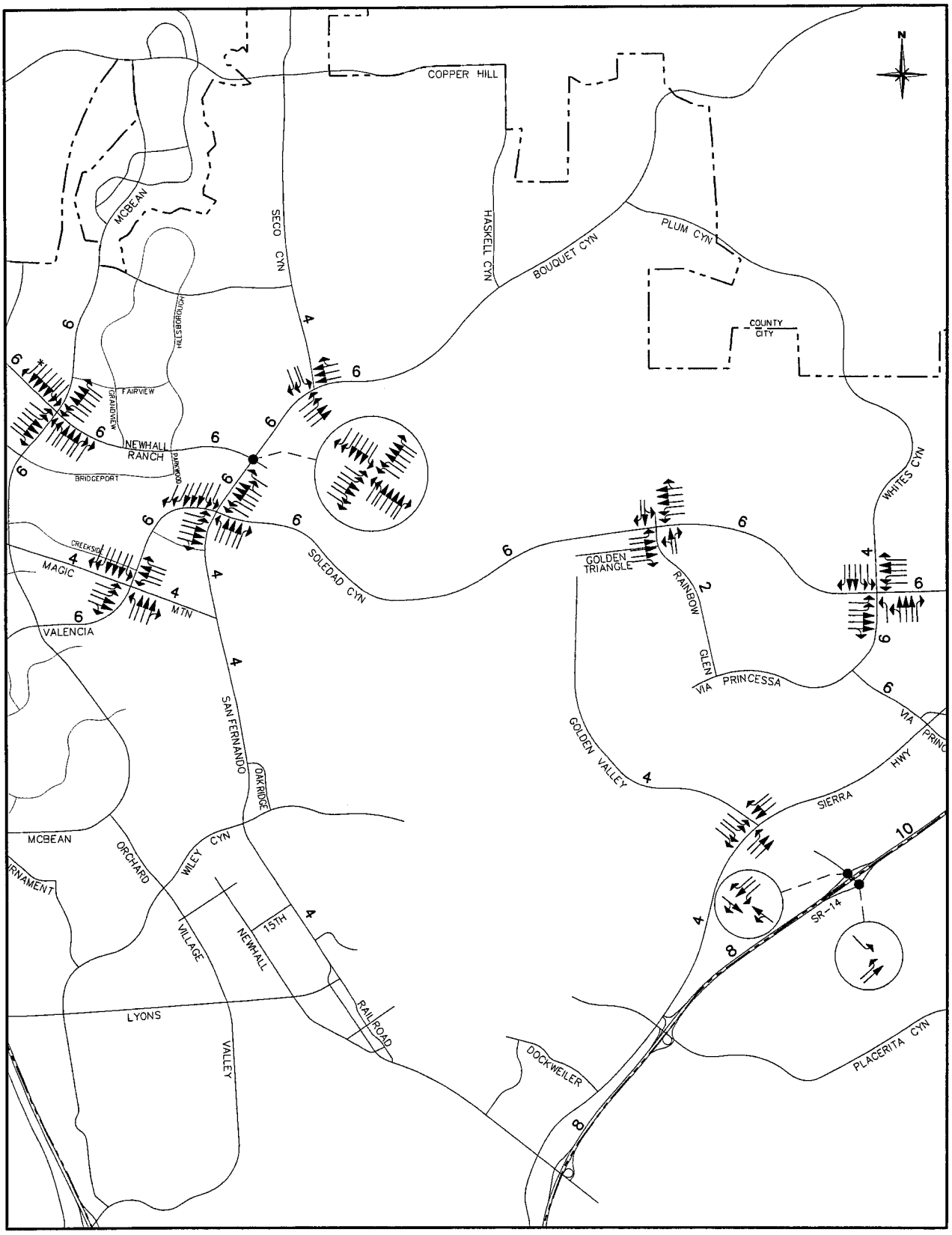
2.1.1 Existing Roadway System

The existing roadway network in the study area is illustrated in Figure 2-1 in the form of mid-block lanes and intersection lane configurations for the intersections being studied. Major arterial streets near to the project site consist of Bouquet Canyon Road, Newhall Ranch Road, Soledad Canyon Road, Valencia Parkway and Golden Valley Road.

The SR-14 Freeway provides regional access for residents of the site and is located approximately 3.5 miles south of the project site. The I-5 Freeway is located approximately 3.5 miles west of the project site.

2.1.2 Existing Traffic Volumes and Levels of Service

The existing average daily traffic (ADT) volumes on the study area roadway system are illustrated in Figure 2-2. Illustrations of peak hour turning movement volumes for each study area intersection can be found in Figures 2-3 and 2-4 for the AM and PM peak hours, respectively. The peak hour counts were collected at various times during the past year and a half and in most cases during the second half of 2002 (see Table 2-1 for dates).



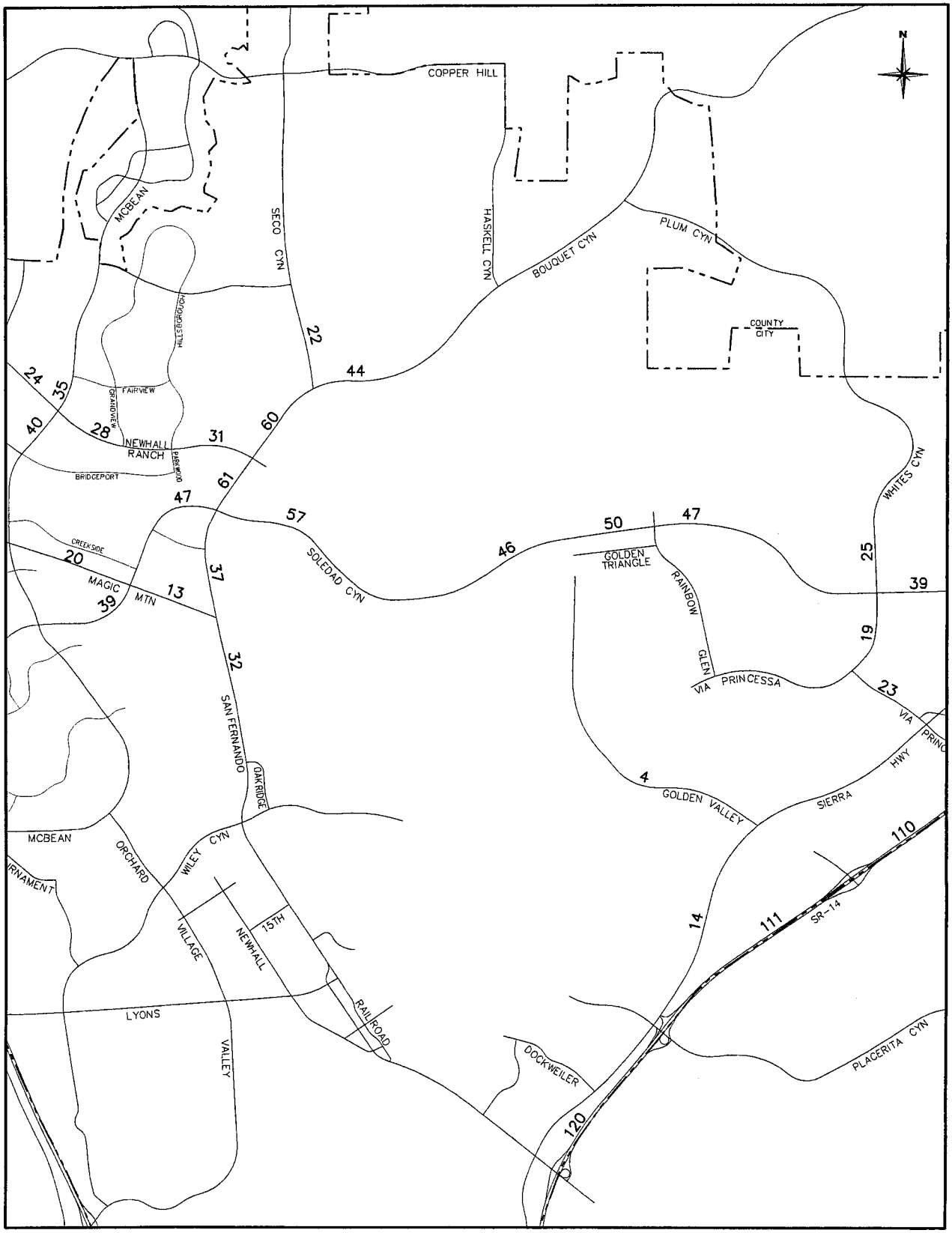
Legend

X Mid-block Lanes

Intersection Lane

Figure 2-1

EXISTING ROADWAY NETWORK



Legend

XX ADT (thousands)

Figure 2-2

AVERAGE DAILY TRAFFIC VOLUMES
- EXISTING CONDITIONS

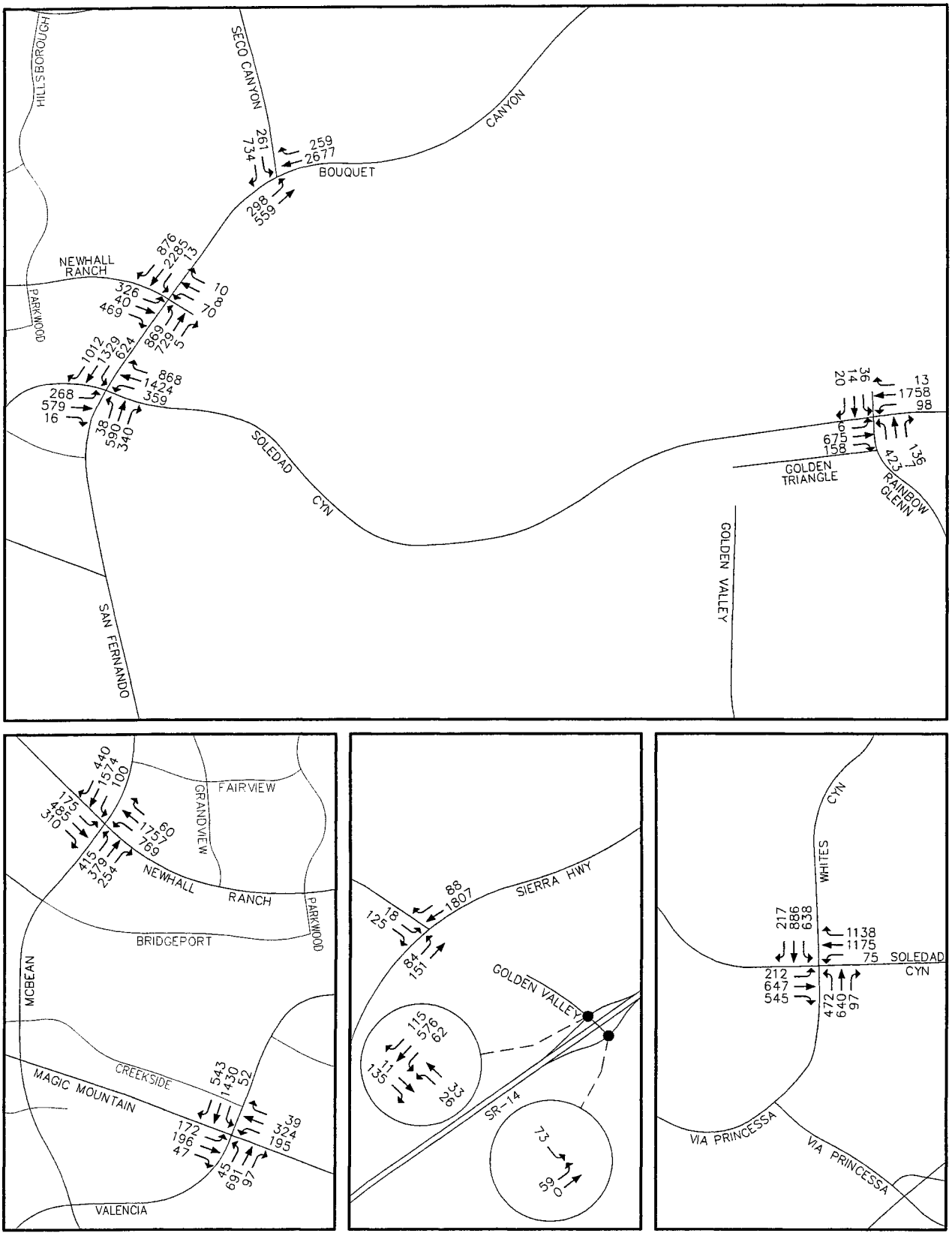


Figure 2-3

AM PEAK HOUR TURNING MOVEMENT VOLUMES
- EXISTING CONDITIONS

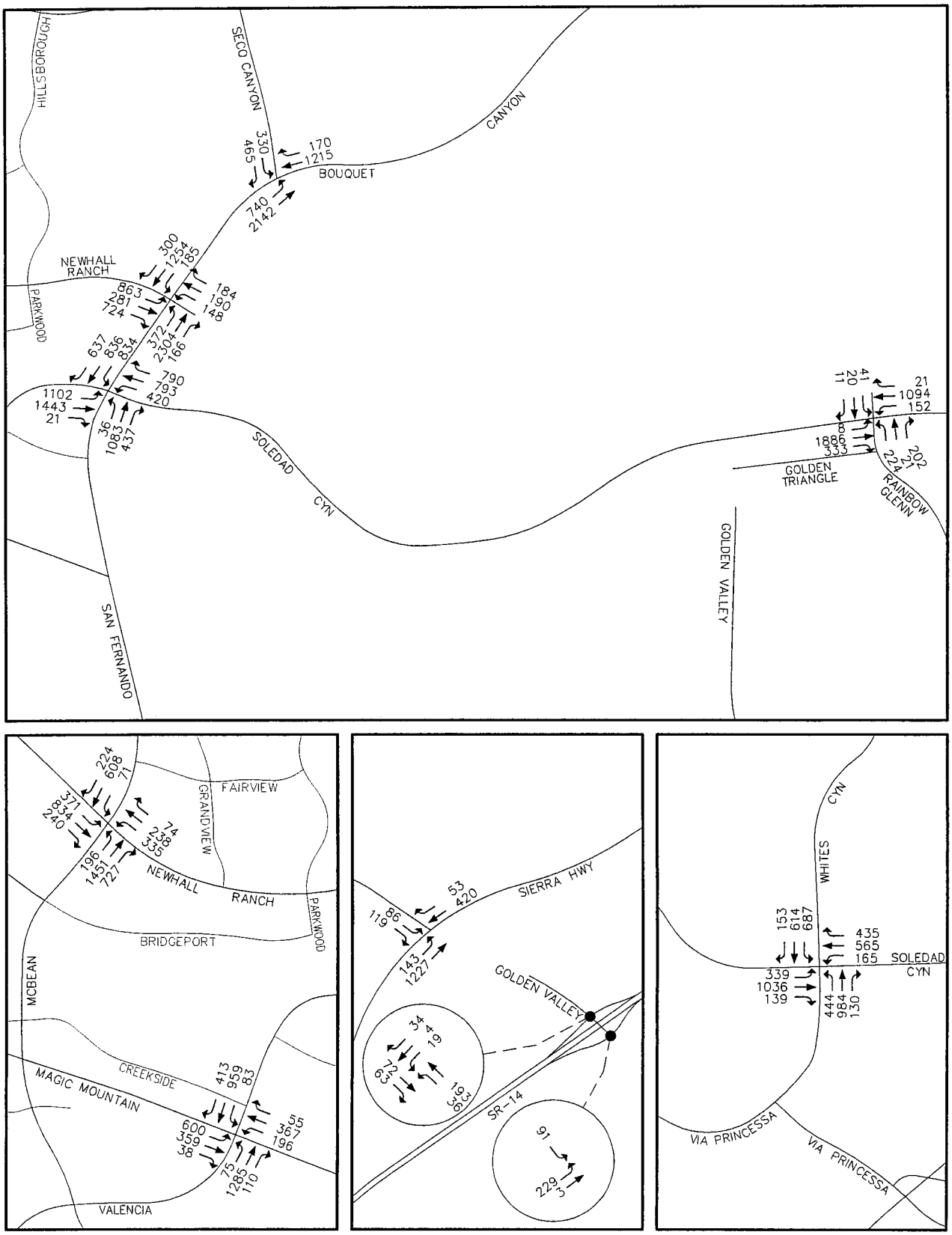


Figure 2-4

PM PEAK HOUR TURNING MOVEMENT VOLUMES
- EXISTING CONDITIONS

As discussed in the section on performance criteria in Chapter 1.0, level of service (LOS) is a concept developed to quantify the degree of comfort afforded to drivers as they travel on a given roadway. The degree of comfort includes such elements as travel time, number of stops, total amount of stopped delay, etc. As defined in the HCM 2000, six grades are used to denote the various LOS. The six are denoted A through F and a discussion on these was also given in Chapter 1.0.

The results of the ICU LOS analyses for project area intersections are shown in Table 2-1 (ICU worksheets are provided in Appendix A). The table shows how the following intersections on Soledad Canyon Road do not currently meet the City's performance standard:

- Bouquet Canyon Road & Soledad Canyon Road (LOS F in PM Peak Hour)
- Whites Canyon Road & Soledad Canyon Road (LOS E in AM Peak Hour)

2.1.3 Public Transportation

Santa Clarita Transit currently operates six fixed-route transit lines (Routes 3, 4, 502, 503, 504 and 507) which provide service near to the project site. Each route passes the project site via the intersection of Bouquet Canyon Road and Newhall Ranch Road.

In addition to the bus routes, there is a Metrolink rail station just south of the project site on Soledad Canyon Road which provides regional transit access to the site.

2.2 INTERIM YEAR TRANSPORTATION SYSTEM

The Interim Year transportation system consists of roadway improvements and future infrastructure consistent with the related projects included within the horizon year. Generally, this horizon year corresponds to a level of development approximately 10 years in the future. While this horizon does not coincide specifically with the buildout of the project site (estimated to occur by 2008), it represents the best timeframe for planning purposes since it includes a comprehensive set of cumulative development projects that have been incorporated into the SCVCTM. With this, a conservative scenario is established for analyzing the impacts of the proposed project combined with projected and approved growth on a reasonably expanded circulation system. This approach is supported by the City Transportation and Engineering Services staff and was established through consultation with Ian Pari of the Transportation and Engineering Services Department.

Future roadways that affect the study area include the extension of Newhall Ranch Road west to I-5 (estimated completion in 2006), the extension of Newhall Ranch Road east to Golden Valley Road/Soledad Canyon Road (est. 2006), the connection of Via Princessa between its current western terminus (near San Fernando Road) and its current eastern terminus (near Rainbow Glenn Drive) (est. post-2010), and the extension of Magic Mountain Parkway to Via Princessa (est. post-2010). Figure 2-5 illustrates the general location of these future arterial roadways.

At the direction of the City, an alternative Interim Year scenario is also analyzed that includes the construction and operation of Santa Clarita Parkway between Bouquet Canyon Road and Placerita Canyon Road. While Santa Clarita Parkway is not usually included within the Interim Year horizon, the City Planning and Transportation and Engineering Services staff requested this special analysis as a portion of the roadway passes through the project site.

Interim Year land use is based on data provided by the City and County. For this analysis, the Interim Year land use database was updated to include the most recent data from the City and County regarding approved, pending and planned projects. See Appendix C for the list of Related Projects in the vicinity of the proposed project and Appendix H for the complete Interim Year land use database.

2.3 LONG-RANGE TRANSPORTATION SYSTEM

The City's Circulation Element includes significant future roadway projects near the project site in addition to those included in the Interim Year scenario. Specifically, Santa Clarita Parkway which will bisect the project site in a north/south alignment and is planned to connect Bouquet Canyon Road with SR-14 at Placerita Canyon Road. Also shown in the Circulation Element is a northerly extension of Golden Valley Road that intersects with Newhall Ranch Road within the project site, just north of the Santa Clara River, and extends to Plum Canyon Road.

The previously referenced Figure 2-5 illustrates the general location of these future facilities.

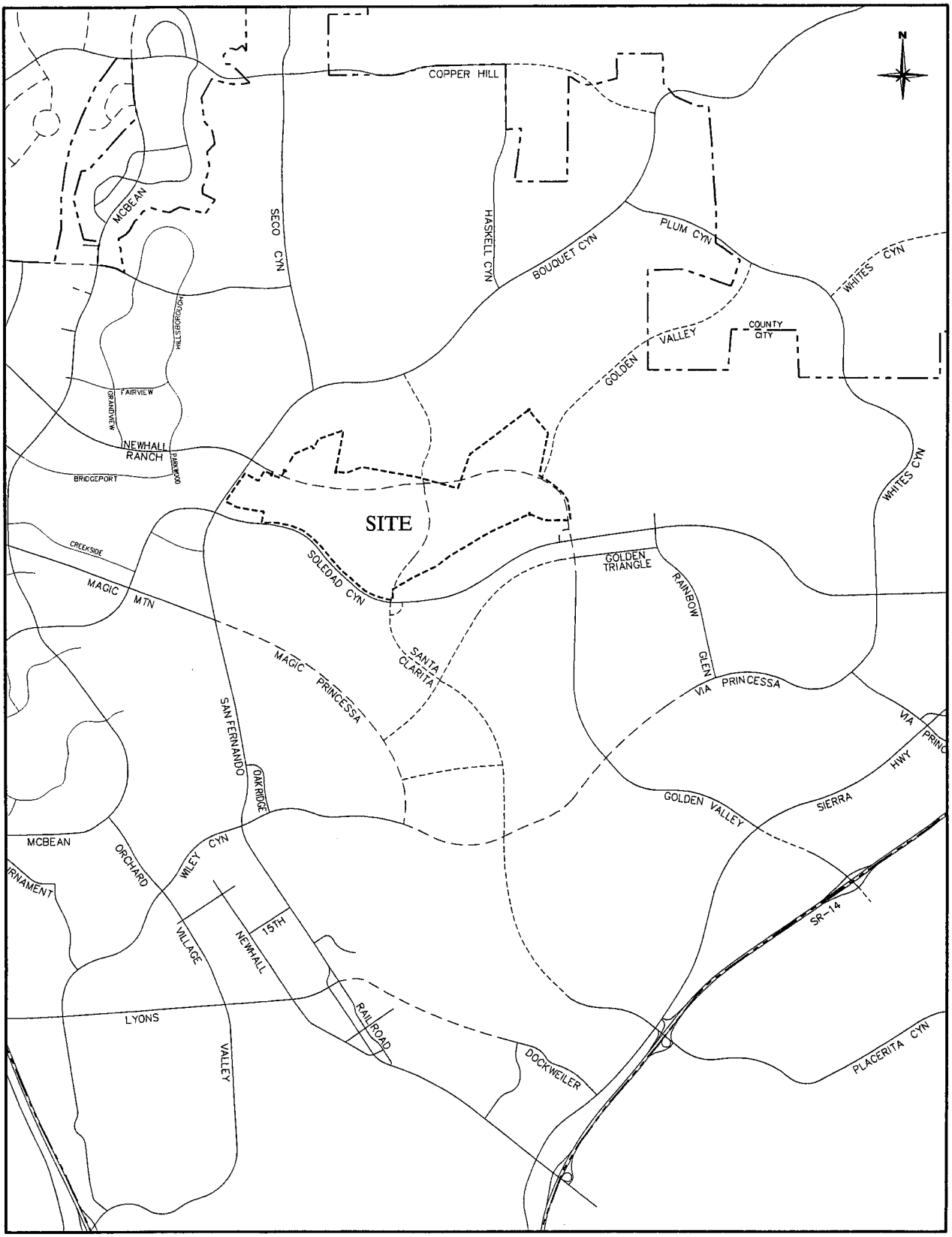
Table 2-1

ICU SUMMARY – EXISTING (2002) CONDITIONS

	AM PEAK HOUR		PM PEAK HOUR		COUNT
INTERSECTION	ICU	LOS	ICU	LOS	DATE
48. McBean & Newhall Ranch	.82	D	.66	B	8/26/02
57. Valencia & Magic Mountain	.58	A	.69	B	12/3/01
65. Bouquet & Soledad	.76	C	1.04*	F	6/3/02
66. Bouquet & Newhall Ranch	.88	D	.83	D	6/3/02
67. Seco & Bouquet	.90	D	.90	D	10/23/02
146. SR-14 NB Ramp & Golden Valley	.17	A	.28	A	10/24/02
147. SR-14 SB Ramp & Golden Valley	.52	A	.25	A	10/24/02
162. Sierra & Golden Valley	.68	B	.47	A	8/5/02
169. Rainbow Glen & Soledad	.72	C	.67	B	10/23/02
172. Whites Canyon & Soledad	.97*	E	.77	C	10/24/02

* Exceeds performance standard (see Table 1-3)

Level of service ranges:
.00 - .60 A
.61 - .70 B
.71 - .80 C
.81 - .90 D
.91 – 1.00 E
Above 1.00 F



Legend

——— Existing Roadway
– – – – – Interim Year Roadway
---------- Long-Range Roadway
——— City Boundary

Figure 2-5

FUTURE TRANSPORTATION SYSTEM
- INTERIM YEAR AND LONG-RANGE

3.0 PROJECT DESCRIPTION

This chapter describes the project in terms of its transportation characteristics. Trip generation is summarized and the distribution of project trips on the study area roadway network is presented.

3.1 PROJECT OVERVIEW

The site plan for the proposed Riverpark project can be seen in Figure 3-1. The project site is located entirely within in the City of Santa Clarita, just north of Soledad Canyon Road and just east of Bouquet Canyon Road.

Riverpark is currently being planned as a development consisting of 1,183 dwelling units and a maximum of 40,000 square feet of retail commercial uses. A total of 439 dwelling units are single-family detached units with the remaining 744 dwelling units consisting of apartments. The project applicant estimates that first occupancies will occur in 2006 with the project building out over a period of two to three years.

There are four potential points of access to the site, two of which will be available prior to buildout of the project. One is the existing intersection of Bouquet Canyon Road and Newhall Ranch Road. Newhall Ranch Road currently terminates just east of Bouquet Canyon Road but will be extended into the site. This segment of Newhall Ranch Road (a portion of the Cross Valley Connector) is shown on the City's Circulation Element as a major highway and ultimately extends via a bridge, across the Santa Clara River, further to the east to connect with the planned extension of Golden Valley Road in the vicinity of Soledad Canyon Road. This access from Golden Valley Road and Soledad Canyon Road is the second point of access into the site.

Two additional potential access points result from the future extensions of Santa Clarita Parkway. This future roadway is shown on the City's Circulation Element as a major highway that would provide a north/south connection between Bouquet Canyon Road and Sierra Highway. The alignment of Santa Clarita Parkway bisects the Riverpark site and will ultimately provide southerly access to the site from

Soledad Canyon Road and northerly access from Bouquet Canyon Road. The project includes the construction of a portion of Santa Clarita Parkway (from Newhall Ranch Road south approximately 1,500 feet). The timeframe for the construction of these future segments of Santa Clarita Parkway has not been established by the City at this time.

The proposed commercial uses are located near the southeast corner of the Bouquet Canyon Road/Newhall Ranch Road intersection. Detailed development plans for these commercial uses are not being proposed at this time, therefore exact driveway locations are unknown. For this analysis, it is assumed that the center will have a full access driveway on Newhall Ranch road (approximately 500 feet east of Bouquet Canyon Road) as well as a right-turn-in/right-turn-out driveway on Bouquet Canyon Road (approximately 250 feet south of Newhall Ranch Road).

3.2 PROJECT TRIP GENERATION

Trip generation estimates for the proposed project are shown in Table 3-1. The trip generation for the non-commercial uses is calculated using trip rates from the SCVCTM which are based on published data from the Institute of Transportation Engineers (ITE) Sixth Edition Trip Generation Manual (see Reference 2 in Section 1.7). The commercial center trip generation is calculated using the ITE equation based shopping center trip rate.

The proposed project is estimated to generate approximately 13,300 total average daily trips with approximately 800 occurring in the AM peak hour (600 outbound) and approximately 1,250 occurring in the PM peak hour (760 inbound).

3.3 PROJECT TRIP DISTRIBUTION

The geographic distribution of project generated trips was determined using the SCVCTM to prepare a project only select zone run. The Interim Year version of the SCVCTM provided the background conditions for this select zone run. The model takes into account the specific type of land use proposed for the site and how that land use would interact with the other land uses in the City.

Table 3-1

TRIP GENERATION AND TRIP RATE SUMMARY

LAND USE	UNITS	AM PEAK HOUR IN	AM PEAK HOUR OUT	AM PEAK HOUR TOTAL	PM PEAK HOUR IN	PM PEAK HOUR OUT	PM PEAK HOUR TOTAL	ADT
TRIP GENERATION								
Residential								
Area A1- Single Family	225 DU	43	126	169	146	81	227	2,228
Area A2/B - Single Family	214 DU	41	120	161	139	77	216	2,119
Area C - Apartment	420 DU	34	181	215	172	88	260	2,898
Area D - Apartment	324 DU	26	139	165	133	68	201	2,236
Area A1- Developed Park	4.25 AC	0	0	0	0	0	0	11
Sub-total Residential	1,183 DU	144	566	710	590	314	904	9,492
Commercial								
Retail Commercial	40.00 TSF	57	36	93	165	178	343	3,782
Total		**201**	**602**	**803**	**755**	**492**	**1,247**	**13,274**
TRIP RATES								
Single Family Detached [1]	DU	.19	.56	.75	.65	.36	1.01	9.90
Apartment [2]	DU	.08	.43	.51	.41	.21	.62	6.90
Developed Park [3]	ACRE	.00	.00	.00	.03	.04	.07	2.60
Retail Commercial [4]	TSF	ADT: LN(T) = 0.643*LN(X) + 5.866						
		AM: LN(T) = 0.596*LN(X) + 2.329 (61% IB/39% OB)						
		PM: LN(T) = 0.660*LN(X) + 3.403 (48% IB/52% OB)						

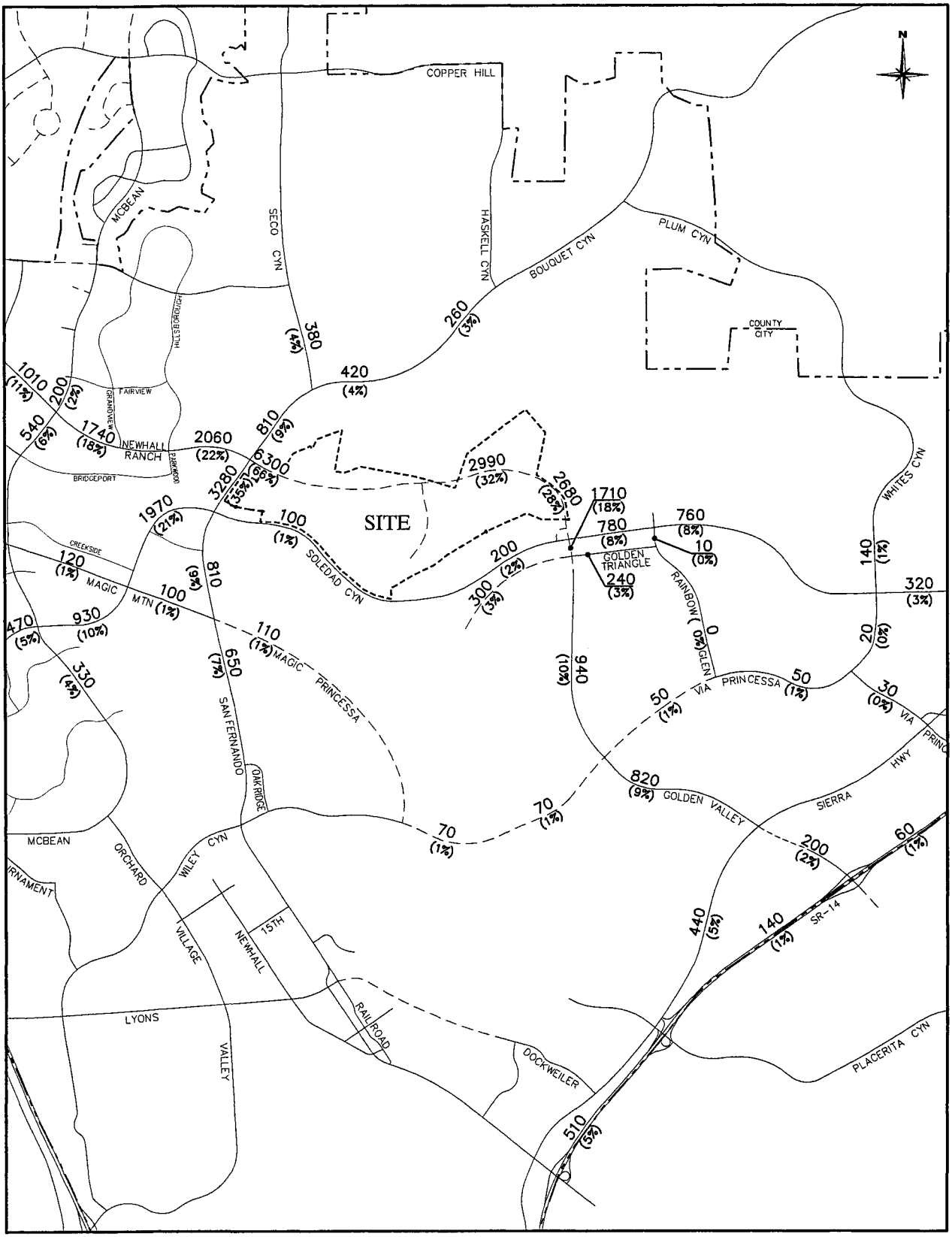
Notes:
[1] SCVCTM Category 3 (Single Family 6-10 DU/Acre)
[2] SCVCTM Category 5 (Apartment)
[3] SCVCTM Category 51 (Developed Park)
[4] Institute of Transportation Engineers (ITE) Category 820 (Shopping Center)

DU = Dwelling Unit
AC = ACRE
TSF = Thousand Square Feet

Figure 3-2 illustrates the project only average daily trips (ADT) and distribution percentages for the residential portion of the site. Figures 3-3 and 3-4 illustrate the residential generated trips for the AM and PM peak hours, respectively. Approximately two thirds of the project's residential traffic accesses the site via the Newhall Ranch Road/Bouquet Canyon Road intersection and approximately 30 percent access the site via the Newhall Ranch Road/Golden Valley Road intersection at Soledad Canyon Road. Approximately five percent of the residential trips are local interaction with the project's commercial center and with the existing commercial center located on the northeast corner of the Bouquet Canyon Road/Newhall Ranch Road intersection.

At the regional level, over 90 percent of the project's residential generated traffic stays within the Santa Clarita Valley. This is due in part to the substantial employment base that has developed within the area as well as to the majority of residential daily trip generation being non-work based (i.e. work trips typically account for only two to four of the average ten trips generated each day by a single family residence). The remaining traffic is oriented outside the Valley with approximately five percent south on SR-14/I-5, approximately one percent east on SR-14, approximately one percent north on I-5 and less than one percent west on SR-126.

Figure 3-5 illustrates the ADT and distribution percentages for the commercial center. Figures 3-6 and 3-7 illustrate the retail commercial generated trips for the AM and PM peak hours, respectively. The distribution of traffic generated by the retail commercial center will be more localized than the project's residential component, as is depicted in the distribution illustration.



Legend

XXXX Project ADT
(Y%) Distribution Percentage

Figure 3-2

AVERAGE DAILY TRAFFIC VOLUMES
- PROJECT RESIDENTIAL TRIPS ONLY

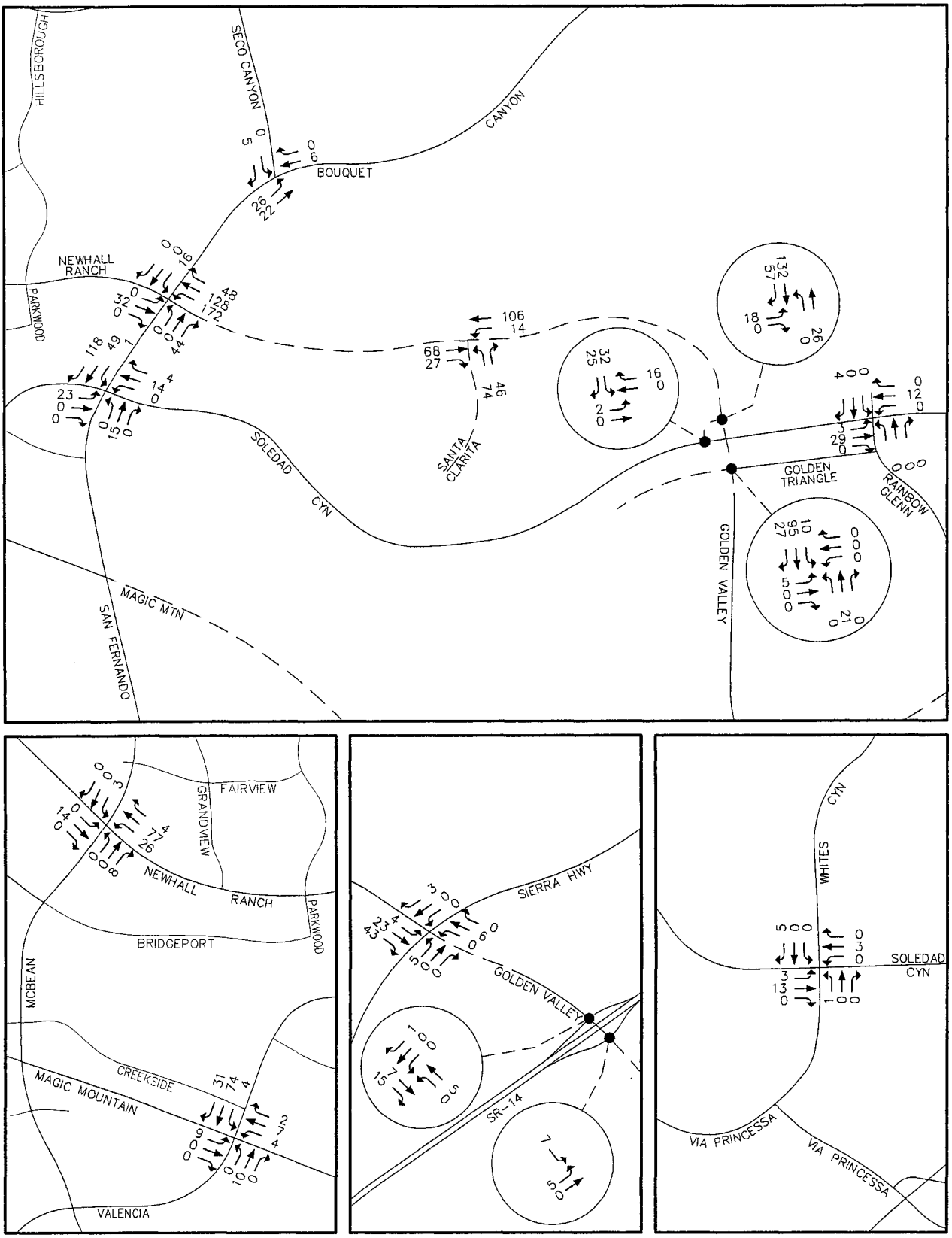


Figure 3-3

AM PEAK HOUR VOLUMES
- PROJECT RESIDENTIAL TRIPS ONLY

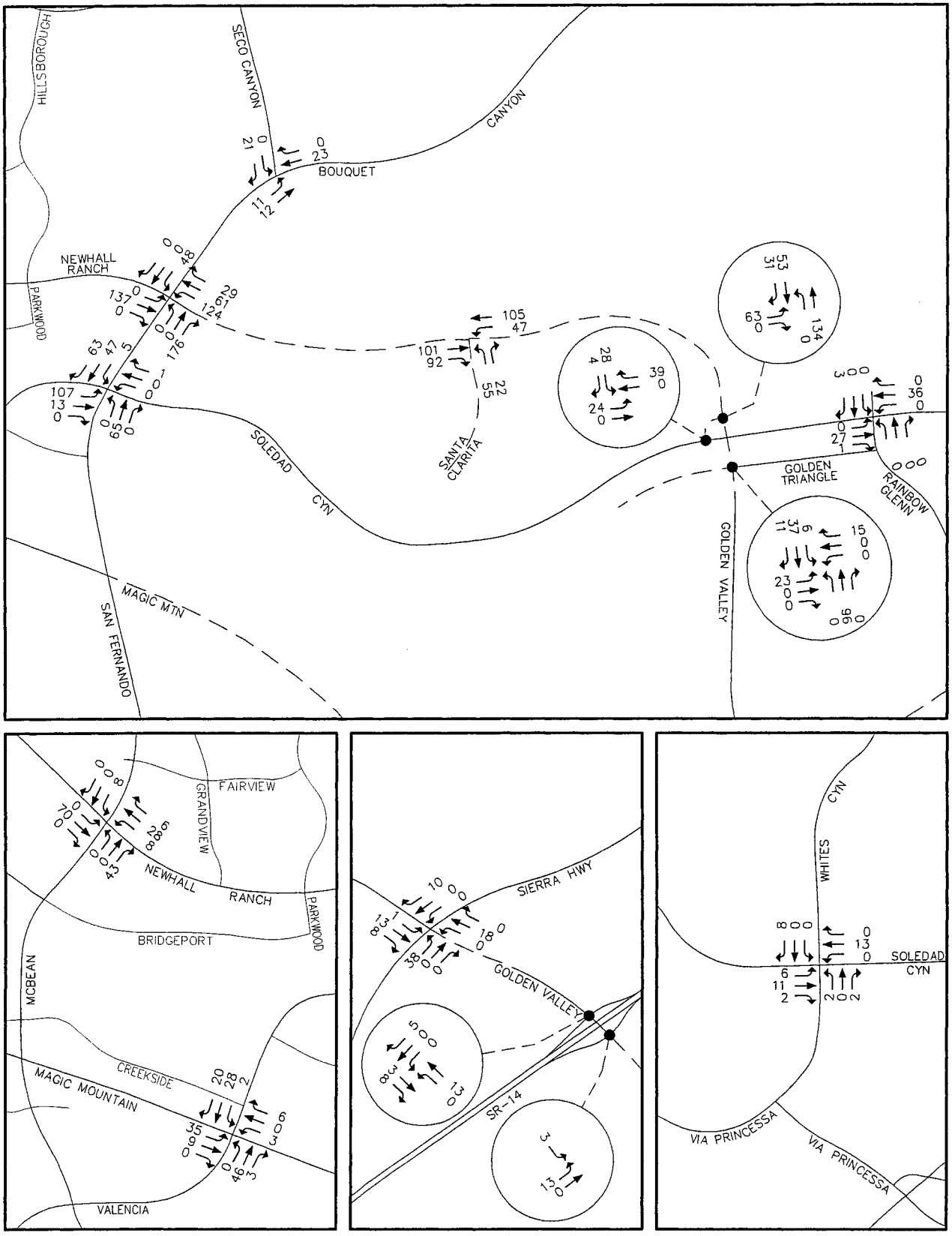
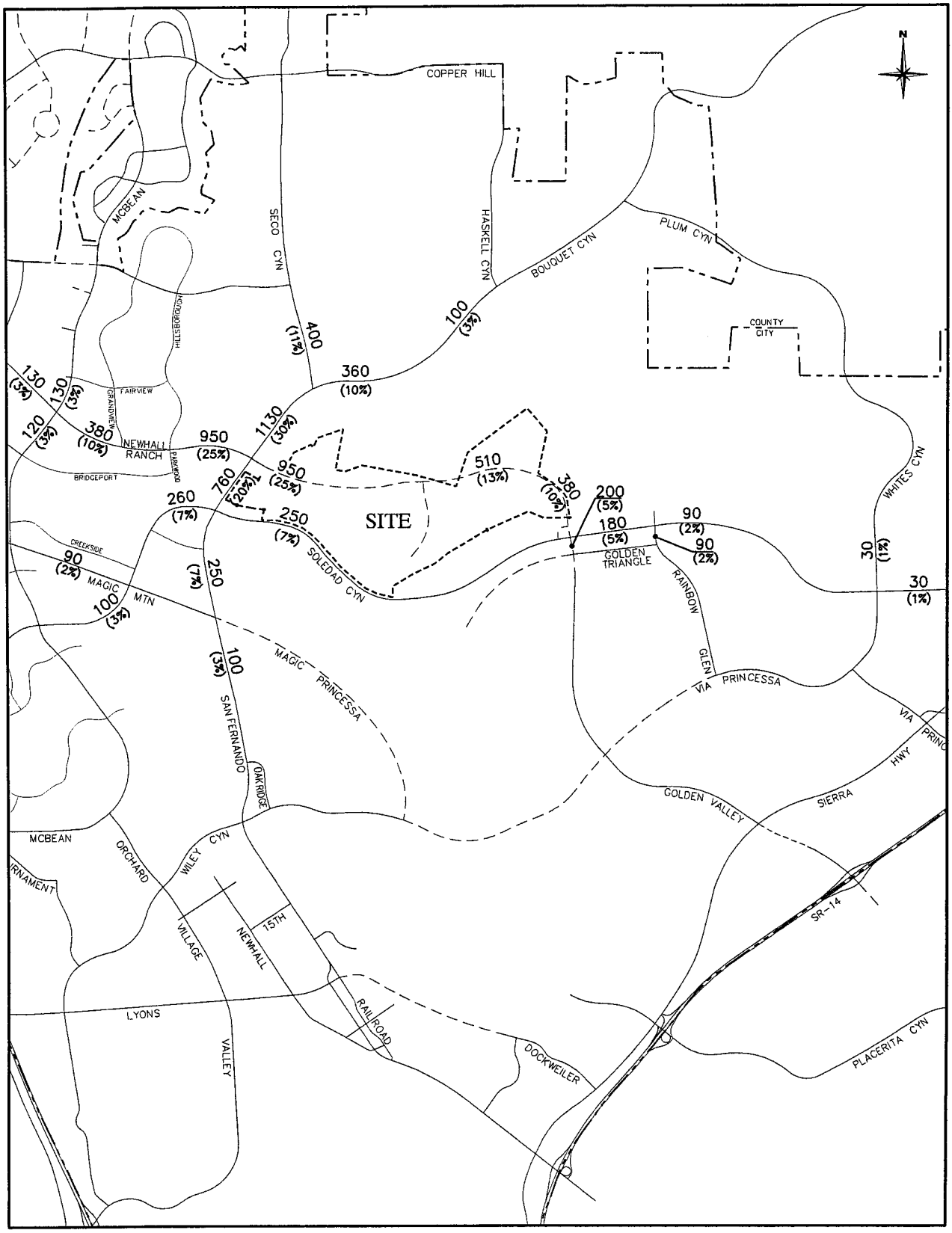


Figure 3-4

PM PEAK HOUR VOLUMES
- PROJECT RESIDENTIAL TRIPS ONLY



Legend	Figure 3-5
XXXX Project ADT (Y%) Distribution Percentage	AVERAGE DAILY TRAFFIC VOLUMES - PROJECT COMMERCIAL TRIPS ONLY

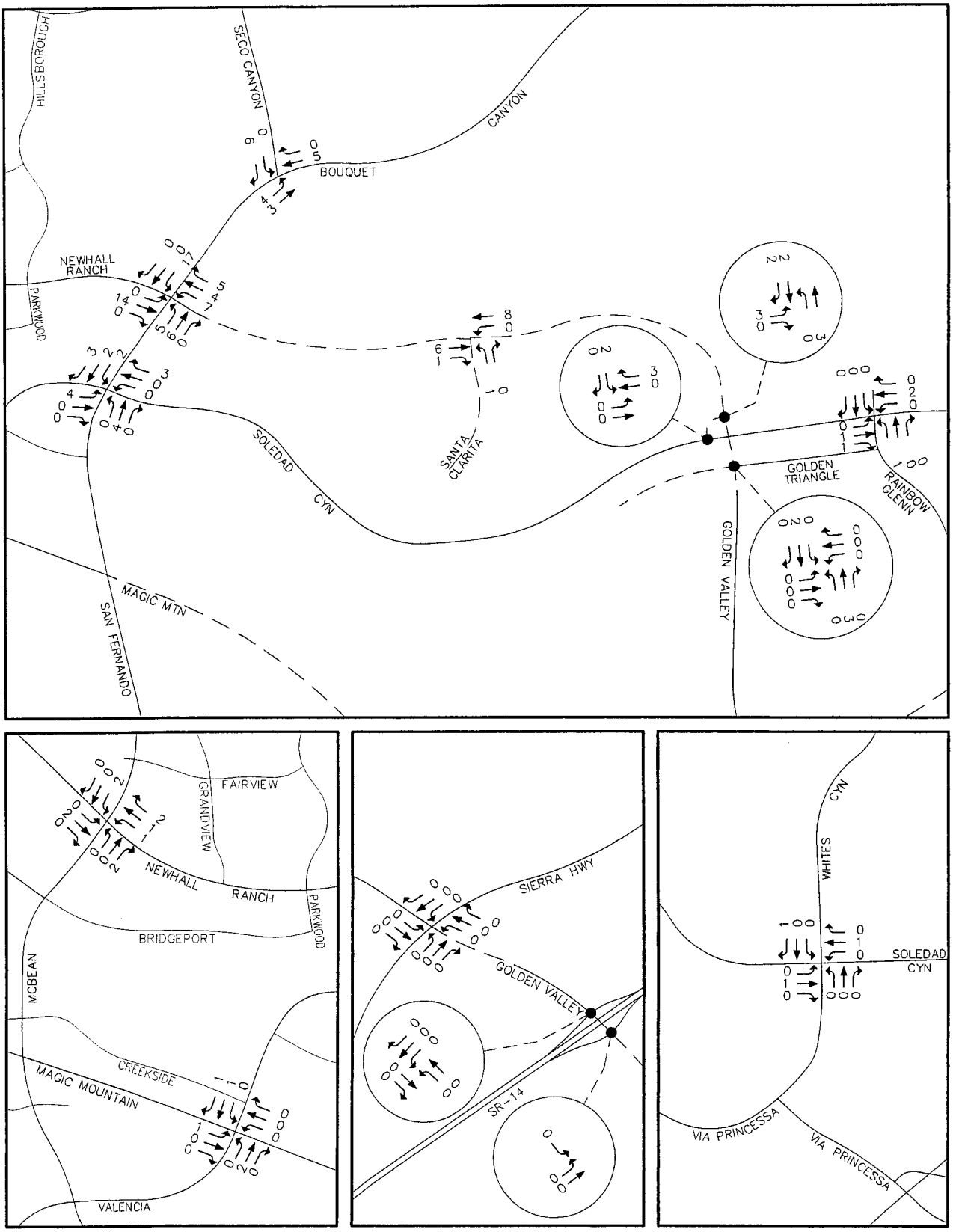


Figure 3-6

AM PEAK HOUR VOLUMES
- PROJECT COMMERCIAL TRIPS ONLY

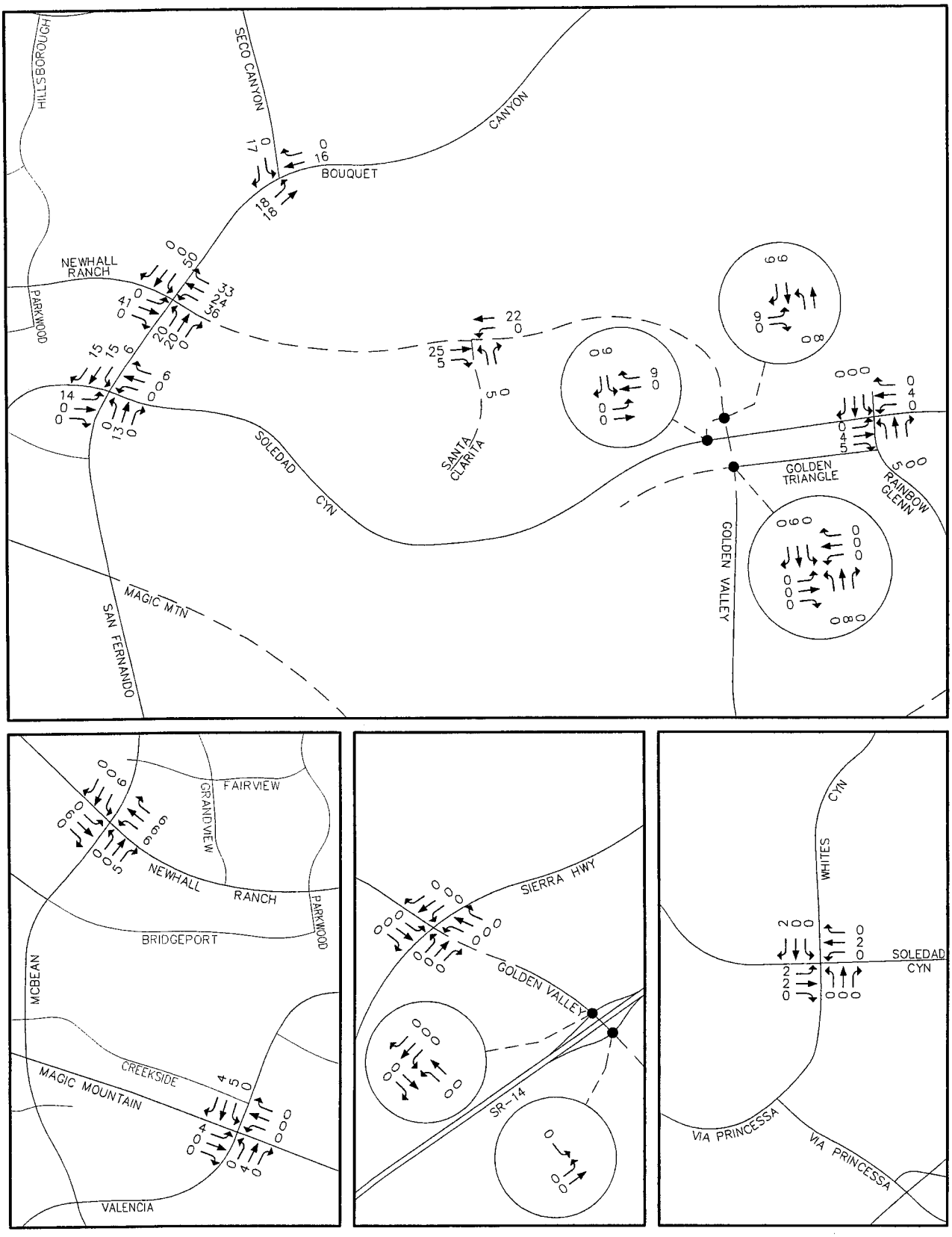


Figure 3-7

PM PEAK HOUR VOLUMES
- PROJECT COMMERCIAL TRIPS ONLY

4.0 IMPACT ANALYSIS

This chapter addresses the traffic impacts of the proposed project. As discussed in Section 1.3, an interim year and long-range horizon are the time frames used for this analysis. Traffic conditions with and without the proposed project are described in the following sections. Project impacts are identified using the criteria outlined in Chapter 1.0.

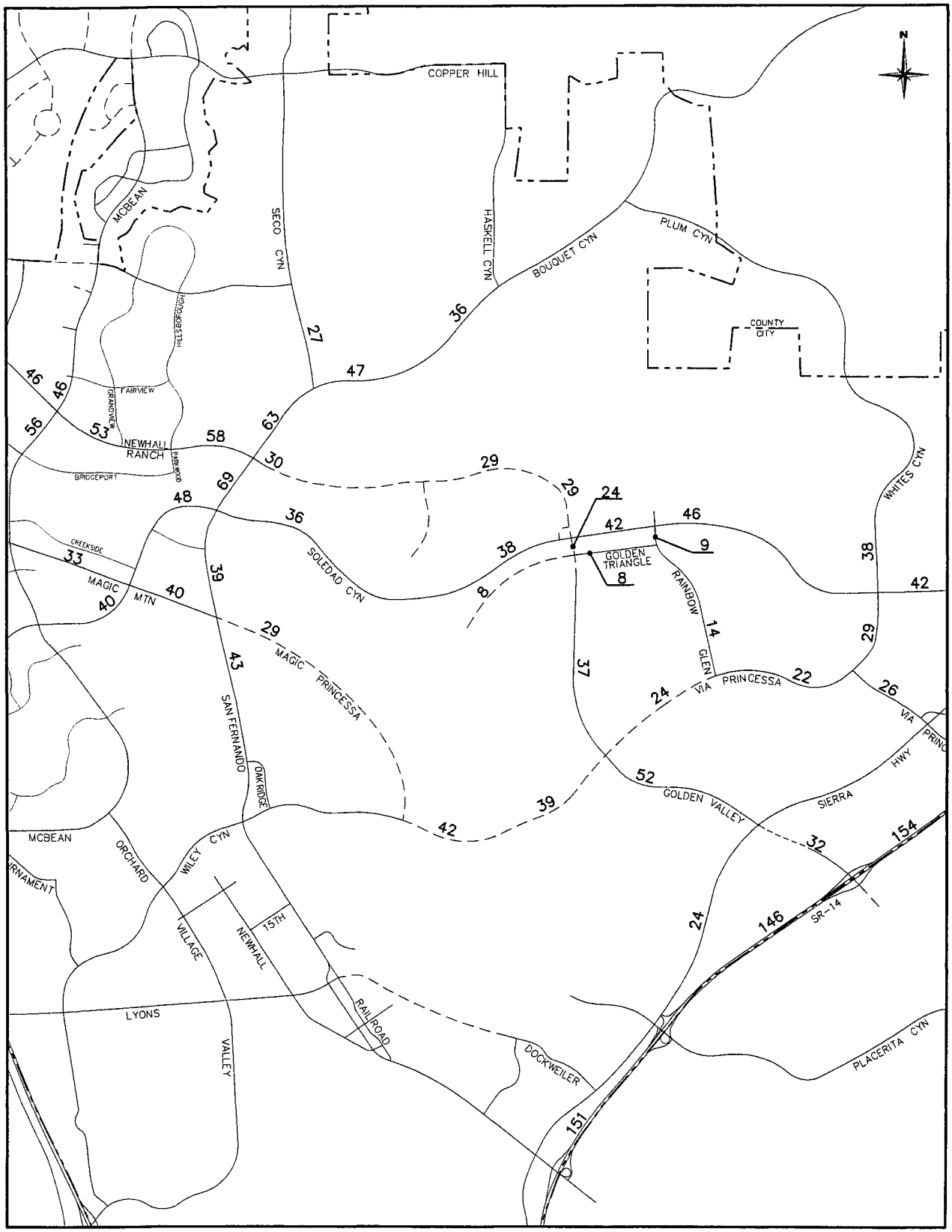
4.1 INTERIM YEAR ANALYSIS

The Interim Year traffic conditions are based on the Interim Year setting described in Section 2.2. This setting forms the basis for identifying the potential Interim Year traffic impacts of the proposed project. The following sections discuss Interim Year no-project and with-project conditions.

4.1.1 Interim Year No-Project Traffic Conditions

Interim Year no-project ADT volumes within the study area are shown in Figure 4-1. The Interim Year no-project peak hour turning movement volumes for the intersections in the study area are illustrated in Figures 4-2 and 4-3 for the AM and PM peak hours, respectively.

Table 4-1 provides the corresponding ICU values and also listed for comparison purposes are the ICUs for existing conditions. The ICU tabulations indicate that deficiencies at three additional intersections (McBean Parkway/Newhall Ranch Road, Valencia Boulevard/Magic Mountain Parkway, and Seco Canyon Road/Bouquet Canyon Road) are forecast to occur by the Interim Year when compared to existing conditions. The Bouquet Canyon Road/Soledad Canyon Road intersection and the Whites Canyon Road/Soledad Canyon Road intersection, which have been shown to be deficient for existing conditions, are forecast to remain deficient for Interim Year conditions without the proposed project. While remaining deficient, conditions improve from LOS F to LOS E at the Bouquet Canyon Road/Soledad Canyon Road intersection due to the planned improvement project at this location. Specifically, the planned improvements consist of adding a third left-turn lane in the eastbound direction.



Legend	Figure 4-1
XX ADT (thousands)	AVERAGE DAILY TRAFFIC VOLUMES - INTERIM YEAR WITHOUT PROJECT

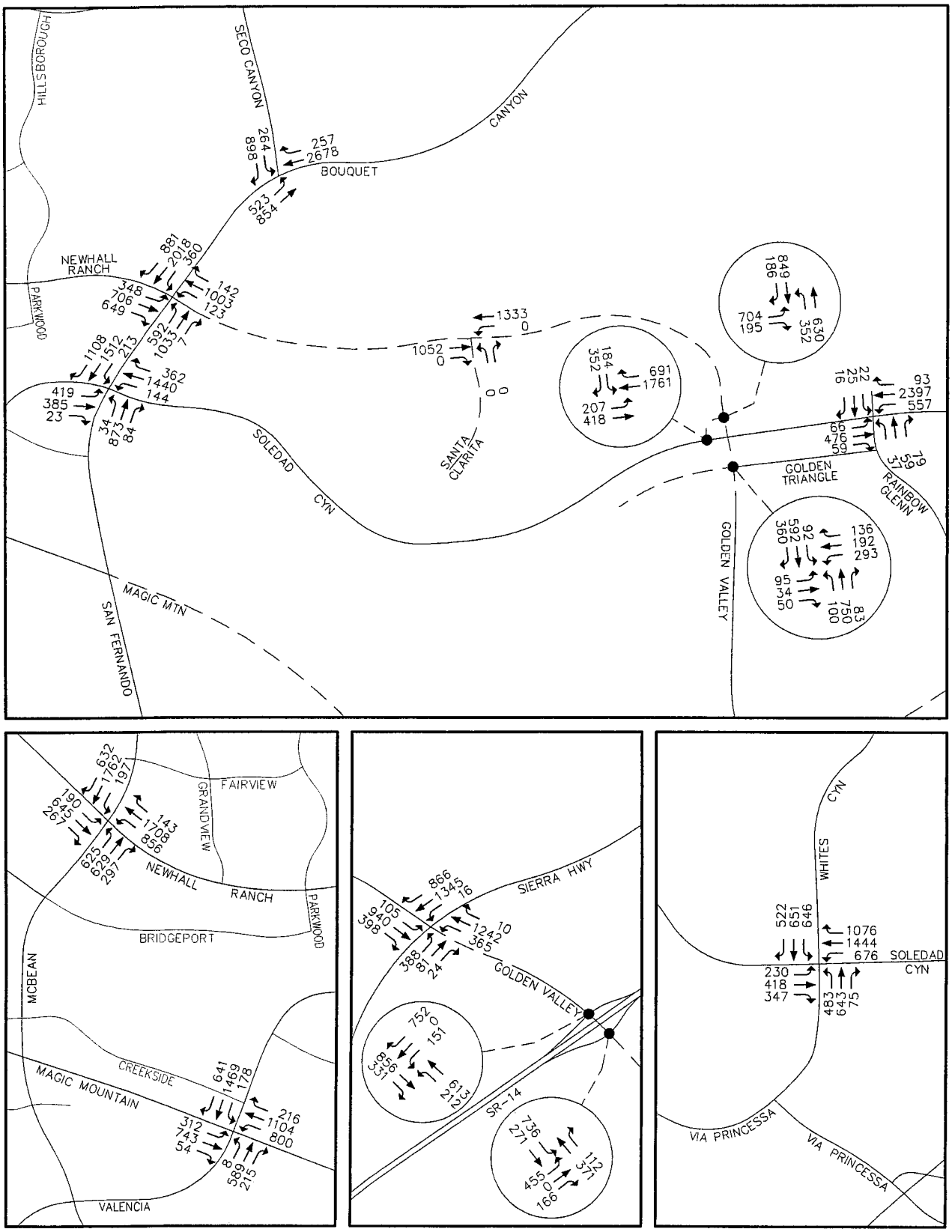


Figure 4-2

AM PEAK HOUR TURNING MOVEMENT VOLUMES
- INTERIM YEAR WITHOUT PROJECT

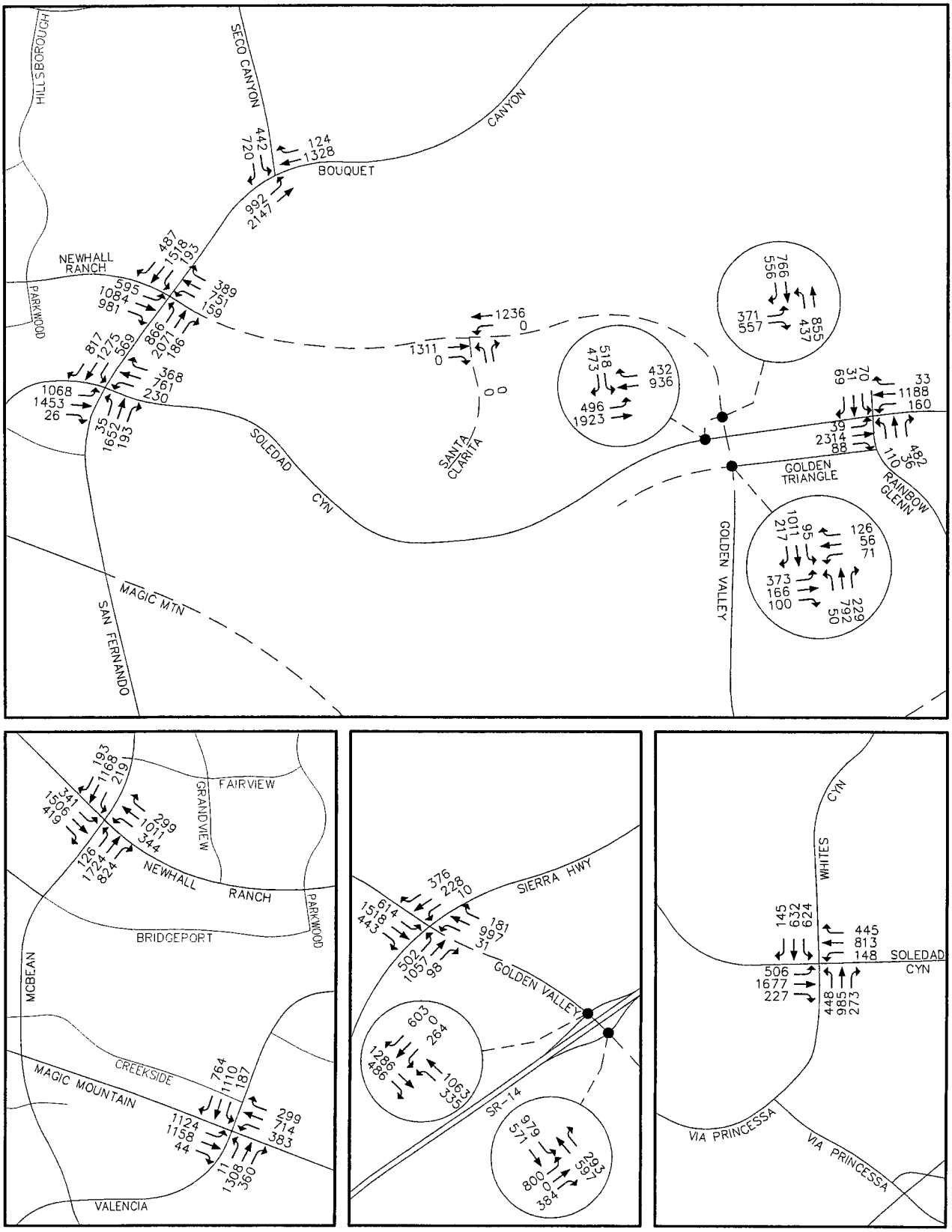


Figure 4-3

PM PEAK HOUR TURNING MOVEMENT VOLUMES
- INTERIM YEAR WITHOUT PROJECT

Table 4-1

ICU AND LOS SUMMARY – EXISTING AND INTERIM YEAR WITHOUT PROJECT

INTERSECTION	EXISTING AM		EXISTING PM		INTERIM YEAR WITHOUT PROJECT AM		INTERIM YEAR WITHOUT PROJECT PM		INCREASE AM	INCREASE PM
48. McBean & Newhall Ranch	.82	D	.66	B	.91	E*	.88	D	.09	.22
57. Valencia & Magic Mountain	.58	A	.69	B	1.07	F*	1.09	F*	.49	.40
65. Bouquet & Soledad	.76	C	1.04	F*	.76	C	.92	E*	.00	-.12
66. Bouquet & Newhall Ranch	.88	D	.83	D	.85	D	.88	D	-.03	.05
67. Seco & Bouquet	.90	D	.90	D	.96	E*	.96	E*	.06	.06
146. SR-14 NB Ramp & Golden Valley	.17	A	.28	A	.55	A	.78	C	.38	.50
147. SR-14 SB Ramp & Golden Valley	.52	A	.25	A	.61	B	.81	D	.07	.56
162. Sierra & Golden Valley	.68	B	.47	A	.87	D	.84	D	.19	.37
164. Golden Valley & Golden Triangle					.52	A	.60	A		
165. Golden Valley & Valley Center					.56	A	.60	A		
169. Rainbow Glen & Soledad	.72	C	.67	B	.69	B	.89	D	-.03	.22
172. Whites Canyon & Soledad	.97	E*	.77	C	.98	E*	.88	D	.01	.11
198. Valley Center & Soledad					.65	B	.62	B		

* Exceeds performance standard (see Table 1-3)

Level of service ranges:
.00 - .60 A
.61 - .70 B
.71 - .80 C
.81 - .90 D
.91 – 1.00 E
Above 1.00 F

4.1.2 Interim Year With Project Traffic Conditions

As discussed in Chapter 3.0, the proposed project would generate approximately 13,300 vehicle trips per day, with approximately 800 trips in the AM peak hour and approximately 1,250 trips in the PM peak hour.

Interim Year volumes that include project generated traffic are provided in Figure 4-4 for the ADT volumes and in Figures 4-5 and 4-6 for the AM and PM peak hours, respectively. Peak hour ICU values can be found in Table 4-2 which provides a comparison between Interim Year no-project and Interim Year with-project conditions. The table shows that six intersections experience a significant impact due to the project generated traffic (see Table 1-3 for significant impact criteria) with four of those intersections forecast to exceed LOS "D". The following intersections are those significantly impacted:

Intersections with Significant Project Impact at LOS "E" or LOS "F":

- McBean Parkway and Newhall Ranch Road (both a.m. and p.m. peak)
- Valencia Boulevard and Magic Mountain Parkway (both a.m. and p.m. peak)
- Bouquet Canyon Road and Soledad Canyon Road (p.m. peak)
- Seco Canyon Road and Bouquet Canyon Road (both a.m. and p.m. peak)

Intersections with Significant Project Impact at LOS "D":

- Bouquet Canyon Road and Newhall Ranch Road (both a.m. and p.m. peak)
- Whites Canyon Road and Soledad Canyon Road (p.m. peak)

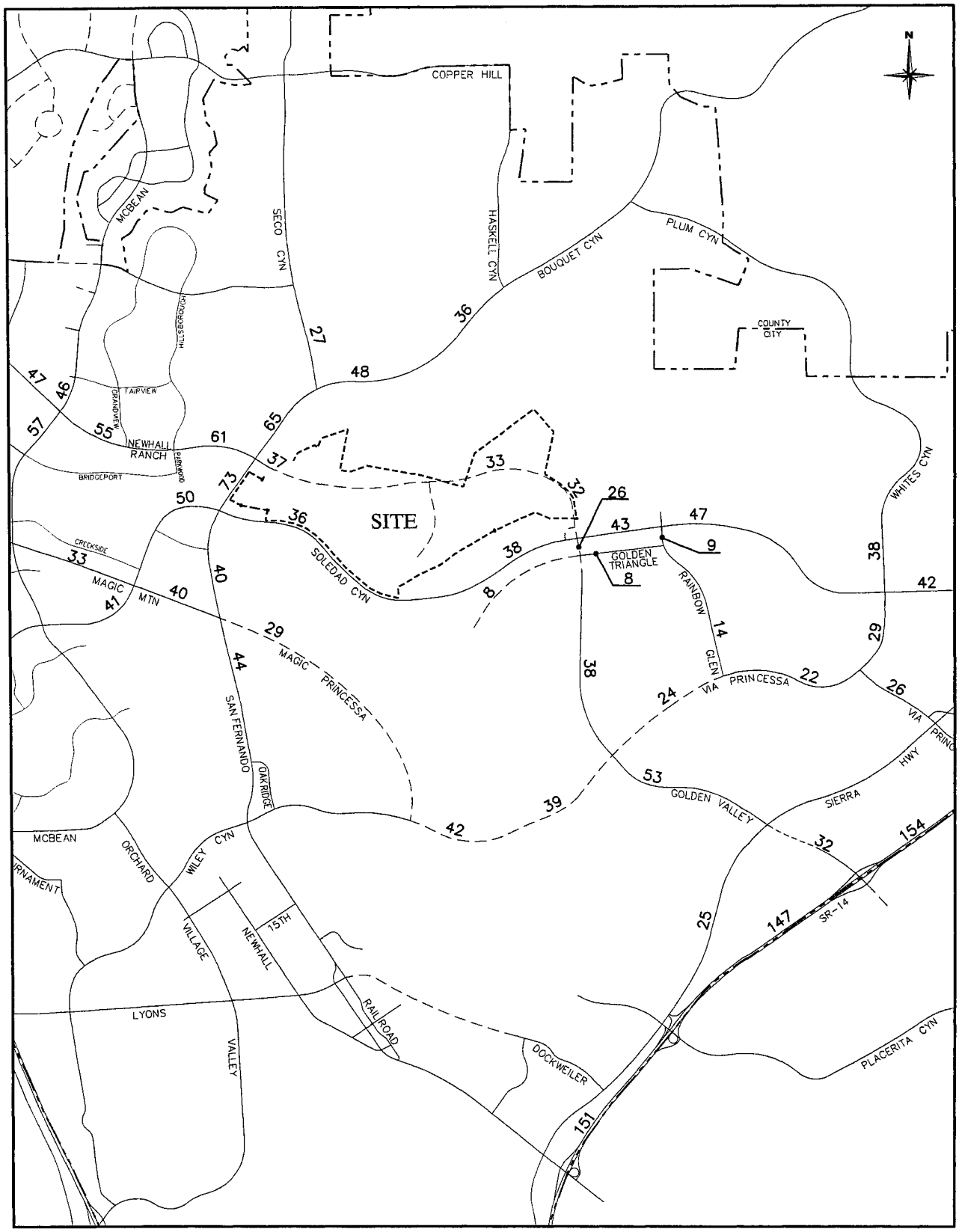
4.1.3 Interim Year With Mitigation

The previous section identified the six intersections that are significantly impacted by the proposed project under Interim Year conditions. Four result in conditions of LOS "E" or worse and two result in LOS "D". Mitigation measures that address these impacts are as follows:

Mitigation not requiring acquisition of right-of-way:

48. McBean & Newhall Ranch	Add 4th Eastbound Through Lane, and Add 4th Westbound Through Lane
66. Bouquet & Newhall Ranch	Add 4th Eastbound Through Lane, and Add 4th Westbound Through Lane
67. Seco & Bouquet	Convert 1st Southbound Right-Turn Lane to a shared Left-Turn/Right-Turn Lane (for 1 Left-Turn Lane, 1 shared Left-Turn/Right-Turn Lane, 1 Right-Turn Lane)

(mitigation continued on Page 4-11)



Legend

XX ADT (thousands)

Figure 4-4

AVERAGE DAILY TRAFFIC VOLUMES
- INTERIM YEAR WITH PROJECT

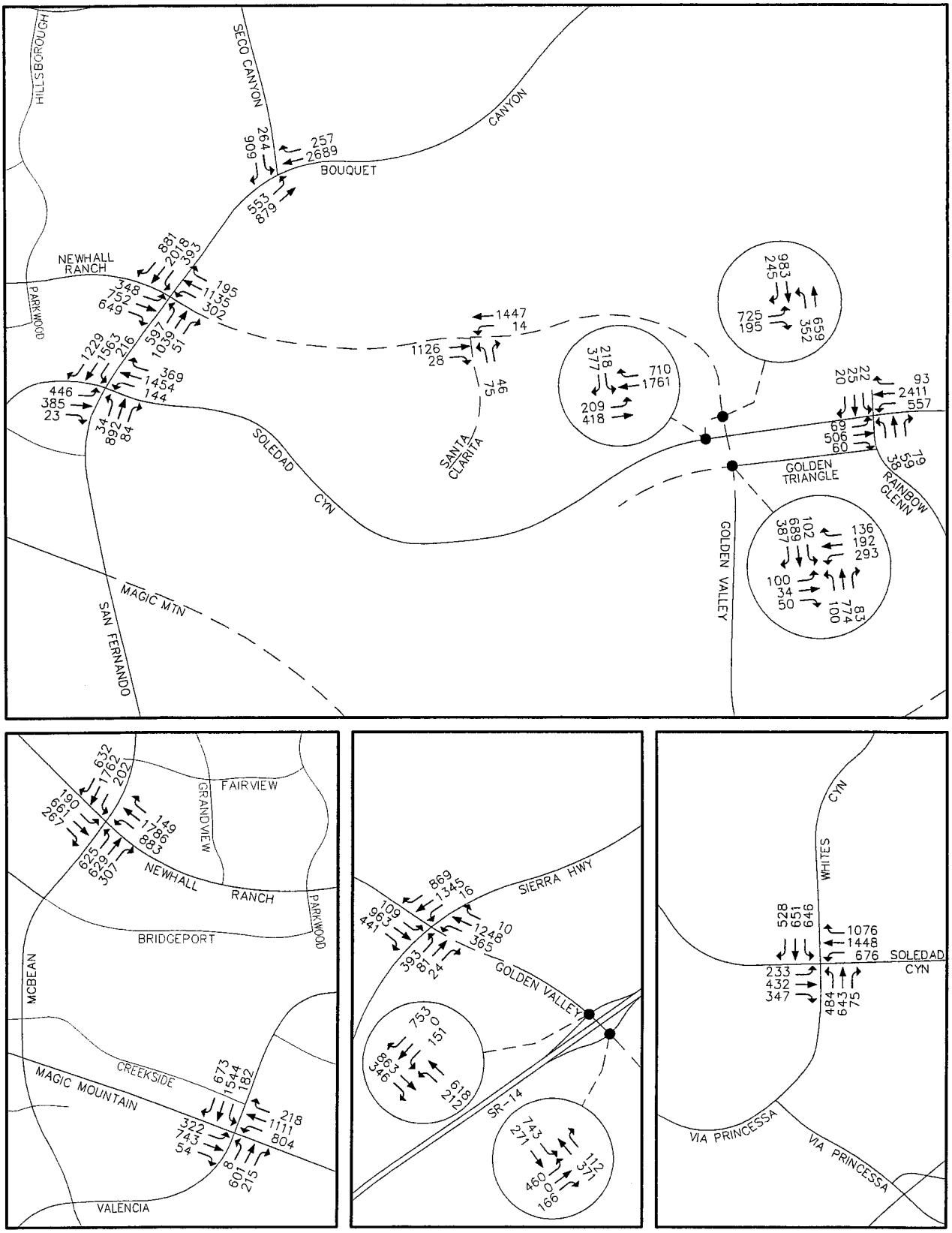


Figure 4-5

AM PEAK HOUR TURNING MOVEMENT VOLUMES
- INTERIM YEAR WITH PROJECT

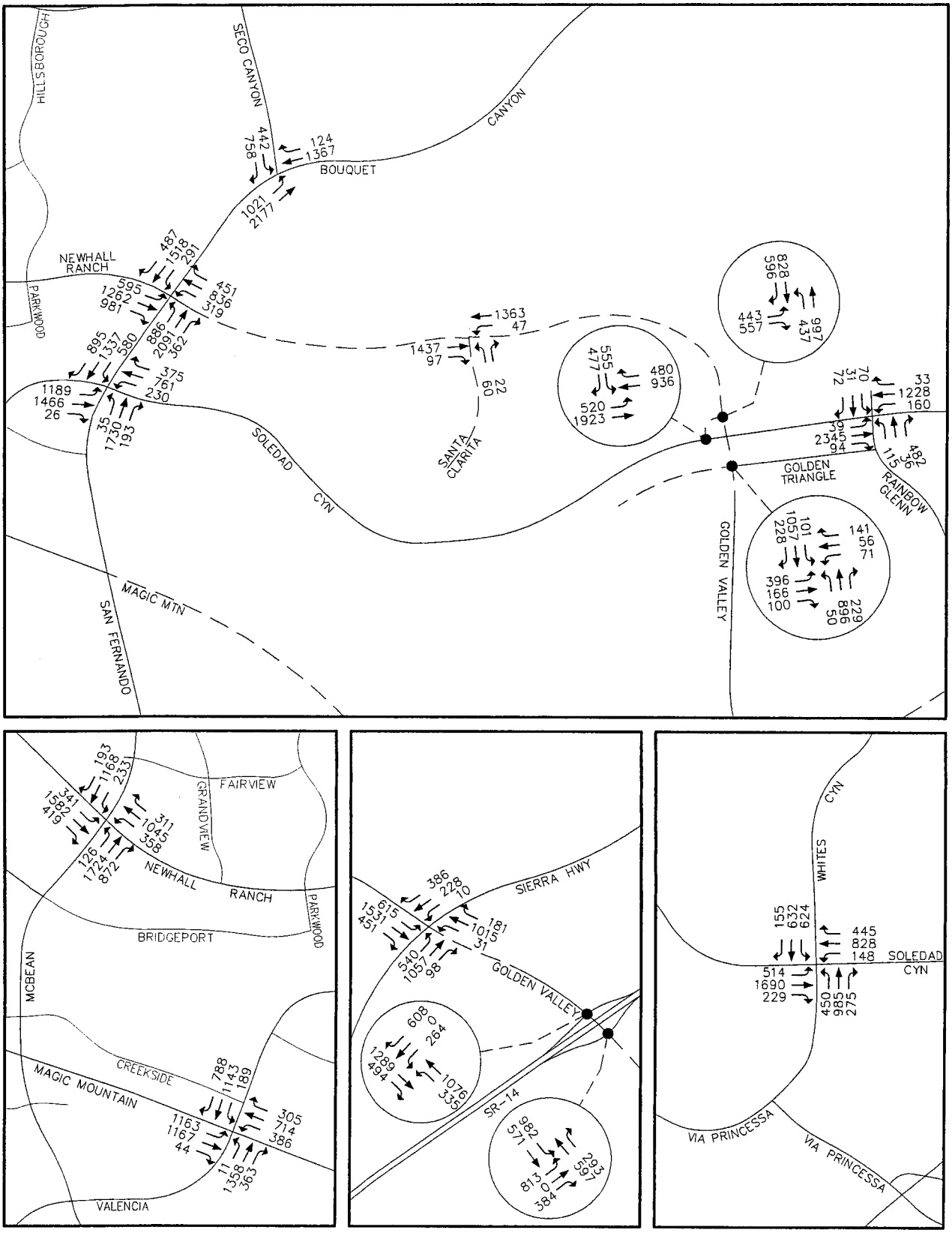


Figure 4-6

PM PEAK HOUR TURNING MOVEMENT VOLUMES
- INTERIM YEAR WITH PROJECT

Table 4-2

ICU AND LOS SUMMARY – INTERIM YEAR WITH AND WITHOUT PROJECT

INTERSECTION	INTERIM YEAR WITHOUT PROJECT AM		INTERIM YEAR WITHOUT PROJECT PM		INTERIM YEAR WITH PROJECT AM		INTERIM YEAR WITH PROJECT PM		INCREASE AM	INCREASE PM
48. McBean & Newhall Ranch	.91	E	.88	D	.92	E	.90	D	.01**	.02*
57. Valencia & Magic Mountain	1.07	F	1.09	F	1.08	F	1.11	F	.01**	.02**
65. Bouquet & Soledad	.76	C	.92	E	.78	C	.97	E	.02	.05**
66. Bouquet & Newhall Ranch	.85	D	.88	D	.88	D	.90	D	.03*	.02*
67. Seco & Bouquet	.96	E	.96	E	.97	E	.97	E	.01**	.01**
146. SR-14 NB Ramp & Golden Valley	.55	A	.78	C	.55	A	.78	C	.00	.00
147. SR-14 SB Ramp & Golden Valley	.61	B	.81	D	.61	B	.81	D	.00	.00
158. Santa Clarita & Newhall Ranch					.42	A	.43	A		
162. Sierra & Golden Valley	.87	D	.84	D	.87	D	.85	D	.00	.01
164. Golden Valley & Golden Triangle	.52	A	.60	A	.55	A	.63	B	.03	.03
165. Golden Valley & Valley Center	.56	A	.60	A	.60	A	.61	B	.04	.01
169. Rainbow Glen & Soledad	.69	B	.89	D	.71	C	.90	D	.02	.01
172. Whites Canyon & Soledad	.98	E	.88	D	.98	E	.90	D	.00	.02*
198. Valley Center & Soledad	.65	B	.62	B	.67	B	.63	B	.02	.01

* Significant Project Impact (see Table 1-3) at LOS "D"
** Significant Project Impact (see Table 1-3) at LOS "E" or "F"

Level of service ranges:

.00 - .60	A
.61 - .70	B
.71 - .80	C
.81 - .90	D
.91 – 1.00	E
Above 1.00	F

(mitigation continued from Page 4-6)

Mitigation requiring acquisition of right-of-way:

57. Valencia & Magic Mountain	Add 3rd Eastbound Through Lane
65. Bouquet & Soledad	Add 4th Northbound Through Lane
67. Seco & Bouquet	Add 1st Westbound Right-Turn Lane
172. Whites Canyon & Soledad	Add 2nd dedicated Northbound Left-Turn Lane & convert shared Northbound Left-Turn/Through Lane to 3rd dedicated Through Lane, Or, Add 1st Eastbound Right-Turn Lane

Table 4-3 summarizes the resulting ICUs and LOS with this mitigation. As shown above, most of these improvements require the acquisition of right-of-way which is out of the applicant's control.

The project's percentage impact (as shown by the ICU) on the affected intersections, based on mitigation only where right-of-way is not required, is as follows:

o McBean & Newhall Ranch (mitigated)	AM: -.04	PM: -.05
o Bouquet & Newhall Ranch (mitigated)	AM: -.03	PM: -.01
o Seco & Bouquet (partially mitigated)	AM: .01	PM: -.10
o Valencia & Magic Mountain (unmitigated)	AM: .01	PM: .02
o Bouquet & Soledad (unmitigated)	AM: .02	PM: .05
o Whites Canyon & Soledad (unmitigated)	AM: .00	PM: .02

The Riverpark project is located within the Bouquet Canyon Bridge and Thoroughfare District (Bouquet B & T District). This district is considered a full-mitigation district, that is, traffic improvements identified in the district mitigate traffic impacts created by planned growth within the district. In summary, the District has been designed to accommodate the needs of future development anticipated by the City and County General Plans.

Future identified improvements within the Bouquet Bridge and Thoroughfare District may result in improved operation at the impacted intersections. Various factors, including but not limited to, dedication of additional right-of-way at these affected intersections due to use alteration, expansion, or change, acquisition of the affected right-of-way by the City via funds from a Bridge and Thoroughfare

Table 4-3

COMPARISON OF CONDITIONS BEFORE AND AFTER MITIGATION – INTERIM YEAR

INTERSECTION	INTERIM YEAR WITHOUT PROJECT AM		INTERIM YEAR WITHOUT PROJECT PM		INTERIM YEAR WITH PROJECT & MITIGATION AM		INTERIM YEAR WITH PROJECT & MITIGATION PM		NET CHANGE AM	NET CHANGE PM
48. McBean & Newhall Ranch	.91	E	.88	D	.87	D	.83	D	-.04	-.05
57. Valencia & Magic Mountain*	1.07	F	1.09	F	1.00	E	1.07	F	-.07	-.02
65. Bouquet & Soledad*	.76	C	.92	E	.78	C	.89	D	.02	-.03
66. Bouquet & Newhall Ranch	.85	D	.88	D	.82	D	.87	D	-.03	-.01
67. Seco & Bouquet*	.96	E	.96	E	.92	E	.86	D	-.04	-.10
172. Whites Canyon & Soledad*	.98	E	.88	D	.95	E	.88	D	-.03	.00

*See Section 4.1.3 for additional information regarding availability of right-of-way at these locations.

Level of service ranges:	
.00 - .60	A
.61 - .70	B
.71 - .80	C
.81 - .90	D
.91 – 1.00	E
Above 1.00	F

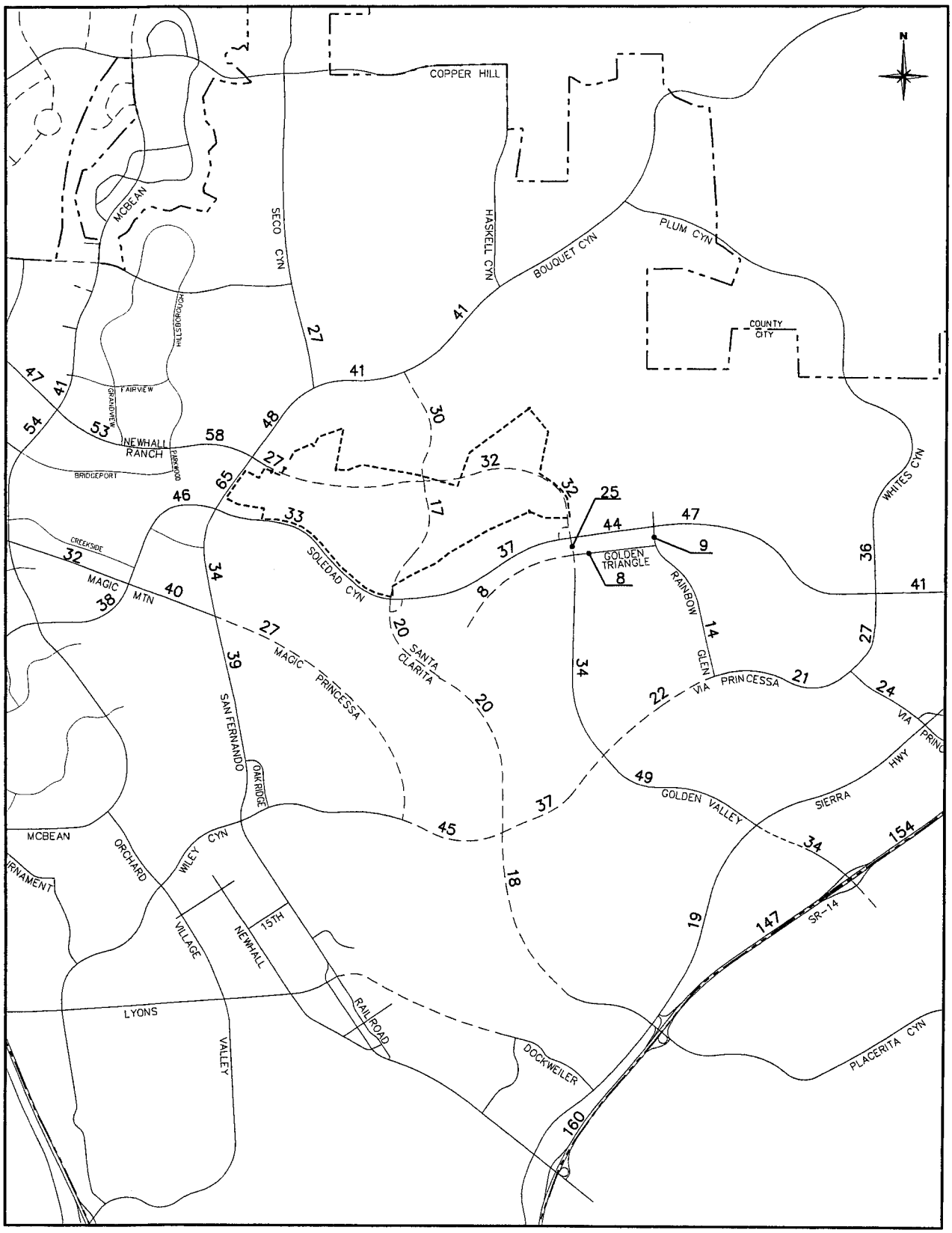
District, continued expansion of the Valley's circulation system (i.e. construction of regional roadway improvements), and increased public transit use may improve the operation of each of the affected intersections.

Without mitigation, the Valencia Boulevard/Magic Mountain Parkway intersection is forecast as LOS F (same as the no-project conditions), the Bouquet Canyon Road/Soledad Canyon Road intersection is forecast as LOS E (same as the no-project conditions), the Seco Canyon Road/Bouquet Canyon Road intersection is forecast as LOS E (same as the no-project conditions), and the Whites Canyon Road/Soledad Canyon Road intersection is forecast as LOS D (same as the no-project and the with project/with mitigation conditions). The remaining significantly impacted intersections will be fully mitigated with the proposed improvements and are forecast as LOS D.

4.1.4 Alternative Interim Year No-Project Traffic Conditions

An alternative Interim Year setting has been analyzed with and without the proposed project. This setting differs from the Interim Year setting analyzed in the previous section due to the inclusion of the entire length of the future Santa Clarita Parkway (for both the with- and without-project scenarios). No-project ADT volumes for this scenario are shown in Figure 4-7. The no-project peak hour turning movement volumes for the intersections in the study area are illustrated in Figures 4-8 and 4-9 for the AM and PM peak hours, respectively. Table 4-4 provides the corresponding ICU values and also listed for comparison purposes are the ICUs for existing conditions.

Under this alternative, the ICU tabulations indicate that deficiencies occur at two additional intersections (Valencia Boulevard/Magic Mountain Parkway, and Seco Canyon Road/Bouquet Canyon Road) when compared to existing conditions. The Bouquet Canyon Road/Soledad Canyon Road intersection and the Whites Canyon Road/Soledad Canyon Road intersection, which have been shown to be deficient for existing conditions, are forecast to remain deficient for the alternative Interim Year conditions without the proposed project. While remaining deficient, conditions improve from LOS F to LOS E at the Bouquet Canyon Road/Soledad Canyon Road intersection due to the planned improvement project at this location. Specifically, the planned improvements consist of adding a third left-turn lane in the eastbound direction.



Legend

XX ADT (thousands)

Figure 4-7

AVERAGE DAILY TRAFFIC VOLUMES
- ALTERNATIVE INTERIM YEAR
WITHOUT PROJECT

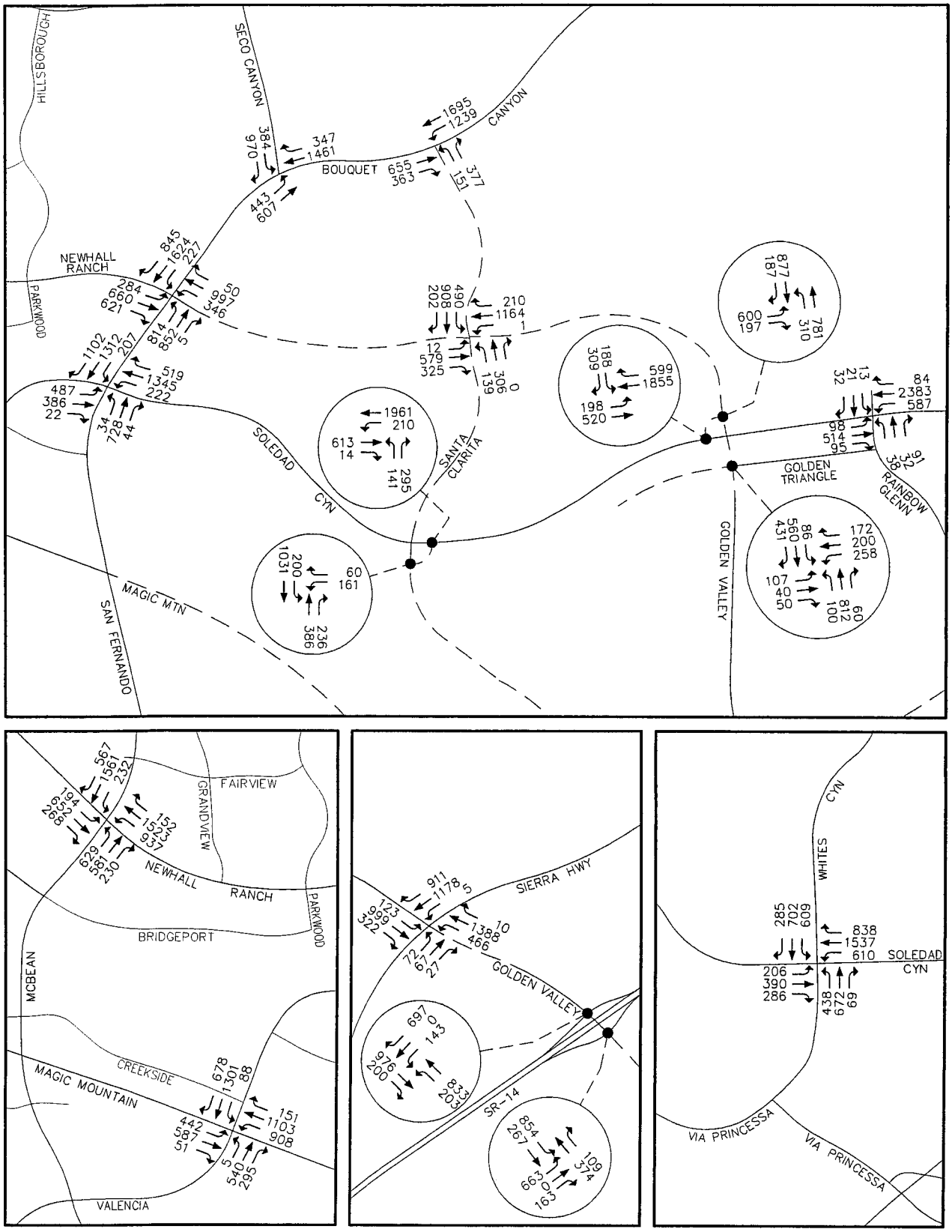


Figure 4-8

AM PEAK HOUR TURNING MOVEMENT VOLUMES
- ALTERNATIVE INTERIM YEAR
WITHOUT PROJECT

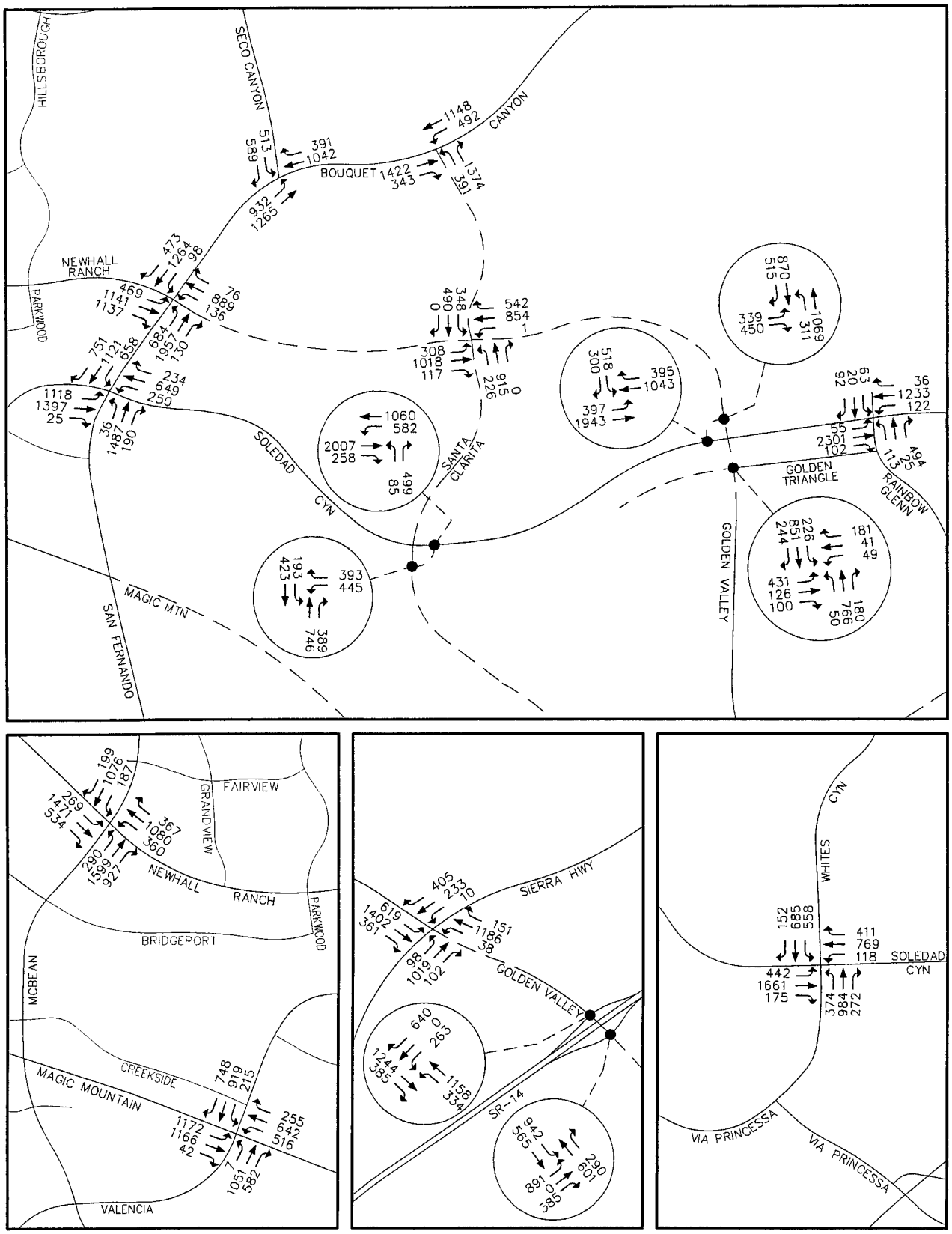


Figure 4-9

PM PEAK HOUR TURNING MOVEMENT VOLUMES
- ALTERNATIVE INTERIM YEAR
WITHOUT PROJECT

Table 4-4

ICU AND LOS SUMMARY – EXISTING AND ALTERNATIVE INTERIM YEAR WITHOUT PROJECT

INTERSECTION	EXISTING AM		EXISTING PM		ALT. INTERIM YEAR WITHOUT PROJECT AM		ALT. INTERIM YEAR WITHOUT PROJECT PM		INCREASE AM	INCREASE PM
48. McBean & Newhall Ranch	.82	D	.66	B	.89	D	.83	D	.07	.17
57. Valencia & Magic Mountain	.58	A	.69	B	1.05	F*	1.16	F*	.47	.47
65. Bouquet & Soledad	.76	C	1.04	F*	.72	C	.91	E*	-.04	-.13
66. Bouquet & Newhall Ranch	.88	D	.83	D	.83	D	.78	C	-.05	-.05
67. Seco & Bouquet	.90	D	.90	D	.79	C	.93	E*	-.11	.03
146. SR-14 NB Ramp & Golden Valley	.17	A	.28	A	.64	B	.79	C	.47	.51
147. SR-14 SB Ramp & Golden Valley	.52	A	.25	A	.64	B	.80	C	.12	.55
157. Santa Clarita & Soledad Access					.35	A	.44	A		
158. Santa Clarita & Newhall Ranch					.57	A	.69	B		
159. Santa Clarita & Bouquet					.66	B	.76	C		
162. Sierra & Golden Valley	.68	B	.47	A	.78	C	.86	D	.10	.39
164. Golden Valley & Golden Triangle					.53	A	.68	B		
165. Golden Valley & Valley Center					.53	A	.55	A		
169. Rainbow Glen & Soledad	.72	C	.67	B	.69	B	.88	D	-.03	.21
172. Whites Canyon & Soledad	.97	E*	.77	C	.96	E*	.87	D	-.01	.10
197. Santa Clarita Access & Soledad					.51	A	.70	B		
198. Valley Center & Soledad					.64	B	.62	B		
157b. Santa Clarita & Soledad (at grade)					.72	C	.76	C		

* Exceeds performance standard (see Table 1-3)

Level of service ranges:
.00 - .60 A
.61 - .70 B
.71 - .80 C
.81 - .90 D
.91 – 1.00 E
Above 1.00 F

4.1.5 Alternative Interim Year With Project Traffic Conditions

Alternative Interim Year volumes that include project generated traffic are provided in Figure 4-10 for the ADT volumes and in Figures 4-11 and 4-12 for the AM and PM peak hours, respectively. Peak hour ICU values can be found in Table 4-5 which provides a comparison between Interim Year no-project and Interim Year with-project conditions. The table shows that five intersections experience a significant impact due to the project generated traffic (see Table 1-3 for significant impact criteria) with four of those intersections forecast to exceed LOS "D". The following intersections are those significantly impacted:

Intersections with Significant Project Impact at LOS "E" or LOS "F":

- McBean Parkway and Newhall Ranch Road (both AM and PM peak)
- Valencia Boulevard and Magic Mountain Parkway (both AM and PM peak)
- Bouquet Canyon Road and Soledad Canyon Road (PM peak)
- Seco Canyon Road and Bouquet Canyon Road (PM peak)

Intersections with Significant Project Impact at LOS "D":

- Bouquet Canyon Road and Newhall Ranch Road (both AM and PM peak)

4.1.6 Alternative Interim Year With Mitigation

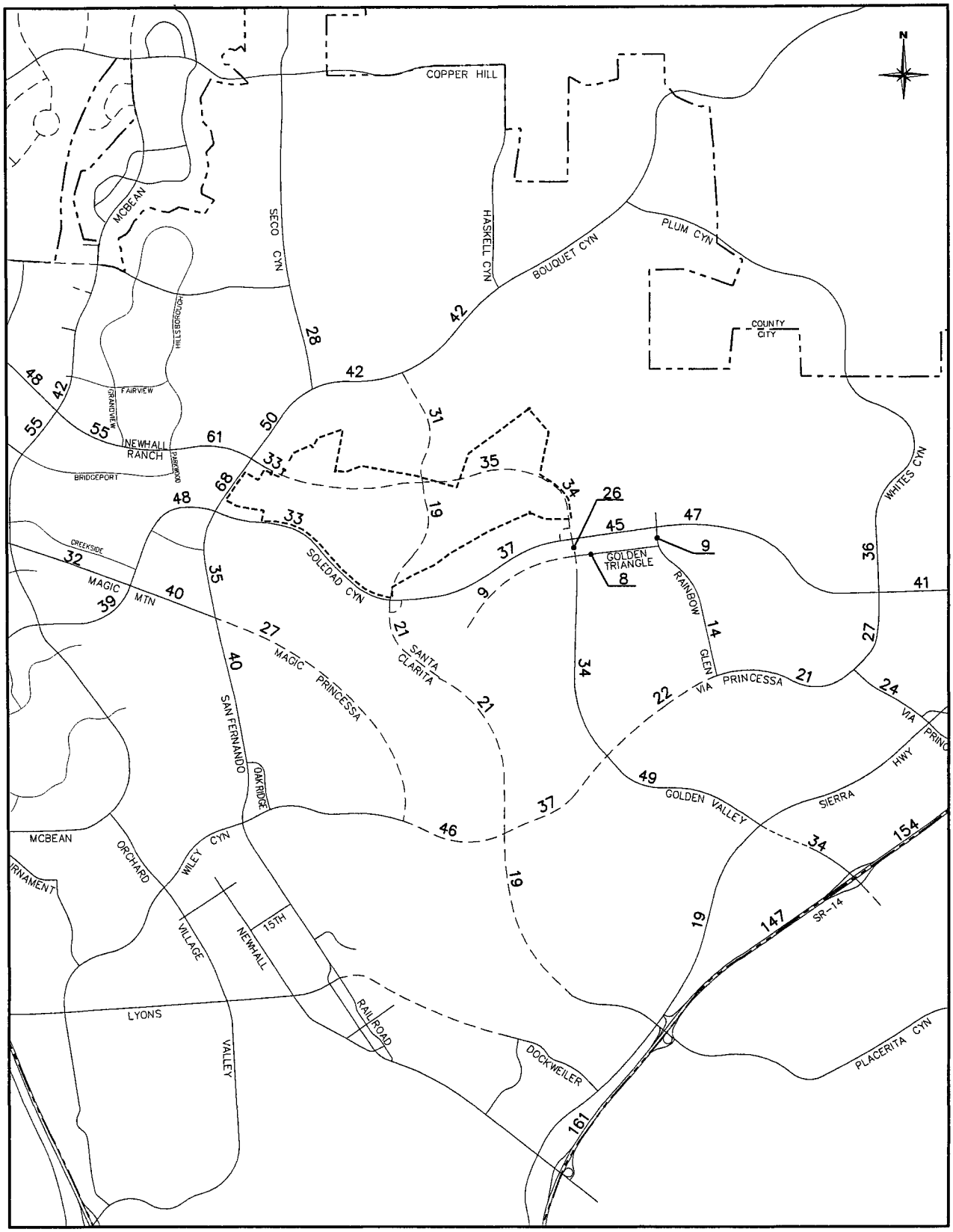
The previous section identified five intersections that are significantly impacted by the proposed project under the Alternative Interim Year conditions. Four result in conditions of LOS "E" or worse and one results in LOS "D". Mitigation measures that address these impacts are as follows:

Mitigation not requiring acquisition of right-of-way:

48. McBean & Newhall Ranch	Add 4th Eastbound Through Lane, and Add 4th Westbound Through Lane
66. Bouquet & Newhall Ranch	Add 4th Eastbound Through Lane, and Add 4th Westbound Through Lane
67. Seco & Bouquet	Convert 1st Southbound Right-Turn Lane to a shared Left-Turn/Right-Turn Lane (for 1 Left-Turn Lane, 1 shared Left-Turn/Right-Turn Lane, 1 Right-Turn Lane)

Mitigation requiring acquisition of right-of-way:

57. Valencia & Magic Mountain	Add 3rd Eastbound Through Lane
65. Bouquet & Soledad	Add 4th Northbound Through Lane



Legend	Figure 4-10
XX ADT (thousands)	AVERAGE DAILY TRAFFIC VOLUMES - ALTERNATIVE INTERIM YEAR WITH PROJECT

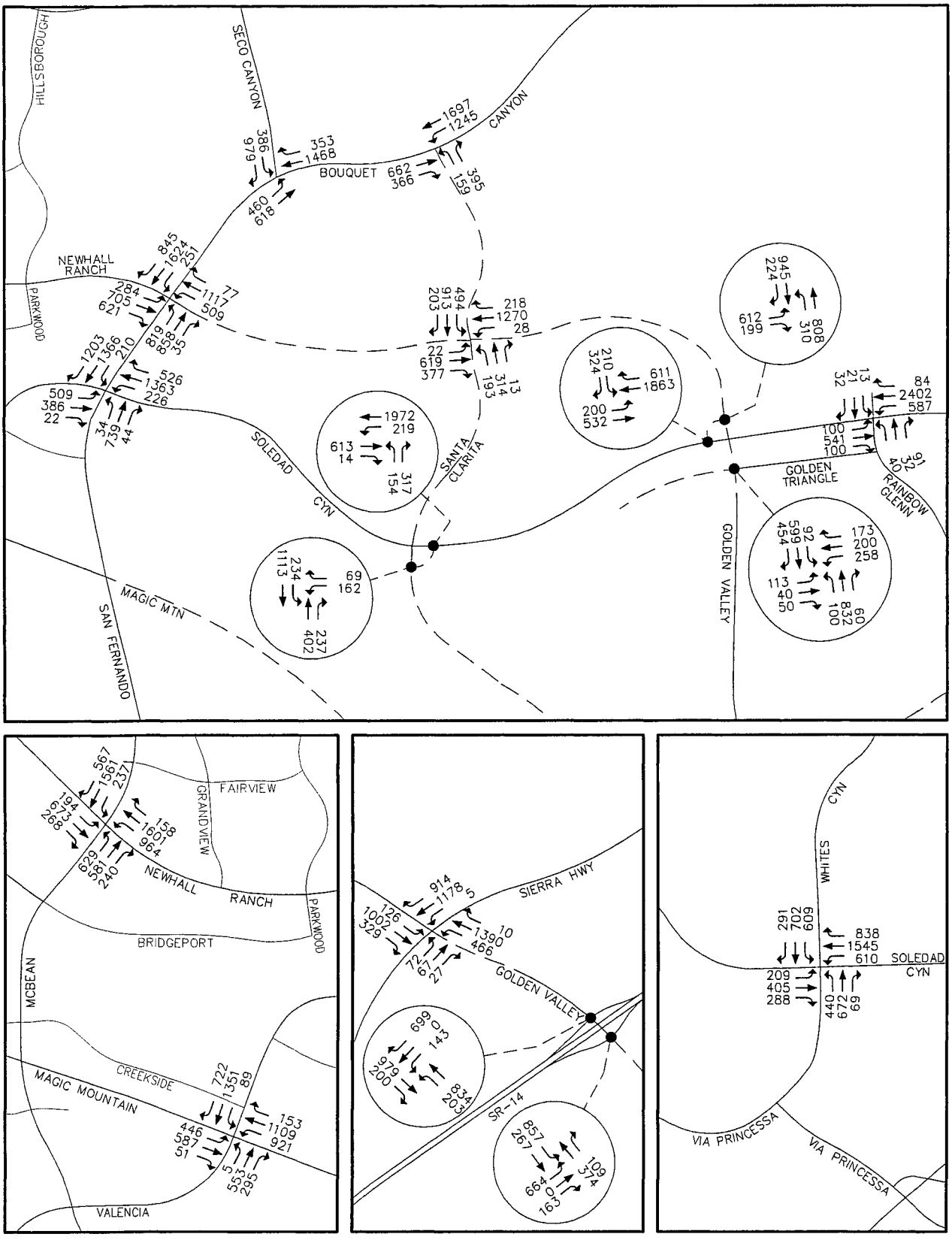


Figure 4-11

AM PEAK HOUR TURNING MOVEMENT VOLUMES
- ALTERNATIVE INTERIM YEAR WITH PROJECT

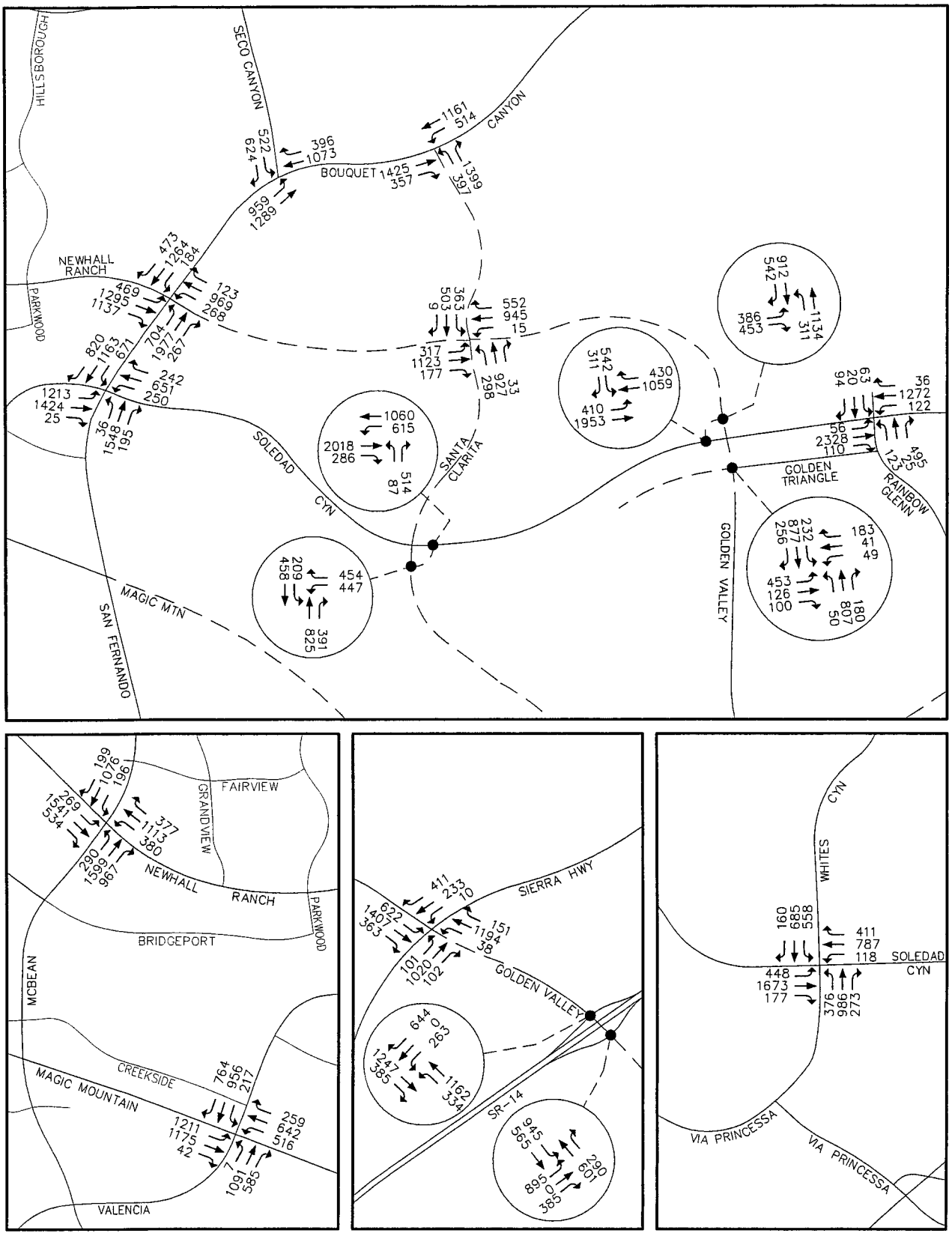


Figure 4-12

PM PEAK HOUR TURNING MOVEMENT VOLUMES
- ALTERNATIVE INTERIM YEAR WITH PROJECT

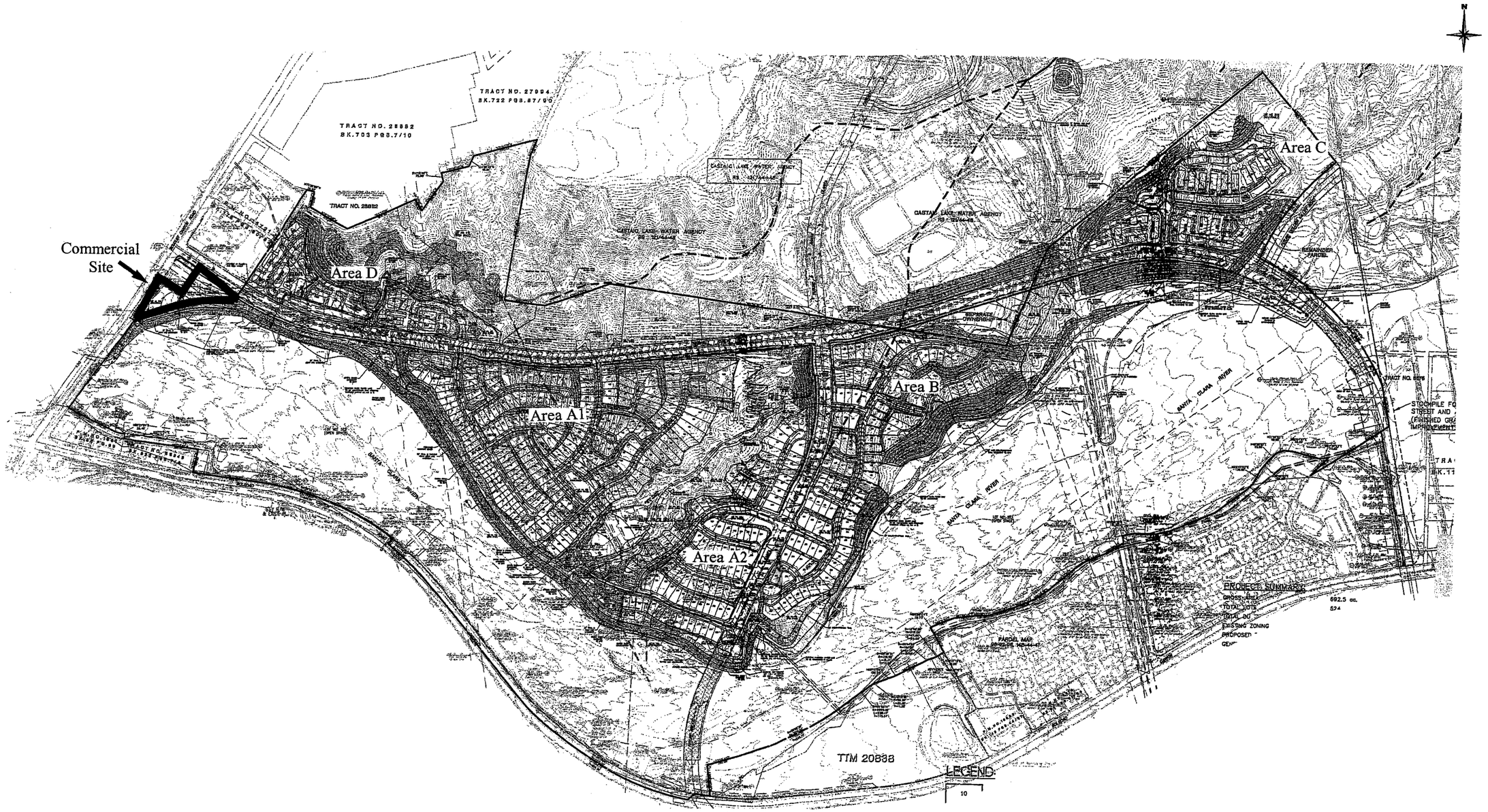


Figure 3-1

PROJECT SITE PLAN

Table 4-5

ICU AND LOS SUMMARY – ALTERNATIVE INTERIM YEAR WITH AND WITHOUT PROJECT

INTERSECTION	ALT. INTERIM YEAR WITHOUT PROJECT AM		ALT. INTERIM YEAR WITHOUT PROJECT PM		ALT. INTERIM YEAR WITH PROJECT AM		ALT. INTERIM YEAR WITH PROJECT PM		INCREASE AM	INCREASE PM
48. McBean & Newhall Ranch	.89	D	.83	D	.91	E	.86	D	.02**	.03*
57. Valencia & Magic Mountain	1.05	F	1.16	F	1.07	F	1.17	F	.02**	.01**
65. Bouquet & Soledad	.72	C	.91	E	.74	C	.93	E	.02	.02**
66. Bouquet & Newhall Ranch	.83	D	.78	C	.85	D	.82	D	.02*	.04*
67. Seco & Bouquet	.79	C	.93	E	.80	C	.95	E	.01	.02**
146. SR-14 NB Ramp & Golden Valley	.64	B	.79	C	.64	B	.80	C	.00	.01
147. SR-14 SB Ramp & Golden Valley	.64	B	.80	C	.64	B	.80	C	.00	.00
157. Santa Clarita & Soledad Access	.35	A	.44	A	.36	A	.48	A	.01	.04
158. Santa Clarita & Newhall Ranch	.57	A	.69	B	.62	B	.71	C	.05	.02
159. Santa Clarita & Bouquet	.66	B	.76	C	.67	B	.77	C	.01	.01
162. Sierra & Golden Valley	.78	C	.86	D	.78	C	.87	D	.00	.01
164. Golden Valley & Golden Triangle	.53	A	.68	B	.54	A	.70	B	.01	.02
165. Golden Valley & Valley Center	.53	A	.55	A	.54	A	.55	A	.01	.00
169. Rainbow Glen & Soledad	.69	B	.88	D	.69	B	.88	D	.00	.00
172. Whites Canyon & Soledad	.96	E	.87	D	.96	E	.87	D	.00	.00
197. Santa Clarita Access & Soledad	.51	A	.70	B	.52	A	.71	C	.01	.01
198. Valley Center & Soledad	.64	B	.62	B	.65	B	.62	B	.01	.00
157b. Santa Clarita & Soledad (at grade)	.72	C	.76	C	.75	C	.78	C	.03	.02

* Significant Project Impact (see Table 1-3) at LOS "D"
** Significant Project Impact (see Table 1-3) LOS "E" or "F"

Level of service ranges:
.00 - .60 A
.61 - .70 B
.71 - .80 C
.81 - .90 D
.91 – 1.00 E
Above 1.00 F

Table 4-6 summarizes the resulting ICUs and LOS with this mitigation. As shown above, some of these improvements require the acquisition of right-of-way, which is out of the applicants control.

The project's percentage impact (as shown by the ICU) on the affected intersections, based on mitigation only where right-of-way is not required, is as follows:

o	McBean & Newhall Ranch (mitigated)	AM: -.01	PM: -.04
o	Bouquet & Newhall Ranch (mitigated)	AM: -.02	PM: -.02
o	Seco & Bouquet (mitigated)	AM: .01	PM: -.13
o	Valencia & Magic Mountain (unmitigated)	AM: .02	PM: .01
o	Bouquet & Soledad (unmitigated)	AM: .02	PM: .02

The Riverpark project is located within the Bouquet Canyon Bridge and Thoroughfare District (Bouquet B & T District). This district is considered a full-mitigation district, that is, traffic improvements identified in the district mitigate traffic impacts created by planned growth within the district. In summary, the District has been designed to accommodate the needs of future development anticipated by the City and County General Plans.

Future identified improvements within the Bouquet Bridge and Thoroughfare District may result in improved operation at the impacted intersections. Various factors, including but not limited to, dedication of additional right-of-way at these affected intersections due to use alteration, expansion, or change, acquisition of the affected right-of-way by the City via funds from a Bridge and Thoroughfare District, continued expansion of the Valley's circulation system (i.e. construction of regional roadway improvements), and increased public transit use may improve the operation of each of the affected intersections.

Without mitigation, the Valencia Boulevard/Magic Mountain Parkway intersection is forecast as LOS F (same as the no-project and the with project/with mitigation conditions) and the Bouquet Canyon Road/Soledad Canyon Road intersection is forecast as LOS E (same as the no-project conditions). The remaining significantly impacted intersections will be fully mitigated with the proposed improvements and are forecast as LOS D or better.

Table 4-6

COMPARISON OF CONDITIONS BEFORE AND AFTER MITIGATION - ALTERNATIVE INTERIM YEAR

INTERSECTION	ALT. INTERIM YEAR WITHOUT PROJECT AM		ALT. INTERIM YEAR WITHOUT PROJECT PM		ALT. INTERIM YEAR WITH PROJECT & MITIGATION AM		ALT. INTERIM YEAR WITH PROJECT & MITIGATION PM		NET CHANGE AM	NET CHANGE PM
48. McBean & Newhall Ranch	.89	D	.83	D	.88	D	.79	C	-.01	-.04
57. Valencia & Magic Mountain*	1.05	F	1.16	F	1.01	F	1.06	F	-.04	-.10
65. Bouquet & Soledad*	.72	C	.91	E	.74	C	.86	D	.00	-.05
66. Bouquet & Newhall Ranch	.83	D	.78	C	.81	D	.76	C	-.02	-.02
67. Seco & Bouquet	.79	C	.93	E	.80	C	.80	C	.01	-.13

*See Section 4.1.6 for additional information regarding availability of right-of-way at this location.

Level of service ranges:

.00 - .60	A
.61 - .70	B
.71 - .80	C
.81 - .90	D
.91 – 1.00	E
Above 1.00	F

4.2 LONG-RANGE ANALYSIS

Since the proposed project involves a General Plan amendment, an evaluation of long-range conditions is provided. The long-range conditions are obtained from the SCVCTM and are based on long-range cumulative (buildout) land use projections for the Santa Clarita Valley and a roadway network that is consistent with the City's General Plan Circulation Element. The purpose of this analysis is to determine if the proposed project results in significant changes in roadway volumes when compared to the forecasts used to develop the City's General Plan Circulation Element. This forms the basis for identifying the potential long-range traffic impacts of the proposed project.

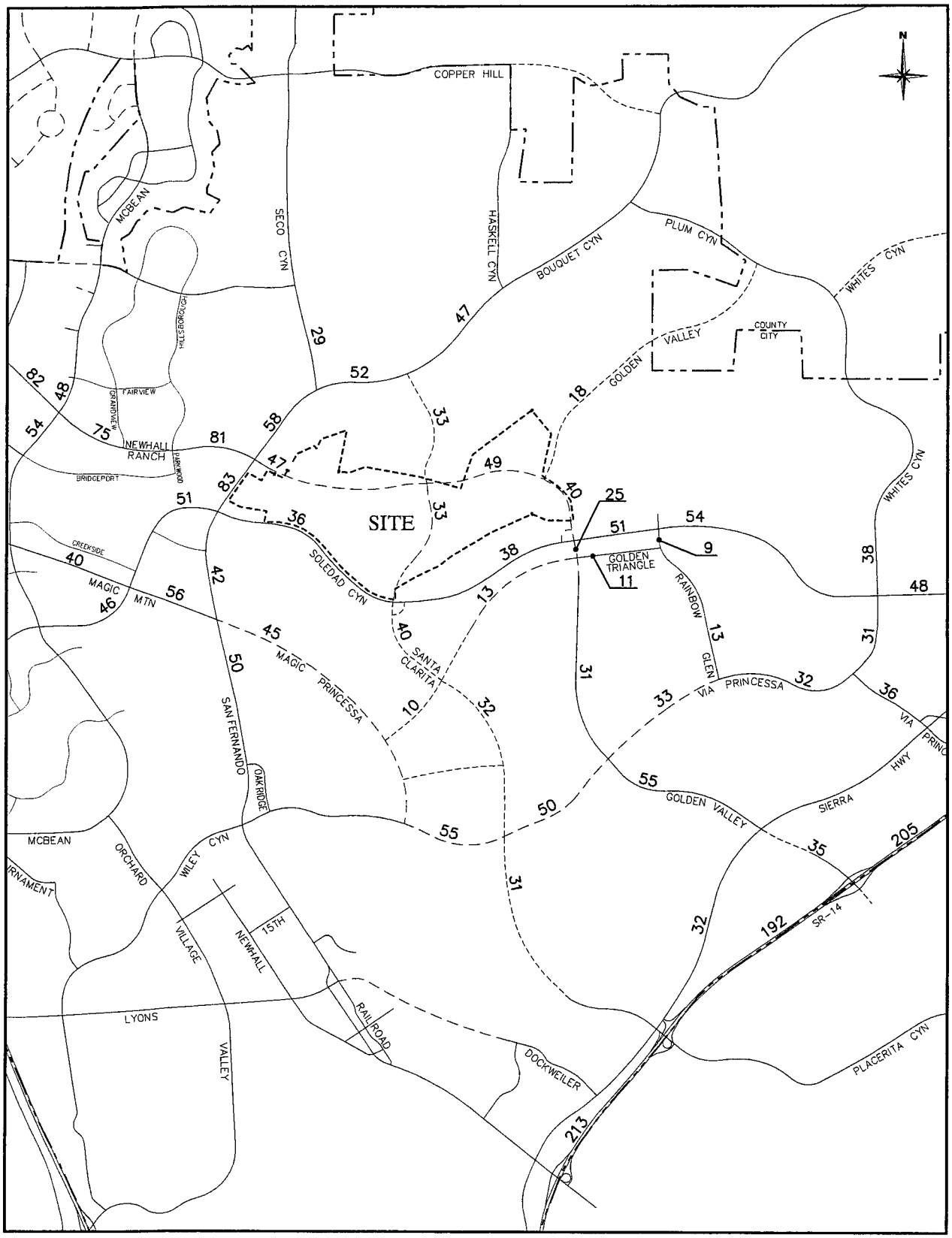
The following sections discuss conditions with and without the project for this scenario as well as an alternative long-range scenario which does not include the future Santa Clarita Parkway and a scenario for a four lane Santa Clarita Parkway between Bouquet Canyon Road and Soledad Canyon Road. Consistent with the City's previous General Plan studies which only address ADT volumes, ADT volumes are forecast for Long Range Cumulative conditions in the following analyses. Peak hour intersection turning movement volumes are used to compare the four lane and deletion scenarios to the current Circulation Element.

4.2.1 Long-Range Cumulative Traffic Conditions

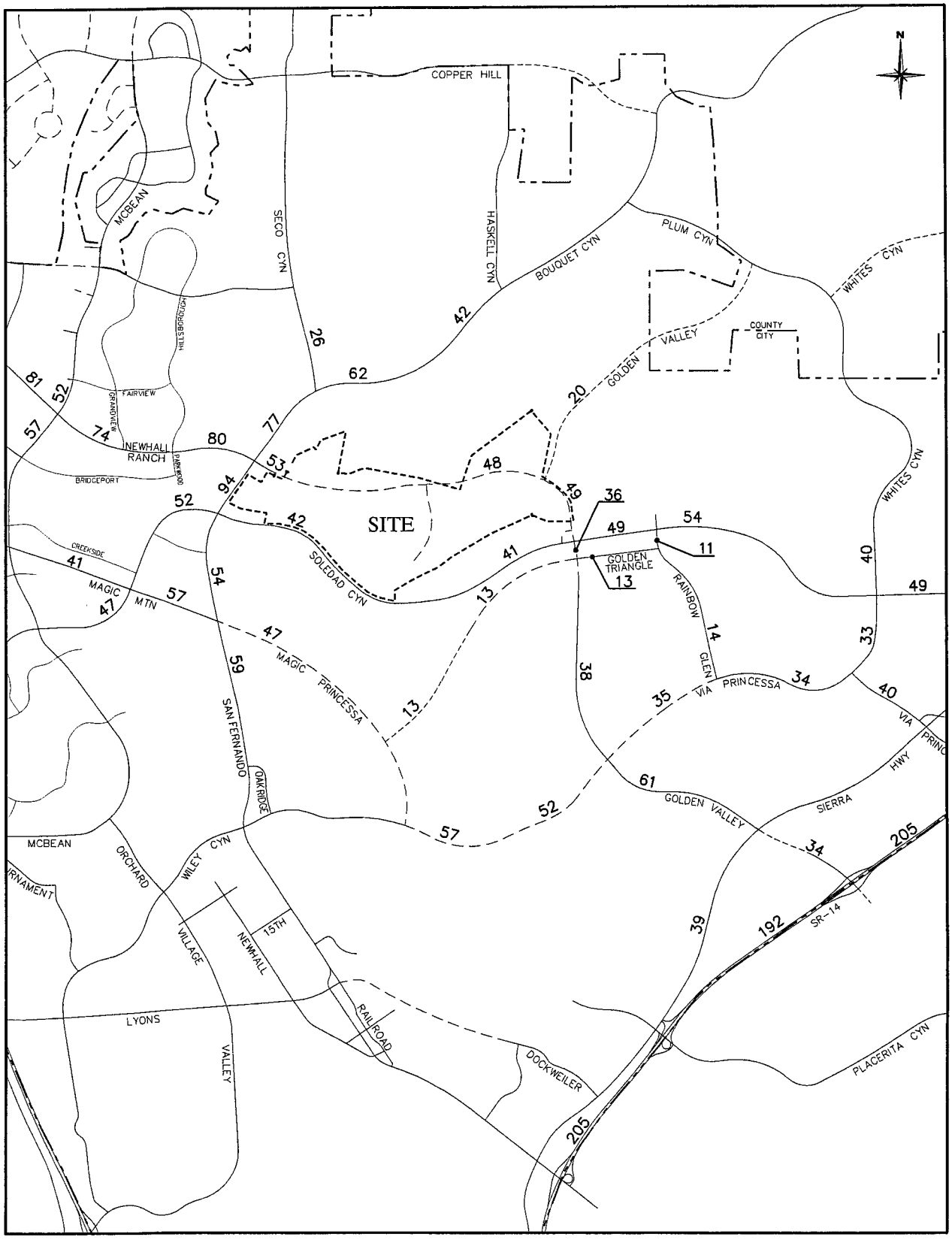
Long-range Cumulative ADT volumes within the study area are shown in Figure 4-13. These forecasts are based on the project site being developed with the land use that has historically been used by the City and the County for long-range planning (see following section for details). Figure 4-14 illustrates the Long Range Cumulative ADT volumes without Santa Clarita Parkway.

4.2.2 Long-Range Cumulative With Project Traffic Conditions

The proposed project represents a net reduction in traffic generation when compared to the land uses allowed by the current General Plan. Table 4-7 compares the proposed project to the General Plan land use and shows that the proposed project generates approximately 68,000 ADT less than what was planned for the property under the City's General Plan. Likewise, when compared to the land use that has historically been used by the City and the County for long-range planning in the SCVCTM, the proposed project generates approximately 14,000 ADT less, as shown in Table 4-8.



Legend	Figure 4-13
XX ADT (thousands)	AVERAGE DAILY TRAFFIC VOLUMES - LONG-RANGE WITH PREVIOUS PLAN ON SITE



Legend	Figure 4-14
XX ADT (thousands)	AVERAGE DAILY TRAFFIC VOLUMES - LONG-RANGE WITH PREVIOUS PLAN ON SITE WITHOUT SANTA CLARITA PARKWAY

Table 4-7

TRIP GENERATION COMPARISON – GENERAL PLAN VS. PROPOSED PROJECT

Land Use		General Plan Units	General Plan ADT	Proposed Project Units	Proposed Project ADT	Difference Units	Difference ADT
Single Family Residential	DU	2,642	26,156	439	4,347	-2,203	-21,809
Apartment	DU	--	--	744	5,134	744	5,134
Mobile Home	DU	360	2,484	--	--	-360	-2,484
Commercial Center (>30 ac)	TSF	537.54	21,534	--	--	-537	-21,534
Commercial Center (<10 ac)	TSF	23.95	2,037	40	3,782	16.05	1,745
Industrial Park	TSF	304.87	1,829	--	--	-304.87	-1,829
Commercial Office	TSF	2,381.54	27,531	--	--	-2,381.54	-27,531
Neighborhood Park	AC	--		4.25	11	4.25	11
TOTAL			81,571		13,274		-68,297

Notes:
DU = Dwelling Unit
TSF = Thousand Square Feet
AC = Acres

Table 4-8

TRIP GENERATION COMPARISON – LONG-RANGE CUMULATIVE VS. PROPOSED PROJECT

Land Use		Long-Range Cumulative Units	Long-Range Cumulative ADT	Proposed Project Units	Difference Units	Difference ADT	Difference Units
Single Family Residential	DU	1,180	11,682	439	4,347	-741	-7,335
Condominium/Townhouse	DU	700	5,600	--	--	-700	-5,600
Apartment	DU	--	--	744	5,134	744	5,134
Commercial Center	TSF	162	8,588	40	3,782	-112	-4,806
Golf Course	AC	150	1,194	--	--	-150	-1,194
Neighborhood Park	AC	--		4.25	11	4.25	11
TOTAL			27,064		13,274		-13,790

Notes:
DU = Dwelling Unit
TSF = Thousand Square Feet
AC = Acres

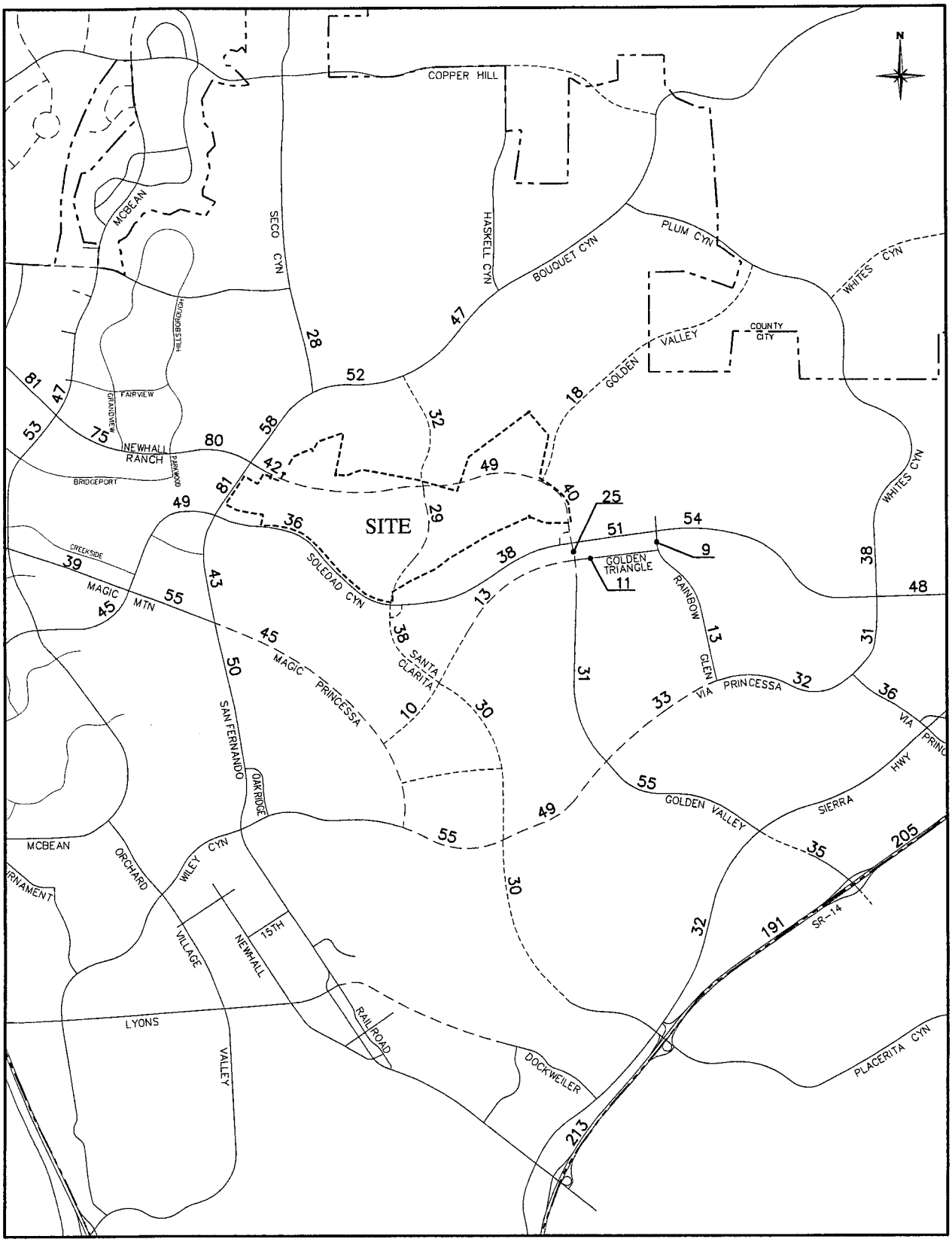
Figure 4-15 illustrates Long-range Cumulative conditions based on development of the site with the proposed project. Figure 4-16 illustrates the proposed project with the removal of Santa Clarita Parkway. When compared to the figures presented in the previous section, these figures illustrate how the net reduction in trip generation for the project site results in lower traffic volumes than would be realized if the site were to be developed as previously anticipated by the City in the SCVCTM. In the vicinity of the project site, volumes along Bouquet Canyon Road would reduce by 2 percent, Newhall Ranch Road volumes would reduce by 1 percent, volumes on Valencia Boulevard would reduce by 4 percent and on Santa Clarita Parkway, volumes would reduce by 12 percent.

However, the magnitude of difference between the land uses, as shown on the roadway network, isn't as evident as it is in the trip generation tables. Since each scenario is modeled independent of the other, two distinct volume assignments result. Each assignment is unique and optimizes the available roadway capacity in order to minimize total travel times. Therefore, high demand roadways such as Bouquet Canyon Road and Soledad Canyon Road will be utilized nearly the same given either land use scenario. Nonetheless, the proposed plan results in a significant reduction of traffic volume on the City's roadways as compared to the City's General Plan designations for the site and the long-range uses identified in the SCVCTM.

4.2.3 Long-Range Cumulative With Project and Santa Clarita Parkway Alternatives

The previous sections presented Long-range Cumulative ADT volumes consistent with the City's Circulation Element, which includes Santa Clarita Parkway as a six lane major highway from Bouquet Canyon Road to SR-14. This section evaluates two alternative configurations for the segment of Santa Clarita Parkway between Bouquet Canyon Road and Soledad Canyon Road. The first alternative changes this segment to a four lane secondary highway and the second alternative removes this segment altogether. Since each of these alternatives would represent a permanent change to the City's Circulation Element, they are evaluated in the context of long-range (buildout) conditions.

To determine the impacts of each of these scenarios, peak hour turning movement volumes at affected intersections were derived. Table 4-9 summarizes the ICU values and LOS for intersections in the vicinity of this section of Santa Clarita Parkway that are affected by implementation of one of the

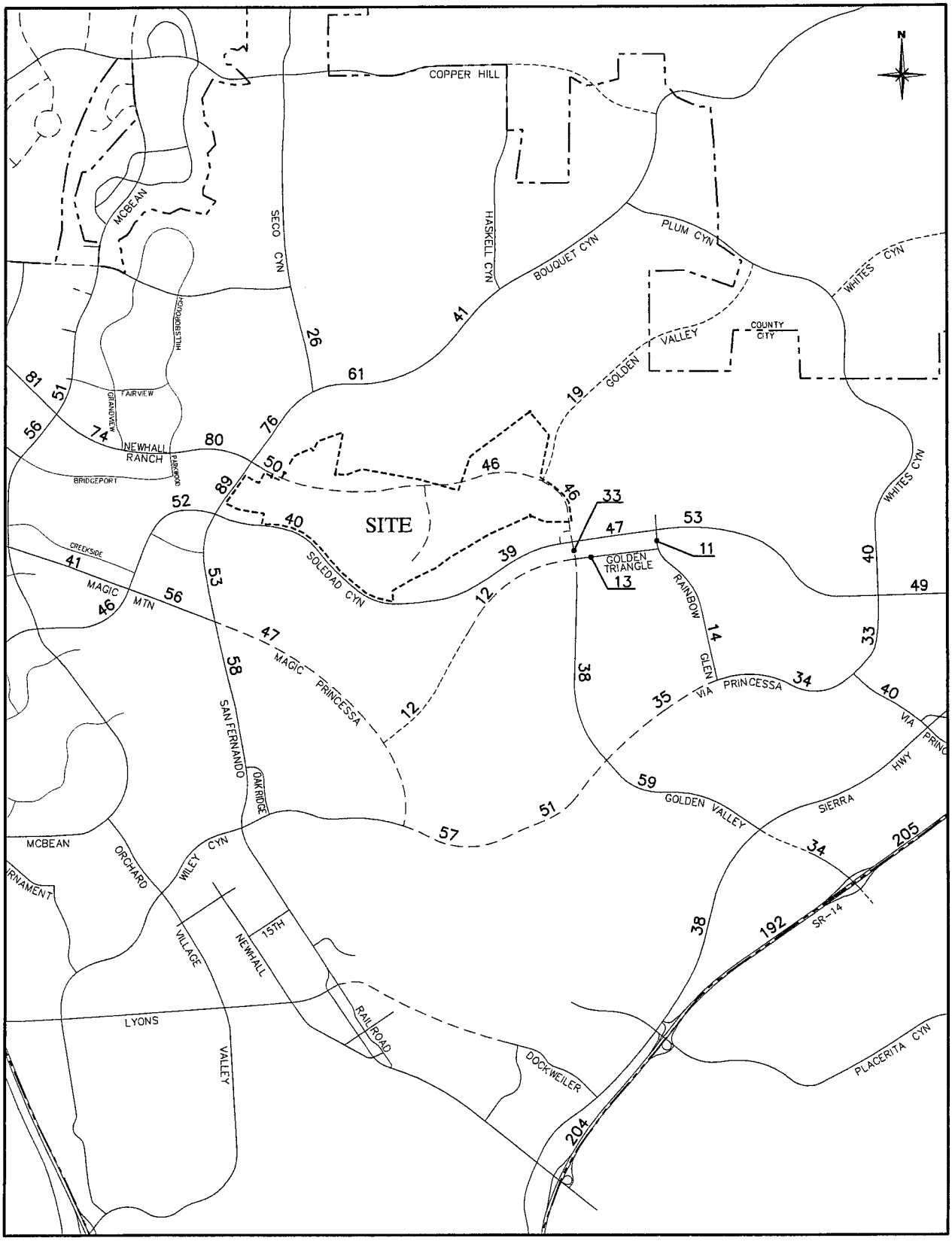


Legend

XX ADT (thousands)

Figure 4-15

AVERAGE DAILY TRAFFIC VOLUMES
- LONG-RANGE WITH PROPOSED PROJECT ON SITE



Legend	Figure 4-16
XX ADT (thousands)	AVERAGE DAILY TRAFFIC VOLUMES - LONG-RANGE WITH PROPOSED PROJECT ON SITE WITHOUT SANTA CLARITA PARKWAY

Table 4-9

ICU AND LOS SUMMARY – LONG-RANGE CUMULATIVE WITH SANTA CLARITA PARKWAY ALTERNATIVES

INTERSECTION	LONG-RANGE WITH 6 LANE HIGHWAY[1] AM		LONG-RANGE WITH 6 LANE HIGHWAY[1] PM		LONG-RANGE WITH 4 LANE SEGMENT[2] AM		LONG-RANGE WITH 4 LANE SEGMENT[2] PM		LONG-RANGE WITHOUT SEGMENT[3] AM		LONG-RANGE WITHOUT SEGMENT[3] PM	
65. Bouquet & Soledad	.79	C	.90 (.99)	D (E*)	.79	C	.87 (.96)	D (E*)	.82	D	.92 (1.01)	E* (F*)
66. Bouquet & Newhall Ranch	.84	D	.83	D	.87	D	.87	D	.90	D	.98	E*
67. Seco & Bouquet	.84	D	.84	D	.84	D	.86	D	.93	E*	.87	D
157. Santa Clarita & Soledad	.80	C	.88	D	.83	D	.83	D	.53	A	.73	C
158. Santa Clarita & Newhall Ranch	.75	C	.80	C	.80	C	.88	D	.53	A	.59	A
159. Santa Clarita & Bouquet	.72	C	.87	D	.65	B	.82	D				
165. Golden Valley & Valley Center	.64	B	.58	A	.66	B	.62	B	.68	B	.66	B
198. Valley Center & Soledad	.72	C	.64	B	.69	B	.66	B	.72	C	.67	B

[1]As shown in Circulation Element
[2]4 Lanes between Bouquet Canyon Road & Soledad Canyon Road, 6 Lanes South of Soledad Canyon Road
[3]Segment between Bouquet Canyon Road & Soledad Canyon Road deleted, 6 Lanes South of Soledad Canyon Road

Values in parenthesis indicate ICU and LOS without a 4th Northbound Through Lane at the Bouquet/Soledad intersection.

*Exceeds Performance Standard

Level of service ranges:
.00 - .60 A
.61 - .70 B
.71 - .80 C
.81 - .90 D
.91 – 1.00 E
Above 1.00 F

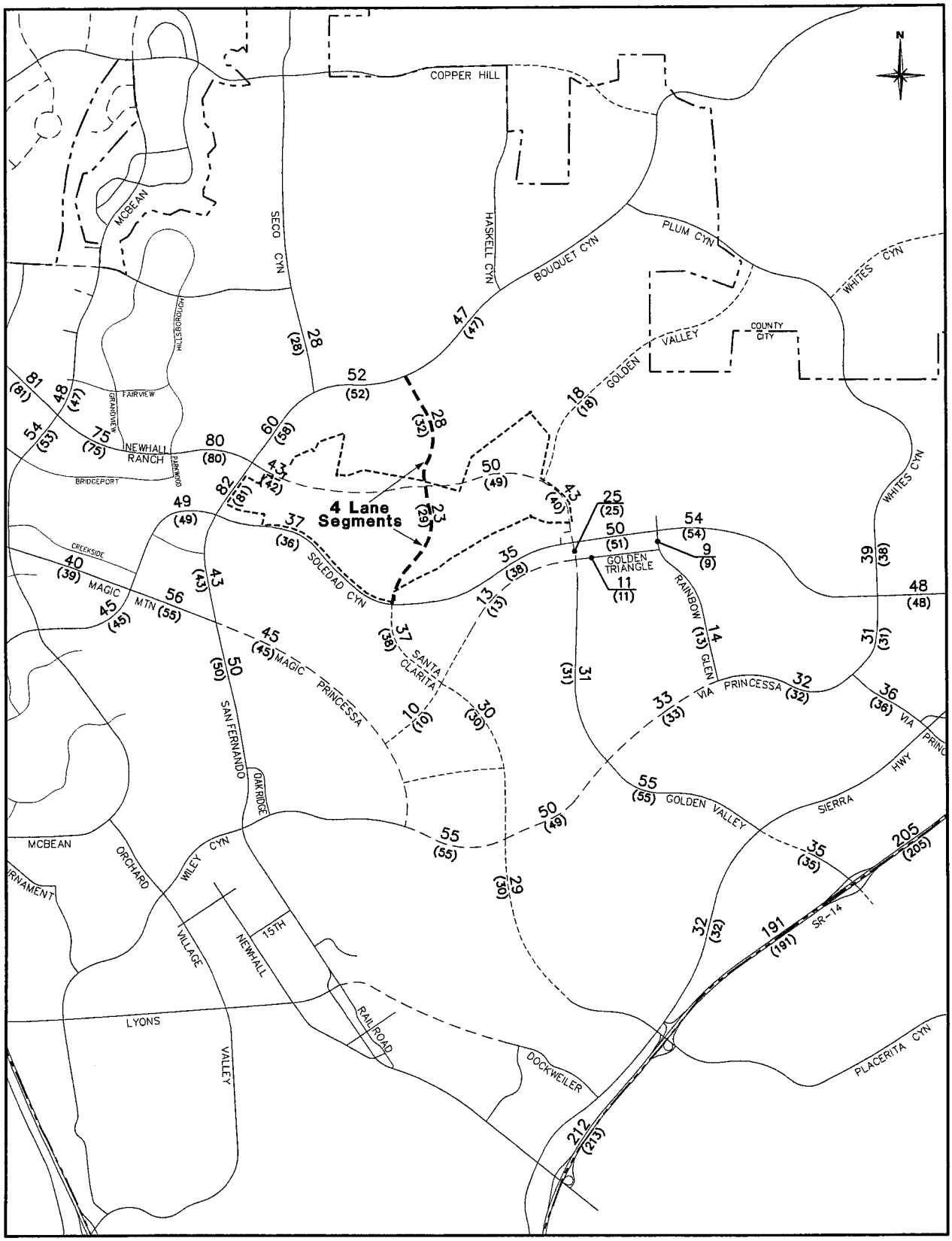
Santa Clarita Parkway alternatives. ADT volumes for each scenario with a comparison to the six lane baseline scenario are provided in Figures 4-17 and 4-18 for the four lane and deletion scenarios, respectively.

The peak hour analysis indicates that the downgrade to a four lane roadway, or secondary highway, between Bouquet Canyon Road and Soledad Canyon Road, yields results very similar to the baseline six lane scenario. This is to be expected since the forecasts that are based on a six lane roadway indicate a demand for Santa Clarita Parkway that can be accommodated by just a four lane roadway. Some shifting of traffic patterns does occur during the peak hours due to the downgrade and this is indicated by intersection ICU values that increase in some instances and decrease in others. Overall, no deficiencies occur and the LOS either remains the same or changes slightly. For example, the Santa Clarita Parkway intersections at Soledad Canyon Road and at Newhall Ranch Road each increase from LOS C to LOS D during one peak hour and remain the same in the other peak hour. Conversely, the intersections of Santa Clarita Parkway/Bouquet Canyon Road and Valley Center/Soledad Canyon Road each experience an improvement in LOS during the AM peak hour with a change from LOS C to LOS B. All intersections remain at LOS D or better and ADT volumes for the surrounding roadways are relatively unaffected by the change to the roadway. No significant impacts would occur with implementation of this alternative.

Deleting the segment altogether has a much greater effect on the surrounding roadway system. With the deletion, the following three intersections are forecast to have a deficient LOS (E or worse):

- Bouquet Canyon Road and Soledad Canyon Road
- Bouquet Canyon Road and Newhall Ranch Road
- Seco Canyon Road and Bouquet Canyon Road

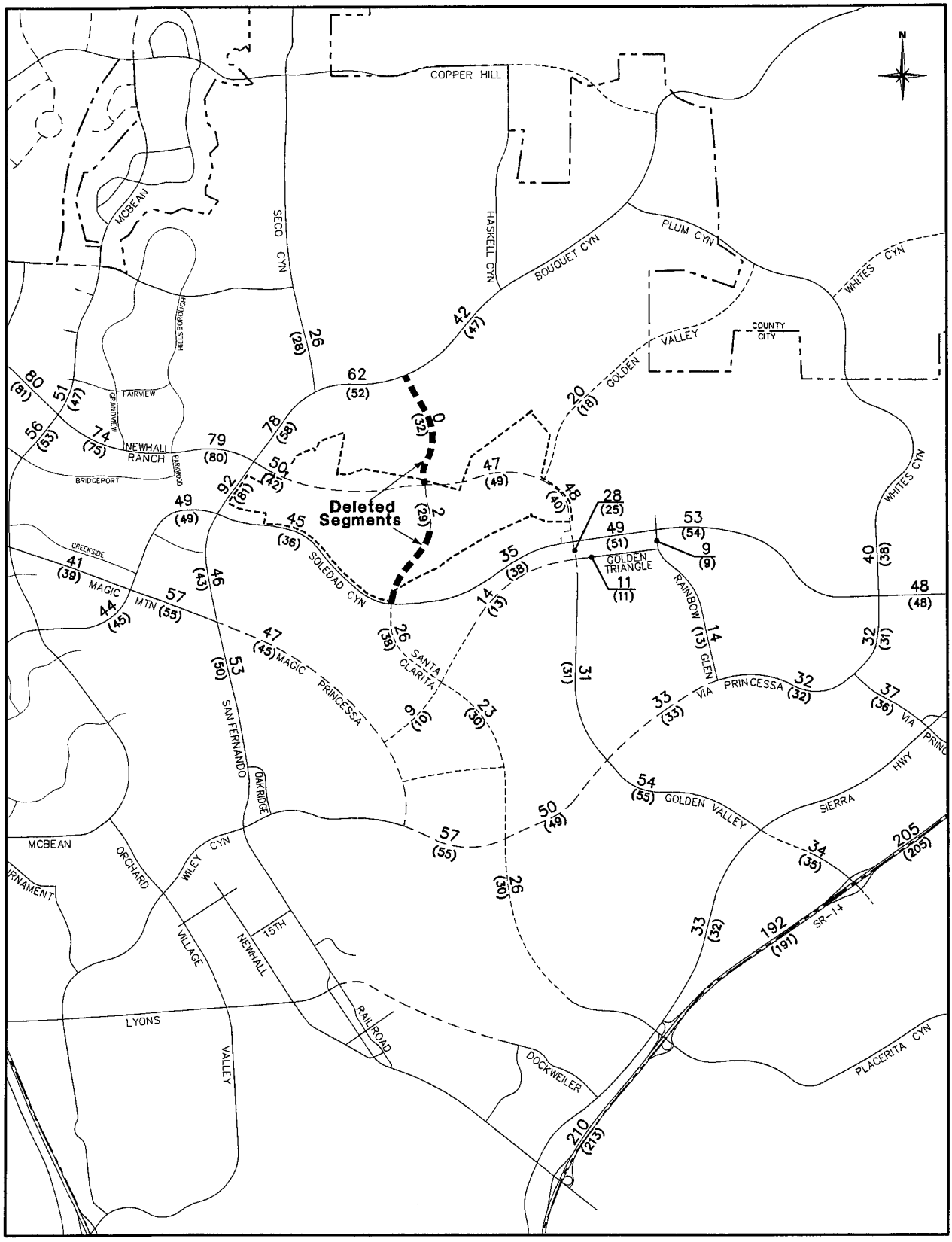
Likewise, ADT volumes with the deletion scenario have a much greater effect on the surrounding roadways. Bouquet Canyon Road north of Newhall Ranch Road increases by 20,000 ADT (from 58,000 ADT to 78,000 ADT) when compared to the six lane baseline scenario. The segment of Bouquet Canyon Road between Newhall Ranch Road and Soledad Canyon Road increases by 11,000 ADT (from 81,000 ADT to 92,000 ADT). The deletion also effects a larger geographical area with notable increases to ADT volumes on McBean Parkway (4,000 ADT), Whites Canyon Road (2,000 ADT) and San Fernando Road (3,000 ADT).



Legend	
XX	ADT - 4 Lane Scenario (thousands)
(XX)	ADT - 6 Lane Scenario (thousands)

Figure 4-17

AVERAGE DAILY TRAFFIC VOLUMES
- LONG-RANGE WITH PROJECT ON SITE AND 4 LANE SEGMENT OF SANTA CLARITA PARKWAY



Legend	
XX	ADT - Deleted Scenario (thousands)
(XX)	ADT - 6 Lane Scenario (thousands)

Figure 4-18

AVERAGE DAILY TRAFFIC VOLUMES
- LONG-RANGE WITH PROJECT ON SITE AND
DELETED SEGMENT OF SANTA CLARITA PKWY

The long-range forecasts presented above indicate that there would be no detrimental effects to the roadway system if the segment of Santa Clarita Parkway between Bouquet Canyon Road and Soledad Canyon Road were to be downgraded from a six lane roadway to a four lane roadway, or from a major highway to secondary highway. All intersections affected by the change are forecast to operate at an acceptable LOS.

In contrast to the four lane scenario, the deletion scenario has a significant negative effect on the roadway system. Three intersections along Bouquet Canyon Road become deficient and ADT volumes along Bouquet Canyon Road increase by as much as 20,000 ADT. The deletion scenario affects a wider area with notable ADT increases from McBean Parkway to Whites Canyon Road. For the LOS calculations, the three intersections shown as deficient in the deletion scenario have been assumed to be constructed to their maximum (buildout) configuration. For example, the intersection of Newhall Ranch Road and Bouquet Canyon Road, which is forecast as LOS E, consists of four through lanes in each direction. Mitigation that would result in LOS D for any of the deficient intersections would require significant measures such as two additional lanes through the intersection.

4.3 SPECIAL ISSUES

4.3.1 Freeway Analysis

Freeway mainline segments and ramps have been analyzed using the criteria outlined in Sections 1.4.1 and 1.4.3, respectively. Table 4-10 summarizes the comparison of future conditions with and without the proposed project for Interim Year conditions. The Alternative Interim Year conditions are summarized in Table 4-11. Detailed V/C calculations, including a summary of existing conditions, are located in Appendix C.

The southbound SR-14 freeway experiences significant congestion in the southbound direction during the AM peak hour and in the northbound direction during the PM peak hour. This is quantified in the above referenced tables which indicate LOS "F" for those time periods. Peak hour volumes on the freeway on and off ramps are forecast as LOS "C" or better.

Table 4-10

FREEWAY LEVEL OF SERVICE SUMMARY – INTERIM YEAR CONDITIONS

LOCATION		INTERIM YEAR WITHOUT-PROJECT CAPACITY	VOLUME	V/C	LOS	INTERIM YEAR WITH PROJECT CAPACITY	VOLUME	V/C	LOS
I. AM PEAK HOUR									
A. Freeway Ramps									
Golden Valley Road	NB On	2,250	848	.377	A	2,250	855	.380 (.003)	A
& SR-14	SB On	1,500	543	.362	A	1,500	558	.372 (.010)	A
	NB Off	1,500	621	.414	A	1,500	626	.417 (.003)	A
	SB Off	1,500	903	.602	B	1,500	904	.603 (.001)	B
Placerita Canyon Road	NB On (d)	2,250	6	.003	A	2,250	6	.003 (.000)	A
& SR-14	NB On (l)	1,500	353	.235	A	1,500	353	.235 (.000)	A
	SB On[1]	1,500	734	.489	A	1,500	763	.509 (.020)	A
	SB On[2]	1,500	261	.174	A	1,500	261	.174 (.000)	A
	NB Off	1,500	532	.355	A	1,500	536	.357 (.002)	A
	SB Off	1,500	942	.628	B	1,500	944	.629 (.001)	B
B. Freeway Mainline Segments									
SR-14 s/o Placerita Cyn	NB	7,600	3,519	.463	B	7,600	3,527	.464 (.001)	B
SR-14 s/o Golden Valley	NB	7,600	3,344	.440	B	7,600	3,349	.441 (.001)	B
SR-14 n/o Golden Valley	NB	9,600	3,571	.372	B	9,600	3,578	.373 (.001)	B
SR-14 s/o Placerita Cyn	SB	8,000	8,176	1.022	F	8,000	8,220	1.028 (.006)	F
SR-14 s/o Golden Valley	SB	7,600	8,123	1.069	F	7,600	8,138	1.071 (.002)	F
SR-14 n/o Golden Valley	SB	9,600	8,482	.844	D	9,600	8,483	.884 (.000)	D
II. PM PEAK HOUR									
A. Freeway Ramps									
Golden Valley Road	NB On	2,250	1,272	.565	A	2,250	1,275	.567 (.002)	A
& SR-14	SB On	1,500	821	.547	A	1,500	829	.553 (.006)	A
	NB Off	1,500	1,184	.789	C	1,500	1,197	.798 (.009)	C
	SB Off	1,500	867	.578	A	1,500	872	.581 (.003)	A
Placerita Canyon Road	NB On (d)	2,250	1	.000	A	2,250	1	.000 (.000)	A
& SR-14	NB On (l)	1,500	560	.373	A	1,500	560	.373 (.000)	A
	SB On[1]	1,500	392	.261	A	1,500	398	.265 (.004)	A
	SB On[2]	1,500	299	.199	A	1,500	302	.201 (.002)	A
	NB Off	1,500	644	.429	A	1,500	669	.446 (.017)	A
	SB Off	1,500	748	.499	A	1,500	748	.499 (.000)	A
B. Freeway Mainline Segments									
SR-14 s/o Placerita Cyn	NB	7,600	8,327	1.096	F	7,600	8,365	1.101 (.005)	F
SR-14 s/o Golden Valley	NB	7,600	8,244	1.085	F	7,600	8,257	1.086 (.001)	F
SR-14 n/o Golden Valley	NB	9,600	8,330	.868	D	9,600	8,333	.868 (.000)	D
SR-14 s/o Placerita Cyn	SB	8,000	4,983	.623	C	8,000	5,000	.625 (.002)	C
SR-14 s/o Golden Valley	SB	7,600	5,039	.663	C	7,600	5,047	.664 (.001)	C
SR-14 n/o Golden Valley	SB	9,600	5,084	.530	C	9,600	5,089	.530 (.000)	C

Notes:
V/C shown in parentheses represent the project's increment of the total V/C
(d) = Direct Ramp
(l) = Loop Ramp
[1] SB On-ramp from Sierra Highway
[2] SB On-ramp from Placerita Canyon Road

Table 4-11

FREEWAY LEVEL OF SERVICE SUMMARY – ALTERNATIVE INTERIM YEAR CONDITIONS

LOCATION		ALTERNATIVE INTERIM YEAR WITHOUT-PROJECT CAPACITY	VOLUME	V/C	LOS	ALTERNATIVE INTERIM YEAR WITH PROJECT CAPACITY	VOLUME	V/C	LOS
I. AM PEAK HOUR									
A. Freeway Ramps									
Golden Valley Road & SR-14	NB On	2,250	963	.428	A	2,250	966	.429 (.001)	A
	SB On	1,500	403	.269	A	1,500	403	.269 (.000)	A
	NB Off	1,500	826	.551	A	1,500	827	.551 (.000)	A
	SB Off	1,500	840	.560	A	1,500	842	.561 (.001)	A
Placerita Canyon Road & SR-14	NB On (d)	2,250	7	.003	A	2,250	7	.003 (.000)	A
	NB On (l)	1,500	213	.142	A	1,500	213	.142 (.000)	A
	SB On[1]	1,500	826	.551	A	1,500	843	.562 (.001)	A
	SB On[2]	1,500	758	.505	A	1,500	795	.530 (.015)	A
	NB Off	1,500	612	.408	A	1,500	619	.413 (.005)	A
	SB Off	1,500	887	.591	A	1,500	887	.591 (.000)	A
B. Freeway Mainline Segments									
SR-14 s/o Placerita Cyn	NB	7,600	3,781	.498	B	7,600	3,789	.499 (.001)	B
SR-14 s/o Golden Valley	NB	7,600	3,389	.446	B	7,600	3,390	.446 (.000)	B
SR-14 n/o Golden Valley	NB	9,600	3,527	.367	B	9,600	3,530	.368 (.001)	B
SR-14 s/o Placerita Cyn	SB	8,000	8,643	1.080	F	8,000	8,696	1.087 (.007)	F
SR-14 s/o Golden Valley	SB	7,600	7,942	1.045	F	7,600	7,942	1.045 (.000)	F
SR-14 n/o Golden Valley	SB	9,600	8,378	.873	D	9,600	8,380	.873 (.000)	D
II. PM PEAK HOUR									
A. Freeway Ramps									
Golden Valley Road & SR-14	NB On	2,250	1,232	.548	A	2,250	1,235	.549 (.001)	A
	SB On	1,500	719	.479	A	1,500	719	.479 (.000)	A
	NB Off	1,500	1,276	.851	D	1,500	1,280	.853 (.002)	D
	SB Off	1,500	903	.602	B	1,500	907	.605 (.003)	B
Placerita Canyon Road & SR-14	NB On (d)	2,250	2	.001	A	2,250	2	.001 (.000)	A
	NB On (l)	1,500	596	.397	A	1,500	596	.397 (.000)	A
	SB On[1]	1,500	790	.527	A	1,500	804	.536 (.009)	A
	SB On[2]	1,500	228	.152	A	1,500	234	.156 (.004)	A
	NB Off	1,500	958	.639	B	1,500	997	.665 (.026)	B
	SB Off	1,500	701	.467	A	1,500	702	.468 (.001)	A
B. Freeway Mainline Segments									
SR-14 s/o Placerita Cyn	NB	7,600	8,611	1.133	F	7,600	8,653	1.139 (.006)	F
SR-14 s/o Golden Valley	NB	7,600	8,250	1.086	F	7,600	8,254	1.086 (.000)	F
SR-14 n/o Golden Valley	NB	9,600	8,204	.855	D	9,600	8,207	.855 (.000)	D
SR-14 s/o Placerita Cyn	SB	8,000	5,337	.667	C	8,000	5,356	.670 (.003)	C
SR-14 s/o Golden Valley	SB	7,600	5,022	.661	C	7,600	5,023	.661 (.000)	C
SR-14 n/o Golden Valley	SB	9,600	5,205	.542	C	9,600	5,210	.543 (.001)	C

Notes:
V/C shown in parentheses represent the project's increment of the total V/C
(d) = Direct Ramp
(l) = Loop Ramp
[1] SB On-ramp from Sierra Highway
[2] SB On-ramp from Placerita Canyon Road

The amount of project traffic forecast for the SR-14 freeway segments is generally less than 50 vehicles per hour. For those segments forecast as LOS "F", the project's component of the future V/C is .007 or less which is under the threshold of significance (.020) established by the County CMP (see Table 1-2). Likewise, the project does not cause a significant impact on the freeway on and off ramps since those locations remain at an acceptable LOS with the project traffic.

4.3.2 CMP Analysis

The Los Angeles County Congestion Management Program (CMP) (see Reference 9 in Section 1.7) requires that a proposed development address two major subject areas with respect to traffic impacts. These are the project's impacts on the CMP highway system and on the local and regional transit systems. Also included is a debit/credit analysis that uses the CMP's New Development Activity Debits and the CMP's Countywide Deficiency Plan Credits to assess the project's impacts and benefits.

According to the CMP guidelines, the geographical area examined in a CMP traffic impact analysis (TIA) consists of the CMP monitoring locations that meet the following criteria:

1. CMP intersections where the proposed project will add 50 or more trips during the AM or PM weekday peak hours (of adjacent street traffic).
2. Mainline freeway locations where the project will add 150 or more trips, in either direction, during either the AM or PM weekday peak hours.

Two CMP intersections and no mainline freeway locations meet the above criteria. The following list indicates the two CMP intersections:

- Valencia Boulevard & Magic Mountain Parkway
- Sierra Highway and Placerita Canyon Road

Table 4-12 summarizes the intersection ICUs and LOS for the two intersections based on the CMP ICU calculation methodology. The CMP ICU methodology differs from the City methodology used elsewhere in this report in regards to the per lane capacity used in the calculations (2,880 vphpl for dual left-turn lanes and 1,600 vphpl for all other lane configurations). Included in the table are the relevant ICUs and LOS after taking into account the project mitigation identified in previous sections.

Table 4-12

ICU AND LOS SUMMARY – CMP MONITORING INTERSECTIONS

INTERSECTION	WITHOUT PROJECT AM		WITHOUT PROJECT PM		WITH PROJECT AM		WITH PROJECT PM		INCREASE AM	INCREASE PM
INTERIM YEAR										
57. Valencia & Magic Mountain	1.17	F	1.19	F	1.18 (1.10)	F (F)	1.20 (1.20)	F (F)	.01 (-.07)	.01 (.01)
145. Sierra Hwy & Placerita Canyon	.92	E	1.10	F	.93	E	1.11	F	.01	.01
ALTERNATIVE INTERIM YEAR										
57. Valencia & Magic Mountain	1.14	F	1.26	F	1.16 (1.09)	F (F)	1.28 (1.20)	F (F)	.02* (-.05)	.02* (-.06)
145. Sierra Hwy & Placerita Canyon	1.13	F	1.27	F	1.13	F	1.28	F	.00	.01

* Significant Project Impact – CMP Criteria (V/C increase ≥ .02 causing or worsening LOS "F")

Note: Values in parenthesis indicate ICU and LOS with the project mitigation identified in previous sections. ICUs calculated using Los Angeles County CMP methodology (see Section 4.3.2 for description).

Level of service ranges:	
.00 - .60	A
.61 - .70	B
.71 - .80	C
.81 - .90	D
.91 – 1.00	E
Above 1.00	F

CMP methodology states that a significant project impact occurs when the proposed project increases traffic demand at a CMP monitoring location by two percent of capacity (V/C ≥ .02), causing or worsening LOS "F". Without mitigation, the project causes a significant impact at the intersection of Valencia Boulevard & Magic Mountain Parkway for the Alternative Interim Year scenario since it worsens LOS "F" conditions. With the mitigation previously identified in section 4.1.6, the project has no significant impacts since the project results in an improvement over no-project conditions.

Another component of the CMP transportation impact analysis is a review of transit impacts. This review includes evidence that transit operators received the Notice of Preparation (included in the project EIR), identification of existing transit services near the project (see Section 2.1.3), estimation of the number of project trips assigned to transit, information on facilities and/or programs that will encourage public transit use, and an analysis of project impacts on transit service.

The proposed project is forecast to generate 13,274 ADT. The conversion to person trips is accomplished by using the CMP guidelines (multiplying the ADT by an occupancy factor of 1.4) which results in a total of 18,584 average daily person trips. Applying the CMP's factor for converting total person trips to transit trips (.035) results in approximately 650 total daily transit trips and approximately 65 peak hour transit trips (based on the peak hour representing ten percent of the total daily trips).

The City of Santa Clarita does not have level of service standards for transit service that are applicable to future development such as the proposed project. Transit service is evaluated and funded on an as-needed basis. If additional fixed route service will be needed near the project site in the future, the project should coordinate with the transit provider to identify appropriate bus stop/turnout locations.

One purpose of the CMP is to track new development activity. This is accomplished by using established impact values (debits) for each type of land use developed. Conversely, credits are applied for transportation improvement strategies that have been identified as beneficial to the transportation system. Table 4-13 summarizes the CMP debits and credits associated with the proposed project and its mitigation. The table shows that the proposed project results in a net credit surplus of 95,430 points. These surplus credit points can be transferred to other jurisdictions or can be pooled through sub-regional forums to offset impacts at other locations as determined by the County in cooperation with other local jurisdictions.

Table 4-13

CMP DEBIT AND CREDIT SUMMARY

CATEGORY	UNITS	DEBIT VALUE	SUBTOTAL
Single-Family Residential	1,183 DU	6.80	8,044
Commercial 0-299 TSF	40.00 TSF	22.23	889
Total Debits			8,933

IMPROVEMENT	QUANTITY	CREDIT VALUE	SUBTOTAL
General Use Highway Lane			
Newhall Ranch Road	1.75 miles x 4 lanes	11,500	80,500
Santa Clarita Parkway	.50 miles x 4 lanes	11,500	23,000
Intersection Modification (CMP Route)			
Valencia & Magic Mountain	1	575	575
Intersection Modification (Non-CMP Major Arterial)			
McBean & Newhall Ranch	1	144	144
Seco Canyon & Bouquet Canyon	1	144	144
Total Credits			104,363
TOTAL MITIGATION GOAL (DEBIT POINTS)			8,933
TOTAL DEFICIENCY PLAN IMPROVEMENTS (CREDIT POINTS)			104,363
SURPLUS CREDIT POINTS			**95,430**

4.3.3 Pre-Interim Year Analysis

This section evaluates an occupancy of up to 500 units of the project without the Newhall Ranch Road extension to Golden Valley Road, including the Newhall Ranch Road/Golden Valley Road bridge across the Santa Clara River. This scenario differs from the interim year analyses of previous sections by not including any future development in the Whitaker-Bermite area and only including development of the Valencia Commerce Center (an approved industrial park development located east of I-5 and north of SR-126 that will ultimately consist of approximately 13,500,000 square feet of development) up through the currently approved "Phase 3" (approximately 9,400,000 total square feet of development). Roadway infrastructure also does not include the future extensions of Via Princessa and Magic Mountain Parkway through the Whitaker-Bermite site since these improvements are not anticipated to occur before the development of the Whitaker-Bermite property.

Included in this analysis is the development of project's first 500 dwelling units. Table 4-14 summarizes the land use and trip generation characteristics for the 500 units. The table shows that the first 500 units will generate 4,260 total average daily trips with 319 occurring in the AM peak hour (250 outbound) and 415 occurring in the PM peak hour (270 inbound). The distribution of these trips is illustrated in Figures 4-19 and 4-20 which show the project-only traffic turning movement volumes for the AM and PM peak hours, respectively.

Pre-Interim Year volumes without the proposed project are illustrated in Figures 4-21 and 4-22 for the AM and PM peak hours, respectively. Corresponding volumes for "with project" conditions are shown in Figures 4-23 and 4-24.

Table 4-14

TRIP GENERATION SUMMARY FOR 500 DWELLING UNITS

			------ AM PEAK HOUR ------			------ PM PEAK HOUR ------			
LOCATION	LAND USE	UNITS	IN	OUT	TOTAL	IN	OUT	TOTAL	ADT
Area A	Single Family	270 DU	51	151	202	176	97	273	2,673
Area D	Apartment	230 DU	18	99	117	94	48	142	1,587
Total		**500 DU**	**69**	**250**	**319**	**270**	**145**	**415**	**4,260**

See Table 3-1 for source of trip rates.

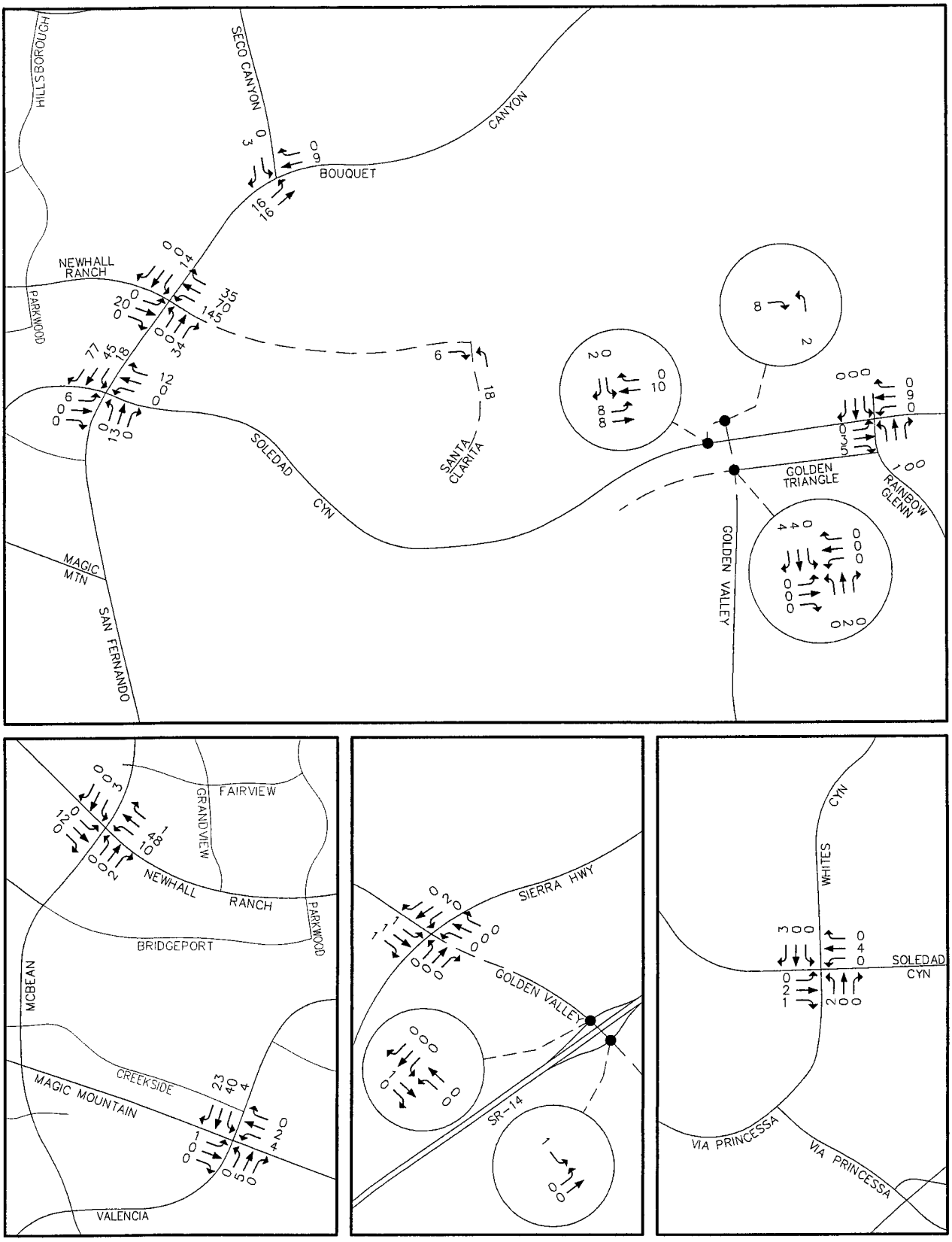


Figure 4-19

AM PEAK HOUR TURNING MOVEMENT VOLUMES
- PROJECT WITH 500 DWELLING UNITS ONLY

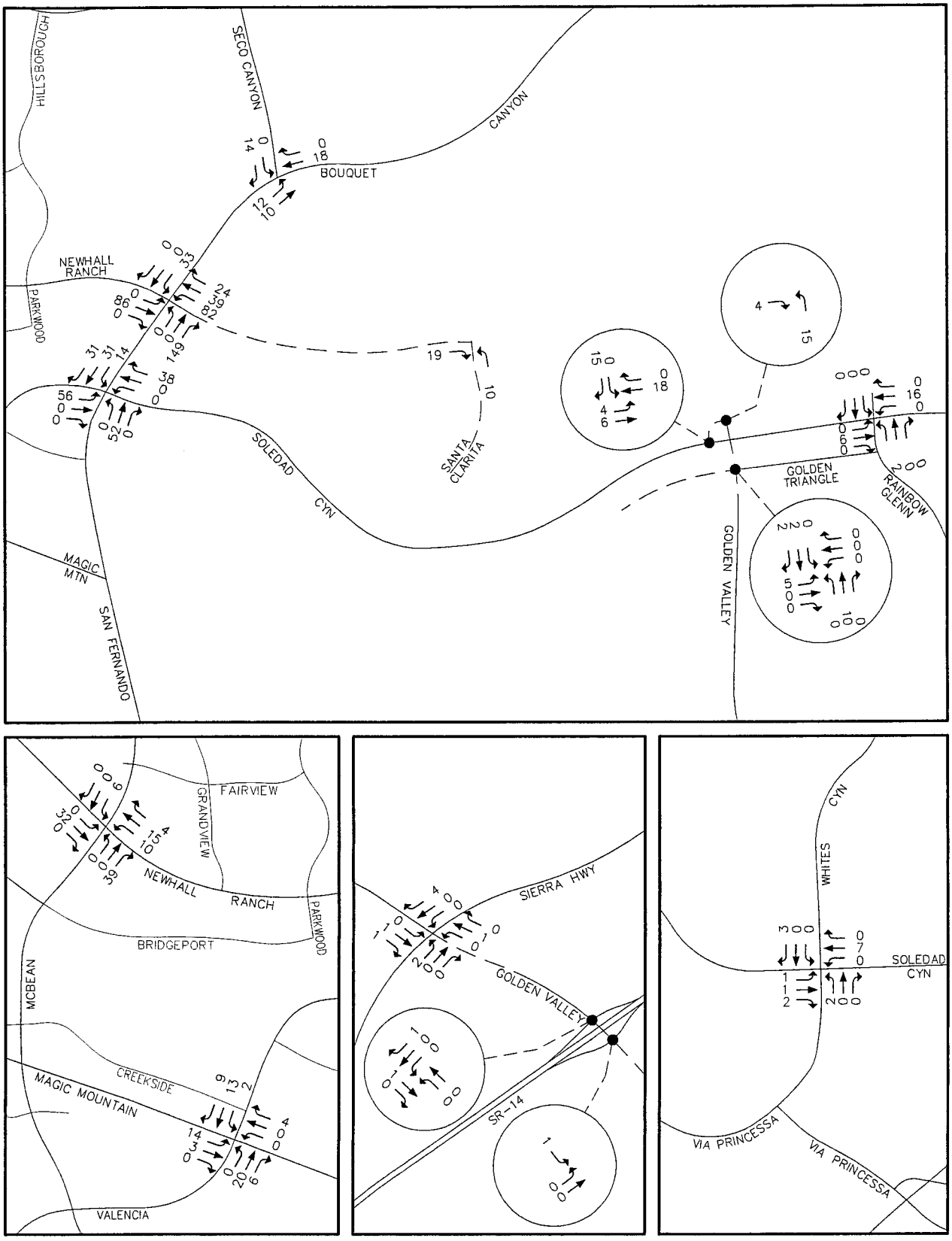


Figure 4-20

PM PEAK HOUR TURNING MOVEMENT VOLUMES
- PROJECT WITH 500 DWELLING UNITS ONLY

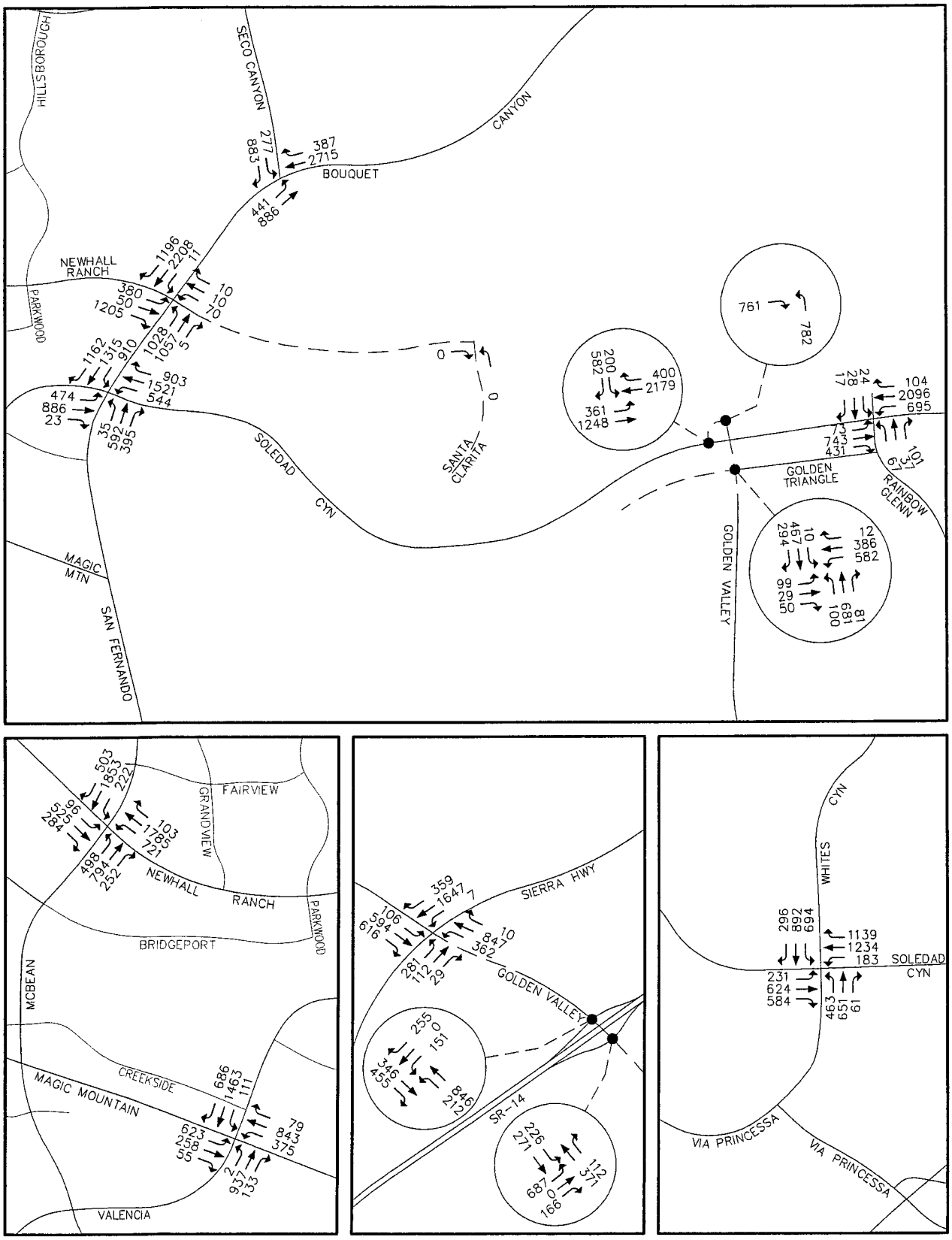


Figure 4-21

AM PEAK HOUR TURNING MOVEMENT VOLUMES
- PRE-INTERIM YEAR WITHOUT PROJECT

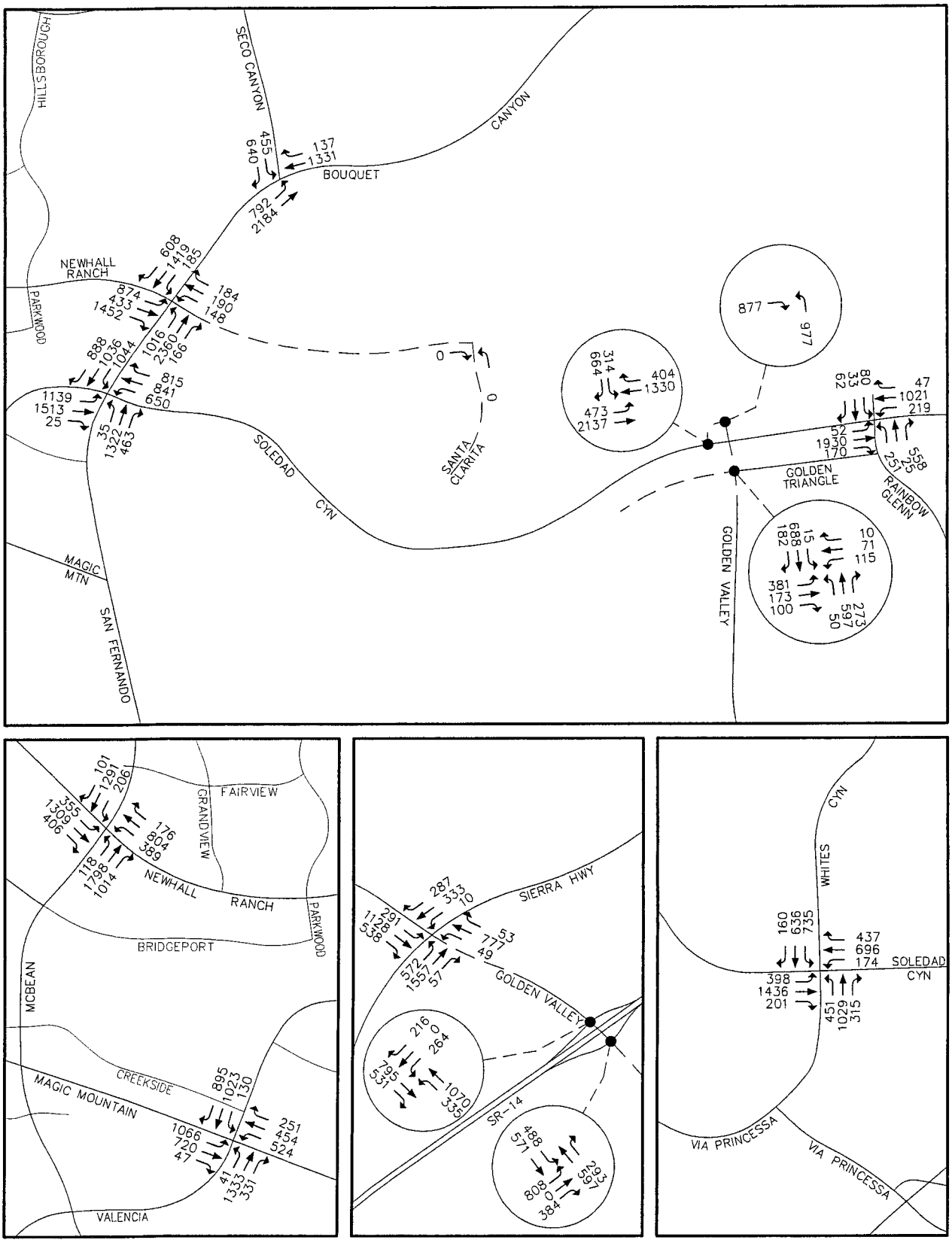


Figure 4-22

PM PEAK HOUR TURNING MOVEMENT VOLUMES
- PRE-INTERIM YEAR WITHOUT PROJECT

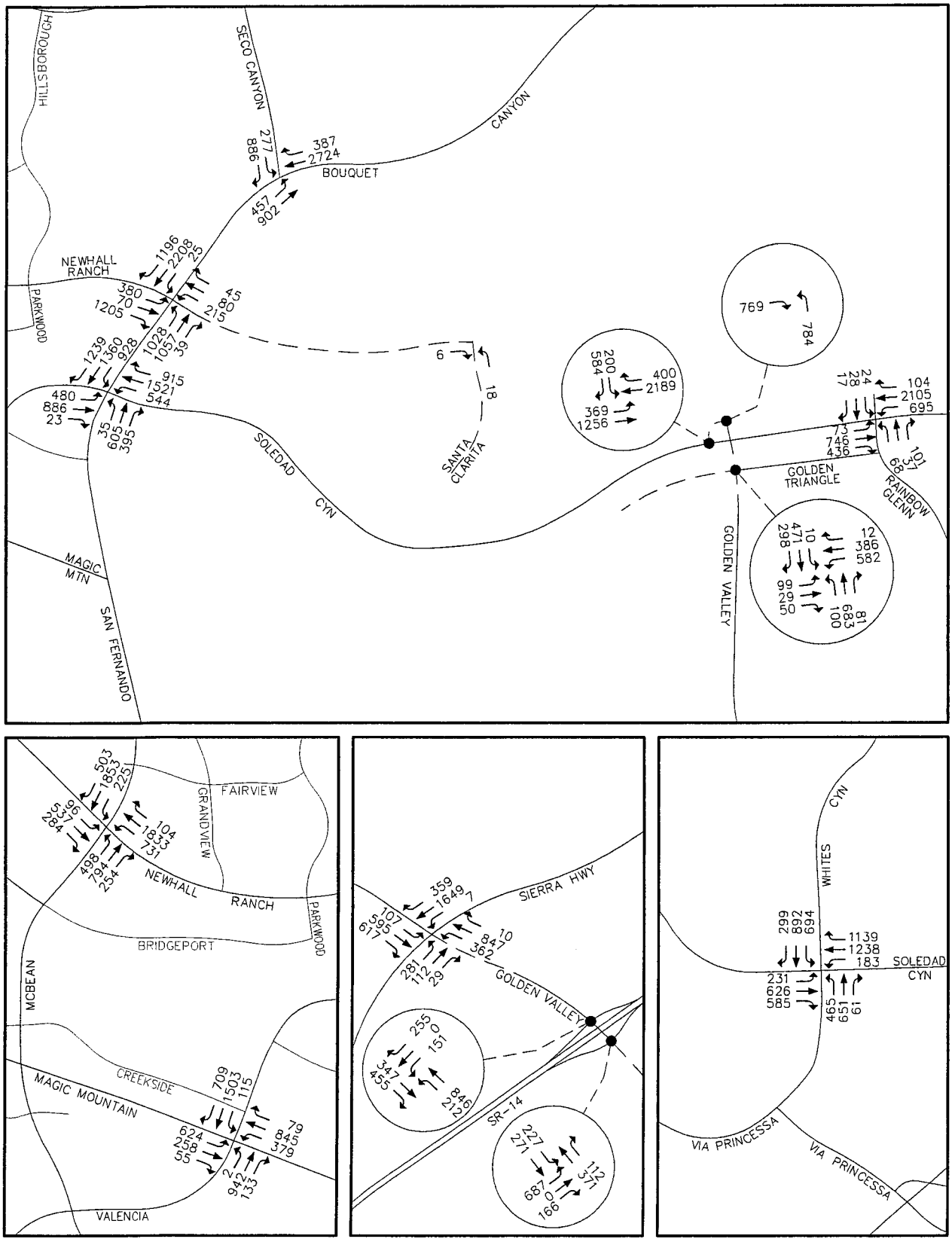


Figure 4-23

AM PEAK HOUR TURNING MOVEMENT VOLUMES
- PRE-INTERIM YEAR WITH PROJECT

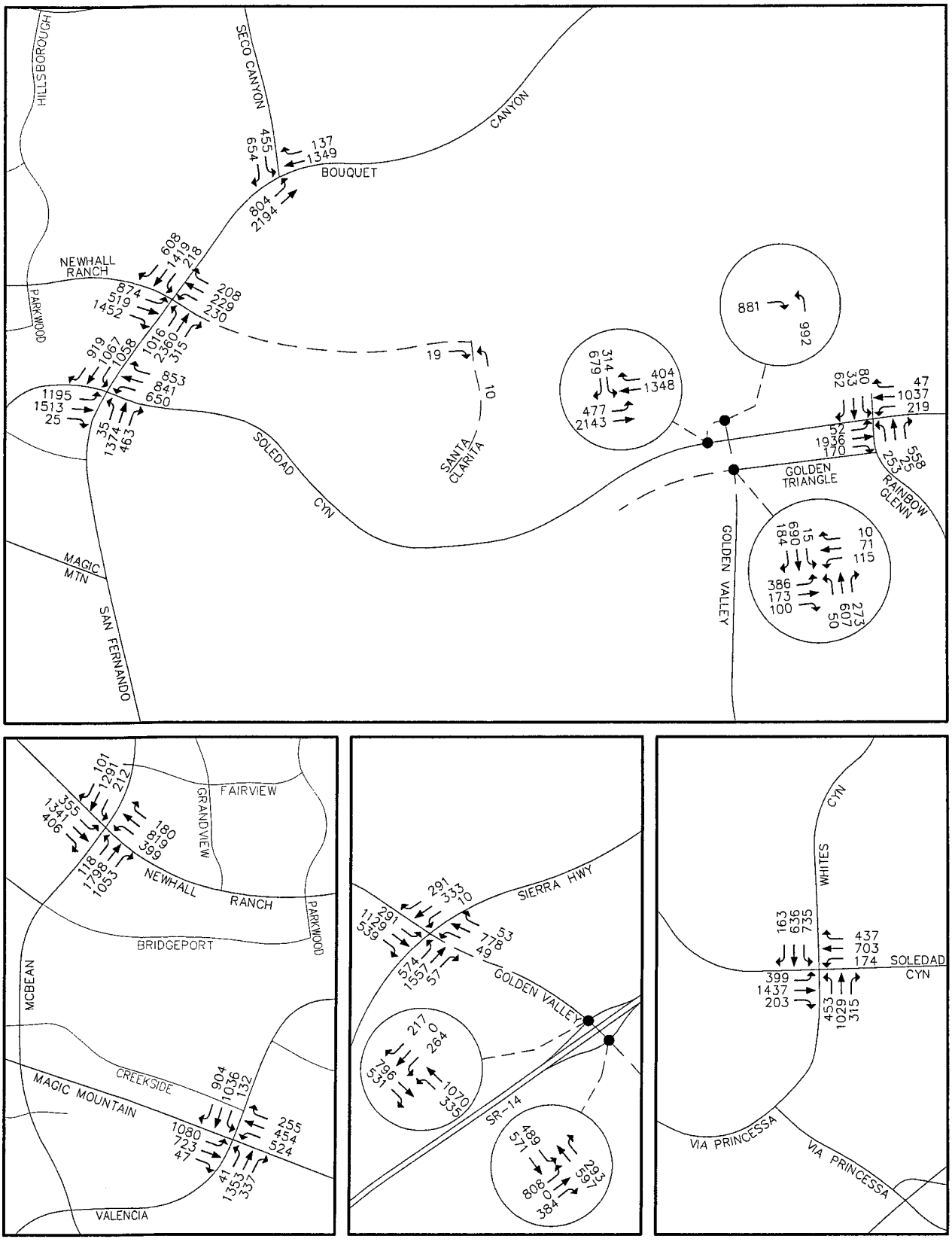


Figure 4-24

PM PEAK HOUR TURNING MOVEMENT VOLUMES
- PRE-INTERIM YEAR WITH PROJECT

Table 4-15 summarizes the ICUs and LOS for the study area intersections for the Pre-Interim Year scenario. The table shows that four intersections experience a significant impact due to the project generated traffic (see Table 1-3 for significant impact criteria) with three of those intersections forecast to exceed LOS "D". The following intersections are those significantly impacted:

Intersections with Significant Project Impact at LOS "E" or LOS "F":

- Valencia Boulevard and Magic Mountain Parkway
- Bouquet Canyon Road and Soledad Canyon Road
- Seco Canyon Road and Bouquet Canyon Road

Intersections with Significant Project Impact at LOS "D":

- Bouquet Canyon Road and Newhall Ranch Road

Mitigation that addresses the above impacts is summarized as follows:

Mitigation not requiring acquisition of right-of-way:

65. Bouquet & Soledad	Temporary configuration to consist of 3 Southbound Left-Turn Lanes and 2 Southbound Through Lanes. Will revert to 2 Southbound Left-Turn Lanes and 3 Southbound Through Lanes (existing configuration) when Cross-Valley Connector is completed.
66. Bouquet & Newhall Ranch	Add 2nd Southbound Left-Turn Lane Temporary configuration to consist of 3 Northbound Left-Turn Lanes, 3 Northbound Through Lanes and 2 Westbound Right-Turn Lanes. Will revert to 2 Northbound Left-Turn Lanes, 4 Northbound Through Lanes, and 1 Westbound Right-Turn Lane (existing configuration) when Cross-Valley Connector is completed.
67. Seco & Bouquet	Convert 1st Southbound Right-Turn Lane to a shared Left-Turn/Right-Turn Lane (for 1 Left-Turn Lane, 1 shared Left-Turn/Right-Turn Lane, 1 Right-Turn Lane)

Mitigation requiring acquisition of right-of-way:

57. Valencia & Magic Mountain	Add 3rd Eastbound Through Lane

Table 4-16 summarizes the resulting ICUs and LOS with this mitigation. As shown above, some of these improvements require the acquisition of right-of-way which is out of the applicant's control.

The improvements at the Bouquet Canyon Road/Soledad Canyon Road intersection consist of reconfiguring the southbound approach to include three left-turn lanes and two through lanes. Similarly, the improvements at the Bouquet Canyon Road/Newhall Ranch Road intersection consist of

Table 4-15

ICU AND LOS SUMMARY – PRE-INTERIM YEAR CONDITIONS

INTERSECTION	PRE-INTERIM YEAR WITHOUT PROJECT AM		PRE-INTERIM YEAR WITHOUT PROJECT PM		PRE-INTERIM YEAR WITH PROJECT AM		PRE-INTERIM YEAR WITH PROJECT PM		INCREASE AM	INCREASE PM
48. McBean & Newhall Ranch	.87	D	.86	D	.88	D	.87	D	.01	.01
57. Valencia & Magic Mountain	.80	C	1.01	F	.81	D	1.02	F	.01	.01**
65. Bouquet & Soledad	.86	D	1.13	F	.88	D	1.14	F	.02*	.01**
66. Bouquet & Newhall Ranch	.82	D	.88	D	.84	D	.88	D	.02*	.00
67. Seco & Bouquet	.98	E	.98	E	.98	E	.99	E	.00	.01**
146. SR-14 NB Ramp & Golden Valley	.47	A	.64	B	.47	A	.64	B	.00	.00
147. SR-14 SB Ramp & Golden Valley	.55	A	.67	B	.55	A	.67	B	.00	.00
162. Sierra & Golden Valley	1.06	F	.90	D	1.06	F	.90	D	.00	.00
164. Golden Valley & Golden Triangle	.64	B	.54	A	.64	B	.54	A	.00	.00
165. Golden Valley & Valley Center	.53	A	.60	A	.54	A	.60	A	.01	.00
169. Rainbow Glen & Soledad	.65	B	.86	D	.65	B	.86	D	.00	.00
172. Whites Canyon & Soledad	.98	E	.98	E	.98	E	.98	E	.00	.00
198. Valley Center & Soledad	.85	D	.73	C	.85	D	.75	C	.00	.02

* Significant Project Impact (see Table 1-3) at LOS "D"
** Significant Project Impact (see Table 1-3) at LOS "E" or "F"

Level of service ranges:	
.00 - .60	A
.61 - .70	B
.71 - .80	C
.81 - .90	D
.91 – 1.00	E
Above 1.00	F

Table 4-16

COMPARISON OF CONDITIONS BEFORE AND AFTER MITIGATION – PRE-INTERIM YEAR

INTERSECTION	PRE-INTERIM YEAR WITHOUT PROJECT AM		PM		PRE-INTERIM YEAR WITH PROJECT & MITIGATION AM		PM		NET CHANGE AM	PM
57. Valencia & Magic Mountain*	.80	C	1.01	F	.81	D	.95	E	.01	-.06
65. Bouquet & Soledad	.86	D	1.13	F	.89	D	1.04	F	.03	-.09
66. Bouquet & Newhall Ranch	.82	D	.88	D	.82	D	.89	D	.00	.01
67. Seco & Bouquet	.98	E	.98	E	.98	E	.86	D	.00	-.12

*See Section 4.3.3 for additional information regarding availability of right-of-way at this location.

Level of service ranges:

.00 - .60	A
.61 - .70	B
.71 - .80	C
.81 - .90	D
.91 – 1.00	E
Above 1.00	F

reconfiguring the northbound approach to include three left-turn lanes and three through lanes. This configuration is necessary only until the segment of Newhall Ranch Road from Bouquet to Golden Valley Road, including the construction of the Newhall Ranch Road/Golden Valley Road Bridge, across the Santa Clara River is constructed. The construction of this bridge results in a connection between Soledad Canyon Road and Newhall Ranch Road that reduces the volume of traffic through these left-turn movements. With the reduction in traffic, the northbound and southbound triple left-turn lanes are not required and these approaches should be reconfigured back to their planned ultimate configuration which consists of two left-turn lanes, three through lanes and two right-turn lanes at Bouquet Canyon Road/Soledad Canyon Road and two left-turn lanes, four through lanes and one right-turn lane at Bouquet Canyon Road/Newhall Ranch Road.

The project's percentage impact (as shown by the ICU) on the affected intersections, based on mitigation only where right-of-way is not required, is as follows:

- Bouquet & Soledad (mitigated) AM: .03 PM: -.09
- Bouquet & Newhall Ranch (mitigated) AM: .00 PM: .01
- Seco & Bouquet (mitigated) AM: .00 PM: -.12
- Valencia & Magic Mountain (unmitigated) AM: .01 PM: .01

The Riverpark project is located within the Bouquet Canyon Bridge and Thoroughfare District (Bouquet B & T District). This district is considered a full-mitigation district, that is, traffic improvements identified in the district mitigate traffic impacts created by planned growth within the district. In summary, the District has been designed to accommodate the needs of future development anticipated by the City and County General Plans.

Future identified improvements within the Bouquet Bridge and Thoroughfare District may result in improved operation at the impacted intersections. Various factors, including but not limited to, dedication of additional right-of-way at these affected intersections due to use alteration, expansion, or change, acquisition of the affected right-of-way by the City via funds from a Bridge and Thoroughfare District, continued expansion of the Valley's circulation system (i.e. construction of regional roadway improvements), and increased public transit use may improve the operation of each of the affected intersections.

4.4 MITIGATION

4.4.1 On-site Mitigation

The project is responsible for providing vehicular access onto and within the site that is compliant with City codes and regulations. Appropriate traffic control devices will be employed at each location where a project driveway intersects a public roadway.

Two future major arterial roadways pass through the project site (Newhall Ranch Road and Santa Clarita Parkway). The project will construct the portion of these arterials that are located within the site boundary to the arterial standards established by the City. Since the funding of these arterials is included in the Bridge and Thoroughfare (B&T) District improvement program (see Section 4.4.3), the project's B&T payments will be credited with the cost of the construction of these arterials.

4.4.2 Off-site Mitigation

The preceding sections show how a significant impact occurs at the following intersections for the indicated scenarios:

Intersection	Interim Year	Alternative Interim Year	Pre-Interim Year
McBean Parkway and Newhall Ranch Road	X	X	
Valencia Boulevard and Magic Mountain Parkway	X	X	X
Bouquet Canyon Road and Soledad Canyon Road	X	X	X
Bouquet Canyon Road and Newhall Ranch Road	X	X	X
Seco Canyon Road and Bouquet Canyon Road	X	X	X
Whites Canyon Road and Soledad Canyon Road	X		

Each of the off-site impacts occurs in one or more of the Interim Year analysis scenarios. There are no significant impacts due to the project for the Long-Range scenario.

Intersection improvements that fully mitigate the impacts of the proposed project were identified in the applicable section and are summarized in Table 4-17. Locations are noted where mitigation measures will require the acquisition of right-of-way that is not under the control of the project applicant. Therefore, the implementation of these mitigation measures may require the condemnation of property by the City in order to acquire the necessary right-of-way.

Table 4-17

MITIGATION SUMMARY

LOCATION	SCENARIO	MITIGATION
48. McBean & Newhall Ranch	IY, AIY	Add 4th Eastbound Through Lane Add 4th Westbound Through Lane
57. Valencia & Magic Mountain	IY, AIY, PIY	Add 3rd Eastbound Through Lane (requires right-of-way on south side of Valencia Boulevard)
65. Bouquet & Soledad	IY, AIY	Add 4th Northbound Through Lane (requires right-of-way on southeast corner of intersection along Bouquet Canyon Road)
	PIY	Temporary configuration to consist of 3 Southbound Left-Turn Lanes and 2 Southbound Through Lanes. Would revert to 2 Southbound Left-Turn Lanes and 3 Southbound Through Lanes (existing configuration) when Cross-Valley Connector is completed.
66. Bouquet & Newhall Ranch	IY, AIY	Add 4th Eastbound Through Lane Add 4th Westbound Through Lane
	PIY	Add 2nd Southbound Left-Turn Lane Temporary configuration to consist of 3 Northbound Left-Turn Lanes, 3 Northbound Through Lanes and 2 Westbound Right-Turn Lanes. Would revert to 2 Northbound Left-Turn Lanes, 4 Northbound Through Lanes, and 1 Westbound Right-Turn Lane (existing configuration) when Cross-Valley Connector is completed.
67. Seco & Bouquet	IY, AIY, PIY	Convert 1st Southbound Right-Turn Lane to a shared Left-Turn/Right-Turn Lane (for 1 Left-Turn Lane, 1 shared Left-Turn/Right-Turn Lane, 1 Right-Turn Lane)
	IY	Add 1st Westbound Right-Turn Lane (requires right-of-way on northeast corner of intersection along Bouquet Canyon Road)
172. Whites Canyon & Soledad	IY	Add 2nd dedicated Northbound Left-Turn Lane & convert shared Northbound Left-Turn/Through Lane to 3rd dedicated Northbound Through Lane (requires right-of-way on southeast side of intersection along Whites Canyon Road) Or Add 1st Eastbound Right-Turn Lane (requires right-of-way on southwest corner of intersection along Soledad Canyon Road)

IY = Interim Year Scenario
AIY = Alternative Interim Year Scenario
PIY = Pre-Interim Year Scenario

See Appendix G for drawings of each intersection improvement.

At the intersections of Valencia Boulevard/Magic Mountain Parkway, Bouquet Canyon Road/Soledad Canyon Road, Seco Canyon Road/Bouquet Canyon Road, and Whites Canyon Road/Soledad Canyon Road, the City has determined that improvements to reduce the project's impact to a level less than significant require additional right-of-way. These intersections are currently built to their ultimate size. Since the project and these intersections are in a full improvement Bridge and Thoroughfare (B&T) district, the project will pay B&T fees that can be used by the district to acquire additional right-of-way at these intersections. For Interim Year conditions, without mitigation, the Valencia Boulevard/Magic Mountain Parkway intersection is forecast as LOS F (same as the no-project conditions), the Bouquet Canyon Road/Soledad Canyon Road intersection is forecast as LOS E (same as the no-project conditions), the Seco Canyon Road/Bouquet Canyon Road intersection is forecast as LOS E (same as the no-project conditions), and the Whites Canyon Road/Soledad Canyon Road intersection is forecast as LOS D (same as the no-project and the with project with mitigation conditions). The remaining significantly impacted intersections will be fully mitigated with the proposed improvements and are forecast as LOS D or better. The project's share of the future traffic for each location requiring mitigation is provided in Table 4-18.

The first 500 units of the project can be occupied with the Newhall Ranch Road extension from Bouquet Canyon Road as the point of access and does not require the construction of the Newhall Ranch Road/Golden Valley Road bridge across the Santa Clara River. The full buildout of the project necessitates the construction of the Newhall Ranch Road extension to Golden Valley Road, including the Newhall Ranch Road/Golden Valley Road bridge across the Santa Clara River. While a two lane road and bridge would accommodate the project generated traffic alone (approximately 3,000 ADT at the bridge), four to six lanes are required to accommodate the additional non-project traffic that will use the road and bridge (an additional 29,000 ADT).

Table 4-18

PROJECT SHARE AT SIGNIFICANTLY IMPACTED LOCATIONS

INTERSECTION	INTERIM YEAR	ALTERNATIVE INTERIM YEAR
48. McBean & Newhall Ranch	8%	8%
57. Valencia & Magic Mountain	5%	5%
65. Bouquet & Soledad	4%	4%
66. Bouquet & Newhall Ranch	22%	26%
67. Seco & Bouquet	13%	2%
172. Whites Canyon & Soledad	4%	N/A

See Appendix E for share calculations

4.4.3 Bridge and Thoroughfare District Fee

Within the Santa Clarita Valley, the County and the City have established Bridge and Thoroughfare (B&T) Districts to manage the many significant infrastructure improvements planned to occur within the valley. The project site is located within the Bouquet Canyon District and the B&T fee for the Bouquet Canyon District is $14,200 per factored dwelling unit.

The Bouquet Canyon B&T District has recently been updated and is considered a full improvement district. The implication of this is that the B&T fees collected within the district have been calculated to cover all the anticipated improvements necessary to build out the arterial roadway network as outlined in the City's General Plan Circulation Element. Since most of the mitigation identified for the project is included in the B&T program, B&T improvements constructed directly by the project should be credited against the project's total B&T fee.

APPENDIX A
INTERSECTION CAPACITY UTILIZATION WORKSHEETS

Peak hour intersection volume/capacity ratios are calculated by means of intersection capacity utilization (ICU) values. ICU calculations were performed for the intersections shown in Figure A-1.

The procedure is based on the critical movement methodology, and shows the amount of capacity utilized by each critical move. A "de-facto" right-turn lane is used in the ICU calculation for cases where a curb lane is wide enough to separately serve both through and right-turn traffic (typically with a width of 19 feet from curb to outside of through-lane with parking prohibited during peak periods). Such lanes are treated the same as striped right-turn lanes during the ICU calculations, but they are denoted on the ICU calculation worksheets using the letter "d" in place of a numerical entry for right-turn lanes.

The methodology also incorporates a check for right-turn capacity utilization. Both right-turn-on-green (RTOG) and right-turn-on-red (RTOR) capacity availability are calculated and checked against the total right-turn capacity need. If insufficient capacity is available, then an adjustment is made to the total capacity utilization value. The following example shows how this adjustment is made.

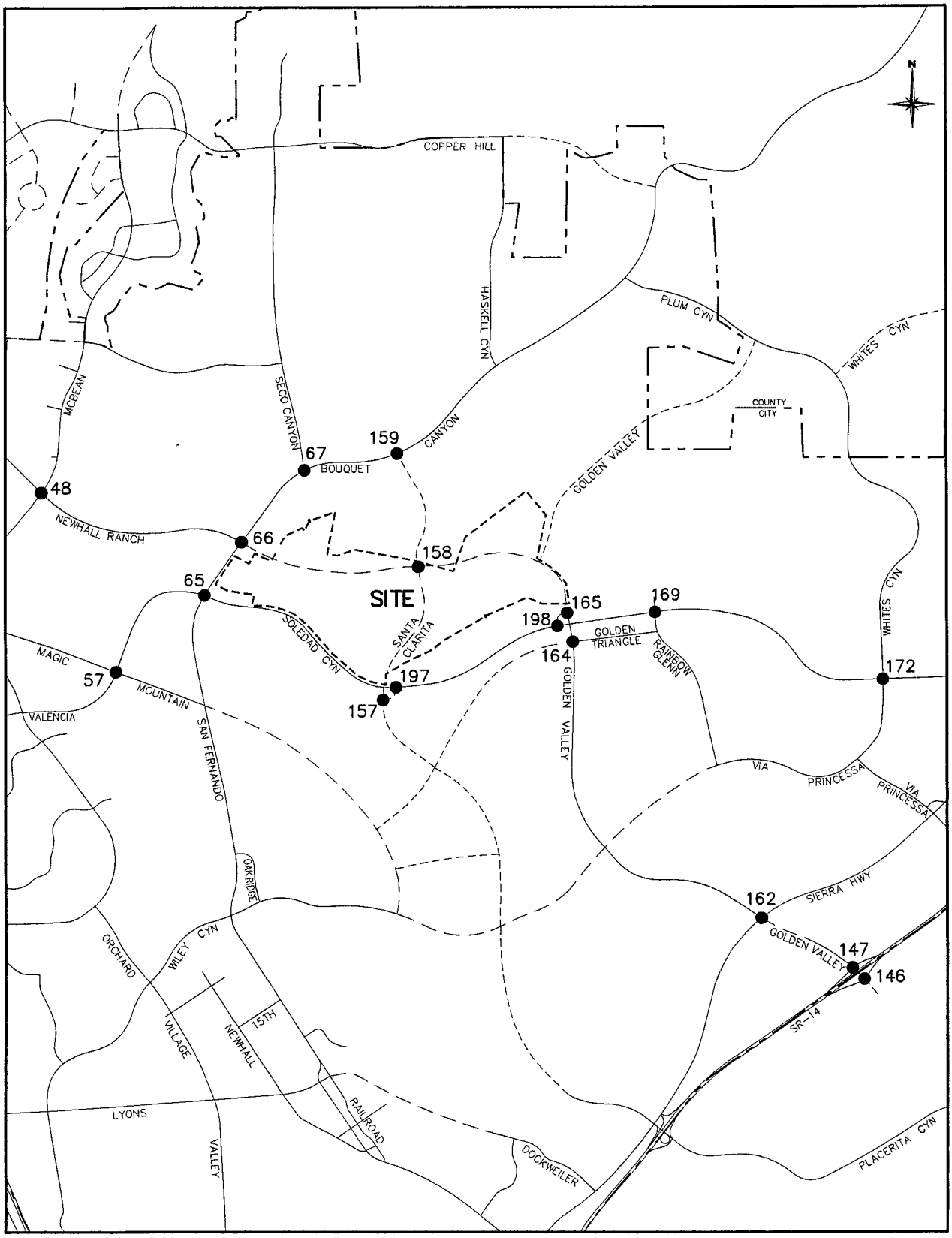
Example of Right-turn Capacity Utilization For Northbound Right

1. Right-Turn-On-Green (RTOG)

If NBT is critical move, then:
RTOG = V/C (NBT)
Otherwise,
RTOG = V/C (NBL) + V/C (SBT) - V/C (SBL)

2. Right-Turn-On-Red (RTOR)

If WBL is critical move, then:
RTOR = V/C (WBL)
Otherwise,
RTOR = V/C (EBL) + V/C (WBT) - V/C (EBT)



Legend

- Study Location
- Site Boundary
- Existing Roadway
- Interim Year Roadway
- Long-Range Roadway
- City Boundary

Figure A-1

INTERSECTION STUDY LOCATIONS

3. Right-Turn Overlap Adjustment

If the northbound right is assumed to overlap with the adjacent westbound left, adjustments to the RTOG and RTOR values are made as follows:

RTOG = RTOG + V/C (WBL)
RTOR = RTOR - V/C (WBL)

4. Total Right-Turn Capacity (RTC) Availability For NBR

RTC = RTOG + factor x RTOR
Where factor = RTOR saturation flow factor (typically 75%)

5. Right-turn Adjustment for ICU Calculation

Right-turn adjustment is then as follows: Additional ICU = V/C (NBR) - RTC

A zero or negative value indicates that adequate capacity is available and no adjustment is necessary. A positive value indicates that the available RTOR and RTOG capacity does not adequately accommodate the right-turn V/C, therefore the right-turn is essentially considered to be a critical movement. In such cases, the right-turn adjustment is noted on the ICU worksheet and it is included in the total capacity utilization value. When it is determined that a right-turn adjustment is required for more than one right-turn movement, the word "multi" is printed on the worksheet instead of an actual right-turn movement reference, and the right-turn adjustments are cumulatively added to the total capacity utilization value. In such cases, further operational evaluation is typically carried out to determine if under actual operational conditions, the critical right-turns would operate simultaneously, and therefore a right-turn adjustment credit should be applied.

Shared Lane V/C Methodology

For intersection approaches where shared usage of a lane is permitted by more than one turn movement (e.g., left/through, through/right, left/through/right), the individual turn volumes are evaluated to determine whether dedication of the shared lane is warranted to any one given turn movement. The following example demonstrates how this evaluation is carried out:

Example of Shared Lane Utilization for Shared Left/Through Lane

1. Average Lane Volume (ALV)

$$ALV = \frac{\text{Left-Turn Volume + Through Volume}}{\text{Total Left + Through Approach Lanes (including shared lane)}}.$$

2. ALV for Each Approach

$$ALV\ (Left) = \frac{\text{Left-Turn Volume}}{\text{Left Approach Lanes (including shared lane)}}.$$

$$ALV\ (Through) = \frac{\text{Through Volume}}{\text{Through Approach Lanes (including shared lane)}}.$$

3. Lane Dedication is Warranted

If ALV (Left) is greater than ALV then full dedication of the shared lane to the left-turn approach is warranted. Left-turn and through V/C ratios for this case are calculated as follows:

$$V/C\ (Left) = \frac{\text{Left-Turn Volume}}{\text{Left Approach Capacity (including shared lane)}}.$$

$$V/C\ (Through) = \frac{\text{Through Volume}}{\text{Through Approach Capacity (excluding shared lane)}}.$$

Similarly, if ALV (Through) is greater than ALV then full dedication to the through approach is warranted, and left-turn and through V/C ratios are calculated as follows:

$$V/C\ (Left) = \frac{\text{Left-Turn Volume}}{\text{Left Approach Capacity (excluding shared lane)}}.$$

$$V/C\ (Through) = \frac{\text{Through Volume}}{\text{Through Approach Capacity (including shared lane)}}.$$

4. Lane Dedication is not Warranted

If ALV (Left) and ALV (Through) are both less than ALV, the left/through lane is assumed to be truly shared and each left, left/through or through approach lane carries an evenly distributed volume of traffic equal to ALV. A combined left/through V/C ratio is calculated as follows:

$$\text{V/C (Left/Through)} = \frac{\text{Left-Turn Volume + Through Volume}}{\text{Total Left + Through Approach Capacity (including shared lane)}}.$$

This V/C (Left/Through) ratio is assigned as the V/C (Through) ratio for the critical movement analysis and ICU summary listing.

If split phasing has not been designated for this approach, the relative proportion of V/C (Through) that is attributed to the left-turn volume is estimated as follows:

If approach has more than one left-turn (including shared lane), then:

$$\text{V/C (Left)} = \text{V/C (Through)}$$

If approach has only one left-turn lane (shared lane), then:

$$\text{V/C (Left)} = \frac{\text{Left-Turn Volume}}{\text{Single Approach Lane Capacity}}.$$

If this left-turn movement is determined to be a critical movement, the V/C (Left) value is posted in brackets on the ICU summary printout.

These same steps are carried out for shared through/right lanes. If full dedication of a shared through/right lane to the right-turn movement is warranted, the right-turn V/C value calculated in step three is checked against the RTOR and RTOG capacity availability if the option to include right-turns in the V/C ratio calculations is selected. If the V/C value that is determined using the shared lane methodology described here is reduced due to RTOR and RTOG capacity availability, the V/C value for the through/right lanes is posted in brackets.

When an approach contains more than one shared lane (e.g., left/through and through/right), steps one and two listed above are carried out for the three turn movements combined. Step four is carried out if dedication is not warranted for either of the shared lanes. If dedication of one of the shared lanes is warranted to one movement or another, step three is carried out for the two movements involved, and then steps one through four are repeated for the two movements involved in the other shared lane.

48. McBean & Newhall Ranch

Existing Count (2002)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3500	415	.12*	196	.06
NBT	3	5250	379	.07	1451	.28*
NBR	2	3500	254	.07	727	.21
SBL	2	3500	100	.03	71	.02*
SBT	4	7000	1574	.22*	608	.09
SBR	f		440		224	
EBL	2	3500	175	.05*	371	.11
EBT	3	5250	485	.09	834	.16*
EBR	1	1750	310	.18	240	.14
WBL	2	3500	769	.22	335	.10*
WBT	3	5250	1757	.33*	238	.05
WBR	1	1750	60	.03	74	.04
Clearance Interval				.10*		.10*

TOTAL CAPACITY UTILIZATION .82 .66

Pre-Interim Year without Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3500	498	.14*	118	.03
NBT	3	5250	794	.15	1798	.34*
NBR	2	3500	252	.07	1014	.29
SBL	2	3500	222	.06	206	.06*
SBT	4	7000	1853	.26*	1291	.18
SBR	f		503		101	
EBL	2	3500	96	.03*	355	.10
EBT	3	5250	525	.10	1309	.25*
EBR	1	1750	284	.16	406	.23
WBL	2	3500	721	.21	389	.11*
WBT	3	5250	1785	.34*	804	.15
WBR	1	1750	103	.06	176	.10
Clearance Interval				.10*		.10*

TOTAL CAPACITY UTILIZATION .87 .86

Pre-Interim Year with Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3500	498	.14*	118	.03
NBT	3	5250	794	.15	1798	.34*
NBR	2	3500	254	.07	1053	.30
SBL	2	3500	225	.06	212	.06*
SBT	4	7000	1853	.26*	1291	.18
SBR	f		503		101	
EBL	2	3500	96	.03*	355	.10
EBT	3	5250	537	.10	1341	.26*
EBR	1	1750	284	.16	406	.23
WBL	2	3500	731	.21	399	.11*
WBT	3	5250	1833	.35*	819	.16
WBR	1	1750	104	.06	180	.10
Clearance Interval				.10*		.10*

TOTAL CAPACITY UTILIZATION .88 .87

Interim Year without Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3500	625	.18*	126	.04
NBT	3	5250	629	.12	1724	.33*
NBR	2	3500	297	.08	824	.24
SBL	2	3500	197	.06	219	.06*
SBT	4	7000	1762	.25*	1168	.17
SBR	f		632		193	
EBL	2	3500	190	.05*	341	.10
EBT	3	5250	645	.12	1506	.29*
EBR	1	1750	267	.15	419	.24
WBL	2	3500	856	.24	344	.10*
WBT	3	5250	1708	.33*	1011	.19
WBR	1	1750	143	.08	299	.17
Clearance Interval				.10*		.10*

TOTAL CAPACITY UTILIZATION .91 .88

48. McBean & Newhall Ranch

Interim Year with Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3500	625	.18*	126	.04
NBT	3	5250	629	.12	1724	.33*
NBR	2	3500	307	.09	872	.25
SBL	2	3500	202	.06	233	.07*
SBT	4	7000	1762	.25*	1168	.17
SBR	f		632		193	
EBL	2	3500	190	.05*	341	.10
EBT	3	5250	661	.13	1582	.30*
EBR	1	1750	267	.15	419	.24
WBL	2	3500	883	.25	358	.10*
WBT	3	5250	1786	.34*	1045	.20
WBR	1	1750	149	.09	311	.18
Clearance Interval				.10*		.10*
TOTAL CAPACITY UTILIZATION				.92		.90

Interim Year with Project with Mitigation

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3500	625	.18*	126	.04
NBT	3	5250	629	.12	1724	.33*
NBR	2	3500	307	.09	872	.25
SBL	2	3500	202	.06	233	.07*
SBT	4	7000	1762	.25*	1168	.17
SBR	f		632		193	
EBL	2	3500	190	.05	341	.10
EBT	4	7000	661	.09*	1582	.23*
EBR	1	1750	267	.15	419	.24
WBL	2	3500	883	.25*	358	.10*
WBT	4	7000	1786	.26	1045	.15
WBR	1	1750	149	.09	311	.18
Clearance Interval				.10*		.10*
TOTAL CAPACITY UTILIZATION				.87		.83

Interim Year w/Santa Clarita Pkwy w/out Proj

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3500	629	.18*	290	.08
NBT	3	5250	581	.11	1599	.30*
NBR	2	3500	230	.07	927	.26
SBL	2	3500	232	.07	187	.05*
SBT	4	7000	1561	.22*	1076	.15
SBR	f		567		199	
EBL	2	3500	194	.06	269	.08
EBT	3	5250	652	.12*	1471	.28*
EBR	1	1750	268	.15	534	.31
WBL	2	3500	937	.27*	360	.10*
WBT	3	5250	1523	.29	1080	.21
WBR	1	1750	152	.09	367	.21
Clearance Interval				.10*		.10*
TOTAL CAPACITY UTILIZATION				.89		.83

Interim Year w/Santa Clarita Pkwy w/Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3500	629	.18*	290	.08
NBT	3	5250	581	.11	1599	.30*
NBR	2	3500	240	.07	967	.28
SBL	2	3500	237	.07	196	.06*
SBT	4	7000	1561	.22*	1076	.15
SBR	f		567		199	
EBL	2	3500	194	.06	269	.08
EBT	3	5250	673	.13*	1541	.29*
EBR	1	1750	268	.15	534	.31
WBL	2	3500	964	.28*	380	.11*
WBT	3	5250	1601	.30	1113	.21
WBR	1	1750	158	.09	377	.22
Clearance Interval				.10*		.10*
TOTAL CAPACITY UTILIZATION				.91		.86

48. McBean & Newhall Ranch

Int Year w/Sta Clarita Pkwy w/Proj w/Mitigation

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3500	629	.18*	290	.08
NBT	3	5250	581	.11	1599	.30*
NBR	2	3500	240	.07	967	.28
SBL	2	3500	237	.07	196	.06*
SBT	4	7000	1561	.22*	1076	.15
SBR	f		567		199	
EBL	2	3500	194	.06	269	.08
EBT	4	7000	673	.10*	1541	.22*
EBR	1	1750	268	.15	534	.31
WBL	2	3500	964	.28*	380	.11*
WBT	4	7000	1601	.23	1113	.16
WBR	1	1750	158	.09	377	.22
Clearance Interval				.10*		.10*
TOTAL CAPACITY UTILIZATION				**.88**		**.79**

57. Valencia & Magic Mtn

Existing Count (2002)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1750	45	.03*	75	.04
NBT	3	5250	691	.15	1285	.27*
NBR	0	0	97		110	
SBL	1	1750	52	.03	83	.05*
SBT	3	5250	1430	.27*	959	.18
SBR	2	3500	543	.16	413	.12
EBL	2	3500	172	.05	600	.17*
EBT	2	3500	196	.07*	359	.11
EBR	0	0	47		38	
WBL	1	1750	195	.11*	196	.11
WBT	2	3500	324	.09	367	.10*
WBR	1	1750	39	.02	55	.03
Clearance Interval				.10*		.10*

TOTAL CAPACITY UTILIZATION .58 .69

Pre-Interim Year without Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1750	2	.00	41	.02
NBT	3	5250	937	.20	1333	.32*
NBR	0	0	133		331	
SBL	1	1750	111	.06	130	.07*
SBT	3	5250	1463	.28*	1023	.19
SBR	2	3500	686	.20	895	.26
EBL	2	3500	623	.18*	1066	.30
EBT	2	3500	258	.09	720	.22*
EBR	0	0	55		47	
WBL	1	1750	375	.21	524	.30*
WBT	2	3500	843	.24*	454	.13
WBR	1	1750	79	.05	251	.14
Clearance Interval				.10*		.10*

TOTAL CAPACITY UTILIZATION .80 1.01

Pre-Interim Year with Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1750	2	.00	41	.02
NBT	3	5250	942	.20	1353	.32*
NBR	0	0	133		337	
SBL	1	1750	115	.07	132	.08*
SBT	3	5250	1503	.29*	1036	.20
SBR	2	3500	709	.20	904	.26
EBL	2	3500	624	.18*	1080	.31
EBT	2	3500	258	.09	723	.22*
EBR	0	0	55		47	
WBL	1	1750	379	.22	524	.30*
WBT	2	3500	845	.24*	454	.13
WBR	1	1750	79	.05	255	.15
Clearance Interval				.10*		.10*

TOTAL CAPACITY UTILIZATION .81 1.02

Pre-Interim Year with Project with Mitigation

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1750	2	.00	41	.02
NBT	3	5250	942	.20	1353	.32*
NBR	0	0	133		337	
SBL	1	1750	115	.07	132	.08*
SBT	3	5250	1503	.29*	1036	.20
SBR	2	3500	709	.20	904	.26
EBL	2	3500	624	.18*	1080	.31
EBT	3	5250	258	.06	723	.15*
EBR	0	0	55		47	
WBL	1	1750	379	.22	524	.30*
WBT	2	3500	845	.24*	454	.13
WBR	1	1750	79	.05	255	.15
Clearance Interval				.10*		.10*

TOTAL CAPACITY UTILIZATION .81 .95

57. Valencia & Magic Mtn

Interim Year without Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1750	8	.00	11	.01
NBT	3	5250	589	.15	1308	.32*
NBR	0	0	215		360	
SBL	1	1750	178	.10	187	.11*
SBT	3	5250	1469	.28*	1110	.21
SBR	2	3500	641	.18	764	.22
EBL	2	3500	312	.09	1124	.32
EBT	2	3500	743	.23*	1158	.34*
EBR	0	0	54		44	
WBL	1	1750	800	.46*	383	.22*
WBT	2	3500	1104	.32	714	.20
WBR	1	1750	216	.12	299	.17
Clearance Interval				.10*		.10*

TOTAL CAPACITY UTILIZATION 1.07 1.09

Interim Year with Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1750	8	.00	11	.01
NBT	3	5250	601	.16	1358	.33*
NBR	0	0	215		363	
SBL	1	1750	182	.10	189	.11*
SBT	3	5250	1544	.29*	1143	.22
SBR	2	3500	673	.19	788	.23
EBL	2	3500	322	.09	1163	.33
EBT	2	3500	743	.23*	1167	.35*
EBR	0	0	54		44	
WBL	1	1750	804	.46*	386	.22*
WBT	2	3500	1111	.32	714	.20
WBR	1	1750	218	.12	305	.17
Clearance Interval				.10*		.10*

TOTAL CAPACITY UTILIZATION 1.08 1.11

Interim Year with Project with Mitigation

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1750	8	.00	11	.01
NBT	3	5250	601	.16	1358	.33*
NBR	0	0	215		363	
SBL	1	1750	182	.10	189	.11*
SBT	3	5250	1544	.29*	1143	.22
SBR	2	3500	673	.19	788	.23
EBL	2	3500	322	.09	1163	.33*
EBT	3	5250	743	.15*	1167	.23
EBR	0	0	54		44	
WBL	1	1750	804	.46*	386	.22
WBT	2	3500	1111	.32	714	.20*
WBR	1	1750	218	.12	305	.17
Clearance Interval				.10*		.10*

TOTAL CAPACITY UTILIZATION 1.00 1.07

Interim Year w/Santa Clarita Pkwy w/out Proj

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1750	5	.00	7	.00
NBT	3	5250	540	.15	1051	.30*
NBR	0	0	295	.17	582	.33
SBL	1	1750	88	.05	215	.12*
SBT	3	5250	1301	.25*	919	.18
SBR	2	3500	678	.19	748	.21
EBL	2	3500	442	.13	1172	.33
EBT	2	3500	587	.18*	1166	.35*
EBR	0	0	51		42	
WBL	1	1750	908	.52*	516	.29*
WBT	2	3500	1103	.32	642	.18
WBR	1	1750	151	.09	255	.15
Clearance Interval				.10*		.10*

TOTAL CAPACITY UTILIZATION 1.05 1.16

57. Valencia & Magic Mtn

Interim Year w/Santa Clarita Pkwy w/Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1750	5	.00	7	.00
NBT	3	5250	553	.16	1091	.31*
NBR	0	0	295	.17	585	.33
SBL	1	1750	89	.05	217	.12*
SBT	3	5250	1351	.26*	956	.18
SBR	2	3500	722	.21	764	.22
EBL	2	3500	446	.13	1211	.35
EBT	2	3500	587	.18*	1175	.35*
EBR	0	0	51		42	
WBL	1	1750	921	.53*	516	.29*
WBT	2	3500	1109	.32	642	.18
WBR	1	1750	153	.09	259	.15
Clearance Interval				.10*		.10*
TOTAL CAPACITY UTILIZATION				1.07		1.17

Int Year w/Sta Clarita Pkwy w/Proj w/Mitigation

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1750	5	.00	7	.00
NBT	3	5250	553	.16	1091	.31*
NBR	0	0	295	.17	585	.33
SBL	1	1750	89	.05	217	.12*
SBT	3	5250	1351	.26*	956	.18
SBR	2	3500	722	.21	764	.22
EBL	2	3500	446	.13	1211	.35*
EBT	3	5250	587	.12*	1175	.23
EBR	0	0	51		42	
WBL	1	1750	921	.53*	516	.29
WBT	2	3500	1109	.32	642	.18*
WBR	1	1750	153	.09	259	.15
Clearance Interval				.10*		.10*
TOTAL CAPACITY UTILIZATION				1.01		1.06

65. Bouquet & Soledad

Existing Count (2002)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1750	38	.02	36	.02
NBT	3	5250	590	.11*	1083	.21*
NBR	1	1750	340	.19	437	.25
SBL	2	3500	624	.18*	834	.24*
SBT	3	5250	1329	.25	836	.16
SBR	2	3500	1012	.29	637	.18
EBL	2	3500	268	.08*	1102	.31*
EBT	3	5250	579	.11	1443	.28
EBR	0	0	16		21	
WBL	2	3500	359	.10	420	.12
WBT	2.5	7000	1424	{.29}*	793	{.18}*
WBR	1.5		868		790	
Clearance Interval				.10*		.10*

Note: Assumes Right-Turn Overlap for SBR

TOTAL CAPACITY UTILIZATION .76 1.04

Pre-Interim Year without Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1750	35	.02	35	.02
NBT	3	5250	592	.11*	1322	.25*
NBR	1	1750	395	.23	463	.26
SBL	2	3500	910	.26*	1044	.30*
SBT	3	5250	1315	.25	1036	.20
SBR	2	3500	1162	.33	888	.25
EBL	3	5250	474	.09*	1139	.22
EBT	3	5250	886	.17	1513	.29*
EBR	0	0	23		25	
WBL	2	3500	544	.16	650	.19*
WBT	2.5	7000	1521	{.30}*	841	{.18}
WBR	1.5		903		815	
Clearance Interval				.10*		.10*

Note: Assumes Right-Turn Overlap for SBR

TOTAL CAPACITY UTILIZATION .86 1.13

Pre-Interim Year with Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1750	35	.02	35	.02
NBT	3	5250	605	.12*	1374	.26*
NBR	1	1750	395	.23	463	.26
SBL	2	3500	928	.27*	1058	.30*
SBT	3	5250	1360	.26	1067	.20
SBR	2	3500	1239	.35	919	.26
EBL	3	5250	480	.09*	1195	.23
EBT	3	5250	886	.17	1513	.29*
EBR	0	0	23		25	
WBL	2	3500	544	.16	650	.19*
WBT	2.5	7000	1521	{.30}*	841	{.19}
WBR	1.5		915		853	
Clearance Interval				.10*		.10*

Note: Assumes Right-Turn Overlap for SBR

TOTAL CAPACITY UTILIZATION .88 1.14

Pre-Interim Year with Project with Mitigation

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1750	35	.02*	35	.02
NBT	3	5250	605	.12	1374	.26*
NBR	1	1750	395	.23	463	.26
SBL	3	5250	928	.18	1058	.20*
SBT	2	3500	1360	.39*	1067	.30
SBR	2	3500	1239	.35	919	.26
EBL	3	5250	480	.09*	1195	.23
EBT	3	5250	886	.17	1513	.29*
EBR	0	0	23		25	
WBL	2	3500	544	.16	650	.19*
WBT	2.5	7000	1521	{.29}*	841	{.20}
WBR	1.5		915		853	
Clearance Interval				.10*		.10*

Note: Assumes Right-Turn Overlap for SBR

TOTAL CAPACITY UTILIZATION .89 1.04

65. Bouquet & Soledad

Interim Year without Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1750	34	.02*	35	.02
NBT	3	5250	873	.17	1652	.31*
NBR	1	1750	84	.05	193	.11
SBL	2	3500	213	.06	569	.16*
SBT	3	5250	1512	.29*	1275	.24
SBR	2	3500	1108	.32	817	.23
EBL	3	5250	419	.08*	1068	.20
EBT	3	5250	385	.08	1453	.28*
EBR	0	0	23		26	
WBL	2	3500	144	.04	230	.07*
WBT	2.5	7000	1440	.27*	761	{.14}
WBR	1.5		362	.21	368	{.09}
Clearance Interval				.10*		.10*

Note: Assumes Right-Turn Overlap for SBR

TOTAL CAPACITY UTILIZATION .76 .92

Interim Year with Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1750	34	.02*	35	.02
NBT	3	5250	892	.17	1730	.33*
NBR	1	1750	84	.05	193	.11
SBL	2	3500	216	.06	580	.17*
SBT	3	5250	1563	.30*	1337	.25
SBR	2	3500	1229	.35	895	.26
EBL	3	5250	446	.08*	1189	.23*
EBT	3	5250	385	.08	1466	.28
EBR	0	0	23		26	
WBL	2	3500	144	.04	230	.07
WBT	2.5	7000	1454	.28*	761	{.14}*
WBR	1.5		369	.21	375	{.09}
Clearance Interval				.10*		.10*

Note: Assumes Right-Turn Overlap for SBR

TOTAL CAPACITY UTILIZATION .78 .97

Interim Year with Project with Mitigation

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1750	34	.02*	35	.02
NBT	4	7000	892	.13	1730	.25*
NBR	1	1750	84	.05	193	.11
SBL	2	3500	216	.06	580	.17*
SBT	3	5250	1563	.30*	1337	.25
SBR	2	3500	1229	.35	895	.26
EBL	3	5250	446	.08*	1189	.23*
EBT	3	5250	385	.08	1466	.28
EBR	0	0	23		26	
WBL	2	3500	144	.04	230	.07
WBT	2.5	7000	1454	.28*	761	{.14}*
WBR	1.5		369	.21	375	{.09}
Clearance Interval				.10*		.10*

Note: Assumes Right-Turn Overlap for SBR

TOTAL CAPACITY UTILIZATION .78 .89

Interim Year w/Santa Clarita Pkwy w/out Proj

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1750	34	.02*	36	.02
NBT	3	5250	728	.14	1487	.28*
NBR	1	1750	44	.03	190	.11
SBL	2	3500	207	.06	658	.19*
SBT	3	5250	1312	.25*	1121	.21
SBR	2	3500	1102	.31	751	.21
EBL	3	5250	487	.09*	1118	.21
EBT	3	5250	386	.08	1397	.27*
EBR	0	0	22		25	
WBL	2	3500	222	.06	250	.07*
WBT	2.5	7000	1345	{.26}*	649	{.12}
WBR	1.5		519	{.20}	234	
Clearance Interval				.10*		.10*

Note: Assumes Right-Turn Overlap for SBR

TOTAL CAPACITY UTILIZATION .72 .91

65. Bouquet & Soledad

Interim Year w/Santa Clarita Pkwy w/Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1750	34	.02*	36	.02
NBT	3	5250	739	.14	1548	.29*
NBR	1	1750	44	.03	195	.11
SBL	2	3500	210	.06	671	.19*
SBT	3	5250	1366	.26*	1163	.22
SBR	2	3500	1203	.34	820	.23
EBL	3	5250	509	.10*	1213	.23*
EBT	3	5250	386	.08	1424	.28
EBR	0	0	22		25	
WBL	2	3500	226	.06	250	.07
WBT	2.5	7000	1363	{.26}*	651	{.12}*
WBR	1.5		526	{.20}	242	
Clearance Interval				.10*		.10*

Note: Assumes Right-Turn Overlap for SBR

TOTAL CAPACITY UTILIZATION .74 .93

Int Year w/Sta Clarita Pkwy w/Proj w/Mitigation

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1750	34	.02*	36	.02
NBT	4	7000	739	.11	1548	.22*
NBR	1	1750	44	.03	195	.11
SBL	2	3500	210	.06	671	.19*
SBT	3	5250	1366	.26*	1163	.22
SBR	2	3500	1203	.34	820	.23
EBL	3	5250	509	.10*	1213	.23*
EBT	3	5250	386	.08	1424	.28
EBR	0	0	22		25	
WBL	2	3500	226	.06	250	.07
WBT	2.5	7000	1363	{.26}*	651	{.12}*
WBR	1.5		526	{.17}	242	
Clearance Interval				.10*		.10*

Note: Assumes Right-Turn Overlap for SBR

TOTAL CAPACITY UTILIZATION .74 .86

65. Bouquet & Soledad

Long-Range with 6 Lane SCP

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1750	10	.01*	20	.01
NBT	3	5250	670	.13	1880	.36*
NBR	1	1750	60	.03	260	.15
SBL	2	3500	400	.11	630	.18*
SBT	3	5250	1840	.35*	1360	.26
SBR	2	3500	1380	.39	910	.26
EBL	3	5250	410	.08*	1230	.23*
EBT	3	5250	400	.08	1160	.23
EBR	0	0	10		30	
WBL	2	3500	230	.07	180	.05
WBT	2.5	7000	1320	.25*	640	{.12}*
WBR	1.5		460	{.07}	440	{.12}
Clearance Interval				.10*		.10*

Note: Assumes Right-Turn Overlap for SBR

TOTAL CAPACITY UTILIZATION .79 .99

Long-Range with 4 Lane SCP

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1750	10	.01*	30	.02
NBT	3	5250	650	.12	2010	.38*
NBR	1	1750	50	.03	240	.14
SBL	2	3500	510	.15	410	.12*
SBT	3	5250	1900	.36*	1380	.26
SBR	2	3500	1280	.37	850	.24
EBL	3	5250	430	.08*	1170	.22*
EBT	3	5250	410	.08	1350	.26
EBR	0	0	20		30	
WBL	2	3500	140	.04	180	.05
WBT	2.5	7000	1240	.24*	600	{.14}*
WBR	1.5		440	{.04}	540	
Clearance Interval				.10*		.10*

Note: Assumes Right-Turn Overlap for SBR

TOTAL CAPACITY UTILIZATION .79 .96

Long-Range without SCP north of Soledad

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1750	10	.01*	50	.03
NBT	3	5250	740	.14	1890	.36*
NBR	1	1750	50	.03	200	.11
SBL	2	3500	730	.21	570	.16*
SBT	3	5250	2050	.39*	1590	.30
SBR	2	3500	1240	.35	880	.25
EBL	3	5250	380	.07*	1130	.22*
EBT	3	5250	420	.08	1280	.25
EBR	0	0	10		30	
WBL	2	3500	120	.03	180	.05
WBT	2.5	7000	1330	{.25}*	550	.16*
WBR	1.5		520	{.08}	1030	.29
Right Turn Adjustment					WBR	.01*
Clearance Interval				.10*		.10*

Note: Assumes Right-Turn Overlap for SBR

TOTAL CAPACITY UTILIZATION .82 1.01

65. Bouquet & Soledad

Long-Range with 6 Lane SCP

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1750	10	.01*	20	.01
NBT	4	7000	670	.10	1880	.27*
NBR	1	1750	60	.03	260	.15
SBL	2	3500	400	.11	630	.18*
SBT	3	5250	1840	.35*	1360	.26
SBR	2	3500	1380	.39	910	.26
EBL	3	5250	410	.08*	1230	.23*
EBT	3	5250	400	.08	1160	.23
EBR	0	0	10		30	
WBL	2	3500	230	.07	180	.05
WBT	2.5	7000	1320	.25*	640	{.12}*
WBR	1.5		460	{.07}	440	{.12}
Clearance Interval				.10*		.10*

Note: Assumes Right-Turn Overlap for SBR

TOTAL CAPACITY UTILIZATION .79 .90

Long-Range with 4 Lane SCP

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1750	10	.01*	30	.02
NBT	4	7000	650	.09	2010	.29*
NBR	1	1750	50	.03	240	.14
SBL	2	3500	510	.15	410	.12*
SBT	3	5250	1900	.36*	1380	.26
SBR	2	3500	1280	.37	850	.24
EBL	3	5250	430	.08*	1170	.22*
EBT	3	5250	410	.08	1350	.26
EBR	0	0	20		30	
WBL	2	3500	140	.04	180	.05
WBT	2.5	7000	1240	.24*	600	{.14}*
WBR	1.5		440	{.04}	540	
Clearance Interval				.10*		.10*

Note: Assumes Right-Turn Overlap for SBR

TOTAL CAPACITY UTILIZATION .79 .87

Long-Range without SCP north of Soledad

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1750	10	.01*	50	.03
NBT	4	7000	740	.11	1890	.27*
NBR	1	1750	50	.03	200	.11
SBL	2	3500	730	.21	570	.16*
SBT	3	5250	2050	.39*	1590	.30
SBR	2	3500	1240	.35	880	.25
EBL	3	5250	380	.07*	1130	.22*
EBT	3	5250	420	.08	1280	.25
EBR	0	0	10		30	
WBL	2	3500	120	.03	180	.05
WBT	2.5	7000	1330	{.25}*	550	.16*
WBR	1.5		520	{.08}	1030	.29
Right Turn Adjustment					WBR	.01*
Clearance Interval				.10*		.10*

Note: Assumes Right-Turn Overlap for SBR

TOTAL CAPACITY UTILIZATION .82 .92

66. Bouquet & Newhall Ranch

Existing Count (2002)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3500	869	.25*	372	.11
NBT	4	7000	729	.10	2304	.33*
NBR	1	1750	5	.00	166	.09
SBL	1	1750	13	.01	185	.11*
SBT	3	5250	2285	.44*	1254	.24
SBR	2	3500	876	.25	300	.09
EBL	2	3500	326	.09*	863	.25*
EBT	2	3500	40	.01	281	.08
EBR	2	3500	469	.13	724	.21
WBL	2	3500	70	.02	148	.04
WBT	3	5250	8	.00*	190	.04*
WBR	1	1750	10	.01	184	.11
Clearance Interval				.10*		.10*
Note: Assumes Right-Turn Overlap for SBR EBR						

TOTAL CAPACITY UTILIZATION .88 .83

Pre-Interim Year without Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3500	1028	.29*	1016	.29*
NBT	4	7000	1057	.15	2360	.34
NBR	1	1750	5	.00	166	.09
SBL	1	1750	11	.01	185	.11
SBT	4	7000	2208	.32*	1419	.20*
SBR	2	3500	1196	.34	608	.17
EBL	2	3500	380	.11*	874	.25*
EBT	2	3500	50	.01	433	.12
EBR	2	3500	1205	.34	1452	.41
WBL	2	3500	70	.02	148	.04
WBT	3	5250	10	.00*	190	.04*
WBR	1	1750	10	.01	184	.11
Clearance Interval				.10*		.10*
Note: Assumes Right-Turn Overlap for SBR EBR						

TOTAL CAPACITY UTILIZATION .82 .88

Pre-Interim Year with Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3500	1028	.29*	1016	.29*
NBT	4	7000	1057	.15	2360	.34
NBR	1	1750	39	.02	315	.18
SBL	1	1750	25	.01	218	.12
SBT	4	7000	2208	.32*	1419	.20*
SBR	2	3500	1196	.34	608	.17
EBL	2	3500	380	.11*	874	.25*
EBT	2	3500	70	.02	519	.15
EBR	2	3500	1205	.34	1452	.41
WBL	2	3500	215	.06	230	.07
WBT	3	5250	80	.02*	229	.04*
WBR	1	1750	45	.03	208	.12
Clearance Interval				.10*		.10*
Note: Assumes Right-Turn Overlap for SBR EBR						

TOTAL CAPACITY UTILIZATION .84 .88

Pre-Interim Year with Project with Mitigation

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	3	5250	1028	.20*	1016	.19
NBT	3	5250	1057	.20	2360	.45*
NBR	1	1750	39	.02	315	.18
SBL	2	3500	25	.01	218	.06*
SBT	4	7000	2208	.32*	1419	.20
SBR	2	3500	1196	.34	608	.17
EBL	2	3500	380	.11*	874	.25*
EBT	2	3500	70	.02	519	.15
EBR	2	3500	1205	.34	1452	.41
WBL	2	3500	215	.06	230	.07
WBT	4	7000	80	.01*	229	.03*
WBR	2	3500	45	.01	208	.06
Right Turn Adjustment		EBR	.08*			
Clearance Interval				.10*		.10*
Note: Assumes Right-Turn Overlap for SBR EBR						

TOTAL CAPACITY UTILIZATION .82 .89

66. Bouquet & Newhall Ranch

Interim Year without Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3500	592	.17*	866	.25*
NBT	4	7000	1033	.15	2071	.30
NBR	1	1750	7	.00	186	.11
SBL	1	1750	360	.21	193	.11
SBT	4	7000	2018	.29*	1518	.22*
SBR	2	3500	881	.25	487	.14
EBL	2	3500	348	.10*	595	.17*
EBT	3	5250	706	.13	1084	.21
EBR	2	3500	649	.19	981	.28
WBL	2	3500	123	.04	159	.05
WBT	3	5250	1003	.19*	751	.14*
WBR	1	1750	142	.08	389	.22
Clearance Interval				.10*		.10*

TOTAL CAPACITY UTILIZATION .85 .88

Interim Year with Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3500	597	.17*	886	.25
NBT	4	7000	1039	.15	2091	.30*
NBR	1	1750	51	.03	362	.21
SBL	1	1750	393	.22	291	.17*
SBT	4	7000	2018	.29*	1518	.22
SBR	2	3500	881	.25	487	.14
EBL	2	3500	348	.10*	595	.17*
EBT	3	5250	752	.14	1262	.24
EBR	2	3500	649	.19	981	.28
WBL	2	3500	302	.09	319	.09
WBT	3	5250	1135	.22*	836	.16*
WBR	1	1750	195	.11	451	.26
Clearance Interval				.10*		.10*

TOTAL CAPACITY UTILIZATION .88 .90

Interim Year with Project with Mitigation

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3500	597	.17*	886	.25
NBT	4	7000	1039	.15	2091	.30*
NBR	1	1750	51	.03	362	.21
SBL	1	1750	393	.22	291	.17*
SBT	4	7000	2018	.29*	1518	.22
SBR	2	3500	881	.25	487	.14
EBL	2	3500	348	.10*	595	.17*
EBT	4	7000	752	.11	1262	.18
EBR	2	3500	649	.19	981	.28
WBL	2	3500	302	.09	319	.09
WBT	4	7000	1135	.16*	836	.12*
WBR	1	1750	195	.11	451	.26
Right Turn Adjustment					WBR	.01*
Clearance Interval				.10*		.10*

TOTAL CAPACITY UTILIZATION .82 .87

Interim Year w/Santa Clarita Pkwy w/out Proj

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3500	814	.23*	684	.20*
NBT	4	7000	852	.12	1957	.28
NBR	1	1750	5	.00	130	.07
SBL	1	1750	227	.13	98	.06
SBT	4	7000	1624	.23*	1264	.18*
SBR	2	3500	845	.24	473	.14
EBL	2	3500	284	.08*	469	.13*
EBT	3	5250	660	.13	1141	.22
EBR	2	3500	621	.18	1137	.32
WBL	2	3500	346	.10	136	.04
WBT	3	5250	997	.19*	889	.17*
WBR	1	1750	50	.03	76	.04
Clearance Interval				.10*		.10*

TOTAL CAPACITY UTILIZATION .83 .78

66. Bouquet & Newhall Ranch

Interim Year w/Santa Clarita Pkwy w/Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3500	819	.23*	704	.20
NBT	4	7000	858	.12	1977	.28*
NBR	1	1750	35	.02	267	.15
SBL	1	1750	251	.14	184	.11*
SBT	4	7000	1624	.23*	1264	.18
SBR	2	3500	845	.24	473	.14
EBL	2	3500	284	.08*	469	.13
EBT	3	5250	705	.13	1295	.25*
EBR	2	3500	621	.18	1137	.32
WBL	2	3500	509	.15	268	.08*
WBT	3	5250	1117	.21*	969	.18
WBR	1	1750	77	.04	123	.07
Clearance Interval				.10*		.10*
TOTAL CAPACITY UTILIZATION				.85		.82

Int Year w/Sta Clarita Pkwy w/Proj w/Mitigation

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3500	819	.23*	704	.20
NBT	4	7000	858	.12	1977	.28*
NBR	1	1750	35	.02	267	.15
SBL	1	1750	251	.14	184	.11*
SBT	4	7000	1624	.23*	1264	.18
SBR	2	3500	845	.24	473	.14
EBL	2	3500	284	.08	469	.13*
EBT	4	7000	705	.10*	1295	.19
EBR	2	3500	621	.18	1137	.32
WBL	2	3500	509	.15*	268	.08
WBT	4	7000	1117	.16	969	.14*
WBR	1	1750	77	.04	123	.07
Clearance Interval				.10*		.10*
TOTAL CAPACITY UTILIZATION				.81		.76

66. Bouquet & Newhall Ranch

Long-Range with 6 Lane SCP

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3500	600	.17*	700	.20*
NBT	4	7000	810	.12	2470	.35
NBR	1	1750	80	.05	340	.19
SBL	2	3500	70	.02	90	.03
SBT	4	7000	1980	.28*	1250	.18*
SBR	2	3500	1160	.33	620	.18
EBL	2	3500	330	.09*	500	.14
EBT	4	7000	760	.11	1850	.26*
EBR	2	3500	980	.28	1280	.37
WBL	2	3500	640	.18	300	.09*
WBT	4	7000	1400	.20*	1400	.20
WBR	1	1750	40	.02	160	.09
Clearance Interval				.10*		.10*

Note: Assumes Right-Turn Overlap for SBR EBR

TOTAL CAPACITY UTILIZATION .84 .83

Long-Range with 4 Lane SCP

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3500	520	.15*	740	.21
NBT	4	7000	900	.13	2590	.37*
NBR	1	1750	70	.04	360	.21
SBL	2	3500	240	.07	90	.03*
SBT	4	7000	1900	.27*	1210	.17
SBR	2	3500	1230	.35	670	.19
EBL	2	3500	320	.09*	640	.18
EBT	4	7000	650	.09	1950	.28*
EBR	2	3500	1040	.30	1060	.30
WBL	2	3500	710	.20	310	.09*
WBT	4	7000	1430	.20*	1270	.18
WBR	1	1750	40	.02	210	.12
Right Turn Adjustment		EBR	.06*			
Clearance Interval			.10*		.10*	

Note: Assumes Right-Turn Overlap for SBR EBR

TOTAL CAPACITY UTILIZATION .87 .87

Long-Range without SCP north of Soledad

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3500	390	.11*	800	.23
NBT	4	7000	1130	.16	2840	.41*
NBR	1	1750	80	.05	390	.22
SBL	2	3500	330	.09	300	.09*
SBT	4	7000	2380	.34*	1580	.23
SBR	2	3500	1160	.33	590	.17
EBL	2	3500	390	.11*	750	.21
EBT	4	7000	760	.11	1900	.27*
EBR	2	3500	950	.27	1030	.29
WBL	2	3500	660	.19	380	.11*
WBT	4	7000	1370	.20*	1220	.17
WBR	1	1750	200	.11	370	.21
Right Turn Adjustment		EBR	.04*			
Clearance Interval			.10*		.10*	

Note: Assumes Right-Turn Overlap for SBR EBR

TOTAL CAPACITY UTILIZATION .90 .98

67. Seco & Bouquet

Existing Count (2002)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	1	1750	261	.15*	330	.19*
SBT	0	0	0		0	
SBR	2	3500	734	.21	465	.13
EBL	2	3500	298	.09*	740	.21
EBT	2	3500	559	.16	2142	.61*
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	3	5250	2677	.56*	1215	.26
WBR	0	0	259		170	
Clearance Interval				.10*		.10*
TOTAL CAPACITY UTILIZATION				.90		.90

Pre-Interim Year without Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	1	1750	277	.16*	455	.26*
SBT	0	0	0		0	
SBR	2	3500	883	.25	640	.18
EBL	2	3500	441	.13*	792	.23
EBT	2	3500	886	.25	2184	.62*
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	3	5250	2715	.59*	1331	.28
WBR	0	0	387		137	
Clearance Interval				.10*		.10*
TOTAL CAPACITY UTILIZATION				.98		.98

Pre-Interim Year with Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	1	1750	277	.16*	455	.26*
SBT	0	0	0		0	
SBR	2	3500	886	.25	654	.19
EBL	2	3500	457	.13*	804	.23
EBT	2	3500	902	.26	2194	.63*
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	3	5250	2724	.59*	1349	.28
WBR	0	0	387		137	
Clearance Interval				.10*		.10*
TOTAL CAPACITY UTILIZATION				.98		.99

Pre-Interim Year with Project with Mitigation

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	1.5		277	.16*	455	.13*
SBT	0	5250	0		0	
SBR	1.5		886	.25	654	{.11}
EBL	2	3500	457	.13*	804	.23
EBT	2	3500	902	.26	2194	.63*
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	3	5250	2724	.59*	1349	.28
WBR	0	0	387		137	
Clearance Interval				.10*		.10*
TOTAL CAPACITY UTILIZATION				.98		.86

67. Seco & Bouquet

Interim Year without Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	1	1750	264	.15*	442	.25*
SBT	0	0	0		0	
SBR	2	3500	898	.26	720	.21
EBL	2	3500	523	.15*	992	.28
EBT	2	3500	854	.24	2147	.61*
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	3	5250	2678	.56*	1328	.28
WBR	0	0	257		124	
Clearance Interval				.10*		.10*

TOTAL CAPACITY UTILIZATION .96 .96

Interim Year with Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	1	1750	264	.15*	442	.25*
SBT	0	0	0		0	
SBR	2	3500	909	.26	758	.22
EBL	2	3500	553	.16*	1021	.29
EBT	2	3500	879	.25	2177	.62*
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	3	5250	2689	.56*	1367	.28
WBR	0	0	257		124	
Clearance Interval				.10*		.10*

TOTAL CAPACITY UTILIZATION .97 .97

Interim Year with Project with Mitigation

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	1.5		264	.15*	442	
SBT	0	5250	0		0	{.14}*
SBR	1.5		909	.26	758	
EBL	2	3500	553	.16*	1021	.29
EBT	2	3500	879	.25	2177	.62*
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	3	5250	2689	.51*	1367	.26
WBR	1	1750	257	.15	124	.07
Clearance Interval				.10*		.10*

TOTAL CAPACITY UTILIZATION .92 .86

Interim Year w/Santa Clarita Pkwy w/out Proj

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	1	1750	384	.22*	513	.29*
SBT	0	0	0		0	
SBR	2	3500	970	.28	589	.17
EBL	2	3500	443	.13*	932	.27*
EBT	2	3500	607	.17	1265	.36
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	3	5250	1461	.34*	1042	.27*
WBR	0	0	347		391	
Clearance Interval				.10*		.10*

TOTAL CAPACITY UTILIZATION .79 .93

67. Seco & Bouquet

Interim Year w/Santa Clarita Pkwy w/Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	1	1750	386	.22*	522	.30*
SBT	0	0	0		0	
SBR	2	3500	979	.28	624	.18
EBL	2	3500	460	.13*	959	.27*
EBT	2	3500	618	.18	1289	.37
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	3	5250	1468	.35*	1073	.28*
WBR	0	0	353		396	
Clearance Interval				.10*		.10*
TOTAL CAPACITY UTILIZATION				.80		.95

Int Year w/Sta Clarita Pkwy w/Proj w/Mitigation

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	1.5		386	.22*	522	
SBT	0	5250	0		0	{.15}*
SBR	1.5		979	.28	624	
EBL	2	3500	460	.13*	959	.27*
EBT	2	3500	618	.18	1289	.37
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	3	5250	1468	.35*	1073	.28*
WBR	0	0	353		396	
Clearance Interval				.10*		.10*
TOTAL CAPACITY UTILIZATION				.80		.80

67. Seco & Bouquet

Long-Range with 6 Lane SCP

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	1.5		440		610	.17*
SBT	0	5250	0	{.23}*	0	
SBR	1.5		910		550	{.07}
EBL	2	3500	430	.12*	1120	.32*
EBT	3	5250	600	.11	1670	.32
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	3	5250	2050	.39*	1300	.25*
WBR	1	1750	510	.29	330	.19
Clearance Interval				.10*		.10*
TOTAL CAPACITY UTILIZATION				.84		.84

Long-Range with 4 Lane SCP

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	1.5		250	.14*	590	.17*
SBT	0	5250	0		0	
SBR	1.5		1140	.33	550	{.06}
EBL	2	3500	460	.13*	1200	.34*
EBT	3	5250	660	.13	1900	.36
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	3	5250	1990	.38*	1310	.25*
WBR	1	1750	480	.27	200	.11
Right Turn Adjustment			SBR	.09*		
Clearance Interval				.10*		.10*
TOTAL CAPACITY UTILIZATION				.84		.86

Long-Range without SCP north of Soledad

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	1.5		100	.06*	480	
SBT	0	5250	0		0	{.15}*
SBR	1.5		1100	.31	700	
EBL	2	3500	540	.15*	1060	.30*
EBT	3	5250	1030	.20	2610	.50
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	3	5250	2500	.48*	1700	.32*
WBR	1	1750	560	.32	140	.08
Right Turn Adjustment			SBR	.14*		
Clearance Interval				.10*		.10*
TOTAL CAPACITY UTILIZATION				.93		.87

146. SR-14 NB Rp & Golden Valley

Existing Count (2002)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1750	59	.03*	229	.13*
NBT	1	1750	0	.00	3	.00
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	1	1750	73	.04*	91	.05*
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Clearance Interval				.10*		.10*

TOTAL CAPACITY UTILIZATION .17 .28

Pre-Interim Year without Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3500	687	.20*	808	.23*
NBT	0	0	0		0	
NBR	1	1750	166	.09	384	.22
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	2	3500	226	.06*	488	.14*
EBT	2	3500	271	.08	571	.16
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	2	3500	371	.11*	597	.17*
WBR	1	1750	112	.06	293	.17
Clearance Interval				.10*		.10*

TOTAL CAPACITY UTILIZATION .47 .64

Pre-Interim Year with Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3500	687	.20*	808	.23*
NBT	0	0	0		0	
NBR	1	1750	166	.09	384	.22
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	2	3500	227	.06*	489	.14*
EBT	2	3500	271	.08	571	.16
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	2	3500	371	.11*	597	.17*
WBR	1	1750	112	.06	293	.17
Clearance Interval				.10*		.10*

TOTAL CAPACITY UTILIZATION .47 .64

Interim Year without Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3500	455	.13*	800	.23*
NBT	0	0	0		0	
NBR	1	1750	166	.09	384	.22
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	2	3500	736	.21*	979	.28*
EBT	2	3500	271	.08	571	.16
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	2	3500	371	.11*	597	.17*
WBR	1	1750	112	.06	293	.17
Clearance Interval				.10*		.10*

TOTAL CAPACITY UTILIZATION .55 .78

146. SR-14 NB Rp & Golden Valley

Interim Year with Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3500	460	.13*	813	.23*
NBT	0	0	0		0	
NBR	1	1750	166	.09	384	.22
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	2	3500	743	.21*	982	.28*
EBT	2	3500	271	.08	571	.16
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	2	3500	371	.11*	597	.17*
WBR	1	1750	112	.06	293	.17
Clearance Interval				.10*		.10*

TOTAL CAPACITY UTILIZATION .55 .78

Interim Year w/Santa Clarita Pkwy w/out Proj

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3500	663	.19*	891	.25*
NBT	0	0	0		0	
NBR	1	1750	163	.09	385	.22
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	2	3500	854	.24*	942	.27*
EBT	2	3500	267	.08	565	.16
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	2	3500	374	.11*	601	.17*
WBR	1	1750	109	.06	290	.17
Clearance Interval				.10*		.10*

TOTAL CAPACITY UTILIZATION .64 .79

Interim Year w/Santa Clarita Pkwy w/Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3500	664	.19*	895	.26*
NBT	0	0	0		0	
NBR	1	1750	163	.09	385	.22
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	2	3500	857	.24*	945	.27*
EBT	2	3500	267	.08	565	.16
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	2	3500	374	.11*	601	.17*
WBR	1	1750	109	.06	290	.17
Clearance Interval				.10*		.10*

TOTAL CAPACITY UTILIZATION .64 .80

147. SR-14 SB Rp & Golden Valley

Existing Count (2002)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	1	1750	62	.04	19	.01*
SBT	1	1750	576	.33*	4	.00
SBR	1	1750	115	.07	34	.02
EBL	0	0	0		0	
EBT	1	1750	11	.08*	72	.08
EBR	0	0	135		63	
WBL	0	0	26	{.01}*	36	
WBT	1	1750	33	.03	193	.13*
WBR	0	0	0		0	
Right Turn Adjustment					SBR	.01*
Clearance Interval				.10*		.10*

TOTAL CAPACITY UTILIZATION .52 .25

Pre-Interim Year without Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	1	1750	151	.09*	264	.15*
SBT	0.5	3500	0	.07	0	{.02}
SBR	1.5		255		216	
EBL	0	0	0		0	
EBT	2	3500	346	.10	795	.23*
EBR	1	1750	455	.26	531	.30
WBL	1	1750	212	.12	335	.19*
WBT	2	3500	846	.24*	1070	.31
WBR	0	0	0		0	
Right Turn Adjustment			EBR	.12*		
Clearance Interval				.10*		.10*

TOTAL CAPACITY UTILIZATION .55 .67

Pre-Interim Year with Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	1	1750	151	.09*	264	.15*
SBT	0.5	3500	0	.07	0	{.02}
SBR	1.5		255		217	
EBL	0	0	0		0	
EBT	2	3500	347	.10	796	.23*
EBR	1	1750	455	.26	531	.30
WBL	1	1750	212	.12	335	.19*
WBT	2	3500	846	.24*	1070	.31
WBR	0	0	0		0	
Right Turn Adjustment			EBR	.12*		
Clearance Interval				.10*		.10*

TOTAL CAPACITY UTILIZATION .55 .67

Interim Year without Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	1	1750	151	.09	264	.15*
SBT	0.5	3500	0	{.15}*	0	{.07}
SBR	1.5		752		603	
EBL	0	0	0		0	
EBT	2	3500	856	.24*	1286	.37*
EBR	1	1750	331	.19	486	.28
WBL	1	1750	212	.12*	335	.19*
WBT	2	3500	613	.18	1063	.30
WBR	0	0	0		0	
Clearance Interval				.10*		.10*

TOTAL CAPACITY UTILIZATION .61 .81

147. SR-14 SB Rp & Golden Valley

Interim Year with Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	1	1750	151	.09	264	.15*
SBT	0.5	3500	0	{.14}*	0	{.08}
SBR	1.5		753		608	
EBL	0	0	0		0	
EBT	2	3500	863	.25*	1289	.37*
EBR	1	1750	346	.20	494	.28
WBL	1	1750	212	.12*	335	.19*
WBT	2	3500	618	.18	1076	.31
WBR	0	0	0		0	
Clearance Interval				.10*		.10*

TOTAL CAPACITY UTILIZATION .61 .81

Interim Year w/Santa Clarita Pkwy w/out Proj

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	1	1750	143	.08	263	.15*
SBT	0.5	3500	0	{.14}*	0	{.10}
SBR	1.5		697		640	
EBL	0	0	0		0	
EBT	2	3500	976	.28*	1244	.36*
EBR	1	1750	200	.11	385	.22
WBL	1	1750	203	.12*	334	.19*
WBT	2	3500	833	.24	1158	.33
WBR	0	0	0		0	
Clearance Interval				.10*		.10*

TOTAL CAPACITY UTILIZATION .64 .80

Interim Year w/Santa Clarita Pkwy w/Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	1	1750	143	.08	263	.15*
SBT	0.5	3500	0	{.14}*	0	{.10}
SBR	1.5		699		644	
EBL	0	0	0		0	
EBT	2	3500	979	.28*	1247	.36*
EBR	1	1750	200	.11	385	.22
WBL	1	1750	203	.12*	334	.19*
WBT	2	3500	834	.24	1162	.33
WBR	0	0	0		0	
Clearance Interval				.10*		.10*

TOTAL CAPACITY UTILIZATION .64 .80

157. Santa Clarita & Soledad Acc

Interim Year w/Santa Clarita Pkwy w/out Proj

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	3	5250	386	.07	746	.14*
NBR	f		236		389	
SBL	2	3500	200	.06	193	.06*
SBT	3	5250	1031	.20*	423	.08
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	1.5		161	.05*	445	
WBT	0	5250	0		0	{.14}*
WBR	1.5		60		393	
Clearance Interval				.10*		.10*

TOTAL CAPACITY UTILIZATION .35 .44

Interim Year w/Santa Clarita Pkwy w/Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	3	5250	402	.08	825	.16*
NBR	f		237		391	
SBL	2	3500	234	.07	209	.06*
SBT	3	5250	1113	.21*	458	.09
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	1.5		162	.05*	447	
WBT	0	5250	0		0	{.16}*
WBR	1.5		69		454	
Clearance Interval				.10*		.10*

TOTAL CAPACITY UTILIZATION .36 .48

157. Santa Clarita & Soledad (at Grade)

Interim Year w/Santa Clarita Pkwy w/out Proj

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1750	76	.04*	57	.03
NBT	3	5250	386	.07	746	.14*
NBR	1	1750	160	.09	332	.19
SBL	2	3500	135	.04	165	.05*
SBT	3	5250	1031	.21*	423	.09
SBR	0	0	65		28	
EBL	2	3500	4	.00	121	.03
EBT	3	5250	613	.12	2007	.38*
EBR	1	1750	10	.01	137	.08
WBL	2	3500	153	.04	309	.09*
WBT	3	5250	1961	.37*	1060	.20
WBR	1	1750	57	.03	273	.16
Clearance Interval				.10*		.10*

TOTAL CAPACITY UTILIZATION .72 .76

Interim Year w/Santa Clarita Pkwy w/Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1750	77	.04*	57	.03
NBT	3	5250	402	.08	825	.16*
NBR	1	1750	160	.09	334	.19
SBL	2	3500	157	.04	179	.05*
SBT	3	5250	1113	.23*	458	.09
SBR	0	0	77		30	
EBL	2	3500	4	.00	144	.04
EBT	3	5250	613	.12	2018	.38*
EBR	1	1750	10	.01	142	.08
WBL	2	3500	154	.04	305	.09*
WBT	3	5250	1972	.38*	1060	.20
WBR	1	1750	65	.04	310	.18
Clearance Interval				.10*		.10*

TOTAL CAPACITY UTILIZATION .75 .78

157. Santa Clarita & Soledad

Long-Range with 6 Lane SCP

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3500	190	.05*	170	.05
NBT	3	5250	530	.10	1460	.28*
NBR	1	1750	270	.15	440	.25
SBL	2	3500	170	.05	140	.04*
SBT	3	5250	1480	.28*	770	.15
SBR	1	1750	120	.07	60	.03
EBL	1	1750	30	.02*	140	.08
EBT	3	5250	640	.12	1800	.34*
EBR	1	1750	120	.07	260	.15
WBL	2	3500	320	.09	420	.12*
WBT	3	5250	1860	.35*	960	.18
WBR	1	1750	80	.05	220	.13
Clearance Interval				.10*		.10*

TOTAL CAPACITY UTILIZATION .80 .88

Long-Range with 4 Lane SCP

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3500	360	.10*	380	.11
NBT	2	3500	380	.11	900	.26*
NBR	1	1750	280	.16	570	.33
SBL	2	3500	180	.05	180	.05*
SBT	2	3500	1100	.31*	640	.18
SBR	1	1750	80	.05	40	.02
EBL	1	1750	30	.02*	100	.06
EBT	3	5250	600	.11	1550	.30*
EBR	1	1750	270	.15	500	.29
WBL	2	3500	400	.11	410	.12*
WBT	3	5250	1560	.30*	840	.16
WBR	1	1750	80	.05	250	.14
Clearance Interval				.10*		.10*

TOTAL CAPACITY UTILIZATION .83 .83

Long-Range without SCP north of Soledad

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3500	430	.12*	690	.20*
NBT	0	0	0		0	
NBR	2	3500	280	.08	660	.19
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	3	5250	630	.12	1550	.30*
EBR	1	1750	470	.27	600	.34
WBL	2	3500	450	.13	460	.13*
WBT	3	5250	1650	.31*	960	.18
WBR	0	0	0		0	
Clearance Interval				.10*		.10*

Note: Assumes Right-Turn Overlap for EBR

TOTAL CAPACITY UTILIZATION .53 .73

158. Santa Clarita & Newhall Rch

Pre-Interim Year without Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1750	0	.00	0	.00
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	1	1750	0	.00	0	.00
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Clearance Interval				.10*		.10*

TOTAL CAPACITY UTILIZATION .10 .10

Pre-Interim Year with Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1750	18	.01*	10	.01*
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	1	1750	6	.00	19	.01
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Clearance Interval				.10*		.10*

TOTAL CAPACITY UTILIZATION .11 .11

Interim Year without Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1750	0	.00	0	.00
NBT	0	0	0		0	
NBR	1	1750	0	.00	0	.00
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	3	5250	1052	.20	1311	.25*
EBR	1	1750	0	.00	0	.00
WBL	1	1750	0	.00	0	.00
WBT	3	5250	1333	.25*	1236	.24
WBR	0	0	0		0	
Clearance Interval				.10*		.10*

TOTAL CAPACITY UTILIZATION .35 .35

Interim Year with Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1750	75	.04*	60	.03*
NBT	0	0	0		0	
NBR	1	1750	46	.03	22	.01
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	3	5250	1126	.21	1437	.27*
EBR	1	1750	28	.02	97	.06
WBL	1	1750	14	.01	47	.03*
WBT	3	5250	1447	.28*	1363	.26
WBR	0	0	0		0	
Clearance Interval				.10*		.10*

TOTAL CAPACITY UTILIZATION .42 .43

158. Santa Clarita & Newhall Rch

Interim Year w/Santa Clarita Pkwy w/out Proj

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3500	139	.04*	226	.06
NBT	3	5250	306	.06	915	.17*
NBR	0	0	0		0	
SBL	2	3500	490	.14	348	.10*
SBT	3	5250	908	.21*	490	.09
SBR	0	0	202		0	
EBL	2	3500	12	.00	308	.09*
EBT	3	5250	579	.11	1018	.19
EBR	1	1750	325	.19	117	.07
WBL	1	1750	1	.00	1	.00
WBT	3	5250	1164	.22*	854	.16*
WBR	1	1750	210	.12	542	.31
Right Turn Adjustment					WBR	.07*
Clearance Interval				.10*		.10*
TOTAL CAPACITY UTILIZATION				.57		.69

Interim Year w/Santa Clarita Pkwy w/Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3500	193	.06*	298	.09
NBT	3	5250	314	.06	927	.18*
NBR	0	0	13		33	
SBL	2	3500	494	.14	363	.10*
SBT	3	5250	913	.21*	503	.10
SBR	0	0	203		9	
EBL	2	3500	22	.01*	317	.09*
EBT	3	5250	619	.12	1123	.21
EBR	1	1750	377	.22	177	.10
WBL	1	1750	28	.02	15	.01
WBT	3	5250	1270	.24*	945	.18*
WBR	1	1750	218	.12	552	.32
Right Turn Adjustment					WBR	.06*
Clearance Interval				.10*		.10*
TOTAL CAPACITY UTILIZATION				.62		.71

158. Santa Clarita & Newhall Rch

Long-Range with 6 Lane SCP

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3500	200	.06*	350	.10
NBT	3	5250	430	.08	1200	.23*
NBR	1	1750	50	.03	240	.14
SBL	2	3500	450	.13	370	.11*
SBT	3	5250	1270	.24*	660	.13
SBR	1	1750	40	.02	20	.01
EBL	2	3500	40	.01*	290	.08
EBT	3	5250	690	.13	1750	.33*
EBR	1	1750	190	.11	210	.12
WBL	2	3500	270	.08	120	.03*
WBT	3	5250	1760	.34*	1440	.27
WBR	1	1750	200	.11	490	.28
Clearance Interval				.10*		.10*

TOTAL CAPACITY UTILIZATION .75 .80

Long-Range with 4 Lane SCP

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3500	110	.03*	180	.05
NBT	2	3500	360	.10	900	.26*
NBR	1	1750	40	.02	130	.07
SBL	2	3500	340	.10	310	.09*
SBT	2	3500	1060	.30*	610	.17
SBR	1	1750	120	.07	20	.01
EBL	2	3500	20	.01*	100	.03
EBT	3	5250	840	.16	2090	.40*
EBR	1	1750	90	.05	150	.09
WBL	2	3500	160	.05	110	.03*
WBT	3	5250	1870	.36*	1540	.29
WBR	1	1750	200	.11	450	.26
Clearance Interval				.10*		.10*

TOTAL CAPACITY UTILIZATION .80 .88

Long-Range without SCP north of Soledad

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1750	70	.04*	40	.02*
NBT	0	0	0		0	
NBR	1	1750	40	.02	30	.02
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	3	5250	1120	.21	2370	.45*
EBR	1	1750	20	.01	80	.05
WBL	1	1750	20	.01	40	.02*
WBT	3	5250	2040	.39*	1810	.34
WBR	0	0	0		0	
Clearance Interval				.10*		.10*

TOTAL CAPACITY UTILIZATION .53 .59

159. Santa Clarita & Bouquet

Interim Year w/Santa Clarita Pkwy w/out Proj

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3500	151	.04*	391	.11*
NBT	0	0	0		0	
NBR	2	3500	377	.11	1374	.39
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	3	5250	655	.12*	1422	.27*
EBR	1	1750	363	.21	343	.20
WBL	2	3500	1239	.35*	492	.14*
WBT	3	5250	1695	.32	1148	.22
WBR	0	0	0		0	
Right Turn Adjustment			EBR	.05*	NBR	.14*
Clearance Interval				.10*		.10*

Note: Assumes Right-Turn Overlap for NBR EBR

TOTAL CAPACITY UTILIZATION .66 .76

Interim Year w/Santa Clarita Pkwy w/Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3500	159	.05*	397	.11*
NBT	0	0	0		0	
NBR	2	3500	395	.11	1399	.40
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	3	5250	662	.13*	1425	.27*
EBR	1	1750	366	.21	357	.20
WBL	2	3500	1245	.36*	514	.15*
WBT	3	5250	1697	.32	1161	.22
WBR	0	0	0		0	
Right Turn Adjustment			EBR	.03*	NBR	.14*
Clearance Interval				.10*		.10*

Note: Assumes Right-Turn Overlap for NBR EBR

TOTAL CAPACITY UTILIZATION .67 .77

159. Santa Clarita & Bouquet

Long-Range with 6 Lane SCP

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3500	220	.06*	340	.10*
NBT	0	0	0		0	
NBR	2	3500	440	.13	1570	.45
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	3	5250	630	.12*	1680	.32*
EBR	1	1750	440	.25	470	.27
WBL	2	3500	1250	.36*	560	.16*
WBT	3	5250	2220	.42	1270	.24
WBR	0	0	0		0	
Right Turn Adjustment			EBR	.08*	NBR	.19*
Clearance Interval				.10*		.10*

Note: Assumes Right-Turn Overlap for NBR

TOTAL CAPACITY UTILIZATION .72 .87

Long-Range with 4 Lane SCP

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3500	170	.05*	180	.05*
NBT	0	0	0		0	
NBR	2	3500	390	.11	1200	.34
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	3	5250	710	.14*	1970	.38*
EBR	1	1750	210	.12	370	.21
WBL	2	3500	1250	.36*	540	.15*
WBT	3	5250	2190	.42	1290	.25
WBR	0	0	0		0	
Right Turn Adjustment					NBR	.14*
Clearance Interval				.10*		.10*

Note: Assumes Right-Turn Overlap for NBR

TOTAL CAPACITY UTILIZATION .65 .82

162. Sierra & Golden Valley

Existing Count (2002)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1750	84	.05*	143	.08
NBT	2	3500	151	.04	1227	.35*
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	2	3500	1807	.52*	420	.12
SBR	1	1750	88	.05	53	.03
EBL	2	3500	18	.01*	86	.02*
EBT	0	0	0		0	
EBR	2	3500	125	.04	119	.03
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Clearance Interval				.10*		.10*

TOTAL CAPACITY UTILIZATION .68 .47

Pre-Interim Year without Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1750	281	.16*	572	.33
NBT	2	3500	112	.04	1557	.46*
NBR	0	0	29		57	
SBL	1	1750	7	.00	10	.01*
SBT	2	3500	1647	.47*	333	.10
SBR	1	1750	359	.21	287	.16
EBL	2	3500	106	.03	291	.08
EBT	3	5250	594	.17*	1128	.32*
EBR	0	0	616	.35	538	
WBL	2	3500	362	.10*	49	.01*
WBT	3	5250	847	.16	777	.16
WBR	0	0	10		53	
Right Turn Adjustment		EBR		.06*		
Clearance Interval				.10*		.10*

TOTAL CAPACITY UTILIZATION 1.06 .90

Pre-Interim Year with Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1750	281	.16*	574	.33
NBT	2	3500	112	.04	1557	.46*
NBR	0	0	29		57	
SBL	1	1750	7	.00	10	.01*
SBT	2	3500	1649	.47*	333	.10
SBR	1	1750	359	.21	291	.17
EBL	2	3500	107	.03	291	.08
EBT	3	5250	595	.17*	1129	.32*
EBR	0	0	617	.35	539	
WBL	2	3500	362	.10*	49	.01*
WBT	3	5250	847	.16	778	.16
WBR	0	0	10		53	
Right Turn Adjustment		EBR		.06*		
Clearance Interval				.10*		.10*

TOTAL CAPACITY UTILIZATION 1.06 .90

Interim Year without Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3500	388	.11*	502	.14
NBT	2	3500	81	.03	1057	.33*
NBR	0	0	24		98	
SBL	1	1750	16	.01	10	.01*
SBT	2	3500	1345	.38*	228	.07
SBR	2	3500	866	.25	376	.11
EBL	2	3500	105	.03	614	.18*
EBT	3	5250	940	.18*	1518	.29
EBR	1	1750	398	.23	443	.25
WBL	2	3500	365	.10*	31	.01
WBT	3	5250	1242	.24	997	.22*
WBR	0	0	10		181	
Clearance Interval				.10*		.10*

TOTAL CAPACITY UTILIZATION .87 .84

162. Sierra & Golden Valley

Interim Year with Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3500	393	.11*	540	.15
NBT	2	3500	81	.03	1057	.33*
NBR	0	0	24		98	
SBL	1	1750	16	.01	10	.01*
SBT	2	3500	1345	.38*	228	.07
SBR	2	3500	869	.25	386	.11
EBL	2	3500	109	.03	615	.18*
EBT	3	5250	963	.18*	1531	.29
EBR	1	1750	441	.25	451	.26
WBL	2	3500	365	.10*	31	.01
WBT	3	5250	1248	.24	1015	.23*
WBR	0	0	10		181	
Clearance Interval				.10*		.10*

TOTAL CAPACITY UTILIZATION .87 .85

Interim Year w/Santa Clarita Pkwy w/out Proj

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3500	72	.02*	98	.03
NBT	2	3500	67	.03	1019	.32*
NBR	0	0	27		102	
SBL	1	1750	5	.00	10	.01*
SBT	2	3500	1178	.34*	233	.07
SBR	2	3500	911	.26	405	.12
EBL	2	3500	123	.04	619	.18*
EBT	3	5250	999	.19*	1402	.27
EBR	1	1750	322	.18	361	.21
WBL	2	3500	466	.13*	38	.01
WBT	3	5250	1388	.27	1186	.25*
WBR	0	0	10		151	
Clearance Interval				.10*		.10*

TOTAL CAPACITY UTILIZATION .78 .86

Interim Year w/Santa Clarita Pkwy w/Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3500	72	.02*	101	.03
NBT	2	3500	67	.03	1020	.32*
NBR	0	0	27		102	
SBL	1	1750	5	.00	10	.01*
SBT	2	3500	1178	.34*	233	.07
SBR	2	3500	914	.26	411	.12
EBL	2	3500	126	.04	622	.18*
EBT	3	5250	1002	.19*	1407	.27
EBR	1	1750	329	.19	363	.21
WBL	2	3500	466	.13*	38	.01
WBT	3	5250	1390	.27	1194	.26*
WBR	0	0	10		151	
Clearance Interval				.10*		.10*

TOTAL CAPACITY UTILIZATION .78 .87

164. Golden Valley & Golden Tri

Pre-Interim Year without Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1750	100	.06*	50	.03*
NBT	3	5250	681	.15	597	.17
NBR	0	0	81		273	
SBL	1	1750	10	.01	15	.01
SBT	3	5250	467	.13*	688	.17*
SBR	0	0	294	.17	182	
EBL	1	1750	99	.06	381	.22*
EBT	2	3500	29	.02*	173	.08
EBR	0	0	50	.03	100	
WBL	1	1750	582	.33*	115	.07
WBT	2	3500	386	.11	71	.02*
WBR	0	0	12		10	
Clearance Interval				.10*		.10*

TOTAL CAPACITY UTILIZATION .64 .54

Pre-Interim Year with Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1750	100	.06*	50	.03*
NBT	3	5250	683	.15	607	.17
NBR	0	0	81		273	
SBL	1	1750	10	.01	15	.01
SBT	3	5250	471	.13*	690	.17*
SBR	0	0	298	.17	184	
EBL	1	1750	99	.06	386	.22*
EBT	2	3500	29	.02*	173	.08
EBR	0	0	50	.03	100	
WBL	1	1750	582	.33*	115	.07
WBT	2	3500	386	.11	71	.02*
WBR	0	0	12		10	
Clearance Interval				.10*		.10*

TOTAL CAPACITY UTILIZATION .64 .54

Interim Year without Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1750	100	.06*	50	.03*
NBT	3	5250	750	.16	792	.19
NBR	0	0	83		229	
SBL	1	1750	92	.05	95	.05
SBT	3	5250	592	.17*	1011	.23*
SBR	0	0	360	.21	217	
EBL	1	1750	95	.05	373	.21*
EBT	2	3500	34	.02*	166	.08
EBR	0	0	50	.03	100	
WBL	1	1750	293	.17*	71	.04
WBT	2	3500	192	.09	56	.03*
WBR	0	0	136		126	.07
Clearance Interval				.10*		.10*

TOTAL CAPACITY UTILIZATION .52 .60

Interim Year with Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1750	100	.06*	50	.03*
NBT	3	5250	774	.16	896	.21
NBR	0	0	83		229	
SBL	1	1750	102	.06	101	.06
SBT	3	5250	689	.20*	1057	.24*
SBR	0	0	387	.22	228	
EBL	1	1750	100	.06	396	.23*
EBT	2	3500	34	.02*	166	.08
EBR	0	0	50	.03	100	
WBL	1	1750	293	.17*	71	.04
WBT	2	3500	192	.09	56	.03*
WBR	0	0	136		141	.08
Clearance Interval				.10*		.10*

TOTAL CAPACITY UTILIZATION .55 .63

164. Golden Valley & Golden Tri

Interim Year w/Santa Clarita Pkwy w/out Proj

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1750	100	.06	50	.03
NBT	3	5250	812	.17*	766	.18*
NBR	0	0	60		180	
SBL	1	1750	86	.05*	226	.13*
SBT	3	5250	560	.16	851	.21
SBR	0	0	431	.25	244	
EBL	1	1750	107	.06	431	.25*
EBT	2	3500	40	.02*	126	.06
EBR	0	0	50	.03	100	
WBL	1	1750	258	.15*	49	.03
WBT	2	3500	200	.11	41	.02*
WBR	0	0	172		181	.10
Right Turn Adjustment			SBR	.04*		
Clearance Interval				.10*		.10*
TOTAL CAPACITY UTILIZATION				.53		.68

Interim Year w/Santa Clarita Pkwy w/Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1750	100	.06*	50	.03
NBT	3	5250	832	.17	807	.19*
NBR	0	0	60		180	
SBL	1	1750	92	.05	232	.13*
SBT	3	5250	599	.17*	877	.22
SBR	0	0	454	.26	256	
EBL	1	1750	113	.06	453	.26*
EBT	2	3500	40	.02*	126	.06
EBR	0	0	50	.03	100	
WBL	1	1750	258	.15*	49	.03
WBT	2	3500	200	.11	41	.02*
WBR	0	0	173		183	.10
Right Turn Adjustment			SBR	.04*		
Clearance Interval				.10*		.10*
TOTAL CAPACITY UTILIZATION				.54		.70

165. Golden Valley & Valley Cntr

Pre-Interim Year without Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3500	782	.22*	977	.28*
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	1	1750	761	.43	877	.50
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Right Turn Adjustment			EBR	.21*	EBR	.22*
Clearance Interval				.10*		.10*

Note: Assumes Right-Turn Overlap for EBR

TOTAL CAPACITY UTILIZATION .53 .60

Pre-Interim Year with Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3500	784	.22*	992	.28*
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	1	1750	769	.44	881	.50
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Right Turn Adjustment			EBR	.22*	EBR	.22*
Clearance Interval				.10*		.10*

Note: Assumes Right-Turn Overlap for EBR

TOTAL CAPACITY UTILIZATION .54 .60

Interim Year without Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3500	352	.10*	437	.12*
NBT	3	5250	630	.12	855	.16
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	3	5250	849	.16*	766	.15*
SBR	f		186		556	
EBL	2	3500	704	.20*	371	.11*
EBT	0	0	0		0	
EBR	1	1750	195	.11	557	.32
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Right Turn Adjustment					EBR	.12*
Clearance Interval				.10*		.10*

TOTAL CAPACITY UTILIZATION .56 .60

Interim Year with Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3500	352	.10*	437	.12*
NBT	3	5250	659	.13	997	.19
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	3	5250	983	.19*	828	.16*
SBR	f		245		596	
EBL	2	3500	725	.21*	443	.13*
EBT	0	0	0		0	
EBR	1	1750	195	.11	557	.32
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Right Turn Adjustment					EBR	.10*
Clearance Interval				.10*		.10*

TOTAL CAPACITY UTILIZATION .60 .61

165. Golden Valley & Valley Cntr

Interim Year w/Santa Clarita Pkwy w/out Proj

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3500	310	.09*	311	.09*
NBT	3	5250	781	.15	1069	.20
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	3	5250	877	.17*	870	.17*
SBR	f		187		515	
EBL	2	3500	600	.17*	339	.10*
EBT	0	0	0		0	
EBR	1	1750	197	.11	450	.26
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Right Turn Adjustment					EBR	.09*
Clearance Interval				.10*		.10*
TOTAL CAPACITY UTILIZATION				.53		.55

Interim Year w/Santa Clarita Pkwy w/Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3500	310	.09*	311	.09*
NBT	3	5250	808	.15	1134	.22
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	3	5250	945	.18*	912	.17*
SBR	f		224		542	
EBL	2	3500	612	.17*	386	.11*
EBT	0	0	0		0	
EBR	1	1750	199	.11	453	.26
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Right Turn Adjustment					EBR	.08*
Clearance Interval				.10*		.10*
TOTAL CAPACITY UTILIZATION				.54		.55

165. Golden Valley & Valley Cntr

Long-Range with 6 Lane SCP

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3500	380	.11*	210	.06
NBT	3	5250	570	.11	1210	.23*
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	3	5250	1140	.22*	810	.15
SBR	f		370		730	
EBL	2	3500	740	.21*	880	.25*
EBT	0	0	0		0	
EBR	1	1750	60	.03	270	.15
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Clearance Interval				.10*		.10*

TOTAL CAPACITY UTILIZATION .64 .58

Long-Range with 4 Lane SCP

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3500	390	.11*	180	.05
NBT	3	5250	630	.12	1310	.25*
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	3	5250	1200	.23*	930	.18
SBR	f		430		850	
EBL	2	3500	760	.22*	930	.27*
EBT	0	0	0		0	
EBR	1	1750	100	.06	220	.13
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Clearance Interval				.10*		.10*

TOTAL CAPACITY UTILIZATION .66 .62

Long-Range without SCP north of Soledad

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3500	390	.11*	170	.05
NBT	3	5250	750	.14	1470	.28*
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	3	5250	1420	.27*	1090	.21
SBR	f		510		1000	
EBL	2	3500	690	.20*	990	.28*
EBT	0	0	0		0	
EBR	1	1750	90	.05	230	.13
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Clearance Interval				.10*		.10*

TOTAL CAPACITY UTILIZATION .68 .66

169. Rainbow Glen & Soledad

Existing Count (2002)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0.5		423		224	
NBT	0.5	1750	7	.25*	21	.14*
NBR	1	1750	136	.08	202	.12
SBL	0.5		36		41	
SBT	0.5	1750	14	.03*	20	.03*
SBR	d	1750	20	.01	11	.01
EBL	1	1750	6	.00	8	.00
EBT	3	5250	675	.13	1886	.36*
EBR	1	1750	158	.09	333	.19
WBL	2	3500	98	.03	152	.04*
WBT	3	5250	1758	.34*	1094	.21
WBR	0	0	13		21	
Clearance Interval				.10*		.10*
Note: Assumes N/S Split Phasing						
TOTAL CAPACITY UTILIZATION				.72		.67

Pre-Interim Year without Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0.5		67		251	
NBT	0.5	1750	37	.06*	25	.16*
NBR	1	1750	101	.06	558	.32
SBL	0.5		24		80	
SBT	0.5	1750	28	.03*	33	.06*
SBR	d	1750	17	.01	62	.04
EBL	1	1750	73	.04*	52	.03
EBT	3	5250	743	.14	1930	.37*
EBR	1	1750	431	.25	170	.10
WBL	2	3500	695	.20	219	.06*
WBT	3	5250	2096	.42*	1021	.20
WBR	0	0	104		47	
Right Turn Adjustment					NBR	.11*
Clearance Interval				.10*		.10*
Note: Assumes N/S Split Phasing						
TOTAL CAPACITY UTILIZATION				.65		.86

Pre-Interim Year with Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0.5		68		253	
NBT	0.5	1750	37	.06*	25	.16*
NBR	1	1750	101	.06	558	.32
SBL	0.5		24		80	
SBT	0.5	1750	28	.03*	33	.06*
SBR	d	1750	17	.01	62	.04
EBL	1	1750	73	.04*	52	.03
EBT	3	5250	746	.14	1936	.37*
EBR	1	1750	436	.25	170	.10
WBL	2	3500	695	.20	219	.06*
WBT	3	5250	2105	.42*	1037	.21
WBR	0	0	104		47	
Right Turn Adjustment					NBR	.11*
Clearance Interval				.10*		.10*
Note: Assumes N/S Split Phasing						
TOTAL CAPACITY UTILIZATION				.65		.86

Interim Year without Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0.5		37		110	
NBT	0.5	1750	59	.05*	36	.08*
NBR	1	1750	79	.05	482	.28
SBL	0.5		22		70	
SBT	0.5	1750	25	.03*	31	.06*
SBR	d	1750	16	.01	69	.04
EBL	1	1750	66	.04*	39	.02
EBT	3	5250	476	.09	2314	.44*
EBR	1	1750	59	.03	88	.05
WBL	2	3500	557	.16	160	.05*
WBT	3	5250	2397	.47*	1188	.23
WBR	0	0	93		33	
Right Turn Adjustment					NBR	.16*
Clearance Interval				.10*		.10*
Note: Assumes N/S Split Phasing						
TOTAL CAPACITY UTILIZATION				.69		.89

169. Rainbow Glen & Soledad

Interim Year with Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0.5		38		115	
NBT	0.5	1750	59	.06*	36	.09*
NBR	1	1750	79	.05	482	.28
SBL	0.5		22		70	
SBT	0.5	1750	25	.03*	31	.06*
SBR	d	1750	20	.01	72	.04
EBL	1	1750	69	.04*	39	.02
EBT	3	5250	506	.10	2345	.45*
EBR	1	1750	60	.03	94	.05
WBL	2	3500	557	.16	160	.05*
WBT	3	5250	2411	.48*	1228	.24
WBR	0	0	93		33	
Right Turn Adjustment					NBR	.15*
Clearance Interval				.10*		.10*
Note: Assumes N/S Split Phasing						
TOTAL CAPACITY UTILIZATION				.71		.90

Interim Year w/Santa Clarita Pkwy w/out Proj

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0.5		38		113	
NBT	0.5	1750	32	.04*	25	.08*
NBR	1	1750	91	.05	494	.28
SBL	0.5		13		63	
SBT	0.5	1750	21	.02*	20	.05*
SBR	d	1750	32	.02	92	.05
EBL	1	1750	98	.06*	55	.03
EBT	3	5250	514	.10	2301	.44*
EBR	1	1750	95	.05	102	.06
WBL	2	3500	587	.17	122	.03*
WBT	3	5250	2383	.47*	1233	.24
WBR	0	0	84		36	
Right Turn Adjustment					NBR	.18*
Clearance Interval				.10*		.10*
Note: Assumes N/S Split Phasing						
TOTAL CAPACITY UTILIZATION				.69		.88

Interim Year w/Santa Clarita Pkwy w/Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0.5		40		123	
NBT	0.5	1750	32	.04*	25	.08*
NBR	1	1750	91	.05	495	.28
SBL	0.5		13		63	
SBT	0.5	1750	21	.02*	20	.05*
SBR	d	1750	32	.02	94	.05
EBL	1	1750	100	.06*	56	.03
EBT	3	5250	541	.10	2328	.44*
EBR	1	1750	100	.06	110	.06
WBL	2	3500	587	.17	122	.03*
WBT	3	5250	2402	.47*	1272	.25
WBR	0	0	84		36	
Right Turn Adjustment					NBR	.18*
Clearance Interval				.10*		.10*
Note: Assumes N/S Split Phasing						
TOTAL CAPACITY UTILIZATION				.69		.88

172. Whites Cyn & Soledad

Existing Count (2002)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1.5		472		444	
NBT	2.5	7000	640	.16*	984	.20*
NBR	1	1750	97	.06	130	.07
SBL	2	3500	638	.18	687	.20*
SBT	2	3500	886	.25*	614	.18
SBR	1	1750	217	.12	153	.09
EBL	2	3500	212	.06*	339	.10
EBT	3	5250	647	.18	1036	.22*
EBR	0	0	545	.31	139	
WBL	2	3500	75	.02	165	.05*
WBT	2	3500	1175	.34*	565	.16
WBR	1	1750	1138	.65	435	.25
Right Turn Adjustment			WBR	.06*		
Clearance Interval				.10*		.10*

Note: Assumes N/S Split Phasing
Note: Assumes Right-Turn Overlap for SBR WBR

TOTAL CAPACITY UTILIZATION .97 .77

Pre-Interim Year without Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1.5		463		451	
NBT	2.5	7000	651	.16*	1029	.21*
NBR	1	1750	61	.03	315	.18
SBL	2	3500	694	.20	735	.21*
SBT	2	3500	892	.25*	636	.18
SBR	1	1750	296	.17	160	.09
EBL	2	3500	231	.07*	398	.11
EBT	2	3500	624	.18	1436	.41*
EBR	1	1750	584	.33	201	.11
WBL	2	3500	183	.05	174	.05*
WBT	2	3500	1234	.35*	696	.20
WBR	1	1750	1139	.65	437	.25
Right Turn Adjustment			WBR	.05*		
Clearance Interval				.10*		.10*

Note: Assumes N/S Split Phasing
Note: Assumes Right-Turn Overlap for SBR WBR

TOTAL CAPACITY UTILIZATION .98 .98

Pre-Interim Year with Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1.5		465		453	
NBT	2.5	7000	651	.16*	1029	.21*
NBR	1	1750	61	.03	315	.18
SBL	2	3500	694	.20	735	.21*
SBT	2	3500	892	.25*	636	.18
SBR	1	1750	299	.17	163	.09
EBL	2	3500	231	.07*	399	.11
EBT	2	3500	626	.18	1437	.41*
EBR	1	1750	585	.33	203	.12
WBL	2	3500	183	.05	174	.05*
WBT	2	3500	1238	.35*	703	.20
WBR	1	1750	1139	.65	437	.25
Right Turn Adjustment			WBR	.05*		
Clearance Interval				.10*		.10*

Note: Assumes N/S Split Phasing
Note: Assumes Right-Turn Overlap for SBR WBR

TOTAL CAPACITY UTILIZATION .98 .98

Interim Year without Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1.5		483		448	
NBT	2.5	7000	643	.16*	985	.20*
NBR	1	1750	75	.04	273	.16
SBL	2	3500	646	.18	624	.18
SBT	2	3500	651	.19*	632	.18*
SBR	1	1750	522	.30	145	.08
EBL	2	3500	230	.07*	506	.14
EBT	3	5250	418	.12	1677	.36*
EBR	0	0	347	.20	227	
WBL	2	3500	676	.19	148	.04*
WBT	2	3500	1444	.41*	813	.23
WBR	1	1750	1076	.61	445	.25
Right Turn Adjustment			Multi	.05*		
Clearance Interval				.10*		.10*

Note: Assumes N/S Split Phasing
Note: Assumes Right-Turn Overlap for SBR WBR

TOTAL CAPACITY UTILIZATION .98 .88

172. Whites Cyn & Soledad

Interim Year with Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1.5		484		450	
NBT	2.5	7000	643	.16*	985	.21*
NBR	1	1750	75	.04	275	.16
SBL	2	3500	646	.18	624	.18
SBT	2	3500	651	.19*	632	.18*
SBR	1	1750	528	.30	155	.09
EBL	2	3500	233	.07*	514	.15
EBT	3	5250	432	.12	1690	.37*
EBR	0	0	347	.20	229	
WBL	2	3500	676	.19	148	.04*
WBT	2	3500	1448	.41*	828	.24
WBR	1	1750	1076	.61	445	.25
Right Turn Adjustment			Multi	.05*		
Clearance Interval				.10*		.10*

Note: Assumes N/S Split Phasing
Note: Assumes Right-Turn Overlap for SBR WBR

TOTAL CAPACITY UTILIZATION .98 .90

Interim Year with Project with Mitigation

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3500	484	.14*	450	.13
NBT	3	5250	643	.12	985	.19*
NBR	1	1750	75	.04	275	.16
SBL	2	3500	646	.18	624	.18*
SBT	2	3500	651	.19*	632	.18
SBR	1	1750	528	.30	155	.09
EBL	2	3500	233	.07*	514	.15
EBT	3	5250	432	.12	1690	.37*
EBR	0	0	347	.20	229	
WBL	2	3500	676	.19	148	.04*
WBT	2	3500	1448	.41*	828	.24
WBR	1	1750	1076	.61	445	.25
Right Turn Adjustment			SBR	.04*		
Clearance Interval				.10*		.10*

Note: Assumes Right-Turn Overlap for SBR WBR

TOTAL CAPACITY UTILIZATION .95 .88

Interim Year w/Santa Clarita Pkwy w/out Proj

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1.5		438		374	
NBT	2.5	7000	672	.16*	984	.19*
NBR	1	1750	69	.04	272	.16
SBL	2	3500	609	.17	558	.16
SBT	2	3500	702	.20*	685	.20*
SBR	1	1750	285	.16	152	.09
EBL	2	3500	206	.06*	442	.13
EBT	3	5250	390	.11	1661	.35*
EBR	0	0	286	.16	175	
WBL	2	3500	610	.17	118	.03*
WBT	2	3500	1537	.44*	769	.22
WBR	1	1750	838	.48	411	.23
Clearance Interval				.10*		.10*

Note: Assumes N/S Split Phasing
Note: Assumes Right-Turn Overlap for SBR WBR

TOTAL CAPACITY UTILIZATION .96 .87

Interim Year w/Santa Clarita Pkwy w/Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1.5		440		376	
NBT	2.5	7000	672	.16*	986	.19*
NBR	1	1750	69	.04	273	.16
SBL	2	3500	609	.17	558	.16
SBT	2	3500	702	.20*	685	.20*
SBR	1	1750	291	.17	160	.09
EBL	2	3500	209	.06*	448	.13
EBT	3	5250	405	.12	1673	.35*
EBR	0	0	288	.16	177	
WBL	2	3500	612	.17	118	.03*
WBT	2	3500	1545	.44*	787	.22
WBR	1	1750	838	.48	411	.23
Clearance Interval				.10*		.10*

Note: Assumes N/S Split Phasing
Note: Assumes Right-Turn Overlap for SBR WBR

TOTAL CAPACITY UTILIZATION .96 .87

172. Whites Cyn & Soledad

Interim Year with Proj with Alt Mitigation

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1.5		484		450	
NBT	2.5	7000	643	.16*	985	.21*
NBR	1	1750	75	.04	275	.16
SBL	2	3500	646	.18	624	.18
SBT	2	3500	651	.19*	632	.18*
SBR	1	1750	528	.30	155	.09
EBL	2	3500	233	.07*	514	.15*
EBT	3	5250	432	.08	1690	.32
EBR	1	1750	347	.20	229	.13
WBL	2	3500	676	.19	148	.04
WBT	2	3500	1448	.41*	828	.24*
WBR	1	1750	1076	.61	445	.25
Right Turn Adjustment			Multi	.05*		
Clearance Interval				.10*		.10*

Note: Assumes N/S Split Phasing

Note: Assumes Right-Turn Overlap for SBR WBR

TOTAL CAPACITY UTILIZATION **.98** **.88**

197. Santa Clarita Acc & Soledad

Interim Year w/Santa Clarita Pkwy w/out Proj

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1.5		141	.04*	85	.05*
NBT	0	5250	0		0	
NBR	1.5		295		499	.14
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	3	5250	613	.12	2007	.38*
EBR	f		14		258	
WBL	2	3500	210	.06	582	.17*
WBT	3	5250	1961	.37*	1060	.20
WBR	0	0	0		0	
Clearance Interval				.10*		.10*
TOTAL CAPACITY UTILIZATION				.51		.70

Interim Year w/Santa Clarita Pkwy w/Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1.5		154	.04*	87	.05*
NBT	0	5250	0		0	
NBR	1.5		317		514	.15
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	3	5250	613	.12	2018	.38*
EBR	f		14		286	
WBL	2	3500	219	.06	615	.18*
WBT	3	5250	1972	.38*	1060	.20
WBR	0	0	0		0	
Clearance Interval				.10*		.10*
TOTAL CAPACITY UTILIZATION				.52		.71

198. Valley Center & Soledad

Pre-Interim Year without Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	2	3500	200	.06*	314	.09*
SBT	0	0	0		0	
SBR	1	1750	582	.33	664	.38
EBL	2	3500	361	.10*	473	.14
EBT	3	5250	1248	.24	2137	.41*
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	3	5250	2179	.42*	1330	.25
WBR	f		400		404	
Right Turn Adjustment			SBR	.17*	SBR	.13*
Clearance Interval				.10*		.10*

Note: Assumes Right-Turn Overlap for SBR

TOTAL CAPACITY UTILIZATION .85 .73

Pre-Interim Year with Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	2	3500	200	.06*	314	.09*
SBT	0	0	0		0	
SBR	1	1750	584	.33	679	.39
EBL	2	3500	369	.11*	477	.14
EBT	3	5250	1256	.24	2143	.41*
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	3	5250	2189	.42*	1348	.26
WBR	f		400		404	
Right Turn Adjustment			SBR	.16*	SBR	.15*
Clearance Interval				.10*		.10*

Note: Assumes Right-Turn Overlap for SBR

TOTAL CAPACITY UTILIZATION .85 .75

Interim Year without Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	2	3500	184	.05*	518	.15*
SBT	0	0	0		0	
SBR	1	1750	352	.20	473	.27
EBL	2	3500	207	.06*	496	.14
EBT	3	5250	418	.08	1923	.37*
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	3	5250	1761	.34*	936	.18
WBR	f		691		432	
Right Turn Adjustment			SBR	.10*		
Clearance Interval				.10*		.10*

TOTAL CAPACITY UTILIZATION .65 .62

Interim Year with Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	2	3500	218	.06*	555	.16*
SBT	0	0	0		0	
SBR	1	1750	377	.22	477	.27
EBL	2	3500	209	.06*	520	.15
EBT	3	5250	418	.08	1923	.37*
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	3	5250	1761	.34*	936	.18
WBR	f		710		480	
Right Turn Adjustment			SBR	.11*		
Clearance Interval				.10*		.10*

TOTAL CAPACITY UTILIZATION .67 .63

198. Valley Center & Soledad

Interim Year w/Santa Clarita Pkwy w/out Proj

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	2	3500	188	.05*	518	.15*
SBT	0	0	0		0	
SBR	1	1750	309	.18	300	.17
EBL	2	3500	198	.06*	397	.11
EBT	3	5250	520	.10	1943	.37*
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	3	5250	1855	.35*	1043	.20
WBR	f		599		395	
Right Turn Adjustment			SBR	.08*		
Clearance Interval				.10*		.10*
TOTAL CAPACITY UTILIZATION				.64		.62

Interim Year w/Santa Clarita Pkwy w/Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	2	3500	210	.06*	542	.15*
SBT	0	0	0		0	
SBR	1	1750	324	.19	311	.18
EBL	2	3500	200	.06*	410	.12
EBT	3	5250	532	.10	1953	.37*
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	3	5250	1863	.35*	1059	.20
WBR	f		611		430	
Right Turn Adjustment			SBR	.08*		
Clearance Interval				.10*		.10*
TOTAL CAPACITY UTILIZATION				.65		.62

198. Valley Center & Soledad

Long-Range with 6 Lane SCP

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	2	3500	250	.07*	690	.20*
SBT	0	0	0		0	
SBR	1	1750	500	.29	240	.14
EBL	2	3500	70	.02*	420	.12
EBT	3	5250	740	.14	1810	.34*
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	3	5250	1730	.33*	1060	.20
WBR	f		740		730	
Right Turn Adjustment			SBR	.20*		
Clearance Interval				.10*		.10*
TOTAL CAPACITY UTILIZATION				.72		.64

Long-Range with 4 Lane SCP

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	2	3500	300	.09*	820	.23*
SBT	0	0	0		0	
SBR	1	1750	520	.30	200	.11
EBL	2	3500	90	.03*	360	.10
EBT	3	5250	680	.13	1740	.33*
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	3	5250	1470	.28*	970	.18
WBR	f		770		790	
Right Turn Adjustment			SBR	.19*		
Clearance Interval				.10*		.10*
TOTAL CAPACITY UTILIZATION				.69		.66

Long-Range without SCP north of Soledad

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	2	3500	350	.10*	880	.25*
SBT	0	0	0		0	
SBR	1	1750	550	.31	290	.17
EBL	2	3500	110	.03*	460	.13
EBT	3	5250	570	.11	1680	.32*
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	3	5250	1560	.30*	930	.18
WBR	f		670		760	
Right Turn Adjustment			SBR	.19*		
Clearance Interval				.10*		.10*
TOTAL CAPACITY UTILIZATION				.72		.67

APPENDIX B
PEAK HOUR FREEWAY RAMP AND MAINLINE LEVEL OF SERVICE CALCULATIONS

Freeway Mainline LOS Summary Table

Existing Conditions (2001)

Location	Direction	Lanes	AM Peak Hour				PM Peak Hour			
			Capacity	Volume	V/C	LOS	Capacity	Volume	V/C	LOS
SR-14 s/o Placerita Cyn	NB	3+1H	7,600		.000	A	7,600	7,250	.954	E
SR-14 s/o Golden Valley	NB	3+1H	7,600		.000	A	7,600	6,786	.893	E
SR-14 n/o Golden Valley	NB	4+1H	9,600		.000	A	9,600	6,786	.707	C
SR-14 s/o Placerita Cyn	SB	4	8,000	8,125	1.016	F	8,000		.000	A
SR-14 s/o Golden Valley	SB	3+1H	7,600	7,605	1.001	F	7,600		.000	A
SR-14 n/o Golden Valley	SB	4+1H	9,600	7,605	.792	D	9,600		.000	A

Interim Year without Project

Location	Direction	Lanes	AM Peak Hour				PM Peak Hour			
			Capacity	Volume	V/C	LOS	Capacity	Volume	V/C	LOS
SR-14 s/o Placerita Cyn	NB	3+1H	7,600	3,519	.463	B	7,600	8,327	1.096	F
SR-14 s/o Golden Valley	NB	3+1H	7,600	3,344	.440	B	7,600	8,244	1.085	F
SR-14 n/o Golden Valley	NB	4+1H	9,600	3,571	.372	B	9,600	8,330	.868	D
SR-14 s/o Placerita Cyn	SB	4	8,000	8,176	1.022	F	8,000	4,983	.623	C
SR-14 s/o Golden Valley	SB	3+1H	7,600	8,123	1.069	F	7,600	5,039	.663	C
SR-14 n/o Golden Valley	SB	4+1H	9,600	8,482	.884	D	9,600	5,084	.530	C

Interim Year with Project

Location	Direction	Lanes	AM Peak Hour				PM Peak Hour			
			Capacity	Volume	V/C	LOS	Capacity	Volume	V/C	LOS
SR-14 s/o Placerita Cyn	NB	3+1H	7,600	3,527	.464	B	7,600	8,365	1.101	F
SR-14 s/o Golden Valley	NB	3+1H	7,600	3,349	.441	B	7,600	8,257	1.086	F
SR-14 n/o Golden Valley	NB	4+1H	9,600	3,578	.373	B	9,600	8,333	.868	D
SR-14 s/o Placerita Cyn	SB	4	8,000	8,220	1.028	F	8,000	5,000	.625	C
SR-14 s/o Golden Valley	SB	3+1H	7,600	8,138	1.071	F	7,600	5,047	.664	C
SR-14 n/o Golden Valley	SB	4+1H	9,600	8,483	.884	D	9,600	5,089	.530	C

Project's Increment

Location	Direction		AM Peak Hour				PM Peak Hour			
				Volume	V/C			Volume	V/C	
SR-14 s/o Placerita Cyn	NB			8	.001			38	.005	
SR-14 s/o Golden Valley	NB			5	.001			13	.001	
SR-14 n/o Golden Valley	NB			7	.001			3	.000	
SR-14 s/o Placerita Cyn	SB			44	.006			17	.002	
SR-14 s/o Golden Valley	SB			15	.002			8	.001	
SR-14 n/o Golden Valley	SB			1	.000			5	.000	

Freeway Mainline LOS Summary Table

Existing Conditions (2001)

Location	Direction	Lanes	AM Peak Hour				PM Peak Hour			
			Capacity	Volume	V/C	LOS	Capacity	Volume	V/C	LOS
SR-14 s/o Placerita Cyn	NB	3+1H	7,600		.000	A	7,600	7,250	.954	E
SR-14 s/o Golden Valley	NB	3+1H	7,600		.000	A	7,600	6,786	.893	E
SR-14 n/o Golden Valley	NB	4+1H	9,600		.000	A	9,600	6,786	.707	C
SR-14 s/o Placerita Cyn	SB	4	8,000	8,125	1.016	F	8,000		.000	A
SR-14 s/o Golden Valley	SB	3+1H	7,600	7,605	1.001	F	7,600		.000	A
SR-14 n/o Golden Valley	SB	4+1H	9,600	7,605	.792	D	9,600		.000	A

Interim Year Alternative without Project

Location	Direction	Lanes	AM Peak Hour				PM Peak Hour			
			Capacity	Volume	V/C	LOS	Capacity	Volume	V/C	LOS
SR-14 s/o Placerita Cyn	NB	3+1H	7,600	3,781	.498	B	7,600	8,611	1.133	F
SR-14 s/o Golden Valley	NB	3+1H	7,600	3,389	.446	B	7,600	8,250	1.086	F
SR-14 n/o Golden Valley	NB	4+1H	9,600	3,527	.367	B	9,600	8,204	.855	D
SR-14 s/o Placerita Cyn	SB	4	8,000	8,643	1.080	F	8,000	5,337	.667	C
SR-14 s/o Golden Valley	SB	3+1H	7,600	7,942	1.045	F	7,600	5,022	.661	C
SR-14 n/o Golden Valley	SB	4+1H	9,600	8,378	.873	D	9,600	5,205	.542	C

Interim Year Alternative with Project

Location	Direction	Lanes	AM Peak Hour				PM Peak Hour			
			Capacity	Volume	V/C	LOS	Capacity	Volume	V/C	LOS
SR-14 s/o Placerita Cyn	NB	3+1H	7,600	3,789	.499	B	7,600	8,653	1.139	F
SR-14 s/o Golden Valley	NB	3+1H	7,600	3,390	.446	B	7,600	8,254	1.086	F
SR-14 n/o Golden Valley	NB	4+1H	9,600	3,530	.368	B	9,600	8,207	.855	D
SR-14 s/o Placerita Cyn	SB	4	8,000	8,696	1.087	F	8,000	5,356	.670	C
SR-14 s/o Golden Valley	SB	3+1H	7,600	7,942	1.045	F	7,600	5,023	.661	C
SR-14 n/o Golden Valley	SB	4+1H	9,600	8,380	.873	D	9,600	5,210	.543	C

Project's Increment

Location	Direction		AM Peak Hour				PM Peak Hour			
				Volume	V/C			Volume	V/C	
SR-14 s/o Placerita Cyn	NB			8	.001			42	.006	
SR-14 s/o Golden Valley	NB			1	.000			4	.000	
SR-14 n/o Golden Valley	NB			3	.001			3	.000	
SR-14 s/o Placerita Cyn	SB			53	.007			19	.003	
SR-14 s/o Golden Valley	SB			0	.000			1	.000	
SR-14 n/o Golden Valley	SB			2	.000			5	.001	

Freeway Ramp LOS Summary Table

Interchange	Ramp	Lanes	Peak Hour Capacity	Interim Year No Project						Interim Year With Project					
				AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour		
				Volume	V/C	LOS	Volume	V/C	LOS	Volume	V/C	LOS	Volume	V/C	LOS
Golden Valley &	NB On	2	2,250	848	.377	A	1,272	.565	A	855	.380	A	1,275	.567	A
SR-14	SB On	1	1,500	543	.362	A	821	.547	A	558	.372	A	829	.553	A
	NB Off	1	1,500	621	.414	A	1,184	.789	C	626	.417	A	1,197	.798	C
	SB Off	1	1,500	903	.602	B	867	.578	A	904	.603	B	872	.581	A
Placerita Canyon &	NB Direct On	2	2,250	6	.003	A	1	.000	A	6	.003	A	1	.000	A
SR-14	NB Loop On	1	1,500	353	.235	A	560	.373	A	353	.235	A	560	.373	A
	SB On (Sierra)	1	1,500	734	.489	A	392	.261	A	763	.509	A	398	.265	A
	SB On (Placerita)	1	1,500	261	.174	A	299	.199	A	261	.174	A	302	.201	A
	NB Off	1	1,500	532	.355	A	644	.429	A	536	.357	A	669	.446	A
	SB Off	1	1,500	942	.628	B	748	.499	A	944	.629	B	748	.499	A

Freeway Ramp LOS Summary Table

Interchange	Ramp	Lanes	Peak Hour Capacity	Interim Year Alternative No Project						Interim Year Alternative With Project					
				AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour		
				Volume	V/C	LOS	Volume	V/C	LOS	Volume	V/C	LOS	Volume	V/C	LOS
Golden Valley &	NB On	2	2,250	963	.428	A	1,232	.548	A	966	.429	A	1,235	.549	A
SR-14	SB On	1	1,500	403	.269	A	719	.479	A	403	.269	A	719	.479	A
	NB Off	1	1,500	826	.551	A	1,276	.851	D	827	.551	A	1,280	.853	D
	SB Off	1	1,500	840	.560	A	903	.602	B	842	.561	A	907	.605	B
Placerita Canyon &	NB Direct On	2	2,250	7	.003	A	2	.001	A	7	.003	A	2	.001	A
SR-14	NB Loop On	1	1,500	213	.142	A	596	.397	A	213	.142	A	596	.397	A
	SB On (Sierra)	1	1,500	826	.551	A	790	.527	A	843	.562	A	804	.536	A
	SB On (Placerita)	1	1,500	758	.505	A	228	.152	A	795	.530	A	234	.156	A
	NB Off	1	1,500	612	.408	A	958	.639	B	619	.413	A	997	.665	B
	SB Off	1	1,500	887	.591	A	701	.467	A	887	.591	A	702	.468	A

APPENDIX C
RELATED PROJECTS

Gate King Industrial Park - Subdivide 584 acres into 88 industrial lots for 4.4 million square feet of industrial building square footage. The project would also dedicate 239 acres of open space to the City- South of San Fernando Road between Pine Street and Sierra Highway - Master Case 99-264

Western Pacific Housing (Lyons Ranch) - subdivide 384 acres into 3 commercial lots, 831 residential units, a 6 acre park site, and dedicate 211 acres of open space to the City of Santa Clarita. - West of Interstate 5 at Calgrove and The Old Road. Master Case 02-349

Rice Development - development for a 84,000 square foot self storage facility- southwest corner of Bouquet Canyon Road and Newhall Ranch Road – Master Case 02-231

Carl's Jr. - development for a new 3000 square foot drive through restaurant
Northwest corner of Via Princessa and Sierra Highway - Master Case 02-309

Aspen Investment Company - development for eight new industrial buildings totaling 109,000 square feet - north corner of Soledad Canyon Road and Valley Center Drive - Master Case 02-273

Rodgers Development - development for a new 34,000 square foot commercial shopping center - northeast corner of Bouquet Canyon Road and Plum Canyon Road- Master Case 02-232

Motezuma Land Development - subdivision of 90 acres for 174 single family homes, a park site, and four open space lots - southeast corner of Golden Valley Road and Sierra Highway - Master Case 02-063

HH Seco II LLC - development for a new 40,000 square foot commercial shopping center - southwest corner of Seco Canyon Road and Copper Hill - Master Case 01-317

California Canyons Annexation - located in the northeast corner of City. Total area 43.10 acres. 68 existing single family homes. Master Case 96-206

North Valencia No. 2: 1,900 dwelling units (1,400 sfd and 500 multifamily), 210,000 commercial square feet, 15.9 acre community park and 4.1 acres private recreation areas.

West Creek: 2,545 dwelling units (1806 sfd and 739 multi-family), 180,000 commercial retail, 10 acre elementary school, 6.4 acres of recreational facilities.

Lost Canyon Road Annexation - located west of the Sand Canyon area, south of 14 Freeway. 38.8 acres of vacant Business park zoning. Master Case 02-235

Northpark Annexation - north park of the City (north and south portions of Decoro Drive. 1351 existing residential units on 457 acres. Master Case 98-183

Stonecrest Annexation - west of Pinetree area, north of 14 Freeway. 425 existing residential units on 215.9 acres. Master Case 01-068

Whitney Canyon Annexation - located east of 14 Freeway extending east at the terminus of San Fernando Road and into a portion of the Angeles National Forest. 481.75 acres of open space. Master Case 02-345

Golden Valley Ranch – located southeast of the City, east of SR-14 and north of Placerita Canyon Road. 1311 acres of planned community (488 sfr, 2 commercial lots, 1 school lot, 1 fire station site). Master Case 97-212

Towsley Canyon Annexation - located southwest of the City, west of Interstate 5. 60 acres of open space. Master Case 89-016

Porta Bella or Whitaker-Bermite(partial) – located south of Soledad Canyon Road, east of Circle J Ranch area. Approximately 50% of the project land use is included in the Interim Year database. 100% of the project land use is included in the long-range database. 2,911 dwelling units and 92 acres of commercial development on 996 total acres.

Tesoro del Valle – located north of Copper Hill Drive, west of McBean Parkway. 1,791 dwelling units, 10 acre commercial center and elementary school.

Synergy Ermine Street – 116.71 acres site located just west of existing Ermine Street, east of Riverpark site and north of the Santa Clara River. Residential site zoned RVL, ½ to 1 unit/acre.

Valencia Town Center – located east of McBean Parkway, north of Valencia Boulevard, south of Magic Mountain Parkway and west of Citrus Street. Expansion of the existing shopping mall to consist of a 250,000 square foot Department Store.

TPM 20838 – Located north of Bouquet Canyon Road and south of the Santa Clara River. 168 apartment units.

APPENDIX D
NEWHALL RANCH ROAD INTERIM DESIGN

Newhall Ranch Road will be constructed as a six lane roadway between Bouquet Canyon Road and the Santa Clara River Bridge and the bridge will initially be constructed to accommodate four lanes. The following exhibit illustrates this interim configuration. Ultimately, the bridge will be improved to six lanes as envisioned by the City Circulation Element.

Traffic volume forecasts presented in the previous sections of this report indicate that the interim 6 lane/4 lane configuration results in acceptable levels of service as shown in the following intersection capacity utilization worksheets.

BOUQUET CANYON ROAD

NEWHALL RANCH ROAD

FUTURE SANTA CLARITA PARKWAY

NEWHALL RANCH ROAD

GOLDEN VALLEY ROAD EXTENSION (FUTURE)

GOLDEN VALLEY ROAD

SANTA CLARITA PARKWAY

FUTURE IMPROVEMENTS

SOLEDAD CYN. ROAD

LEGEND

6–LANE IMPROVEMENT

4–LANE IMPROVEMENT

* FULL–WIDTH GRADING IS PROPOSED FOR NEWHALL RANCH ROAD AND SANTA CLARITA PARKWAY

FEET
800 400 0 800
1 1/2 0 1
INCHES

NEWHALL LAND

River Park-VTTM 53425
PROPOSED IMPROVEMENTS ON MAJOR THOROUGHFARES

P S O M A S

DATE: 8/29/03 REVISED ON: 9/22/03
JOB No: 1VAL021504 TASK: 3 SHEET NO. 1 OF 1

RP080–01

Plotted: 09/22/03 08:31:51 M:\Northrid~1\53425~1\VFMGR\EXHIB\RPMAP-01.dwg JSan

158. Santa Clarita & Newhall Rch

Interim Year w/Proj & 4 Lane NRR

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1750	75	.04*	60	.03*
NBT	0	0	0		0	
NBR	1	1750	46	.03	22	.01
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	2	3500	1126	.32	1437	.41*
EBR	1	1750	28	.02	97	.06
WBL	1	1750	14	.01	47	.03*
WBT	2	3500	1447	.41*	1363	.39
WBR	0	0	0		0	
Clearance Interval				.10*		.10*

TOTAL CAPACITY UTILIZATION .55 .57

Interim Year w/Proj & SCP & 4 Lane NRR

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3500	193	.06*	298	.09
NBT	2	3500	314	.09	927	.26*
NBR	1	1750	13	.01	33	.02
SBL	2	3500	494	.14	363	.10*
SBT	2	3500	913	.26*	503	.14
SBR	1	1750	203	.12	9	.01
EBL	2	3500	22	.01*	317	.09*
EBT	2	3500	619	.18	1123	.32
EBR	1	1750	377	.22	177	.10
WBL	1	1750	28	.02	15	.01
WBT	2	3500	1270	.36*	945	.27*
WBR	1	1750	218	.12	552	.32
Clearance Interval				.10*		.10*

TOTAL CAPACITY UTILIZATION .79 .82

165. Golden Valley & Valley Cntr

Interim Year w/Proj & 4 Lane NRR

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3500	352	.10*	437	.12*
NBT	2	3500	659	.19	997	.28
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	2	3500	983	.28*	828	.24*
SBR	f		245		596	
EBL	2	3500	725	.21*	443	.13*
EBT	0	0	0		0	
EBR	1	1750	195	.11	557	.32
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Right Turn Adjustment					EBR	.10*
Clearance Interval				.10*		.10*

TOTAL CAPACITY UTILIZATION .69 .69

Interim Year w/Proj & SCP & 4 Lane NRR

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3500	310	.09*	311	.09*
NBT	2	3500	808	.23	1134	.32
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	2	3500	945	.27*	912	.26*
SBR	f		224		542	
EBL	2	3500	612	.17*	386	.11*
EBT	0	0	0		0	
EBR	1	1750	199	.11	453	.26
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Right Turn Adjustment					EBR	.08*
Clearance Interval				.10*		.10*

TOTAL CAPACITY UTILIZATION .63 .64

APPENDIX E
PROJECT SHARE CALCULATIONS

PROJECT SHARE CALCULATIONS

	Existing	Interim Year without Project	Interim Year with Project	Ave.Share	Alt Interim Year without Project	Alt Interim Year with Project	Ave.Share
48. McBean & Newhall Ranch				8%			8%
AM	6718	7951	8093		7526	7673	
PM	5369	8174	8372		8359	8541	
57. Valencia & Magic Mtn				5%			5%
AM	3831	6329	6475		6149	6282	
PM	4540	7462	7631		7315	7465	
65. Bouquet & Soledad				*4%*			*4%*
AM	7447	6597	6839		6408	6628	
PM	8432	8447	8817		7916	8238	
66. Bouquet & Newhall Ranch				22%			26%
AM	5700	7862	8360		7325	7745	
PM	6971	9280	10079		8454	9130	
67. Seco & Bouquet				13%			*2%*
AM	4788	5474	5551		4212	4264	
PM	5062	5753	5889		4732	4863	
145. Sierra & Placerita Canyon				2%			4%
AM	2308	3571	3586		4310	4384	
PM	2836	4089	4127		4923	5000	
146. SR-14 NB Rp & Golden Valley				1%			0%
AM	132	2111	2123		2430	2434	
PM	323	3624	3640		3674	3681	
147. SR-14 SB Rp & Golden Valley				1%			0%
AM	958	2915	2943		3052	3058	
PM	421	4037	4066		4024	4035	
157. Santa Clarita & Soledad Acc				n/a			*7%*
AM					2074	2217	
PM					2589	2784	
158. Santa Clarita & Newhall Rch				*14%*			*8%*
AM		2385	2736		4336	4664	
PM		2547	3026		4819	5262	
159. Santa Clarita & Bouquet				n/a			*1%*
AM					4480	4524	
PM					5170	5253	
162. Sierra & Golden Valley				2%			1%
AM	2273	5780	5864		5568	5586	
PM	2048	6055	6143		5624	5652	
164. Golden Valley & Golden Tri				6%			3%
AM		2777	2940		2876	2971	
PM		3286	3491		3245	3354	
165. Golden Valley & Valley Cntr				8%			5%
AM		2916	3159		2952	3098	
PM		3542	3858		3554	3738	

PROJECT SHARE CALCULATIONS

	Existing	Interim Year without Project	Interim Year with Project	Ave.Share	Alt Interim Year without Project	Alt Interim Year with Project	Ave.Share
169. Rainbow Glen & Soledad				11%			10%
AM	3344	3886	3939		3988	4043	
PM	4013	4620	4705		4656	4744	
172. Whites Cyn & Soledad				4%			10%
AM	6742	7211	7239		6642	6680	
PM	5691	6923	6975		6601	6652	
197. Santa Clarita Acc & Soledad							*2%*
AM					3234	3289	
PM					4491	4580	
198. Valley Center & Soledad				*2%*			*2%*
AM		3613	3693		3669	3740	
PM		4778	4891		4596	4705	

Average share is calculated by dividing the volume of project traffic in the AM and PM peak hours by the total increase in traffic (future conditions minus existing conditions) forecast to occur during the AM and PM peak hours. For intersections not existing today, or for intersections in which future parallel facilities will effect a net reduction in traffic volumes when compared to existing conditions, average share is calculated by dividing the volume of project traffic by the total volume of future traffic.

APPENDIX F
CALTRANS CAPACITY – MEETING NOTES

Meeting Notes – August 10, 2000 Meeting to Discuss Caltrans' Comment Letter on Draft EIR No. 573

Meeting Attendees:	Terry Austin, Austin-Foust Associates, Inc. Joe El Harake, Caltrans Kendall Elmer, Austin-Foust Associates, Inc. Everett Evans, Caltrans Michael Haberkorn, County of Orange Firooz Hamedani, Caltrans Bob Joseph, Caltrans Aileen Kennedy, Caltrans Bryan Speegle, County of Orange
Meeting Location:	Caltrans District 12 Headquarters, Irvine

The primary topic of discussion during the meeting pertained to methodologies for performing level of service analysis on the freeway system within the EIR No. 573 traffic analysis study area. The primary objective of the discussion was to develop a general consensus on a set of freeway facility capacities, level of service standards, and project impact thresholds for the County to apply in order to address freeway impact comments contained in Caltrans' February 22, 2000 DEIR comment letter as well as DEIR comment letters received from others. Two basic components of the freeway system were discussed in-depth during the meeting: 1) the freeway mainline, and 2) freeway ramps. By the end of the meeting a general consensus had been reached as to the assumptions and standards to apply in an updated impact analysis of these two basic freeway components. These assumptions and standards are summarized below.

Freeway Mainline

A maximum capacity of 2,000 vehicles per hour per lane (vphpl) is to be assumed for mixed-flow mainline freeway lanes, a capacity that is cited in the Caltrans Highway Design Manual. A maximum capacity of 1,600 vphpl is to be assumed for high occupancy vehicle (HOV) freeway lanes, a capacity that Caltrans has applied in the past when performing freeway capacity analyses. It should be assumed that no additional mainline capacity is provided by auxiliary lanes that are located between the on-ramp and off-ramp of two adjacent interchanges (i.e., auxiliary lanes that do not extend beyond two adjacent interchanges).

These capacities, which correspond to level of service (LOS) "E" conditions, are to be applied to calculate existing volume-to-capacity (V/C) ratios and future demand-to-capacity (D/C) ratios. LOS "E" (V/C or D/C less than or equal to 1.00) is the performance standard that is to be applied to the freeway mainline (i.e., a freeway mainline segment is considered deficient (LOS "F") when the V/C or D/C ratio is greater than 1.00). Project mitigation is required for freeway mainline segments that are forecast to operate at LOS "F" if the project contribution to the V/C or D/C ratio is greater than 0.03 (the impact threshold specified in the Orange County Congestion Management Program).

For existing traffic conditions which are reported based on observed traffic volumes, existing levels of service based on V/C ratios will be validated against Caltrans' 1998 Freeway Traffic Conditions publication in order to ensure that the V/C methodology accurately depicts existing levels of service, particularly for freeway segments which are currently deficient according to the Caltrans publication. Modeled future traffic forecasts that are applied in the DEIR No. 573 traffic analysis represent the future volume demand on the freeway system. The corresponding future D/C ratios can therefore be directly utilized to accurately portray future levels of service on the freeway mainline.

Freeway Ramps

Carrying capacities for ramps of various configurations were developed based on information contained in the Caltrans Highway Design Manual and the Caltrans Ramp Meter Design Manual. The various ramp configurations and their associated capacities are summarized below.

Metered On-Ramps

A maximum capacity of 900 vehicles per hour (vph) is to be assumed for a one-lane metered on-ramp with only one mixed-flow lane at the meter.

A maximum capacity of 1,080 (20 percent greater than 900) vph is to be assumed for a one-lane metered on-ramp with one mixed-flow lane at the meter plus one HOV preferential lane at the meter.

A maximum capacity of 1,500 vph is to be assumed for a one-lane metered on-ramp with two mixed-flow lanes at the meter.

A maximum capacity of 1,800 vph is to be assumed for a two-lane metered on-ramp with two mixed-flow lanes at the meter.

A maximum capacity of 2,250 (50 percent greater than 1,500) vph is to be assumed for a two-lane metered on-ramp with three mixed-flow lanes at the meter.

Toll Ramps

A maximum capacity of 1,500 vph is to be assumed for a one-lane toll ramp with one cash (stopped) lane and one FasTrak (unstopped) lane.

Non-Metered and Non-Tolled On-Ramps and Off-Ramps

A maximum capacity of 1,500 vph is to be assumed for a one-lane ramp.

A maximum capacity of 2,250 (50 percent greater than 1,500) vph is to be assumed for a two-lane on-ramp that tapers to one merge lane at or beyond the freeway mainline gore point and for a two-lane off-ramp with only one auxiliary lane.

A maximum capacity of 3,000 vph is to be assumed for a two-lane on-ramp that does not taper to one merge lane and for a two-lane off-ramp with two auxiliary lanes.

These capacities, which correspond to level of service (LOS) "E" conditions, are to be applied to calculate ramp V/C ratios. LOS "E" (V/C less than or equal to 1.00) is the performance standard that is to be applied to freeway/tollway ramps (i.e., a ramp is considered deficient (LOS "F") when the V/C ratio is greater than 1.00). Project mitigation is required for ramps that are forecast to operate at LOS "F" if the project contribution to the V/C ratio is greater than 0.03 for ramps at CMP intersections and 0.01 or greater for ramps at non-CMP intersections.

APPENDIX G
ILLUSTRATIONS OF MITIGATION MEASURES

APPROVED BY CITY OF SANTA CLARITA:
Anthony J Madrigal 10/22/98
ANTHONY MADRIGAL, CITY ENGINEER — DATE

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
7	L.A.	126	6.5 - 7.9	6	6

REGISTERED CIVIL ENGINEER
9-28-98
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — JOE E FOUST — No. C-20258 — Exp. 9-30-01 — CIVIL — STATE OF CALIFORNIA

AUSTIN-FOUST ASSOCIATES, INC.
2020 NORTH TUSTIN AVENUE
SANTA ANA, CA. 92701 (714)667-0496 FAX(714)667-7952

DATE REVISED BY | DATE REVISED BY | CALCULATED BY | DESIGNED BY | CHECKED BY | PROJECT ENGINEER

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
Caltrans TRAFFIC DESIGN

GENERAL NOTES

1. UTILITIES SHOWN ON THESE PLANS ARE CORRECT AND ACCURATE TO THE EXTENT OF AVAILABLE RECORDS AND KNOWLEDGE. THE CONTRACTOR IS REQUIRED TO TAKE STEPS TO ASCERTAIN THE EXACT LOCATION OF THE UNDERGROUND FACILITIES PRIOR TO DOING THE WORK THAT MAY DAMAGE SUCH FACILITIES OR INTERFERE WITH THEIR SERVICE.
2. ALL MATERIAL AND EQUIPMENT SHALL BE FURNISHED AND INSTALLED BY THE CONTRACTOR.
3. ALL WIRING SHALL BE MARKED (TAGGED) WITHIN THE CONTROLLER CABINET FOR PHASE IDENTIFICATION.
4. ALL SIGNAL EQUIPMENT SHALL BE WIRED IN ACCORDANCE WITH THE SIGNAL PHASE DIAGRAM.
5. EACH LOOP ASSEMBLY SHALL HAVE A SEPARATE LEAD-IN CABLE TO THE CONTROLLER.
6. LOOPS SHALL BE TYPE E AND CENTERED IN LANES UNLESS OTHERWISE SPECIFIED.
7. PEDESTRIAN HEADS SHALL BE MODULAR TYPE III WITH INTERNATIONAL SYMBOLS.
8. CONDUIT SHALL BE 2" UNLESS OTHERWISE SPECIFIED.
9. PULL BOXES SHALL BE SIZE No. 5 UNLESS OTHERWISE SPECIFIED.
10. ALL WORK IS TO BE DONE IN ACCORDANCE WITH CALTRANS STANDARD PLANS AND SPECIFICATIONS, LATEST EDITION.
11. POLE LOCATIONS SHOWN HEREON ARE APPROXIMATE. PRECISE LOCATIONS SHALL BE ESTABLISHED IN THE FIELD AND VERIFIED BY THE PROJECT ENGINEER.

CONDUCTOR AND CONDUIT SCHEDULE

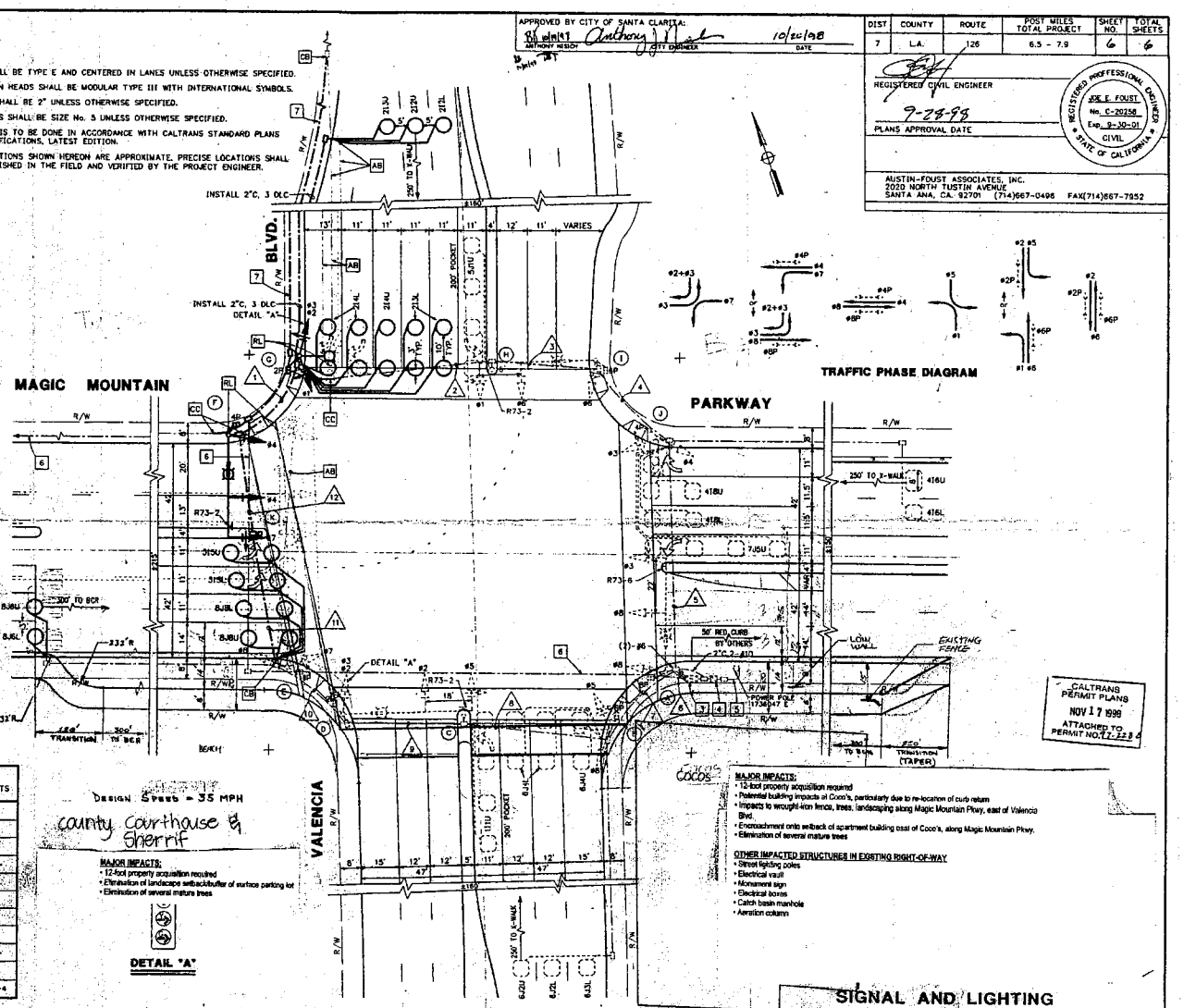
AWG OR CABLE	CONDUCTOR RUN	1	2	3	4	5	6	7	8	9	10	11	12
#14	#1	3	-	1	-	3	-	3	-	-	-	-	-
	#2	3	-	-	-	-	3	3	3	3	3	3	3
	#2+#3	2	-	-	-	-	2	2	2	2	2	2	2
	#3	-	-	-	-	3	6	-	-	-	-	-	-
	#4	3	3	3	3	3	-	-	-	-	-	-	-
	#5	-	-	-	-	-	3	3	3	3	-	-	-
	#6	-	-	-	3	3	6	3	-	-	-	-	-
	#7	-	-	-	-	-	3	3	3	3	3	3	3
	#8	-	-	-	-	-	3	3	3	3	-	-	-
	#2P	-	-	-	-	-	2	2	2	2	2	2	2
	#4P	2	2	2	2	2	2	-	-	-	-	-	-
	#6P	-	-	-	2	2	4	2	-	-	-	-	-
	#2PPB	-	-	-	-	-	1	1	1	1	1	1	1
	#4PPB	1	1	1	1	1	-	-	-	-	-	-	-
	#6PPB	-	-	-	1	2	-	-	-	-	-	-	-
	#8PPB	-	-	-	-	-	1	1	1	1	1	1	1
	PPB Common	1	1	1	1	2	1	1	1	1	1	1	1
	Spares	3	3	3	3	3	6	3	3	3	3	3	3
	TOTAL #14	18	13	13	18	22	57	29	24	24	20	15	15
#10	Int. Illum. Signs, Indic. Lights	-	-	-	2	2	4	2	2	2	2	2	2
	Luminaires	2	2	2	2	4	2	2	2	2	2	2	2
	Signal Common	1	1	1	1	2	1	1	1	1	1	1	1
	TOTAL #10	3	3	3	5	10	5	5	5	5	5	5	5
#8	Signal Service	-	-	-	-	-	-	1	-	-	-	-	-
	#1 Detectors	-	6	6	6	6	-	-	-	-	-	-	-
	#3 Detectors	-	-	-	-	-	2	2	2	2	-	-	-
	#4 Detectors	-	-	-	4	4	-	-	-	-	-	-	-
	#5 Detectors	-	1	1	1	-	-	-	-	-	-	-	-
	#6 Detectors	-	-	-	-	5	5	-	-	-	-	-	-
	#7 Detectors	-	-	-	1	1	-	-	-	-	-	-	-
	#8 Detectors	-	-	-	-	4	4	4	4	4	-	-	-
	TOTAL DLC	0	6	7	7	12	24	12	7	6	6	0	0
CONDUIT SIZE		3"(N)	3"	3"	3"	3"	3-3"	3"	3"	3"	3"	3"(N)	3"(N)

(N) = NEW

POLE AND EQUIPMENT SCHEDULE

NO.	STANDARD TYPE	SIG. MA	LUM. ARM	VEH SIG. MTG. MAST	VEH SIG. MTG. POLE	PED. SIGNAL MTG.	PPB Ø	PPB ARROW	HPS LUMINAIRE	SPECIAL REQUIREMENTS
(A)	25'-4"-BC	45'	15'	MAS MAT	SV-1-T	SP-1-T	6	—	200W	"SNS "Valencia"
(B)	15'		12'		TV-2-T	SP-1-T	8	—	200W	
(C)	PPB POST						8	—		
(D)	25'-4"-BC	45'	15'	MAS MAT	SV-1-T	SP-1-T	8	—	200W	"SNS "Magic Mtn"
(E)	15'		12'		TV-2-T	SP-1-T	2	—	200W	
(F)	25'-4"-BC(R)	45'(R)	15'(R)	MAS MAT	SV-1-T(R)	SP-1-T(R)	2	—	200W(R)	"SNS "Valencia"
(G)	15(R)		12'(R)		TV-2-T(R)	SP-1-T(R)	4	—	200W(R)	
(H)	PPB POST						4	—		
(I)	25'-4"-BC	45'	15'	MAS MAT	SV-1-T	SP-1-T	4	—	200W	"SNS "Magic Mtn"
(J)	15'		12'		TV-2-T	SP-1-T	6	—	200W	
(K)	PPB POST (N)						2	—		"R7, TYPE N-4

"SNS = "INTERNALLY ILLUMINATED STREET NAME SIGN"
(N) = NEW
(R) = RELOCATED



CALTRANS ELECTRICAL	
REVIEWED BY:	REVIEWED BY: DATE:
	11/13/98

SIGNAL AND LIGHTING
MAGIC MOUNTAIN PARKWAY
VALENCIA BOULEVARD
SCALE: 1"=20'

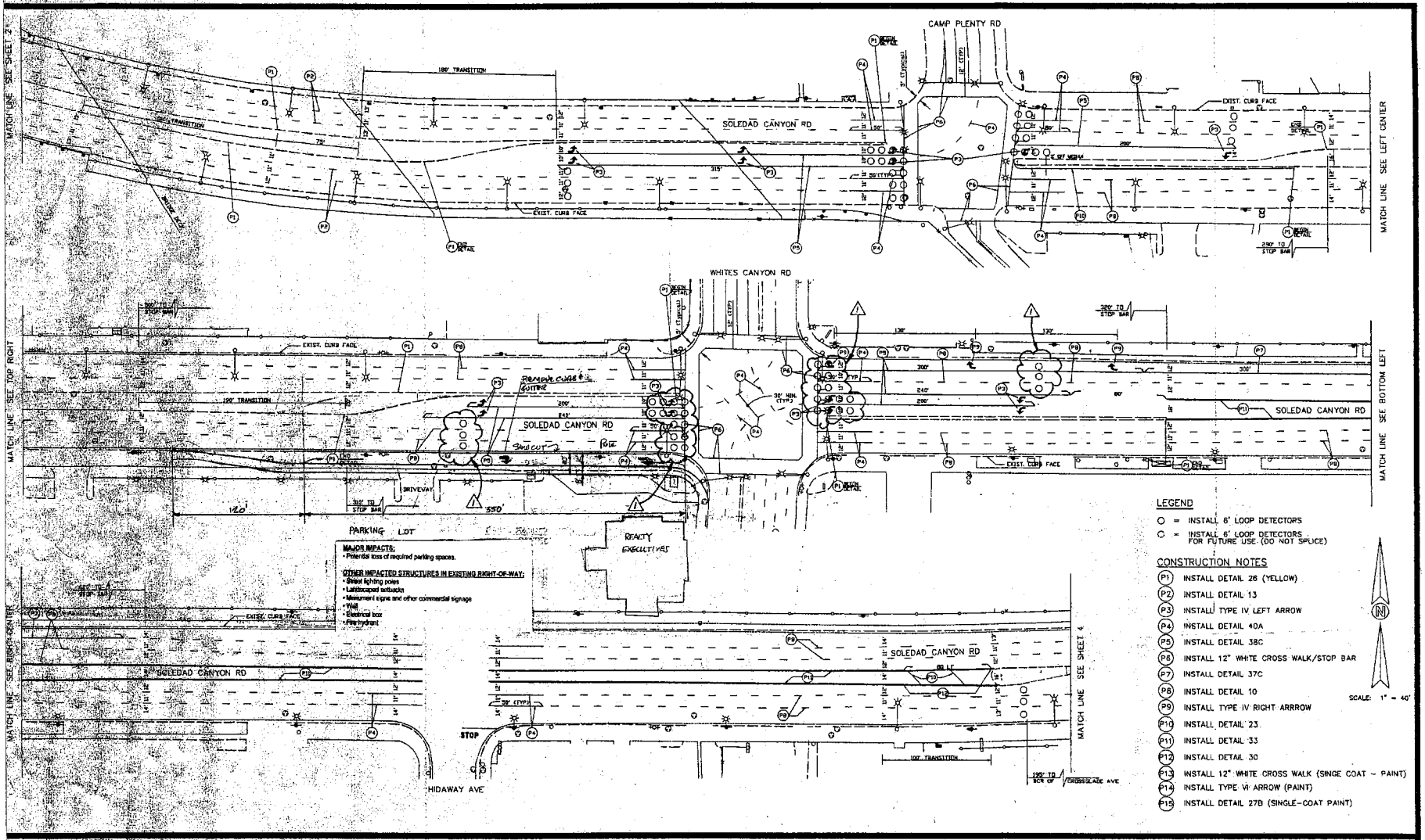
E-2

FOR REDUCED PLANS ORIGINAL SCALE IS IN INCHES 0 1 2 3

CU 07283	EA 07-118581

PERMIT 7PL-16MC-2282

MAGIC MTN/VALENCIA BLVD/MAGIC MTN EASTBOUND



LEGEND

○ = INSTALL 6' LOOP DETECTORS

○ = INSTALL 6' LOOP DETECTORS FOR FUTURE USE. (DO NOT SPLICE)

CONSTRUCTION NOTES

(P1) INSTALL DETAIL 26 (YELLOW)
(P2) INSTALL DETAIL 13
(P3) INSTALL TYPE IV LEFT ARROW
(P4) INSTALL DETAIL 40A
(P5) INSTALL DETAIL 38C
(P6) INSTALL 12" WHITE CROSS WALK/STOP BAR
(P7) INSTALL DETAIL 37C
(P8) INSTALL DETAIL 10
(P9) INSTALL TYPE IV RIGHT ARRROW
(P10) INSTALL DETAIL 23
(P11) INSTALL DETAIL 33
(P12) INSTALL DETAIL 30
(P13) INSTALL 12" WHITE CROSS WALK (SINGE COAT – PAINT)
(P14) INSTALL TYPE VI ARROW (PAINT)
(P15) INSTALL DETAIL 27B (SINGLE-COAT PAINT)

SCALE: 1" = 40'

REVISIONS				
DESCRIPTION	REVISED BY	REVISED DATE	APPROVED BY	APPROVED DATE
DELETE TRAFFIC LOOPS ON WHITES CANYON	MKT	6/6/95	[illegible]	6/6/95

REVIEWED BY: Robert J. Reiman — 6-7-95 (SIGNATURE / DATE)

APPROVED FOR CONSTRUCTION BY: [signature] — 6/8/95 (CITY ENGINEER, RCE 28550 / DATE)

DESIGNED BY: NORM BACULINAO — 5-7-95
DRAWN BY: BONNIE JOSEPH
UNDER SUPERVISION OF:
ROBERT G. NEWMAN, R.C.E. 51733 — 6/6/95 (DATE)

REGISTERED PROFESSIONAL ENGINEER — ROBERT G. NEWMAN — No. C051733 — 6/7/95 — CIVIL — STATE OF CALIFORNIA

CITY OF SANTA CLARITA
COMMUNITY DEVELOPMENT DEPARTMENT
23920 VALENCIA BLVD., SUITE 300
SANTA CLARITA, CALIFORNIA 91355
PHONE (805) 259-CITY/FAX (805) 259-8125

TITLE: STRIPING PLAN

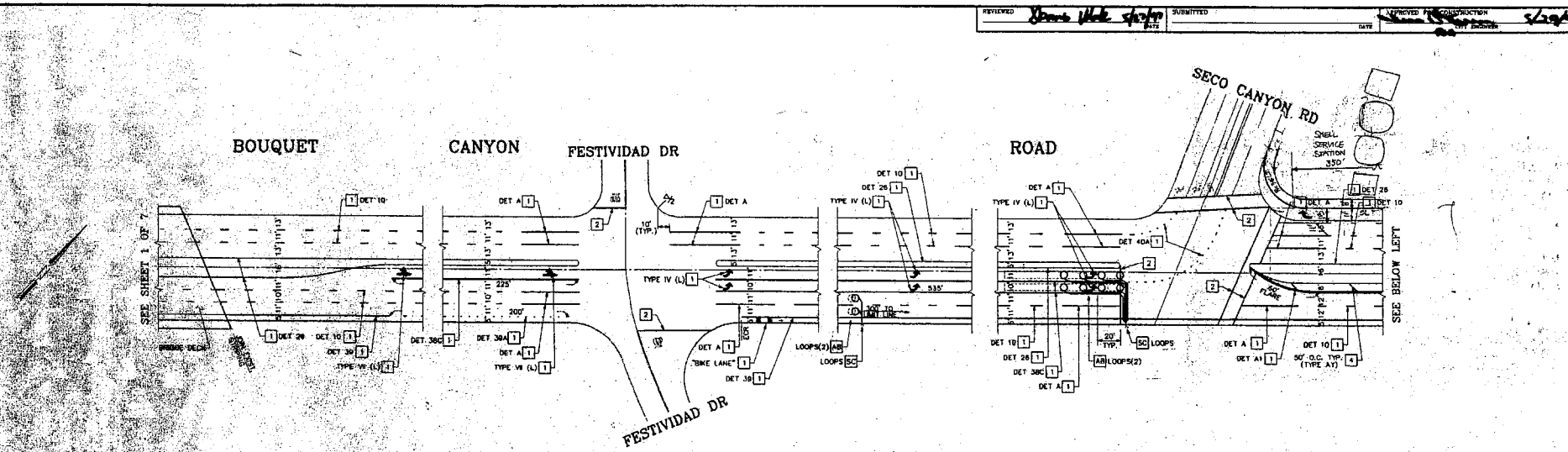
DESCRIPTION: SOLEDAD CANYON ROAD
FROM 800' W/O CAMP PLENTY RD TO 500' E/O HIDAWAY AVE

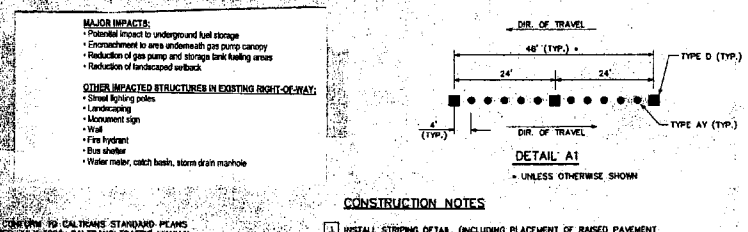
205B

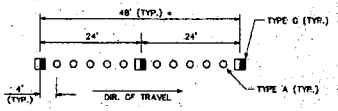
PROJECT: 95-906

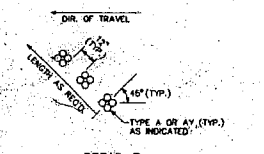
SHT. 3 of SHTS. 4

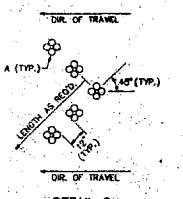
WHITE CANYON & SOLEDAD 1Y











MAJOR IMPACTS:
- Potential impact to underground fuel storage
- Encroachment to area underneath gas pump canopy
- Reduction of gas pump and storage tank fueling areas
- Reduction of landscaped setback

OTHER IMPACTED STRUCTURES IN EXISTING RIGHT-OF-WAY:
- Street lighting poles
- Landscaping
- Monument sign
- Wall
- Fire hydrant
- Bus shelter
- Water meter, catch basin, storm drain manhole

GENERAL NOTES

1. TRAFFIC STRIPING SHALL CONFORM TO CALTRANS STANDARD PLANS AND SPECIFICATIONS, DATED JULY 1992, CALTRANS TRAFFIC MANUAL, LATEST EDITION, THIS PLAN, AND THE SPECIAL PROVISIONS.
2. INDUCTIVE LOOP DETECTORS, SHALL BE 6' DIAMETER; PLACE LIMIT LINE OR CROSSWALK LOOPS 2' BEYOND LIMIT LINE OR CROSSWALK. NEW STRIPING SHALL BE LOCATED, AND APPROVED BY THE ENGINEER IN THE FIELD PRIOR TO POSITIONING LOOPS.
3. INSTALL TWO-WAY BLUE REFLECTIVE MARKER AT EVERY FIRE HYDRANT.
4. ALL ARROW, LEGEND, CROSSWALK, LIMIT LINE, AND STOP BAR PAVEMENT MARKINGS SHALL BE THERMOPLASTIC. ALL BIKE LANE LINES AND BIKE PAVEMENT MARKINGS SHALL BE PAINT.
5. BIKE LANE PAVEMENT MARKINGS SHALL BE INSTALLED AT EVERY INTERSECTION, AS INDICATED ON PLANS, AND AS INSTRUCTED BY THE ENGINEER IN THE FIELD.
6. LIMIT LINES & ARROW LEGENDS SHALL BE INSTALLED AFTER LOOP INSTALLATIONS ARE COMPLETED.

CONSTRUCTION NOTES

1. INSTALL STRIPING DETAIL (INCLUDING PLACEMENT OF RAISED PAVEMENT MARKERS), ARROW, OR PAVEMENT LEGEND AS SHOWN.
2. INSTALL 12" WHITE LINE AS SHOWN.
3. INSTALL 12" YELLOW LINE AS SHOWN.
4. INSTALL DETAIL B, SPACED AS INDICATED.
5. INSTALL DETAIL C, SPACED AS INDICATED.
6. INSTALL TYPE K-4 OBJECT MARKERS SPACED 10' O.C.

REVIEWED	SUBMITTED	APPROVED FOR CONSTRUCTION
DATE	DATE	DATE 5/29/97

REVISIONS			
NO.	DESCRIPTION	APP.	DATE

DESIGNED BY	BB/SI
DRAWN BY	BB/SI
CHECK BY	MMS
DATE	5/97
SCALE	1"=40'

PLANS PREPARED BY:
WILLDAN ASSOCIATES
12900 CROSSROADS PARKWAY SOUTH
SUITE 300, INDUSTRY, CA 91746-3400
(310) 908-6800
UNDER THE SUPERVISION OF
MONICA M. SUTTER, RCE 48591 DATE

CITY OF SANTA CLARITA

SIGNING, STRIPING, AND LOOP REPLACEMENT PLAN

BOUQUET CANYON ROAD
FROM FESTIVIDAD DR.
TO CAMARGO DR.

T/E | SHT. 2 OF 7 SHTS. | PLAN NO. 114

97 SECO # BOUQUET. 14

CONSTRUCTION NOTES

(A-IV) INSTALL TYPE IV ARROW PER STATE OF CALIFORNIA, DEPARTMENT OF TRANSPORTATION, (CALTRANS) STD. PLAN NO. A2B-C

(A-I) INSTALL TYPE I ARROW PER STATE OF CALIFORNIA, DEPARTMENT OF TRANSPORTATION, (CALTRANS) STD. PLAN NO. A2B-C

(A-VI) INSTALL TYPE I ARROW PER STATE OF CALIFORNIA, DEPARTMENT OF TRANSPORTATION, (CALTRANS) STD. PLAN NO. A2B-C

R-61 INSTALL SIGN PER DESIGNATION. SEE STATE OF CALIFORNIA, DEPARTMENT OF TRANSPORTATION, (CALTRANS) "UNIFORM SIGN CHART."

GENERAL NOTES

1. ALL STRIPING AND PAVEMENT MARKINGS TO BE PAINTED (2 COATS) PER STATE OF CALIFORNIA, DEPARTMENT OF TRANSPORTATION STANDARD PLANS AND SPECIFICATIONS. (Current Edition)
2. ALL CONFLICTING STRIPING SHALL BE REMOVED BY SANDBLASTING.
3. ALL SIGNS AND SIGN POSTS SHALL MEET SPECIFICATION ON FILE WITH OPERATIONAL SERVICES DIVISION, D.P.W. AT (818) 458-3708.
4. ALL ARROWS SHALL BE TYPE IV (L OR R) UNLESS OTHERWISE SPECIFIED.
5. ALL LANE STRIPING AT INTERSECTION APPROACHES WITHOUT CROSSWALK (X) LIMIT LINES SHALL END 18' FROM THE EXTENSION OF THE INTERSECTION CURB LINE.
6. ALL STRIPING, PAVEMENT MARKINGS AND SIGNS SHALL BE INSTALLED BY THE COUNTY.

MAJOR IMPACTS:
- Loss of required parking spaces from McDonald's and Kmart sites along Soledad Canyon

OTHER IMPACTED STRUCTURES IN EXISTING RIGHT-OF-WAY:
- Street lighting poles
- Landscaped setbacks
- Signs
- Low wall
- Manhole
- Fire hydrant
- Bus shelter

MAJOR IMPACTS:
- Potential impact to underground fuel storage
- Encroachment to area underneath gas pump canopy
- Reduction of gas pump and storage tank fueling areas
- Loss of parking spaces
- Potential elimination of building/landscaped setback
- Elimination of Del Taco Drive-Thru

OTHER IMPACTED STRUCTURES IN EXISTING RIGHT-OF-WAY:
- Street lighting poles
- Landscaping
- Billboard sign
- Catch basin, storm drain manhole
- Wall
- Commercial signs

MAJOR IMPACTS:
- Potential impact to underground fuel storage
- Encroachment to area underneath gas pump canopy
- Reduction of gas pump and storage tank fueling areas
- Need to relocate paved trail

OTHER IMPACTED STRUCTURES IN EXISTING RIGHT-OF-WAY:
- Street lighting poles
- Landscaping
- Monument sign
- Fence, wall
- Utility vault
- Water meter

MAJOR IMPACTS:
- Potential impact to underground fuel storage
- Encroachment to area underneath gas pump canopy
- Reduction of gas pump and storage tank fueling areas
- Encroachment onto parking areas
- Potential elimination of building/landscaped setbacks
- Required acquisition and demolition of two commercial buildings

OTHER IMPACTED STRUCTURES IN EXISTING RIGHT-OF-WAY
- Street lighting poles
- Landscaping
- Monument sign and other commercial signs
- Water meter
- Water valve

SCALE: 1" = 40'

PREPARED BY:
STRAND ENGINEERING ASSOCIATES
1509 BURBANK BLVD.
VAN NUYS, CA. 91401
(818) 787-0858
CIVIL ENGINEER JON STRAND
REGISTERED PROFESSIONAL ENGINEER JON STRAND NO. 42598 CIVIL STATE OF CALIFORNIA

REVISIONS

CITY OF SANTA CLARITA
APPROVED DATE 7-5-94

SUBMITTED DATE 6-29-94 CIVIL ENGINEER NO. 42598
RECOMMENDED DATE 6-29-94

LOS ANGELES COUNTY
DEPARTMENT OF PUBLIC WORKS
TRAFFIC AND LIGHTING DIVISION
SIGNING AND STRIPING PLAN
BOUQUET CANYON ROAD AT
VALENCIA BL. (SOLEDAD CYN. RD.)
D.E. — SHT. 3 OF 3 — SCALE 1" = 40' — GD 1303A

GS BOUQUET/SOLEDAD # 14, A1H BOM SOLUTIONS

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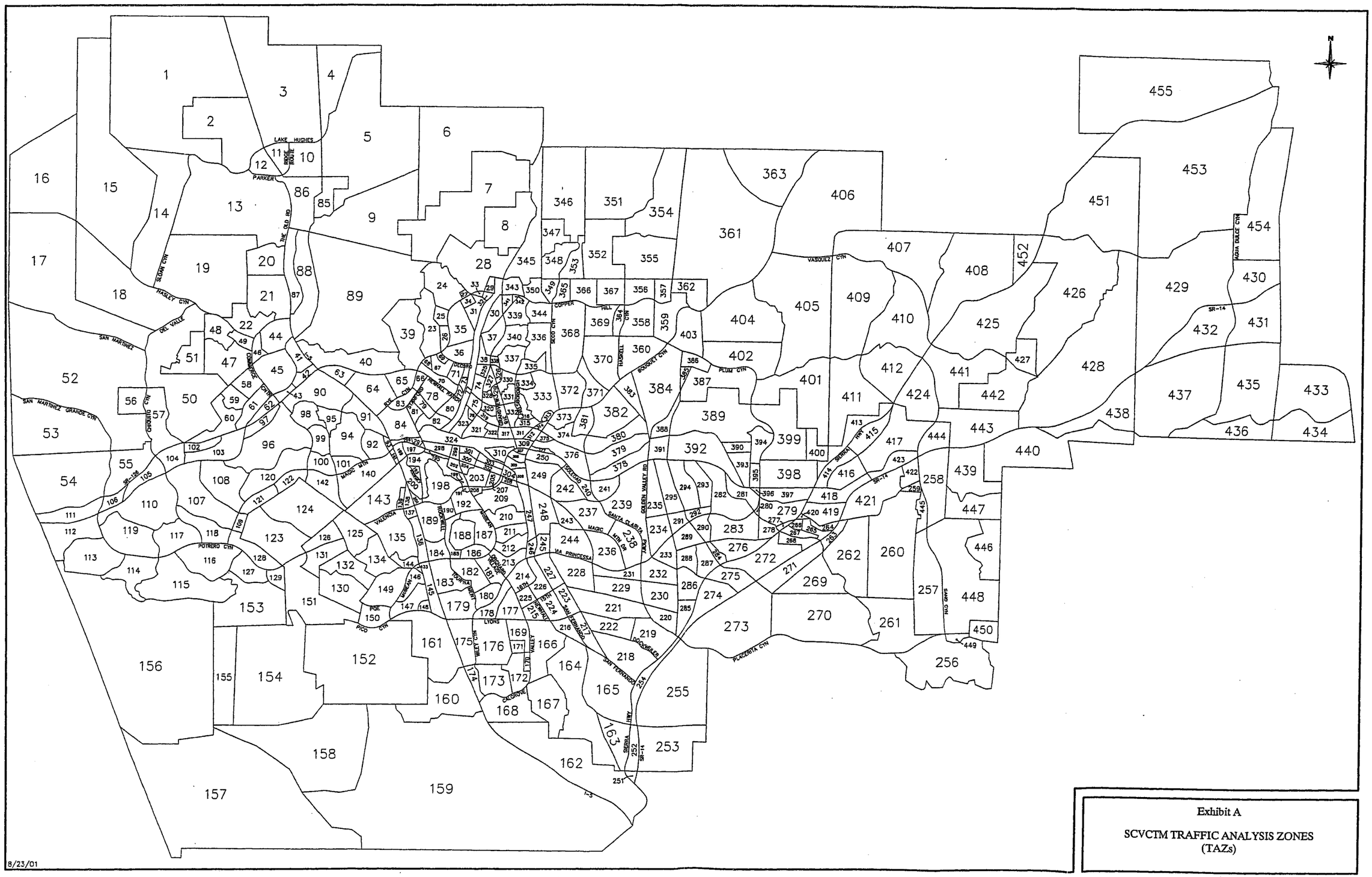
APPENDIX H
SCVCTM LAND USE DATA



8/23/01

Exhibit A

SCVCTM TRAFFIC ANALYSIS ZONES (TAZs)

SCVCTM INTERIM YEAR VER 3.3 ZONAL LAND USE AND TRIP GENERATION

Zone	Land Use Type	Units	-- AM Peak Hour -- In	Out	Total	-- PM Peak Hour -- In	Out	Total	ADT
1	2. Single Family (1-5du/ac)	154.00 DU	29	86	115	100	55	155	1525
	SUB-TOTAL		29	86	115	100	55	155	1525
2	2. Single Family (1-5du/ac)	320.00 DU	61	179	240	208	115	323	3168
	SUB-TOTAL		61	179	240	208	115	323	3168
3	2. Single Family (1-5du/ac)	3842.00 DU	730	2152	2882	2497	1383	3880	38036
	4. Condominium/Townhouse	633.00 DU	38	304	342	298	165	463	5064
	11. Commercial Center(10-30a)	361.27 TSF	264	170	434	860	932	1792	19530
	20. Elementary/Middle School	1848.00 STU	480	370	850	148	166	314	2680
	30. Industrial Park	200.00 TSF	110	20	130	26	104	130	1200
	SUB-TOTAL		1622	3016	4638	3829	2750	6579	66510
5	2. Single Family (1-5du/ac)	651.00 DU	124	365	489	423	234	657	6445
	4. Condominium/Townhouse	100.00 DU	6	48	54	47	26	73	800
	12. Commercial Center (<10ac)	25.00 TSF	27	17	44	83	90	173	2127
	13. Commercial Shops	2.01 TSF	1	1	2	4	4	8	74
	SUB-TOTAL		158	431	589	557	354	911	9446
7	2. Single Family (1-5du/ac)	320.00 DU	61	179	240	208	115	323	3168
	3. Single Family (6-10du/ac)	480.00 DU	91	269	360	312	173	485	4752
	4. Condominium/Townhouse	134.00 DU	8	64	72	63	35	98	1072
	20. Elementary/Middle School	1848.00 STU	480	370	850	148	166	314	2680
	SUB-TOTAL		640	882	1522	731	489	1220	11672
8	2. Single Family (1-5du/ac)	70.00 DU	13	39	52	46	25	71	693
	SUB-TOTAL		13	39	52	46	25	71	693
10	2. Single Family (1-5du/ac)	12.00 DU	2	7	9	8	4	12	119
	4. Condominium/Townhouse	184.00 DU	11	88	99	86	48	134	1472
	12. Commercial Center (<10ac)	20.86 TSF	23	14	37	69	75	144	1774
	15. Sit-Down Restaurant	12.78 TSF	62	57	119	83	55	138	1666
	SUB-TOTAL		98	166	264	246	182	428	5031
11	2. Single Family (1-5du/ac)	23.00 DU	4	13	17	15	8	23	228
	4. Condominium/Townhouse	138.00 DU	8	66	74	65	36	101	1104
	12. Commercial Center (<10ac)	19.46 TSF	21	13	34	65	70	135	1655
	13. Commercial Shops	2.46 TSF	2	1	3	4	4	8	91
	15. Sit-Down Restaurant	7.75 TSF	37	34	71	51	34	85	1010
	30. Industrial Park	41.82 TSF	23	4	27	5	22	27	251
	40. Commercial Office	1.23 TSF	2	0	2	0	2	2	14
	SUB-TOTAL		97	131	228	205	176	381	4353
12	2. Single Family (1-5du/ac)	213.00 DU	40	119	159	138	77	215	2109
	14. Hotel	121.00 ROOM	41	27	68	39	35	74	996
	SUB-TOTAL		81	146	227	177	112	289	3105
13	2. Single Family (1-5du/ac)	408.00 DU	78	228	306	265	147	412	4039

SCVCTM INTERIM YEAR VER 3.3 ZONAL LAND USE AND TRIP GENERATION (cont.)

Zone	Land Use Type	Units	-- AM Peak Hour -- In	Out	Total	-- PM Peak Hour -- In	Out	Total	ADT
13	4. Condominium/Townhouse	54.00 DU	3	26	29	25	14	39	432
	30. Industrial Park	32.93 TSF	18	3	21	4	17	21	198
	SUB-TOTAL		99	257	356	294	178	472	4669
14	2. Single Family (1-5du/ac)	291.00 DU	55	163	218	189	105	294	2881
	50. Golf Course	150.00 AC	23	9	32	15	30	45	1194
	SUB-TOTAL		78	172	250	204	135	339	4075
15	2. Single Family (1-5du/ac)	90.00 DU	17	50	67	58	32	90	891
	SUB-TOTAL		17	50	67	58	32	90	891
17	2. Single Family (1-5du/ac)	148.00 DU	28	83	111	96	53	149	1465
	SUB-TOTAL		28	83	111	96	53	149	1465
18	2. Single Family (1-5du/ac)	246.00 DU	47	138	185	160	89	249	2435
	SUB-TOTAL		47	138	185	160	89	249	2435
19	2. Single Family (1-5du/ac)	1306.00 DU	248	731	979	849	470	1319	12929
	20. Elementary/Middle School	1848.00 STU	480	370	850	148	166	314	2680
	21. High School	2232.00 STU	714	312	1026	134	201	335	3995
	SUB-TOTAL		1442	1413	2855	1131	837	1968	19604
20	2. Single Family (1-5du/ac)	245.00 DU	47	137	184	159	88	247	2426
	4. Condominium/Townhouse	136.00 DU	8	65	73	64	35	99	1088
	30. Industrial Park	174.00 TSF	96	17	113	23	90	113	1044
	SUB-TOTAL		151	219	370	246	213	459	4558
21	2. Single Family (1-5du/ac)	620.00 DU	118	347	465	403	223	626	6138
	12. Commercial Center (<10ac)	70.00 TSF	76	48	124	232	252	484	5954
	SUB-TOTAL		194	395	589	635	475	1110	12092
22	2. Single Family (1-5du/ac)	350.00 DU	67	196	263	227	126	353	3465
	SUB-TOTAL		67	196	263	227	126	353	3465
23	2. Single Family (1-5du/ac)	302.00 DU	57	169	226	196	109	305	2990
	SUB-TOTAL		57	169	226	196	109	305	2990
24	2. Single Family (1-5du/ac)	422.00 DU	80	236	316	274	152	426	4178
	SUB-TOTAL		80	236	316	274	152	426	4178
25	20. Elementary/Middle School	500.00 STU	130	100	230	40	45	85	725
	SUB-TOTAL		130	100	230	40	45	85	725
26	13. Commercial Shops	72.90 TSF	52	35	87	131	131	262	2702
	SUB-TOTAL		52	35	87	131	131	262	2702
27	5. Apartment	181.00 DU	14	78	92	74	38	112	1249
	SUB-TOTAL		14	78	92	74	38	112	1249

SCVCTM INTERIM YEAR VER 3.3 ZONAL LAND USE AND TRIP GENERATION (cont.)

Zone		Land Use Type	Units	-- AM Peak Hour -- In	Out	Total	-- PM Peak Hour -- In	Out	Total	ADT
28	3.	Single Family (6-10du/ac)	400.00 DU	76	224	300	260	144	404	3960
	4.	Condominium/Townhouse	457.00 DU	27	219	246	215	119	334	3656
		SUB-TOTAL		103	443	546	475	263	738	7616
29	5.	Apartment	115.00 DU	9	49	58	47	24	71	794
		SUB-TOTAL		9	49	58	47	24	71	794
30	4.	Condominium/Townhouse	275.00 DU	17	132	149	129	72	201	2200
		SUB-TOTAL		17	132	149	129	72	201	2200
31	3.	Single Family (6-10du/ac)	65.00 DU	12	36	48	42	23	65	644
	4.	Condominium/Townhouse	200.00 DU	12	96	108	94	52	146	1600
	20.	Elementary/Middle School	1200.00 STU	312	240	552	96	108	204	1740
		SUB-TOTAL		336	372	708	232	183	415	3984
32	4.	Condominium/Townhouse	94.00 DU	6	45	51	44	24	68	752
		SUB-TOTAL		6	45	51	44	24	68	752
33	12.	Commercial Center (<10ac)	61.00 TSF	66	42	108	203	220	423	5189
		SUB-TOTAL		66	42	108	203	220	423	5189
34	12.	Commercial Center (<10ac)	107.10 TSF	117	74	191	356	386	742	9110
		SUB-TOTAL		117	74	191	356	386	742	9110
35	3.	Single Family (6-10du/ac)	616.00 DU	117	345	462	400	222	622	6098
	4.	Condominium/Townhouse	60.00 DU	4	29	33	28	16	44	480
	5.	Apartment	200.00 DU	16	86	102	82	42	124	1380
		SUB-TOTAL		137	460	597	510	280	790	7958
36	2.	Single Family (1-5du/ac)	190.00 DU	36	106	142	123	68	191	1881
	4.	Condominium/Townhouse	268.00 DU	16	129	145	126	70	196	2144
		SUB-TOTAL		52	235	287	249	138	387	4025
37	2.	Single Family (1-5du/ac)	212.00 DU	40	119	159	138	76	214	2099
	4.	Condominium/Townhouse	128.00 DU	8	61	69	60	33	93	1024
	25.	Church	20.00 TSF	8	7	15	7	6	13	186
		SUB-TOTAL		56	187	243	205	115	320	3309
38	4.	Condominium/Townhouse	105.00 DU	6	50	56	49	27	76	840
	5.	Apartment	226.00 DU	18	97	115	93	47	140	1559
	12.	Commercial Center (<10ac)	50.00 TSF	55	35	90	166	180	346	4253
		SUB-TOTAL		79	182	261	308	254	562	6652
39	11.	Commercial Center(10-30a)	134.00 TSF	98	63	161	319	346	665	7244
	30.	Industrial Park	4016.00 TSF	2209	402	2611	522	2088	2610	24096
		SUB-TOTAL		2307	465	2772	841	2434	3275	31340
40	34.	Utilities	10.00 TSF	0	0	0	0	0	0	24
		SUB-TOTAL		0	0	0	0	0	0	24

SCVCTM INTERIM YEAR VER 3.3 ZONAL LAND USE AND TRIP GENERATION (cont.)

Zone	Land Use Type	Units	-- AM Peak Hour -- In	Out	Total	-- PM Peak Hour -- In	Out	Total	ADT
41	30. Industrial Park	1046.10 TSF	575	105	680	136	544	680	6277
	SUB-TOTAL		575	105	680	136	544	680	6277
42	30. Industrial Park	275.00 TSF	151	28	179	36	143	179	1650
	SUB-TOTAL		151	28	179	36	143	179	1650
43	30. Industrial Park	273.90 TSF	151	27	178	36	142	178	1643
	SUB-TOTAL		151	27	178	36	142	178	1643
44	2. Single Family (1-5du/ac)	445.00 DU	85	249	334	289	160	449	4406
	13. Commercial Shops	10.00 TSF	7	5	12	18	18	36	371
	20. Elementary/Middle School	500.00 STU	130	100	230	40	45	85	725
	SUB-TOTAL		222	354	576	347	223	570	5502
45	30. Industrial Park	1960.20 TSF	1078	196	1274	255	1019	1274	11761
	SUB-TOTAL		1078	196	1274	255	1019	1274	11761
46	13. Commercial Shops	77.00 TSF	55	37	92	139	139	278	2854
	30. Industrial Park	368.00 TSF	202	37	239	48	191	239	2208
	SUB-TOTAL		257	74	331	187	330	517	5062
47	30. Industrial Park	4254.10 TSF	2340	425	2765	553	2212	2765	25525
	SUB-TOTAL		2340	425	2765	553	2212	2765	25525
48	30. Industrial Park	720.00 TSF	396	72	468	94	374	468	4320
	SUB-TOTAL		396	72	468	94	374	468	4320
49	30. Industrial Park	764.30 TSF	420	76	496	99	397	496	4586
	SUB-TOTAL		420	76	496	99	397	496	4586
50	2. Single Family (1-5du/ac)	100.00 DU	19	56	75	65	36	101	990
	SUB-TOTAL		19	56	75	65	36	101	990
51	30. Industrial Park	1300.00 TSF	715	130	845	169	676	845	7800
	SUB-TOTAL		715	130	845	169	676	845	7800
52	2. Single Family (1-5du/ac)	211.00 DU	40	118	158	137	76	213	2089
	SUB-TOTAL		40	118	158	137	76	213	2089
54	2. Single Family (1-5du/ac)	26.00 DU	5	15	20	17	9	26	257
	3. Single Family (6-10du/ac)	416.00 DU	79	233	312	270	150	420	4118
	SUB-TOTAL		84	248	332	287	159	446	4375
55	2. Single Family (1-5du/ac)	108.00 DU	21	60	81	70	39	109	1069
	3. Single Family (6-10du/ac)	377.00 DU	72	211	283	245	136	381	3732
	4. Condominium/Townhouse	530.00 DU	32	254	286	249	138	387	4240
	20. Elementary/Middle School	460.00 STU	120	92	212	37	41	78	667
	40. Commercial Office	143.00 TSF	222	27	249	30	184	214	1653

SCVCTM INTERIM YEAR VER 3.3 ZONAL LAND USE AND TRIP GENERATION (cont.)

Zone		Land Use Type	Units	-- AM Peak Hour -- In	Out	Total	-- PM Peak Hour -- In	Out	Total	ADT
55	51.	Developed Park	15.00 AC	0	0	0	0	1	1	39
		SUB-TOTAL		467	644	1111	631	539	1170	11400
56	2.	Single Family (1-5du/ac)	64.00 DU	12	36	48	42	23	65	634
		SUB-TOTAL		12	36	48	42	23	65	634
57	3.	Single Family (6-10du/ac)	30.00 DU	6	17	23	20	11	31	297
	12.	Commercial Center (<10ac)	71.00 TSF	77	49	126	236	256	492	6039
	40.	Commercial Office	214.00 TSF	332	41	373	45	276	321	2474
		SUB-TOTAL		415	107	522	301	543	844	8810
58	30.	Industrial Park	1051.50 TSF	578	105	683	137	547	684	6309
		SUB-TOTAL		578	105	683	137	547	684	6309
59	30.	Industrial Park	764.00 TSF	420	76	496	99	397	496	4584
		SUB-TOTAL		420	76	496	99	397	496	4584
60	30.	Industrial Park	411.60 TSF	226	41	267	54	214	268	2470
		SUB-TOTAL		226	41	267	54	214	268	2470
61	30.	Industrial Park	852.90 TSF	469	85	554	111	444	555	5117
		SUB-TOTAL		469	85	554	111	444	555	5117
62	30.	Industrial Park	627.30 TSF	345	63	408	82	326	408	3764
		SUB-TOTAL		345	63	408	82	326	408	3764
63	30.	Industrial Park	575.00 TSF	316	58	374	75	299	374	3450
		SUB-TOTAL		316	58	374	75	299	374	3450
64	30.	Industrial Park	2742.00 TSF	1508	274	1782	356	1426	1782	16452
		SUB-TOTAL		1508	274	1782	356	1426	1782	16452
65	10.	Commercial Center (>30ac)	150.00 TSF	71	45	116	246	267	513	6009
	30.	Industrial Park	329.00 TSF	181	33	214	43	171	214	1974
		SUB-TOTAL		252	78	330	289	438	727	7983
66	10.	Commercial Center (>30ac)	170.45 TSF	80	51	131	280	303	583	6828
	30.	Industrial Park	348.00 TSF	191	35	226	45	181	226	2088
		SUB-TOTAL		271	86	357	325	484	809	8916
67	3.	Single Family (6-10du/ac)	291.00 DU	55	163	218	189	105	294	2881
		SUB-TOTAL		55	163	218	189	105	294	2881
68	5.	Apartment	208.00 DU	17	89	106	85	44	129	1435
		SUB-TOTAL		17	89	106	85	44	129	1435
69	3.	Single Family (6-10du/ac)	35.00 DU	7	20	27	23	13	36	347
		SUB-TOTAL		7	20	27	23	13	36	347

SCVCTM INTERIM YEAR VER 3.3 ZONAL LAND USE AND TRIP GENERATION (cont.)

Zone		Land Use Type	Units	-- AM Peak Hour -- In	Out	Total	-- PM Peak Hour -- In	Out	Total	ADT
70	11.	Commercial Center(10-30a)	147.00 TSF	107	69	176	350	379	729	7947
	26.	Day Care	150.00 STU	65	57	122	60	69	129	678
	30.	Industrial Park	600.00 TSF	330	60	390	78	312	390	3600
	32.	Manufacturing/Warehouse	75.00 TSF	42	13	55	20	35	55	383
		SUB-TOTAL		544	199	743	508	795	1303	12608
71	21.	High School	2500.00 STU	800	350	1150	150	225	375	4475
		SUB-TOTAL		800	350	1150	150	225	375	4475
72	13.	Commercial Shops	60.00 TSF	43	29	72	108	108	216	2224
		SUB-TOTAL		43	29	72	108	108	216	2224
74	3.	Single Family (6-10du/ac)	153.00 DU	29	86	115	99	55	154	1515
	4.	Condominium/Townhouse	147.00 DU	9	71	80	69	38	107	1176
		SUB-TOTAL		38	157	195	168	93	261	2691
75	4.	Condominium/Townhouse	149.00 DU	9	72	81	70	39	109	1192
	51.	Developed Park	17.50 AC	0	0	0	1	1	2	46
		SUB-TOTAL		9	72	81	71	40	111	1238
76	5.	Apartment	188.00 DU	15	81	96	77	39	116	1297
	12.	Commercial Center (<10ac)	11.00 TSF	12	8	20	37	40	77	936
		SUB-TOTAL		27	89	116	114	79	193	2233
78	30.	Industrial Park	1776.00 TSF	977	178	1155	231	924	1155	10656
		SUB-TOTAL		977	178	1155	231	924	1155	10656
79	30.	Industrial Park	685.00 TSF	377	69	446	89	356	445	4110
		SUB-TOTAL		377	69	446	89	356	445	4110
80	30.	Industrial Park	880.00 TSF	484	88	572	114	458	572	5280
		SUB-TOTAL		484	88	572	114	458	572	5280
81	30.	Industrial Park	711.00 TSF	391	71	462	92	370	462	4266
		SUB-TOTAL		391	71	462	92	370	462	4266
82	30.	Industrial Park	1007.55 TSF	554	101	655	131	524	655	6045
		SUB-TOTAL		554	101	655	131	524	655	6045
83	30.	Industrial Park	876.00 TSF	482	88	570	114	456	570	5256
		SUB-TOTAL		482	88	570	114	456	570	5256
84	30.	Industrial Park	333.00 TSF	183	33	216	43	173	216	1998
		SUB-TOTAL		183	33	216	43	173	216	1998
86	2.	Single Family (1-5du/ac)	346.00 DU	66	194	260	225	125	350	3425
	12.	Commercial Center (<10ac)	15.00 TSF	16	10	26	50	54	104	1276
	14.	Hotel	36.00 ROOM	12	8	20	12	10	22	296

SCVCTM INTERIM YEAR VER 3.3 ZONAL LAND USE AND TRIP GENERATION (cont.)

Zone		Land Use Type	Units	-- AM Peak Hour -- In	Out	Total	-- PM Peak Hour -- In	Out	Total	ADT
86	15.	Sit-Down Restaurant	47.26 TSF	228	210	438	308	205	513	6160
		SUB-TOTAL		322	422	744	595	394	989	11157
89	53.	Wayside Honor Ranch	20.00 SG	60	40	100	80	80	160	2000
		SUB-TOTAL		60	40	100	80	80	160	2000
90	12.	Commercial Center (<10ac)	65.29 TSF	71	45	116	217	235	452	5554
	30.	Industrial Park	1511.20 TSF	831	151	982	196	786	982	9067
	31.	Business Park	533.68 TSF	640	123	763	160	528	688	5444
		SUB-TOTAL		1542	319	1861	573	1549	2122	20065
91	11.	Commercial Center(10-30a)	113.38 TSF	83	53	136	270	293	563	6129
		SUB-TOTAL		83	53	136	270	293	563	6129
92	10.	Commercial Center (>30ac)	580.00 TSF	273	174	447	951	1032	1983	23235
	14.	Hotel	700.00 ROOM	238	154	392	224	203	427	5761
		SUB-TOTAL		511	328	839	1175	1235	2410	28996
93	13.	Commercial Shops	20.00 TSF	14	10	24	36	36	72	741
	14.	Hotel	169.00 ROOM	57	37	94	54	49	103	1391
		SUB-TOTAL		71	47	118	90	85	175	2132
94	54.	Six Flags Magic Mtn	240.00 SG	720	480	1200	960	960	1920	24000
		SUB-TOTAL		720	480	1200	960	960	1920	24000
97	55.	Travel Village	26.20 SG	79	52	131	105	105	210	2620
		SUB-TOTAL		79	52	131	105	105	210	2620
101	31.	Business Park	200.00 TSF	240	46	286	60	198	258	2040
		SUB-TOTAL		240	46	286	60	198	258	2040
102	3.	Single Family (6-10du/ac)	319.00 DU	61	179	240	207	115	322	3158
	4.	Condominium/Townhouse	267.00 DU	16	128	144	125	69	194	2136
	5.	Apartment	145.00 DU	12	62	74	59	30	89	1001
	13.	Commercial Shops	60.30 TSF	43	29	72	109	109	218	2235
	20.	Elementary/Middle School	750.00 STU	195	150	345	60	68	128	1088
	25.	Church	10.00 TSF	4	3	7	4	3	7	93
	26.	Day Care	100.00 STU	43	38	81	40	46	86	452
	40.	Commercial Office	17.30 TSF	27	3	30	4	22	26	200
	51.	Developed Park	21.20 AC	0	0	0	1	1	2	55
		SUB-TOTAL		401	592	993	609	463	1072	10418
103	3.	Single Family (6-10du/ac)	270.00 DU	51	151	202	176	97	273	2673
	4.	Condominium/Townhouse	123.00 DU	7	59	66	58	32	90	984
	5.	Apartment	320.00 DU	26	138	164	131	67	198	2208
		SUB-TOTAL		84	348	432	365	196	561	5865
104	11.	Commercial Center(10-30a)	153.00 TSF	112	72	184	364	395	759	8271

SCVCTM INTERIM YEAR VER 3.3 ZONAL LAND USE AND TRIP GENERATION (cont.)

Zone		Land Use Type	Units	-- AM Peak Hour -- In	Out	Total	-- PM Peak Hour -- In	Out	Total	ADT
104	40.	Commercial Office	99.00 TSF	153	19	172	21	128	149	1144
		SUB-TOTAL		265	91	356	385	523	908	9415
105	11.	Commercial Center(10-30a)	77.90 TSF	57	37	94	185	201	386	4211
	40.	Commercial Office	245.00 TSF	380	47	427	51	316	367	2832
		SUB-TOTAL		437	84	521	236	517	753	7043
125	20.	Elementary/Middle School	1200.00 STU	312	240	552	96	108	204	1740
	21.	High School	2400.00 STU	768	336	1104	144	216	360	4296
		SUB-TOTAL		1080	576	1656	240	324	564	6036
130	2.	Single Family (1-5du/ac)	708.00 DU	135	396	531	460	255	715	7009
		SUB-TOTAL		135	396	531	460	255	715	7009
132	2.	Single Family (1-5du/ac)	436.00 DU	83	244	327	283	157	440	4316
	20.	Elementary/Middle School	900.00 STU	234	180	414	72	81	153	1305
		SUB-TOTAL		317	424	741	355	238	593	5621
133	11.	Commercial Center(10-30a)	27.00 TSF	20	13	33	64	70	134	1460
		SUB-TOTAL		20	13	33	64	70	134	1460
134	2.	Single Family (1-5du/ac)	482.00 DU	92	270	362	313	174	487	4772
		SUB-TOTAL		92	270	362	313	174	487	4772
135	2.	Single Family (1-5du/ac)	167.00 DU	32	94	126	109	60	169	1653
	4.	Condominium/Townhouse	172.00 DU	10	83	93	81	45	126	1376
	50.	Golf Course	208.00 AC	31	12	43	21	42	63	1656
		SUB-TOTAL		73	189	262	211	147	358	4685
137	12.	Commercial Center (<10ac)	72.00 TSF	78	50	128	239	259	498	6124
		SUB-TOTAL		78	50	128	239	259	498	6124
138	11.	Commercial Center(10-30a)	120.00 TSF	88	56	144	286	310	596	6487
		SUB-TOTAL		88	56	144	286	310	596	6487
139	5.	Apartment	474.00 DU	38	204	242	194	100	294	3271
		SUB-TOTAL		38	204	242	194	100	294	3271
140	2.	Single Family (1-5du/ac)	339.00 DU	64	190	254	220	122	342	3356
	4.	Condominium/Townhouse	414.00 DU	25	199	224	195	108	303	3312
	5.	Apartment	280.00 DU	22	120	142	115	59	174	1932
	11.	Commercial Center(10-30a)	130.00 TSF	95	61	156	309	335	644	7028
	31.	Business Park	250.00 TSF	300	58	358	75	248	323	2550
		SUB-TOTAL		506	628	1134	914	872	1786	18178
141	15.	Sit-Down Restaurant	20.30 TSF	98	90	188	132	88	220	2646
	16.	Fast Food Restaurant	10.10 TSF	257	247	504	176	162	338	5011
		SUB-TOTAL		355	337	692	308	250	558	7657

SCVCTM INTERIM YEAR VER 3.3 ZONAL LAND USE AND TRIP GENERATION (cont.)

Zone		Land Use Type	Units	-- AM Peak Hour -- In	Out	Total	-- PM Peak Hour -- In	Out	Total	ADT
143	3.	Single Family (6-10du/ac)	478.00 DU	91	268	359	311	172	483	4732
	4.	Condominium/Townhouse	218.00 DU	13	105	118	102	57	159	1744
	20.	Elementary/Middle School	462.00 STU	120	92	212	37	42	79	670
	51.	Developed Park	4.80 AC	0	0	0	0	0	0	12
		SUB-TOTAL		224	465	689	450	271	721	7158
144	2.	Single Family (1-5du/ac)	6.00 DU	1	3	4	4	2	6	59
		SUB-TOTAL		1	3	4	4	2	6	59
145	10.	Commercial Center (>30ac)	763.00 TSF	359	229	588	1251	1358	2609	30566
	13.	Commercial Shops	45.74 TSF	33	22	55	82	82	164	1695
		SUB-TOTAL		392	251	643	1333	1440	2773	32261
146	2.	Single Family (1-5du/ac)	314.00 DU	60	176	236	204	113	317	3109
	4.	Condominium/Townhouse	296.00 DU	18	142	160	139	77	216	2368
		SUB-TOTAL		78	318	396	343	190	533	5477
147	3.	Single Family (6-10du/ac)	136.00 DU	26	76	102	88	49	137	1346
	4.	Condominium/Townhouse	697.00 DU	42	335	377	328	181	509	5576
	20.	Elementary/Middle School	750.00 STU	195	150	345	60	68	128	1088
	51.	Developed Park	5.00 AC	0	0	0	0	0	0	13
		SUB-TOTAL		263	561	824	476	298	774	8023
148	11.	Commercial Center(10-30a)	150.00 TSF	110	71	181	357	387	744	8109
		SUB-TOTAL		110	71	181	357	387	744	8109
149	2.	Single Family (1-5du/ac)	535.00 DU	102	300	402	348	193	541	5297
	4.	Condominium/Townhouse	500.00 DU	30	240	270	235	130	365	4000
	12.	Commercial Center (<10ac)	34.85 TSF	38	24	62	116	125	241	2964
		SUB-TOTAL		170	564	734	699	448	1147	12261
150	2.	Single Family (1-5du/ac)	114.00 DU	22	64	86	74	41	115	1129
		SUB-TOTAL		22	64	86	74	41	115	1129
152	2.	Single Family (1-5du/ac)	279.00 DU	53	156	209	181	100	281	2762
		SUB-TOTAL		53	156	209	181	100	281	2762
159	2.	Single Family (1-5du/ac)	4.00 DU	1	2	3	3	1	4	40
		SUB-TOTAL		1	2	3	3	1	4	40
160	3.	Single Family (6-10du/ac)	170.00 DU	32	95	127	110	61	171	1683
	4.	Condominium/Townhouse	281.00 DU	17	135	152	132	73	205	2248
	5.	Apartment	380.00 DU	30	163	193	156	80	236	2622
	11.	Commercial Center(10-30a)	110.00 TSF	80	52	132	262	284	546	5947
	51.	Developed Park	7.98 AC	0	0	0	0	0	0	21
		SUB-TOTAL		159	445	604	660	498	1158	12521
161	2.	Single Family (1-5du/ac)	533.00 DU	101	298	399	346	192	538	5277

SCVCTM INTERIM YEAR VER 3.3 ZONAL LAND USE AND TRIP GENERATION (cont.)

Zone		Land Use Type	Units	-- AM Peak Hour -- In	Out	Total	-- PM Peak Hour -- In	Out	Total	ADT
161	4.	Condominium/Townhouse	531.00 DU	32	255	287	250	138	388	4248
	11.	Commercial Center(10-30a)	48.00 TSF	35	23	58	114	124	238	2595
	12.	Commercial Center (<10ac)	40.22 TSF	44	28	72	134	145	279	3421
	13.	Commercial Shops	12.05 TSF	9	6	15	22	22	44	447
	14.	Hotel	283.00 ROOM	96	62	158	91	82	173	2329
	40.	Commercial Office	282.41 TSF	438	54	492	59	364	423	3265
	56.	CHP Office	55.74 SG	167	111	278	223	223	446	5574
		SUB-TOTAL		922	837	1759	1239	1290	2529	27156
162	2.	Single Family (1-5du/ac)	83.00 DU	16	46	62	54	30	84	822
		SUB-TOTAL		16	46	62	54	30	84	822
163	30.	Industrial Park	2567.08 TSF	1412	257	1669	334	1335	1669	15402
		SUB-TOTAL		1412	257	1669	334	1335	1669	15402
164	2.	Single Family (1-5du/ac)	121.00 DU	23	68	91	79	44	123	1198
	50.	Golf Course	145.00 AC	22	9	31	15	29	44	1154
		SUB-TOTAL		45	77	122	94	73	167	2352
165	2.	Single Family (1-5du/ac)	36.00 DU	7	20	27	23	13	36	356
	4.	Condominium/Townhouse	80.00 DU	5	38	43	38	21	59	640
	12.	Commercial Center (<10ac)	30.23 TSF	33	21	54	100	109	209	2571
	13.	Commercial Shops	7.60 TSF	5	4	9	14	14	28	282
	15.	Sit-Down Restaurant	23.95 TSF	115	107	222	156	104	260	3122
	23.	Hospital	24.66 TSF	18	6	24	5	17	22	414
	30.	Industrial Park	1890.89 TSF	1040	189	1229	246	983	1229	11345
	32.	Manufacturing/Warehouse	2.47 TSF	1	0	1	1	1	2	13
	40.	Commercial Office	13.81 TSF	21	3	24	3	18	21	160
		SUB-TOTAL		1245	388	1633	586	1280	1866	18903
166	2.	Single Family (1-5du/ac)	431.00 DU	82	241	323	280	155	435	4267
	4.	Condominium/Townhouse	217.00 DU	13	104	117	102	56	158	1736
	12.	Commercial Center (<10ac)	48.64 TSF	53	34	87	161	175	336	4137
	13.	Commercial Shops	1.38 TSF	1	1	2	2	2	4	51
	15.	Sit-Down Restaurant	4.34 TSF	21	19	40	28	19	47	566
	23.	Hospital	38.58 TSF	27	10	37	8	27	35	648
	32.	Manufacturing/Warehouse	11.00 TSF	6	2	8	3	5	8	56
	40.	Commercial Office	30.10 TSF	47	6	53	6	39	45	348
		SUB-TOTAL		250	417	667	590	478	1068	11809
167	2.	Single Family (1-5du/ac)	327.00 DU	62	183	245	213	118	331	3237
		SUB-TOTAL		62	183	245	213	118	331	3237
168	2.	Single Family (1-5du/ac)	59.00 DU	11	33	44	38	21	59	584
		SUB-TOTAL		11	33	44	38	21	59	584
169	2.	Single Family (1-5du/ac)	124.00 DU	24	69	93	81	45	126	1228
	4.	Condominium/Townhouse	94.00 DU	6	45	51	44	24	68	752

SCVCTM INTERIM YEAR VER 3.3 ZONAL LAND USE AND TRIP GENERATION (cont.)

Zone		Land Use Type	Units	-- AM Peak Hour -- In	Out	Total	-- PM Peak Hour -- In	Out	Total	ADT
169	10.	Commercial Center (>30ac)	200.00 TSF	94	60	154	328	356	684	8012
		SUB-TOTAL		124	174	298	453	425	878	9992
170	2.	Single Family (1-5du/ac)	163.00 DU	31	91	122	106	59	165	1614
		SUB-TOTAL		31	91	122	106	59	165	1614
171	2.	Single Family (1-5du/ac)	32.00 DU	6	18	24	21	12	33	317
	20.	Elementary/Middle School	157.00 STU	41	31	72	13	14	27	228
		SUB-TOTAL		47	49	96	34	26	60	545
172	2.	Single Family (1-5du/ac)	185.00 DU	35	104	139	120	67	187	1831
		SUB-TOTAL		35	104	139	120	67	187	1831
173	2.	Single Family (1-5du/ac)	336.00 DU	64	188	252	218	121	339	3326
		SUB-TOTAL		64	188	252	218	121	339	3326
174	11.	Commercial Center(10-30a)	35.00 TSF	26	16	42	83	90	173	1892
		SUB-TOTAL		26	16	42	83	90	173	1892
175	2.	Single Family (1-5du/ac)	162.00 DU	31	91	122	105	58	163	1604
	4.	Condominium/Townhouse	160.00 DU	10	77	87	75	42	117	1280
	11.	Commercial Center(10-30a)	98.01 TSF	72	46	118	233	253	486	5298
	20.	Elementary/Middle School	74.00 STU	19	15	34	6	7	13	107
	34.	Utilities	87.12 TSF	0	0	0	0	0	0	207
		SUB-TOTAL		132	229	361	419	360	779	8496
176	2.	Single Family (1-5du/ac)	686.00 DU	130	384	514	446	247	693	6791
	4.	Condominium/Townhouse	135.00 DU	8	65	73	63	35	98	1080
	10.	Commercial Center (>30ac)	196.02 TSF	92	59	151	321	349	670	7853
	13.	Commercial Shops	141.57 TSF	102	68	170	255	255	510	5247
		SUB-TOTAL		332	576	908	1085	886	1971	20971
177	2.	Single Family (1-5du/ac)	477.00 DU	91	267	358	310	172	482	4722
	4.	Condominium/Townhouse	264.00 DU	16	127	143	124	69	193	2112
	11.	Commercial Center(10-30a)	81.68 TSF	60	38	98	194	211	405	4415
	20.	Elementary/Middle School	92.00 STU	24	18	42	7	8	15	133
		SUB-TOTAL		191	450	641	635	460	1095	11382
178	2.	Single Family (1-5du/ac)	333.00 DU	63	186	249	216	120	336	3297
	11.	Commercial Center(10-30a)	21.78 TSF	16	10	26	52	56	108	1177
	13.	Commercial Shops	6.53 TSF	5	3	8	12	12	24	242
	40.	Commercial Office	14.81 TSF	23	3	26	3	19	22	171
		SUB-TOTAL		107	202	309	283	207	490	4887
179	2.	Single Family (1-5du/ac)	167.00 DU	32	94	126	109	60	169	1653
	13.	Commercial Shops	21.78 TSF	16	10	26	39	39	78	807
	34.	Utilities	87.12 TSF	0	0	0	0	0	0	207
	42.	Medical Office	24.83 TSF	48	12	60	25	66	91	849
		SUB-TOTAL		96	116	212	173	165	338	3516

SCVCTM INTERIM YEAR VER 3.3 ZONAL LAND USE AND TRIP GENERATION (cont.)

Zone		Land Use Type	Units	-- AM Peak Hour -- In	Out	Total	-- PM Peak Hour -- In	Out	Total	ADT
180	2.	Single Family (1-5du/ac)	428.00 DU	81	240	321	278	154	432	4237
		SUB-TOTAL		81	240	321	278	154	432	4237
181	3.	Single Family (6-10du/ac)	282.00 DU	54	158	212	183	102	285	2792
	20.	Elementary/Middle School	37.00 STU	10	7	17	3	3	6	54
		SUB-TOTAL		64	165	229	186	105	291	2846
182	3.	Single Family (6-10du/ac)	276.00 DU	52	155	207	179	99	278	2732
	4.	Condominium/Townhouse	229.00 DU	14	110	124	108	60	168	1832
	6.	Mobile Home	238.00 DU	19	76	95	83	50	133	1642
	11.	Commercial Center(10-30a)	76.23 TSF	56	36	92	181	197	378	4121
	20.	Elementary/Middle School	83.00 STU	22	17	39	7	7	14	120
	25.	Church	17.25 TSF	7	6	13	6	5	11	160
		SUB-TOTAL		170	400	570	564	418	982	10607
183	4.	Condominium/Townhouse	634.00 DU	38	304	342	298	165	463	5072
	12.	Commercial Center (<10ac)	3.50 TSF	4	2	6	12	13	25	298
	22.	College	3274.00 STU	426	33	459	393	164	557	5042
	50.	Golf Course	100.00 AC	15	6	21	10	20	30	796
		SUB-TOTAL		483	345	828	713	362	1075	11208
184	40.	Commercial Office	250.00 TSF	388	48	436	53	323	376	2890
		SUB-TOTAL		388	48	436	53	323	376	2890
185	2.	Single Family (1-5du/ac)	133.00 DU	25	74	99	86	48	134	1317
	3.	Single Family (6-10du/ac)	211.00 DU	40	118	158	137	76	213	2089
		SUB-TOTAL		65	192	257	223	124	347	3406
186	3.	Single Family (6-10du/ac)	150.00 DU	29	84	113	98	54	152	1485
	23.	Hospital	125.24 TSF	89	33	122	28	88	116	2104
	42.	Medical Office	108.90 TSF	211	53	264	108	291	399	3724
		SUB-TOTAL		329	170	499	234	433	667	7313
187	2.	Single Family (1-5du/ac)	111.00 DU	21	62	83	72	40	112	1099
	4.	Condominium/Townhouse	307.00 DU	18	147	165	144	80	224	2456
	34.	Utilities	217.80 TSF	0	0	0	0	0	0	518
	51.	Developed Park	14.00 AC	0	0	0	0	1	1	36
		SUB-TOTAL		39	209	248	216	121	337	4109
188	2.	Single Family (1-5du/ac)	72.00 DU	14	40	54	47	26	73	713
	4.	Condominium/Townhouse	216.00 DU	13	104	117	102	56	158	1728
		SUB-TOTAL		27	144	171	149	82	231	2441
189	22.	College	20000.00 STU	2600	200	2800	2400	1000	3400	30800
	40.	Commercial Office	28.44 TSF	44	5	49	6	37	43	329
		SUB-TOTAL		2644	205	2849	2406	1037	3443	31129
190	2.	Single Family (1-5du/ac)	171.00 DU	32	96	128	111	62	173	1693
		SUB-TOTAL		32	96	128	111	62	173	1693

SCVCTM INTERIM YEAR VER 3.3 ZONAL LAND USE AND TRIP GENERATION (cont.)

Zone		Land Use Type	Units	-- AM Peak Hour -- In	Out	Total	-- PM Peak Hour -- In	Out	Total	ADT
191	12.	Commercial Center (<10ac)	50.00 TSF	55	35	90	166	180	346	4253
		SUB-TOTAL		55	35	90	166	180	346	4253
192	2.	Single Family (1-5du/ac)	164.00 DU	31	92	123	107	59	166	1624
	4.	Condominium/Townhouse	660.00 DU	40	317	357	310	172	482	5280
		SUB-TOTAL		71	409	480	417	231	648	6904
193	31.	Business Park	250.00 TSF	300	58	358	75	248	323	2550
		SUB-TOTAL		300	58	358	75	248	323	2550
194	50.	Golf Course	100.00 AC	15	6	21	10	20	30	796
		SUB-TOTAL		15	6	21	10	20	30	796
195	3.	Single Family (6-10du/ac)	76.00 DU	14	43	57	49	27	76	752
		SUB-TOTAL		14	43	57	49	27	76	752
196	13.	Commercial Shops	16.00 TSF	12	8	20	29	29	58	593
		SUB-TOTAL		12	8	20	29	29	58	593
197	31.	Business Park	376.64 TSF	452	87	539	113	373	486	3842
		SUB-TOTAL		452	87	539	113	373	486	3842
198	2.	Single Family (1-5du/ac)	179.00 DU	34	100	134	116	64	180	1772
	3.	Single Family (6-10du/ac)	152.00 DU	29	85	114	99	55	154	1505
		SUB-TOTAL		63	185	248	215	119	334	3277
199	14.	Hotel	237.00 ROOM	81	52	133	76	69	145	1951
	15.	Sit-Down Restaurant	5.00 TSF	24	22	46	33	22	55	652
		SUB-TOTAL		105	74	179	109	91	200	2603
200	31.	Business Park	434.28 TSF	521	100	621	130	430	560	4430
		SUB-TOTAL		521	100	621	130	430	560	4430
201	31.	Business Park	200.00 TSF	240	46	286	60	198	258	2040
		SUB-TOTAL		240	46	286	60	198	258	2040
202	5.	Apartment	560.00 DU	45	241	286	230	118	348	3864
	13.	Commercial Shops	22.00 TSF	16	11	27	40	40	80	815
	14.	Hotel	250.00 ROOM	85	55	140	80	73	153	2058
	18.	Health Club	54.00 TSF	52	35	87	117	78	195	2160
	40.	Commercial Office	13.00 TSF	20	2	22	3	17	20	150
		SUB-TOTAL		218	344	562	470	326	796	9047
203	10.	Commercial Center (>30ac)	956.00 TSF	449	287	736	1568	1702	3270	38297
		SUB-TOTAL		449	287	736	1568	1702	3270	38297
204	13.	Commercial Shops	62.00 TSF	45	30	75	112	112	224	2298
	17.	Movie Theater	3300.00 SEAT	0	0	0	165	66	231	5808

SCVCTM INTERIM YEAR VER 3.3 ZONAL LAND USE AND TRIP GENERATION (cont.)

Zone		Land Use Type	Units	-- AM Peak Hour -- In	Out	Total	-- PM Peak Hour -- In	Out	Total	ADT
204	40.	Commercial Office	400.00 TSF	620	76	696	84	516	600	4624
		SUB-TOTAL		665	106	771	361	694	1055	12730
205	24.	Library	112.39 TSF	85	34	119	382	415	797	9550
	40.	Commercial Office	93.31 TSF	145	18	163	20	120	140	1079
		SUB-TOTAL		230	52	282	402	535	937	10629
206	11.	Commercial Center(10-30a)	166.11 TSF	121	78	199	395	429	824	8980
	15.	Sit-Down Restaurant	21.50 TSF	104	96	200	140	93	233	2802
		SUB-TOTAL		225	174	399	535	522	1057	11782
207	40.	Commercial Office	230.00 TSF	357	44	401	48	297	345	2659
		SUB-TOTAL		357	44	401	48	297	345	2659
208	4.	Condominium/Townhouse	234.00 DU	14	112	126	110	61	171	1872
		SUB-TOTAL		14	112	126	110	61	171	1872
209	2.	Single Family (1-5du/ac)	414.00 DU	79	232	311	269	149	418	4099
	4.	Condominium/Townhouse	352.00 DU	21	169	190	165	92	257	2816
		SUB-TOTAL		100	401	501	434	241	675	6915
210	2.	Single Family (1-5du/ac)	205.00 DU	39	115	154	133	74	207	2029
	4.	Condominium/Townhouse	208.00 DU	12	100	112	98	54	152	1664
	11.	Commercial Center(10-30a)	148.10 TSF	108	70	178	352	382	734	8007
		SUB-TOTAL		159	285	444	583	510	1093	11700
211	2.	Single Family (1-5du/ac)	167.00 DU	32	94	126	109	60	169	1653
		SUB-TOTAL		32	94	126	109	60	169	1653
212	2.	Single Family (1-5du/ac)	252.00 DU	48	141	189	164	91	255	2495
	4.	Condominium/Townhouse	272.00 DU	16	131	147	128	71	199	2176
	25.	Church	18.03 TSF	7	6	13	6	5	11	168
	51.	Developed Park	4.20 AC	0	0	0	0	0	0	11
		SUB-TOTAL		71	278	349	298	167	465	4850
213	2.	Single Family (1-5du/ac)	275.00 DU	52	154	206	179	99	278	2723
	25.	Church	25.09 TSF	10	8	18	9	8	17	233
		SUB-TOTAL		62	162	224	188	107	295	2956
214	3.	Single Family (6-10du/ac)	183.00 DU	35	102	137	119	66	185	1812
		SUB-TOTAL		35	102	137	119	66	185	1812
215	2.	Single Family (1-5du/ac)	105.00 DU	20	59	79	68	38	106	1040
	4.	Condominium/Townhouse	52.00 DU	3	25	28	24	14	38	416
	11.	Commercial Center(10-30a)	100.00 TSF	73	47	120	238	258	496	5406
	13.	Commercial Shops	43.56 TSF	31	21	52	78	78	156	1614
	21.	High School	1016.00 STU	325	142	467	61	91	152	1819
	25.	Church	50.18 TSF	20	17	37	18	15	33	467

SCVCTM INTERIM YEAR VER 3.3 ZONAL LAND USE AND TRIP GENERATION (cont.)

Zone		Land Use Type	Units	-- AM Peak Hour -- In	Out	Total	-- PM Peak Hour -- In	Out	Total	ADT
215	34.	Utilities	47.92 TSF	0	0	0	0	0	0	114
		SUB-TOTAL		472	311	783	487	494	981	10876
216	3.	Single Family (6-10du/ac)	22.00 DU	4	12	16	14	8	22	218
	4.	Condominium/Townhouse	128.00 DU	8	61	69	60	33	93	1024
	11.	Commercial Center(10-30a)	149.96 TSF	109	70	179	357	387	744	8107
	40.	Commercial Office	10.45 TSF	16	2	18	2	13	15	121
		SUB-TOTAL		137	145	282	433	441	874	9470
217	2.	Single Family (1-5du/ac)	202.00 DU	38	113	151	131	73	204	2000
	4.	Condominium/Townhouse	28.00 DU	2	13	15	13	7	20	224
	11.	Commercial Center(10-30a)	65.75 TSF	48	31	79	156	170	326	3555
	13.	Commercial Shops	3.27 TSF	2	2	4	6	6	12	121
	14.	Hotel	10.00 ROOM	3	2	5	3	3	6	82
	30.	Industrial Park	22.44 TSF	12	2	14	3	12	15	135
	40.	Commercial Office	22.44 TSF	35	4	39	5	29	34	259
		SUB-TOTAL		140	167	307	317	300	617	6376
218	4.	Condominium/Townhouse	641.00 DU	38	308	346	301	167	468	5128
	6.	Mobile Home	151.00 DU	12	48	60	53	32	85	1042
	11.	Commercial Center(10-30a)	100.00 TSF	73	47	120	238	258	496	5406
	13.	Commercial Shops	64.25 TSF	46	31	77	116	116	232	2381
	25.	Church	9.41 TSF	4	3	7	3	3	6	88
		SUB-TOTAL		173	437	610	711	576	1287	14045
219	2.	Single Family (1-5du/ac)	40.00 DU	8	22	30	26	14	40	396
		SUB-TOTAL		8	22	30	26	14	40	396
220	2.	Single Family (1-5du/ac)	8.00 DU	2	4	6	5	3	8	79
	34.	Utilities	566.28 TSF	0	0	0	0	0	0	1348
		SUB-TOTAL		2	4	6	5	3	8	1427
221	2.	Single Family (1-5du/ac)	295.00 DU	56	165	221	192	106	298	2921
	4.	Condominium/Townhouse	6.00 DU	0	3	3	3	2	5	48
	6.	Mobile Home	30.00 DU	2	10	12	11	6	17	207
	20.	Elementary/Middle School	28.00 STU	7	6	13	2	3	5	41
	22.	College	362.00 STU	47	4	51	43	18	61	557
	25.	Church	92.52 TSF	36	31	67	33	28	61	860
	30.	Industrial Park	144.40 TSF	79	14	93	19	75	94	866
		SUB-TOTAL		227	233	460	303	238	541	5500
222	2.	Single Family (1-5du/ac)	33.00 DU	6	18	24	21	12	33	327
	22.	College	3164.00 STU	411	32	443	380	158	538	4873
	25.	Church	16.70 TSF	7	6	13	6	5	11	155
		SUB-TOTAL		424	56	480	407	175	582	5355
223	2.	Single Family (1-5du/ac)	19.00 DU	4	11	15	12	7	19	188
	11.	Commercial Center(10-30a)	43.38 TSF	32	20	52	103	112	215	2345

SCVCTM INTERIM YEAR VER 3.3 ZONAL LAND USE AND TRIP GENERATION (cont.)

Zone		Land Use Type	Units	-- AM Peak Hour -- In	Out	Total	-- PM Peak Hour -- In	Out	Total	ADT
223	23.	Hospital	4.32 TSF	3	1	4	1	3	4	73
	30.	Industrial Park	70.36 TSF	39	7	46	9	37	46	422
	40.	Commercial Office	0.36 TSF	1	0	1	0	0	0	4
		SUB-TOTAL		79	39	118	125	159	284	3032
224	2.	Single Family (1-5du/ac)	230.00 DU	44	129	173	150	83	233	2277
	4.	Condominium/Townhouse	500.00 DU	30	240	270	235	130	365	4000
	6.	Mobile Home	30.00 DU	2	10	12	11	6	17	207
	13.	Commercial Shops	81.68 TSF	59	39	98	147	147	294	3027
	20.	Elementary/Middle School	111.00 STU	29	22	51	9	10	19	161
	24.	Library	16.73 TSF	13	5	18	57	62	119	1421
		SUB-TOTAL		177	445	622	609	438	1047	11093
225	2.	Single Family (1-5du/ac)	136.00 DU	26	76	102	88	49	137	1346
	4.	Condominium/Townhouse	77.00 DU	5	37	42	36	20	56	616
	20.	Elementary/Middle School	296.00 STU	77	59	136	24	27	51	429
	51.	Developed Park	14.00 AC	0	0	0	0	1	1	36
		SUB-TOTAL		108	172	280	148	97	245	2427
226	2.	Single Family (1-5du/ac)	300.00 DU	57	168	225	195	108	303	2970
	4.	Condominium/Townhouse	292.00 DU	18	140	158	137	76	213	2336
	13.	Commercial Shops	69.70 TSF	50	33	83	125	125	250	2583
	25.	Church	8.00 TSF	3	3	6	3	2	5	74
		SUB-TOTAL		128	344	472	460	311	771	7963
228	2.	Single Family (1-5du/ac)	50.00 DU	10	28	38	33	18	51	495
		SUB-TOTAL		10	28	38	33	18	51	495
229	1.	Single Family (<1du/ac)	74.00 DU	21	50	71	62	27	89	733
		SUB-TOTAL		21	50	71	62	27	89	733
234	11.	Commercial Center(10-30a)	100.00 TSF	73	47	120	238	258	496	5406
	31.	Business Park	470.24 TSF	564	108	672	141	466	607	4796
		SUB-TOTAL		637	155	792	379	724	1103	10202
235	11.	Commercial Center(10-30a)	20.00 TSF	15	9	24	48	52	100	1081
	31.	Business Park	130.00 TSF	156	30	186	39	129	168	1326
		SUB-TOTAL		171	39	210	87	181	268	2407
236	2.	Single Family (1-5du/ac)	80.00 DU	15	45	60	52	29	81	792
	3.	Single Family (6-10du/ac)	80.00 DU	15	45	60	52	29	81	792
	20.	Elementary/Middle School	300.00 STU	78	60	138	24	27	51	435
	51.	Developed Park	5.00 AC	0	0	0	0	0	0	13
		SUB-TOTAL		108	150	258	128	85	213	2032
237	2.	Single Family (1-5du/ac)	100.00 DU	19	56	75	65	36	101	990
	5.	Apartment	300.00 DU	24	129	153	123	63	186	2070
	40.	Commercial Office	50.00 TSF	78	10	88	11	65	76	578

SCVCTM INTERIM YEAR VER 3.3 ZONAL LAND USE AND TRIP GENERATION (cont.)

Zone		Land Use Type	Units	-- AM Peak Hour -- In	Out	Total	-- PM Peak Hour -- In	Out	Total	ADT
237	51.	Developed Park	24.40 AC	0	0	0	1	1	2	63
		SUB-TOTAL		121	195	316	200	165	365	3701
238	2.	Single Family (1-5du/ac)	80.00 DU	15	45	60	52	29	81	792
	3.	Single Family (6-10du/ac)	110.00 DU	21	62	83	72	40	112	1089
	4.	Condominium/Townhouse	60.00 DU	4	29	33	28	16	44	480
	10.	Commercial Center (>30ac)	15.00 TSF	7	5	12	25	27	52	601
	12.	Commercial Center (<10ac)	20.00 TSF	22	14	36	66	72	138	1701
	15.	Sit-Down Restaurant	10.00 TSF	48	45	93	65	43	108	1303
	31.	Business Park	100.00 TSF	120	23	143	30	99	129	1020
	51.	Developed Park	25.90 AC	0	0	0	1	1	2	67
		SUB-TOTAL		237	223	460	339	327	666	7053
239	13.	Commercial Shops	337.29 TSF	243	162	405	607	607	1214	12500
	30.	Industrial Park	387.07 TSF	213	39	252	50	201	251	2322
	32.	Manufacturing/Warehouse	1552.60 TSF	869	264	1133	419	730	1149	7918
	40.	Commercial Office	262.87 TSF	407	50	457	55	339	394	3039
		SUB-TOTAL		1732	515	2247	1131	1877	3008	25779
243	2.	Single Family (1-5du/ac)	100.00 DU	19	56	75	65	36	101	990
	4.	Condominium/Townhouse	200.00 DU	12	96	108	94	52	146	1600
	5.	Apartment	200.00 DU	16	86	102	82	42	124	1380
	10.	Commercial Center (>30ac)	30.00 TSF	14	9	23	49	53	102	1202
	12.	Commercial Center (<10ac)	10.00 TSF	11	7	18	33	36	69	851
	15.	Sit-Down Restaurant	10.00 TSF	48	45	93	65	43	108	1303
	40.	Commercial Office	70.00 TSF	109	13	122	15	90	105	809
		SUB-TOTAL		229	312	541	403	352	755	8135
244	1.	Single Family (<1du/ac)	95.00 DU	28	64	92	80	34	114	940
	2.	Single Family (1-5du/ac)	322.00 DU	61	180	241	209	116	325	3188
	3.	Single Family (6-10du/ac)	95.00 DU	18	53	71	62	34	96	940
	4.	Condominium/Townhouse	157.00 DU	9	75	84	74	41	115	1256
	11.	Commercial Center(10-30a)	54.45 TSF	40	26	66	130	140	270	2944
	30.	Industrial Park	40.00 TSF	22	4	26	5	21	26	240
	40.	Commercial Office	86.16 TSF	134	16	150	18	111	129	996
		SUB-TOTAL		312	418	730	578	497	1075	10504
245	4.	Condominium/Townhouse	148.00 DU	9	71	80	70	38	108	1184
	30.	Industrial Park	345.58 TSF	190	35	225	45	180	225	2073
	32.	Manufacturing/Warehouse	61.16 TSF	34	10	44	17	29	46	312
		SUB-TOTAL		233	116	349	132	247	379	3569
246	32.	Manufacturing/Warehouse	58.81 TSF	33	10	43	16	28	44	300
		SUB-TOTAL		33	10	43	16	28	44	300
247	11.	Commercial Center(10-30a)	71.37 TSF	52	34	86	170	184	354	3858
		SUB-TOTAL		52	34	86	170	184	354	3858

SCVCTM INTERIM YEAR VER 3.3 ZONAL LAND USE AND TRIP GENERATION (cont.)

Zone		Land Use Type	Units	-- AM Peak Hour -- In	Out	Total	-- PM Peak Hour -- In	Out	Total	ADT
248	2.	Single Family (1-5du/ac)	2.00 DU	0	1	1	1	1	2	20
	4.	Condominium/Townhouse	4.00 DU	0	2	2	2	1	3	32
	30.	Industrial Park	882.09 TSF	485	88	573	115	459	574	5293
		SUB-TOTAL		485	91	576	118	461	579	5345
249	32.	Manufacturing/Warehouse	291.68 TSF	163	50	213	79	137	216	1488
		SUB-TOTAL		163	50	213	79	137	216	1488
250	13.	Commercial Shops	58.00 TSF	42	28	70	104	104	208	2149
		SUB-TOTAL		42	28	70	104	104	208	2149
254	13.	Commercial Shops	8.71 TSF	6	4	10	16	16	32	323
		SUB-TOTAL		6	4	10	16	16	32	323
255	1.	Single Family (<1du/ac)	2.00 DU	1	1	2	2	1	3	20
		SUB-TOTAL		1	1	2	2	1	3	20
256	2.	Single Family (1-5du/ac)	20.00 DU	4	11	15	13	7	20	198
		SUB-TOTAL		4	11	15	13	7	20	198
257	2.	Single Family (1-5du/ac)	120.00 DU	23	67	90	78	43	121	1188
	4.	Condominium/Townhouse	11.00 DU	1	5	6	5	3	8	88
		SUB-TOTAL		24	72	96	83	46	129	1276
258	2.	Single Family (1-5du/ac)	74.00 DU	14	41	55	48	27	75	733
	32.	Manufacturing/Warehouse	125.00 TSF	70	21	91	34	59	93	638
		SUB-TOTAL		84	62	146	82	86	168	1371
260	2.	Single Family (1-5du/ac)	27.00 DU	5	15	20	18	10	28	267
		SUB-TOTAL		5	15	20	18	10	28	267
261	2.	Single Family (1-5du/ac)	10.00 DU	2	6	8	7	4	11	99
		SUB-TOTAL		2	6	8	7	4	11	99
262	2.	Single Family (1-5du/ac)	927.00 DU	176	519	695	603	334	937	9177
	4.	Condominium/Townhouse	295.00 DU	18	142	160	139	77	216	2360
		SUB-TOTAL		194	661	855	742	411	1153	11537
264	2.	Single Family (1-5du/ac)	63.00 DU	12	35	47	41	23	64	624
		SUB-TOTAL		12	35	47	41	23	64	624
265	2.	Single Family (1-5du/ac)	600.00 DU	114	336	450	390	216	606	5940
		SUB-TOTAL		114	336	450	390	216	606	5940
266	11.	Commercial Center(10-30a)	101.04 TSF	74	47	121	240	261	501	5462
		SUB-TOTAL		74	47	121	240	261	501	5462
267	11.	Commercial Center(10-30a)	100.00 TSF	73	47	120	238	258	496	5406
		SUB-TOTAL		73	47	120	238	258	496	5406

SCVCTM INTERIM YEAR VER 3.3 ZONAL LAND USE AND TRIP GENERATION (cont.)

Zone		Land Use Type	Units	-- AM Peak Hour -- In	Out	Total	-- PM Peak Hour -- In	Out	Total	ADT
268	2.	Single Family (1-5du/ac)	13.00 DU	2	7	9	8	5	13	129
	11.	Commercial Center(10-30a)	182.33 TSF	133	86	219	434	470	904	9857
		SUB-TOTAL		135	93	228	442	475	917	9986
269	2.	Single Family (1-5du/ac)	393.00 DU	75	220	295	255	141	396	3891
	11.	Commercial Center(10-30a)	90.66 TSF	66	43	109	216	234	450	4901
	21.	High School	500.00 STU	160	70	230	30	45	75	895
		SUB-TOTAL		301	333	634	501	420	921	9687
270	1.	Single Family (<1du/ac)	8.00 DU	2	5	7	7	3	10	79
		SUB-TOTAL		2	5	7	7	3	10	79
271	2.	Single Family (1-5du/ac)	488.00 DU	93	273	366	317	176	493	4831
	10.	Commercial Center (>30ac)	585.00 TSF	275	176	451	959	1041	2000	23435
	20.	Elementary/Middle School	500.00 STU	130	100	230	40	45	85	725
		SUB-TOTAL		498	549	1047	1316	1262	2578	28991
272	2.	Single Family (1-5du/ac)	531.00 DU	101	297	398	345	191	536	5257
	3.	Single Family (6-10du/ac)	154.00 DU	29	86	115	100	55	155	1525
	4.	Condominium/Townhouse	300.00 DU	18	144	162	141	78	219	2400
	12.	Commercial Center (<10ac)	8.12 TSF	9	6	15	27	29	56	691
		SUB-TOTAL		157	533	690	613	353	966	9873
273	2.	Single Family (1-5du/ac)	6.00 DU	1	3	4	4	2	6	59
		SUB-TOTAL		1	3	4	4	2	6	59
274	2.	Single Family (1-5du/ac)	174.00 DU	33	97	130	113	63	176	1723
		SUB-TOTAL		33	97	130	113	63	176	1723
275	2.	Single Family (1-5du/ac)	64.00 DU	12	36	48	42	23	65	634
	20.	Elementary/Middle School	314.00 STU	82	63	145	25	28	53	455
	40.	Commercial Office	1.65 TSF	3	0	3	0	2	2	19
		SUB-TOTAL		97	99	196	67	53	120	1108
276	3.	Single Family (6-10du/ac)	5.00 DU	1	3	4	3	2	5	50
	4.	Condominium/Townhouse	539.00 DU	32	259	291	253	140	393	4312
	12.	Commercial Center (<10ac)	98.01 TSF	107	68	175	325	353	678	8337
	25.	Church	7.84 TSF	3	3	6	3	2	5	73
		SUB-TOTAL		143	333	476	584	497	1081	12772
277	12.	Commercial Center (<10ac)	4.91 TSF	5	3	8	16	18	34	418
	16.	Fast Food Restaurant	3.00 TSF	76	73	149	52	48	100	1488
		SUB-TOTAL		81	76	157	68	66	134	1906
278	40.	Commercial Office	10.00 TSF	16	2	18	2	13	15	116
		SUB-TOTAL		16	2	18	2	13	15	116
279	2.	Single Family (1-5du/ac)	313.00 DU	59	175	234	203	113	316	3099

SCVCTM INTERIM YEAR VER 3.3 ZONAL LAND USE AND TRIP GENERATION (cont.)

Zone		Land Use Type	Units	-- AM Peak Hour -- In	Out	Total	-- PM Peak Hour -- In	Out	Total	ADT
279	12.	Commercial Center (<10ac)	26.33 TSF	29	18	47	87	95	182	2240
	40.	Commercial Office	0.20 TSF	0	0	0	0	0	0	2
		SUB-TOTAL		88	193	281	290	208	498	5341
282	4.	Condominium/Townhouse	486.00 DU	29	233	262	228	126	354	3888
	11.	Commercial Center(10-30a)	17.90 TSF	13	8	21	43	46	89	968
		SUB-TOTAL		42	241	283	271	172	443	4856
283	4.	Condominium/Townhouse	400.00 DU	24	192	216	188	104	292	3200
		SUB-TOTAL		24	192	216	188	104	292	3200
284	2.	Single Family (1-5du/ac)	2.00 DU	0	1	1	1	1	2	20
	6.	Mobile Home	346.00 DU	28	111	139	121	73	194	2387
		SUB-TOTAL		28	112	140	122	74	196	2407
285	30.	Industrial Park	566.28 TSF	311	57	368	74	294	368	3398
		SUB-TOTAL		311	57	368	74	294	368	3398
286	32.	Manufacturing/Warehouse	141.13 TSF	79	24	103	38	66	104	720
		SUB-TOTAL		79	24	103	38	66	104	720
290	2.	Single Family (1-5du/ac)	1.00 DU	0	1	1	1	0	1	10
		SUB-TOTAL		0	1	1	1	0	1	10
291	2.	Single Family (1-5du/ac)	55.00 DU	10	31	41	36	20	56	545
	31.	Business Park	181.63 TSF	218	42	260	54	180	234	1853
		SUB-TOTAL		228	73	301	90	200	290	2398
292	2.	Single Family (1-5du/ac)	161.00 DU	31	90	121	105	58	163	1594
		SUB-TOTAL		31	90	121	105	58	163	1594
293	2.	Single Family (1-5du/ac)	90.00 DU	17	50	67	58	32	90	891
	4.	Condominium/Townhouse	368.00 DU	22	177	199	173	96	269	2944
		SUB-TOTAL		39	227	266	231	128	359	3835
294	11.	Commercial Center(10-30a)	364.00 TSF	266	171	437	866	939	1805	19678
	30.	Industrial Park	210.00 TSF	116	21	137	27	109	136	1260
	31.	Business Park	349.98 TSF	420	80	500	105	346	451	3570
		SUB-TOTAL		802	272	1074	998	1394	2392	24508
295	32.	Manufacturing/Warehouse	1020.58 TSF	572	173	745	276	480	756	5205
	40.	Commercial Office	56.00 TSF	87	11	98	12	72	84	647
		SUB-TOTAL		659	184	843	288	552	840	5852
298	5.	Apartment	830.00 DU	66	357	423	340	174	514	5727
		SUB-TOTAL		66	357	423	340	174	514	5727
299	11.	Commercial Center(10-30a)	184.00 TSF	134	86	220	438	475	913	9947
		SUB-TOTAL		134	86	220	438	475	913	9947

SCVCTM INTERIM YEAR VER 3.3 ZONAL LAND USE AND TRIP GENERATION (cont.)

Zone		Land Use Type	Units	-- AM Peak Hour -- In	Out	Total	-- PM Peak Hour -- In	Out	Total	ADT
300	10.	Commercial Center (>30ac)	272.00 TSF	128	82	210	446	484	930	10896
		SUB-TOTAL		128	82	210	446	484	930	10896
301	13.	Commercial Shops	135.00 TSF	97	65	162	243	243	486	5003
	19.	Car Dealership	150.00 TSF	242	90	332	168	252	420	5625
		SUB-TOTAL		339	155	494	411	495	906	10628
302	10.	Commercial Center (>30ac)	384.42 TSF	181	115	296	630	684	1314	15400
	12.	Commercial Center (<10ac)	30.00 TSF	33	21	54	100	108	208	2552
		SUB-TOTAL		214	136	350	730	792	1522	17952
303	19.	Car Dealership	150.00 TSF	242	90	332	168	252	420	5625
		SUB-TOTAL		242	90	332	168	252	420	5625
304	11.	Commercial Center(10-30a)	131.00 TSF	96	62	158	312	338	650	7082
		SUB-TOTAL		96	62	158	312	338	650	7082
305	11.	Commercial Center(10-30a)	160.00 TSF	117	75	192	381	413	794	8650
	32.	Manufacturing/Warehouse	100.00 TSF	56	17	73	27	47	74	510
		SUB-TOTAL		173	92	265	408	460	868	9160
306	11.	Commercial Center(10-30a)	180.00 TSF	131	85	216	428	464	892	9731
		SUB-TOTAL		131	85	216	428	464	892	9731
307	11.	Commercial Center(10-30a)	128.00 TSF	93	60	153	305	330	635	6920
		SUB-TOTAL		93	60	153	305	330	635	6920
308	4.	Condominium/Townhouse	106.00 DU	6	51	57	50	28	78	848
	6.	Mobile Home	168.00 DU	13	54	67	59	35	94	1159
	12.	Commercial Center (<10ac)	50.00 TSF	55	35	90	166	180	346	4253
	32.	Manufacturing/Warehouse	29.40 TSF	16	5	21	8	14	22	150
		SUB-TOTAL		90	145	235	283	257	540	6410
309	13.	Commercial Shops	3.00 TSF	2	1	3	5	5	10	111
		SUB-TOTAL		2	1	3	5	5	10	111
310	19.	Car Dealership	111.00 TSF	179	67	246	124	186	310	4163
	51.	Developed Park	17.20 AC	0	0	0	1	1	2	45
		SUB-TOTAL		179	67	246	125	187	312	4208
311	3.	Single Family (6-10du/ac)	104.00 DU	20	58	78	68	37	105	1030
	4.	Condominium/Townhouse	156.00 DU	9	75	84	73	41	114	1248
		SUB-TOTAL		29	133	162	141	78	219	2278
312	11.	Commercial Center(10-30a)	180.00 TSF	131	85	216	428	464	892	9731
	34.	Utilities	84.00 TSF	0	0	0	0	0	0	200
		SUB-TOTAL		131	85	216	428	464	892	9931

SCVCTM INTERIM YEAR VER 3.3 ZONAL LAND USE AND TRIP GENERATION (cont.)

Zone		Land Use Type	Units	-- AM Peak Hour -- In	Out	Total	-- PM Peak Hour -- In	Out	Total	ADT
313	4.	Condominium/Townhouse	264.00 DU	16	127	143	124	69	193	2112
		SUB-TOTAL		16	127	143	124	69	193	2112
314	11.	Commercial Center(10-30a)	178.00 TSF	130	84	214	424	459	883	9623
		SUB-TOTAL		130	84	214	424	459	883	9623
315	4.	Condominium/Townhouse	166.00 DU	10	80	90	78	43	121	1328
		SUB-TOTAL		10	80	90	78	43	121	1328
316	2.	Single Family (1-5du/ac)	121.00 DU	23	68	91	79	44	123	1198
		SUB-TOTAL		23	68	91	79	44	123	1198
317	20.	Elementary/Middle School	924.00 STU	240	185	425	74	83	157	1340
	51.	Developed Park	18.00 AC	0	0	0	1	1	2	47
		SUB-TOTAL		240	185	425	75	84	159	1387
318	2.	Single Family (1-5du/ac)	21.00 DU	4	12	16	14	8	22	208
	4.	Condominium/Townhouse	252.00 DU	15	121	136	118	66	184	2016
		SUB-TOTAL		19	133	152	132	74	206	2224
319	13.	Commercial Shops	2.00 TSF	1	1	2	4	4	8	74
	20.	Elementary/Middle School	250.00 STU	65	50	115	20	23	43	363
	25.	Church	80.00 TSF	31	26	57	29	24	53	744
	40.	Commercial Office	240.00 TSF	372	46	418	50	310	360	2774
		SUB-TOTAL		469	123	592	103	361	464	3955
320	2.	Single Family (1-5du/ac)	125.00 DU	24	70	94	81	45	126	1238
		SUB-TOTAL		24	70	94	81	45	126	1238
321	3.	Single Family (6-10du/ac)	62.00 DU	12	35	47	40	22	62	614
	4.	Condominium/Townhouse	93.00 DU	6	45	51	44	24	68	744
		SUB-TOTAL		18	80	98	84	46	130	1358
322	3.	Single Family (6-10du/ac)	40.00 DU	8	22	30	26	14	40	396
	4.	Condominium/Townhouse	60.00 DU	4	29	33	28	16	44	480
		SUB-TOTAL		12	51	63	54	30	84	876
323	3.	Single Family (6-10du/ac)	121.00 DU	23	68	91	79	44	123	1198
	4.	Condominium/Townhouse	169.00 DU	10	81	91	79	44	123	1352
		SUB-TOTAL		33	149	182	158	88	246	2550
325	3.	Single Family (6-10du/ac)	205.00 DU	39	115	154	133	74	207	2029
		SUB-TOTAL		39	115	154	133	74	207	2029
326	2.	Single Family (1-5du/ac)	101.00 DU	19	57	76	66	36	102	1000
		SUB-TOTAL		19	57	76	66	36	102	1000
327	2.	Single Family (1-5du/ac)	105.00 DU	20	59	79	68	38	106	1040
		SUB-TOTAL		20	59	79	68	38	106	1040

SCVCTM INTERIM YEAR VER 3.3 ZONAL LAND USE AND TRIP GENERATION (cont.)

Zone	Land Use Type	Units	-- AM Peak Hour -- In	Out	Total	-- PM Peak Hour -- In	Out	Total	ADT
328	2. Single Family (1-5du/ac)	110.00 DU	21	62	83	72	40	112	1089
	SUB-TOTAL		21	62	83	72	40	112	1089
329	2. Single Family (1-5du/ac)	50.00 DU	10	28	38	33	18	51	495
	20. Elementary/Middle School	924.00 STU	240	185	425	74	83	157	1340
	SUB-TOTAL		250	213	463	107	101	208	1835
330	2. Single Family (1-5du/ac)	143.00 DU	27	80	107	93	51	144	1416
	SUB-TOTAL		27	80	107	93	51	144	1416
331	2. Single Family (1-5du/ac)	167.00 DU	32	94	126	109	60	169	1653
	SUB-TOTAL		32	94	126	109	60	169	1653
332	2. Single Family (1-5du/ac)	114.00 DU	22	64	86	74	41	115	1129
	4. Condominium/Townhouse	102.00 DU	6	49	55	48	27	75	816
	SUB-TOTAL		28	113	141	122	68	190	1945
333	2. Single Family (1-5du/ac)	803.00 DU	153	450	603	522	289	811	7950
	4. Condominium/Townhouse	360.00 DU	22	173	195	169	94	263	2880
	13. Commercial Shops	25.05 TSF	18	12	30	45	45	90	928
	20. Elementary/Middle School	924.00 STU	240	185	425	74	83	157	1340
	SUB-TOTAL		433	820	1253	810	511	1321	13098
334	2. Single Family (1-5du/ac)	164.00 DU	31	92	123	107	59	166	1624
	SUB-TOTAL		31	92	123	107	59	166	1624
335	2. Single Family (1-5du/ac)	194.00 DU	37	109	146	126	70	196	1921
	SUB-TOTAL		37	109	146	126	70	196	1921
336	2. Single Family (1-5du/ac)	589.00 DU	112	330	442	383	212	595	5831
	20. Elementary/Middle School	924.00 STU	240	185	425	74	83	157	1340
	51. Developed Park	7.30 AC	0	0	0	0	0	0	19
	SUB-TOTAL		352	515	867	457	295	752	7190
337	2. Single Family (1-5du/ac)	390.00 DU	74	218	292	253	140	393	3861
	SUB-TOTAL		74	218	292	253	140	393	3861
338	11. Commercial Center(10-30a)	92.00 TSF	67	43	110	219	237	456	4974
	SUB-TOTAL		67	43	110	219	237	456	4974
339	2. Single Family (1-5du/ac)	128.00 DU	24	72	96	83	46	129	1267
	3. Single Family (6-10du/ac)	161.00 DU	31	90	121	105	58	163	1594
	20. Elementary/Middle School	924.00 STU	240	185	425	74	83	157	1340
	51. Developed Park	7.00 AC	0	0	0	0	0	0	18
	SUB-TOTAL		295	347	642	262	187	449	4219
340	2. Single Family (1-5du/ac)	270.00 DU	51	151	202	176	97	273	2673
	3. Single Family (6-10du/ac)	124.00 DU	24	69	93	81	45	126	1228

SCVCTM INTERIM YEAR VER 3.3 ZONAL LAND USE AND TRIP GENERATION (cont.)

Zone		Land Use Type	Units	-- AM Peak Hour -- In	Out	Total	-- PM Peak Hour -- In	Out	Total	ADT
340	4.	Condominium/Townhouse	264.00 DU	16	127	143	124	69	193	2112
		SUB-TOTAL		91	347	438	381	211	592	6013
341	5.	Apartment	325.00 DU	26	140	166	133	68	201	2243
	26.	Day Care	260.00 STU	112	99	211	104	120	224	1175
		SUB-TOTAL		138	239	377	237	188	425	3418
342	4.	Condominium/Townhouse	168.00 DU	10	81	91	79	44	123	1344
		SUB-TOTAL		10	81	91	79	44	123	1344
343	2.	Single Family (1-5du/ac)	90.00 DU	17	50	67	58	32	90	891
	3.	Single Family (6-10du/ac)	89.00 DU	17	50	67	58	32	90	881
	4.	Condominium/Townhouse	132.00 DU	8	63	71	62	34	96	1056
		SUB-TOTAL		42	163	205	178	98	276	2828
344	2.	Single Family (1-5du/ac)	415.00 DU	79	232	311	270	149	419	4109
	11.	Commercial Center(10-30a)	40.00 TSF	29	19	48	95	103	198	2162
		SUB-TOTAL		108	251	359	365	252	617	6271
345	2.	Single Family (1-5du/ac)	23.00 DU	4	13	17	15	8	23	228
		SUB-TOTAL		4	13	17	15	8	23	228
347	2.	Single Family (1-5du/ac)	500.00 DU	95	280	375	325	180	505	4950
		SUB-TOTAL		95	280	375	325	180	505	4950
348	2.	Single Family (1-5du/ac)	675.00 DU	128	378	506	439	243	682	6682
		SUB-TOTAL		128	378	506	439	243	682	6682
349	4.	Condominium/Townhouse	83.00 DU	5	40	45	39	22	61	664
		SUB-TOTAL		5	40	45	39	22	61	664
350	25.	Church	25.00 TSF	10	8	18	9	8	17	233
		SUB-TOTAL		10	8	18	9	8	17	233
352	2.	Single Family (1-5du/ac)	592.00 DU	112	332	444	385	213	598	5861
		SUB-TOTAL		112	332	444	385	213	598	5861
353	2.	Single Family (1-5du/ac)	630.00 DU	120	353	473	410	227	637	6237
		SUB-TOTAL		120	353	473	410	227	637	6237
356	2.	Single Family (1-5du/ac)	385.00 DU	73	216	289	250	139	389	3811
		SUB-TOTAL		73	216	289	250	139	389	3811
357	2.	Single Family (1-5du/ac)	160.00 DU	30	90	120	104	58	162	1584
		SUB-TOTAL		30	90	120	104	58	162	1584
358	2.	Single Family (1-5du/ac)	421.00 DU	80	236	316	274	152	426	4168
	4.	Condominium/Townhouse	255.00 DU	15	122	137	120	66	186	2040

SCVCTM INTERIM YEAR VER 3.3 ZONAL LAND USE AND TRIP GENERATION (cont.)

Zone		Land Use Type	Units	-- AM Peak Hour -- In	Out	Total	-- PM Peak Hour -- In	Out	Total	ADT
358	20.	Elementary/Middle School	462.00 STU	120	92	212	37	42	79	670
	51.	Developed Park	9.60 AC	0	0	0	0	0	0	25
		SUB-TOTAL		215	450	665	431	260	691	6903
359	2.	Single Family (1-5du/ac)	570.00 DU	108	319	427	371	205	576	5643
	4.	Condominium/Townhouse	192.00 DU	12	92	104	90	50	140	1536
		SUB-TOTAL		120	411	531	461	255	716	7179
360	2.	Single Family (1-5du/ac)	538.00 DU	102	301	403	350	194	544	5326
	4.	Condominium/Townhouse	248.00 DU	15	119	134	117	64	181	1984
	12.	Commercial Center (<10ac)	119.00 TSF	130	82	212	395	428	823	10122
	20.	Elementary/Middle School	462.00 STU	120	92	212	37	42	79	670
		SUB-TOTAL		367	594	961	899	728	1627	18102
361	2.	Single Family (1-5du/ac)	188.00 DU	36	105	141	122	68	190	1861
		SUB-TOTAL		36	105	141	122	68	190	1861
362	2.	Single Family (1-5du/ac)	173.00 DU	33	97	130	112	62	174	1713
		SUB-TOTAL		33	97	130	112	62	174	1713
364	3.	Single Family (6-10du/ac)	199.00 DU	38	111	149	129	72	201	1970
		SUB-TOTAL		38	111	149	129	72	201	1970
365	2.	Single Family (1-5du/ac)	201.00 DU	38	113	151	131	72	203	1990
	4.	Condominium/Townhouse	102.00 DU	6	49	55	48	27	75	816
		SUB-TOTAL		44	162	206	179	99	278	2806
366	2.	Single Family (1-5du/ac)	320.00 DU	61	179	240	208	115	323	3168
		SUB-TOTAL		61	179	240	208	115	323	3168
367	3.	Single Family (6-10du/ac)	437.00 DU	83	245	328	284	157	441	4326
		SUB-TOTAL		83	245	328	284	157	441	4326
368	2.	Single Family (1-5du/ac)	128.00 DU	24	72	96	83	46	129	1267
	20.	Elementary/Middle School	462.00 STU	120	92	212	37	42	79	670
	25.	Church	21.00 TSF	8	7	15	8	6	14	195
		SUB-TOTAL		152	171	323	128	94	222	2132
369	2.	Single Family (1-5du/ac)	202.00 DU	38	113	151	131	73	204	2000
		SUB-TOTAL		38	113	151	131	73	204	2000
370	2.	Single Family (1-5du/ac)	1080.00 DU	205	605	810	702	389	1091	10692
	20.	Elementary/Middle School	1331.00 STU	346	266	612	106	120	226	1930
		SUB-TOTAL		551	871	1422	808	509	1317	12622
371	2.	Single Family (1-5du/ac)	673.00 DU	128	377	505	437	242	679	6663
		SUB-TOTAL		128	377	505	437	242	679	6663

SCVCTM INTERIM YEAR VER 3.3 ZONAL LAND USE AND TRIP GENERATION (cont.)

Zone		Land Use Type	Units	-- AM Peak Hour -- In	Out	Total	-- PM Peak Hour -- In	Out	Total	ADT
372	2.	Single Family (1-5du/ac)	287.00 DU	55	161	216	187	103	290	2841
	4.	Condominium/Townhouse	230.00 DU	14	110	124	108	60	168	1840
	11.	Commercial Center(10-30a)	153.55 TSF	112	72	184	365	396	761	8301
		SUB-TOTAL		181	343	524	660	559	1219	12982
373	2.	Single Family (1-5du/ac)	236.00 DU	45	132	177	153	85	238	2336
	20.	Elementary/Middle School	462.00 STU	120	92	212	37	42	79	670
	25.	Church	23.52 TSF	9	8	17	8	7	15	219
		SUB-TOTAL		174	232	406	198	134	332	3225
374	5.	Apartment	324.00 DU	26	139	165	133	68	201	2236
	11.	Commercial Center(10-30a)	150.00 TSF	110	71	181	357	387	744	8109
		SUB-TOTAL		136	210	346	490	455	945	10345
375	12.	Commercial Center (<10ac)	40.00 TSF	44	28	72	133	144	277	3402
	16.	Fast Food Restaurant	5.00 TSF	127	122	249	87	80	167	2481
		SUB-TOTAL		171	150	321	220	224	444	5883
376	3.	Single Family (6-10du/ac)	225.00 DU	43	126	169	146	81	227	2228
	51.	Developed Park	4.25 AC	0	0	0	0	0	0	11
		SUB-TOTAL		43	126	169	146	81	227	2239
377	13.	Commercial Shops	57.50 TSF	41	28	69	103	103	206	2131
		SUB-TOTAL		41	28	69	103	103	206	2131
378	6.	Mobile Home	332.00 DU	27	106	133	116	70	186	2291
	10.	Commercial Center (>30ac)	500.00 TSF	235	150	385	820	890	1710	20030
	13.	Commercial Shops	41.00 TSF	30	20	50	74	74	148	1519
	31.	Business Park	56.00 TSF	67	13	80	17	55	72	571
	40.	Commercial Office	110.00 TSF	171	21	192	23	142	165	1272
		SUB-TOTAL		530	310	840	1050	1231	2281	25683
379	3.	Single Family (6-10du/ac)	214.00 DU	41	120	161	139	77	216	2119
		SUB-TOTAL		41	120	161	139	77	216	2119
380	5.	Apartment	420.00 DU	34	181	215	172	88	260	2898
		SUB-TOTAL		34	181	215	172	88	260	2898
382	34.	Utilities	21.00 TSF	0	0	0	0	0	0	50
		SUB-TOTAL		0	0	0	0	0	0	50
383	2.	Single Family (1-5du/ac)	231.00 DU	44	129	173	150	83	233	2287
	13.	Commercial Shops	8.71 TSF	6	4	10	16	16	32	323
		SUB-TOTAL		50	133	183	166	99	265	2610
384	2.	Single Family (1-5du/ac)	354.00 DU	67	198	265	230	127	357	3505
	12.	Commercial Center (<10ac)	23.07 TSF	25	16	41	77	83	160	1962
		SUB-TOTAL		92	214	306	307	210	517	5467

SCVCTM INTERIM YEAR VER 3.3 ZONAL LAND USE AND TRIP GENERATION (cont.)

Zone		Land Use Type	Units	-- AM Peak Hour -- In	Out	Total	-- PM Peak Hour -- In	Out	Total	ADT
387	2.	Single Family (1-5du/ac)	375.00 DU	71	210	281	244	135	379	3712
		SUB-TOTAL		71	210	281	244	135	379	3712
389	2.	Single Family (1-5du/ac)	1025.00 DU	195	574	769	666	369	1035	10148
	3.	Single Family (6-10du/ac)	126.00 DU	24	71	95	82	45	127	1247
	20.	Elementary/Middle School	351.00 STU	91	70	161	28	32	60	509
		SUB-TOTAL		310	715	1025	776	446	1222	11904
390	2.	Single Family (1-5du/ac)	150.00 DU	29	84	113	98	54	152	1485
		SUB-TOTAL		29	84	113	98	54	152	1485
391	13.	Commercial Shops	16.33 TSF	12	8	20	29	29	58	605
	32.	Manufacturing/Warehouse	376.36 TSF	211	64	275	102	177	279	1919
		SUB-TOTAL		223	72	295	131	206	337	2524
392	2.	Single Family (1-5du/ac)	239.00 DU	45	134	179	155	86	241	2366
	20.	Elementary/Middle School	102.00 STU	27	20	47	8	9	17	148
		SUB-TOTAL		72	154	226	163	95	258	2514
393	3.	Single Family (6-10du/ac)	162.00 DU	31	91	122	105	58	163	1604
	4.	Condominium/Townhouse	100.00 DU	6	48	54	47	26	73	800
	12.	Commercial Center (<10ac)	52.27 TSF	57	36	93	174	188	362	4446
	25.	Church	37.64 TSF	15	12	27	14	11	25	350
		SUB-TOTAL		109	187	296	340	283	623	7200
394	2.	Single Family (1-5du/ac)	325.00 DU	62	182	244	211	117	328	3217
	20.	Elementary/Middle School	92.00 STU	24	18	42	7	8	15	133
	21.	High School	848.00 STU	271	119	390	51	76	127	1518
	51.	Developed Park	3.20 AC	0	0	0	0	0	0	8
		SUB-TOTAL		357	319	676	269	201	470	4876
395	3.	Single Family (6-10du/ac)	185.00 DU	35	104	139	120	67	187	1831
	11.	Commercial Center(10-30a)	165.53 TSF	121	78	199	394	427	821	8948
	20.	Elementary/Middle School	185.00 STU	48	37	85	15	17	32	268
		SUB-TOTAL		204	219	423	529	511	1040	11047
396	12.	Commercial Center (<10ac)	76.23 TSF	83	53	136	253	274	527	6484
		SUB-TOTAL		83	53	136	253	274	527	6484
397	12.	Commercial Center (<10ac)	74.00 TSF	81	51	132	246	266	512	6294
		SUB-TOTAL		81	51	132	246	266	512	6294
398	2.	Single Family (1-5du/ac)	1120.00 DU	213	627	840	728	403	1131	11088
	4.	Condominium/Townhouse	120.00 DU	7	58	65	56	31	87	960
	12.	Commercial Center (<10ac)	117.57 TSF	128	81	209	390	423	813	10000
	13.	Commercial Shops	2.68 TSF	2	1	3	5	5	10	99
	15.	Sit-Down Restaurant	8.45 TSF	41	38	79	55	37	92	1102
	20.	Elementary/Middle School	111.00 STU	29	22	51	9	10	19	161
		SUB-TOTAL		420	827	1247	1243	909	2152	23410

SCVCTM INTERIM YEAR VER 3.3 ZONAL LAND USE AND TRIP GENERATION (cont.)

Zone		Land Use Type	Units	-- AM Peak Hour -- In	Out	Total	-- PM Peak Hour -- In	Out	Total	ADT
399	2.	Single Family (1-5du/ac)	722.00 DU	137	404	541	469	260	729	7148
	20.	Elementary/Middle School	286.00 STU	74	57	131	23	26	49	415
		SUB-TOTAL		211	461	672	492	286	778	7563
401	2.	Single Family (1-5du/ac)	800.00 DU	152	448	600	520	288	808	7920
		SUB-TOTAL		152	448	600	520	288	808	7920
402	2.	Single Family (1-5du/ac)	1392.00 DU	264	780	1044	905	501	1406	13781
	11.	Commercial Center(10-30a)	98.02 TSF	72	46	118	233	253	486	5299
		SUB-TOTAL		336	826	1162	1138	754	1892	19080
403	2.	Single Family (1-5du/ac)	111.00 DU	21	62	83	72	40	112	1099
	12.	Commercial Center (<10ac)	46.00 TSF	50	32	82	153	166	319	3913
		SUB-TOTAL		71	94	165	225	206	431	5012
404	2.	Single Family (1-5du/ac)	170.00 DU	32	95	127	110	61	171	1683
		SUB-TOTAL		32	95	127	110	61	171	1683
405	2.	Single Family (1-5du/ac)	65.00 DU	12	36	48	42	23	65	644
		SUB-TOTAL		12	36	48	42	23	65	644
406	2.	Single Family (1-5du/ac)	38.00 DU	7	21	28	25	14	39	376
		SUB-TOTAL		7	21	28	25	14	39	376
407	2.	Single Family (1-5du/ac)	10.00 DU	2	6	8	7	4	11	99
		SUB-TOTAL		2	6	8	7	4	11	99
408	2.	Single Family (1-5du/ac)	53.00 DU	10	30	40	34	19	53	525
		SUB-TOTAL		10	30	40	34	19	53	525
410	2.	Single Family (1-5du/ac)	63.00 DU	12	35	47	41	23	64	624
		SUB-TOTAL		12	35	47	41	23	64	624
411	2.	Single Family (1-5du/ac)	800.00 DU	152	448	600	520	288	808	7920
		SUB-TOTAL		152	448	600	520	288	808	7920
412	1.	Single Family (<1du/ac)	120.00 DU	35	80	115	101	43	144	1188
		SUB-TOTAL		35	80	115	101	43	144	1188
413	2.	Single Family (1-5du/ac)	104.00 DU	20	58	78	68	37	105	1030
	4.	Condominium/Townhouse	246.00 DU	15	118	133	116	64	180	1968
	12.	Commercial Center (<10ac)	26.94 TSF	29	19	48	89	97	186	2292
	32.	Manufacturing/Warehouse	45.21 TSF	25	8	33	12	21	33	231
	40.	Commercial Office	36.59 TSF	57	7	64	8	47	55	423
		SUB-TOTAL		146	210	356	293	266	559	5944
414	2.	Single Family (1-5du/ac)	40.00 DU	8	22	30	26	14	40	396
	4.	Condominium/Townhouse	1358.00 DU	81	652	733	638	353	991	10864

SCVCTM INTERIM YEAR VER 3.3 ZONAL LAND USE AND TRIP GENERATION (cont.)

Zone		Land Use Type	Units	-- AM Peak Hour -- In	Out	Total	-- PM Peak Hour -- In	Out	Total	ADT
414	6.	Mobile Home	250.00 DU	20	80	100	88	53	141	1725
	13.	Commercial Shops	95.83 TSF	69	46	115	172	172	344	3552
		SUB-TOTAL		178	800	978	924	592	1516	16537
415	2.	Single Family (1-5du/ac)	250.00 DU	48	140	188	163	90	253	2475
		SUB-TOTAL		48	140	188	163	90	253	2475
416	2.	Single Family (1-5du/ac)	579.00 DU	110	324	434	376	208	584	5732
	4.	Condominium/Townhouse	148.00 DU	9	71	80	70	38	108	1184
	13.	Commercial Shops	15.00 TSF	11	7	18	27	27	54	556
	20.	Elementary/Middle School	760.00 STU	198	152	350	61	68	129	1102
	51.	Developed Park	15.00 AC	0	0	0	0	1	1	39
		SUB-TOTAL		328	554	882	534	342	876	8613
417	2.	Single Family (1-5du/ac)	579.00 DU	110	324	434	376	208	584	5732
	4.	Condominium/Townhouse	149.00 DU	9	72	81	70	39	109	1192
		SUB-TOTAL		119	396	515	446	247	693	6924
418	2.	Single Family (1-5du/ac)	107.00 DU	20	60	80	70	39	109	1059
	4.	Condominium/Townhouse	619.00 DU	37	297	334	291	161	452	4952
	11.	Commercial Center(10-30a)	100.56 TSF	73	47	120	239	259	498	5436
		SUB-TOTAL		130	404	534	600	459	1059	11447
419	2.	Single Family (1-5du/ac)	554.00 DU	105	310	415	360	199	559	5485
	4.	Condominium/Townhouse	816.00 DU	49	392	441	384	212	596	6528
		SUB-TOTAL		154	702	856	744	411	1155	12013
420	4.	Condominium/Townhouse	40.00 DU	2	19	21	19	10	29	320
		SUB-TOTAL		2	19	21	19	10	29	320
421	30.	Industrial Park	300.00 TSF	165	30	195	39	156	195	1800
	31.	Business Park	300.00 TSF	360	69	429	90	297	387	3060
		SUB-TOTAL		525	99	624	129	453	582	4860
422	2.	Single Family (1-5du/ac)	76.00 DU	14	43	57	49	27	76	752
	4.	Condominium/Townhouse	80.00 DU	5	38	43	38	21	59	640
	12.	Commercial Center (<10ac)	4.00 TSF	4	3	7	13	14	27	340
	20.	Elementary/Middle School	416.00 STU	108	83	191	33	37	70	603
		SUB-TOTAL		131	167	298	133	99	232	2335
423	1.	Single Family (<1du/ac)	353.00 DU	102	237	339	297	127	424	3495
	3.	Single Family (6-10du/ac)	17.00 DU	3	10	13	11	6	17	168
	12.	Commercial Center (<10ac)	98.01 TSF	107	68	175	325	353	678	8337
	40.	Commercial Office	10.89 TSF	17	2	19	2	14	16	126
		SUB-TOTAL		229	317	546	635	500	1135	12126
424	2.	Single Family (1-5du/ac)	114.00 DU	22	64	86	74	41	115	1129
	4.	Condominium/Townhouse	84.00 DU	5	40	45	39	22	61	672
		SUB-TOTAL		27	104	131	113	63	176	1801

SCVCTM INTERIM YEAR VER 3.3 ZONAL LAND USE AND TRIP GENERATION (cont.)

Zone	Land Use Type	Units	-- AM Peak Hour -- In	Out	Total	-- PM Peak Hour -- In	Out	Total	ADT
425	2. Single Family (1-5du/ac)	68.00 DU	13	38	51	44	24	68	673
	51. Developed Park	31.00 AC	0	0	0	1	1	2	81
	SUB-TOTAL		13	38	51	45	25	70	754
426	2. Single Family (1-5du/ac)	68.00 DU	13	38	51	44	24	68	673
	32. Manufacturing/Warehouse	39.60 TSF	22	7	29	11	19	30	202
	SUB-TOTAL		35	45	80	55	43	98	875
427	2. Single Family (1-5du/ac)	27.00 DU	5	15	20	18	10	28	267
	SUB-TOTAL		5	15	20	18	10	28	267
428	2. Single Family (1-5du/ac)	565.00 DU	107	316	423	367	203	570	5594
	SUB-TOTAL		107	316	423	367	203	570	5594
429	2. Single Family (1-5du/ac)	55.00 DU	10	31	41	36	20	56	545
	SUB-TOTAL		10	31	41	36	20	56	545
430	2. Single Family (1-5du/ac)	2.00 DU	0	1	1	1	1	2	20
	SUB-TOTAL		0	1	1	1	1	2	20
431	2. Single Family (1-5du/ac)	3.00 DU	1	2	3	2	1	3	30
	SUB-TOTAL		1	2	3	2	1	3	30
433	2. Single Family (1-5du/ac)	8.00 DU	2	4	6	5	3	8	79
	SUB-TOTAL		2	4	6	5	3	8	79
434	2. Single Family (1-5du/ac)	25.00 DU	5	14	19	16	9	25	247
	SUB-TOTAL		5	14	19	16	9	25	247
437	2. Single Family (1-5du/ac)	8.00 DU	2	4	6	5	3	8	79
	4. Condominium/Townhouse	13.00 DU	1	6	7	6	3	9	104
	SUB-TOTAL		3	10	13	11	6	17	183
438	4. Condominium/Townhouse	13.00 DU	1	6	7	6	3	9	104
	SUB-TOTAL		1	6	7	6	3	9	104
439	2. Single Family (1-5du/ac)	170.00 DU	32	95	127	110	61	171	1683
	3. Single Family (6-10du/ac)	660.00 DU	125	370	495	429	238	667	6534
	SUB-TOTAL		157	465	622	539	299	838	8217
440	2. Single Family (1-5du/ac)	568.00 DU	108	318	426	369	204	573	5623
	SUB-TOTAL		108	318	426	369	204	573	5623
441	2. Single Family (1-5du/ac)	150.00 DU	29	84	113	98	54	152	1485
	SUB-TOTAL		29	84	113	98	54	152	1485
442	2. Single Family (1-5du/ac)	72.00 DU	14	40	54	47	26	73	713
	3. Single Family (6-10du/ac)	216.00 DU	41	121	162	140	78	218	2138
	SUB-TOTAL		55	161	216	187	104	291	2851

SCVCTM INTERIM YEAR VER 3.3 ZONAL LAND USE AND TRIP GENERATION (cont.)

Zone		Land Use Type	Units	-- AM Peak Hour -- In	Out	Total	-- PM Peak Hour -- In	Out	Total	ADT
443	2.	Single Family (1-5du/ac)	150.00 DU	29	84	113	98	54	152	1485
	20.	Elementary/Middle School	407.00 STU	106	81	187	33	37	70	590
	23.	Hospital	30.00 TSF	21	8	29	7	21	28	504
	40.	Commercial Office	108.90 TSF	169	21	190	23	140	163	1259
		SUB-TOTAL		325	194	519	161	252	413	3838
444	2.	Single Family (1-5du/ac)	775.00 DU	147	434	581	504	279	783	7672
	3.	Single Family (6-10du/ac)	87.00 DU	17	49	66	57	31	88	861
	11.	Commercial Center(10-30a)	110.00 TSF	80	52	132	262	284	546	5947
	25.	Church	4.00 TSF	2	1	3	1	1	2	37
		SUB-TOTAL		246	536	782	824	595	1419	14517
445	2.	Single Family (1-5du/ac)	29.00 DU	6	16	22	19	10	29	287
		SUB-TOTAL		6	16	22	19	10	29	287
446	2.	Single Family (1-5du/ac)	91.00 DU	17	51	68	59	33	92	901
		SUB-TOTAL		17	51	68	59	33	92	901
448	2.	Single Family (1-5du/ac)	395.00 DU	75	221	296	257	142	399	3910
		SUB-TOTAL		75	221	296	257	142	399	3910
449	2.	Single Family (1-5du/ac)	20.00 DU	4	11	15	13	7	20	198
		SUB-TOTAL		4	11	15	13	7	20	198
451	2.	Single Family (1-5du/ac)	40.00 DU	8	22	30	26	14	40	396
		SUB-TOTAL		8	22	30	26	14	40	396
453	2.	Single Family (1-5du/ac)	172.00 DU	33	96	129	112	62	174	1703
	20.	Elementary/Middle School	490.00 STU	127	98	225	39	44	83	711
		SUB-TOTAL		160	194	354	151	106	257	2414
454	2.	Single Family (1-5du/ac)	116.00 DU	22	65	87	75	42	117	1148
	13.	Commercial Shops	6.14 TSF	4	3	7	11	11	22	228
	57.	Agua Dulce Airport	34.06 SG	102	68	170	136	136	272	3406
		SUB-TOTAL		128	136	264	222	189	411	4782
455	2.	Single Family (1-5du/ac)	80.00 DU	15	45	60	52	29	81	792
		SUB-TOTAL		15	45	60	52	29	81	792

SCVCTM INTERIM YEAR VER 3.3 LAND USE AND TRIP GENERATION SUMMARY

	Land Use Type	Units	-- AM Peak Hour -- In	Out	Total	-- PM Peak Hour -- In	Out	Total	ADT
1.	Single Family (<1du/ac)	652.00 DU	189	437	626	549	235	784	6455
2.	Single Family (1-5du/ac)	54364.00 DU	10332	30436	40768	35333	19569	54902	538212
3.	Single Family (6-10du/ac)	9466.00 DU	1801	5304	7105	6151	3409	9560	93713
4.	Condominium/Townhouse	23233.00 DU	1396	11153	12549	10917	6047	16964	185864
5.	Apartment	5676.00 DU	454	2440	2894	2326	1191	3517	39166
6.	Mobile Home	1545.00 DU	123	495	618	542	325	867	10660
10.	Commercial Center (>30ac)	4801.89 TSF	2258	1442	3700	7874	8546	16420	192364
11.	Commercial Center(10-30a)	5809.94 TSF	4244	2732	6976	13825	14990	28815	314088
12.	Commercial Center (<10ac)	1719.61 TSF	1875	1190	3065	5710	6191	11901	146270
13.	Commercial Shops	1716.02 TSF	1233	826	2059	3089	3089	6178	63596
14.	Hotel	1806.00 ROOM	613	397	1010	579	524	1103	14864
15.	Sit-Down Restaurant	171.34 TSF	826	763	1589	1116	743	1859	22332
16.	Fast Food Restaurant	18.10 TSF	460	442	902	315	290	605	8980
17.	Movie Theater	3300.00 SEAT	0	0	0	165	66	231	5808
18.	Health Club	54.00 TSF	52	35	87	117	78	195	2160
19.	Car Dealership	411.00 TSF	663	247	910	460	690	1150	15413
20.	Elementary/Middle School	25507.00 STU	6630	5099	11729	2042	2297	4339	36989
21.	High School	9496.00 STU	3038	1329	4367	570	854	1424	16998
22.	College	26800.00 STU	3484	269	3753	3216	1340	4556	41272
23.	Hospital	222.80 TSF	158	58	216	49	156	205	3743
24.	Library	129.11 TSF	98	39	137	439	477	916	10971
25.	Church	466.19 TSF	184	155	339	167	139	306	4335
26.	Day Care	510.00 STU	220	194	414	204	235	439	2305
30.	Industrial Park	38933.61 TSF	21411	3894	25305	5062	20245	25307	233601
31.	Business Park	3832.44 TSF	4598	883	5481	1149	3795	4944	39092
32.	Manufacturing/Warehouse	3929.99 TSF	2199	668	2867	1063	1848	2911	20045
34.	Utilities	1121.24 TSF	0	0	0	0	0	0	2668
40.	Commercial Office	3151.92 TSF	4891	601	5492	662	4065	4727	36436
42.	Medical Office	133.73 TSF	259	65	324	133	357	490	4573
50.	Golf Course	703.00 AC	106	42	148	71	141	212	5596
51.	Developed Park	271.53 AC	0	0	0	7	11	18	705
53.	Wayside Honor Ranch	20.00 SG	60	40	100	80	80	160	2000
54.	Six Flags Magic Mtn	240.00 SG	720	480	1200	960	960	1920	24000
55.	Travel Village	26.20 SG	79	52	131	105	105	210	2620
56.	CHP Office	55.74 SG	167	111	278	223	223	446	5574
57.	Agua Dulce Airport	34.06 SG	102	68	170	136	136	272	3406
	TOTAL		74923	72386	147309	105406	103447	208853	2156874

Restaurant/Retail/Office (Former Coco's)

SOURCE: PSOMAS - February 2004

Photo 1 – Magic Mountain Parkway Southeast Corner at Valencia Boulevard Facing East

112-10-02/04

Restaurant/Retail/Office (Former Coco's)

SOURCE: PSOMAS - February 2004

Photo 2 – Magic Mountain Parkway East of Valencia Boulevard South Side Facing West

112-16-02/04

Apartment Building (EQR Valencia LLC)

SOURCE: PSOMAS - February 2004

Photo 3 – Magic Mountain Parkway East of Valencia Boulevard South Side Facing East

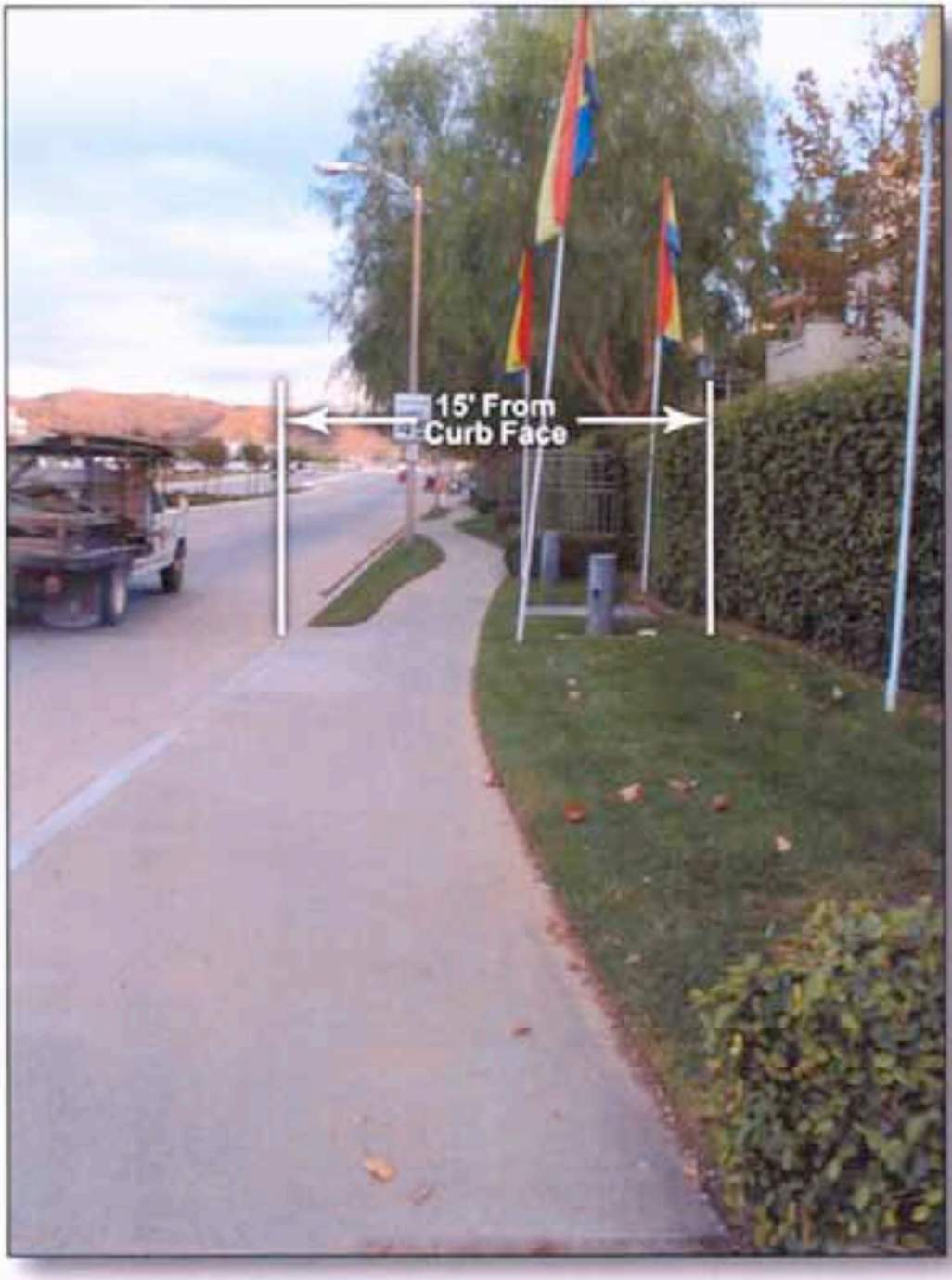
113-16-02.fd4

Restaurant/Retail/Office (Former Coco's)

SOURCE: PSOMAS – February 2004

Photo 4 – Magic Mountain Parkway East of Valencia Boulevard South Side Facing West

112-16+02/04



Apartment Building (EQR Valencia LLC)

SOURCE: PSOMAS - February 2004

Photo 5 – Magic Mountain Parkway East of Valencia Boulevard South Side Facing East

113-16-03/04

Restaurant/Retail/Office (Former Coco's)

SOURCE: PSOMAS - February 2004

Photo 6 – Magic Mountain Parkway East of Valencia Boulevard South Side Facing West

112-16-02/04

Restaurant/Retail/Office (Former Coco's)
Apartment Building (EQR Valencia LLC)

SOURCE: PSOMAS - February 2004

Photo 7 – Magic Mountain Parkway East of Valencia Boulevard South Side Facing West

112-16+02/04

County Courthouse and Sheriff's Department Adjacent

SOURCE: PSOMAS - February 2004

Photo 8 – Magic Mountain Parkway West of Valencia Boulevard South Side Facing East

112-16-02/04

County Courthouse and Sheriff's Department Adjacent

SOURCE: PSOMAS – February 2004

Photo 9 – Magic Mountain Parkway West of Valencia Boulevard South Side Facing West

112-16-02/04

Restaurant/Retail/Office (Former Coco's)

SOURCE: PSOMAS – February 2004

Photo 10 – Facing West along South Side of Magic Mountain Parkway East of Valencia Boulevard Intersection

112-16-02/04

Restaurant/Retail/Office (Former Coco's)

SOURCE: PSOMAS – February 2004

Photo 11 – Facing South along East Side of Valencia Boulevard South of Magic Mountain Parkway

112-16-02/04

Restaurant/Retail/Office (Former Coco's)

SOURCE: PSOMAS - February 2004

Photo 12 – Facing East along South Side of Magic Mountain Parkway East of Valencia Boulevard Intersection

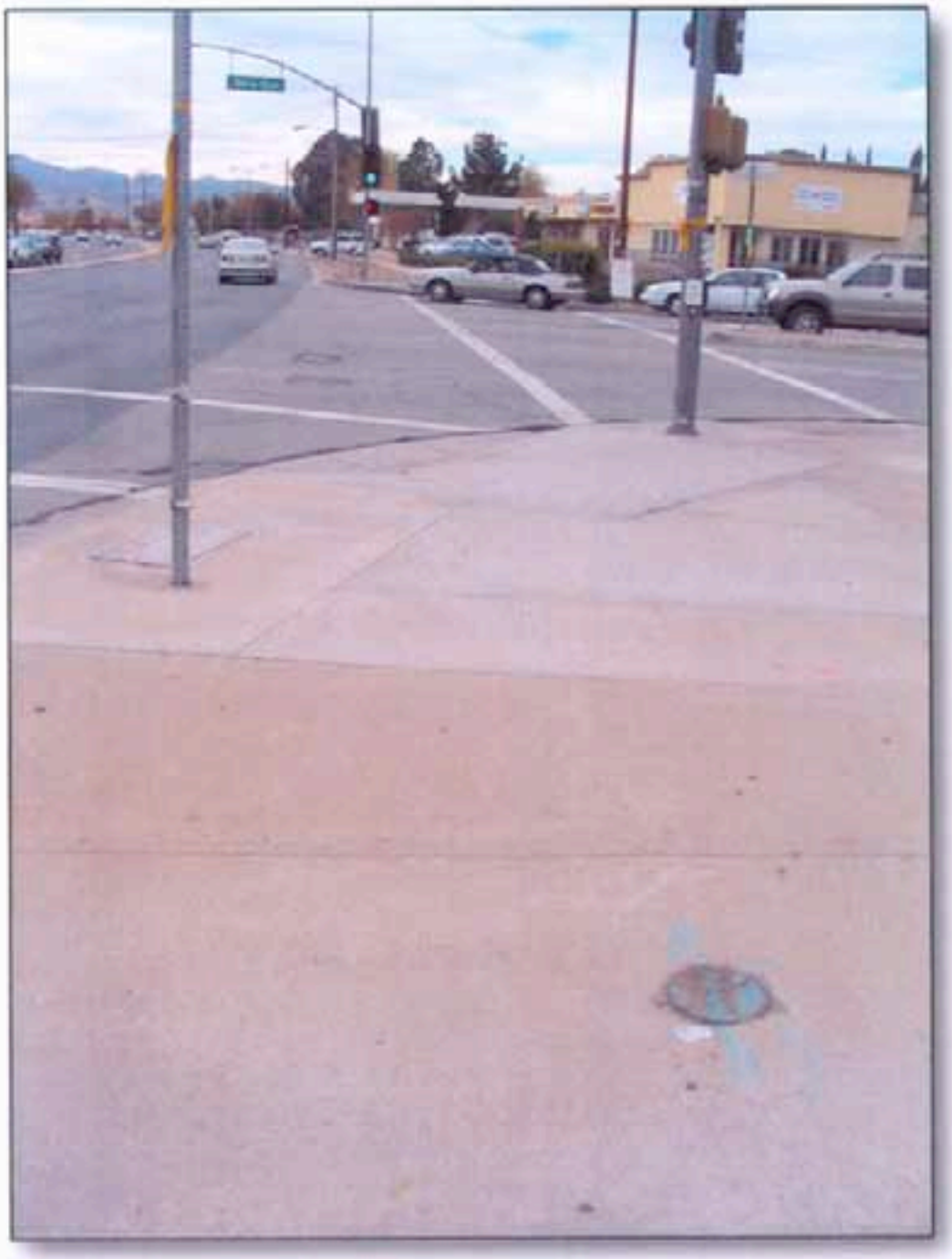
112-16\C02\04

Restaurant/Retail/Office (Former Coco's)

SOURCE: PSOMAS – February 2004

Photo 13 – Facing North along the East Side of Valencia Boulevard at Magic Mountain Parkway Intersection

112-16-02/04

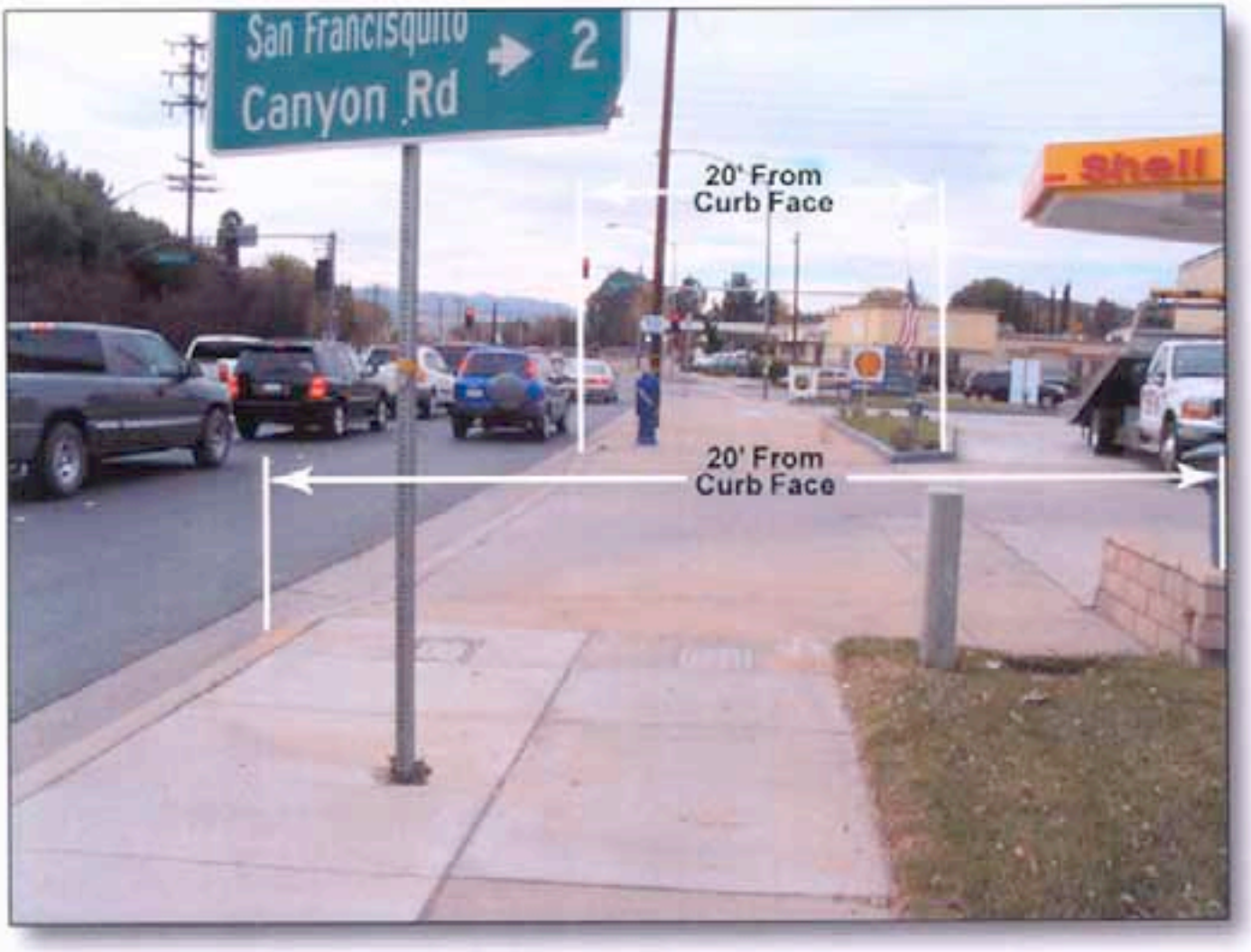


Shell Gas Station

SOURCE: PSOMAS – February 2004

Photo 1 – Northeast Corner Bouquet Canyon Road and Seco Canyon Road Facing West

112-16-03/04



Shell Gas Station

SOURCE: PSOMAS – February 2004

Photo 2 – Bouquet Canyon Road on North Side East of Seco Canyon Road Facing West

112-16-02/04

Shell Gas Station

SOURCE: PSOMAS – February 2004

Photo 3 – Seco Canyon Road and Bouquet Canyon Road Northeast Corner Facing South

112-16-02/04

Coffee Kiosk Drive-Thru Adjacent

SOURCE: PSOMAS - February 2004

Photo 4 – Bouquet Canyon Road North Side East of Seco Canyon Road Facing West

112-16-02/04

Coffee Kiosk Drive-Thru Adjacent

SOURCE: PSOMAS – February 2004

Photo 5 – Bouquet Canyon Road North Side East of Seco Canyon Road Facing West

112-16-02/04

Sav On, Ralph's, Realty Executives

SOURCE: PSOMAS - February 2004

Photo 1 – Soledad Canyon Road at Whites Canyon Road South Side Facing West

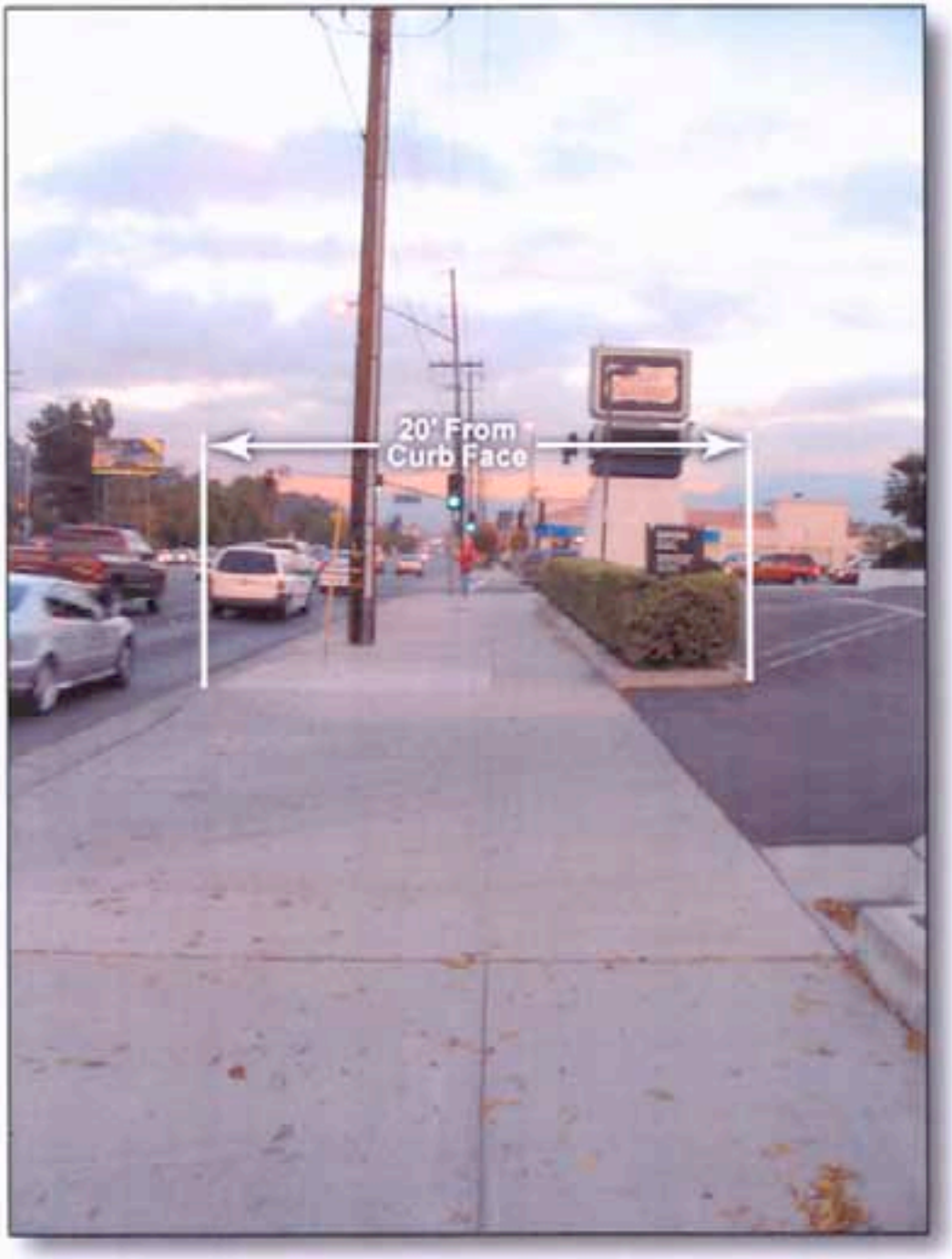
112-15-02/04

Sav On, Ralph's, Realty Executives

SOURCE: PSOMAS – February 2004

Photo 2 – Soledad Canyon Road at Whites Canyon Road South Side Facing West

112-16-02/04



Realty Executives

SOURCE: PSOMAS - February 2004

Photo 3 – Soledad Canyon Road at Whites Canyon Road South Side Facing East

113-16-02:04

Realty Executives

SOURCE: PSOMAS - February 2004

Photo 4 – Soledad Canyon Road at Whites Canyon Road South Side Facing East

113-16-02:04

Mc Donald's

SOURCE: PSOMAS - February 2004

Photo 1 – Facing East Soledad Canyon Road, along South Side of Soledad Canyon Road , West of Bouquet Canyon Road

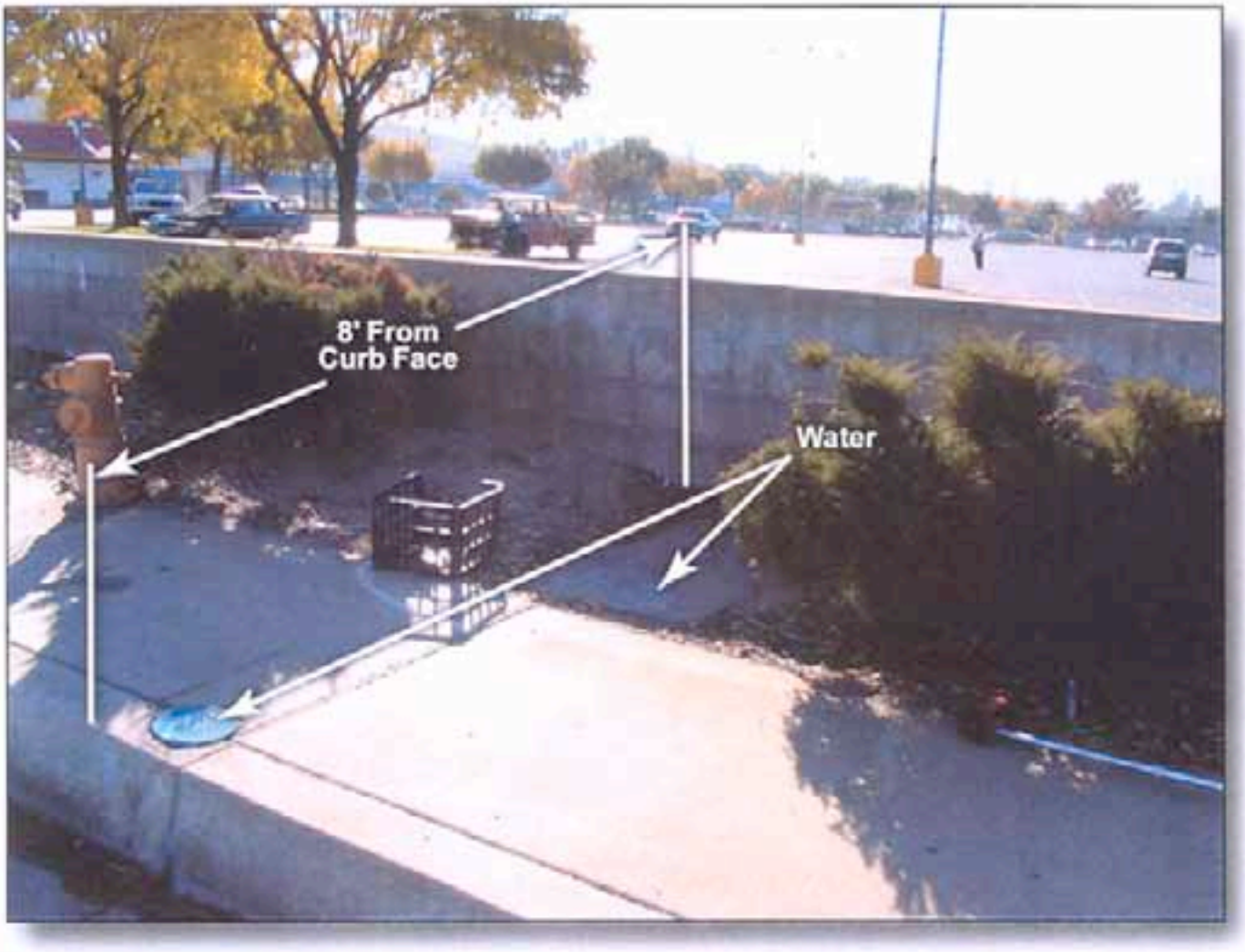
112-16-03/04

Mc Donald's

SOURCE: PSOMAS – February 2004

Photo 2 – Facing East Soledad Canyon Road, along South Side of Soledad Canyon Road, West of Bouquet Canyon Road

112-1640204



Mc Donald's

SOURCE: PSOMAS – February 2004

Photo 3 – Facing Southeast Soledad Canyon Road

112-16\02/04

Mc Donald's

SOURCE: PSOMAS – February 2004

Photo 4 – Facing East Soledad Canyon Road, along South Side of Soledad Canyon Road, West of Bouquet Canyon Road

112-16-02/04

Mc Donald's

SOURCE: PSOMAS - February 2004

Photo 5 – Facing East Soledad Canyon Road, along South Side of Soledad Canyon Road, West of Bouquet Canyon Road

112-16-02/04

Mc Donald's

SOURCE: PSOMAS – February 2004

Photo 6 – Facing East Soledad Canyon Road

112-16-02/04

KMart Adjacent (Parking Lot)

SOURCE: PSOMAS – February 2004

Photo 7 – Facing West Soledad Canyon Road, along South Side of Soledad Canyon Road, West of Bouquet Canyon Road

112-16-02/04

KMart Adjacent (Parking Lot)

SOURCE: PSOMAS – February 2004

Photo 8 – Facing West Soledad Canyon Road, along South Side of Soledad Canyon Road, West of Bouquet Canyon Road

112-10-02/04

Mc Donald's

SOURCE: PSOMAS – February 2004

Photo 9 – Facing East Soledad Canyon Road, along South Side of Soledad Canyon Road, West of Bouquet Canyon Road

112-16-02/04

Mc Donald's

SOURCE: PSOMAS - February 2004

Photo 10 – Facing East Soledad Canyon Road

112-16-02/04

Mc Donald's

SOURCE: PSOMAS – February 2004

Photo 11 – Facing East Soledad Canyon Road, at Bouquet Canyon Road, along South Side of Soledad Canyon Road

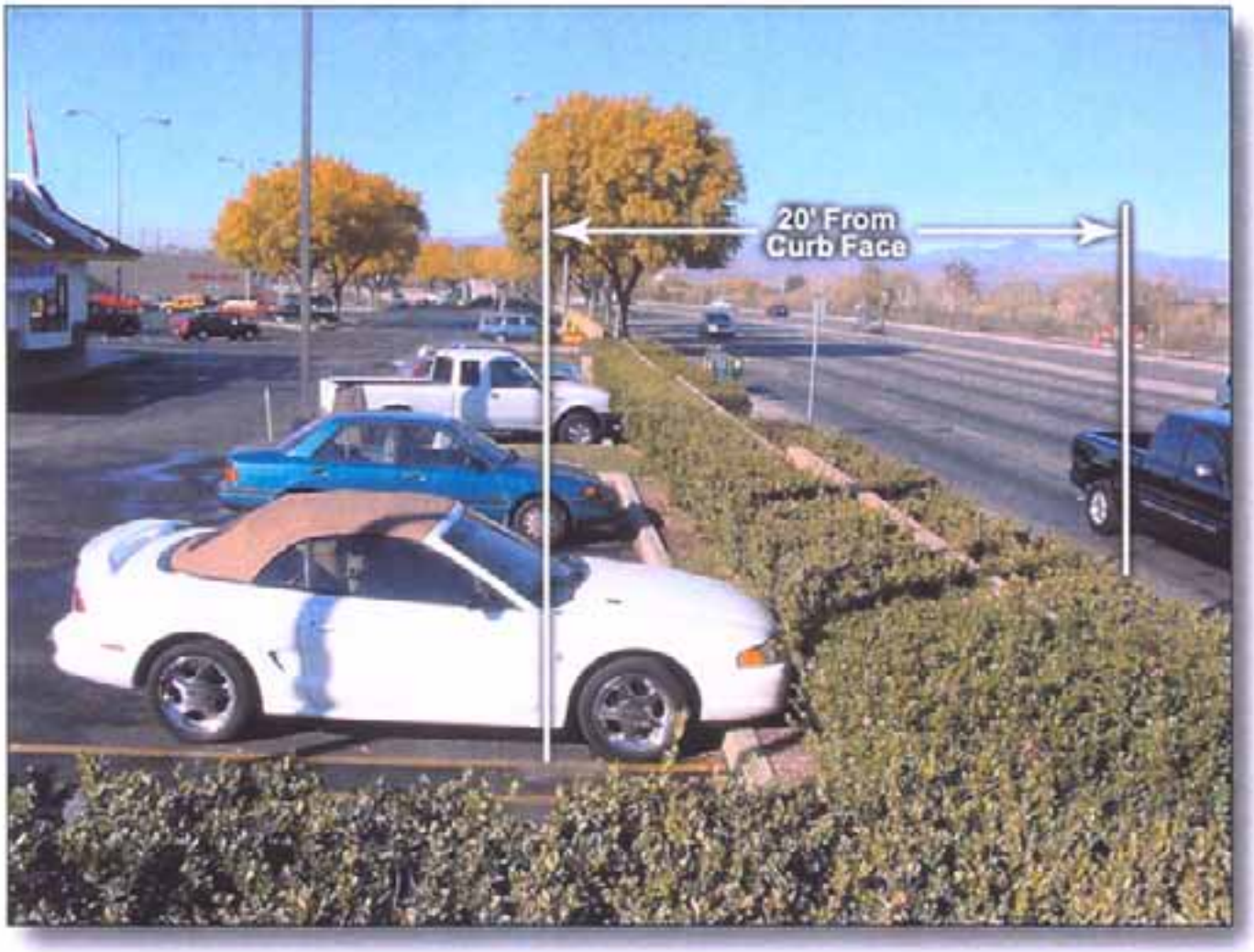
112-16+02/04

Mc Donald's

SOURCE: PSOMAS – February 2004

Photo 12 – Facing East Soledad Canyon Road at Bouquet Canyon Road, South Side of Soledad Canyon Road

112-16\02/04



Mc Donald's

SOURCE: PSOMAS – February 2004

Photo 13 – Facing West Soledad Canyon Road, along South Side of Soledad Canyon Road, West of Bouquet Canyon Road

112-16-02/04

Mc Donalds Adjacent

SOURCE: PSOMAS – February 2004

Photo 14 – Facing North Bouquet Canyon Road, West of Valencia Boulevard/Soledad Canyon Road

112-16\02/04

Mc Donalds Adjacent

SOURCE: PSOMAS - February 2004

Photo 15 – Facing South Bouquet Canyon Road, West of Soledad Canyon Road, on North Side of Bouquet Canyon Road

112-16-03/04

KMart Parking Lot and Taco Bell

SOURCE: PSOMAS - February 2004

Photo 16 – Facing South Bouquet Canyon Road, South of Soledad Canyon Road

113-16-02/04

KMart Parking Lot and McDonald's

SOURCE: PSOMAS – February 2004

Photo 17 – Facing North Bouquet Canyon Road, South of Soledad Canyon Road

112-15-02/04

KMart Parking Lot

SOURCE: PSOMAS - February 2004

Photo 18 – Facing West (Soledad Canyon Road) Valencia Boulevard, South Side of Soledad Canyon Road, West of Bouquet Canyon Road

112-19-02/04

Mobile Gas Station

SOURCE: PSOMAS - February 2004

Photo 19 – Facing East Soledad Canyon Road, East of Bouquet Canyon Road, on South Side of Soledad Canyon Road

112-16-02/04

SOURCE: PSOMAS – February 2004

Photo 20 – Facing East Soledad Canyon Road, East of Bouquet Canyon Road, on South Side of Soledad Canyon Road

112-16+02/04

SOURCE: PSOMAS – February 2004

Photo 21 – Facing Southeast Soledad Canyon Road, East of Bouquet Canyon Road, on South Side of Soledad Canyon Road

112-10-02/04

SOURCE: PSOMAS - February 2004

Photo 22 – Facing West Soledad Canyon Road

112-16+02/04

Century 21

SOURCE: PSOMAS - February 2004

Photo 23 – Facing West Soledad Canyon Road

112-16-02/04

Mobil Station

SOURCE: PSOMAS – February 2004

Photo 24 – Facing West Soledad Canyon Road at Bouquet Canyon Road, East of Bouquet Canyon Road, South Side of Soledad Canyon Road

112-16+02.04

Mobil Station

SOURCE: PSOMAS - February 2004

Photo 25 – Facing West Soledad Canyon Road at Bouquet Canyon Road

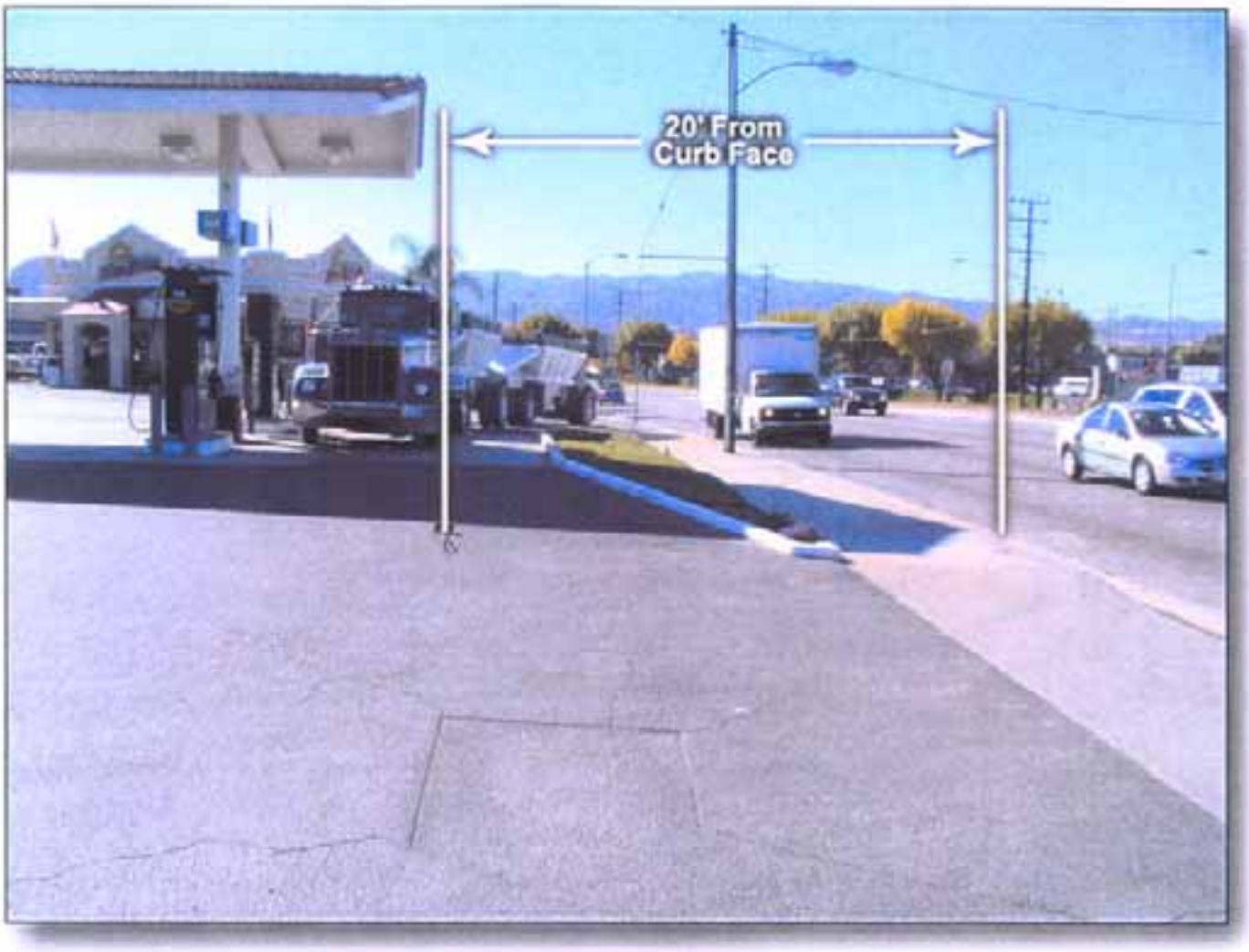
113-16-02/04

Mobil Station

SOURCE: PSOMAS – February 2004

Photo 26 – Facing West Soledad Canyon Road, East of Bouquet Canyon Road, on South Side of Soledad Canyon Road

112-16-02/04



Mobil Station and Del Taco

SOURCE: PSOMAS - February 2004

Photo 27 – Facing South Bouquet Canyon Road, South of Soledad Canyon Road/Valencia Boulevard Intersection, along East Side of Bouquet Canyon Road

112-16-02/04

Mobil Station

SOURCE: PSOMAS - February 2004

Photo 28 – Facing North Bouquet Canyon Road at Soledad Canyon Road, along East Side of Bouquet Canyon Road

112-16-02/04

Del Taco Drive-Thru

SOURCE: PSOMAS – February 2004

Photo 29 – Facing South Bouquet Canyon Road, South of Soledad Canyon Road/Valencia Boulevard, Along East Side of Bouquet Canyon Road

112-16-02/04

Del Taco Drive-Thru and Commercial Mini-Mall

SOURCE: PSOMAS - February 2004

Photo 30 – Facing South Bouquet Canyon Road, South of Soledad Canyon Road/Valencia Boulevard, Along East Side of Bouquet Canyon Road

113-15-02/04

Commercial Mini-Mall

SOURCE: PSOMAS – February 2004

Photo 31 – Facing South Bouquet Canyon Road, South of Soledad Canyon Road/Valencia Boulevard, Along East Side of Bouquet Canyon Road

112-16+02/04

Mobil Gas Station

SOURCE: PSOMAS - February 2004

Photo 32 – Facing North Bouquet Canyon Road, South of Soledad Canyon Road Intersection, Along East Side of Bouquet Canyon Road

112-16+02/04

Commercial Mini-Mall

SOURCE: PSOMAS - February 2004

Photo 33 – Facing East Soledad Canyon Road, on North Side of Soledad Canyon Road and East of Bouquet Canyon Road

112-16+03.104

Chichi's Pizza and Burrito Factory Adjacent

SOURCE: PSOMAS – February 2004

Photo 34 – Facing West Soledad Canyon Road, on North Side of Soledad Canyon Road and East of Bouquet Canyon Road

112-16-02:04

Chichi's Pizza

SOURCE: PSOMAS – February 2004

Photo 35 – Facing West Soledad Canyon Road, on North Side of Soledad Canyon Road and East of Bouquet Canyon Road

112-16-02.ai

76 Service Station

SOURCE: PSOMAS – February 2004

Photo 36 – Facing West Soledad Canyon Road at Bouquet Canyon Road, North Side of Soledad Canyon Road

112-15-02/04

76 Service Station

SOURCE: PSOMAS - February 2004

Photo 37 – Facing South Bouquet Canyon Road and Soledad Canyon Road, east Side of Bouquet Canyon Road

112-16-02/04

76 Service Station and Commercial Uses

SOURCE: PSOMAS – February 2004

Photo 38 – Facing North Bouquet Canyon Road, East Side of Bouquet Canyon

112-16\02304

Ultramar Gas Station

SOURCE: PSOMAS – February 2004

Photo 39 – Facing South along Soledad Canyon Road, East of Bouquet Canyon Road, on the North Side of Soledad Canyon Road

112-16-02/04

City of Santa Clarita – Trail

SOURCE: PSOMAS - February 2004

Photo 40 – Facing West Soledad Canyon Road/Valencia Canyon Road, along North Side of Valencia Boulevard, West of Bouquet Canyon Road

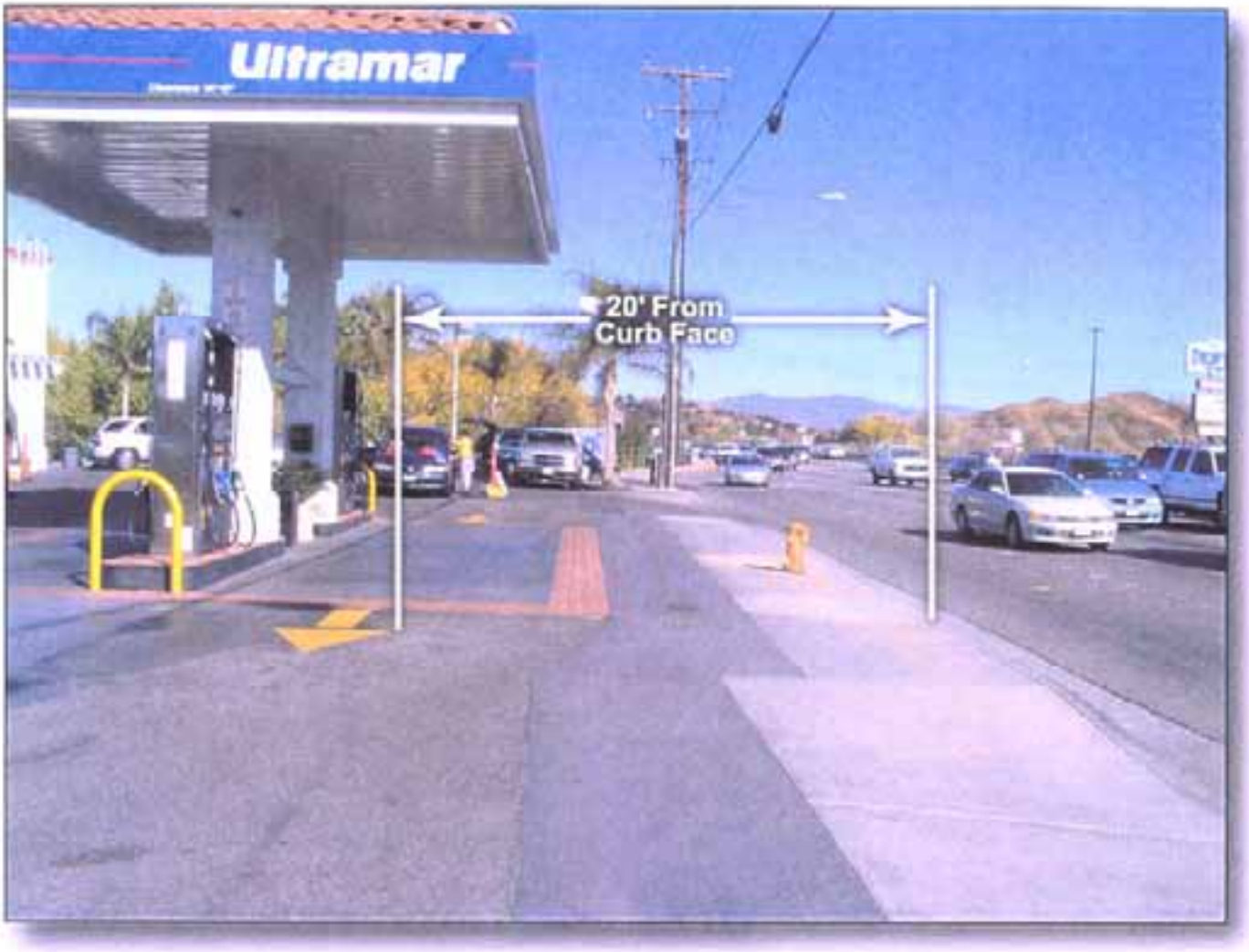
112-16\02\04

Ultramar Gas Station

SOURCE: PSOMAS - February 2004

Photo 41 – Facing East Soledad Canyon Road at Bouquet Canyon Road, on North Side of Soledad Canyon Road

112-16-02:04



Ultramar Gas Station

SOURCE: PSOMAS - February 2004

Photo 42 – Facing North Bouquet Canyon Road, West Side of Bouquet Canyon Road

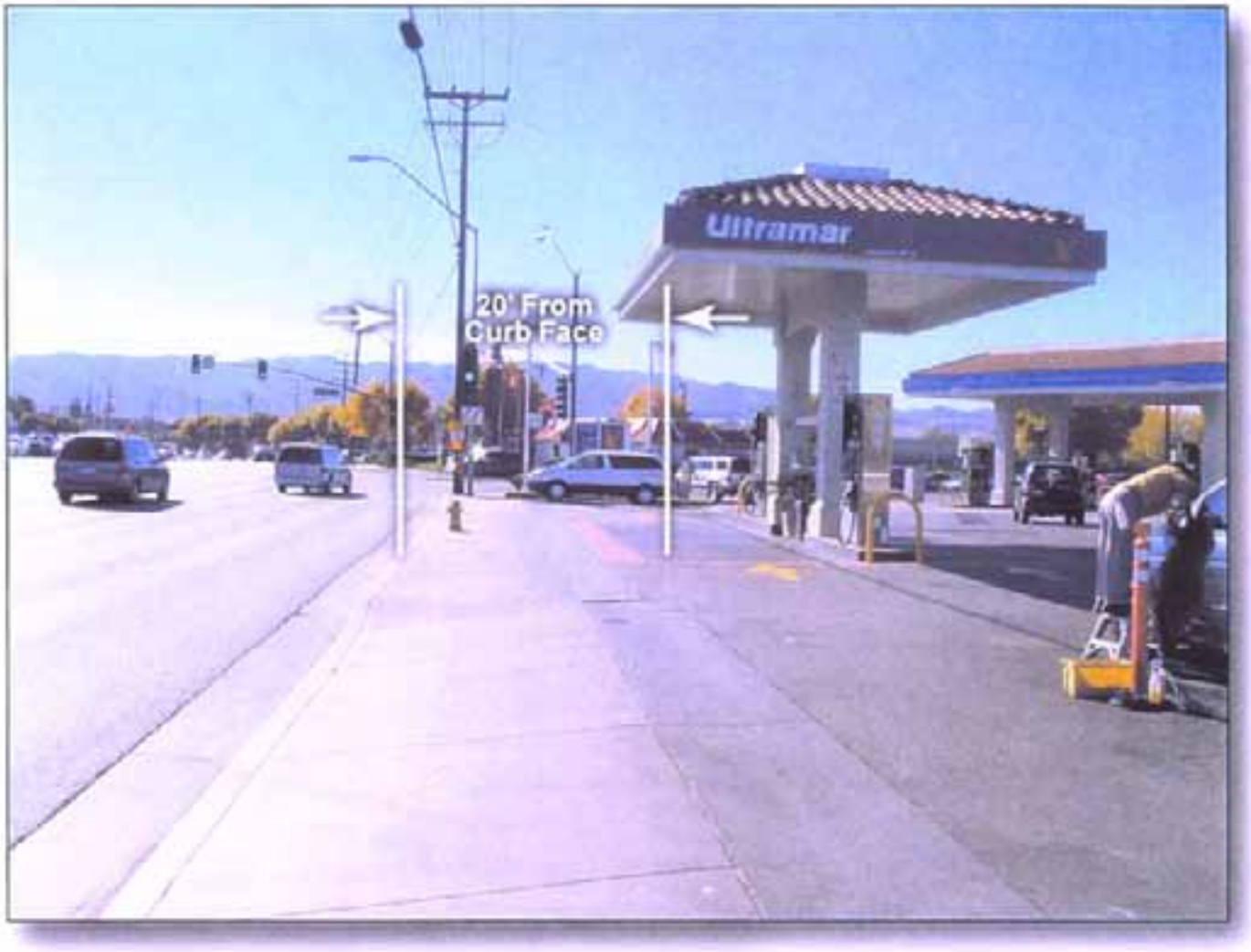
112-10-02/04

Ultramar Gas Station

SOURCE: PSOMAS - February 2004

Photo 43 – Facing North Bouquet Canyon Road, West Side of Bouquet Canyon Road

112-16-02/04



Ultramar Gas Station

SOURCE: PSOMAS – February 2004

Photo 44 – Facing South Bouquet Canyon Road, West Side of Bouquet Canyon Road

112-16-02/04

APPENDIX 4.4
Air Quality Data

EXISTING CALINE4 EMISSIONS

BAY AREA AQMD SIMPLIFIED CALINE4 ANALYSIS

Project Title:	River Park
Intersection:	Valencia Boulevard/Magic Mountain Parkway
Analysis Condition:	Existing Traffic Volumes
Nearest Air Monitoring Station measuring CO:	SRA13
Background 1-hour CO Concentration (ppm):	6.0
Background 8-hour CO Concentration (ppm):	3.1
Persistence Factor:	0.7
Analysis Year:	2002

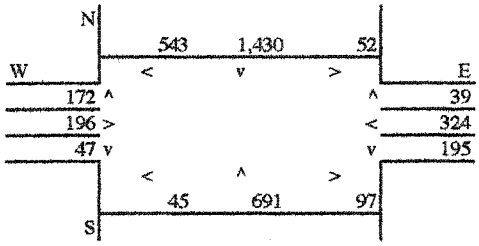
		Roadway Type	No. of Lanes	Average Cruise Speed A.M.	Average Cruise Speed P.M.
North-South Roadway:	Valencia Boulevard	At Grade	6	30	30
East-West Roadway:	Magic Mountain Parkway	At Grade	4	30	30

EMFAC7G COMPOSITE EMISSION FACTORS FOR CO

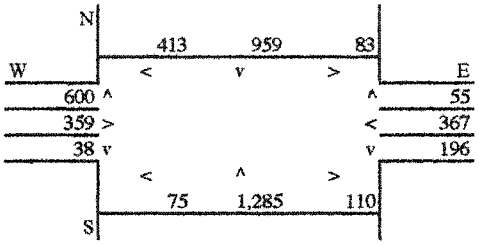
	Average Speed (miles per hour)									
Year	10	15	20	25	30	35	40	45	50	55
1998	24.84	16.74	12.71	10.30	8.67	7.50	6.65	6.07	5.78	5.88
1999	22.93	15.46	11.73	9.50	8.00	6.93	6.14	5.61	5.35	5.46
2000	21.02	14.17	10.75	8.70	7.33	6.35	5.63	5.15	4.92	5.03
2001	19.63	13.24	10.04	8.13	6.85	5.93	5.27	4.82	4.62	4.73
2002	18.24	12.31	9.33	7.55	6.36	5.52	4.90	4.50	4.32	4.43
2003	16.86	11.37	8.63	6.98	5.88	5.10	4.54	4.17	4.01	4.14
2004	15.47	10.44	7.92	6.40	5.39	4.69	4.17	3.85	3.71	3.84
2005	14.08	9.51	7.21	5.83	4.91	4.27	3.81	3.52	3.41	3.54
2010	10.78	7.30	5.52	4.46	3.77	3.28	2.95	2.75	2.69	2.83

PEAK HOUR TURNING VOLUMES

A.M. Peak



P.M. Peak



Representative Traffic Volumes (Vehicles per Hour)

N-S Road	2,927	N-S Road	3,395
E-W Road	1,327	E-W Road	1,852

ROADWAY CO CONTRIBUTIONS

Roadway	Reference CO Concentrations 50 Feet	100 Feet	300 Feet		Traffic Volume		Emission Factor		
A.M. Peak Hour									
N-S Road	4.9	3.5	1.6	*	2,927	*	6.36	÷	100,000
E-W Road	2.2	1.7	1.1	*	1,327	*	6.36	÷	100,000
P.M. Peak Hour									
N-S Road	4.9	3.5	1.6	*	3,395	*	6.36	÷	100,000
E-W Road	2.2	1.7	1.1	*	1,852	*	6.36	÷	100,000

TOTAL CO CONCENTRATIONS (ppm)

	A.M. Peak Hour	P.M. Peak Hour	8-Hour
50 Feet from Roadway Edge	7.1	7.3	4.1
100 Feet from Roadway Edge	6.8	7.0	3.8
300 Feet from Roadway Edge	6.4	6.5	3.5

BAY AREA AQMD SIMPLIFIED CALINE4 ANALYSIS

Project Title:	River Park
Intersection:	Bouquet Canyon Road/Seco Canyon Road
Analysis Condition:	Existing Year Traffic Volumes
Nearest Air Monitoring Station measuring CO:	SRA13
Background 1-hour CO Concentration (ppm):	6.0
Background 8-hour CO Concentration (ppm):	3.1
Persistence Factor:	0.7
Analysis Year:	2002

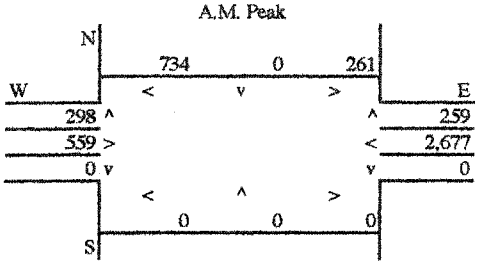
		Roadway Type	No. of Lanes	Average Cruise Speed A.M.	Average Cruise Speed P.M.
North-South Roadway:	Bouquet Canyon Road	At Grade	2	20	20
East-West Roadway:	Seco Canyon Road	At Grade	4	20	20

EMFAC7G COMPOSITE EMISSION FACTORS FOR CO

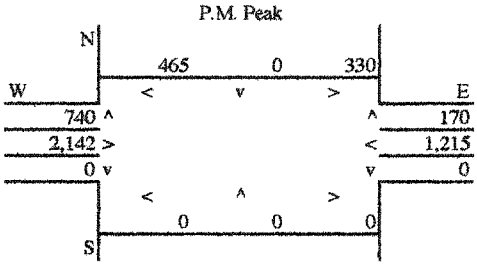
	Average Speed (miles per hour)									
Year	10	15	20	25	30	35	40	45	50	55
1998	24.84	16.74	12.71	10.30	8.67	7.50	6.65	6.07	5.78	5.88
1999	22.93	15.46	11.73	9.50	8.00	6.93	6.14	5.61	5.35	5.46
2000	21.02	14.17	10.75	8.70	7.33	6.35	5.63	5.15	4.92	5.03
2001	19.63	13.24	10.04	8.13	6.85	5.93	5.27	4.82	4.62	4.73
2002	18.24	12.31	9.33	7.55	6.36	5.52	4.90	4.50	4.32	4.43
2003	16.86	11.37	8.63	6.98	5.88	5.10	4.54	4.17	4.01	4.14
2004	15.47	10.44	7.92	6.40	5.39	4.69	4.17	3.85	3.71	3.84
2005	14.08	9.51	7.21	5.83	4.91	4.27	3.81	3.52	3.41	3.54
2010	10.78	7.30	5.52	4.46	3.77	3.28	2.95	2.75	2.69	2.83

PEAK HOUR TURNING VOLUMES

A.M. Peak



P.M. Peak



Representative Traffic Volumes (Vehicles per Hour)

N-S Road	1,552	N-S Road	1,705
E-W Road	4,268	E-W Road	4,562

ROADWAY CO CONTRIBUTIONS

Roadway	Reference CO Concentrations 50 Feet	100 Feet	300 Feet		Traffic Volume		Emission Factor		
A.M. Peak Hour									
N-S Road	2.2	1.7	1.0	*	1,552	*	9.33	÷	100,000
E-W Road	5.4	3.8	1.6	*	4,268	*	9.33	÷	100,000
P.M. Peak Hour									
N-S Road	2.2	1.7	1.0	*	1,705	*	9.33	÷	100,000
E-W Road	5.4	3.8	1.6	*	4,562	*	9.33	÷	100,000

TOTAL CO CONCENTRATIONS (ppm)

	A.M. Peak Hour	P.M. Peak Hour	8-Hour
50 Feet from Roadway Edge	8.5	8.6	5.0
100 Feet from Roadway Edge	7.8	7.9	4.5
300 Feet from Roadway Edge	6.8	6.8	3.7

BAY AREA AQMD SIMPLIFIED CALINE4 ANALYSIS

Project Title:	River Park
Intersection:	Sierra Highway/Golden Valley Road
Analysis Condition:	Existing Year Traffic Volumes
Nearest Air Monitoring Station measuring CO:	SRA13
Background 1-hour CO Concentration (ppm):	6.0
Background 8-hour CO Concentration (ppm):	3.1
Persistence Factor:	0.7
Analysis Year:	2002

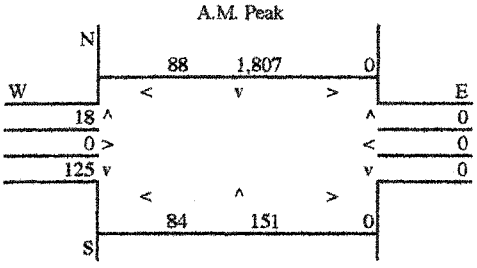
		Roadway Type	No. of Lanes	Average Cruise Speed A.M.	Average Cruise Speed P.M.
North-South Roadway:	Sierra Highway	At Grade	4	30	30
East-West Roadway:	Golden Valley Road	At Grade	6	35	35

EMFAC7G COMPOSITE EMISSION FACTORS FOR CO

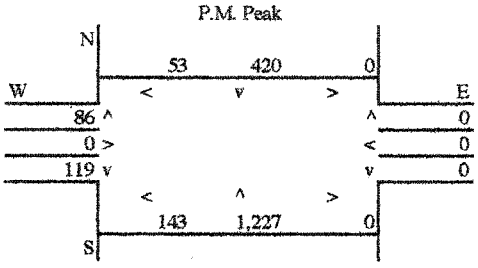
	Average Speed (miles per hour)									
Year	10	15	20	25	30	35	40	45	50	55
1998	24.84	16.74	12.71	10.30	8.67	7.50	6.65	6.07	5.78	5.88
1999	22.93	15.46	11.73	9.50	8.00	6.93	6.14	5.61	5.35	5.46
2000	21.02	14.17	10.75	8.70	7.33	6.35	5.63	5.15	4.92	5.03
2001	19.63	13.24	10.04	8.13	6.85	5.93	5.27	4.82	4.62	4.73
2002	18.24	12.31	9.33	7.55	6.36	5.52	4.90	4.50	4.32	4.43
2003	16.86	11.37	8.63	6.98	5.88	5.10	4.54	4.17	4.01	4.14
2004	15.47	10.44	7.92	6.40	5.39	4.69	4.17	3.85	3.71	3.84
2005	14.08	9.51	7.21	5.83	4.91	4.27	3.81	3.52	3.41	3.54
2010	10.78	7.30	5.52	4.46	3.77	3.28	2.95	2.75	2.69	2.83

PEAK HOUR TURNING VOLUMES

A.M. Peak



P.M. Peak



Representative Traffic Volumes (Vehicles per Hour)

N-S Road	2,167	N-S Road	1,909
E-W Road	315	E-W Road	401

ROADWAY CO CONTRIBUTIONS

Roadway	Reference CO Concentrations 50 Feet	100 Feet	300 Feet		Traffic Volume		Emission Factor		
A.M. Peak Hour									
N-S Road	5.4	3.8	1.6	*	2,167	*	6.36	÷	100,000
E-W Road	2.0	1.7	1.1	*	315	*	5.52	÷	100,000
P.M. Peak Hour									
N-S Road	5.4	3.8	1.6	*	1,909	*	6.36	÷	100,000
E-W Road	2.0	1.7	1.1	*	401	*	5.52	÷	100,000

TOTAL CO CONCENTRATIONS (ppm)

	A.M. Peak Hour	P.M. Peak Hour	8-Hour
50 Feet from Roadway Edge	6.8	6.7	3.7
100 Feet from Roadway Edge	6.6	6.5	3.5
300 Feet from Roadway Edge	6.2	6.2	3.3

BAY AREA AQMD SIMPLIFIED CALINE4 ANALYSIS

Project Title:	River Park
Intersection:	Rainbow Glen/Soledad Canyon Road
Analysis Condition:	Existing Year Traffic Volumes
Nearest Air Monitoring Station measuring CO:	SRA13
Background 1-hour CO Concentration (ppm):	6.0
Background 8-hour CO Concentration (ppm):	3.1
Persistence Factor:	0.7
Analysis Year:	2002

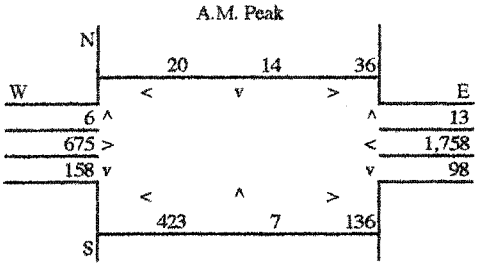
		Roadway Type	No. of Lanes	Average Cruise Speed A.M.	Average Cruise Speed P.M.
North-South Roadway:	Rainbow Glen	At Grade	2	20	20
East-West Roadway:	Soledad Canyon Road	At Grade	6	20	20

EMFAC7G COMPOSITE EMISSION FACTORS FOR CO

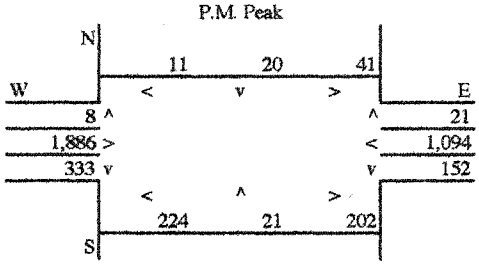
	Average Speed (miles per hour)									
Year	10	15	20	25	30	35	40	45	50	55
1998	24.84	16.74	12.71	10.30	8.67	7.50	6.65	6.07	5.78	5.88
1999	22.93	15.46	11.73	9.50	8.00	6.93	6.14	5.61	5.35	5.46
2000	21.02	14.17	10.75	8.70	7.33	6.35	5.63	5.15	4.92	5.03
2001	19.63	13.24	10.04	8.13	6.85	5.93	5.27	4.82	4.62	4.73
2002	18.24	12.31	9.33	7.55	6.36	5.52	4.90	4.50	4.32	4.43
2003	16.86	11.37	8.63	6.98	5.88	5.10	4.54	4.17	4.01	4.14
2004	15.47	10.44	7.92	6.40	5.39	4.69	4.17	3.85	3.71	3.84
2005	14.08	9.51	7.21	5.83	4.91	4.27	3.81	3.52	3.41	3.54
2010	10.78	7.30	5.52	4.46	3.77	3.28	2.95	2.75	2.69	2.83

PEAK HOUR TURNING VOLUMES

A.M. Peak



P.M. Peak



Representative Traffic Volumes (Vehicles per Hour)

N-S Road	836	N-S Road	952
E-W Road	3,040	E-W Road	3,556

ROADWAY CO CONTRIBUTIONS

Roadway	Reference CO Concentrations 50 Feet	100 Feet	300 Feet		Traffic Volume		Emission Factor		
A.M. Peak Hour									
N-S Road	2.2	1.7	1.0	*	836	*	9.33	÷	100,000
E-W Road	4.9	3.5	1.6	*	3,040	*	9.33	÷	100,000
P.M. Peak Hour									
N-S Road	2.2	1.7	1.0	*	952	*	9.33	÷	100,000
E-W Road	4.9	3.5	1.6	*	3,556	*	9.33	÷	100,000

TOTAL CO CONCENTRATIONS (ppm)

	A.M. Peak Hour	P.M. Peak Hour	8-Hour
50 Feet from Roadway Edge	7.6	7.8	4.4
100 Feet from Roadway Edge	7.1	7.3	4.1
300 Feet from Roadway Edge	6.5	6.6	3.6

BAY AREA AQMD SIMPLIFIED CALINE4 ANALYSIS

Project Title:	River Park
Intersection:	Whites Canyon/Soledad Canyon Road
Analysis Condition:	Existing Year Traffic Volumes
Nearest Air Monitoring Station measuring CO:	SRA13
Background 1-hour CO Concentration (ppm):	6.0
Background 8-hour CO Concentration (ppm):	3.1
Persistence Factor:	0.7
Analysis Year:	2002

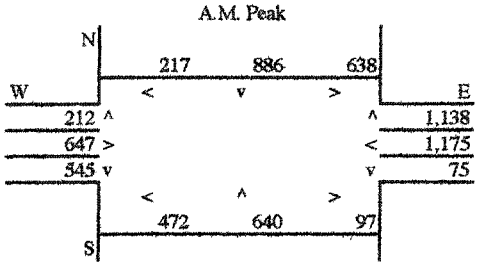
		Roadway Type	No. of Lanes	Average Cruise Speed A.M.	P.M.
North-South Roadway:	Whites Canyon	At Grade	4	35	35
East-West Roadway:	Soledad Canyon Road	At Grade	4	35	35

EMFAC7G COMPOSITE EMISSION FACTORS FOR CO

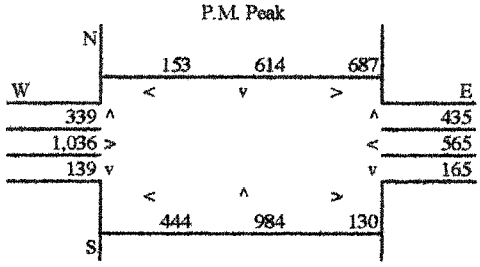
	Average Speed (miles per hour)									
Year	10	15	20	25	30	35	40	45	50	55
1998	24.84	16.74	12.71	10.30	8.67	7.50	6.65	6.07	5.78	5.88
1999	22.93	15.46	11.73	9.50	8.00	6.93	6.14	5.61	5.35	5.46
2000	21.02	14.17	10.75	8.70	7.33	6.35	5.63	5.15	4.92	5.03
2001	19.63	13.24	10.04	8.13	6.85	5.93	5.27	4.82	4.62	4.73
2002	18.24	12.31	9.33	7.55	6.36	5.52	4.90	4.50	4.32	4.43
2003	16.86	11.37	8.63	6.98	5.88	5.10	4.54	4.17	4.01	4.14
2004	15.47	10.44	7.92	6.40	5.39	4.69	4.17	3.85	3.71	3.84
2005	14.08	9.51	7.21	5.83	4.91	4.27	3.81	3.52	3.41	3.54
2010	10.78	7.30	5.52	4.46	3.77	3.28	2.95	2.75	2.69	2.83

PEAK HOUR TURNING VOLUMES

A.M. Peak



P.M. Peak



Representative Traffic Volumes (Vehicles per Hour)

N-S Road	3,731	N-S Road	3,212
E-W Road	3,770	E-W Road	3,018

ROADWAY CO CONTRIBUTIONS

Roadway	Reference CO Concentrations 50 Feet	100 Feet	300 Feet		Traffic Volume		Emission Factor		
A.M. Peak Hour									
N-S Road	2.2	1.7	1.1	*	3,731	*	5.52	÷	100,000
E-W Road	5.4	3.8	1.6	*	3,770	*	5.52	÷	100,000
P.M. Peak Hour									
N-S Road	5.4	3.8	1.6	*	3,212	*	5.52	÷	100,000
E-W Road	2.2	1.7	1.1	*	3,018	*	5.52	÷	100,000

TOTAL CO CONCENTRATIONS (ppm)

	A.M. Peak Hour	P.M. Peak Hour	8-Hour
50 Feet from Roadway Edge	7.6	7.3	4.2
100 Feet from Roadway Edge	7.1	7.0	3.9
300 Feet from Roadway Edge	6.6	6.5	3.5

PROJECTED CALINE4 EMISSIONS

BAY AREA AQMD SIMPLIFIED CALINE4 ANALYSIS

Project Title:	River Park
Intersection:	Valencia Boulevard/Magic Mountain Parkway
Analysis Condition:	Interim Year Traffic Volumes
Nearest Air Monitoring Station measuring CO:	SRA13
Background 1-hour CO Concentration (ppm):	6.0
Background 8-hour CO Concentration (ppm):	3.1
Persistence Factor:	0.7
Analysis Year:	2010

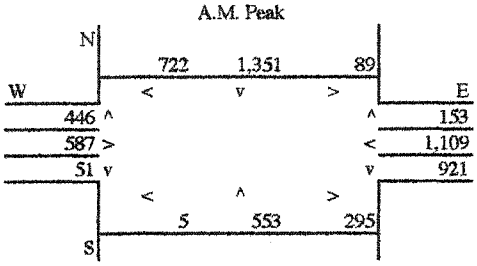
		Roadway Type	No. of Lanes	Average Cruise Speed A.M.	Average Cruise Speed P.M.
North-South Roadway:	Valencia Boulevard	At Grade	6	30	30
East-West Roadway:	Magic Mountain Parkway	At Grade	4	30	30

EMFAC7G COMPOSITE EMISSION FACTORS FOR CO

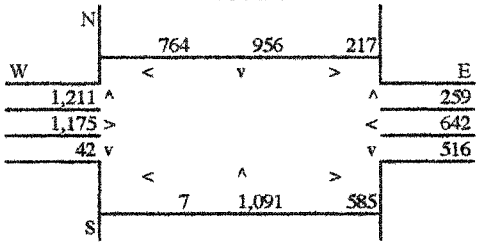
	Average Speed (miles per hour)									
Year	10	15	20	25	30	35	40	45	50	55
1998	24.84	16.74	12.71	10.30	8.67	7.50	6.65	6.07	5.78	5.88
1999	22.93	15.46	11.73	9.50	8.00	6.93	6.14	5.61	5.35	5.46
2000	21.02	14.17	10.75	8.70	7.33	6.35	5.63	5.15	4.92	5.03
2001	19.63	13.24	10.04	8.13	6.85	5.93	5.27	4.82	4.62	4.73
2002	18.24	12.31	9.33	7.55	6.36	5.52	4.90	4.50	4.32	4.43
2003	16.86	11.37	8.63	6.98	5.88	5.10	4.54	4.17	4.01	4.14
2004	15.47	10.44	7.92	6.40	5.39	4.69	4.17	3.85	3.71	3.84
2005	14.08	9.51	7.21	5.83	4.91	4.27	3.81	3.52	3.41	3.54
2010	10.78	7.30	5.52	4.46	3.77	3.28	2.95	2.75	2.69	2.83

PEAK HOUR TURNING VOLUMES

A.M. Peak



P.M. Peak



Representative Traffic Volumes (Vehicles per Hour)

N-S Road	3,314	N-S Road	4,498
E-W Road	3,154	E-W Road	3,841

ROADWAY CO CONTRIBUTIONS

Roadway	Reference CO Concentrations 50 Feet	100 Feet	300 Feet		Traffic Volume		Emission Factor		
A.M. Peak Hour									
N-S Road	4.9	3.5	1.6	*	3,314	*	3.77	÷	100,000
E-W Road	2.2	1.7	1.1	*	3,154	*	3.77	÷	100,000
P.M. Peak Hour									
N-S Road	4.9	3.5	1.6	*	4,498	*	3.77	÷	100,000
E-W Road	2.2	1.7	1.1	*	3,841	*	3.77	÷	100,000

TOTAL CO CONCENTRATIONS (ppm)

	A.M. Peak Hour	P.M. Peak Hour	8-Hour
50 Feet from Roadway Edge	6.9	7.1	3.9
100 Feet from Roadway Edge	6.6	6.8	3.7
300 Feet from Roadway Edge	6.3	6.4	3.4

BAY AREA AQMD SIMPLIFIED CALINE4 ANALYSIS

Project Title:	River Park
Intersection:	Bouquet Canyon Road/Seco Canyon Road
Analysis Condition:	Interim Year Traffic Volumes
Nearest Air Monitoring Station measuring CO:	SRA13
Background 1-hour CO Concentration (ppm):	6.0
Background 8-hour CO Concentration (ppm):	3.1
Persistence Factor:	0.7
Analysis Year:	2010

		Roadway Type	No. of Lanes	Average Cruise Speed A.M.	Average Cruise Speed P.M.
North-South Roadway:	Bouquet Canyon Road	At Grade	2	20	20
East-West Roadway:	Seco Canyon Road	At Grade	4	20	20

EMFAC7G COMPOSITE EMISSION FACTORS FOR CO

	Average Speed (miles per hour)									
Year	10	15	20	25	30	35	40	45	50	55
1998	24.84	16.74	12.71	10.30	8.67	7.50	6.65	6.07	5.78	5.88
1999	22.93	15.46	11.73	9.50	8.00	6.93	6.14	5.61	5.35	5.46
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2002	18.24	12.31	9.33	7.55	6.36	5.52	4.90	4.50	4.32	4.43
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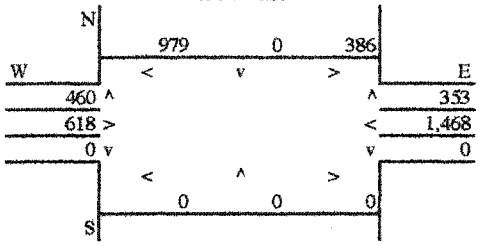
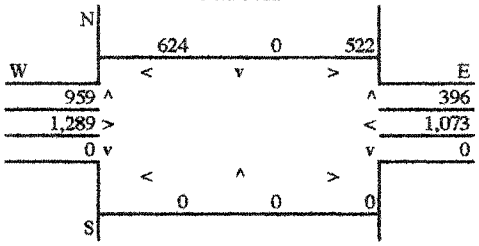
2005	14.08	9.51	7.21	5.83	4.91	4.27	3.81	3.52	3.41	3.54
2010	10.78	7.30	5.52	4.46	3.77	3.28	2.95	2.75	2.69	2.83

PEAK HOUR TURNING VOLUMES

A.M. Peak



P.M. Peak



Representative Traffic Volumes (Vehicles per Hour)

N-S Road	2,178	N-S Road	2,501
E-W Road	3,525	E-W Road	3,945

ROADWAY CO CONTRIBUTIONS

Roadway	Reference CO Concentrations 50 Feet	100 Feet	300 Feet		Traffic Volume		Emission Factor		
A.M. Peak Hour									
N-S Road	2.2	1.7	1.0	*	2,178	*	5.52	÷	100,000
E-W Road	5.4	3.8	1.6	*	3,525	*	5.52	÷	100,000
P.M. Peak Hour									
N-S Road	2.2	1.7	1.0	*	2,501	*	5.52	÷	100,000
E-W Road	5.4	3.8	1.6	*	3,945	*	5.52	÷	100,000

TOTAL CO CONCENTRATIONS (ppm)

	A.M. Peak Hour	P.M. Peak Hour	8-Hour
50 Feet from Roadway Edge	7.3	7.5	4.2
100 Feet from Roadway Edge	6.9	7.1	3.9
300 Feet from Roadway Edge	6.4	6.5	3.5

BAY AREA AQMD SIMPLIFIED CALINE4 ANALYSIS

Project Title:	River Park
Intersection:	Santa Clarita Parkway/Bouquet Canyon Road
Analysis Condition:	Interim Year Traffic Volumes
Nearest Air Monitoring Station measuring CO:	SRA13
Background 1-hour CO Concentration (ppm):	6.0
Background 8-hour CO Concentration (ppm):	3.1
Persistence Factor:	0.7
Analysis Year:	2010

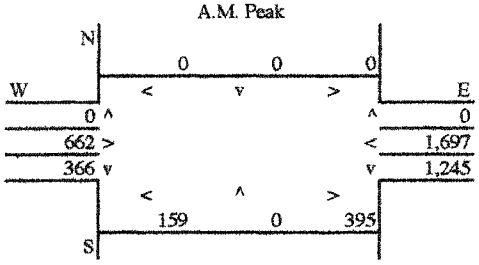
		Roadway Type	No. of Lanes	Average Cruise Speed A.M.	Average Cruise Speed P.M.
North-South Roadway:	Santa Clarita Parkway	At Grade	6	20	20
East-West Roadway:	Bouquet Canyon Road	At Grade	2	20	20

EMFAC7G COMPOSITE EMISSION FACTORS FOR CO

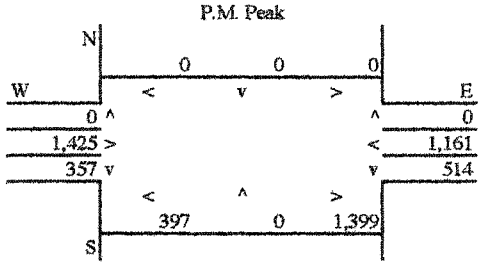
	Average Speed (miles per hour)									
Year	10	15	20	25	30	35	40	45	50	55
1998	24.84	16.74	12.71	10.30	8.67	7.50	6.65	6.07	5.78	5.88
1999	22.93	15.46	11.73	9.50	8.00	6.93	6.14	5.61	5.35	5.46
2000	21.02	14.17	10.75	8.70	7.33	6.35	5.63	5.15	4.92	5.03
2001	19.63	13.24	10.04	8.13	6.85	5.93	5.27	4.82	4.62	4.73
2002	18.24	12.31	9.33	7.55	6.36	5.52	4.90	4.50	4.32	4.43
2003	16.86	11.37	8.63	6.98	5.88	5.10	4.54	4.17	4.01	4.14
2004	15.47	10.44	7.92	6.40	5.39	4.69	4.17	3.85	3.71	3.84
2005	14.08	9.51	7.21	5.83	4.91	4.27	3.81	3.52	3.41	3.54
2010	10.78	7.30	5.52	4.46	3.77	3.28	2.95	2.75	2.69	2.83

PEAK HOUR TURNING VOLUMES

A.M. Peak



P.M. Peak



Representative Traffic Volumes (Vehicles per Hour)

N-S Road	2,165	N-S Road	2,667
E-W Road	3,999	E-W Road	4,499

ROADWAY CO CONTRIBUTIONS

Roadway	Reference CO Concentrations 50 Feet	100 Feet	300 Feet		Traffic Volume		Emission Factor		
A.M. Peak Hour									
N-S Road	2.0	1.7	1.1	*	2,165	*	5.52	÷	100,000
E-W Road	5.7	4.0	1.7	*	3,999	*	5.52	÷	100,000
P.M. Peak Hour									
N-S Road	2.0	1.7	1.1	*	2,667	*	5.52	÷	100,000
E-W Road	5.7	4.0	1.7	*	4,499	*	5.52	÷	100,000

TOTAL CO CONCENTRATIONS (ppm)

	A.M. Peak Hour	P.M. Peak Hour	8-Hour
50 Feet from Roadway Edge	7.5	7.7	4.3
100 Feet from Roadway Edge	7.1	7.2	4.0
300 Feet from Roadway Edge	6.5	6.6	3.5

BAY AREA AQMD SIMPLIFIED CALINE4 ANALYSIS

Project Title:	River Park
Intersection:	Sierra Highway/Golden Valley Road
Analysis Condition:	Interim Year Traffic Volumes
Nearest Air Monitoring Station measuring CO:	SRA13
Background 1-hour CO Concentration (ppm):	6.0
Background 8-hour CO Concentration (ppm):	3.1
Persistence Factor:	0.7
Analysis Year:	2010

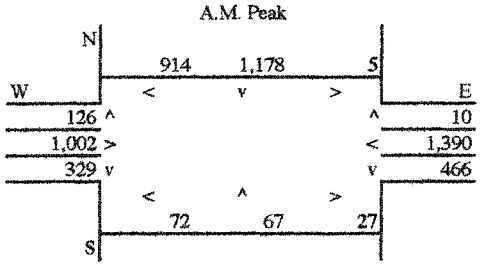
		Roadway Type	No. of Lanes	Average Cruise Speed A.M.	Average Cruise Speed P.M.
North-South Roadway:	Sierra Highway	At Grade	4	30	30
East-West Roadway:	Golden Valley Road	At Grade	6	35	35

EMFAC7G COMPOSITE EMISSION FACTORS FOR CO

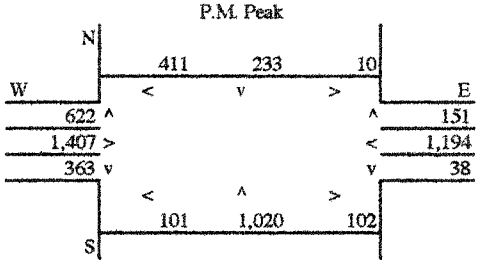
	Average Speed (miles per hour)									
Year	10	15	20	25	30	35	40	45	50	55
1998	24.84	16.74	12.71	10.30	8.67	7.50	6.65	6.07	5.78	5.88
1999	22.93	15.46	11.73	9.50	8.00	6.93	6.14	5.61	5.35	5.46
2000	21.02	14.17	10.75	8.70	7.33	6.35	5.63	5.15	4.92	5.03
2001	19.63	13.24	10.04	8.13	6.85	5.93	5.27	4.82	4.62	4.73
2002	18.24	12.31	9.33	7.55	6.36	5.52	4.90	4.50	4.32	4.43
2003	16.86	11.37	8.63	6.98	5.88	5.10	4.54	4.17	4.01	4.14
2004	15.47	10.44	7.92	6.40	5.39	4.69	4.17	3.85	3.71	3.84
2005	14.08	9.51	7.21	5.83	4.91	4.27	3.81	3.52	3.41	3.54
2010	10.78	7.30	5.52	4.46	3.77	3.28	2.95	2.75	2.69	2.83

PEAK HOUR TURNING VOLUMES

A.M. Peak



P.M. Peak



Representative Traffic Volumes (Vehicles per Hour)

N-S Road	2,300	N-S Road	2,447
E-W Road	3,833	E-W Road	4,098

ROADWAY CO CONTRIBUTIONS

Roadway	Reference CO Concentrations 50 Feet	100 Feet	300 Feet		Traffic Volume		Emission Factor		
A.M. Peak Hour									
N-S Road	2.2	1.7	1.1	*	2,300	*	3.77	÷	100,000
E-W Road	4.9	3.5	1.6	*	3,833	*	3.28	÷	100,000
P.M. Peak Hour									
N-S Road	2.2	1.7	1.1	*	2,447	*	3.77	÷	100,000
E-W Road	4.9	3.5	1.6	*	4,098	*	3.28	÷	100,000

TOTAL CO CONCENTRATIONS (ppm)

	A.M. Peak Hour	P.M. Peak Hour	8-Hour
50 Feet from Roadway Edge	6.8	6.9	3.7
100 Feet from Roadway Edge	6.6	6.6	3.6
300 Feet from Roadway Edge	6.3	6.3	3.4

BAY AREA AQMD SIMPLIFIED CALINE4 ANALYSIS

Project Title:	River Park
Intersection:	Rainbow Glen/Soledad Canyon Road
Analysis Condition:	Interim Year Traffic Volumes
Nearest Air Monitoring Station measuring CO:	SRA13
Background 1-hour CO Concentration (ppm):	6.0
Background 8-hour CO Concentration (ppm):	3.1
Persistence Factor:	0.7
Analysis Year:	2010

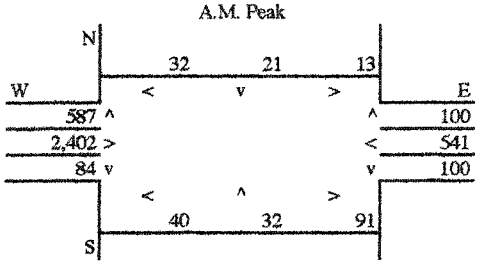
		Roadway Type	No. of Lanes	Average Cruise Speed A.M.	Average Cruise Speed P.M.
North-South Roadway:	Rainbow Glen	At Grade	2	20	20
East-West Roadway:	Soledad Canyon Road	At Grade	6	20	20

EMFAC7G COMPOSITE EMISSION FACTORS FOR CO

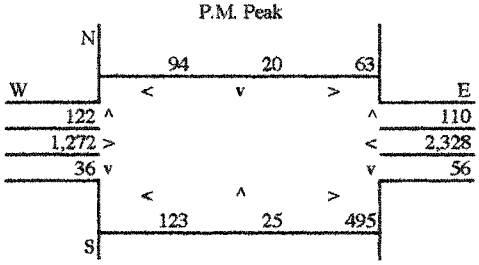
	Average Speed (miles per hour)									
Year	10	15	20	25	30	35	40	45	50	55
1998	24.84	16.74	12.71	10.30	8.67	7.50	6.65	6.07	5.78	5.88
1999	22.93	15.46	11.73	9.50	8.00	6.93	6.14	5.61	5.35	5.46
2000	21.02	14.17	10.75	8.70	7.33	6.35	5.63	5.15	4.92	5.03
2001	19.63	13.24	10.04	8.13	6.85	5.93	5.27	4.82	4.62	4.73
2002	18.24	12.31	9.33	7.55	6.36	5.52	4.90	4.50	4.32	4.43
2003	16.86	11.37	8.63	6.98	5.88	5.10	4.54	4.17	4.01	4.14
2004	15.47	10.44	7.92	6.40	5.39	4.69	4.17	3.85	3.71	3.84
2005	14.08	9.51	7.21	5.83	4.91	4.27	3.81	3.52	3.41	3.54
2010	10.78	7.30	5.52	4.46	3.77	3.28	2.95	2.75	2.69	2.83

PEAK HOUR TURNING VOLUMES

A.M. Peak



P.M. Peak



Representative Traffic Volumes (Vehicles per Hour)

N-S Road	785	N-S Road	755
E-W Road	3,686	E-W Road	4,324

ROADWAY CO CONTRIBUTIONS

Roadway	Reference CO Concentrations 50 Feet	100 Feet	300 Feet		Traffic Volume		Emission Factor		
A.M. Peak Hour									
N-S Road	2.2	1.7	1.0	*	785	*	5.52	÷	100,000
E-W Road	4.9	3.5	1.6	*	3,686	*	5.52	÷	100,000
P.M. Peak Hour									
N-S Road	2.2	1.7	1.0	*	755	*	5.52	÷	100,000
E-W Road	4.9	3.5	1.6	*	4,324	*	5.52	÷	100,000

TOTAL CO CONCENTRATIONS (ppm)

	A.M. Peak Hour	P.M. Peak Hour	8-Hour
50 Feet from Roadway Edge	7.1	7.3	4.0
100 Feet from Roadway Edge	6.8	6.9	3.8
300 Feet from Roadway Edge	6.4	6.4	3.4

BAY AREA AQMD SIMPLIFIED CALINE4 ANALYSIS

Project Title:	River Park
Intersection:	Whites Canyon/Soledad Canyon Road
Analysis Condition:	Interim Year Traffic Volumes
Nearest Air Monitoring Station measuring CO:	SRA13
Background 1-hour CO Concentration (ppm):	6.0
Background 8-hour CO Concentration (ppm):	3.1
Persistence Factor:	0.7
Analysis Year:	2010

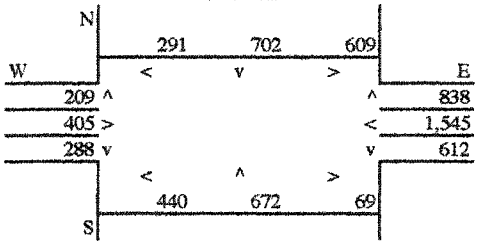
		Roadway Type	No. of Lanes	Average Cruise Speed A.M.	Average Cruise Speed P.M.
North-South Roadway:	Whites Canyon	At Grade	4	35	35
East-West Roadway:	Soledad Canyon Road	At Grade	4	35	35

EMFAC7G COMPOSITE EMISSION FACTORS FOR CO

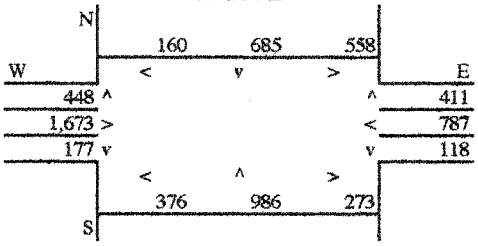
	Average Speed (miles per hour)									
Year	10	15	20	25	30	35	40	45	50	55
1998	24.84	16.74	12.71	10.30	8.67	7.50	6.65	6.07	5.78	5.88
1999	22.93	15.46	11.73	9.50	8.00	6.93	6.14	5.61	5.35	5.46
2000	21.02	14.17	10.75	8.70	7.33	6.35	5.63	5.15	4.92	5.03
2001	19.63	13.24	10.04	8.13	6.85	5.93	5.27	4.82	4.62	4.73
2002	18.24	12.31	9.33	7.55	6.36	5.52	4.90	4.50	4.32	4.43
2003	16.86	11.37	8.63	6.98	5.88	5.10	4.54	4.17	4.01	4.14
2004	15.47	10.44	7.92	6.40	5.39	4.69	4.17	3.85	3.71	3.84
2005	14.08	9.51	7.21	5.83	4.91	4.27	3.81	3.52	3.41	3.54
2010	10.78	7.30	5.52	4.46	3.77	3.28	2.95	2.75	2.69	2.83

PEAK HOUR TURNING VOLUMES

A.M. Peak



P.M. Peak



Representative Traffic Volumes (Vehicles per Hour)

N-S Road	3,321	N-S Road	3,248
E-W Road	4,078	E-W Road	3,820

ROADWAY CO CONTRIBUTIONS

	Reference CO Concentrations				Traffic		Emission		
Roadway	50 Feet	100 Feet	300 Feet		Volume		Factor		
A.M. Peak Hour									
N-S Road	2.2	1.7	1.1	*	3,321	*	3.28	÷	100,000
E-W Road	5.4	3.8	1.6	*	4,078	*	3.28	÷	100,000
P.M. Peak Hour									
N-S Road	2.2	1.7	1.1	*	3,248	*	3.28	÷	100,000
E-W Road	5.4	3.8	1.6	*	3,820	*	3.28	÷	100,000

TOTAL CO CONCENTRATIONS (ppm)

	A.M. Peak Hour	P.M. Peak Hour	8-Hour
50 Feet from Roadway Edge	7.0	6.9	3.8
100 Feet from Roadway Edge	6.7	6.7	3.6
300 Feet from Roadway Edge	6.3	6.3	3.4

BAY AREA AQMD SIMPLIFIED CALINE4 ANALYSIS

Project Title:	River Park
Intersection:	Valley Center/Soledad Canyon Road
Analysis Condition:	Interim Year Traffic Volumes
Nearest Air Monitoring Station measuring CO:	SRA13
Background 1-hour CO Concentration (ppm):	6.0
Background 8-hour CO Concentration (ppm):	3.1
Persistence Factor:	0.7
Analysis Year:	2010

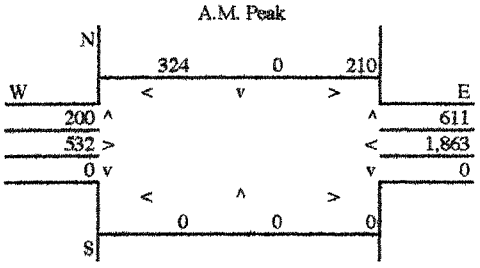
		Roadway Type	No. of Lanes	Average Cruise Speed A.M.	Average Cruise Speed P.M.
North-South Roadway:	Valley Center	At Grade	2	25	25
East-West Roadway:	Soledad Canyon Road	At Grade	6	35	35

EMFAC7G COMPOSITE EMISSION FACTORS FOR CO

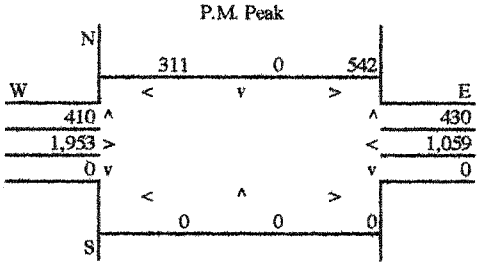
	Average Speed (miles per hour)									
Year	10	15	20	25	30	35	40	45	50	55
1998	24.84	16.74	12.71	10.30	8.67	7.50	6.65	6.07	5.78	5.88
1999	22.93	15.46	11.73	9.50	8.00	6.93	6.14	5.61	5.35	5.46
2000	21.02	14.17	10.75	8.70	7.33	6.35	5.63	5.15	4.92	5.03
2001	19.63	13.24	10.04	8.13	6.85	5.93	5.27	4.82	4.62	4.73
2002	18.24	12.31	9.33	7.55	6.36	5.52	4.90	4.50	4.32	4.43
2003	16.86	11.37	8.63	6.98	5.88	5.10	4.54	4.17	4.01	4.14
2004	15.47	10.44	7.92	6.40	5.39	4.69	4.17	3.85	3.71	3.84
2005	14.08	9.51	7.21	5.83	4.91	4.27	3.81	3.52	3.41	3.54
2010	10.78	7.30	5.52	4.46	3.77	3.28	2.95	2.75	2.69	2.83

PEAK HOUR TURNING VOLUMES

A.M. Peak



P.M. Peak



Representative Traffic Volumes (Vehicles per Hour)

N-S Road	1,345	N-S Road	1,693
E-W Road	3,216	E-W Road	3,984

ROADWAY CO CONTRIBUTIONS

Roadway	Reference CO Concentrations 50 Feet	100 Feet	300 Feet		Traffic Volume		Emission Factor		
A.M. Peak Hour									
N-S Road	2.2	1.7	1.0	*	1,345	*	4.46	÷	100,000
E-W Road	4.9	3.5	1.6	*	3,216	*	3.28	÷	100,000
P.M. Peak Hour									
N-S Road	2.2	1.7	1.0	*	1,693	*	4.46	÷	100,000
E-W Road	4.9	3.5	1.6	*	3,984	*	3.28	÷	100,000

TOTAL CO CONCENTRATIONS (ppm)

	A.M. Peak Hour	P.M. Peak Hour	8-Hour
50 Feet from Roadway Edge	6.6	6.8	3.7
100 Feet from Roadway Edge	6.5	6.6	3.6
300 Feet from Roadway Edge	6.2	6.3	3.3

UNMITIGATED CONSTRUCTION EMISSIONS

Project Name Riverpark **Unmitigated Emissions**
Subphase A, Weeks 1 thru 19
Length of Subphase (weeks) 19.00
Year 2004

Calculated Emissions
Mitigated Emissions

Emissions Source/Subphase	Emissions (Pounds per Day) CO	ROG	NOx	SOx	PM10	Mitigation
Demolition Subphase						
Fugitive Demolition Dust	0.00	0.00	0.00	0.00	0.00	No Demolition During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Demolition Dust	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Grading Subphase						
FugitiveDust	--	--	--	--	2,066.32	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	1,197.57	163.32	1,278.74	--	60.30	
Worker Commute Trips	14.14	1.54	2.57	0.02	0.05	
Mitigation/Reduction						
Fugitive Dust	--	--	--	--	1,343.16	Rule 403
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Pavement and Asphalt Subphase						
Paving Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	No Pavement and Asphalt During This Subphase
Off-Road Diesel Exhaust Emissions	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust Emissions	0.00	0.00	0.00	0.00	0.00	
Worker Commute Emissions	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Building Construction and Architectural Coatings Subphase						
Building Construction						No Building Construction During This Subphase
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Architectural Painting						
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Net Emission Totals:	**1,211.71**	**164.86**	**1,281.31**	**0.02**	**1,403.74**	
SCAQMD Threshold:	**550.00**	**75.00**	**100.00**	**150.00**	**150.00**	
Exceeds Threshold?	Yes	Yes	Yes	No	Yes	

Project Name Riverpark **Unmitigated Emissions**
Subphase B, Weeks 20 thru 25
Length of Subphase (weeks) 6.00
Year 2004

Calculated Emissions
Mitigated Emissions

Emissions Source/Subphase	Emissions (Pounds per Day) CO	ROG	NOx	SOx	PM10	Mitigation
Demolition Subphase						
Fugitive Demolition Dust	--	--	--	--	0.00	No Demolition During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Demolition Dust	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Grading Subphase						
FugitiveDust	--	--	--	--	2,686.32	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	1,255.68	163.32	1,200.67	--	55.04	
Worker Commute Trips	12.94	1.41	2.38	0.02	0.08	
Mitigation/Reduction						
Fugitive Dust	--	--	--	--	1,343.16	Fugitive Dust Rule 403
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Pavement and Asphalt Subphase						
Paving Off-Gas Emissions	--	0.37	--	--	--	
Off-Road Diesel Exhaust Emissions	261.64	34.03	249.59	--	11.33	
On-Road Diesel Exhaust Emissions	1.21	0.17	1.62	0.01	0.03	
Worker Commute Emissions	2.55	0.28	0.47	0.00	0.02	
Mitigation/Reduction						
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	No Mitigation Employed
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Building Construction and Architectural Coatings Subphase						
Building Construction						
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	No Building Construction During This Subphase
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Architectural Painting						
Off-Gas Emissions	--	0.00	--	--	--	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Net Emission Totals:	1,534.02	199.59	1,454.73	0.03	1,409.66	
SCAQMD Threshold:	550.00	75.00	100.00	150.00	150.00	
Exceeds Threshold?	Yes	Yes	Yes	No	Yes	

Project Name Riverpark **Unmitigated Emissions**
Subphase C, Weeks 26 thru 30
Length of Subphase (weeks) 5.00
Year 2005

Calculated Emissions
Mitigated Emissions

Emissions Source/Subphase	Emissions (Pounds per Day) CO	ROG	NOx	SOx	PM10	Mitigation
Demolition Subphase						
Fugitive Demolition Dust	--	--	--	--	0.00	No Demolition During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Demolition Dust	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Grading Subphase						
FugitiveDust	--	--	--	--	2,238.60	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	1,070.56	139.78	1,032.64	--	47.40	
Worker Commute Trips	11.05	1.21	2.03	0.01	0.07	
Mitigation/Reduction						
Fugitive Dust	--	--	--	--	1,119.30	Fugitive Dust Rule 403
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Pavement and Asphalt Subphase						
Paving Off-Gas Emissions	--	0.37	--	--	--	
Off-Road Diesel Exhaust Emissions	261.64	34.03	249.59	--	11.93	
On-Road Diesel Exhaust Emissions	1.21	0.17	1.62	0.01	0.03	
Worker Commute Emissions	2.55	0.28	0.47	0.00	0.02	
Mitigation/Reduction						
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	No Mitigation Employed
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Building Construction and Architectural Coatings Subphase						
Building Construction						
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	No Building Construction During This Subphase
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Architectural Painting						
Off-Gas Emissions	--	0.00	--	--	--	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Net Emission Totals:	**1,347.01**	**175.84**	**1,286.35**	**0.03**	**1,178.15**	
SCAQMD Threshold:	**550.00**	**75.00**	**100.00**	**150.00**	**150.00**	
Exceeds Threshold?	**Yes**	**Yes**	**Yes**	**No**	**Yes**	

Project Name Riverpark Unmitigated Emissions

Subphase D, Weeks 31 thru 44

Length of Subphase (weeks) 14.00

Year 2005

Calculated Emissions

Mitigated Emissions

Emissions Source/Subphase	Emissions (Pounds per Day) CO	ROG	NOx	SOx	PM10	Mitigation
Demolition Subphase						
Fugitive Demolition Dust	--	--	--	--	0.00	No Demolition During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Demolition Dust	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Grading Subphase						
FugitiveDust	--	--	--	--	2,691.52	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	1,070.58	139.78	1,092.64	--	47.40	
Worker Commute Trips	11.03	1.21	2.03	0.01	0.07	
Mitigation/Reduction						
Fugitive Dust	--	--	--	--	1,343.16	Fugitive Dust Rule 403
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Pavement and Asphalt Subphase						
Paving Off-Gas Emissions	--	0.13	--	--	--	
Off-Road Diesel Exhaust Emissions	409.36	51.42	359.90	--	16.10	
On-Road Diesel Exhaust Emissions	0.43	0.06	0.58	0.01	0.01	
Worker Commute Emissions	3.39	0.37	0.62	0.00	0.02	
Mitigation/Reduction						
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	No Mitigation Employed
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Building Construction and Architectural Coatings Subphase						
Building Construction						
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	No Building Construction During This Subphase
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Architectural Painting						
Off-Gas Emissions	--	0.00	--	--	--	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Net Emission Totals:	1,494.80	192.97	1,395.77	0.02	1,406.76	
SCAQMD Threshold:	550.00	75.00	100.00	150.00	150.00	
Exceeds Threshold?	Yes	Yes	Yes	No	Yes	

Project Name Riverpark Unmitigated Emissions
Subphase E, Weeks 44 thru 50
Length of Subphase (weeks) 6.00
Year 2005

Calculated Emissions
Mitigated Emissions

Emissions Source/Subphase	Emissions (Pounds per Day) CO	ROG	NOx	SOx	PM10	Mitigation
Demolition Subphase						
Fugitive Demolition Dust	--	--	--	--	0.00	No Demolition During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Demolition Dust	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Grading Subphase						
FugitiveDust	--	--	--	--	1,131.28	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	1,075.58	139.79	1,092.68	--	47.40	
Worker Commute Trips	11.68	1.21	2.08	0.01	0.07	
Mitigation/Reduction						
Fugitive Dust	--	--	--	--	575.64	Fugitive Dust Rule 403
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Pavement and Asphalt Subphase						
Paving Off-Gas Emissions	--	0.37	--	--	--	
Off-Road Diesel Exhaust Emissions	409.30	51.42	359.99	--	16.40	
On-Road Diesel Exhaust Emissions	1.21	0.17	1.62	0.01	0.03	
Worker Commute Emissions	3.39	0.37	0.63	0.00	0.02	
Mitigation/Reduction						
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	No Mitigation Employed
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Building Construction and Architectural Coatings Subphase						
Building Construction						
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	6.79	0.74	1.99	0.01	0.05	
Architectural Painting						
Off-Gas Emissions	--	69.61	--	--	--	
Worker Commute Trips	6.79	0.74	1.25	0.01	0.04	
Mitigation/Reduction						
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	No Mitigation Employed
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Net Emission Totals:	**1,509.15**	**264.41**	**1,400.06**	**0.05**	**639.35**	
SCAQMD Threshold:	**550.00**	**75.00**	**100.00**	**150.00**	**150.00**	
Exceeds Threshold?	**Yes**	**Yes**	**Yes**	**No**	**Yes**	

Project Name Riverpark **Unmitigated Emissions**
Subphase F, Weeks 51 thru 89
Length of Subphase (weeks) 39.00
Year 2005

Calculated Emissions
Mitigated Emissions

Emissions Source/Subphase	Emissions (Pounds per Day) CO	ROG	NOx	SOx	PM10	Mitigation
Demolition Subphase						
Fugitive Demolition Dust	--	--	--	--	0.00	No Demolition During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Demolition Dust	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Grading Subphase						
FugitiveDust	--	--	--	--	0.00	No Grading During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	--	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Dust	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Pavement and Asphalt Subphase						
Paving Off-Gas Emissions	--	0.37	--	--	--	
Off-Road Diesel Exhaust Emissions	261.64	34.05	249.59	--	11.33	
On-Road Diesel Exhaust Emissions	1.21	0.17	1.62	0.01	0.09	
Worker Commute Emissions	2.55	0.28	0.47	0.00	0.02	
Mitigation/Reduction						
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	No Mitigation Employed
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Building Construction and Architectural Coatings Subphase						
Building Construction						
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	6.79	0.74	1.99	0.01	0.04	
Architectural Painting						
Off-Gas Emissions	--	59.61	--	--	--	
Worker Commute Trips	6.79	0.74	1.25	0.01	0.04	
Mitigation/Reduction						
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	No Mitigation Employed
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Net Emission Totals:	**278.97**	**105.94**	**254.92**	**0.04**	**11.46**	
SCAQMD Threshold:	**550.00**	**75.00**	**100.00**	**150.00**	**150.00**	
Exceeds Threshold?	**No**	**Yes**	**Yes**	**No**	**No**	

Project Name Riverpark **Unmitigated Emissions**
Subphase G, Weeks 90 thru 94
Length of Subphase (weeks) 5.00
Year 2006

Calculated Emissions
Mitigated Emissions

Emissions Source/Subphase	Emissions (Pounds per Day) CO	ROG	NOx	SOx	PM10	Mitigation
Demolition Subphase						
Fugitive Demolition Dust	--	--	--	--	0.00	No Demolition During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Demolition Dust	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Grading Subphase						
FugitiveDust	--	--	--	--	0.00	No Grading During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	--	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Dust	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Pavement and Asphalt Subphase						
Paving Off-Gas Emissions	--	0.33	--	--	--	No Mitigation Employed
Off-Road Diesel Exhaust Emissions	268.99	34.09	238.41	--	10.34	
On-Road Diesel Exhaust Emissions	1.10	0.16	1.54	0.01	0.03	
Worker Commute Emissions	2.34	0.26	0.44	0.00	0.02	
Mitigation/Reduction						
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Building Construction and Architectural Coatings Subphase						
Building Construction						No Mitigation Employed
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	9.35	1.05	2.77	0.01	0.06	
Architectural Painting						
Off-Gas Emissions	--	98.98	--	--	--	
Worker Commute Trips	9.35	1.05	1.74	0.01	0.06	
Mitigation/Reduction						
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Net Emission Totals:	**291.12**	**135.86**	**244.89**	**0.04**	**10.51**	
SCAQMD Threshold:	**550.00**	**75.00**	**100.00**	**150.00**	**150.00**	
Exceeds Threshold?	**No**	**Yes**	**Yes**	**No**	**No**	

Project Name Riverpark Unmitigated Emissions
Subphase H, Weeks 95 thru 99
Length of Subphase (weeks) 5.00
Year 2006

Calculated Emissions
Mitigated Emissions

Emissions Source/Subphase	Emissions (Pounds per Day) CO	ROG	NOx	SOx	PM10	Mitigation
Demolition Subphase						
Fugitive Demolition Dust	--	--	--	--	0.00	No Demolition During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Demolition Dust	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Grading Subphase						
FugitiveDust	--	--	--	--	0.00	No Grading During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	--	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Dust	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Pavement and Asphalt Subphase						
Paving Off-Gas Emissions	--	8.37	--	--	--	
Off-Road Diesel Exhaust Emissions	268.99	34.03	238.41	--	10.34	
On-Road Diesel Exhaust Emissions	1.10	0.16	1.54	0.01	0.03	
Worker Commute Emissions	2.34	0.26	0.44	0.00	0.02	
Mitigation/Reduction						
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	No Mitigation Employed
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Building Construction and Architectural Coatings Subphase						
Building Construction						
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	12.46	1.37	3.69	0.02	0.09	
Architectural Painting						
Off-Gas Emissions	--	155.59	--	--	--	
Worker Commute Trips	12.46	1.37	2.32	0.02	0.09	
Mitigation/Reduction						
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	No Mitigation Employed
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Net Emission Totals:	**297.35**	**193.15**	**246.40**	**0.05**	**10.56**	
SCAQMD Threshold:	**550.00**	**75.00**	**100.00**	**150.00**	**150.00**	
Exceeds Threshold?	**No**	**Yes**	**Yes**	**No**	**No**	

Project Name Riverpark **Unmitigated Emissions**

Subphase 1, Weeks 100 thru 105

Length of Subphase (weeks) 6.00

Year 2006

Calculated Emissions

Mitigated Emissions

Emissions Source/Subphase	Emissions (Pounds per Day) CO	ROG	NOx	SOx	PM10	Mitigation
Demolition Subphase						
Fugitive Demolition Dust	--	--	--	--	0.00	No Demolition During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Demolition Dust	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Grading Subphase						
FugitiveDust	--	--	--	--	0.00	No Grading During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	--	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Dust	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Pavement and Asphalt Subphase						
Paving Off-Gas Emissions	--	0.37	--	--	--	
Off-Road Diesel Exhaust Emissions	621.81	83.71	634.47	--	28.74	
On-Road Diesel Exhaust Emissions	1.10	0.16	1.54	0.01	0.03	
Worker Commute Emissions	11.29	1.24	2.10	0.02	0.08	
Mitigation/Reduction						
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	No Mitigation Employed
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Building Construction and Architectural Coatings Subphase						
Building Construction						
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	15.58	1.71	4.61	0.02	0.11	
Architectural Painting						
Off-Gas Emissions	--	175.00	--	--	--	
Worker Commute Trips	15.58	1.71	2.90	0.02	0.11	
Mitigation/Reduction						
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	No Mitigation Employed
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Net Emission Totals:	**665.36**	**261.91**	**645.63**	**0.07**	**29.06**	
SCAQMD Threshold:	**550.00**	**75.00**	**100.00**	**150.00**	**150.00**	
Exceeds Threshold?	**Yes**	**Yes**	**Yes**	**No**	**No**	

Project Name Riverpark Unmitigated Emissions
Subphase J, Weeks 106 thru 107
Length of Subphase (weeks) 2.00
Year 2006

Calculated Emissions
Mitigated Emissions

Emissions Source/Subphase	Emissions (Pounds per Day) CO	ROG	NOx	SOx	PM10	Mitigation
Demolition Subphase						
Fugitive Demolition Dust	--	--	--	--	0.00	No Demolition During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Demolition Dust	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Grading Subphase						
FugitiveDust	--	--	--	--	0.00	No Grading During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	--	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Dust	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Pavement and Asphalt Subphase						
Paving Off-Gas Emissions	--	0.00	--	--	--	No Pavement or Asphalt During This Subphase
Off-Road Diesel Exhaust Emissions	0.00	0.00	0.00	--	0.00	
On-Road Diesel Exhaust Emissions	0.00	0.00	0.00	0.00	0.00	
Worker Commute Emissions	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Building Construction and Architectural Coatings Subphase						
Building Construction						
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	15.55	1.71	4.61	0.02	0.11	
Architectural Painting						
Off-Gas Emissions	--	173.90	--	--	--	
Worker Commute Trips	15.58	1.71	2.90	0.02	0.11	
Mitigation/Reduction						
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	No Mitigation Employed
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Net Emission Totals:	31.16	176.42	7.51	0.04	0.22	
SCAQMD Threshold:	550.00	75.00	100.00	150.00	150.00	
Exceeds Threshold?	No	Yes	No	No	No	

Project Name Riverpark **Unmitigated Emissions**
Subphase K, Weeks 108 thru 116
Length of Subphase (weeks) 9.00
Year 2006

Calculated Emissions
Mitigated Emissions

Emissions Source/Subphase	Emissions (Pounds per Day) CO	ROG	NOx	SOx	PM10	Mitigation
Demolition Subphase						
Fugitive Demolition Dust	--	--	--	--	0.00	No Demolition During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Demolition Dust	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Grading Subphase						
FugitiveDust	--	--	--	--	0.00	No Grading During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	--	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Dust	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Pavement and Asphalt Subphase						
Paving Off-Gas Emissions	--	0.12	--	--	--	
Off-Road Diesel Exhaust Emissions	268.99	34.00	238.41	--	10.34	
On-Road Diesel Exhaust Emissions	0.34	0.05	0.48	0.00	0.01	
Worker Commute Emissions	2.34	0.26	0.44	0.00	0.02	
Mitigation/Reduction						
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	No Mitigation Employed
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Building Construction and Architectural Coatings Subphase						
Building Construction						
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	12.46	1.37	3.68	0.02	0.09	
Architectural Painting						
Off-Gas Emissions	--	129.33	--	--	--	
Worker Commute Trips	12.46	1.37	2.32	0.02	0.09	
Mitigation/Reduction						
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	No Mitigation Employed
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Net Emission Totals:	296.59	166.52	245.34	0.04	10.54	
SCAQMD Threshold:	550.00	75.00	100.00	150.00	150.00	
Exceeds Threshold?	No	Yes	Yes	No	No	

Project Name Riverpark Unmitigated Emissions
Subphase L, Weeks 117 thru 157
Length of Subphase (weeks) 41.00
Year 2006

Calculated Emissions
Mitigated Emissions

Emissions Source/Subphase	Emissions (Pounds per Day) CO	ROG	NOx	SOx	PM10	Mitigation
Demolition Subphase						
Fugitive Demolition Dust	--	--	--	--	0.00	No Demolition During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Demolition Dust	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Grading Subphase						
FugitiveDust	--	--	--	--	0.00	No Grading During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	--	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Dust	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Pavement and Asphalt Subphase						
Paving Off-Gas Emissions	--	0.00	--	--	--	No Pavement and Asphalt in this Subphase
Off-Road Diesel Exhaust Emissions	0.00	0.00	0.00	--	0.00	
On-Road Diesel Exhaust Emissions	0.00	0.00	0.00	0.00	0.00	
Worker Commute Emissions	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Building Construction and Architectural Coatings Subphase						
Building Construction						
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	9.55	1.03	2.77	0.01	0.06	
Architectural Painting						
Off-Gas Emissions	--	111.92	--	--	--	
Worker Commute Trips	9.55	1.03	1.74	0.01	0.06	
Mitigation/Reduction						
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	No Mitigation Employed
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Net Emission Totals:	**18.69**	**113.97**	**4.51**	**0.03**	**0.13**	
SCAQMD Threshold:	**550.00**	**75.00**	**100.00**	**150.00**	**150.00**	
Exceeds Threshold?	**No**	**Yes**	**No**	**No**	**No**	

Project Name Riverpark Unmitigated Emissions
Subphase M, Weeks 158 thru 200
Length of Subphase (weeks) 43.00
Year 2007

Calculated Emissions
Mitigated Emissions

Emissions Source/Subphase	Emissions (Pounds per Day) CO	ROG	NOx	SOx	PM10	Mitigation
Demolition Subphase						
Fugitive Demolition Dust	--	--	--	--	0.00	No Demolition During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Demolition Dust	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Grading Subphase						
FugitiveDust	--	--	--	--	0.00	No Grading During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	--	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Dust	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Pavement and Asphalt Subphase						
Paving Off-Gas Emissions	--	0.00	--	--	--	No Pavement and Asphalt in this Subphase
Off-Road Diesel Exhaust Emissions	0.00	0.00	0.00	--	0.00	
On-Road Diesel Exhaust Emissions	0.00	0.00	0.00	0.00	0.00	
Worker Commute Emissions	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Building Construction and Architectural Coatings Subphase						
Building Construction						
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	5.73	0.63	1.76	0.00	0.04	
Architectural Painting						
Off-Gas Emissions	--	55.31	--	--	--	
Worker Commute Trips	5.73	0.63	1.07	0.00	0.04	
Mitigation/Reduction						
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	No Mitigation Employed
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Net Emission Totals:	11.47	56.58	2.78	0.01	0.08	
SCAQMD Threshold:	550.00	75.00	100.00	150.00	150.00	
Exceeds Threshold?	No	No	No	No	No	

Project Name Riverpark Unmitigated Emissions
Subphase N, Weeks 201 thru 219
Length of Subphase (weeks) 20.00
Year 2008

Calculated Emissions
Mitigated Emissions

Emissions Source/Subphase	Emissions (Pounds per Day) CO	ROG	NOx	SOx	PM10	Mitigation
Demolition Subphase						
Fugitive Demolition Dust	--	--	--	--	0.00	No Demolition During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Demolition Dust	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Grading Subphase						
FugitiveDust	--	--	--	--	0.00	No Grading During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	--	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Dust	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Pavement and Asphalt Subphase						
Paving Off-Gas Emissions	--	0.00	--	--	--	No Pavement and Asphalt in this Subphase
Off-Road Diesel Exhaust Emissions	0.00	0.00	0.00	--	0.00	
On-Road Diesel Exhaust Emissions	0.00	0.00	0.00	0.00	0.00	
Worker Commute Emissions	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Building Construction and Architectural Coatings Subphase						
Building Coustruction						
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	2.47	0.27	0.74	0.00	0.02	
Architectural Painting						
Off-Gas Emissions	--	29.38	--	--	--	
Worker Commute Trips	2.47	0.27	0.46	0.00	0.02	
Mitigation/Reduction						
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	No Mitigation Employed
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Net Emission Totals:	4.94	29.92	1.20	0.00	0.04	
SCAQMD Threshold:	550.00	75.00	100.00	150.00	150.00	
Exceeds Threshold?	No	No	No	No	No	

MITIGATED CONSTRUCTION EMISSIONS

Project Name Riverpark **Mitigated Emissions**
Subphase A, Weeks 1 thru 19
Length of Subphase (weeks) 19.00
Year 2004

Calculated Emissions
Mitigated Emissions

Emissions Source/Subphase	Emissions (Pounds per Day) CO	ROG	NOx	SOx	PM10	Mitigation
Demolition Subphase						
Fugitive Demolition Dust	0.00	0.00	0.00	0.00	0.00	No Demolition During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Demolition Dust	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Grading Subphase						
FugitiveDust	--	--	--	--	2,686.32	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	1,197.57	163.32	1,278.74	--	60.50	
Worker Commute Trips	14.14	1.54	2.57	0.02	0.08	
Mitigation/Reduction						
Fugitive Dust	--	--	--	--	1,343.16	Fugitive Dust Rule 403
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	No On-Road Trucks During Grading
Off-Road Diesel Exhaust	1,077.81	146.99	511.50	n/a	51.43	Cooled Exhaust Gas Recirculation for Off-Road Diesel Exhaust
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Pavement and Asphalt Subphase						
Paving Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	No Pavement and Asphalt During This Subphase
Off-Road Diesel Exhaust Emissions	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust Emissions	0.00	0.00	0.00	0.00	0.00	
Worker Commute Emissions	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Building Construction and Architectural Coatings Subphase						
Building Construction						No Building Construction During This Subphase
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Architectural Painting						
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Net Emission Totals:	**133.89**	**17.87**	**769.81**	**0.02**	**1,352.32**	
SCAQMD Threshold:	**550.00**	**75.00**	**100.00**	**150.00**	**150.00**	
Exceeds Threshold?	**No**	**No**	**Yes**	**No**	**Yes**	

Project Name **Riverpark** **Mitigated Emissions**
Subphase **B, Weeks 20 thru 25**
Length of Subphase (weeks) **6.00**
Year **2004**

Calculated Emissions
Mitigated Emissions

Emissions Source/Subphase	Emissions (Pounds per Day) CO	ROG	NOx	SOx	PM10	Mitigation
Demolition Subphase						
Fugitive Demolition Dust	--	--	--	--	0.00	No Demolition During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Demolition Dust	--	--	--	--	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Grading Subphase						
FugitiveDust	--	--	--	--	2,686.32	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	1,253.68	163.32	1,200.67	--	55.04	
Worker Commute Trips	12.94	1.41	2.38	0.02	0.08	
Mitigation/Reduction						
Fugitive Dust	--	--	--	--	1,343.16	Water Exposed Surfaces Three Times Daily
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	No On-Road Trucks During Grading
Off-Road Diesel Exhaust	1,130.11	146.99	480.27	n/a	46.78	Cooled Exhaust Gas Recirculation for Off-Road Diesel Exhaust
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Pavement and Asphalt Subphase						
Paving Off-Gas Emissions	--	0.37	--	--	--	
Off-Road Diesel Exhaust Emissions	261.64	34.03	249.59	--	11.39	
On-Road Diesel Exhaust Emissions	1.21	0.17	1.62	0.01	0.03	
Worker Commute Emissions	2.35	0.28	0.47	0.00	0.02	
Mitigation/Reduction						
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	None Available
On-Road Diesel Exhaust	1.09	0.15	0.65	0.01	0.02	Cooled Exhaust Gas Recirculation for Off-Road Diesel Exhaust
Off-Road Diesel Exhaust	235.48	30.63	134.78	n/a	16.77	Aqueous Fuel/Cooled Exhaust Gas Recirculation
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Building Construction and Architectural Coatings Subphase						
Building Construction						
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	No Building Construction During This Subphase
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Architectural Painting						
Off-Gas Emissions	--	0.00	--	--	--	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Off-Road Diesel Exhaust	0.00	0.00	0.00	n/a	0.00	
Off-Gas Emissions	--	n/a	--	--	--	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Net Emission Totals:	**167.34**	**21.82**	**839.04**	**0.02**	**1,346.08**	
SCAQMD Threshold:	**550.00**	**75.00**	**100.00**	**150.00**	**150.00**	
Exceeds Threshold?	**No**	**No**	**Yes**	**No**	**Yes**	

Project Name **Riverpark** **Mitigated Emissions**
Subphase **C, Weeks 26 thru 30**
Length of Subphase (weeks) **5.00**
Year **2005**

Calculated Emissions
Mitigated Emissions

Emissions Source/Subphase	Emissions (Pounds per Day) CO	ROG	NOx	SOx	PM10	Mitigation
Demolition Subphase						
Fugitive Demolition Dust	--	--	--	--	0.00	No Demolition During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Demolition Dust	--	--	--	--	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Grading Subphase						
FugitiveDust	--	--	--	--	2,238.60	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	1,070.58	139.78	1,032.64	--	47.40	
Worker Commute Trips	11.03	1.21	2.03	0.01	0.07	
Mitigation/Reduction						
Fugitive Dust	--	--	--	--	1,119.30	Water Exposed Surfaces Three Times Daily
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	No On-Road Trucks During Grading
Off-Road Diesel Exhaust	963.52	125.80	557.63	n/a	70.15	Aqueous Fuel/Cooled Exhaust Gas Recirculation
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Pavement and Asphalt Subphase						
Paving Off-Gas Emissions	--	0.37	--	--	--	
Off-Road Diesel Exhaust Emissions	261.64	34.03	249.59	--	11.33	
On-Road Diesel Exhaust Emissions	1.21	0.17	1.62	0.01	0.03	
Worker Commute Emissions	2.55	0.26	0.47	0.00	0.02	
Mitigation/Reduction						
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	No additional mitigation available for Off-Gas Emissions
On-Road Diesel Exhaust	1.09	0.15	0.88	0.01	0.02	Aqueous Fuel/Cooled Exhaust Gas Recirculation
Off-Road Diesel Exhaust	235.48	30.63	134.78	n/a	16.77	Aqueous Fuel/Cooled Exhaust Gas Recirculation
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Building Construction and Architectural Coatings Subphase						
Building Construction						
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	No Building Construction During This Subphase
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Architectural Painting						
Off-Gas Emissions	--	0.00	--	--	--	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Off-Road Diesel Exhaust	0.00	0.00	0.00	n/a	0.00	
Off-Gas Emissions	--	n/a	--	--	--	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Net Emission Totals:	**146.92**	**19.26**	**593.07**	**0.02**	**1,091.20**	
SCAQMD Threshold:	**550.00**	**75.00**	**100.00**	**150.00**	**150.00**	
Exceeds Threshold?	**No**	**No**	**Yes**	**No**	**Yes**	

Project Name **Riverpark** **Mitigated Emissions**
Subphase **D, Weeks 31 thru 44**
Length of Subphase (weeks) **14.00**
Year **2005**

Calculated Emissions
Mitigated Emissions

Emissions Source/Subphase	Emissions (Pounds per Day) CO	ROG	NOx	SOx	PM10	Mitigation
Demolition Subphase						
Fugitive Demolition Dust	--	--	--	--	0.00	No Demolition During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Demolition Dust	--	--	--	--	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Grading Subphase						
FugitiveDust	--	--	--	--	2,686.32	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	1,070.58	139.78	1,032.64	--	47.40	
Worker Commute Trips	11.03	1.21	2.03	0.01	0.07	
Mitigation/Reduction						
Fugitive Dust	--	--	--	--	1,343.16	Water Exposed Surfaces Three Times Daily
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	No On-Road Trucks During Grading
Off-Road Diesel Exhaust	963.52	125.80	557.63	n/a	70.15	Aqueous Fuel/Cooled Exhaust Gas Recirculation
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Pavement and Asphalt Subphase						
Paving Off-Gas Emissions	--	0.13	--	--	--	
Off-Road Diesel Exhaust Emissions	407.36	51.42	353.90	--	16.10	
On-Road Diesel Exhaust Emissions	0.43	0.06	0.58	0.01	0.01	
Worker Commute Emissions	3.39	0.37	0.62	0.00	0.02	
Mitigation/Reduction						
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	None Available
On-Road Diesel Exhaust	0.39	0.05	0.31	0.01	0.01	Aqueous Fuel/Cooled Exhaust Gas Recirculation
Off-Road Diesel Exhaust	368.42	46.28	194.35	n/a	23.83	Aqueous Fuel/Cooled Exhaust Gas Recirculation
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Building Construction and Architectural Coatings Subphase						
Building Construction						
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	No Building Construction During This Subphase
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Architectural Painting						
Off-Gas Emissions	--	0.00	--	--	--	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Off-Road Diesel Exhaust	0.00	0.00	0.00	n/a	0.00	
Off-Gas Emissions	--	n/a	--	--	--	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Net Emission Totals:	**162.46**	**20.84**	**643.49**	**0.02**	**1,312.77**	
SCAQMD Threshold:	**550.00**	**75.00**	**100.00**	**150.00**	**150.00**	
Exceeds Threshold?	**No**	**No**	**Yes**	**No**	**Yes**	

Project Name Riverpark **Mitigated Emissions**
Subphase E, Weeks 44 thru 50
Length of Subphase (weeks) 6.00
Year 2005

Calculated Emissions
Mitigated Emissions

Emissions Source/Subphase	Emissions (Pounds per Day) CO	ROG	NOx	SOx	PM10	Mitigation
Demolition Subphase						
Fugitive Demolition Dust	--	--	--	--	0.00	No Demolition During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Demolition Dust	--	--	--	--	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Grading Subphase						
FugitiveDust	--	--	--	--	1,151.28	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	1,070.58	139.78	1,092.64	--	47.40	
Worker Commute Trips	11.03	1.21	2.03	0.01	0.02	
Mitigation/Reduction						
Fugitive Dust	--	--	--	--	575.64	Water Exposed Surfaces Three Times Daily
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	No On-Road Trucks During Grading
Off-Road Diesel Exhaust	963.52	125.80	557.63	n/a	70.15	Aqueous Fuel/Cooled Exhaust Gas Recirculation
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Pavement and Asphalt Subphase						
Paving Off-Gas Emissions	--	0.37	--	--	--	
Off-Road Diesel Exhaust Emissions	409.36	51.42	359.90	--	16.10	
On-Road Diesel Exhaust Emissions	1.21	0.17	1.62	0.01	0.03	
Worker Commute Emissions	3.39	0.37	0.62	0.00	0.02	
Mitigation/Reduction						
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	No additional mitigation available for Off-Gas Emissions
On-Road Diesel Exhaust	1.09	0.15	0.88	0.01	0.02	Aqueous Fuel/Cooled Exhaust Gas Recirculation
Off-Road Diesel Exhaust	368.42	46.28	194.35	n/a	23.83	Aqueous Fuel/Cooled Exhaust Gas Recirculation
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Building Construction and Architectural Coatings Subphase						
Building Construction						
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	6.79	0.74	1.99	0.01	0.03	
Architectural Painting						
Off-Gas Emissions	--	69.61	--	--	--	
Worker Commute Trips	6.79	0.74	1.25	0.01	0.04	
Mitigation/Reduction						
Off-Road Diesel Exhaust	0.00	0.00	0.00	n/a	0.00	Aqueous Fuel/Cooled Exhaust Gas Recirculation
Off-Gas Emissions	--	0.00	--	--	--	No additional mitigation available for Off-Gas Emissions
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Net Emission Totals:	**176.12**	**92.18**	**647.21**	**0.04**	**545.34**	
SCAQMD Threshold:	**550.00**	**75.00**	**100.00**	**150.00**	**150.00**	
Exceeds Threshold?	**No**	**Yes**	**Yes**	**No**	**Yes**	

Project Name **Riverpark** **Mitigated Emissions**
Subphase **F, Weeks 51 thru 89**
Length of Subphase (weeks) **39.00**
Year **2005**

Calculated Emissions
Mitigated Emissions

Emissions Source/Subphase	Emissions (Pounds per Day) CO	ROG	NOx	SOx	PM10	Mitigation
Demolition Subphase						
Fugitive Demolition Dust	--	--	--	--	0.00	No Demolition During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Demolition Dust	--	--	--	--	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Grading Subphase						
FugitiveDust	--	--	--	--	0.00	No Grading During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	--	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Dust	--	--	--	--	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	n/a	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Pavement and Asphalt Subphase						
Paving Off-Gas Emissions	--	0.37	--	--	--	
Off-Road Diesel Exhaust Emissions	261.64	34.03	249.59	--	11.33	
On-Road Diesel Exhaust Emissions	1.21	0.17	1.62	0.01	0.03	
Worker Commute Emissions	2.55	0.28	0.47	0.00	0.02	
Mitigation/Reduction						
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	No additional mitigation available for Off-Gas Emissions
On-Road Diesel Exhaust	1.09	0.15	0.88	0.01	0.02	Aqueous Fuel/Cooled Exhaust Gas Recirculation
Off-Road Diesel Exhaust	235.48	30.63	134.78	n/a	16.77	Aqueous Fuel/Cooled Exhaust Gas Recirculation
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Building Construction and Architectural Coatings Subphase						
Building Construction						
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	6.79	0.74	1.99	0.01	0.04	
Architectural Painting						
Off-Gas Emissions	--	69.61	--	--	--	
Worker Commute Trips	6.79	0.74	1.25	0.01	0.04	
Mitigation/Reduction						
Off-Road Diesel Exhaust	0.00	0.00	0.00	n/a	0.00	Aqueous Fuel/Cooled Exhaust Gas Recirculation
Off-Gas Emissions	--	0.00	--	--	--	No additional mitigation available for Off-Gas Emissions
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Net Emission Totals:	**42.41**	**75.16**	**119.27**	**0.02**	**-5.33**	
SCAQMD Threshold:	**550.00**	**75.00**	**100.00**	**150.00**	**150.00**	
Exceeds Threshold?	**No**	**Yes**	**Yes**	**No**	**No**	

Project Name **Riverpark** **Mitigated Emissions**
Subphase **G, Weeks 90 thru 94**
Length of Subphase (weeks) **5.00**
Year **2006**

Calculated Emissions
Mitigated Emissions

Emissions Source/Subphase	Emissions (Pounds per Day) CO	ROG	NOx	SOx	PM10	Mitigation
Demolition Subphase						
Fugitive Demolition Dust	--	--	--	--	0.00	No Demolition During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Demolition Dust	--	--	--	--	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Grading Subphase						
FugitiveDust	--	--	--	--	0.00	No Grading During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	--	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Dust	--	--	--	--	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	n/a	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Pavement and Asphalt Subphase						
Paving Off-Gas Emissions	--	0.37	--	--	--	
Off-Road Diesel Exhaust Emissions	268.99	34.03	238.41	--	10.34	
On-Road Diesel Exhaust Emissions	1.10	0.16	1.54	0.01	0.03	
Worker Commute Emissions	2.34	0.26	0.44	0.00	0.02	
Mitigation/Reduction						
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	No additional mitigation available for Off-Gas Emissions
On-Road Diesel Exhaust	0.99	0.14	0.83	0.01	0.02	Aqueous Fuel/Cooled Exhaust Gas Recirculation
Off-Road Diesel Exhaust	242.09	30.63	128.74	n/a	15.30	Aqueous Fuel/Cooled Exhaust Gas Recirculation
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Building Construction and Architectural Coatings Subphase						
Building Construction						
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	9.35	1.03	2.77	0.01	0.06	
Architectural Painting						
Off-Gas Emissions	--	98.98	--	--	--	
Worker Commute Trips	9.35	1.03	1.74	0.01	0.06	
Mitigation/Reduction						
Off-Road Diesel Exhaust	0.00	0.00	0.00	n/a	0.00	Aqueous Fuel/Cooled Exhaust Gas Recirculation
Off-Gas Emissions	--	0.00	--	--	--	No additional mitigation available for Off-Gas Emissions
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Net Emission Totals:	**48.04**	**105.08**	**115.32**	**0.03**	**-4.81**	
SCAQMD Threshold:	**550.00**	**75.00**	**100.00**	**150.00**	**150.00**	
Exceeds Threshold?	**No**	**Yes**	**Yes**	**No**	**No**	

Project Name **Riverpark** **Mitigated Emissions**
Subphase **H, Weeks 95 thru 99**
Length of Subphase (weeks) **5.00**
Year **2006**

Calculated Emissions
Mitigated Emissions

Emissions Source/Subphase	Emissions (Pounds per Day) CO	ROG	NOx	SOx	PM10	Mitigation
Demolition Subphase						
Fugitive Demolition Dust	--	--	--	--	0.00	No Demolition During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Demolition Dust	--	--	--	--	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Grading Subphase						
FugitiveDust	--	--	--	--	0.00	No Grading During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	--	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Dust	--	--	--	--	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	n/a	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Pavement and Asphalt Subphase						
Paving Off-Gas Emissions	--	0.37	--	--	--	
Off-Road Diesel Exhaust Emissions	268.99	34.03	238.41	--	10.34	
On-Road Diesel Exhaust Emissions	1.10	0.16	1.54	0.01	0.03	
Worker Commute Emissions	2.34	0.26	0.44	0.00	0.02	
Mitigation/Reduction						
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	No additional mitigation available for Off-Gas Emissions
On-Road Diesel Exhaust	0.99	0.14	0.83	0.01	0.02	Aqueous Fuel/Cooled Exhaust Gas Recirculation
Off-Road Diesel Exhaust	242.09	30.63	128.74	n/a	15.30	Aqueous Fuel/Cooled Exhaust Gas Recirculation
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Building Construction and Architectural Coatings Subphase						
Building Construction						
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	12.46	1.37	3.69	0.02	0.09	
Architectural Painting						
Off-Gas Emissions	--	155.59	--	--	--	
Worker Commute Trips	12.46	1.37	7.32	0.02	0.09	
Mitigation/Reduction						
Off-Road Diesel Exhaust	0.00	0.00	0.00	n/a	0.00	Aqueous Fuel/Cooled Exhaust Gas Recirculation
Off-Gas Emissions	--	0.00	--	--	--	No additional mitigation available for Off-Gas Emissions
Worker Commute Trips	0.12	0.02	0.03	0.00	0.00	
Net Emission Totals:	**54.15**	**162.36**	**116.79**	**0.04**	**-4.77**	
SCAQMD Threshold:	**550.00**	**75.00**	**100.00**	**150.00**	**150.00**	
Exceeds Threshold?	**No**	**Yes**	**Yes**	**No**	**No**	

Project Name **Riverpark** **Mitigated Emissions**
Subphase **I, Weeks 100 thru 105**
Length of Subphase (weeks) **6.00**
Year **2006**

Calculated Emissions
Mitigated Emissions

Emissions Source/Subphase	Emissions (Pounds per Day) CO	ROG	NOx	SOx	PM10	Mitigation
Demolition Subphase						
Fugitive Demolition Dust	--	--	--	--	0.00	No Demolition During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Demolition Dust	--	--	--	--	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Grading Subphase						
FugitiveDust	--	--	--	--	0.00	No Grading During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	--	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Dust	--	--	--	--	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	n/a	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Pavement and Asphalt Subphase						
Paving Off-Gas Emissions	--	0.37	--	--	--	
Off-Road Diesel Exhaust Emissions	621.81	83.71	634.47	--	28.74	
On-Road Diesel Exhaust Emissions	1.10	0.16	1.54	0.01	0.03	
Worker Commute Emissions	11.29	1.24	2.10	0.02	0.08	
Mitigation/Reduction						
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	No additional mitigation available for Off-Gas Emissions
On-Road Diesel Exhaust	0.99	0.14	0.83	0.01	0.02	Aqueous Fuel/Cooled Exhaust Gas Recirculation
Off-Road Diesel Exhaust	559.63	75.34	342.61	n/a	42.54	Aqueous Fuel/Cooled Exhaust Gas Recirculation
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	0
Building Construction and Architectural Coatings Subphase						
Building Construction						
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	15.58	1.71	4.61	0.02	0.11	
Architectural Painting						
Off-Gas Emissions	--	173.00	--	--	--	
Worker Commute Trips	15.58	1.71	2.90	0.02	0.11	
Mitigation/Reduction						
Off-Road Diesel Exhaust	0.00	0.00	0.00	n/a	0.00	Aqueous Fuel/Cooled Exhaust Gas Recirculation
Off-Gas Emissions	--	0.00	--	--	--	No additional mitigation available for Off-Gas Emissions
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	0
Net Emission Totals:	**104.74**	**186.43**	**302.18**	**0.06**	**-13.49**	
SCAQMD Threshold:	**550.00**	**75.00**	**100.00**	**150.00**	**150.00**	
Exceeds Threshold?	**No**	**Yes**	**Yes**	**No**	**No**	

Project Name Riverpark **Mitigated Emissions**
Subphase J, Weeks 106 thru 107
Length of Subphase (weeks) 2.00
Year 2006

Calculated Emissions
Mitigated Emissions

Emissions Source/Subphase	Emissions (Pounds per Day) CO	ROG	NOx	SOx	PM10	Mitigation
Demolition Subphase						
Fugitive Demolition Dust	--	--	--	--	0.00	No Demolition During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Demolition Dust	--	--	--	--	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Grading Subphase						
FugitiveDust	--	--	--	--	0.00	No Grading During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	--	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Dust	--	--	--	--	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	n/a	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Pavement and Asphalt Subphase						
Paving Off-Gas Emissions	--	0.00	--	--	--	No Pavement or Asphalt During This Subphase
Off-Road Diesel Exhaust Emissions	0.00	0.00	0.00	--	0.00	
On-Road Diesel Exhaust Emissions	0.00	0.00	0.00	0.00	0.00	
Worker Commute Emissions	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	n/a	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Building Construction and Architectural Coatings Subphase						
Building Construction						
Off-Road Diesel Exhaust	0.48	0.09	0.09	0.00	0.00	
Worker Commute Trips	15.58	1.71	4.61	0.02	0.11	
Architectural Painting						
Off-Gas Emissions	--	173.00	--	--	--	
Worker Commute Trips	15.58	1.71	1.90	0.02	0.11	
Mitigation/Reduction						
Off-Road Diesel Exhaust	0.00	0.00	0.00	n/a	0.00	Aqueous Fuel/Cooled Exhaust Gas Recirculation
Off-Gas Emissions	--	0.00	--	--	--	No additional mitigation available for Off-Gas Emissions
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Net Emission Totals:	**31.16**	**176.42**	**7.51**	**0.04**	**0.22**	
SCAQMD Threshold:	**550.00**	**75.00**	**100.00**	**150.00**	**150.00**	
Exceeds Threshold?	**No**	**Yes**	**No**	**No**	**No**	

Project Name Riverpark **Mitigated Emissions**
Subphase K, Weeks 108 thru 116
Length of Subphase (weeks) 9.00
Year 2006

Calculated Emissions
Mitigated Emissions

Emissions Source/Subphase	Emissions (Pounds per Day) CO	ROG	NOx	SOx	PM10	Mitigation
Demolition Subphase						
Fugitive Demolition Dust	--	--	--	--	0.00	No Demolition During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Demolition Dust	--	--	--	--	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Grading Subphase						
FugitiveDust	--	--	--	--	0.00	No Grading During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	--	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Dust	--	--	--	--	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	n/a	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Pavement and Asphalt Subphase						
Paving Off-Gas Emissions	--	0.12	--	--	--	
Off-Road Diesel Exhaust Emissions	268.99	34.03	238.47	--	10.34	
On-Road Diesel Exhaust Emissions	0.34	0.05	0.48	0.00	0.01	
Worker Commute Emissions	2.24	0.26	0.44	0.00	0.02	
Mitigation/Reduction						
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	No additional mitigation available for Off-Gas Emissions
On-Road Diesel Exhaust	0.31	0.04	0.26	0.00	0.01	Aqueous Fuel/Cooled Exhaust Gas Recirculation
Off-Road Diesel Exhaust	242.09	30.63	128.74	n/a	15.30	Aqueous Fuel/Cooled Exhaust Gas Recirculation
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Building Construction and Architectural Coatings Subphase						
Building Construction						
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	12.46	1.37	3.69	0.02	0.09	
Architectural Painting						
Off-Gas Emissions	--	129.33	--	--	--	
Worker Commute Trips	12.46	1.37	2.32	0.02	0.09	
Mitigation/Reduction						
Off-Road Diesel Exhaust	0.00	0.00	0.00	n/a	0.00	Aqueous Fuel/Cooled Exhaust Gas Recirculation
Off-Gas Emissions	--	0.00	--	--	--	No additional mitigation available for Off-Gas Emissions
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Net Emission Totals:	**54.19**	**138.85**	**116.34**	**0.04**	**-4.77**	
SCAQMD Threshold:	**550.00**	**75.00**	**100.00**	**150.00**	**150.00**	
Exceeds Threshold?	**No**	**Yes**	**Yes**	**No**	**No**	

Project Name Riverpark **Mitigated Emissions**
Subphase L, Weeks 117 thru 157
Length of Subphase (weeks) 41.00
Year 2006

Calculated Emissions
Mitigated Emissions

Emissions Source/Subphase	Emissions (Pounds per Day) CO	ROG	NOx	SOx	PM10	Mitigation
Demolition Subphase						
Fugitive Demolition Dust	--	--	--	--	0.00	No Demolition During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Demolition Dust	--	--	--	--	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Grading Subphase						
FugitiveDust	--	--	--	--	0.00	No Grading During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	--	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Dust	--	--	--	--	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	n/a	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Pavement and Asphalt Subphase						
Paving Off-Gas Emissions	--	0.00	--	--	--	No Pavement and Asphalt in this Subphase
Off-Road Diesel Exhaust Emissions	0.00	0.00	0.00	--	0.00	
On-Road Diesel Exhaust Emissions	0.00	0.00	0.00	0.00	0.00	
Worker Commute Emissions	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	n/a	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Building Construction and Architectural Coatings Subphase						
Building Construction						
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	9.35	1.03	2.77	0.01	0.06	
Architectural Painting						
Off-Gas Emissions	--	111.92	--	--	--	
Worker Commute Trips	9.35	1.03	1.74	0.01	0.06	
Mitigation/Reduction						
Off-Road Diesel Exhaust	0.00	0.00	0.00	n/a	0.00	Aqueous Fuel/Cooled Exhaust Gas Recirculation
Off-Gas Emissions	--	0.00	--	--	--	No additional mitigation available for Off-Gas Emissions
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Net Emission Totals:	**18.69**	**113.97**	**4.51**	**0.03**	**0.13**	
SCAQMD Threshold:	**550.00**	**75.00**	**100.00**	**150.00**	**150.00**	
Exceeds Threshold?	**No**	**Yes**	**No**	**No**	**No**	

Project Name Riverpark **Mitigated Emissions**
Subphase M, Weeks 158 thru 200
Length of Subphase (weeks) 43.00
Year 2007

Calculated Emissions
Mitigated Emissions

Emissions Source/Subphase	Emissions (Pounds per Day) CO	ROG	NOx	SOx	PM10	Mitigation
Demolition Subphase						
Fugitive Demolition Dust	--	--	--	--	0.00	No Demolition During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Demolition Dust	--	--	--	--	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Grading Subphase						
FugitiveDust	--	--	--	--	0.00	No Grading During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	--	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Dust	--	--	--	--	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	n/a	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Pavement and Asphalt Subphase						
Paving Off-Gas Emissions	--	0.00	--	--	--	No Pavement and Asphalt in this Subphase
Off-Road Diesel Exhaust Emissions	0.00	0.00	0.00	--	0.00	
On-Road Diesel Exhaust Emissions	0.00	0.00	0.00	0.00	0.00	
Worker Commute Emissions	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	n/a	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Building Construction and Architectural Coatings Subphase						
Building Construction						
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	5.73	0.63	1.70	0.00	0.04	
Architectural Painting						
Off-Gas Emissions	--	55.31	--	--	--	
Worker Commute Trips	5.73	0.63	1.07	0.00	0.04	
Mitigation/Reduction						
Off-Road Diesel Exhaust	0.00	0.00	0.00	n/a	0.00	Aqueous Fuel/Cooled Exhaust Gas Recirculation
Off-Gas Emissions	--	0.00	--	--	--	No additional mitigation available for Off-Gas Emissions
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	0
Net Emission Totals:	**11.47**	**56.58**	**2.78**	**0.01**	**0.08**	
SCAQMD Threshold:	**550.00**	**75.00**	**100.00**	**150.00**	**150.00**	
Exceeds Threshold?	**No**	**No**	**No**	**No**	**No**	

Project Name Riverpark **Mitigated Emissions**
Subphase N, Weeks 201 thru 219
Length of Subphase (weeks) 20.00
Year 2008

Calculated Emissions
Mitigated Emissions

Emissions Source/Subphase	Emissions (Pounds per Day) CO	ROG	NOx	SOx	PM10	Mitigation
Demolition Subphase						
Fugitive Demolition Dust	--	--	--	--	0.00	No Demolition During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Demolition Dust	--	--	--	--	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Grading Subphase						
FugitiveDust	--	--	--	--	0.00	No Grading During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	--	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Dust	--	--	--	--	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	n/a	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Pavement and Asphalt Subphase						
Paving Off-Gas Emissions	--	0.00	--	--	--	No Pavement and Asphalt in this Subphase
Off-Road Diesel Exhaust Emissions	0.00	0.00	0.00	--	0.00	
On-Road Diesel Exhaust Emissions	0.00	0.00	0.00	0.00	0.00	
Worker Commute Emissions	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	n/a	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Building Construction and Architectural Coatings Subphase						
Building Construction						
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	2.47	0.27	0.34	0.00	0.02	
Architectural Painting						
Off-Gas Emissions	--	29.38	--	--	--	
Worker Commute Trips	2.47	0.27	0.46	0.00	0.02	
Mitigation/Reduction						
Off-Road Diesel Exhaust	0.00	0.00	0.00	n/a	0.00	Aqueous Fuel/Cooled Exhaust Gas Recirculation
Off-Gas Emissions	--	0.00	--	--	--	No additional mitigation available for Off-Gas Emissions
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Net Emission Totals:	**4.94**	**29.92**	**1.20**	**0.00**	**0.04**	
SCAQMD Threshold:	**550.00**	**75.00**	**100.00**	**150.00**	**150.00**	
Exceeds Threshold?	**No**	**No**	**No**	**No**	**No**	

URBEMIS2002
UNMITIGATED OPERATIONAL EMISSIONS
SUMMERTIME

URBEMIS 2002 For Windows 7.4.2

File Name: C:\Program Files\URBEMIS 2002 For Windows\Riverpark August 2003.urb
Project Name: Riverpark August 2003
Project Location: South Coast Air Basin (Los Angeles area)
On-Road Motor Vehicle Emissions Based on EMFAC2002 version 2.2

SUMMARY REPORT
(Pounds/Day - Summer)

AREA SOURCE EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10
TOTALS (lbs/day,unmitigated)	65.17	19.41	14.98	0.17	0.05

OPERATIONAL (VEHICLE) EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10
TOTALS (lbs/day,unmitigated)	129.99	132.53	1,479.54	1.29	111.86

SUM OF AREA AND OPERATIONAL EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10
TOTALS (lbs/day,unmitigated)	195.15	151.94	1,494.52	1.46	111.91

AREA SOURCE EMISSION ESTIMATES (Summer Pounds per Day, Unmitigated)

Source	ROG	NOx	CO	SO2	PM10
Natural Gas	1.49	19.32	8.21	-	0.04
Wood Stoves - No summer emissions					
Fireplaces - No summer emissions					
Landscaping	0.81	0.09	6.77	0.17	0.01
Consumer Prdcts	62.87	-	-	-	-
TOTALS(lbs/day,unmitigated)	65.17	19.41	14.98	0.17	0.05

UNMITIGATED OPERATIONAL EMISSIONS

	ROG	NOx	CO	SO2	PM10
Single family housing	52.63	54.50	612.24	0.53	46.10
Apartments low rise	63.86	61.57	691.67	0.60	52.08
City park	0.18	0.12	1.31	0.00	0.10
Strip mall	13.31	16.34	174.32	0.16	13.57
TOTAL EMISSIONS (lbs/day)	129.99	132.53	1,479.54	1.29	111.86

Does not include correction for passby trips.
Does not include double counting adjustment for internal trips.

OPERATIONAL (Vehicle) EMISSION ESTIMATES

Analysis Year: 2004 Temperature (F): 90 Season: Summer

EMFAC Version: EMFAC2002 (9/2002)

Summary of Land Uses:

Unit Type	Trip Rate	Size	Total Trips
Single family housing	9.90 trips / dwelling units	459.00	4,544.10
Apartments low rise	6.90 trips / dwelling units	744.00	5,133.60
City park	2.60 trips / acres	4.50	11.70
Strip mall	40.00 trips / 1000 sq. ft.	40.00	1,600.00

Vehicle Assumptions:

Fleet Mix:

Vehicle Type	Percent Type	Non-Catalyst	Catalyst	Diesel
Light Auto	93.00	2.70	96.80	0.50
Light Truck < 3,750 lbs	0.00	4.60	92.70	2.70
Light Truck 3,751- 5,750	0.00	2.60	96.20	1.20
Med Truck 5,751- 8,500	2.00	2.90	94.20	2.90
Lite-Heavy 8,501-10,000	0.00	0.00	80.00	20.00
Lite-Heavy 10,001-14,000	0.00	0.00	66.70	33.30
Med-Heavy 14,001-33,000	0.00	10.00	20.00	70.00
Heavy-Heavy 33,001-60,000	2.00	0.00	12.50	87.50
Line Haul > 60,000 lbs	0.00	0.00	0.00	100.00
Urban Bus	0.10	0.00	0.00	100.00
Motorcycle	1.60	87.50	12.50	0.00
School Bus	0.00	0.00	0.00	100.00
Motor Home	1.30	15.40	76.90	7.70

Travel Conditions

	Residential			Commercial		
	Home-Work	Home-Shop	Home-Other	Commute	Non-Work	Customer
Urban Trip Length (miles)	11.5	4.9	6.0	10.3	5.5	5.5
Rural Trip Length (miles)	11.5	4.9	6.0	10.3	5.5	5.5
Trip Speeds (mph)	35.0	40.0	40.0	40.0	40.0	40.0
% of Trips - Residential	20.0	37.0	43.0			
% of Trips - Commercial (by land use)						
City park				5.0	2.5	92.5
Strip mall				2.0	1.0	97.0

Changes made to the default values for Land Use Trip Percentages

Changes made to the default values for Area

The natural gas residential percentage changed from 60 to 100.
The consumer product persons per residential unit changed from 2.861 to 3.056.

Changes made to the default values for Operations

The light auto percentage changed from 56.1 to 93.
The light truck < 3750 lbs percentage changed from 15.1 to 0.
The light truck 3751-5750 percentage changed from 15.6 to 0.
The med truck 5751-8500 percentage changed from 6.9 to 2.
The lite-heavy truck 8501-10000 percentage changed from 1.0 to 0.
The lite-heavy truck 10001-14000 percentage changed from 0.3 to 0.
The med-heavy truck 14001-33000 percentage changed from 1.0 to 0.
The heavy-heavy truck 33001-60000 percentage changed from 0.8 to 2.
The school bus percentage changed from 0.2 to 0.
The double counting internal work trip limit changed from to 32.585.
The double counting shopping trip limit changed from to 16.2925.
The double counting other trip limit changed from to 1562.8225.
Mitigation measure Provide Sidewalks and/or Pedestrian Paths:1
has been changed from off to on.
Mitigation measure Provide Direct Pedestrian Connections:1
has been changed from off to on.
Mitigation measure Provide Pedestrian Safety:0.5
has been changed from off to on.
Mitigation measure Provide Street Lighting:0.5
has been changed from off to on.
Mitigation measure Provide Pedestrian Signalization and Signage:0.5
has been changed from off to on.
Mitigation measure Floor Area Ratio 0.75 or Greater:1
has been changed from off to on.
Mitigation measure Provide Street Lighting:0.5
has been changed from off to on.
Mitigation measure Project Provides Shade Trees to Shade Sidewalks:0.5
has been changed from off to on.
Mitigation measure Provide Pedestrian Safety Designs/Infrastructure at Crossings:0.5
has been changed from off to on.
Mitigation measure Articulated Storefront(s) Display Windows with Visual Interest:0.25
has been changed from off to on.
Mitigation measure No Long Uninterrupted Walls Along Pedestrian Walkways:0.25
has been changed from off to on.
Mitigation measure Provide Bike Lanes/Paths Connecting to Bikeway System:2
has been changed from off to on.

URBEMIS2002
UNMITIGATED OPERATIONAL EMISSIONS
WINTERTIME

URBEMIS 2002 For Windows 7.4.2

File Name: C:\Program Files\URBEMIS 2002 For Windows\Riverpark August 2003.urb
Project Name: Riverpark August 2003
Project Location: South Coast Air Basin (Los Angeles area)
On-Road Motor Vehicle Emissions Based on EMFAC2002 version 2.2

SUMMARY REPORT
(Pounds/Day - Winter)

AREA SOURCE EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10
TOTALS (lbs/day,unmitigated)	1,726.58	84.00	4,016.68	10.58	615.07

OPERATIONAL (VEHICLE) EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10
TOTALS (lbs/day,unmitigated)	119.88	191.06	1,393.67	1.14	111.86

SUM OF AREA AND OPERATIONAL EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10
TOTALS (lbs/day,unmitigated)	1,846.46	275.05	5,410.35	11.72	726.93

AREA SOURCE EMISSION ESTIMATES (Winter Pounds per Day, Unmitigated)

Source	ROG	NOx	CO	SO2	PM10
Natural Gas	1.49	19.32	8.21	-	0.04
Wood Stoves	314.75	49.37	2,522.13	8.23	411.44
Fireplaces	1,347.47	15.30	1,486.33	2.35	203.59
Landscaping - No winter emissions					
Consumer Prdcts	62.87	-	-	-	-
TOTALS(lbs/day,unmitigated)	1,726.58	84.00	4,016.68	10.58	615.07

UNMITIGATED OPERATIONAL EMISSIONS

	ROG	NOx	CO	SO2	PM10
Single family housing	49.46	78.59	574.77	0.47	46.10
Apartments low rise	56.00	88.79	649.34	0.53	52.08
City park	0.11	0.18	1.26	0.00	0.10
Strip mall	14.32	23.51	168.31	0.14	13.57
TOTAL EMISSIONS (lbs/day)	119.88	191.06	1,393.67	1.14	111.86

Does not include correction for passby trips.
Does not include double counting adjustment for internal trips.

OPERATIONAL (Vehicle) EMISSION ESTIMATES

Analysis Year: 2004 Temperature (F): 50 Season: Winter

EMFAC Version: EMFAC2002 (9/2002)

Summary of Land Uses:

Unit Type	Trip Rate	Size	Total Trips
Single family housing	9.90 trips / dwelling units	459.00	4,544.10
Apartments low rise	6.90 trips / dwelling units	744.00	5,133.60
City park	2.60 trips / acres	4.50	11.70
Strip mall	40.00 trips / 1000 sq. ft.	40.00	1,600.00

Vehicle Assumptions:

Fleet Mix:

Vehicle Type	Percent Type	Non-Catalyst	Catalyst	Diesel
Light Auto	93.00	2.70	96.80	0.50
Light Truck < 3,750 lbs	0.00	4.60	92.70	2.70
Light Truck 3,751- 5,750	0.00	2.60	96.20	1.20
Med Truck 5,751- 8,500	2.00	2.90	94.20	2.90
Lite-Heavy 8,501-10,000	0.00	0.00	80.00	20.00
Lite-Heavy 10,001-14,000	0.00	0.00	66.70	33.30
Med-Heavy 14,001-33,000	0.00	10.00	20.00	70.00
Heavy-Heavy 33,001-60,000	2.00	0.00	12.50	87.50
Line Haul > 60,000 lbs	0.00	0.00	0.00	100.00
Urban Bus	0.10	0.00	0.00	100.00
Motorcycle	1.60	87.50	12.50	0.00
School Bus	0.00	0.00	0.00	100.00
Motor Home	1.30	15.40	76.90	7.70

Travel Conditions

	Residential			Commercial		
	Home-Work	Home-Shop	Home-Other	Commute	Non-Work	Customer
Urban Trip Length (miles)	11.5	4.9	6.0	10.3	5.5	5.5
Rural Trip Length (miles)	11.5	4.9	6.0	10.3	5.5	5.5
Trip Speeds (mph)	35.0	40.0	40.0	40.0	40.0	40.0
% of Trips - Residential	20.0	37.0	43.0			
% of Trips - Commercial (by land use)						
City park				5.0	2.5	92.5
Strip mall				2.0	1.0	97.0

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SUMMERTIME EMISSIONS REDUCTIONS

ESTIMATED EMISSIONS REDUCTIONS EFFICIENCIES
River Park Recommended Mitigation - Summertime Emissions

Input Fields

LAND USE		Mitigated Emissions in Pounds per Day			
		CO	VOC	NO_x	PM_{10}
Single Family Residential Uses	Vehicular Sources	672.2	58.6	54.9	48.1
	Area Sources	5.0	4.7	0.5	0.0
Multi-Family Residential Uses	Vehicular Sources	691.9	63.9	61.6	53.1
	Area Sources	8.6	23.7	0.5	0.0
Commercial/Office Uses	Vehicular Sources	174.3	13.2	16.2	13.6
	Area Sources	5.6	21.7	0.5	0.0
Industrial Uses	Vehicular Sources				
	Area Sources				
Total Emissions	Vehicular Sources	1,478.4	129.8	132.4	111.8
	Area Sources	15.0	65.2	19.4	0.1
	Total Non-Reduced Emissions	1,493.4	195.0	151.8	111.8

Recommended (Measures already incorporated into Project are marked "No."			Emission Reduction Efficiency				Reduced Emissions in Pounds per Day				
Yes	No	MEASURES, EFFICIENCIES, AND REDUCTIONS	CO	VOC	NO_x	PM_{10}	CO	VOC	NO_x	PM_{10}	REASONS FOR REJECTING MITIGATION MEASURES
Stationary Sources											
All Residential Uses											
X		Use solar or low emission water heaters	10.0%	11.0%	9.5%	4.5%	1.0	4.8	1.2	0.0	
X		Use built-in energy-efficient appliances	3.0%	2.5%	3.0%	6.5%	0.3	1.1	0.4	0.0	
	X	Provide shade trees to reduce heating/cooling needs	0.0%	0.0%	0.0%	0.5%	0.0	0.0	0.0	0.0	This measure is already incorporated into the project.
X		Use energy-efficient and automated controls for air conditioners	0.0%	0.0%	0.0%	0.5%	0.0	0.0	0.0	0.0	
X		Use double-glass paned windows	4.5%	4.5%	4.0%	2.5%	0.4	2.0	0.5	0.0	
	X	Provide ventilation systems for enclosed parking facilities	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	Measure does not reduce emissions.
X		Use lighting controls and energy efficient lighting	0.0%	0.0%	0.0%	0.5%	0.0	0.0	0.0	0.0	
	X	Use fuel cells in residential subdivisions to produce heat and elec.	1.0%	0.0%	1.5%	7.0%	0.0	0.0	0.0	0.0	Measure not feasible.
X		Orient buildings to the north	13.5%	14.0%	13.0%	10.5%	1.3	6.1	1.7	0.0	
X		Use light-colored roof materials to reflect heat	1.5%	1.5%	1.5%	1.5%	0.1	0.7	0.2	0.0	
X		Comply with Title 24	13.0%	14.0%	13.0%	7.5%	1.3	6.1	1.7	0.0	
Multi-Family Residential Uses											
X		Use central water heating systems	8.5%	9.0%	8.0%	4.0%	0.4	2.0	0.5	0.0	
Commercial and Office Uses											
X		Use solar or low emission water heaters	0.5%	0.5%	0.5%	0.5%	0.0	0.1	0.0	0.0	
		Use central water heating systems	0.5%	0.5%	0.5%	0.5%	FALSE	FALSE	FALSE	FALSE	
	X	Provide shade trees to reduce heating/cooling needs	0.5%	0.5%	0.5%	1.0%	0.0	0.0	0.0	0.0	Measure already incorporated into project
X		Use energy-efficient and automated controls for air conditioners	1.0%	1.0%	1.0%	1.5%	0.0	0.2	0.1	0.0	
X		Use double-glass paned windows	3.0%	3.5%	3.0%	2.5%	0.1	0.8	0.2	0.0	
	X	Use energy-efficient low-sodium parking lights	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	Measure does not reduce emissions.
	X	Provide ventilation systems for enclosed parking facilities	0.0%	0.0%	0.0%	0.5%	0.0	0.0	0.0	0.0	No parking garage is proposed on site.
X		Use lighting controls and energy efficient lighting	7.0%	3.0%	8.5%	19.5%	0.3	0.7	0.5	0.0	
X		Use light-colored roof materials to reflect heat	1.0%	1.0%	1.0%	0.5%	0.0	0.2	0.1	0.0	
X		Comply with Title 24	9.5%	10.0%	9.0%	7.0%	0.5	2.2	0.6	0.0	
X		Orient buildings to the north	12.5%	11.0%	13.5%	17.5%	0.6	2.4	0.9	0.0	
Industrial Uses											
	X	Provide shade trees to reduce heating/cooling needs	0.0%	0.0%	0.0%	0.5%	0.0	0.0	0.0	0.0	No industrial uses are proposed within the project.
	X	Use energy-efficient and automated controls for air conditioners	0.0%	0.0%	0.0%	1.0%	0.0	0.0	0.0	0.0	
	X	Use double-glass paned windows	0.0%	0.0%	0.5%	1.0%	0.0	0.0	0.0	0.0	
	X	Use energy-efficient low-sodium parking lights	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	
	X	Provide ventilation systems for enclosed parking facilities	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	
	X	Use lighting controls and energy efficient lighting	0.5%	0.0%	1.0%	2.5%	0.0	0.0	0.0	0.0	
	X	Use light-colored roof materials to reflect heat	0.0%	0.0%	0.0%	0.5%	0.0	0.0	0.0	0.0	
	X	Orient buildings to the north	2.5%	2.0%	3.0%	5.5%	0.0	0.0	0.0	0.0	
	X	Comply with Title 24	0.5%	0.0%	1.0%	3.0%	0.0	0.0	0.0	0.0	
	X	Improved storage and handling of source materials	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	
	X	Materials substitution (e.g., use water-based paints, life cycle analysis)	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	
	X	Utilize efficient manufacturing processes	1.5%	0.5%	2.0%	6.0%	0.0	0.0	0.0	0.0	
	X	Resource recovery systems	3.0%	3.5%	3.0%	1.5%	0.0	0.0	0.0	0.0	

ESTIMATED EMISSIONS REDUCTIONS EFFICIENCIES
River Park Recommended Mitigation - Summertime Emissions

Recommended (Measures already incorporated into Project are marked "No."			Emission Reduction Efficiency				Reduced Emissions in Pounds per Day				
Yes	No	MEASURES, EFFICIENCIES, AND REDUCTIONS	CO	VOC	NO_x	PM_{10}	CO	VOC	NO_x	PM_{10}	REASONS FOR REJECTING MITIGATION MEASURES
Mobile Sources											
Residential Uses											
	X	Allow satellite telecommunications centers in residential subdivisions	0.1%	0.1%	0.1%	0.1%	0.0	0.0	0.0	0.0	Satellite telecommunication centers are superseded by other technology.
	X	Shuttle service from res. subdivisions to commercial core areas	0.1%	0.1%	0.1%	0.1%	0.0	0.0	0.0	0.0	Bus transit and Metrolink already serve the area.
X		Construct bus passenger benches and shelters	0.2%	0.2%	0.2%	0.2%	2.6	0.2	0.2	0.2	
	X	Construct pedestrian facility improvements	0.1%	0.1%	0.1%	0.1%	0.0	0.0	0.0	0.0	This measure is already incorporated into the project.
	X	Retail services within or adjacent to residential subdivisions	1.3%	1.0%	1.3%	1.3%	0.0	0.0	0.0	0.0	This measure is already incorporated into the project.
	X	Shuttles to major rail transit centers or multi-modal stations	0.1%	0.1%	0.1%	0.1%	0.0	0.0	0.0	0.0	Bus transit and Metrolink already serve the area.
X		Contribute to regional transit systems	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	
X		Synchronize traffic lights on streets impacted by development	4.0%	4.0%	4.0%	4.0%	52.2	4.7	4.6	3.9	
	X	Construct bicycle trails	0.1%	0.1%	0.1%	0.1%	0.0	0.0	0.0	0.0	This measure is already incorporated into the project.
Commercial Uses											
	X	Preferential parking spaces for carpools and vanpools	0.1%	0.1%	0.1%	0.1%	0.0	0.0	0.0	0.0	Retail commercial is not suited for carpools and vanpools.
	X	Implement on-site circulation plan in parking lots	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	Measure does not reduce emissions.
	X	Provide separate windows for fast-food restaurants	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	Measure does not reduce emissions.
	X	Provide video-conference facilities	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	No office requiring video conferencing is proposed on the site.
	X	Set up resident worker training programs to improve job/housing balance	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	Measure does not reduce emissions.
	X	Implement home dispatching system for employees	0.1%	0.0%	0.1%	0.1%	0.0	0.0	0.0	0.0	This measure is not suitable for retail uses.
	X	Minimize use of fleet vehicles during smog alerts	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	Retail use does not employ fleet vehicles.
	X	Use low emission fleet vehicles	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	Retail use does not employ fleet vehicles.
	X	Reduce employee parking spaces for those business not under Rule 2202	0.1%	0.1%	0.1%	0.1%	0.0	0.0	0.0	0.0	Staggered retail employee hours not suited for carpooling or vanpooling
	X	Lunch shuttle service from a worksite to food establishments	0.5%	0.4%	0.5%	0.5%	0.0	0.0	0.0	0.0	Adequate restaurant uses exist in project area within walking distance.
	X	Implement compressed work-week schedules	1.0%	0.8%	1.0%	1.0%	0.0	0.0	0.0	0.0	Compressed work weeks not suitable for retail uses.
	X	Trip reduction plan to achieve 1.5 AVR for businesses	0.1%	0.1%	0.1%	0.1%	0.0	0.0	0.0	0.0	Staggered retail employee hours not suited for carpooling or vanpooling
	X	Utilize satellite offices rather than regular worksite to reduce VMT	0.1%	0.1%	0.1%	0.1%	0.0	0.0	0.0	0.0	Office uses not proposed on the commercial site.
	X	Establish a home-based telecommuting program	0.1%	0.1%	0.1%	0.1%	0.0	0.0	0.0	0.0	Telecommuting not suitable for retail uses.
	X	Provide or contribute to child care and after school facilities	0.1%	0.1%	0.1%	0.1%	0.0	0.0	0.0	0.0	There is no clear connection between providing this service and reducing air emissions.
	X	Offer travel incentives such as discounts on purchases for transit riders	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	Measure does not reduce emissions.
	X	Provide on-site employee services such as cafeteria, banks, etc.	0.3%	0.2%	0.3%	0.3%	0.0	0.0	0.0	0.0	Food establishments and services already exist in the project area.
	X	Shuttle service from residential core area to the worksite	0.1%	0.1%	0.1%	0.1%	0.0	0.0	0.0	0.0	There is no residential core that would generate all or most of the employees for this project.
X		Construct bus passenger benches and shelters	0.1%	0.1%	0.1%	0.1%	0.2	0.0	0.0	0.0	
	X	Pricing structure for single-occupancy employee parking	2.0%	1.5%	2.0%	2.0%	0.0	0.0	0.0	0.0	Employee scheduling of retail uses do not facilitate carpooling, so single occupancy vehicles are the norm.
	X	Residential units within or adjacent to commercial developments	4.0%	3.1%	4.0%	4.0%	0.0	0.0	0.0	0.0	Measure already incorporated into project
	X	Utilize excess parking as park-n-ride or contribute to park-n-ride	0.1%	0.1%	0.1%	0.1%	0.0	0.0	0.0	0.0	No excess parking is proposed at the project.
	X	Construct bicycle facility improvements	0.3%	0.2%	0.3%	0.3%	0.0	0.0	0.0	0.0	Measure already incorporated into project
	X	Construct pedestrian facility improvements	0.2%	0.2%	0.2%	0.2%	0.0	0.0	0.0	0.0	Measure already incorporated into project
	X	Shuttles to major rail transit centers or multi-modal stations	0.1%	0.1%	0.1%	0.1%	0.0	0.0	0.0	0.0	Bus service already serves the area.
X		Contribute to regional transit systems	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	
	X	Charge visitors to park	2.0%	1.5%	2.0%	2.0%	0.0	0.0	0.0	0.0	Retail uses do not typically charge patrons to park.
X		Synchronize traffic lights on streets impacted by development	4.0%	4.0%	4.0%	4.0%	7.0	0.5	0.7	0.5	
	X	Reschedule truck deliveries and pickups for off-peak hours	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	Measure does not reduce emissions.
	X	Paid parking at walkup kiosks	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	Retail uses do not typically charge patrons to park.
	X	On-site truck loading zones	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	Measure does not reduce emissions.
	X	Implement or contribute to public outreach programs	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	Measure does not reduce emissions.
X		Provide commuter information areas	0.1%	0.1%	0.1%	0.1%	0.2	0.0	0.0	0.0	

ESTIMATED EMISSIONS REDUCTIONS EFFICIENCIES
River Park Recommended Mitigation - Summertime Emissions

Recommended (Measures already incorporated into Project are marked "No." Yes	No	MEASURES, EFFICIENCIES, AND REDUCTIONS	Emission Reduction Efficiency CO	VOC	NO_x	PM_{10}	Reduced Emissions in Pounds per Day CO	VOC	NO_x	PM_{10}	REASONS FOR REJECTING MITIGATION MEASURES
Industrial Uses											
	X	Preferential parking spaces for carpools and vanpools	0.1%	0.1%	0.1%	0.1%	0.0	0.0	0.0	0.0	No industrial uses are proposed within the project.
	X	Implement on-site circulation plan in parking lots	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	
	X	Set up resident worker training programs to improve job/housing balance	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	
	X	Implement home dispatching system for employees	0.1%	0.0%	0.1%	0.1%	0.0	0.0	0.0	0.0	
	X	Minimize use of fleet vehicles during smog alerts	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	
	X	Use low emission fleet vehicles	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	
	X	Provide commuter information areas	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	
	X	Reduce employee parking spaces for those business not under Rule 2202	0.1%	0.1%	0.1%	0.1%	0.0	0.0	0.0	0.0	
	X	Implement compressed work-week schedules	1.0%	0.8%	1.0%	1.0%	0.0	0.0	0.0	0.0	
	X	Offer loans or other incentives to employees who move locally	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	
	X	Trip reduction plan to achieve 1.5 AVR for businesses	0.1%	0.1%	0.1%	0.1%	0.0	0.0	0.0	0.0	
	X	Provide or contribute to child care and after school facilities	0.1%	0.1%	0.1%	0.1%	0.0	0.0	0.0	0.0	
	X	Provide on-site employee services such as cafetaria, banks, etc.	0.2%	0.2%	0.3%	0.3%	0.0	0.0	0.0	0.0	
	X	Shuttle service from residential core area to the worksite	0.1%	0.1%	0.1%	0.1%	0.0	0.0	0.0	0.0	
	X	Construct bus passenger benches and shelters	0.1%	0.1%	0.1%	0.1%	0.0	0.0	0.0	0.0	
	X	Pricing structure for single-occupancy employee parking	2.0%	1.5%	2.0%	2.0%	0.0	0.0	0.0	0.0	
	X	Utilize excess parking as park-n-ride or contribute to park-n-ride	0.1%	0.1%	0.1%	0.1%	0.0	0.0	0.0	0.0	
	X	Construct bicycle facility improvements	0.3%	0.2%	0.3%	0.3%	0.0	0.0	0.0	0.0	
	X	Construct pedestrian facility improvements	0.2%	0.2%	0.2%	0.2%	0.0	0.0	0.0	0.0	
	X	Shuttles to major rail transit centers or multi-modal stations	0.1%	0.1%	0.1%	0.1%	0.0	0.0	0.0	0.0	
	X	Contribute to regional transit systems	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	
	X	Synchronize traffic lights on streets impacted by development	4.0%	4.0%	4.0%	4.0%	0.0	0.0	0.0	0.0	
	X	Reschedule truck deliveries and pickups for off-peak hours	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	
	X	Lunch shuttle system from worksite to food establishments	0.5%	0.4%	0.5%	0.5%	0.0	0.0	0.0	0.0	
	X	On-site truck loading zones	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	
	X	Install aerodynamic add-on devices to heavy-duty trucks	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	
	X	Implement or contribute to public outreach programs	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	
	X	Reduce ship cruising speeds in the inner harbor	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	
	X	Use low-emission fuels or electrify airport ground service vehicles	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	
	X	Engine tuning for marine vessels	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	
	X	Reduce number of aircraft engines used during idling	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	
	X	Install monitoring system to control airport shuttles	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	
	X	Use centralized ground power systems for airport service vehicles	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	
		Net Reduction in Stationary Sources Emissions (Pounds per day)					6.7	29.1	8.6	0.0	
		Net Reduction in Mobile Sources Emissions (Pounds per day)					62.1	5.5	5.6	4.7	
		Total Net Reduction in Emissions (Pounds per day)					68.8	34.6	14.1	4.7	
		No Wood Burning Fire Places or Stoves in Residential Units									
		Percentage Reduced					4.6%	17.7%	9.3%	4.2%	
		Total Reduced Stationary Source Emissions					8.3	36.1	10.8	0.0	
		Total Reduced Mobile Source Emissions					1416.3	124.3	126.8	107.1	
		TOTAL REDUCED EMISSIONS					1,424.6	160.4	137.7	107.1	
		SCAQMD Thresholds					550.0	55.0	55.0	150.0	
		ProjectAir Quality Impacts Significant?					YES	YES	YES	NO	

Impact Sciences, Inc.
Prepared by R. Mamaghani
11/14/03

Based on SCAQMD
CEQA Air Quality Handbook
Table 11-6

WINTERTIME EMISSIONS REDUCTIONS

ESTIMATED EMISSIONS REDUCTIONS EFFICIENCIES
River Park Recommended Mitigation - Wintertime Emissions Without Wood Burning Stoves or Fire Places

Input Fields

LAND USE		Unmitigated Emissions in Pounds per Day			
		CO	VOC	NO_x	PM_{10}
Single Family Residential Uses	Vehicular Sources	574.8	49.6	78.6	46.1
	Area Sources	2.7	21.5	0.4	0.0
Multi-Family Residential Uses	Vehicular Sources	649.3	54.0	88.8	52.0
	Area Sources	2.7	21.5	0.4	0.0
Commercial/Office Uses	Vehicular Sources	168.3	14.8	23.5	13.8
	Area Sources	2.7	21.5	0.4	0.0
Industrial Uses	Vehicular Sources				
	Area Sources				
Total Emissions	Vehicular Sources	1,392.4	119.8	190.9	111.7
	Area Sources	8.2	64.4	19.3	0.0
	Total Non-Reduced Emissions	1,400.6	184.1	210.2	111.8

Recommended (Measures already incorporated into Project are marked "No."			Emission Reduction Efficiency				Reduced Emissions in Pounds per Day				
Yes	No	MEASURES, EFFICIENCIES, AND REDUCTIONS	CO	VOC	NO_x	PM_{10}	CO	VOC	NO_x	PM_{10}	REASONS FOR REJECTING MITIGATION MEASURES
Stationary Sources											
All Residential Uses											
X		Use solar or low emission water heaters	10.0%	11.0%	9.5%	4.5%	0.5	4.7	1.2	0.0	
X		Use built-in energy-efficient appliances	3.0%	2.5%	3.0%	6.5%	0.2	1.1	0.4	0.0	
	X	Provide shade trees to reduce heating/cooling needs	0.0%	0.0%	0.0%	0.5%	0.0	0.0	0.0	0.0	This measure is already incorporated into the project.
X		Use energy-efficient and automated controls for air conditioners	0.0%	0.0%	0.0%	0.5%	0.0	0.0	0.0	0.0	
X		Use double-glass paned windows	4.5%	4.5%	4.0%	2.5%	0.2	1.9	0.5	0.0	
	X	Provide ventilation systems for enclosed parking facilities	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	Measure does not reduce emissions.
X		Use lighting controls and energy efficient lighting	0.0%	0.0%	0.0%	0.5%	0.0	0.0	0.0	0.0	
	X	Use fuel cells in residential subdivisions to produce heat and elec.	1.0%	0.0%	1.5%	7.0%	0.0	0.0	0.0	0.0	Measure not feasible.
X		Orient buildings to the north	13.5%	14.0%	13.0%	10.5%	0.7	6.0	1.7	0.0	
X		Use light-colored roof materials to reflect heat	1.5%	1.5%	1.5%	1.5%	0.1	0.6	0.2	0.0	
X		Comply with Title 24	13.0%	14.0%	13.0%	7.5%	0.7	6.0	1.7	0.0	
Multi-Family Residential Uses											
X		Use central water heating systems	8.5%	9.0%	8.0%	4.0%	0.2	1.9	0.5	0.0	
Commercial and Office Uses											
X		Use solar or low emission water heaters	0.5%	0.5%	0.5%	0.5%	0.0	0.1	0.0	0.0	
		Use central water heating systems	0.5%	0.5%	0.5%	0.5%	FALSE	FALSE	FALSE	FALSE	
	X	Provide shade trees to reduce heating/cooling needs	0.5%	0.5%	0.5%	1.0%	0.0	0.0	0.0	0.0	Measure already incorporated into project
X		Use energy-efficient and automated controls for air conditioners	1.0%	1.0%	1.0%	1.5%	0.0	0.2	0.1	0.0	
X		Use double-glass paned windows	3.0%	3.5%	3.0%	2.5%	0.1	0.8	0.2	0.0	
	X	Use energy-efficient low-sodium parking lights	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	Measure does not reduce emissions.
	X	Provide ventilation systems for enclosed parking facilities	0.0%	0.0%	0.0%	0.5%	0.0	0.0	0.0	0.0	No parking garage is proposed on site.
X		Use lighting controls and energy efficient lighting	7.0%	8.0%	8.5%	19.5%	0.2	0.6	0.5	0.0	
X		Use light-colored roof materials to reflect heat	1.0%	1.0%	1.0%	0.5%	0.0	0.2	0.1	0.0	
X		Comply with Title 24	9.5%	10.0%	9.0%	7.0%	0.3	2.1	0.6	0.0	
X		Orient buildings to the north	12.5%	11.0%	13.5%	17.5%	0.3	2.4	0.9	0.0	
Industrial Uses											
	X	Provide shade trees to reduce heating/cooling needs	0.0%	0.0%	0.0%	0.5%	0.0	0.0	0.0	0.0	No industrial uses are proposed within the project.
	X	Use energy-efficient and automated controls for air conditioners	0.0%	0.0%	0.0%	1.0%	0.0	0.0	0.0	0.0	
	X	Use double-glass paned windows	0.0%	0.0%	0.5%	1.0%	0.0	0.0	0.0	0.0	
	X	Use energy-efficient low-sodium parking lights	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	
	X	Provide ventilation systems for enclosed parking facilities	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	
	X	Use lighting controls and energy efficient lighting	0.5%	0.0%	1.0%	2.5%	0.0	0.0	0.0	0.0	
	X	Use light-colored roof materials to reflect heat	0.0%	0.0%	0.0%	0.5%	0.0	0.0	0.0	0.0	
	X	Orient buildings to the north	2.5%	2.0%	3.0%	5.5%	0.0	0.0	0.0	0.0	
	X	Comply with Title 24	0.5%	0.0%	1.0%	3.0%	0.0	0.0	0.0	0.0	
	X	Improved storage and handling of source materials	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	
	X	Materials substitution (e.g., use water-based paints, life cycle analysis)	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	
	X	Utilize efficient manufacturing processes	1.5%	0.5%	2.0%	6.0%	0.0	0.0	0.0	0.0	
	X	Resource recovery systems	3.0%	3.5%	3.0%	1.5%	0.0	0.0	0.0	0.0	

Impact Sciences, Inc.
Prepared by R. Mamaghani
11/14/08

Based on SCAQMD
CEQA Air Quality Handbook
Table 11-6

ESTIMATED EMISSIONS REDUCTIONS EFFICIENCIES
River Park Recommended Mitigation - Wintertime Emissions Without Wood Burning Stoves or Fire Places

Recommended (Measures already incorporated into Project are marked "No."			Emission Reduction Efficiency				Reduced Emissions in Pounds per Day				
Yes	No	MEASURES, EFFICIENCIES, AND REDUCTIONS	CO	VOC	NO_x	PM_{10}	CO	VOC	NO_x	PM_{10}	REASONS FOR REJECTING MITIGATION MEASURES
Mobile Sources											
Residential Uses											
	X	Allow satellite telecommunications centers in residential subdivisions	0.1%	0.1%	0.1%	0.1%	0.0	0.0	0.0	0.0	Satellite telecommunications centers are superseded by other technology.
	X	Shuttle service from res. subdivisions to commercial core areas	0.1%	0.1%	0.1%	0.1%	0.0	0.0	0.0	0.0	Bus transit and Metrolink already serve the area.
X		Construct bus passenger benches and shelters	0.2%	0.2%	0.2%	0.2%	2.4	0.2	0.3	0.2	
	X	Construct pedestrian facility improvements	0.1%	0.1%	0.1%	0.1%	0.0	0.0	0.0	0.0	This measure is already incorporated into the project.
	X	Retail services within or adjacent to residential subdivisions	1.3%	1.0%	1.3%	1.3%	0.0	0.0	0.0	0.0	This measure is already incorporated into the project.
	X	Shuttles to major rail transit centers or multi-modal stations	0.1%	0.1%	0.1%	0.1%	0.0	0.0	0.0	0.0	Bus transit and Metrolink already serve the area.
X		Contribute to regional transit systems	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	
X		Synchronize traffic lights on streets impacted by development	4.0%	4.0%	4.0%	4.0%	49.0	4.2	6.7	3.9	
	X	Construct bicycle trails	0.1%	0.1%	0.1%	0.1%	0.0	0.0	0.0	0.0	This measure is already incorporated into the project.
Commercial Uses											
	X	Preferential parking spaces for carpools and vanpools	0.1%	0.1%	0.1%	0.1%	0.0	0.0	0.0	0.0	Retail commercial is not suited for carpools and vanpools.
	X	Implement on-site circulation plan in parking lots	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	Measure does not reduce emissions.
	X	Provide separate windows for fast-food restaurants	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	Measure does not reduce emissions.
	X	Provide video-conference facilities	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	No office requiring video conferencing is proposed on the site.
	X	Set up resident worker training programs to improve job/housing balance	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	Measure does not reduce emissions.
	X	Implement home dispatching system for employees	0.1%	0.0%	0.1%	0.1%	0.0	0.0	0.0	0.0	This measure is not suitable for retail uses.
	X	Minimize use of fleet vehicles during smog alerts	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	Retail use does not employ fleet vehicles.
	X	Use low emission fleet vehicles	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	Retail use does not employ fleet vehicles.
	X	Reduce employee parking spaces for those business not under Rule 2202	0.1%	0.1%	0.1%	0.1%	0.0	0.0	0.0	0.0	Staggered retail employee hours not suited for carpooling or vanpooling.
	X	Lunch shuttle service from a worksite to food establishments	0.5%	0.4%	0.5%	0.5%	0.0	0.0	0.0	0.0	Adequate restaurant uses exist in project area within walking distance.
	X	Implement compressed work-week schedules	1.0%	0.8%	1.0%	1.0%	0.0	0.0	0.0	0.0	Compressed work weeks not suitable for retail uses.
	X	Trip reduction plan to achieve 1.5 AVR for businesses	0.1%	0.1%	0.1%	0.1%	0.0	0.0	0.0	0.0	Staggered retail employee hours not suited for carpooling or vanpooling.
	X	Utilize satellite offices rather than regular worksite to reduce VMT	0.1%	0.1%	0.1%	0.1%	0.0	0.0	0.0	0.0	Office uses not proposed on the commercial site.
	X	Establish a home-based telecommuting program	0.1%	0.1%	0.1%	0.1%	0.0	0.0	0.0	0.0	Telecommuting not suitable for retail uses.
	X	Provide or contribute to child care and after school facilities	0.1%	0.1%	0.1%	0.1%	0.0	0.0	0.0	0.0	There is no clear connection between providing this service and reducing air emissions.
	X	Offer travel incentives such as discounts on purchases for transit riders	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	Measure does not reduce emissions.
	X	Provide on-site employee services such as cafeteria, banks, etc.	0.3%	0.2%	0.3%	0.3%	0.0	0.0	0.0	0.0	Food establishments and services already exist in the project area.
	X	Shuttle service from residential core area to the worksite	0.1%	0.1%	0.1%	0.1%	0.0	0.0	0.0	0.0	There is no residential core that would generate all or most of the employees for this project.
X		Construct bus passenger benches and shelters	0.1%	0.1%	0.1%	0.1%	0.2	0.0	0.0	0.0	
	X	Pricing structure for single-occupancy employee parking	2.0%	1.5%	2.0%	2.0%	0.0	0.0	0.0	0.0	Employee scheduling of retail uses do not facilitate carpooling, so single occupancy vehicles are the norm.
	X	Residential units within or adjacent to commercial developments	4.0%	3.1%	4.0%	4.0%	0.0	0.0	0.0	0.0	Measure already incorporated into project
	X	Utilize excess parking as park-n-ride or contribute to park-n-ride	0.1%	0.1%	0.1%	0.1%	0.0	0.0	0.0	0.0	No excess parking is proposed at the project.
	X	Construct bicycle facility improvements	0.3%	0.2%	0.3%	0.3%	0.0	0.0	0.0	0.0	Measure already incorporated into project
	X	Construct pedestrian facility improvements	0.2%	0.2%	0.2%	0.2%	0.0	0.0	0.0	0.0	Measure already incorporated into project
	X	Shuttles to major rail transit centers or multi-modal stations	0.1%	0.1%	0.1%	0.1%	0.0	0.0	0.0	0.0	Bus service already serves the area.
X		Contribute to regional transit systems	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	
	X	Charge visitors to park	2.0%	1.5%	2.0%	2.0%	0.0	0.0	0.0	0.0	Retail uses do not typically charge patrons to park.
X		Synchronize traffic lights on streets impacted by development	4.0%	4.0%	4.0%	4.0%	6.7	0.6	0.9	0.5	
	X	Reschedule truck deliveries and pickups for off-peak hours	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	Measure does not reduce emissions.
	X	Paid parking at walkup kiosks	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	Retail uses do not typically charge patrons to park.
	X	On-site truck loading zones	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	Measure does not reduce emissions.
	X	Implement or contribute to public outreach programs	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	Measure does not reduce emissions.
X		Provide commuter information areas	0.1%	0.1%	0.1%	0.1%	0.2	0.0	0.0	0.0	

ESTIMATED EMISSIONS REDUCTIONS EFFICIENCIES
River Park Recommended Mitigation - Wintertime Emissions Without Wood Burning Stoves or Fire Places

Recommended Measures already incorporated into Project are marked "No."			Emission Reduction Efficiency				Reduced Emissions in Pounds per Day				
Yes	No	MEASURES, EFFICIENCIES, AND REDUCTIONS	CO	VOC	NO_x	PM_{10}	CO	VOC	NO_x	PM_{10}	REASONS FOR REJECTING MITIGATION MEASURES
Industrial Uses											
	X	Preferential parking spaces for carpools and vanpools	0.1%	0.1%	0.1%	0.1%	0.0	0.0	0.0	0.0	No industrial uses are proposed within the project.
	X	Implement on-site circulation plan in parking lots	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	
	X	Set up resident worker training programs to improve job/housing balance	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	
	X	Implement home dispatching system for employees	0.1%	0.0%	0.1%	0.1%	0.0	0.0	0.0	0.0	
	X	Minimize use of fleet vehicles during smog alerts	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	
	X	Use low emission fleet vehicles	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	
	X	Provide commuter information areas	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	
	X	Reduce employee parking spaces for those business not under Rule 2202	0.1%	0.1%	0.1%	0.1%	0.0	0.0	0.0	0.0	
	X	Implement compressed work-week schedules	1.0%	0.8%	1.0%	1.0%	0.0	0.0	0.0	0.0	
	X	Offer loans or other incentives to employees who move locally	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	
	X	Trip reduction plan to achieve 1.5 AVR for businesses	0.1%	0.1%	0.1%	0.1%	0.0	0.0	0.0	0.0	
	X	Provide or contribute to child care and after school facilities	0.1%	0.1%	0.1%	0.1%	0.0	0.0	0.0	0.0	
	X	Provide on-site employee services such as cafeteria, banks, etc.	0.3%	0.2%	0.3%	0.3%	0.0	0.0	0.0	0.0	
	X	Shuttle service from residential core area to the worksite	0.1%	0.1%	0.1%	0.1%	0.0	0.0	0.0	0.0	
	X	Construct bus passenger benches and shelters	0.1%	0.1%	0.1%	0.1%	0.0	0.0	0.0	0.0	
	X	Pricing structure for single-occupancy employee parking	2.0%	1.5%	2.0%	2.0%	0.0	0.0	0.0	0.0	
	X	Utilize excess parking as park-n-ride or contribute to park-n-ride	0.1%	0.1%	0.1%	0.1%	0.0	0.0	0.0	0.0	
	X	Construct bicycle facility improvements	0.3%	0.2%	0.3%	0.3%	0.0	0.0	0.0	0.0	
	X	Construct pedestrian facility improvements	0.2%	0.2%	0.2%	0.2%	0.0	0.0	0.0	0.0	
	X	Shuttles to major rail transit centers or multi-modal stations	0.1%	0.1%	0.1%	0.1%	0.0	0.0	0.0	0.0	
	X	Contribute to regional transit systems	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	
	X	Synchronize traffic lights on streets impacted by development	4.0%	4.0%	4.0%	4.0%	0.0	0.0	0.0	0.0	
	X	Reschedule truck deliveries and pickups for off-peak hours	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	
	X	Lunch shuttle system from worksite to food establishments	0.5%	0.4%	0.5%	0.5%	0.0	0.0	0.0	0.0	
	X	On-site truck loading zones	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	
	X	Install aerodynamic add-on devices to heavy-duty trucks	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	
	X	Implement or contribute to public outreach programs	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	
	X	Reduce ship cruising speeds in the inner harbor	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	
	X	Use low-emission fuels or electrify airport ground service vehicles	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	
	X	Engine tuning for marine vessels	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	
	X	Reduce number of aircraft engines used during idling	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	
	X	Install monitoring system to control airport shuttles	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	
	X	Use centralized ground power systems for airport service vehicles	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	
						Net Reduction in Stationary Sources Emissions (Pounds per day)	3.7	28.7	8.5	0.0	
						Net Reduction in Mobile Sources Emissions (Pounds per day)	58.5	5.0	8.0	4.7	
						Total Net Reduction in Emissions (Pounds per day)	62.1	33.8	16.6	4.7	
						No Wood Burning Fire Places or Stoves in Residential Units	4,008.5	1,662.2	64.7	615.0	
						Percentage Reduced	75.3%	91.9%	29.5%	83.3%	
						Total Reduced Stationary Source Emissions	4.5	35.6	10.8	0.0	
						Total Reduced Mobile Source Emissions	1333.9	114.7	182.9	107.0	
						TOTAL REDUCED EMISSIONS	1,338.5	150.4	193.7	107.0	
						SCAQMD Thresholds	550.0	55.0	55.0	150.0	
						ProjectAir Quality Impacts Significant?	YES	YES	YES	NO	

Based on SCAQMD
CEQA Air Quality Handbook
Table 11-6

APPENDIX 4.5
Noise Data

SOUND32 - RELEASE 07/30/91, MODIFIED 04/22/00

TITLE:
RIVER PARK AREA A-1, LOTS AND WALLS AS PROPOSED AND AT CONVENTIONAL SPEEDS

1

BARRIER DATA
****

BAR ELE	BARRIER HEIGHTS 0	1	2	3	4	5	6	7	BAR ID	LENGTH
1	-	0.*							30 FEET	327.6
2	-	0.*							30 FEET	402.2
3	-	0.*							8 FEET	662.9
4	-	0.*							10 FEET	305.3
5	-	0.*							10 FEET	120.8
6	-	0.*							B5 P2	269.3
7	-	0.*							B5 P3	353.6
8	-	0.*							6 FEET	36.4
9	-	0.*							B6 P2	378.6
10	-	0.*							B6 P3	60.2
11	-	0.*							B6 P4	141.4
12	-	0.*							B6 P5	50.0
13	-	0.*							B6 P6	44.7
14	-	0.*							6 FEET	31.6
15	-	0.*							B7 P2	294.6
16	-	0.*							6 FEET	50.2
17	-	0.*							B8 P2	335.0
18	-	0.*							B8 P3	50.0
19	-	0.*							B8 P4	90.0
20	-	0.*							10 FEET	45.0
21	-	0.*							B9 P2	83.3
22	-	0.*							B9 P3	274.0
23	-	0.*							B9 P4	242.2
24	-	0.*							B9 P5	201.2
25	-	0.*							B9 P6	190.4

26	-	0.*	B9 P7	100.5
27	-	0.*	10 FEET	90.1
28	-	0.*	B10 P2	1005.6
29	-	0.*	B10 P3	4.0
30	-	0.*	6 FEET	201.2
31	-	0.*	10 FEET	70.9
32	-	0.*	B11 P2	130.4
33	-	0.*	B11 P3	226.1
34	-	0.*	B11 P4	256.8
35	-	0.*	B11 P5	78.1
36	-	0.*	B11 P6	247.6
37	-	0.*	B11 P7	149.0
38	-	0.*	6 FEET	41.2
39	-	0.*	B12 P2	46.1
40	-	0.*	B12 P3	30.4
41	-	0.*	B12 P4	290.9
42	-	0.*	B12 P5	24.9
43	-	0.*	B12 P6	328.8
44	-	0.*	B12 P7	53.4
45	-	0.*	B12 P8	308.7
46	-	0.*	6 FEET	178.0
47	-	0.*	B13 P2	193.3
48	-	0.*	B13 P3	23.7
49	-	0.*	B13 P4	426.2
50	-	0.*	B13 P5	60.2
51	-	0.*	6 FEET	67.1
52	-	0.*	B14 P2	36.4
53	-	0.*	B14 P3	4.0
54	-	0.*	10 FEET	241.7
55	-	0.*	B14 P5	289.5
56	-	0.*	B14 P6	104.5
57	-	0.*	B14 P7	318.0
58	-	0.*	B14 P8	32.2
59	-	0.*	B14 P9	35.1
60	-	0.*	6 FEET	143.2
61	-	0.*	B15 P2	4.0
62	-	0.*	10 FEET	332.5
63	-	0.*	B15 P4	133.4
64	-	0.*	B15 P5	204.6
65	-	0.*	B15 P6	1467.5
66	-	0.*	6 FEET	478.1

```
  67      -    0.*                                            B16 P2      170.3
  68      -    0.*                                            B16 P3       92.2

  69      -    0.*                                            6 FEET       90.6
  70      -    0.*                                            B17 P2      310.6
  71      -    0.*                                            B17 P3       90.6
  72      -    0.*                                            B17 P4      130.4
  73      -    0.*                                            B17 P5       63.2
  74      -    0.*                                            B17 P6      400.0
  75      -    0.*                                            B17 P7      100.5
  76      -    0.*                                            B17 P8       63.4
  77      -    0.*                                            B17 P9      261.7
  78      -    0.*                                            B17 P10      64.0
  ----------------------------------------------------------------------------
-------------
        0    1    2    3    4    5    6    7
1
 REC REC ID  LEQ(CAL)
 --------------------------------
  1  LOT 1      67.     500.    65.9
  2  LOT 2      67.     500.    63.3
  3  LOT 3      67.     500.    64.3
  4  LOT 7      67.     500.    62.5
  5  LOT 8      67.     500.    61.4
  6  LOT 56     67.     500.    66.6
  7  LOT 55     67.     500.    64.1
  8  LOT 57     67.     500.    58.4
  9  LOT 58     67.     500.    57.9
 10  LOT 60     67.     500.    58.6
 11  LOT 61     67.     500.    58.6
 12  LOT 62     67.     500.    57.7
 13  LOT 64     67.     500.    56.9
 14  LOT 66     67.     500.    56.3
 15  LOT 69     67.     500.    58.6
 16  LOT 70     67.     500.    57.7
 17  LOT 176    67.     500.    59.4
 18  LOT 170    67.     500.    59.8
 19  LOT 162    67.     500.    54.6
 20  LOT 165    67.     500.    59.5
 21  LOT 161    67.     500.    58.3
 22  LOT 158    67.     500.    67.0
 BARRIER HEIGHT INDEX FOR EACH BARRIER SECTION
   1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1
1  1  1  1
   1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1
1  1  1  1
   1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1
1  1  1  1
```

```
   1  1  1
 CORRESPONDING BARRIER HEIGHTS FOR EACH SECTION
  0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0
. 0. 0. 0.
  0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0
. 0. 0. 0.
  0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0
. 0. 0. 0.
  0. 0. 0.
```

SOUND32 - RELEASE 07/30/91, MODIFIED 04/22/00

TITLE:
RIVER PARK AREA A-1, RIVER LOTS AS PROPOSED AND AT CONVENTIONAL S
PEEDS

1

BARRIER DATA
****

BAR ELE	0	BARRIER HEIGHTS 1	2	3	4	5	6	7	BAR ID	LENGTH
1	-	0.*							30 FEET	327.6
2	-	0.*							30 FEET	402.2
3	-	0.*							8 FEET	662.9
4	-	0.*							10 FEET	305.3
5	-	0.*							10 FEET	120.8
6	-	0.*							B5 P2	269.3
7	-	0.*							B5 P3	353.6
8	-	0.*							6 FEET	36.4
9	-	0.*							B6 P2	378.6
10	-	0.*							B6 P3	60.2
11	-	0.*							B6 P4	141.4
12	-	0.*							B6 P5	50.0
13	-	0.*							B6 P6	44.7
14	-	0.*							6 FEET	31.6
15	-	0.*							B7 P2	294.6
16	-	0.*							6 FEET	50.2
17	-	0.*							B8 P2	335.0
18	-	0.*							B8 P3	50.0
19	-	0.*							B8 P4	90.0
20	-	0.*							10 FEET	45.0
21	-	0.*							B9 P2	83.3
22	-	0.*							B9 P3	274.0
23	-	0.*							B9 P4	242.2
24	-	0.*							B9 P5	201.2
25	-	0.*							B9 P6	190.4

26	-	0.*	B9 P7	100.5
27	-	0.*	10 FEET	90.1
28	-	0.*	B10 P2	1005.6
29	-	0.*	B10 P3	4.0
30	-	0.*	6 FEET	201.2
31	-	0.*	10 FEET	70.9
32	-	0.*	B11 P2	130.4
33	-	0.*	B11 P3	226.1
34	-	0.*	B11 P4	256.8
35	-	0.*	B11 P5	78.1
36	-	0.*	B11 P6	247.6
37	-	0.*	B11 P7	149.0
38	-	0.*	6 FEET	41.2
39	-	0.*	B12 P2	46.1
40	-	0.*	B12 P3	30.4
41	-	0.*	B12 P4	290.9
42	-	0.*	B12 P5	24.9
43	-	0.*	B12 P6	328.8
44	-	0.*	B12 P7	53.4
45	-	0.*	B12 P8	308.7
46	-	0.*	6 FEET	178.0
47	-	0.*	B13 P2	193.3
48	-	0.*	B13 P3	23.7
49	-	0.*	B13 P4	426.2
50	-	0.*	B13 P5	60.2
51	-	0.*	6 FEET	67.1
52	-	0.*	B14 P2	36.4
53	-	0.*	B14 P3	4.0
54	-	0.*	10 FEET	241.7
55	-	0.*	B14 P5	289.5
56	-	0.*	B14 P6	104.5
57	-	0.*	B14 P7	318.0
58	-	0.*	B14 P8	32.2
59	-	0.*	B14 P9	35.1
60	-	0.*	6 FEET	143.2
61	-	0.*	B15 P2	4.0
62	-	0.*	10 FEET	332.5
63	-	0.*	B15 P4	133.4
64	-	0.*	B15 P5	204.6
65	-	0.*	B15 P6	1467.5
66	-	0.*	6 FEET	478.1

```
 67      -    0.*                                        B16 P2      170.3
 68      -    0.*                                        B16 P3       92.2

 69      -    0.*                                        6 FEET       90.6
 70      -    0.*                                        B17 P2      310.6
 71      -    0.*                                        B17 P3       90.6
 72      -    0.*                                        B17 P4      130.4
 73      -    0.*                                        B17 P5       63.2
 74      -    0.*                                        B17 P6      400.0
 75      -    0.*                                        B17 P7      100.5
 76      -    0.*                                        B17 P8       63.4
 77      -    0.*                                        B17 P9      261.7
 78      -    0.*                                        B17 P10      64.0
 ------------------------------------------------------------------------
-------------
         0    1    2    3    4    5    6    7
1
 REC REC ID  LEQ(CAL)
 ---------------------------------
  1  LOT 3      67.     500.    64.5
  2  LOT 4      67.     500.    63.9
  3  LOT 8      67.     500.    62.1
  4  LOT 12     67.     500.    61.3
  5  LOT 13     67.     500.    61.1
  6  LOT 17     67.     500.    60.5
  7  LOT 29     67.     500.    59.7
  8  LOT 203    67.     500.    59.5
 BARRIER HEIGHT INDEX FOR EACH BARRIER SECTION
   1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1
1  1  1  1
   1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1
1  1  1  1
   1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1
1  1  1  1
   1  1  1
 CORRESPONDING BARRIER HEIGHTS FOR EACH SECTION
  0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0
. 0. 0. 0.
  0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0
. 0. 0. 0.
  0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0
. 0. 0. 0.
  0. 0. 0.
```

SOUND32 - RELEASE 07/30/91, MODIFIED 04/22/00

TITLE:
RIVER PARK AREA A-2, LOTS AS PROPOSED & AT CONVENTIONAL SPEEDS

1

BARRIER DATA
****

BAR ELE	0	1	BARRIER HEIGHTS 2	3	4	5	6	7	BAR ID	LENGTH
1	-	0.*							30 FEET	327.6
2	-	0.*							30 FEET	402.2
3	-	0.*							8 FEET	662.9
4	-	0.*							10 FEET	305.3
5	-	0.*							10 FEET	120.8
6	-	0.*							B5 P2	269.3
7	-	0.*							B5 P3	353.6
8	-	0.*							6 FEET	36.4
9	-	0.*							B6 P2	378.6
10	-	0.*							B6 P3	60.2
11	-	0.*							B6 P4	141.4
12	-	0.*							B6 P5	50.0
13	-	0.*							B6 P6	44.7
14	-	0.*							6 FEET	31.6
15	-	0.*							B7 P2	294.6
16	-	0.*							6 FEET	50.2
17	-	0.*							B8 P2	335.0
18	-	0.*							B8 P3	50.0
19	-	0.*							B8 P4	90.0
20	-	0.*							10 FEET	45.0
21	-	0.*							B9 P2	83.3
22	-	0.*							B9 P3	274.0
23	-	0.*							B9 P4	242.2
24	-	0.*							B9 P5	201.2
25	-	0.*							B9 P6	190.4

26	-	0.*	B9 P7	100.5
27	-	0.*	10 FEET	90.1
28	-	0.*	B10 P2	1005.6
29	-	0.*	B10 P3	4.0
30	-	0.*	6 FEET	201.2
31	-	0.*	10 FEET	70.9
32	-	0.*	B11 P2	130.4
33	-	0.*	B11 P3	226.1
34	-	0.*	B11 P4	256.8
35	-	0.*	B11 P5	78.1
36	-	0.*	B11 P6	247.6
37	-	0.*	B11 P7	149.0
38	-	0.*	6 FEET	41.2
39	-	0.*	B12 P2	46.1
40	-	0.*	B12 P3	30.4
41	-	0.*	B12 P4	290.9
42	-	0.*	B12 P5	24.9
43	-	0.*	B12 P6	328.8
44	-	0.*	B12 P7	53.4
45	-	0.*	B12 P8	308.7
46	-	0.*	6 FEET	178.0
47	-	0.*	B13 P2	193.3
48	-	0.*	B13 P3	23.7
49	-	0.*	B13 P4	426.2
50	-	0.*	B13 P5	60.2
51	-	0.*	6 FEET	67.1
52	-	0.*	B14 P2	36.4
53	-	0.*	B14 P3	4.0
54	-	0.*	10 FEET	241.7
55	-	0.*	B14 P5	289.5
56	-	0.*	B14 P6	104.5
57	-	0.*	B14 P7	318.0
58	-	0.*	B14 P8	32.2
59	-	0.*	B14 P9	35.1
60	-	0.*	6 FEET	143.2
61	-	0.*	B15 P2	4.0
62	-	0.*	10 FEET	332.5
63	-	0.*	B15 P4	133.4
64	-	0.*	B15 P5	204.6
65	-	0.*	B15 P6	1467.5
66	-	0.*	6 FEET	478.1

67	-	0.*	B16 P2	170.3
68	-	0.*	B16 P3	92.2
69	-	0.*	6 FEET	90.6
70	-	0.*	B17 P2	310.6
71	-	0.*	B17 P3	90.6
72	-	0.*	B17 P4	130.4
73	-	0.*	B17 P5	63.2
74	-	0.*	B17 P6	400.0
75	-	0.*	B17 P7	100.5
76	-	0.*	B17 P8	63.4
77	-	0.*	B17 P9	261.7
78	-	0.*	B17 P10	64.0

0 1 2 3 4 5 6 7

1

REC	REC ID	LEQ(CAL)		
1	LOT 270	67.	500.	59.9
2	LOT 269	67.	500.	59.7
3	LOT 264	67.	500.	60.8
4	LOT 262	67.	500.	61.9
5	LOT 261	67.	500.	62.7
6	LOT 260	67.	500.	63.8
7	LOT 259	67.	500.	60.3
8	LOT 255	67.	500.	58.8
9	LOT 252	67.	500.	59.0
10	LOT 251	67.	500.	57.8
11	LOT 292	67.	500.	63.9
12	LOT 294	67.	500.	61.1
13	LOT 295	67.	500.	65.1
14	LOT 313	67.	500.	56.8
15	LOT 314	67.	500.	70.9
16	LOT 337	67.	500.	71.5
17	LOT 338	67.	500.	72.1
18	LOT 378	67.	500.	66.3
19	LOT 377	67.	500.	63.7
20	LOT 376	67.	500.	62.9
21	LOT 368	67.	500.	65.5
22	LOT 385	67.	500.	59.2
23	LOT 458	67.	500.	61.5
24	LOT 456	67.	500.	58.0
25	LOT 449	67.	500.	57.5
26	LOT 448	67.	500.	55.6
27	LOT 442	67.	500.	68.7
28	LOT 434	67.	500.	62.0
29	LOT 429	67.	500.	63.2

```
 30  LOT 427   67.     500.   61.9
 31  LOT 424   67.     500.   59.3
 32  LOT 422   67.     500.   59.4
 33  LOT 420   67.     500.   59.7
 34  LOT 475   67.     500.   59.9
 BARRIER HEIGHT INDEX FOR EACH BARRIER SECTION
   1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1
1  1  1  1
   1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1
1  1  1  1
   1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1
1  1  1  1
   1  1  1
 CORRESPONDING BARRIER HEIGHTS FOR EACH SECTION
  0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0
. 0. 0. 0.
  0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0
. 0. 0. 0.
  0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0
. 0. 0. 0.
  0. 0. 0.
```

SOUND32 - RELEASE 07/30/91, MODIFIED 04/22/00

TITLE:
RIVER PARK AREA A-2,B, RIVER LOTS AS PROPOSED AND WITH CONVENTIONAL SPEEDS

1

BARRIER DATA
****

BAR ELE	0	1	BARRIER HEIGHTS 2	3	4	5	6	7	BAR ID	LENGTH
1	-	0.*							30 FEET	327.6
2	-	0.*							30 FEET	402.2
3	-	0.*							8 FEET	662.9
4	-	0.*							10 FEET	305.3
5	-	0.*							10 FEET	120.8
6	-	0.*							B5 P2	269.3
7	-	0.*							B5 P3	353.6
8	-	0.*							6 FEET	36.4
9	-	0.*							B6 P2	378.6
10	-	0.*							B6 P3	60.2
11	-	0.*							B6 P4	141.4
12	-	0.*							B6 P5	50.0
13	-	0.*							B6 P6	44.7
14	-	0.*							6 FEET	31.6
15	-	0.*							B7 P2	294.6
16	-	0.*							6 FEET	50.2
17	-	0.*							B8 P2	335.0
18	-	0.*							B8 P3	50.0
19	-	0.*							B8 P4	90.0
20	-	0.*							10 FEET	45.0
21	-	0.*							B9 P2	83.3
22	-	0.*							B9 P3	274.0
23	-	0.*							B9 P4	242.2
24	-	0.*							B9 P5	201.2
25	-	0.*							B9 P6	190.4

26	-	0.*	B9 P7	100.5
27	-	0.*	10 FEET	90.1
28	-	0.*	B10 P2	1005.6
29	-	0.*	B10 P3	4.0
30	-	0.*	6 FEET	201.2
31	-	0.*	10 FEET	70.9
32	-	0.*	B11 P2	130.4
33	-	0.*	B11 P3	226.1
34	-	0.*	B11 P4	256.8
35	-	0.*	B11 P5	78.1
36	-	0.*	B11 P6	247.6
37	-	0.*	B11 P7	149.0
38	-	0.*	6 FEET	41.2
39	-	0.*	B12 P2	46.1
40	-	0.*	B12 P3	30.4
41	-	0.*	B12 P4	290.9
42	-	0.*	B12 P5	24.9
43	-	0.*	B12 P6	328.8
44	-	0.*	B12 P7	53.4
45	-	0.*	B12 P8	308.7
46	-	0.*	6 FEET	178.0
47	-	0.*	B13 P2	193.3
48	-	0.*	B13 P3	23.7
49	-	0.*	B13 P4	426.2
50	-	0.*	B13 P5	60.2
51	-	0.*	6 FEET	67.1
52	-	0.*	B14 P2	36.4
53	-	0.*	B14 P3	4.0
54	-	0.*	10 FEET	241.7
55	-	0.*	B14 P5	289.5
56	-	0.*	B14 P6	104.5
57	-	0.*	B14 P7	318.0
58	-	0.*	B14 P8	32.2
59	-	0.*	B14 P9	35.1
60	-	0.*	6 FEET	143.2
61	-	0.*	B15 P2	4.0
62	-	0.*	10 FEET	332.5
63	-	0.*	B15 P4	133.4
64	-	0.*	B15 P5	204.6
65	-	0.*	B15 P6	1467.5
66	-	0.*	6 FEET	478.1

```
 67      -    0.*                                        B16 P2      170.3
 68      -    0.*                                        B16 P3       92.2

 69      -    0.*                                        6 FEET       90.6
 70      -    0.*                                        B17 P2      310.6
 71      -    0.*                                        B17 P3       90.6
 72      -    0.*                                        B17 P4      130.4
 73      -    0.*                                        B17 P5       63.2
 74      -    0.*                                        B17 P6      400.0
 75      -    0.*                                        B17 P7      100.5
 76      -    0.*                                        B17 P8       63.4
 77      -    0.*                                        B17 P9      261.7
 78      -    0.*                                        B17 P10      64.0
 ------------------------------------------------------------------------
-------------
         0    1    2    3    4    5    6    7
1
 REC REC ID  LEQ(CAL)
 ---------------------------------
  1  LOT 288   67.     500.    60.0
  2  LOT 352   67.     500.    60.5
  3  LOT 350   67.     500.    59.9
  4  LOT 348   67.     500.    61.4
  5  LOT 346   67.     500.    62.3
  6  LOT 344   67.     500.    63.5
  7  LOT 341   67.     500.    66.4
  8  LOT 338   67.     500.    72.2
 BARRIER HEIGHT INDEX FOR EACH BARRIER SECTION
    1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1
1  1  1  1
    1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1
1  1  1  1
    1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1
1  1  1  1
    1  1  1
 CORRESPONDING BARRIER HEIGHTS FOR EACH SECTION
   0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0
. 0. 0. 0.
   0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0
. 0. 0. 0.
   0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0
. 0. 0. 0.
   0. 0. 0.
```

SOUND32 - RELEASE 07/30/91, MODIFIED 04/22/00

TITLE:
RIVER PARK AREA C, LOTS AS PROPOSED & AT CONVENTIONAL SPEEDS

1

BARRIER DATA
****

BAR ELE	0	1	BARRIER HEIGHTS 2	3	4	5	6	7	BAR ID	LENGTH
1	-	0.*							30 FEET	327.6
2	-	0.*							30 FEET	402.2
3	-	0.*							8 FEET	662.9
4	-	0.*							10 FEET	305.3
5	-	0.*							10 FEET	120.8
6	-	0.*							B5 P2	269.3
7	-	0.*							B5 P3	353.6
8	-	0.*							6 FEET	36.4
9	-	0.*							B6 P2	378.6
10	-	0.*							B6 P3	60.2
11	-	0.*							B6 P4	141.4
12	-	0.*							B6 P5	50.0
13	-	0.*							B6 P6	44.7
14	-	0.*							6 FEET	31.6
15	-	0.*							B7 P2	294.6
16	-	0.*							6 FEET	50.2
17	-	0.*							B8 P2	335.0
18	-	0.*							B8 P3	50.0
19	-	0.*							B8 P4	90.0
20	-	0.*							10 FEET	45.0
21	-	0.*							B9 P2	83.3
22	-	0.*							B9 P3	274.0
23	-	0.*							B9 P4	242.2
24	-	0.*							B9 P5	201.2
25	-	0.*							B9 P6	190.4

26	-	0.*	B9 P7	100.5
27	-	0.*	10 FEET	90.1
28	-	0.*	B10 P2	1005.6
29	-	0.*	B10 P3	4.0
30	-	0.*	6 FEET	201.2
31	-	0.*	10 FEET	70.9
32	-	0.*	B11 P2	130.4
33	-	0.*	B11 P3	226.1
34	-	0.*	B11 P4	256.8
35	-	0.*	B11 P5	78.1
36	-	0.*	B11 P6	247.6
37	-	0.*	B11 P7	149.0
38	-	0.*	6 FEET	41.2
39	-	0.*	B12 P2	46.1
40	-	0.*	B12 P3	30.4
41	-	0.*	B12 P4	290.9
42	-	0.*	B12 P5	24.9
43	-	0.*	B12 P6	328.8
44	-	0.*	B12 P7	53.4
45	-	0.*	B12 P8	308.7
46	-	0.*	6 FEET	178.0
47	-	0.*	B13 P2	193.3
48	-	0.*	B13 P3	23.7
49	-	0.*	B13 P4	426.2
50	-	0.*	B13 P5	60.2
51	-	0.*	6 FEET	67.1
52	-	0.*	B14 P2	36.4
53	-	0.*	B14 P3	4.0
54	-	0.*	10 FEET	241.7
55	-	0.*	B14 P5	289.5
56	-	0.*	B14 P6	104.5
57	-	0.*	B14 P7	318.0
58	-	0.*	B14 P8	32.2
59	-	0.*	B14 P9	35.1
60	-	0.*	6 FEET	143.2
61	-	0.*	B15 P2	4.0
62	-	0.*	10 FEET	332.5
63	-	0.*	B15 P4	133.4
64	-	0.*	B15 P5	204.6
65	-	0.*	B15 P6	1467.5
66	-	0.*	6 FEET	478.1

```
 67      -    0.*                                        B16 P2      170.3
 68      -    0.*                                        B16 P3       92.2

 69      -    0.*                                        6 FEET       90.6
 70      -    0.*                                        B17 P2      310.6
 71      -    0.*                                        B17 P3       90.6
 72      -    0.*                                        B17 P4      130.4
 73      -    0.*                                        B17 P5       63.2
 74      -    0.*                                        B17 P6      400.0
 75      -    0.*                                        B17 P7      100.5
 76      -    0.*                                        B17 P8       63.4
 77      -    0.*                                        B17 P9      261.7
 78      -    0.*                                        B17 P10      64.0
 ------------------------------------------------------------------------
-------------
         0    1    2    3    4    5    6    7
1
 REC REC ID  LEQ(CAL)
 --------------------------------
  1  LOT 521A  67.     500.    71.4
  2  LOT 521B  67.     500.    66.4
  3  LOT 519A  67.     500.    60.0
  4  LOT 519B  67.     500.    57.5
  5  LOT 519C  67.     500.    59.6
  6  LOT 519D  67.     500.    56.4
 BARRIER HEIGHT INDEX FOR EACH BARRIER SECTION
    1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1
1  1  1  1
    1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1
1  1  1  1
    1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1
1  1  1  1
    1  1  1
 CORRESPONDING BARRIER HEIGHTS FOR EACH SECTION
   0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0
. 0. 0. 0.
   0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0
. 0. 0. 0.
   0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0
. 0. 0. 0.
   0. 0. 0.
```

SOUND32 - RELEASE 07/30/91, MODIFIED 04/22/00

TITLE:
RIVER PARK AREA D, LOTS AS PROPOSED & AT CONVENTIONAL SPEEDS

1

BARRIER DATA
****

BAR ELE	0	1	BARRIER HEIGHTS 2	3	4	5	6	7	BAR ID	LENGTH
1	-	0.*							30 FEET	327.6
2	-	0.*							30 FEET	402.2
3	-	0.*							8 FEET	662.9
4	-	0.*							10 FEET	305.3
5	-	0.*							10 FEET	120.8
6	-	0.*							B5 P2	269.3
7	-	0.*							B5 P3	353.6
8	-	0.*							6 FEET	36.4
9	-	0.*							B6 P2	378.6
10	-	0.*							B6 P3	60.2
11	-	0.*							B6 P4	141.4
12	-	0.*							B6 P5	50.0
13	-	0.*							B6 P6	44.7
14	-	0.*							6 FEET	31.6
15	-	0.*							B7 P2	294.6
16	-	0.*							6 FEET	50.2
17	-	0.*							B8 P2	335.0
18	-	0.*							B8 P3	50.0
19	-	0.*							B8 P4	90.0
20	-	0.*							10 FEET	45.0
21	-	0.*							B9 P2	83.3
22	-	0.*							B9 P3	274.0
23	-	0.*							B9 P4	242.2
24	-	0.*							B9 P5	201.2
25	-	0.*							B9 P6	190.4

26	-	0.*	B9 P7	100.5
27	-	0.*	10 FEET	90.1
28	-	0.*	B10 P2	1005.6
29	-	0.*	B10 P3	4.0
30	-	0.*	6 FEET	201.2
31	-	0.*	10 FEET	70.9
32	-	0.*	B11 P2	130.4
33	-	0.*	B11 P3	226.1
34	-	0.*	B11 P4	256.8
35	-	0.*	B11 P5	78.1
36	-	0.*	B11 P6	247.6
37	-	0.*	B11 P7	149.0
38	-	0.*	6 FEET	41.2
39	-	0.*	B12 P2	46.1
40	-	0.*	B12 P3	30.4
41	-	0.*	B12 P4	290.9
42	-	0.*	B12 P5	24.9
43	-	0.*	B12 P6	328.8
44	-	0.*	B12 P7	53.4
45	-	0.*	B12 P8	308.7
46	-	0.*	6 FEET	178.0
47	-	0.*	B13 P2	193.3
48	-	0.*	B13 P3	23.7
49	-	0.*	B13 P4	426.2
50	-	0.*	B13 P5	60.2
51	-	0.*	6 FEET	67.1
52	-	0.*	B14 P2	36.4
53	-	0.*	B14 P3	4.0
54	-	0.*	10 FEET	241.7
55	-	0.*	B14 P5	289.5
56	-	0.*	B14 P6	104.5
57	-	0.*	B14 P7	318.0
58	-	0.*	B14 P8	32.2
59	-	0.*	B14 P9	35.1
60	-	0.*	6 FEET	143.2
61	-	0.*	B15 P2	4.0
62	-	0.*	10 FEET	332.5
63	-	0.*	B15 P4	133.4
64	-	0.*	B15 P5	204.6
65	-	0.*	B15 P6	1467.5
66	-	0.*	6 FEET	478.1

```
 67      -   0.*                                             B16 P2      170.3
 68      -   0.*                                             B16 P3       92.2

 69      -   0.*                                             6 FEET       90.6
 70      -   0.*                                             B17 P2      310.6
 71      -   0.*                                             B17 P3       90.6
 72      -   0.*                                             B17 P4      130.4
 73      -   0.*                                             B17 P5       63.2
 74      -   0.*                                             B17 P6      400.0
 75      -   0.*                                             B17 P7      100.5
 76      -   0.*                                             B17 P8       63.4
 77      -   0.*                                             B17 P9      261.7
 78      -   0.*                                             B17 P10      64.0
 ----------------------------------------------------------------------------
-------------
       0    1    2    3    4    5    6    7
1
 REC REC ID  LEQ(CAL)
 ---------------------------------
  1  525A       67.     500.    59.6
  2  525B       67.     500.    62.6
  3  525C       67.     500.    64.0
  4  525D       67.     500.    64.0
  5  525E       67.     500.    63.4
  6  525F       67.     500.    63.3
  7  525A       67.     500.    64.8
  8  525B       67.     500.    65.2
  9  525C       67.     500.    72.5
 10  525D       67.     500.    70.2
 11  228        67.     500.    58.6
 BARRIER HEIGHT INDEX FOR EACH BARRIER SECTION
   1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1
1  1  1  1
   1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1
1  1  1  1
   1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1
1  1  1  1
   1  1  1
 CORRESPONDING BARRIER HEIGHTS FOR EACH SECTION
  0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0
. 0. 0. 0.
  0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0
. 0. 0. 0.
  0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0
. 0. 0. 0.
  0. 0. 0.
```

SOUND32 - RELEASE 07/30/91, MODIFIED 04/22/00

TITLE:
RIVER PARK AREA A-1, LOTS AS PROPOSED AND WITH REALISTIC SPEEDS

1

BARRIER DATA
****

BAR ELE	0	1	2	3	4	5	6	7	BAR ID	LENGTH
1	-	0.*							30 FEET	327.6
2	-	0.*							30 FEET	402.2
3	-	0.*							8 FEET	662.9
4	-	0.*							10 FEET	305.3
5	-	0.*							10 FEET	120.8
6	-	0.*							B5 P2	269.3
7	-	0.*							B5 P3	353.6
8	-	0.*							6 FEET	36.4
9	-	0.*							B6 P2	378.6
10	-	0.*							B6 P3	60.2
11	-	0.*							B6 P4	141.4
12	-	0.*							B6 P5	50.0
13	-	0.*							B6 P6	44.7
14	-	0.*							6 FEET	31.6
15	-	0.*							B7 P2	294.6
16	-	0.*							6 FEET	50.2
17	-	0.*							B8 P2	335.0
18	-	0.*							B8 P3	50.0
19	-	0.*							B8 P4	90.0
20	-	0.*							10 FEET	45.0
21	-	0.*							B9 P2	83.3
22	-	0.*							B9 P3	274.0
23	-	0.*							B9 P4	242.2
24	-	0.*							B9 P5	201.2
25	-	0.*							B9 P6	190.4

26	-	0.*	B9 P7	100.5
27	-	0.*	10 FEET	90.1
28	-	0.*	B10 P2	1005.6
29	-	0.*	B10 P3	4.0
30	-	0.*	6 FEET	201.2
31	-	0.*	10 FEET	70.9
32	-	0.*	B11 P2	130.4
33	-	0.*	B11 P3	226.1
34	-	0.*	B11 P4	256.8
35	-	0.*	B11 P5	78.1
36	-	0.*	B11 P6	247.6
37	-	0.*	B11 P7	149.0
38	-	0.*	6 FEET	41.2
39	-	0.*	B12 P2	46.1
40	-	0.*	B12 P3	30.4
41	-	0.*	B12 P4	290.9
42	-	0.*	B12 P5	24.9
43	-	0.*	B12 P6	328.8
44	-	0.*	B12 P7	53.4
45	-	0.*	B12 P8	308.7
46	-	0.*	6 FEET	178.0
47	-	0.*	B13 P2	193.3
48	-	0.*	B13 P3	23.7
49	-	0.*	B13 P4	426.2
50	-	0.*	B13 P5	60.2
51	-	0.*	6 FEET	67.1
52	-	0.*	B14 P2	36.4
53	-	0.*	B14 P3	4.0
54	-	0.*	10 FEET	241.7
55	-	0.*	B14 P5	289.5
56	-	0.*	B14 P6	104.5
57	-	0.*	B14 P7	318.0
58	-	0.*	B14 P8	32.2
59	-	0.*	B14 P9	35.1
60	-	0.*	6 FEET	143.2
61	-	0.*	B15 P2	4.0
62	-	0.*	10 FEET	332.5
63	-	0.*	B15 P4	133.4
64	-	0.*	B15 P5	204.6
65	-	0.*	B15 P6	1467.5
66	-	0.*	6 FEET	478.1

```
 67      -    0.*                                         B16 P2     170.3
 68      -    0.*                                         B16 P3      92.2

 69      -    0.*                                         6 FEET      90.6
 70      -    0.*                                         B17 P2     310.6
 71      -    0.*                                         B17 P3      90.6
 72      -    0.*                                         B17 P4     130.4
 73      -    0.*                                         B17 P5      63.2
 74      -    0.*                                         B17 P6     400.0
 75      -    0.*                                         B17 P7     100.5
 76      -    0.*                                         B17 P8      63.4
 77      -    0.*                                         B17 P9     261.7
 78      -    0.*                                         B17 P10     64.0
 -----------------------------------------------------------------
-------------
        0    1    2    3    4    5    6    7
1
 REC REC ID  LEQ(CAL)
 ------------------------------
  1  LOT 1      67.     500.   64.3
  2  LOT 2      67.     500.   61.7
  3  LOT 3      67.     500.   62.6
  4  LOT 7      67.     500.   60.9
  5  LOT 8      67.     500.   59.8
  6  LOT 56     67.     500.   65.2
  7  LOT 55     67.     500.   62.6
  8  LOT 57     67.     500.   57.0
  9  LOT 58     67.     500.   56.6
 10  LOT 60     67.     500.   57.2
 11  LOT 61     67.     500.   57.2
 12  LOT 62     67.     500.   56.2
 13  LOT 64     67.     500.   55.5
 14  LOT 66     67.     500.   54.9
 15  LOT 69     67.     500.   57.1
 16  LOT 70     67.     500.   56.1
 17  LOT 176    67.     500.   58.0
 18  LOT 170    67.     500.   58.5
 19  LOT 162    67.     500.   53.1
 20  LOT 165    67.     500.   58.1
 21  LOT 161    67.     500.   57.0
 22  LOT 158    67.     500.   65.6
 BARRIER HEIGHT INDEX FOR EACH BARRIER SECTION
   1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1
1  1  1  1
   1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1
1  1  1  1
   1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1
1  1  1  1
```

```
   1  1  1
 CORRESPONDING BARRIER HEIGHTS FOR EACH SECTION
  0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0
. 0. 0. 0.
  0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0
. 0. 0. 0.
  0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0
. 0. 0. 0.
  0. 0. 0.
```

SOUND32 - RELEASE 07/30/91, MODIFIED 04/22/00

TITLE:
RIVER PARK AREA A-1, STA CLARA RIVER RESIDENCES AT REALISTIC SPEED LIMITS

1

BARRIER DATA
****

BAR ELE	0	1	BARRIER HEIGHTS 2	3	4	5	6	7	BAR ID	LENGTH
1	-	0.*							30 FEET	327.6
2	-	0.*							30 FEET	402.2
3	-	0.*							8 FEET	662.9
4	-	0.*							10 FEET	305.3
5	-	0.*							10 FEET	120.8
6	-	0.*							B5 P2	269.3
7	-	0.*							B5 P3	353.6
8	-	0.*							6 FEET	36.4
9	-	0.*							B6 P2	378.6
10	-	0.*							B6 P3	60.2
11	-	0.*							B6 P4	141.4
12	-	0.*							B6 P5	50.0
13	-	0.*							B6 P6	44.7
14	-	0.*							6 FEET	31.6
15	-	0.*							B7 P2	294.6
16	-	0.*							6 FEET	50.2
17	-	0.*							B8 P2	335.0
18	-	0.*							B8 P3	50.0
19	-	0.*							B8 P4	90.0
20	-	0.*							10 FEET	45.0
21	-	0.*							B9 P2	83.3
22	-	0.*							B9 P3	274.0
23	-	0.*							B9 P4	242.2
24	-	0.*							B9 P5	201.2
25	-	0.*							B9 P6	190.4

26	-	0.*	B9 P7	100.5
27	-	0.*	10 FEET	90.1
28	-	0.*	B10 P2	1005.6
29	-	0.*	B10 P3	4.0
30	-	0.*	6 FEET	201.2
31	-	0.*	10 FEET	70.9
32	-	0.*	B11 P2	130.4
33	-	0.*	B11 P3	226.1
34	-	0.*	B11 P4	256.8
35	-	0.*	B11 P5	78.1
36	-	0.*	B11 P6	247.6
37	-	0.*	B11 P7	149.0
38	-	0.*	6 FEET	41.2
39	-	0.*	B12 P2	46.1
40	-	0.*	B12 P3	30.4
41	-	0.*	B12 P4	290.9
42	-	0.*	B12 P5	24.9
43	-	0.*	B12 P6	328.8
44	-	0.*	B12 P7	53.4
45	-	0.*	B12 P8	308.7
46	-	0.*	6 FEET	178.0
47	-	0.*	B13 P2	193.3
48	-	0.*	B13 P3	23.7
49	-	0.*	B13 P4	426.2
50	-	0.*	B13 P5	60.2
51	-	0.*	6 FEET	67.1
52	-	0.*	B14 P2	36.4
53	-	0.*	B14 P3	4.0
54	-	0.*	10 FEET	241.7
55	-	0.*	B14 P5	289.5
56	-	0.*	B14 P6	104.5
57	-	0.*	B14 P7	318.0
58	-	0.*	B14 P8	32.2
59	-	0.*	B14 P9	35.1
60	-	0.*	6 FEET	143.2
61	-	0.*	B15 P2	4.0
62	-	0.*	10 FEET	332.5
63	-	0.*	B15 P4	133.4
64	-	0.*	B15 P5	204.6
65	-	0.*	B15 P6	1467.5
66	-	0.*	6 FEET	478.1

```
 67      -    0.*                                        B16 P2      170.3
 68      -    0.*                                        B16 P3       92.2

 69      -    0.*                                        6 FEET       90.6
 70      -    0.*                                        B17 P2      310.6
 71      -    0.*                                        B17 P3       90.6
 72      -    0.*                                        B17 P4      130.4
 73      -    0.*                                        B17 P5       63.2
 74      -    0.*                                        B17 P6      400.0
 75      -    0.*                                        B17 P7      100.5
 76      -    0.*                                        B17 P8       63.4
 77      -    0.*                                        B17 P9      261.7
 78      -    0.*                                        B17 P10      64.0
 ------------------------------------------------------------------------
-------------
         0    1    2    3    4    5    6    7
1
 REC REC ID  LEQ(CAL)
 --------------------------------
  1  LOT 3     67.     500.   62.8
  2  LOT 4     67.     500.   62.3
  3  LOT 8     67.     500.   60.5
  4  LOT 12    67.     500.   59.8
  5  LOT 13    67.     500.   59.5
  6  LOT 17    67.     500.   58.9
  7  LOT 29    67.     500.   58.3
  8  LOT 203   67.     500.   58.2
 BARRIER HEIGHT INDEX FOR EACH BARRIER SECTION
   1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1
1  1  1  1
   1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1
1  1  1  1
   1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1
1  1  1  1
   1  1  1
 CORRESPONDING BARRIER HEIGHTS FOR EACH SECTION
  0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0
. 0. 0. 0.
  0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0
. 0. 0. 0.
  0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0
. 0. 0. 0.
  0. 0. 0.
```

SOUND32 - RELEASE 07/30/91, MODIFIED 04/22/00

TITLE:
RIVER PARK AREA A-2, LOTS AS PROPOSED & AT REALISTIC SPEEDS

1

BARRIER DATA
****

BAR ELE	0	BARRIER HEIGHTS 1	2	3	4	5	6	7	BAR ID	LENGTH
1	-	0.*							30 FEET	327.6
2	-	0.*							30 FEET	402.2
3	-	0.*							8 FEET	662.9
4	-	0.*							10 FEET	305.3
5	-	0.*							10 FEET	120.8
6	-	0.*							B5 P2	269.3
7	-	0.*							B5 P3	353.6
8	-	0.*							6 FEET	36.4
9	-	0.*							B6 P2	378.6
10	-	0.*							B6 P3	60.2
11	-	0.*							B6 P4	141.4
12	-	0.*							B6 P5	50.0
13	-	0.*							B6 P6	44.7
14	-	0.*							6 FEET	31.6
15	-	0.*							B7 P2	294.6
16	-	0.*							6 FEET	50.2
17	-	0.*							B8 P2	335.0
18	-	0.*							B8 P3	50.0
19	-	0.*							B8 P4	90.0
20	-	0.*							10 FEET	45.0
21	-	0.*							B9 P2	83.3
22	-	0.*							B9 P3	274.0
23	-	0.*							B9 P4	242.2
24	-	0.*							B9 P5	201.2
25	-	0.*							B9 P6	190.4

26	-	0.*	B9 P7	100.5
27	-	0.*	10 FEET	90.1
28	-	0.*	B10 P2	1005.6
29	-	0.*	B10 P3	4.0
30	-	0.*	6 FEET	201.2
31	-	0.*	10 FEET	70.9
32	-	0.*	B11 P2	130.4
33	-	0.*	B11 P3	226.1
34	-	0.*	B11 P4	256.8
35	-	0.*	B11 P5	78.1
36	-	0.*	B11 P6	247.6
37	-	0.*	B11 P7	149.0
38	-	0.*	6 FEET	41.2
39	-	0.*	B12 P2	46.1
40	-	0.*	B12 P3	30.4
41	-	0.*	B12 P4	290.9
42	-	0.*	B12 P5	24.9
43	-	0.*	B12 P6	328.8
44	-	0.*	B12 P7	53.4
45	-	0.*	B12 P8	308.7
46	-	0.*	6 FEET	178.0
47	-	0.*	B13 P2	193.3
48	-	0.*	B13 P3	23.7
49	-	0.*	B13 P4	426.2
50	-	0.*	B13 P5	60.2
51	-	0.*	6 FEET	67.1
52	-	0.*	B14 P2	36.4
53	-	0.*	B14 P3	4.0
54	-	0.*	10 FEET	241.7
55	-	0.*	B14 P5	289.5
56	-	0.*	B14 P6	104.5
57	-	0.*	B14 P7	318.0
58	-	0.*	B14 P8	32.2
59	-	0.*	B14 P9	35.1
60	-	0.*	6 FEET	143.2
61	-	0.*	B15 P2	4.0
62	-	0.*	10 FEET	332.5
63	-	0.*	B15 P4	133.4
64	-	0.*	B15 P5	204.6
65	-	0.*	B15 P6	1467.5
66	-	0.*	6 FEET	478.1

67	-	0.*	B16 P2	170.3
68	-	0.*	B16 P3	92.2
69	-	0.*	6 FEET	90.6
70	-	0.*	B17 P2	310.6
71	-	0.*	B17 P3	90.6
72	-	0.*	B17 P4	130.4
73	-	0.*	B17 P5	63.2
74	-	0.*	B17 P6	400.0
75	-	0.*	B17 P7	100.5
76	-	0.*	B17 P8	63.4
77	-	0.*	B17 P9	261.7
78	-	0.*	B17 P10	64.0

---

0 1 2 3 4 5 6 7

1

REC	REC ID	LEQ(CAL)		
1	LOT 270	67.	500.	58.7
2	LOT 269	67.	500.	58.5
3	LOT 264	67.	500.	59.5
4	LOT 262	67.	500.	60.5
5	LOT 261	67.	500.	61.4
6	LOT 260	67.	500.	62.5
7	LOT 259	67.	500.	59.0
8	LOT 255	67.	500.	57.6
9	LOT 252	67.	500.	57.9
10	LOT 251	67.	500.	56.6
11	LOT 292	67.	500.	63.1
12	LOT 294	67.	500.	60.3
13	LOT 295	67.	500.	64.3
14	LOT 313	67.	500.	55.8
15	LOT 314	67.	500.	70.0
16	LOT 337	67.	500.	70.6
17	LOT 338	67.	500.	71.2
18	LOT 378	67.	500.	65.4
19	LOT 377	67.	500.	62.8
20	LOT 376	67.	500.	62.0
21	LOT 368	67.	500.	64.6
22	LOT 385	67.	500.	58.3
23	LOT 458	67.	500.	60.6
24	LOT 456	67.	500.	57.0
25	LOT 449	67.	500.	56.4
26	LOT 448	67.	500.	54.4
27	LOT 442	67.	500.	67.7
28	LOT 434	67.	500.	61.0
29	LOT 429	67.	500.	61.8

```
 30  LOT 427    67.     500.    60.7
 31  LOT 424    67.     500.    58.1
 32  LOT 422    67.     500.    58.3
 33  LOT 420    67.     500.    58.2
 34  LOT 475    67.     500.    58.2
 BARRIER HEIGHT INDEX FOR EACH BARRIER SECTION
    1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1
1  1  1  1
    1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1
1  1  1  1
    1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1
1  1  1  1
    1  1  1
 CORRESPONDING BARRIER HEIGHTS FOR EACH SECTION
   0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0
. 0. 0. 0.
   0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0
. 0. 0. 0.
   0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0
. 0. 0. 0.
   0. 0. 0.
```

SOUND32 - RELEASE 07/30/91, MODIFIED 04/22/00

TITLE:
RIVER PARK AREA A-2, RIVER LOTS AS PROPOSED & WITH REALISTIC SPEE
DS

1

BARRIER DATA
****

BAR ELE		BARRIER HEIGHTS 0 1 2 3 4 5 6 7	BAR ID	LENGTH
1	-	0.*	30 FEET	327.6
2	-	0.*	30 FEET	402.2
3	-	0.*	8 FEET	662.9
4	-	0.*	10 FEET	305.3
5	-	0.*	10 FEET	120.8
6	-	0.*	B5 P2	269.3
7	-	0.*	B5 P3	353.6
8	-	0.*	6 FEET	36.4
9	-	0.*	B6 P2	378.6
10	-	0.*	B6 P3	60.2
11	-	0.*	B6 P4	141.4
12	-	0.*	B6 P5	50.0
13	-	0.*	B6 P6	44.7
14	-	0.*	6 FEET	31.6
15	-	0.*	B7 P2	294.6
16	-	0.*	6 FEET	50.2
17	-	0.*	B8 P2	335.0
18	-	0.*	B8 P3	50.0
19	-	0.*	B8 P4	90.0
20	-	0.*	10 FEET	45.0
21	-	0.*	B9 P2	83.3
22	-	0.*	B9 P3	274.0
23	-	0.*	B9 P4	242.2
24	-	0.*	B9 P5	201.2
25	-	0.*	B9 P6	190.4

26	-	0.*	B9 P7	100.5
27	-	0.*	10 FEET	90.1
28	-	0.*	B10 P2	1005.6
29	-	0.*	B10 P3	4.0
30	-	0.*	6 FEET	201.2
31	-	0.*	10 FEET	70.9
32	-	0.*	B11 P2	130.4
33	-	0.*	B11 P3	226.1
34	-	0.*	B11 P4	256.8
35	-	0.*	B11 P5	78.1
36	-	0.*	B11 P6	247.6
37	-	0.*	B11 P7	149.0
38	-	0.*	6 FEET	41.2
39	-	0.*	B12 P2	46.1
40	-	0.*	B12 P3	30.4
41	-	0.*	B12 P4	290.9
42	-	0.*	B12 P5	24.9
43	-	0.*	B12 P6	328.8
44	-	0.*	B12 P7	53.4
45	-	0.*	B12 P8	308.7
46	-	0.*	6 FEET	178.0
47	-	0.*	B13 P2	193.3
48	-	0.*	B13 P3	23.7
49	-	0.*	B13 P4	426.2
50	-	0.*	B13 P5	60.2
51	-	0.*	6 FEET	67.1
52	-	0.*	B14 P2	36.4
53	-	0.*	B14 P3	4.0
54	-	0.*	10 FEET	241.7
55	-	0.*	B14 P5	289.5
56	-	0.*	B14 P6	104.5
57	-	0.*	B14 P7	318.0
58	-	0.*	B14 P8	32.2
59	-	0.*	B14 P9	35.1
60	-	0.*	6 FEET	143.2
61	-	0.*	B15 P2	4.0
62	-	0.*	10 FEET	332.5
63	-	0.*	B15 P4	133.4
64	-	0.*	B15 P5	204.6
65	-	0.*	B15 P6	1467.5
66	-	0.*	6 FEET	478.1

```
 67      -    0.*                                          B16 P2     170.3
 68      -    0.*                                          B16 P3      92.2

 69      -    0.*                                          6 FEET      90.6
 70      -    0.*                                          B17 P2     310.6
 71      -    0.*                                          B17 P3      90.6
 72      -    0.*                                          B17 P4     130.4
 73      -    0.*                                          B17 P5      63.2
 74      -    0.*                                          B17 P6     400.0
 75      -    0.*                                          B17 P7     100.5
 76      -    0.*                                          B17 P8      63.4
 77      -    0.*                                          B17 P9     261.7
 78      -    0.*                                          B17 P10     64.0
 -----------------------------------------------------------------
-------------
       0    1    2    3    4    5    6    7
1
 REC REC ID  LEQ(CAL)
 --------------------------------
  1  LOT 288   67.     500.   58.8
  2  LOT 352   67.     500.   59.3
  3  LOT 350   67.     500.   58.2
  4  LOT 348   67.     500.   60.3
  5  LOT 346   67.     500.   61.2
  6  LOT 344   67.     500.   62.4
  7  LOT 341   67.     500.   65.5
  8  LOT 338   67.     500.   71.2
 BARRIER HEIGHT INDEX FOR EACH BARRIER SECTION
   1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1
1  1  1  1
   1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1
1  1  1  1
   1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1
1  1  1  1
   1  1  1
 CORRESPONDING BARRIER HEIGHTS FOR EACH SECTION
  0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0
. 0. 0. 0.
  0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0
. 0. 0. 0.
  0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0
. 0. 0. 0.
  0. 0. 0.
```

SOUND32 - RELEASE 07/30/91, MODIFIED 04/22/00

TITLE:
RIVER PARK AREA C, LOTS AS PROPOSED & AT REALISTIC SPEEDS

1

BARRIER DATA
****

BAR ELE	0	BARRIER HEIGHTS 1	2	3	4	5	6	7	BAR ID	LENGTH
1	-	0.*							30 FEET	327.6
2	-	0.*							30 FEET	402.2
3	-	0.*							8 FEET	662.9
4	-	0.*							10 FEET	305.3
5	-	0.*							10 FEET	120.8
6	-	0.*							B5 P2	269.3
7	-	0.*							B5 P3	353.6
8	-	0.*							6 FEET	36.4
9	-	0.*							B6 P2	378.6
10	-	0.*							B6 P3	60.2
11	-	0.*							B6 P4	141.4
12	-	0.*							B6 P5	50.0
13	-	0.*							B6 P6	44.7
14	-	0.*							6 FEET	31.6
15	-	0.*							B7 P2	294.6
16	-	0.*							6 FEET	50.2
17	-	0.*							B8 P2	335.0
18	-	0.*							B8 P3	50.0
19	-	0.*							B8 P4	90.0
20	-	0.*							10 FEET	45.0
21	-	0.*							B9 P2	83.3
22	-	0.*							B9 P3	274.0
23	-	0.*							B9 P4	242.2
24	-	0.*							B9 P5	201.2
25	-	0.*							B9 P6	190.4

26	-	0.*	B9 P7	100.5
27	-	0.*	10 FEET	90.1
28	-	0.*	B10 P2	1005.6
29	-	0.*	B10 P3	4.0
30	-	0.*	6 FEET	201.2
31	-	0.*	10 FEET	70.9
32	-	0.*	B11 P2	130.4
33	-	0.*	B11 P3	226.1
34	-	0.*	B11 P4	256.8
35	-	0.*	B11 P5	78.1
36	-	0.*	B11 P6	247.6
37	-	0.*	B11 P7	149.0
38	-	0.*	6 FEET	41.2
39	-	0.*	B12 P2	46.1
40	-	0.*	B12 P3	30.4
41	-	0.*	B12 P4	290.9
42	-	0.*	B12 P5	24.9
43	-	0.*	B12 P6	328.8
44	-	0.*	B12 P7	53.4
45	-	0.*	B12 P8	308.7
46	-	0.*	6 FEET	178.0
47	-	0.*	B13 P2	193.3
48	-	0.*	B13 P3	23.7
49	-	0.*	B13 P4	426.2
50	-	0.*	B13 P5	60.2
51	-	0.*	6 FEET	67.1
52	-	0.*	B14 P2	36.4
53	-	0.*	B14 P3	4.0
54	-	0.*	10 FEET	241.7
55	-	0.*	B14 P5	289.5
56	-	0.*	B14 P6	104.5
57	-	0.*	B14 P7	318.0
58	-	0.*	B14 P8	32.2
59	-	0.*	B14 P9	35.1
60	-	0.*	6 FEET	143.2
61	-	0.*	B15 P2	4.0
62	-	0.*	10 FEET	332.5
63	-	0.*	B15 P4	133.4
64	-	0.*	B15 P5	204.6
65	-	0.*	B15 P6	1467.5
66	-	0.*	6 FEET	478.1

```
 67      -    0.*                                        B16 P2      170.3
 68      -    0.*                                        B16 P3       92.2

 69      -    0.*                                        6 FEET       90.6
 70      -    0.*                                        B17 P2      310.6
 71      -    0.*                                        B17 P3       90.6
 72      -    0.*                                        B17 P4      130.4
 73      -    0.*                                        B17 P5       63.2
 74      -    0.*                                        B17 P6      400.0
 75      -    0.*                                        B17 P7      100.5
 76      -    0.*                                        B17 P8       63.4
 77      -    0.*                                        B17 P9      261.7
 78      -    0.*                                        B17 P10      64.0
 ------------------------------------------------------------------------
-------------
        0    1    2    3    4    5    6    7
1
 REC REC ID  LEQ(CAL)
 ---------------------------------
  1  LOT 521A  67.    500.   70.4
  2  LOT 521B  67.    500.   64.9
  3  LOT 519A  67.    500.   58.4
  4  LOT 519B  67.    500.   55.7
  5  LOT 519C  67.    500.   57.9
  6  LOT 519D  67.    500.   54.8
 BARRIER HEIGHT INDEX FOR EACH BARRIER SECTION
   1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1
1  1  1  1
   1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1
1  1  1  1
   1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1
1  1  1  1
   1  1  1
 CORRESPONDING BARRIER HEIGHTS FOR EACH SECTION
  0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0
. 0. 0. 0.
  0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0
. 0. 0. 0.
  0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0
. 0. 0. 0.
  0. 0. 0.
```

SOUND32 - RELEASE 07/30/91, MODIFIED 04/22/00

TITLE:
RIVER PARK AREA D, LOTS AS PROPOSED & AT REALISTIC SPEEDS

1

BARRIER DATA
****

BAR ELE	0	1	BARRIER HEIGHTS 2	3	4	5	6	7	BAR ID	LENGTH
1	-	0.*							30 FEET	327.6
2	-	0.*							30 FEET	402.2
3	-	0.*							8 FEET	662.9
4	-	0.*							10 FEET	305.3
5	-	0.*							10 FEET	120.8
6	-	0.*							B5 P2	269.3
7	-	0.*							B5 P3	353.6
8	-	0.*							6 FEET	36.4
9	-	0.*							B6 P2	378.6
10	-	0.*							B6 P3	60.2
11	-	0.*							B6 P4	141.4
12	-	0.*							B6 P5	50.0
13	-	0.*							B6 P6	44.7
14	-	0.*							6 FEET	31.6
15	-	0.*							B7 P2	294.6
16	-	0.*							6 FEET	50.2
17	-	0.*							B8 P2	335.0
18	-	0.*							B8 P3	50.0
19	-	0.*							B8 P4	90.0
20	-	0.*							10 FEET	45.0
21	-	0.*							B9 P2	83.3
22	-	0.*							B9 P3	274.0
23	-	0.*							B9 P4	242.2
24	-	0.*							B9 P5	201.2
25	-	0.*							B9 P6	190.4

26	-	0.*	B9 P7	100.5
27	-	0.*	10 FEET	90.1
28	-	0.*	B10 P2	1005.6
29	-	0.*	B10 P3	4.0
30	-	0.*	6 FEET	201.2
31	-	0.*	10 FEET	70.9
32	-	0.*	B11 P2	130.4
33	-	0.*	B11 P3	226.1
34	-	0.*	B11 P4	256.8
35	-	0.*	B11 P5	78.1
36	-	0.*	B11 P6	247.6
37	-	0.*	B11 P7	149.0
38	-	0.*	6 FEET	41.2
39	-	0.*	B12 P2	46.1
40	-	0.*	B12 P3	30.4
41	-	0.*	B12 P4	290.9
42	-	0.*	B12 P5	24.9
43	-	0.*	B12 P6	328.8
44	-	0.*	B12 P7	53.4
45	-	0.*	B12 P8	308.7
46	-	0.*	6 FEET	178.0
47	-	0.*	B13 P2	193.3
48	-	0.*	B13 P3	23.7
49	-	0.*	B13 P4	426.2
50	-	0.*	B13 P5	60.2
51	-	0.*	6 FEET	67.1
52	-	0.*	B14 P2	36.4
53	-	0.*	B14 P3	4.0
54	-	0.*	10 FEET	241.7
55	-	0.*	B14 P5	289.5
56	-	0.*	B14 P6	104.5
57	-	0.*	B14 P7	318.0
58	-	0.*	B14 P8	32.2
59	-	0.*	B14 P9	35.1
60	-	0.*	6 FEET	143.2
61	-	0.*	B15 P2	4.0
62	-	0.*	10 FEET	332.5
63	-	0.*	B15 P4	133.4
64	-	0.*	B15 P5	204.6
65	-	0.*	B15 P6	1467.5
66	-	0.*	6 FEET	478.1

```
 67      -    0.*                                        B16 P2      170.3
 68      -    0.*                                        B16 P3       92.2

 69      -    0.*                                        6 FEET       90.6
 70      -    0.*                                        B17 P2      310.6
 71      -    0.*                                        B17 P3       90.6
 72      -    0.*                                        B17 P4      130.4
 73      -    0.*                                        B17 P5       63.2
 74      -    0.*                                        B17 P6      400.0
 75      -    0.*                                        B17 P7      100.5
 76      -    0.*                                        B17 P8       63.4
 77      -    0.*                                        B17 P9      261.7
 78      -    0.*                                        B17 P10      64.0
 ------------------------------------------------------------------------
-------------
         0    1    2    3    4    5    6    7
1
 REC REC ID  LEQ(CAL)
 ---------------------------------
  1  525A       67.     500.   57.9
  2  525B       67.     500.   61.0
  3  525C       67.     500.   62.4
  4  525D       67.     500.   62.4
  5  525E       67.     500.   61.8
  6  525F       67.     500.   61.9
  7  525A       67.     500.   63.3
  8  525B       67.     500.   63.7
  9  525C       67.     500.   70.8
 10  525D       67.     500.   69.0
 11  228        67.     500.   56.9
 BARRIER HEIGHT INDEX FOR EACH BARRIER SECTION
   1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1
1  1  1  1
   1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1
1  1  1  1
   1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1
1  1  1  1
   1  1  1
 CORRESPONDING BARRIER HEIGHTS FOR EACH SECTION
  0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0
. 0. 0. 0.
  0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0
. 0. 0. 0.
  0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0
. 0. 0. 0.
  0. 0. 0.
```

SOUND32 - RELEASE 07/30/91, MODIFIED 04/22/00

TITLE:
RIVER PARK AREA A-1, LOTS WITH SETBACKS & AT CONVENTIONAL SPEEDS

1

BARRIER DATA
****

BAR ELE	0	BARRIER HEIGHTS 1	2	3	4	5	6	7	BAR ID	LENGTH
1	-	0.*							30 FEET	327.6
2	-	0.*							30 FEET	402.2
3	-	0.*							8 FEET	662.9
4	-	0.*							10 FEET	305.3
5	-	0.*							10 FEET	120.8
6	-	0.*							B5 P2	269.3
7	-	0.*							B5 P3	353.6
8	-	0.*							6 FEET	36.4
9	-	0.*							B6 P2	378.6
10	-	0.*							B6 P3	60.2
11	-	0.*							B6 P4	141.4
12	-	0.*							B6 P5	50.0
13	-	0.*							B6 P6	44.7
14	-	0.*							6 FEET	31.6
15	-	0.*							B7 P2	294.6
16	-	0.*							6 FEET	50.2
17	-	0.*							B8 P2	335.0
18	-	0.*							B8 P3	50.0
19	-	0.*							B8 P4	90.0
20	-	0.*							10 FEET	45.0
21	-	0.*							B9 P2	83.3
22	-	0.*							B9 P3	274.0
23	-	0.*							B9 P4	242.2
24	-	0.*							B9 P5	201.2
25	-	0.*							B9 P6	190.4

26	-	0.*	B9 P7	100.5
27	-	0.*	10 FEET	90.1
28	-	0.*	B10 P2	1005.6
29	-	0.*	B10 P3	4.0
30	-	0.*	6 FEET	201.2
31	-	0.*	10 FEET	70.9
32	-	0.*	B11 P2	130.4
33	-	0.*	B11 P3	226.1
34	-	0.*	B11 P4	256.8
35	-	0.*	B11 P5	78.1
36	-	0.*	B11 P6	247.6
37	-	0.*	B11 P7	149.0
38	-	0.*	6 FEET	41.2
39	-	0.*	B12 P2	46.1
40	-	0.*	B12 P3	30.4
41	-	0.*	B12 P4	290.9
42	-	0.*	B12 P5	24.9
43	-	0.*	B12 P6	328.8
44	-	0.*	B12 P7	53.4
45	-	0.*	B12 P8	308.7
46	-	0.*	6 FEET	178.0
47	-	0.*	B13 P2	193.3
48	-	0.*	B13 P3	23.7
49	-	0.*	B13 P4	426.2
50	-	0.*	B13 P5	60.2
51	-	0.*	6 FEET	67.1
52	-	0.*	B14 P2	36.4
53	-	0.*	B14 P3	4.0
54	-	0.*	10 FEET	241.7
55	-	0.*	B14 P5	289.5
56	-	0.*	B14 P6	104.5
57	-	0.*	B14 P7	318.0
58	-	0.*	B14 P8	32.2
59	-	0.*	B14 P9	35.1
60	-	0.*	6 FEET	143.2
61	-	0.*	B15 P2	4.0
62	-	0.*	10 FEET	332.5
63	-	0.*	B15 P4	133.4
64	-	0.*	B15 P5	204.6
65	-	0.*	B15 P6	1467.5
66	-	0.*	6 FEET	478.1

```
 67      -    0.*                                        B16 P2     170.3
 68      -    0.*                                        B16 P3      92.2

 69      -    0.*                                        6 FEET      90.6
 70      -    0.*                                        B17 P2     310.6
 71      -    0.*                                        B17 P3      90.6
 72      -    0.*                                        B17 P4     130.4
 73      -    0.*                                        B17 P5      63.2
 74      -    0.*                                        B17 P6     400.0
 75      -    0.*                                        B17 P7     100.5
 76      -    0.*                                        B17 P8      63.4
 77      -    0.*                                        B17 P9     261.7
 78      -    0.*                                        B17 P10     64.0

 79      -    0.*                                        B18 P1      98.5
 80      -    0.*                                        B18 P2     125.5
 ----------------------------------------------------------------------
-------------
        0    1    2    3    4    5    6    7
1
 REC REC ID  LEQ(CAL)
 --------------------------------
  1  LOT 1      67.     500.   62.4
  2  LOT 2      67.     500.   63.8
  3  LOT 3      67.     500.   64.3
  4  LOT 7      67.     500.   62.5
  5  LOT 8      67.     500.   61.4
  6  LOT 56     67.     500.   62.7
  7  LOT 55     67.     500.   64.1
  8  LOT 57     67.     500.   58.7
  9  LOT 58     67.     500.   57.7
 10  LOT 60     67.     500.   58.5
 11  LOT 61     67.     500.   58.7
 12  LOT 62     67.     500.   58.2
 13  LOT 64     67.     500.   56.5
 14  LOT 66     67.     500.   56.0
 15  LOT 69     67.     500.   58.5
 16  LOT 70     67.     500.   59.3
 17  LOT 176    67.     500.   59.8
 18  LOT 170    67.     500.   60.1
 19  LOT 162    67.     500.   54.6
 20  LOT 165    67.     500.   60.9
 21  LOT 161    67.     500.   61.3
 22  LOT 158    67.     500.   65.4
 23  LOT 72     67.     500.   61.4
 BARRIER HEIGHT INDEX FOR EACH BARRIER SECTION
   1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1
1  1  1  1
```

```
   1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1
1  1  1  1
   1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1
1  1  1  1
   1  1  1  1  1
 CORRESPONDING BARRIER HEIGHTS FOR EACH SECTION
  0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0
. 0. 0. 0.
  0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0
. 0. 0. 0.
  0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0
. 0. 0. 0.
  0. 0. 0. 0. 0.
```

SOUND32 - RELEASE 07/30/91, MODIFIED 04/22/00

TITLE:
RIVER PARK AREA A-2, B WITH SETBACKS & AT CONSERVATIVE SPEEDS

1

BARRIER DATA
****

BAR ELE	BARRIER HEIGHTS 0	1	2	3	4	5	6	7	BAR ID	LENGTH
1	-	0.*							30 FEET	327.6
2	-	0.*							30 FEET	402.2
3	-	0.*							8 FEET	662.9
4	-	0.*							10 FEET	305.3
5	-	0.*							10 FEET	120.8
6	-	0.*							B5 P2	269.3
7	-	0.*							B5 P3	353.6
8	-	0.*							6 FEET	36.4
9	-	0.*							B6 P2	378.6
10	-	0.*							B6 P3	60.2
11	-	0.*							B6 P4	141.4
12	-	0.*							B6 P5	50.0
13	-	0.*							B6 P6	44.7
14	-	0.*							6 FEET	31.6
15	-	0.*							B7 P2	294.6
16	-	0.*							6 FEET	50.2
17	-	0.*							B8 P2	335.0
18	-	0.*							B8 P3	50.0
19	-	0.*							B8 P4	90.0
20	-	0.*							10 FEET	45.0
21	-	0.*							B9 P2	83.3
22	-	0.*							B9 P3	274.0
23	-	0.*							B9 P4	242.2
24	-	0.*							B9 P5	201.2
25	-	0.*							B9 P6	190.4

26	-	0.*	B9 P7	100.5
27	-	0.*	10 FEET	90.1
28	-	0.*	B10 P2	1005.6
29	-	0.*	B10 P3	4.0
30	-	0.*	6 FEET	201.2
31	-	0.*	10 FEET	70.9
32	-	0.*	B11 P2	130.4
33	-	0.*	B11 P3	226.1
34	-	0.*	B11 P4	256.8
35	-	0.*	B11 P5	78.1
36	-	0.*	B11 P6	247.6
37	-	0.*	B11 P7	149.0
38	-	0.*	6 FEET	41.2
39	-	0.*	B12 P2	46.1
40	-	0.*	B12 P3	30.4
41	-	0.*	B12 P4	290.9
42	-	0.*	B12 P5	24.9
43	-	0.*	B12 P6	328.8
44	-	0.*	B12 P7	53.4
45	-	0.*	B12 P8	308.7
46	-	0.*	6 FEET	178.0
47	-	0.*	B13 P2	193.3
48	-	0.*	B13 P3	23.7
49	-	0.*	B13 P4	426.2
50	-	0.*	B13 P5	60.2
51	-	0.*	6 FEET	67.1
52	-	0.*	B14 P2	36.4
53	-	0.*	B14 P3	4.0
54	-	0.*	10 FEET	241.7
55	-	0.*	B14 P5	289.5
56	-	0.*	B14 P6	104.5
57	-	0.*	B14 P7	318.0
58	-	0.*	B14 P8	32.2
59	-	0.*	B14 P9	35.1
60	-	0.*	6 FEET	143.2
61	-	0.*	B15 P2	4.0
62	-	0.*	10 FEET	332.5
63	-	0.*	B15 P4	133.4
64	-	0.*	B15 P5	204.6
65	-	0.*	B15 P6	1467.5
66	-	0.*	6 FEET	478.1

```
 67      -    0.*                                            B16 P2      170.3
 68      -    0.*                                            B16 P3       92.2

 69      -    0.*                                            6 FEET       90.6
 70      -    0.*                                            B17 P2      310.6
 71      -    0.*                                            B17 P3       90.6
 72      -    0.*                                            B17 P4      130.4
 73      -    0.*                                            B17 P5       63.2
 74      -    0.*                                            B17 P6      400.0
 75      -    0.*                                            B17 P7      100.5
 76      -    0.*                                            B17 P8       63.4
 77      -    0.*                                            B17 P9      261.7
 78      -    0.*                                            B17 P10      64.0
 -----------------------------------------------------------------
-------------
       0    1    2    3    4    5    6    7
1
 REC REC ID  LEQ(CAL)
 --------------------------------
  1  LOT 263   67.     500.    61.8
  2  LOT 265   67.     500.    60.4
  3  LOT 266   67.     500.    60.0
  4  LOT 267   67.     500.    59.6
  5  LOT 274   67.     500.    61.7
  6  LOT 290   67.     500.    62.6
  7  LOT 299   67.     500.    63.0
  8  LOT 309   67.     500.    56.5
  9  LOT 318   67.     500.    57.7
 10  LOT 342   67.     500.    64.1
 11  LOT 381   67.     500.    61.1
 12  LOT 385   67.     500.    61.2
 13  LOT 372   67.     500.    60.2
 14  LOT 507   67.     500.    60.8
 15  LOT 452   67.     500.    58.0
 16  LOT 445   67.     500.    56.4
 17  S STREET  67.     500.    59.9
 18  LOT 435   67.     500.    60.0
 19  LOT 437   67.     500.    60.3
 20  LOT 426   67.     500.    61.1
 21  LOT 422   67.     500.    59.8
 22  LOT 438   67.     500.    60.8
 23  LOT 411   67.     500.    59.6
 BARRIER HEIGHT INDEX FOR EACH BARRIER SECTION
   1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1
1  1  1  1
   1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1
1  1  1  1
   1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1
```

```
1  1  1  1
   1  1  1
 CORRESPONDING BARRIER HEIGHTS FOR EACH SECTION
  0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0
. 0. 0. 0.
  0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0
. 0. 0. 0.
  0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0
. 0. 0. 0.
  0. 0. 0.
```

SOUND32 - RELEASE 07/30/91, MODIFIED 04/22/00

TITLE:
RIVER PARK AREA C, LOTS WITH SETBACKS & AT CONVENTIONAL SPEEDS

1

BARRIER DATA
****

BAR ELE	0	1	BARRIER HEIGHTS 2	3	4	5	6	7	BAR ID	LENGTH
1	-	0.*							30 FEET	327.6
2	-	0.*							30 FEET	402.2
3	-	0.*							8 FEET	662.9
4	-	0.*							10 FEET	305.3
5	-	0.*							10 FEET	120.8
6	-	0.*							B5 P2	269.3
7	-	0.*							B5 P3	353.6
8	-	0.*							6 FEET	36.4
9	-	0.*							B6 P2	378.6
10	-	0.*							B6 P3	60.2
11	-	0.*							B6 P4	141.4
12	-	0.*							B6 P5	50.0
13	-	0.*							B6 P6	44.7
14	-	0.*							6 FEET	31.6
15	-	0.*							B7 P2	294.6
16	-	0.*							6 FEET	50.2
17	-	0.*							B8 P2	335.0
18	-	0.*							B8 P3	50.0
19	-	0.*							B8 P4	90.0
20	-	0.*							10 FEET	45.0
21	-	0.*							B9 P2	83.3
22	-	0.*							B9 P3	274.0
23	-	0.*							B9 P4	242.2
24	-	0.*							B9 P5	201.2
25	-	0.*							B9 P6	190.4

26	-	0.*	B9 P7	100.5
27	-	0.*	10 FEET	90.1
28	-	0.*	B10 P2	1005.6
29	-	0.*	B10 P3	4.0
30	-	0.*	6 FEET	201.2
31	-	0.*	10 FEET	70.9
32	-	0.*	B11 P2	130.4
33	-	0.*	B11 P3	226.1
34	-	0.*	B11 P4	256.8
35	-	0.*	B11 P5	78.1
36	-	0.*	B11 P6	247.6
37	-	0.*	B11 P7	149.0
38	-	0.*	6 FEET	41.2
39	-	0.*	B12 P2	46.1
40	-	0.*	B12 P3	30.4
41	-	0.*	B12 P4	290.9
42	-	0.*	B12 P5	24.9
43	-	0.*	B12 P6	328.8
44	-	0.*	B12 P7	53.4
45	-	0.*	B12 P8	308.7
46	-	0.*	6 FEET	178.0
47	-	0.*	B13 P2	193.3
48	-	0.*	B13 P3	23.7
49	-	0.*	B13 P4	426.2
50	-	0.*	B13 P5	60.2
51	-	0.*	6 FEET	67.1
52	-	0.*	B14 P2	36.4
53	-	0.*	B14 P3	4.0
54	-	0.*	10 FEET	241.7
55	-	0.*	B14 P5	289.5
56	-	0.*	B14 P6	104.5
57	-	0.*	B14 P7	318.0
58	-	0.*	B14 P8	32.2
59	-	0.*	B14 P9	35.1
60	-	0.*	6 FEET	143.2
61	-	0.*	B15 P2	4.0
62	-	0.*	10 FEET	332.5
63	-	0.*	B15 P4	133.4
64	-	0.*	B15 P5	204.6
65	-	0.*	B15 P6	1467.5
66	-	0.*	10 FEET	85.4

```
 67      -    0.*                                        B16 P2      478.1
 68      -    0.*                                        B16 P3      170.3
 69      -    0.*                                        B16 P4       92.2

 70      -    0.*                                        6 FEET       90.6
 71      -    0.*                                        B17 P2      310.6
 72      -    0.*                                        B17 P3       90.6
 73      -    0.*                                        B17 P4      130.4
 74      -    0.*                                        B17 P5       63.2
 75      -    0.*                                        B17 P6      400.0
 76      -    0.*                                        B17 P7      100.5
 77      -    0.*                                        B17 P8       63.4
 78      -    0.*                                        B17 P9      261.7
 79      -    0.*                                        B17 P10      64.0
 ------------------------------------------------------------------------
-------------
         0    1    2    3    4    5    6    7
1
 REC REC ID  LEQ(CAL)
 --------------------------------
  1  LOT 521A  67.    500.   66.6
  2  LOT 521B  67.    500.   61.8
  3  LOT 519A  67.    500.   60.0
  4  LOT 519B  67.    500.   57.5
  5  LOT 519C  67.    500.   59.6
  6  LOT 519D  67.    500.   56.4
 BARRIER HEIGHT INDEX FOR EACH BARRIER SECTION
    1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1
1  1  1  1
    1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1
1  1  1  1
    1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1
1  1  1  1
    1  1  1  1
 CORRESPONDING BARRIER HEIGHTS FOR EACH SECTION
  0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0
. 0. 0. 0.
  0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0
. 0. 0. 0.
  0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0
. 0. 0. 0.
  0. 0. 0. 0.
```

SOUND32 - RELEASE 07/30/91, MODIFIED 04/22/00

TITLE:
RIVER PARK AREA D, LOTS WITH SETBACKS & AT CONVENTIONAL SPEEDS

1

BARRIER DATA
****

BAR ELE	0	BARRIER HEIGHTS 1	2	3	4	5	6	7	BAR ID	LENGTH
1	-	0.*							30 FEET	327.6
2	-	0.*							30 FEET	402.2
3	-	0.*							8 FEET	662.9
4	-	0.*							10 FEET	305.3
5	-	0.*							10 FEET	120.8
6	-	0.*							B5 P2	269.3
7	-	0.*							B5 P3	353.6
8	-	0.*							6 FEET	36.4
9	-	0.*							B6 P2	378.6
10	-	0.*							B6 P3	60.2
11	-	0.*							B6 P4	141.4
12	-	0.*							B6 P5	50.0
13	-	0.*							B6 P6	44.7
14	-	0.*							6 FEET	31.6
15	-	0.*							B7 P2	294.6
16	-	0.*							6 FEET	50.2
17	-	0.*							B8 P2	335.0
18	-	0.*							B8 P3	50.0
19	-	0.*							B8 P4	90.0
20	-	0.*							10 FEET	45.0
21	-	0.*							B9 P2	83.3
22	-	0.*							B9 P3	274.0
23	-	0.*							B9 P4	242.2
24	-	0.*							B9 P5	201.2
25	-	0.*							B9 P6	190.4

26	-	0.*	B9 P7	100.5
27	-	0.*	10 FEET	90.1
28	-	0.*	B10 P2	1005.6
29	-	0.*	B10 P3	4.0
30	-	0.*	6 FEET	201.2
31	-	0.*	10 FEET	70.9
32	-	0.*	B11 P2	130.4
33	-	0.*	B11 P3	226.1
34	-	0.*	B11 P4	256.8
35	-	0.*	B11 P5	78.1
36	-	0.*	B11 P6	247.6
37	-	0.*	B11 P7	149.0
38	-	0.*	6 FEET	41.2
39	-	0.*	B12 P2	46.1
40	-	0.*	B12 P3	30.4
41	-	0.*	B12 P4	290.9
42	-	0.*	B12 P5	24.9
43	-	0.*	B12 P6	328.8
44	-	0.*	B12 P7	53.4
45	-	0.*	B12 P8	308.7
46	-	0.*	6 FEET	178.0
47	-	0.*	B13 P2	193.3
48	-	0.*	B13 P3	23.7
49	-	0.*	B13 P4	426.2
50	-	0.*	B13 P5	60.2
51	-	0.*	6 FEET	67.1
52	-	0.*	B14 P2	36.4
53	-	0.*	B14 P3	4.0
54	-	0.*	10 FEET	241.7
55	-	0.*	B14 P5	289.5
56	-	0.*	B14 P6	104.5
57	-	0.*	B14 P7	318.0
58	-	0.*	B14 P8	32.2
59	-	0.*	B14 P9	35.1
60	-	0.*	6 FEET	143.2
61	-	0.*	B15 P2	4.0
62	-	0.*	10 FEET	332.5
63	-	0.*	B15 P4	133.4
64	-	0.*	B15 P5	204.6
65	-	0.*	B15 P6	1467.5
66	-	0.*	6 FEET	478.1

```
 67      -    0.*                                        B16 P2      170.3
 68      -    0.*                                        B16 P3       92.2

 69      -    0.*                                        6 FEET       90.6
 70      -    0.*                                        B17 P2      310.6
 71      -    0.*                                        B17 P3       90.6
 72      -    0.*                                        B17 P4      130.4
 73      -    0.*                                        B17 P5       63.2
 74      -    0.*                                        B17 P6      400.0
 75      -    0.*                                        B17 P7      100.5
 76      -    0.*                                        B17 P8       63.4
 77      -    0.*                                        B17 P9      261.7
 78      -    0.*                                        B17 P10      64.0
 ------------------------------------------------------------------------
-------------
        0    1    2    3    4    5    6    7
1
 REC REC ID  LEQ(CAL)
 --------------------------------
  1  525A       67.    500.   59.6
  2  525B       67.    500.   62.6
  3  525C       67.    500.   64.0
  4  525D       67.    500.   64.0
  5  525E       67.    500.   63.4
  6  525F       67.    500.   63.3
  7  525G       67.    500.   64.8
  8  524B       67.    500.   65.2
  9  524C       67.    500.   65.3
 10  525D       67.    500.   68.5
 11  228        67.    500.   58.6
 BARRIER HEIGHT INDEX FOR EACH BARRIER SECTION
   1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1
1  1  1  1
   1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1
1  1  1  1
   1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1
1  1  1  1
   1  1  1
 CORRESPONDING BARRIER HEIGHTS FOR EACH SECTION
  0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0
. 0. 0. 0.
  0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0
. 0. 0. 0.
  0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0
. 0. 0. 0.
  0. 0. 0.
```

SOUND32 - RELEASE 07/30/91, MODIFIED 04/22/00

TITLE:
RIVER PARK AREA A-1, RES. ALONG NRR W/RECOMMENTATIONS & REALISTIC SPEEDS

1

BARRIER DATA
****

BAR ELE	0	1	BARRIER HEIGHTS 2	3	4	5	6	7	BAR ID	LENGTH
1	-	0.*							30 FEET	327.6
2	-	0.*							30 FEET	402.2
3	-	0.*							8 FEET	662.9
4	-	0.*							10 FEET	305.3
5	-	0.*							10 FEET	120.8
6	-	0.*							B5 P2	269.3
7	-	0.*							B5 P3	353.6
8	-	0.*							6 FEET	36.4
9	-	0.*							B6 P2	378.6
10	-	0.*							B6 P3	60.2
11	-	0.*							B6 P4	141.4
12	-	0.*							B6 P5	50.0
13	-	0.*							B6 P6	44.7
14	-	0.*							6 FEET	31.6
15	-	0.*							B7 P2	294.6
16	-	0.*							6 FEET	50.2
17	-	0.*							B8 P2	335.0
18	-	0.*							B8 P3	50.0
19	-	0.*							B8 P4	90.0
20	-	0.*							10 FEET	45.0
21	-	0.*							B9 P2	83.3
22	-	0.*							B9 P3	274.0
23	-	0.*							B9 P4	242.2
24	-	0.*							B9 P5	201.2
25	-	0.*							B9 P6	190.4

26	-	0.*	B9 P7	100.5
27	-	0.*	10 FEET	90.1
28	-	0.*	B10 P2	1005.6
29	-	0.*	B10 P3	4.0
30	-	0.*	6 FEET	201.2
31	-	0.*	10 FEET	70.9
32	-	0.*	B11 P2	130.4
33	-	0.*	B11 P3	226.1
34	-	0.*	B11 P4	256.8
35	-	0.*	B11 P5	78.1
36	-	0.*	B11 P6	247.6
37	-	0.*	B11 P7	149.0
38	-	0.*	6 FEET	41.2
39	-	0.*	B12 P2	46.1
40	-	0.*	B12 P3	30.4
41	-	0.*	B12 P4	290.9
42	-	0.*	B12 P5	24.9
43	-	0.*	B12 P6	328.8
44	-	0.*	B12 P7	53.4
45	-	0.*	B12 P8	308.7
46	-	0.*	6 FEET	178.0
47	-	0.*	B13 P2	193.3
48	-	0.*	B13 P3	23.7
49	-	0.*	B13 P4	426.2
50	-	0.*	B13 P5	60.2
51	-	0.*	6 FEET	67.1
52	-	0.*	B14 P2	36.4
53	-	0.*	B14 P3	4.0
54	-	0.*	10 FEET	241.7
55	-	0.*	B14 P5	289.5
56	-	0.*	B14 P6	104.5
57	-	0.*	B14 P7	318.0
58	-	0.*	B14 P8	32.2
59	-	0.*	B14 P9	35.1
60	-	0.*	6 FEET	143.2
61	-	0.*	B15 P2	4.0
62	-	0.*	10 FEET	332.5
63	-	0.*	B15 P4	133.4
64	-	0.*	B15 P5	204.6
65	-	0.*	B15 P6	1467.5
66	-	0.*	6 FEET	478.1

```
 67      -   0.*                                     B16 P2      170.3
 68      -   0.*                                     B16 P3       92.2

 69      -   0.*                                     6 FEET       90.6
 70      -   0.*                                     B17 P2      310.6
 71      -   0.*                                     B17 P3       90.6
 72      -   0.*                                     B17 P4      130.4
 73      -   0.*                                     B17 P5       63.2
 74      -   0.*                                     B17 P6      400.0
 75      -   0.*                                     B17 P7      100.5
 76      -   0.*                                     B17 P8       63.4
 77      -   0.*                                     B17 P9      261.7
 78      -   0.*                                     B17 P10      64.0

 79      -   0.*                                     B18 P1       98.5
 80      -   0.*                                     B18 P2      125.5
 -----------------------------------------------------------------
-------------
       0    1    2    3    4    5    6    7
1
 REC REC ID  LEQ(CAL)
 --------------------------------
  1  LOT 1     67.    500.   60.8
  2  LOT 2     67.    500.   62.1
  3  LOT 3     67.    500.   62.6
  4  LOT 7     67.    500.   60.9
  5  LOT 8     67.    500.   59.8
  6  LOT 56    67.    500.   61.4
  7  LOT 55    67.    500.   62.6
  8  LOT 57    67.    500.   57.4
  9  LOT 58    67.    500.   56.4
 10  LOT 60    67.    500.   57.1
 11  LOT 61    67.    500.   57.3
 12  LOT 62    67.    500.   56.8
 13  LOT 64    67.    500.   55.1
 14  LOT 66    67.    500.   54.6
 15  LOT 69    67.    500.   57.0
 16  LOT 70    67.    500.   57.7
 17  LOT 176   67.    500.   58.5
 18  LOT 170   67.    500.   58.8
 19  LOT 162   67.    500.   53.1
 20  LOT 165   67.    500.   59.5
 21  LOT 161   67.    500.   59.8
 22  LOT 158   67.    500.   63.9
 23  LOT 72    67.    500.   59.7
 BARRIER HEIGHT INDEX FOR EACH BARRIER SECTION
   1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1
1  1  1  1
```

```
   1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1
1  1  1  1
   1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1
1  1  1  1
   1  1  1  1  1
 CORRESPONDING BARRIER HEIGHTS FOR EACH SECTION
  0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0
. 0. 0. 0.
  0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0
. 0. 0. 0.
  0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0
. 0. 0. 0.
  0. 0. 0. 0. 0.
```

SOUND32 - RELEASE 07/30/91, MODIFIED 04/22/00

TITLE:
RIVER PARK AREA A-1, RIVER LOTS WITH SETBACKS & AT REALISTIC SPEEDS

1

BARRIER DATA
****

BAR ELE	0	1	BARRIER HEIGHTS 2	3	4	5	6	7	BAR ID	LENGTH
1	-	0.*							30 FEET	327.6
2	-	0.*							30 FEET	402.2
3	-	0.*							8 FEET	662.9
4	-	0.*							10 FEET	305.3
5	-	0.*							10 FEET	120.8
6	-	0.*							B5 P2	269.3
7	-	0.*							B5 P3	353.6
8	-	0.*							6 FEET	36.4
9	-	0.*							B6 P2	378.6
10	-	0.*							B6 P3	60.2
11	-	0.*							B6 P4	141.4
12	-	0.*							B6 P5	50.0
13	-	0.*							B6 P6	44.7
14	-	0.*							6 FEET	31.6
15	-	0.*							B7 P2	294.6
16	-	0.*							6 FEET	50.2
17	-	0.*							B8 P2	335.0
18	-	0.*							B8 P3	50.0
19	-	0.*							B8 P4	90.0
20	-	0.*							10 FEET	45.0
21	-	0.*							B9 P2	83.3
22	-	0.*							B9 P3	274.0
23	-	0.*							B9 P4	242.2
24	-	0.*							B9 P5	201.2
25	-	0.*							B9 P6	190.4

26	-	0.*	B9 P7	100.5
27	-	0.*	10 FEET	90.1
28	-	0.*	B10 P2	1005.6
29	-	0.*	B10 P3	4.0
30	-	0.*	6 FEET	201.2
31	-	0.*	10 FEET	70.9
32	-	0.*	B11 P2	130.4
33	-	0.*	B11 P3	226.1
34	-	0.*	B11 P4	256.8
35	-	0.*	B11 P5	78.1
36	-	0.*	B11 P6	247.6
37	-	0.*	B11 P7	149.0
38	-	0.*	6 FEET	41.2
39	-	0.*	B12 P2	46.1
40	-	0.*	B12 P3	30.4
41	-	0.*	B12 P4	290.9
42	-	0.*	B12 P5	24.9
43	-	0.*	B12 P6	328.8
44	-	0.*	B12 P7	53.4
45	-	0.*	B12 P8	308.7
46	-	0.*	6 FEET	178.0
47	-	0.*	B13 P2	193.3
48	-	0.*	B13 P3	23.7
49	-	0.*	B13 P4	426.2
50	-	0.*	B13 P5	60.2
51	-	0.*	6 FEET	67.1
52	-	0.*	B14 P2	36.4
53	-	0.*	B14 P3	4.0
54	-	0.*	10 FEET	241.7
55	-	0.*	B14 P5	289.5
56	-	0.*	B14 P6	104.5
57	-	0.*	B14 P7	318.0
58	-	0.*	B14 P8	32.2
59	-	0.*	B14 P9	35.1
60	-	0.*	6 FEET	143.2
61	-	0.*	B15 P2	4.0
62	-	0.*	10 FEET	332.5
63	-	0.*	B15 P4	133.4
64	-	0.*	B15 P5	204.6
65	-	0.*	B15 P6	1467.5
66	-	0.*	6 FEET	478.1

```
 67      -    0.*                                        B16 P2      170.3
 68      -    0.*                                        B16 P3       92.2

 69      -    0.*                                        6 FEET       90.6
 70      -    0.*                                        B17 P2      310.6
 71      -    0.*                                        B17 P3       90.6
 72      -    0.*                                        B17 P4      130.4
 73      -    0.*                                        B17 P5       63.2
 74      -    0.*                                        B17 P6      400.0
 75      -    0.*                                        B17 P7      100.5
 76      -    0.*                                        B17 P8       63.4
 77      -    0.*                                        B17 P9      261.7
 78      -    0.*                                        B17 P10      64.0
 ------------------------------------------------------------------------
-------------
         0    1    2    3    4    5    6    7
1
 REC REC ID  LEQ(CAL)
 --------------------------------
  1  LOT 3      67.     500.    62.8
  2  LOT 4      67.     500.    62.3
  3  LOT 8      67.     500.    60.5
  4  LOT 12     67.     500.    59.8
  5  LOT 13     67.     500.    59.5
  6  LOT 17     67.     500.    58.9
  7  LOT 29     67.     500.    58.3
  8  LOT 203    67.     500.    58.2
 BARRIER HEIGHT INDEX FOR EACH BARRIER SECTION
   1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1
1  1  1  1
   1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1
1  1  1  1
   1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1
1  1  1  1
   1  1  1
 CORRESPONDING BARRIER HEIGHTS FOR EACH SECTION
  0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0
. 0. 0. 0.
  0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0
. 0. 0. 0.
  0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0
. 0. 0. 0.
  0. 0. 0.
```

SOUND32 - RELEASE 07/30/91, MODIFIED 04/22/00

TITLE:
RIVER PARK AREA A-2, B WITH SETBACKS AND REALISTIC SPEEDS

1

BARRIER DATA
****

BAR ELE	BARRIER HEIGHTS 0	1	2	3	4	5	6	7	BAR ID	LENGTH
1	-	0.*							30 FEET	327.6
2	-	0.*							30 FEET	402.2
3	-	0.*							8 FEET	662.9
4	-	0.*							10 FEET	305.3
5	-	0.*							10 FEET	120.8
6	-	0.*							B5 P2	269.3
7	-	0.*							B5 P3	353.6
8	-	0.*							6 FEET	36.4
9	-	0.*							B6 P2	378.6
10	-	0.*							B6 P3	60.2
11	-	0.*							B6 P4	141.4
12	-	0.*							B6 P5	50.0
13	-	0.*							B6 P6	44.7
14	-	0.*							6 FEET	31.6
15	-	0.*							B7 P2	294.6
16	-	0.*							6 FEET	50.2
17	-	0.*							B8 P2	335.0
18	-	0.*							B8 P3	50.0
19	-	0.*							B8 P4	90.0
20	-	0.*							10 FEET	45.0
21	-	0.*							B9 P2	83.3
22	-	0.*							B9 P3	274.0
23	-	0.*							B9 P4	242.2
24	-	0.*							B9 P5	201.2
25	-	0.*							B9 P6	190.4

26	-	0.*	B9 P7	100.5
27	-	0.*	10 FEET	90.1
28	-	0.*	B10 P2	1005.6
29	-	0.*	B10 P3	4.0
30	-	0.*	6 FEET	201.2
31	-	0.*	10 FEET	70.9
32	-	0.*	B11 P2	130.4
33	-	0.*	B11 P3	226.1
34	-	0.*	B11 P4	256.8
35	-	0.*	B11 P5	78.1
36	-	0.*	B11 P6	247.6
37	-	0.*	B11 P7	149.0
38	-	0.*	6 FEET	41.2
39	-	0.*	B12 P2	46.1
40	-	0.*	B12 P3	30.4
41	-	0.*	B12 P4	290.9
42	-	0.*	B12 P5	24.9
43	-	0.*	B12 P6	328.8
44	-	0.*	B12 P7	53.4
45	-	0.*	B12 P8	308.7
46	-	0.*	6 FEET	178.0
47	-	0.*	B13 P2	193.3
48	-	0.*	B13 P3	23.7
49	-	0.*	B13 P4	426.2
50	-	0.*	B13 P5	60.2
51	-	0.*	6 FEET	67.1
52	-	0.*	B14 P2	36.4
53	-	0.*	B14 P3	4.0
54	-	0.*	10 FEET	241.7
55	-	0.*	B14 P5	289.5
56	-	0.*	B14 P6	104.5
57	-	0.*	B14 P7	318.0
58	-	0.*	B14 P8	32.2
59	-	0.*	B14 P9	35.1
60	-	0.*	6 FEET	143.2
61	-	0.*	B15 P2	4.0
62	-	0.*	10 FEET	332.5
63	-	0.*	B15 P4	133.4
64	-	0.*	B15 P5	204.6
65	-	0.*	B15 P6	1467.5
66	-	0.*	6 FEET	478.1

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 67      -    0.*                                        B16 P2      170.3
 68      -    0.*                                        B16 P3       92.2

 69      -    0.*                                        6 FEET       90.6
 70      -    0.*                                        B17 P2      310.6
 71      -    0.*                                        B17 P3       90.6
 72      -    0.*                                        B17 P4      130.4
 73      -    0.*                                        B17 P5       63.2
 74      -    0.*                                        B17 P6      400.0
 75      -    0.*                                        B17 P7      100.5
 76      -    0.*                                        B17 P8       63.4
 77      -    0.*                                        B17 P9      261.7
 78      -    0.*                                        B17 P10      64.0
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-------------
         0    1    2    3    4    5    6    7
1
 REC REC ID  LEQ(CAL)
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  6  LOT 290   67.     500.   61.7
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 11  LOT 381   67.     500.   60.2
 12  LOT 385   67.     500.   60.3
 13  LOT 372   67.     500.   59.3
 14  LOT 507   67.     500.   59.9
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 16  LOT 445   67.     500.   55.3
 17  S STREET  67.     500.   58.8
 18  LOT 435   67.     500.   58.9
 19  LOT 437   67.     500.   59.1
 20  LOT 426   67.     500.   59.9
 21  LOT 422   67.     500.   58.7
 22  LOT 438   67.     500.   59.6
 23  LOT 411   67.     500.   58.5
 BARRIER HEIGHT INDEX FOR EACH BARRIER SECTION
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1  1  1  1
   1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1
1  1  1  1
   1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1
```

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1  1  1  1
   1  1  1
 CORRESPONDING BARRIER HEIGHTS FOR EACH SECTION
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. 0. 0. 0.
  0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0
. 0. 0. 0.
  0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0
. 0. 0. 0.
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SOUND32 - RELEASE 07/30/91, MODIFIED 04/22/00

TITLE:
RIVER PARK AREA C LOTS WITH SETBACKS & AT REALISTIC SPEEDS

1

BARRIER DATA
****

BAR ELE	0	1	BARRIER HEIGHTS 2	3	4	5	6	7	BAR ID	LENGTH
1	-	0.*							30 FEET	327.6
2	-	0.*							30 FEET	402.2
3	-	0.*							8 FEET	662.9
4	-	0.*							10 FEET	305.3
5	-	0.*							10 FEET	120.8
6	-	0.*							B5 P2	269.3
7	-	0.*							B5 P3	353.6
8	-	0.*							6 FEET	36.4
9	-	0.*							B6 P2	378.6
10	-	0.*							B6 P3	60.2
11	-	0.*							B6 P4	141.4
12	-	0.*							B6 P5	50.0
13	-	0.*							B6 P6	44.7
14	-	0.*							6 FEET	31.6
15	-	0.*							B7 P2	294.6
16	-	0.*							6 FEET	50.2
17	-	0.*							B8 P2	335.0
18	-	0.*							B8 P3	50.0
19	-	0.*							B8 P4	90.0
20	-	0.*							10 FEET	45.0
21	-	0.*							B9 P2	83.3
22	-	0.*							B9 P3	274.0
23	-	0.*							B9 P4	242.2
24	-	0.*							B9 P5	201.2
25	-	0.*							B9 P6	190.4

26	-	0.*	B9 P7	100.5
27	-	0.*	10 FEET	90.1
28	-	0.*	B10 P2	1005.6
29	-	0.*	B10 P3	4.0
30	-	0.*	6 FEET	201.2
31	-	0.*	10 FEET	70.9
32	-	0.*	B11 P2	130.4
33	-	0.*	B11 P3	226.1
34	-	0.*	B11 P4	256.8
35	-	0.*	B11 P5	78.1
36	-	0.*	B11 P6	247.6
37	-	0.*	B11 P7	149.0
38	-	0.*	6 FEET	41.2
39	-	0.*	B12 P2	46.1
40	-	0.*	B12 P3	30.4
41	-	0.*	B12 P4	290.9
42	-	0.*	B12 P5	24.9
43	-	0.*	B12 P6	328.8
44	-	0.*	B12 P7	53.4
45	-	0.*	B12 P8	308.7
46	-	0.*	6 FEET	178.0
47	-	0.*	B13 P2	193.3
48	-	0.*	B13 P3	23.7
49	-	0.*	B13 P4	426.2
50	-	0.*	B13 P5	60.2
51	-	0.*	6 FEET	67.1
52	-	0.*	B14 P2	36.4
53	-	0.*	B14 P3	4.0
54	-	0.*	10 FEET	241.7
55	-	0.*	B14 P5	289.5
56	-	0.*	B14 P6	104.5
57	-	0.*	B14 P7	318.0
58	-	0.*	B14 P8	32.2
59	-	0.*	B14 P9	35.1
60	-	0.*	6 FEET	143.2
61	-	0.*	B15 P2	4.0
62	-	0.*	10 FEET	332.5
63	-	0.*	B15 P4	133.4
64	-	0.*	B15 P5	204.6
65	-	0.*	B15 P6	1467.5
66	-	0.*	10 FEET	85.4

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 68      -    0.*                                        B16 P3      170.3
 69      -    0.*                                        B16 P4       92.2

 70      -    0.*                                        6 FEET       90.6
 71      -    0.*                                        B17 P2      310.6
 72      -    0.*                                        B17 P3       90.6
 73      -    0.*                                        B17 P4      130.4
 74      -    0.*                                        B17 P5       63.2
 75      -    0.*                                        B17 P6      400.0
 76      -    0.*                                        B17 P7      100.5
 77      -    0.*                                        B17 P8       63.4
 78      -    0.*                                        B17 P9      261.7
 79      -    0.*                                        B17 P10      64.0
 ------------------------------------------------------------------------
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 REC REC ID  LEQ(CAL)
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  4  LOT 519B  67.     500.    55.5
  5  LOT 519C  67.     500.    57.7
  6  LOT 519D  67.     500.    54.5
 BARRIER HEIGHT INDEX FOR EACH BARRIER SECTION
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1  1  1  1
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1  1  1  1
    1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1
1  1  1  1
    1  1  1  1
 CORRESPONDING BARRIER HEIGHTS FOR EACH SECTION
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. 0. 0. 0.
   0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0
. 0. 0. 0.
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```

SOUND32 - RELEASE 07/30/91, MODIFIED 04/22/00

TITLE:
RIVER PARK AREA D, LOTS WITH SETBACKS & AT REALISTIC SPEEDS

1

BARRIER DATA
****

BAR ELE	0	1	BARRIER HEIGHTS 2	3	4	5	6	7	BAR ID	LENGTH
1	-	0.*							30 FEET	327.6
2	-	0.*							30 FEET	402.2
3	-	0.*							8 FEET	662.9
4	-	0.*							10 FEET	305.3
5	-	0.*							10 FEET	120.8
6	-	0.*							B5 P2	269.3
7	-	0.*							B5 P3	353.6
8	-	0.*							6 FEET	36.4
9	-	0.*							B6 P2	378.6
10	-	0.*							B6 P3	60.2
11	-	0.*							B6 P4	141.4
12	-	0.*							B6 P5	50.0
13	-	0.*							B6 P6	44.7
14	-	0.*							6 FEET	31.6
15	-	0.*							B7 P2	294.6
16	-	0.*							6 FEET	50.2
17	-	0.*							B8 P2	335.0
18	-	0.*							B8 P3	50.0
19	-	0.*							B8 P4	90.0
20	-	0.*							10 FEET	45.0
21	-	0.*							B9 P2	83.3
22	-	0.*							B9 P3	274.0
23	-	0.*							B9 P4	242.2
24	-	0.*							B9 P5	201.2
25	-	0.*							B9 P6	190.4

26	-	0.*	B9 P7	100.5
27	-	0.*	10 FEET	90.1
28	-	0.*	B10 P2	1005.6
29	-	0.*	B10 P3	4.0
30	-	0.*	6 FEET	201.2
31	-	0.*	10 FEET	70.9
32	-	0.*	B11 P2	130.4
33	-	0.*	B11 P3	226.1
34	-	0.*	B11 P4	256.8
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37	-	0.*	B11 P7	149.0
38	-	0.*	6 FEET	41.2
39	-	0.*	B12 P2	46.1
40	-	0.*	B12 P3	30.4
41	-	0.*	B12 P4	290.9
42	-	0.*	B12 P5	24.9
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44	-	0.*	B12 P7	53.4
45	-	0.*	B12 P8	308.7
46	-	0.*	6 FEET	178.0
47	-	0.*	B13 P2	193.3
48	-	0.*	B13 P3	23.7
49	-	0.*	B13 P4	426.2
50	-	0.*	B13 P5	60.2
51	-	0.*	6 FEET	67.1
52	-	0.*	B14 P2	36.4
53	-	0.*	B14 P3	4.0
54	-	0.*	10 FEET	241.7
55	-	0.*	B14 P5	289.5
56	-	0.*	B14 P6	104.5
57	-	0.*	B14 P7	318.0
58	-	0.*	B14 P8	32.2
59	-	0.*	B14 P9	35.1
60	-	0.*	6 FEET	143.2
61	-	0.*	B15 P2	4.0
62	-	0.*	10 FEET	332.5
63	-	0.*	B15 P4	133.4
64	-	0.*	B15 P5	204.6
65	-	0.*	B15 P6	1467.5
66	-	0.*	6 FEET	478.1

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 67      -    0.*                                        B16 P2      170.3
 68      -    0.*                                        B16 P3       92.2

 69      -    0.*                                        6 FEET       90.6
 70      -    0.*                                        B17 P2      310.6
 71      -    0.*                                        B17 P3       90.6
 72      -    0.*                                        B17 P4      130.4
 73      -    0.*                                        B17 P5       63.2
 74      -    0.*                                        B17 P6      400.0
 75      -    0.*                                        B17 P7      100.5
 76      -    0.*                                        B17 P8       63.4
 77      -    0.*                                        B17 P9      261.7
 78      -    0.*                                        B17 P10      64.0
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  5  525E       67.     500.   61.8
  6  525F       67.     500.   61.9
  7  525G       67.     500.   63.3
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  9  524C       67.     500.   63.9
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1  1  1  1
   1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1
1  1  1  1
   1  1  1
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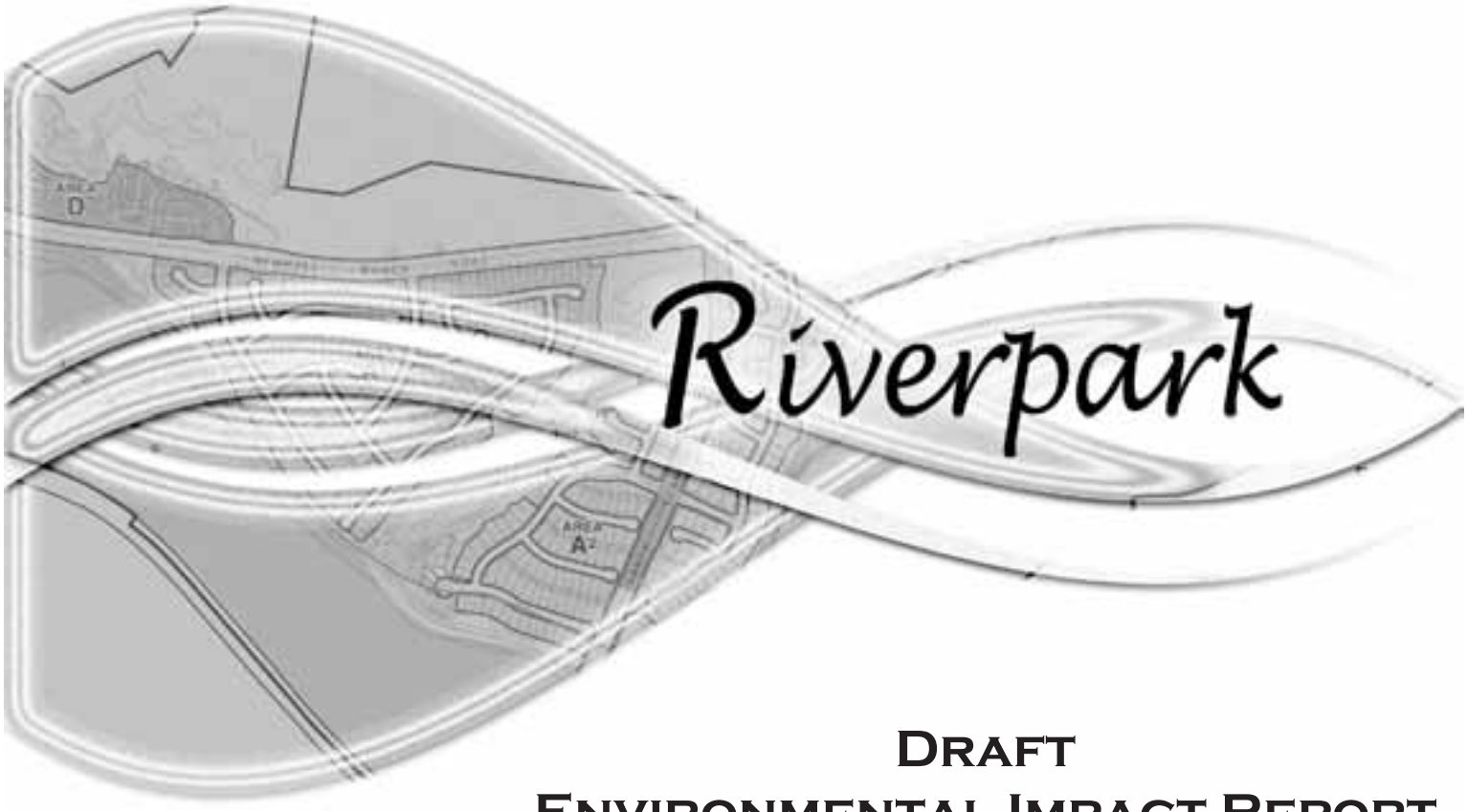

Draft
Environmental Impact Report

SCH No. 2002091081

Volume III – Appendices

Prepared for:

City of Santa Clarita
Department of Planning & Building Services
23920 Valencia Boulevard, Suite 302
Santa Clarita, California 91355

Prepared by:

Impact Sciences, Inc.
30343 Canwood Street, Suite 210
Agoura Hills, California 91301

March 2004

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Volume III

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APPENDIX 4.6
Biological Data and Reports

CONCERN INC.

"Dedicated to the Protection and Preservation of Trees"

September 18, 2003

Newhall Land and Farming Co.
23823 Valencia Blvd.
Valencia, CA 91355
Attn: Mr. Glenn E. Adamick

RE: **Oak Tree Report ADDENDUM #1 – River Park Project** - Tract No. 53425

This addendum letter will address changes to the existing OTR (dated 5-22-03). One oak (#9L) will be taken from the removal list and added to the impacted list, one oak (#73H) will be removed from the relocation list and one oak (#74) will be removed from the impacted list. I have reviewed the plan changes and concur with these adjustments

1. Santa Clarita Parkway, which is proposed to pass through the center of the Riverpark Project has been shortened by approximately 700'. This change will result in the preservation of Heritage Oak #73. This tree will not be impacted or encroached upon. It will require protective fencing prior to construction activities. The Parkway will end approximately 190' north of its northern PZ. This tree is now removed from the list of proposed relocations.

2. In addition to this tree preservation, Oak #74 will not be encroached upon. The construction of the Parkway was going to noticeably impact this tree by encroachment well within its dripline. Santa Clarita Parkway will end approximately 600' north of this tree. This tree will be fenced prior to construction.

3. Oak #9 was listed as a removal. It will now be preserved and encroached upon at its eastern quadrant. The grading of the existing nearby slope will occur 5' within the PZ on the uphill side 17' from the trunk (see attached Section View). In my opinion, this impact will be minor and the tree should be affected short-term or long-term by this activity. The grading and slope work within the PZ will be monitored.

Robert W. Wallace
Registered Consulting Arborist

TABLE 1 : SUMMARY OF DATA (Oak trees)

(ADDENDUM #1)

Total number of Oak trees listed on map (over 2" diameter)	87
Total number of dead Oak trees at site.....(#3HL & 81HV)	2
Total number of Oak trees to be removed or relocated (not including dead trees) (Remove - #10S,11S,12S and Relocate - 68HV,69HV,70V,71V,72V,75HV,82V,83V,84V,85V,86HV,87V)	15
Total number of Oak trees to be impacted by construction (within driplines)...(#6HL,9L,13L)	3
Total number of Oak trees not dead, not to be removed/relocated and/or not to be impacted	67
Total number of trees to be relocated on-site...(#68HV,69HV,70V,71V,72V,75HV,82V,83V,84V,85V,86HV,87V)	13

TABLE 2 : SCHEDULE OF PROPOSED REMOVALS OR RELOCATIONS (Oak trees)

Tree No.	Health Rating	General location	Reason for removal	My Recommendation: Save	Remove	Re-locate
10S	A	See map (Area A-2, Detail 1)	For C&F slope devel. At west edge of Lot 276 (Proposed elev. 1260') Tree at elev. of 1267'		X	
11S	A	See map (Area A-2, Detail 1)	Within pad at west edge of Lot 276 (Proposed elev. 1254') Tree at elevation of 1261')		X	
12S	A	See map (Area A-2, Detail 1)	For pad construction - Lot 275 (Proposed elev. 1254') Tree at elev. of 1274'		X	
68HV	C	See map (Area A-2, Detail 8)	For pad construction - Lot 325 (Proposed elev. 1221') Tree at elev. of 1210'			X
69HV	A	See map (Area A-2, Detail 8)	For pad construction - Lot 323 (Proposed elev. 1235') Tree at elev. of 1210'			X
70V	B	See map (Area A-2, Detail 8)	For pad construction - Lot 322 (Proposed elev. 1236') Tree at elev. of 1210'			X
71V	B	See map (Area A-2, Detail 8)	For pad construction - Lot 319 (Proposed elev. 1239') Tree at elev. Of 1210'			X
72V	B	See map (Area A2, Detail 9)	Lot 316 (Proposed elev. 1240') At edge of pad and top of slope - Tree at elev. Of 1215'			X

09/SEP.19.2003 2:12:47PM 8-34 PHENIX LJ
TREE LIFE CONCERN

TABLE 1 : SUMMARY OF DATA (Oak trees)

Total number of Oak trees listed on map (over 2" diameter).....	87
Total number of dead (or nearly dead) Oak trees at site...(#3HL, & 81HV).....	2
Total number of Oak trees to be removed (Remove - #10S,11S,12S and Relocate - #68HV,69HV,70V,71V,72V,75HV,82V,83V,84V,85V,86HV,87V)	15
Total number of Oak trees to be impacted by construction (within PZ)...(#6HL,9L,13L).....	3
Total number of Oak trees not dead, not to be removed, and/or not to be impacted.....	67
Total number of trees to be relocated on-site (#68HV,69HV,70V,71V,72V,75HV,82V,83V,84V,85V,86HV,87V).....	12

TABLE 2 : SCHEDULE OF PROPOSED REMOVALS (Oak trees)

Tree No.	Health Rating	General location	Reason for removal	My Recommendation: Save	Remove	Re-locate
75HV	C	See map (Area B, detail 11)	For grading & soil cement fetail. At edge of S.C. River (Proposed elev. 1220') Tree at 1211')			X
82L	A	See map (Area A-1, detail 2)	For C&F slope dowel. At west edge of Lot 278 (Proposed elev. 1260') Tree at elev. of 1257'			X
83V	A	See map (Area A-1, detail 2)	Within pad at west edge of Lot 278 (Proposed elev. 1254') Tree at elev. of 1261'			X
84V	A	See map (Area A-1, detail 2)	For pad construction - Lot 275 (Proposed elev. 1254') Tree at elev of 1274'			X
85V	C	See map (Area A-1, detail 2)	For pad construction - Lot 325 (Proposed elev. 1221') Tree at elev of 1210'			X
86HV	A	See map (Area A-1, detail 3)	For pad construction - Lot 323 (Proposed elev. 1235') Tree at 1210'			X
87V	A	See map (Area A-1, detail 3)	For pad construction - Lot 322 (Proposed elev. 1235') Tree at 1210'			X

09/SEP.19.2003.212:48PM 8-34 VALENCIA CO TREE LIFE CONCERN INC.

09/SEP.19.2003.12:49PM 8-34VALENCIA CO NO.577 P.5/5 09

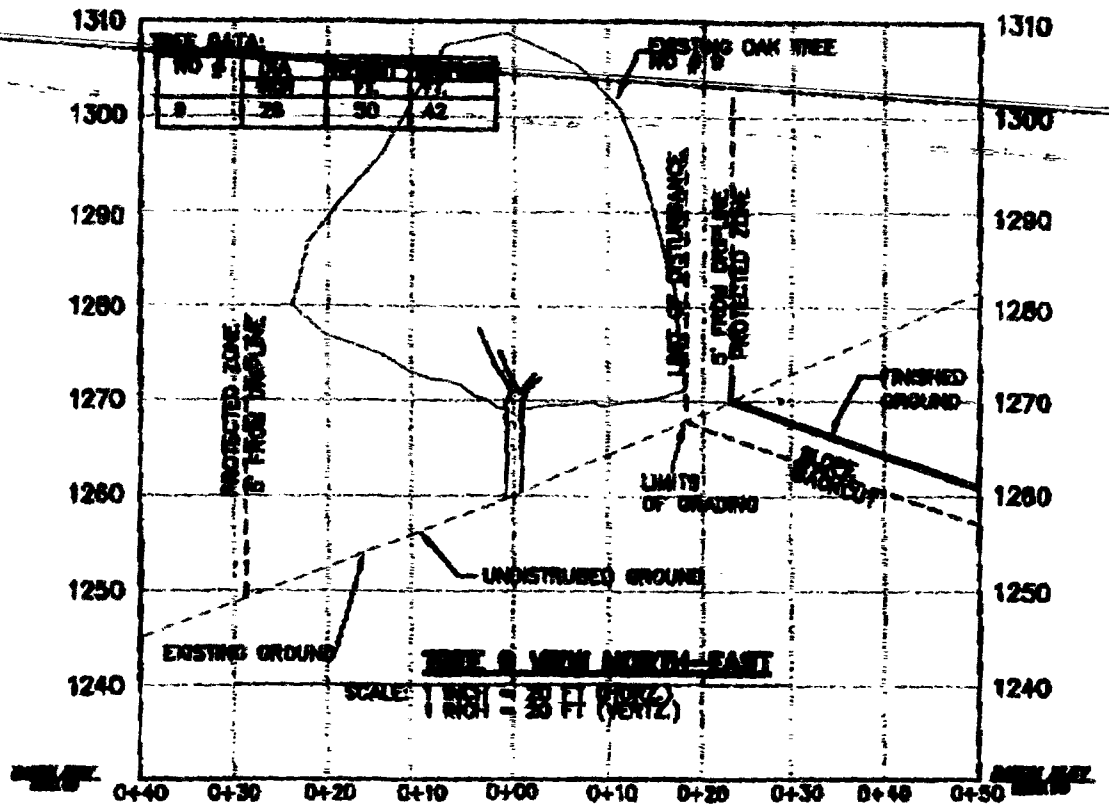
GPS

GPS

FIELD SURVEY

F TRUNK
TYPE

SECTION A'



Ri

TREE LIFE CONCERN

OAK TREE REPORT

RIVERPARK PROJECT

SANTA CLARITA, CA

Report Prepared for:

NEWHALL LAND & FARMING CO.

23823 VALENCIA BLVD.

VALENCIA, CA 91355

(MR. GLENN E. ADAMICK)

Report Prepared by:

TREE LIFE CONCERN, INC.

(ROBERT W. WALLACE)

8458 ETON AVE.

CANOGA PARK, CA 91304

(818) 341-5576

May 22, 2003

TREE LIFE CONCERN INC.

"Dedicated to the Protection and Preservation of Trees"

May 22, 2003

Newhall Land
23823 Valencia Blvd.
Valencia, CA 91355
Attn: Mr. Glenn Adamick

RE: **Oak Tree Report – River Park Project - Tract No. 53425**

THE REPORT

This Oak Tree Report includes:

1. **Tree Location Maps (200 scale area map, 40 scale detail sheets and cross-sections for encroachment trees)** showing the location of existing trees (incl. exact driplines of on-site oaks) and a number assigned to each tree

2. **Background Information**

3. **Summary of Field Inspection** (Oak Trees) with information regarding:
   A. Form - Tree number corresponding to the number on the Tree Location Map (TLM), species of oak, and size
   B. Physical condition
   C. Recommended treatment
   D. Rating: Oak tree vigor is rated alphabetically (Example: a. Excellent, b. Good, c. Fair, d. Poor, e. Nearly Dead, . f. Dead
4. **Summary of Data** (Refer to Table 1)
5. **Schedule of Proposed Removals or Relocations** (Refer to Table 2)
6. **Discussion of oak tree preservation** (general information) and **Mitigation Measures**
7. **Oak Transplantation**
8. **Tree Value Appraisal**
9. **Canopy Forms**
10. **Photographs**
11. **Arborist's Resume**
12. **Appendix** (Glossary of Terms)

LEGEND

H = Heritage oak (ex. HV = Heritage Valley oak)

V = Valley oak

L = California Live oak

S = Scrub oak

SUMMARY OF DATA

TOTAL NUMBER OF OAKS (2" or larger at 4.5' per City ord.) LISTED ON MAP ---------- 87
(25- Q. agrifolia, 15-Q. lobata, 46-Q. dumosa, 1-Q.douglasii)

TOTAL NUMBER OF DEAD OAKS AT SITE ---------- 2
(#3HL & 81HV)

TOTAL NUMBER OF OAKS TO BE REMOVED (Not incl. dead oaks) --- 4
(#9L,10S,11S,12S)

OAK TREES TO BE RELOCATED ---------- 13
(#68HV,69V,70V,71V,72V,73V,75HV,82L,83V,84V,85V,86HV,87V)

TOTAL NUMBER OF OAKS TO BE IMPACTED BY CONSTRUCTION (Encroachment into the Prot. Zone) -------- 3
(#6HL,13L,74HV)

TOTAL NUMBER OF OAKS NOT DEAD, NOT TO BE REMOVED AND NOT TO BE IMPACTED ---------- 65

TOTAL NUMBER OF HERITAGE OAKS ---------- 10
(#3L,5L,6L,67L,68V,74V,75V,80L,81V,86V)

BLUE OAKS - 1 (#76)

REMOVALS OR RELOCATIONS BY SPECIES (not incl. dead oaks) :

VALLEY OAKS - 12 (#68H,69,70,71,72,73,75H,83,84,85,86H,87)

LIVE OAKS - 2 - #9 & 82)

SCRUB OAKS - 3 (#10,11,12)

Robert W. Wallace
Registered Consulting Arborist

LOCATION

This site is located in the City of Santa Clarita north of Soledad Canyon Road and east and east of Bouquet Canyon Road.

BACKGROUND INFORMATION

At the request of Mr. Glenn Adamick (Newhall Land), this report has been prepared to meet the City of Santa Clarita requirements for Oak Tree Reports in accordance with the City's Oak Tree Preservation and Protection Guidelines. While gathering background information for this report, data was collected on 87 oak trees. The majority (67) of the trees were found near the center of this site in a canyon proposed for preservation in conjunction with the project. This canyon is occupied by a construction company contained within several small temporary buildings. The remaining oaks are scattered widely throughout the site.

- Ten Heritage oaks are also present on-site (#3L[dead],5L,6L,67L,68V,74V,75V,80L,81V[dead],86V). These are oaks with a DBH (diameter at breast height) of 34" or larger and oaks with two trunks at 23" diameter or larger.

- In this report each Heritage Oak will be indicated by a capital "H" after its identification number, i.e., 75H. The species of each oak will be indicated by a "V" (Valley oak), "L" (Live oak) or an "S" (Scrub oak) following its number and/or Heritage tree designation, i.e., 75HV.

- Of the 87 oaks found, 25 are California Live oaks (*Quercus agrifolia*), 15 are Valley oaks (*Q. lobata*), 1 is a Blue oak (*Q. douglasii*) and the remainder (46) are Scrub oaks (*Q. berberidifolia*).

- The proposed development will require the removal and/or relocation of 17 living oaks; twelve are Quercus lobata (#68HV,69V,70V,71V,72V,73V,75V, 83V,84V,85V,86V,87V), three are Q. berberidifolia (#10S,11S,12S) and two (#9L & 82L) are Q. agrifolia. Thirteen of the seventeen will be relocated on the project site (68HV,69V,70V,71V,72V,73V,75HV,82L,83V,84V,85V, 86HV,87V). Four will be removed for construction purposes (#9L,10S,11S,12S).

- Three oaks (#6HL, 13L, & 74HV) will be impacted by construction within the protective zone. The work near these oaks will be closely monitored by the project arborist.

- There are 65 oaks that will not be impacted by this project. Most of these will be "fenced" during construction to ensure their protection from possible equipment damage (refer to the Tree Location Map for fencing locations).

SUMMARY OF FIELD INSPECTION
(OAK TREE LIST)

SUMMARY OF FIELD INSPECTION - OAK TREES

FORM						PHYSICAL CONDITION																TREATMENT							RATING			REMARKS
			SIZE																													
Tree number	Quercus Agrifolia	Quercus Lobata	Trunk Diameter (inches") 4.5 Ft Above Base	Height (feet')	Spread (feet')	Tree Declining	Drought Stressed	Weak Main Crotch(s)	Broken Hanging Limb(s)	Fire Damage	Sparse Foliage	Cavity(s) in tree	Trunk Damage	Hollow Trunk	Mainstem Dieback	Insect Damaged	Diseased	Soil buildup at Base	Leaning	Regrown Stump	Surface Roots	Safety Hazard	Safety Prune (crown reduction)	Remove Deadwood	Raise Canopy	Insect Treatment	Disease Treatment	Cable / Brace	Replenish Nutrients	Health	Aesthetics & Conformity	Balance	
1	X		19 11 9 4	28	30																								B	A	A	Growing at edge of dirt road
2		X	26	50	40			X																					A	A	B	Exhibits finely-cut foliage (Old tag #12)
3	X		41	60	65																								F			Oak Root Fungus
4			11- 3" - 6"	15	22																								A	A	A	Scrub oak (Q. berberidifolia)
5	X		40	50	60			X		X																	2		A	A	A	
6	X		27 24	50	60			X		X	X	X	X	X													1		C	B	A	
7	X		11 10 7	24	20					X		X																	C	B	B	
8	X		27	45	45						X		X	X															D	B	A	Trunk damage 30% S/W side Decayed roots
9	X		26	50	30								X	X															D	A	A	Trunk damage 20% east side
10			2	12	15																								A	A	A	Scrub oak (Q. berberidifolia)
11			2	12	15																								A	A	A	Scrub oak (Q. berberidifolia)
12			3	10	14																								A	A	A	Scrub oak (Q. berberidifolia)
13	X		18 16 16	40	55			X																			2		B	A	A	
14			6 4	18	15																								B	B	A	Scrub oak (Q. berberidifolia)
15	X		19 11	45	30																								A	A	A	

RATING CODE

A = EXCELLENT
B = GOOD
C = FAIR
D = POOR
E = NEARLY DEAD
F = DEAD

* SEE PHOTO
R = Remove
I = Impacted
T = Transplantable
NT = Not Transplantable
BMC = Below main crotch

Tree Life Concern Inc.

SUMMARY OF FIELD INSPECTION - OAK TREES

Tree number	FORM: Quercus Agrifolia	FORM: Quercus Lobata	FORM: SIZE: Trunk Diameter (inches") 4.5 Ft Above Base	FORM: SIZE: Height (feet)	FORM: SIZE: Spread (feet)	PHYSICAL CONDITION: Tree Declining	Drought Stressed	Weak Main Crotch(s)	Broken Hanging Limb(s)	Fire Damage	Sparse Foliage	Cavity(s) in tree	Trunk Damage	Hollow Trunk	Mainstem Dieback	Insect Damaged	Diseased	Soil buildup at Base	Leaning	Regrown Stump	Surface Roots	Safety Hazard	TREATMENT: Safety Prune (crown reduction)	Remove Deadwood	Raise Canopy	Insect Treatment	Disease Treatment	Cable / Brace	Replenish Nutrients	RATING: Health	Aesthetics & Conformity	Balance	REMARKS
16	X		24	45	35			X																				2		A	A	A	
17	X		13 12	30	30			X																				1		B	A	A	
18			3 3 3	17	15																									A	A	A	Scrub oak (Q. berberidifolia)
19	X		3 3	18	8			X																						A	A	A	
20	X		3 1	18	5																									A	A	A	
21	X		4	18	10																									A	A	A	
22			4, 3, 3, 3 3 2	17	14																									A	A	A	Scrub oak (Q. berberidifolia)
23			6 6	18	15																									B	A	A	Scrub oak (Q. berberidifolia)
24			9 8 7	20	20																									B	A	A	Scrub oak (Q. berberidifolia) Packrat nest
25			7 6 2 2	20	18																									A	A	A	Scrub oak (Q. berberidifolia)
26			6	18	10																									A	A	A	Scrub oak (Q. berberidifolia)
27			2	14	6														X											A	A	A	Scrub oak (Q. berberidifolia)
28			2 1	9	5														X											A	A	A	Scrub oak (Q. berberidifolia)
29			6 3 2	18	12																									A	A	A	Scrub oak (Q. berberidifolia)
30			6	18	12														X											A	A	A	Scrub oak (Q. berberidifolia)

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SUMMARY OF FIELD INSPECTION - OAK TREES

Tree number	Quercus Agrifolia	Quercus Lobata	SIZE: Trunk Diameter (inches") 4.5 Ft Above Base	SIZE: Height (feet')	SIZE: Spread (feet')	PHYSICAL CONDITION: Tree Declining	Drought Stressed	Weak Main Crotch(s)	Broken Hanging Limb(s)	Fire Damage	Sparse Foliage	Cavity(s) in tree	Trunk Damage	Hollow Trunk	Mainstem Dieback	Insect Damaged	Diseased	Soil buildup at Base	Leaning	Regrown Stump	Surface Roots	Safety Hazard	TREATMENT: Safety Prune (crown reduction)	Remove Deadwood	Raise Canopy	Insect Treatment	Disease Treatment	Cable / Brace	Replenish Nutrients	RATING: Health	Aesthetics & Conformity	Balance	REMARKS
31			9 9 8 6, 5	16	12																									B	A	B	Scrub oak (Q. berberidifolia)
32			6 4	18	20																									B	A	A	Scrub oak (Q. berberidifolia)
33			7 6 6 6, 4	20	18														X											A	A	B	Scrub oak (Q. berberidifolia)
34			7 6	18	14																									A	A	A	Scrub oak (Q. berberidifolia)
35			8 6 6	18	15																									A	A	A	Scrub oak (Q. berberidifolia)
36			3 3 2	18	12																									B	A	B	Scrub oak (Q. berberidifolia)
37			9 7 6 6	18	18																									A	A	A	Scrub oak (Q. berberidifolia)
38			5 5 3	14	14																									C	B	C	Scrub oak (Q. berberidifolia)
39			2	15	15															X										A	A	A	Scrub oak (Q. berberidifolia) Numerous small stems
40			3 2 2 2, 2	14	14																									A	A	A	Scrub oak (Q. berberidifolia)
41			6 6 6 4, 4	18	16																									A	A	A	Scrub oak (Q. berberidifolia) Numerous small stems
42			3 2 2 2	13	10																									A	A	A	Scrub oak (Q. berberidifolia)
43			4 3 2 1	18	10																									A	A	A	Scrub oak (Q. berberidifolia)
44			7 6 5	14	12																									A	A	A	Scrub oak (Q. berberidifolia)
45			3 3 2 2	12	12						X																			B	A	A	Scrub oak (Q. berberidifolia) Numerous small stems

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SUMMARY OF FIELD INSPECTION - OAK TREES

FORM						PHYSICAL CONDITION																TREATMENT							RATING			REMARKS
			SIZE																													
Tree number	Quercus Agrifolia	Quercus Lobata	Trunk Diameter (inches") 4.5 Ft Above Base	Height (feet')	Spread (feet')	Tree Declining	Drought Stressed	Weak Main Crotch(s)	Broken Hanging Limb(s)	Fire Damage	Sparse Foliage	Cavity(s) in tree	Trunk Damage	Hollow Trunk	Mainstem Dieback	Insect Damaged	Diseased	Soil buildup at Base	Leaning	Regrown Stump	Surface Roots	Safety Hazard	Safety Prune (crown reduction)	Remove Deadwood	Raise Canopy	Insect Treatment	Disease Treatment	Cable / Brace	Replenish Nutrients	Health	Aesthetics & Conformity	Balance	
46			2 2 1	12	8																								A	A	A	Scrub Oak (Q. berberidifolia)
47			5 4, 4 4 3, 3	18	18																								A	A	A	Scrub Oak (Q. berberidifolia)
48			6, 6 5, 5 5 3	20	18																								A	A	A	Scrub Oak (Q. berberidifolia)
49			2 2 2	12	10																								B	A	A	Scrub Oak (Q. berberidifolia)
50			3 2, 2 2, 2, 2	12	14																								A	A	A	Scrub Oak (Q. berberidifolia)
51			1 1 2	17	7																								A	A	A	Scrub Oak (Q. berberidifolia)
52			3 3 2 2	15	10																								A	A	A	Scrub Oak (Q. berberidifolia) Packrat @ base
53			4 4 3	15	16																								A	A	A	Scrub Oak (Q. berberidifolia) Packrat @ base
54			4, 4 3, 3 3 2	18	14																								A	A	A	Scrub Oak (Q. berberidifolia)
55			2 2, 2 1 1	15	15																								A	A	A	Scrub Oak (Q. berberidifolia) Packrat; numerous shoots
56			3 2 2 2	16	12																								A	A	A	Scrub Oak (Q. berberidifolia) Numerous shoots
57			2 2 2 2	17	17																								A	A	A	Scrub Oak (Q. berberidifolia) Numerous shoots
58			2 2 2, 2 2	18	15																								A	A	A	Scrub Oak (Q. berberidifolia) Packrat; numerous shoots
59	X		22 20 20 17	45	60			X																				2	A	A	A	
60	X		31	40	60			X				X	X					X										4	A	A	A	

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Tree Life Concern Inc.

SUMMARY OF FIELD INSPECTION - OAK TREES

FORM						PHYSICAL CONDITION															TREATMENT							RATING			RATING CODE
			SIZE																												A = EXCELLENT
Tree number	Quercus Agrifolia	Quercus Lobata	Trunk Diameter (inches") 4.5 Ft Above Base	Height (feet')	Spread (feet')	Tree Declining	Drought Stressed	Weak Main Crotch(s)	Broken Hanging Limb(s)	Fire Damage	Sparse Foliage	Cavity(s) in tree	Trunk Damage	Hollow Trunk	Mainstem Dieback	Insect Damaged	Diseased	Soil buildup at Base	Leaning	Regrown Stump	Surface Roots	Safety Hazard	Safety Prune (crown reduction)	Remove Deadwood	Raise Canopy	Insect Treatment	Disease Treatment	Cable / Brace	Replenish Nutrients	Health	Aesthetics & Conformity	Balance	B = GOOD C = FAIR D = POOR E = NEARLY DEAD F = DEAD * SEE PHOTO R = Remove I = Impacted T = Transplantable NT = Not Transplantable BMC = Below main crotch
61	X		10 9	28	24			X		X		X	X															1		B	A	A	REMARKS
62			3 3	18	12			X		X		X	X							X										B	A	A	Scrub
63			4, 4 4, 4 4 2, 2	15	25																									A	A	A	Hybrid Scrub (Q. berberdifolia) Numerous shoots
64			2 1, 1 1, 1, 1	14	15																									A	A	A	Scrub (Q. berberdifolia) Packrat; numerous shoots
65	X		19 17	45	30					X		X	X																	B	A	A	Old tag #29
66	X		17	35	30																									A	A	B	
67	X		34	40	45					X		X	X	X																A	A	C	
68		X	40 8 6	60	60							X	X		X															C	A	A	Valley Oak (Q. lobata)
69		X	28 8	60	50					X																				A	A	A	Valley Oak (Q. lobata)
70		X	17,15 , 15 15 10	55	60																									B	A	A	Valley Oak (Q. lobata)
71		X	15 11 11 10	45	50			X												X										B	A	A	Valley Oak (Q. lobata)
72		X	16,15,12 11 6	55	50			X												X										B	A	A	Valley Oak (Q. lobata)
73		X	33	80	65																									A	A	A	Valley Oak (Q. lobata)
74		X	48	90	90																		X							A	A	A	Valley Oak (Q. lobata) Old limb failure
75		X	35	50	50							X	X	X					X				X							C	A	C	Valley Oak (Q. lobata) Tractor or fire damage

Tree Life Concern Inc.

SUMMARY OF FIELD INSPECTION - OAK TREES

FORM						PHYSICAL CONDITION																TREATMENT							RATING			REMARKS
			SIZE																													
Tree number	Quercus Agrifolia	Quercus Lobata	Trunk Diameter (inches") 4.5 Ft Above Base	Height (feet')	Spread (feet')	Tree Declining	Drought Stressed	Weak Main Crotch(s)	Broken Hanging Limb(s)	Fire Damage	Sparse Foliage	Cavity(s) in tree	Trunk Damage	Hollow Trunk	Mainstem Dieback	Insect Damaged	Diseased	Soil buildup at Base	Leaning	Regrown Stump	Surface Roots	Safety Hazard	Safety Prune (crown reduction)	Remove Deadwood	Raise Canopy	Insect Treatment	Disease Treatment	Cable / Brace	Replenish Nutrients	Health	Aesthetics & Conformity	Balance	
76			21 16																										A	A	A	Blue Oak Mistletoe control
77	X		20,19,16 13,10,9	45	60			X										X									2		A	A	A	
78	X		16 16 14 14	50	45			X													X							2		A	A	A	
79	X		24,20,18 18 14	60	60			X													X									C	A	A	Exposed roots - Growing out of embankment
80	X		47 17	45	60							X	X	X															A	A	C	BMC = Below main crotch
81		X	38	55	25																								F			Bees
82	X		18 18	40	50			X																				1		A	A	A	
83		X	19	50	28																								A	A	A	
84		X	22 14	55	45																								A	A	A	
85		X	18	45	45																								A	A	A	
86		X	37	60	65																								A	A	A	
87		X	2	10	5																								A	A	A	

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Tree Life Concern Inc.

SUMMARY OF DATA

TABLE 1 : SUMMARY OF DATA (Oak trees)

Total number of Oak trees listed on map (over 2" diameter)	87
Total number of dead Oak trees at site.....(#3HL & 81HV)	2
Total number of Oak trees to be removed or relocated (not including dead trees) (Remove - #9L,10S,11S,12S and Relocate - 68HV,69HV,70V,71V,72V,73V,75HV,82V,83V,84V,85V,86HV,87V)	17
Total number of Oak trees to be impacted by construction (within driplines)...(#6HL,13L & 74HV)	3
Total number of Oak trees not dead, not to be removed/relocated and/or not to be impacted	65
Total number of trees to be relocated on-site...(#68HV,69HV,70V,71V,72V,73V,75HV,82V,83V,84V,85V,86HV,87V)	13

TABLE 2 : SCHEDULE OF PROPOSED REMOVALS OR RELOCATIONS (Oak trees)

				My Recommendation:		
Tree No.	Health Rating	General location	Reason for removal	Save	Remove	Re-locate
9L	D	See map (Area A-2, Detail 1)	To develop stabilizing fill for cut slope		X	
10S	A	See map (Area A-2, Detail 1)	For C&F slope devel. At west edge of Lot 276 (Proposed elev. 1260') Tree at elev. of 1267'		X	
11S	A	See map (Area A-2, Detail 1)	Within pad at west edge of Lot 276 (Proposed elev. 1254') Tree at elevation of 1261')		X	
12S	A	See map (Area A-2, Detail 1)	For pad construction - Lot 275 (Proposed elev. 1254') Tree at elev. of 1274'		X	
68HV	C	See map (Area A-2, Detail 8)	For pad construction - Lot 325 (Proposed elev. 1221') Tree at elev. of 1210'			X
69HV	A	See map (Area A-2, Detail 8)	For pad construction - Lot 323 (Proposed elev. 1235') Tree at elev. of 1210'			X
70V	B	See map (Area A-2, Detail 8)	For pad construction - Lot 322 (Proposed elev. 1236') Tree at elev. of 1210'			X
71V	B	See map (Area A-2, Detail 8)	For pad construction - Lot 319 (Proposed elev. 1239') Tree at elev. Of 1210'			X
72V	B	See map (Area A2, Detail 9)	Lot 316 (Proposed elev. 1240') At edge of pad and top of slope - Tree at elev. Of 1215'			X
73V	A	See map (Area B, Detail 11)	At center of main thoroughfare (Santa Clarita Pkwy.) near south end of site			X

TABLE 1 : SUMMARY OF DATA (Oak trees)

Total number of Oak trees listed on map (over 2" diameter).....	87
Total number of dead (or nearly dead) Oak trees at site...(#3HL, & 81HV).....	2
Total number of Oak trees to be removed (Remove - #9L,10S,11S,12S and Relocate - #68HV,69HV,70V,71V,72V,73V,75HV,82V,83V,84V,85V,86HV,87V)	17
Total number of Oak trees to be impacted by construction (within PZ)...(#6HL,13L & 74HV).....	3
Total number of Oak trees not dead, not to be removed, and/or not to be impacted.....	65
Total number of trees to be relocated on-site (#68HV,69HV,70V,71V,72V,73V,75HV,82V,83V,84V,85V,86HV,87V).....	13

TABLE 2 : SCHEDULE OF PROPOSED REMOVALS (Oak trees)

				My Recommendation:		
Tree No.	Health Rating	General location	Reason for removal	Save	Remove	Re-locate
75HV	C	See map (Area B, detail 11)	For grading & soil cement istall. At edge of S.C. River (Proposed elev. 1220') Tree at 1211')			X
82L	A	See map (Area A-1, detail 2)	For C&F slope devel. At west edge of Lot 276 (Proposed elev. 1260') Tree at elev. of 1267'			X
83V	A	See map (Area A-1, detail 2)	Within pad at west edge of Lot 276 (Proposed elev. 1254') Tree at elev. of 1261'			X
84V	A	See map (Area A-1, detail 2)	For pad construction - Lot 275 (Proposed elev. 1254') Tree at elev of 1274'			X
85V	C	See map (Area A-1, detail 2)	For pad construction - Lot 325 (Proposed elev. 1221') Tree at elev of 1210'			X
86HV	A	See map (Area A-1, detail 3)	For pad construction - Lot 323 (Proposed elev. 1235') Tree at 1210'			X
87V	A	See map (Area A-1, detail 3)	For pad construction - Lot 322 (Proposed elev. 1235') Tree at 1210'			X

OAK TREE PRESERVATION - MITIGATION - APPRAISAL
(Notes on Oak #3)

OAK TREE PRESERVATION

The City of Santa Clarita Protects oak trees that are at least 2" in diameter as measured at 4 1/2' above natural grade. The City's Oak Tree Ordinance seeks to curb the destruction of its native oaks, preserve the natural environment, and protect its plant life heritage.

The following are some helpful recommendations and comments to help preserve and protect the oaks in this report:

A. Control of Diseases and Pests

The oaks referred to in this report generally have an acceptable level of indigenous insect pests. During my visual, above ground inspection I found no sign of Oak Root Fungus (Armillaria mellea) or Bleeding Canker Disease (Erwinnia nimpressuralis/Phytophthora cactorum) on any of the living oaks.

B. Protective Fencing

Equipment damage to the limbs, trunks and roots must be avoided. Even slight trunk injuries can result in long-term, life threatening pathogenic maladies. No storage of equipment or debris within the Protective Zone (dripline plus 5') will be allowed. No dumping of construction waste water i.e., paint, stucco, concrete, clean-up, etc. within Protective Zones. Generally, fencing shall be placed at the Protective Zone of any oak or groups of oaks within 50' of proposed construction activity. Protective Fencing must remain in place during construction projects and shall not be moved or removed without prior written approval from the Department of Community Development under the direct supervision of the Project Consulting Arborist.

Protective Fencing shall be at least 4' in height with a visible sign attached at 50' intervals which reads: [WARNING - THIS FENCE IS FOR THE PROTECTION OF THIS TREE AND SHALL NOT BE REMOVED OR RELOCATED WITHOUT WRITTEN AUTHORIZATION FROM THE CITY OF SANTA CLARITA COMMUNITY DEVELOPMENT DEPARTMENT]

C. Pruning Recommendations

These oaks have never been pruned and many are in an over-weighted condition making them susceptible to main crotch failures or limb failures. Healthy oaks, if not maintained, will eventually grow beyond their ability to support themselves and fail at a weak point. This is commonly at a branch union or the main crotch. Weight reduction pruning and/or cabling is vitally important in an oak tree preservation program. Refer to the Summary of Field Inspection worksheets for specific tree pruning recommendations.

If possible, complete pruning of the larger California Live or Valley oaks, is recommended for health and weight reduction (inspect for occupied woodpecker nests prior to removal of larger dead snags). Any cuts over 2" diameter would require a "Pruning Permit" from the City. After pruning, the installation of support cables to prevent future main crotch failures is recommended (refer to the Summary of Field Inspection for specific tree and cable numbers). All cables should be a minimum of 5/16" diameter EHS (Extra High Strength) and attached with 5/8" diameter, galvanized thru-bolts. Heavy-duty 3/8" thimbles are to be utilized at each attachment point. These recommendations are presented for consideration by the City, current and/or future property owners.

Generally, mature oaks in a residential setting should be pruned every four to six years or at the recommendation of a Certified Arborist. It is advised that mature oaks in park or public space be inspected on an annual basis for tree health and safety (structural integrity).

D. Frequency of Watering

Care should be taken to avoid placing any sprinklers within watering distance to the trunk of an oak tree. Generally, sprinklers should not reach within 15' of a mature oak trunk. Grass or ground covers must never be planted next to the trunks. Too much moisture near the base of an oak is generally believed to be their leading cause of death in residential settings. Oak Root Fungus is the result of over-watering. Oak trees survive and thrive on annual rainfall alone and generally do not need supplemental irrigation except during periods of drought. Watering should take place at or near the dripline. Landscape plans should leave the area within the dripline of an oak tree in a native or natural setting.

E. Grading Restrictions Near Protective Zones

Care must be taken to limit grade changes near the trunk areas. The grade should not be lowered or raised around the trunks of trees. This can lead to plant stress from oxygen deprivation or Oak Root Fungus at the root collar. The grades near the trunks will not be raised on the trees listed in this report.

While speaking at a recent seminar, Dr. Tom Smiley of Bartlett Research Laboratory, told of two recent studies which concluded that moderate "fills" over the outer rootzone of oaks proved to be a minor impact. The studies also concluded that roots tended to grow upward and into these fill areas with no deleterious effect to the tree. This has been my experience in the field as well. Note: "fill" over a root buttress or root collar of an oak can be deadly.

F. Mitigation Measures and Comments

1. The general purpose and intent of the City's Oak Tree Preservation Ordinance is to preserve oak trees, yet allow for their removal in certain circumstances where it is necessary to enable reasonable use of the subject property which would otherwise be prevented by the presence of the trees and no reasonable alternative can be accommodated due to the unique physical development constraints on the property. The approval of the request will not be contrary to or in conflict with the general purpose and intent of the Oak Tree Preservation Ordinance.

   Mitigation for the 17 tree removals/relocations includes the dedication of a 24-acre property with oak tree habitat. This property is directly adjacent to the 4.25 acre active neighborhood park and contains a majority of the oak trees on the project site. The proposed mitigation (dedication of 24 acres of oak habitat open space and the transplanting of 13 oak trees on-site including the costs associated with the corresponding five-year maintenance plan of said trees) for oak tree impacts is consistent with the provisions of the City's Oak Tree Preservation Ordinance.

   It is necessary to relocate three Heritage oak trees (#68HV, 75HV & 86HV) to enable reasonable use of the subject property which is otherwise prevented by the presence of the trees and no reasonable alternative can be accommodated due to the unique physical development constraints of the property. The relocation of these Heritage oak trees is a costly but reasonable alternative to removal. With proper aftercare and monitoring these majestic trees can continue to be a valuable asset to the community and the surrounding area.

   Oak #68HV – This oak exhibits signs of stress and there is deadwood throughout the canopy. During my initial site inventory, I rated this tree "D" (Poor) and advised NHL&F that it was not a candidate for relocation. A year later and after above normal rainfall this past winter, the tree is responding with new growth scattered throughout it's canopy.

F. Mitigation Measures and Comments (Cont'd)

This tree has now been upgraded to a "C" rating (Fair). After consulting with the City's Tree Specialist during an on-site inspection (5-13-03) a determination was made to relocate this tree and attempt to preserve it. The deadwood will be pruned and the tree will be fertilized at least three months prior to side-boxing.

Oak #75HV – This tree has also been upgraded to a "C" rating due to its response to seasonal rains. The trunk is significantly decayed and the tree is leaning but I believe that it has a reasonable chance of surviving relocation efforts. I am recommending weight reduction pruning at the south quadrant of the upper canopy to help stabilize and balance the tree. This pruning should be performed next October or November and prior to boxing.

As mentioned under Background Information, 17 oak trees are proposed for removal, 13 of which are being relocated on-site due to unavoidable grading requirements. Refer to the TreeCalc Appraisal Worksheets for the pecuniary value of these trees, i.e., "Oak Removals" ($18,085.33 and "Oaks to be Relocated On-site" ($368,489.68). The sum total of all on-site oak tree values ($1,158,020.37) are also listed in the attached TreeCalc Worksheets.

The 13 transplanted oak trees shall be carefully maintained and monitored for a five year period. A watering system must be installed and the trees will be monitored at quarterly intervals for the first two years and biannually for the next three years. A Letter of Compliance will be submitted at the end of that time period. As the applicant is proposing to dedicate property to mitigate oak tree impacts, the applicant shall only be responsible for monitoring and maintaining the transplant trees for a five year period. The proposed landscape plan must specify that these transplant oaks are properly installed, staked/guyed and watered to ensure their survival. An irrigation system designed for "dryscape" planting is mandatory for successful oak establishment. Drip-system irrigation is ideal for managing water distribution near oaks. If a transplant tree dies during the monitoring period, the applicant shall replace the tree with two (minimum 24" box size) oak trees. These replacement trees and planting locations shall be approved in advance by the City's Tree Specialist and their survival guaranteed for a five year period.

F. Mitigation Measures and Comments (Cont'd)

2. The following three oaks (#6HL,13L & 74HV) will be encroached upon and impacted by the proposed construction activities:

   6HL - An encroachment 5' within the dripline (to a point 28' from the trunk) at the south canopy quadrant will occur for slope preparation. This oak is located downhill from the grading activity (see cross-section on TLM). In my opinion, it is unlikely that roots will be encountered during the excavation and the impact will be insignificant.

   13L - Slope preparation may encroach up to 2' within the south quadrant of the PZ on Oak #13. This impact will be minor and should not affect the health of this tree. This work must be monitored by the project arborist.

   74HV - The buried bank stabilization in the area of Tree #74 has been carefully designed to avoid this heritage tree. Grading operations for the buried bank stabilization shall remain approximately 12' outside this tree's eastern dripline (well outside the PZ). At the tree's northwestern dripline quadrant, the temporary backcut for alluvium removals, related to the grading at the terminus of Santa Clarita Parkway, will encroach up to the tree's dripline (30' from the trunk). The consulting soils engineer has recommended between 5 and 14 feet of removals in this area. To be conservative, we have assumed that 14 feet of removals will be required. If the maximum 14' removal is necessary (with a 1:1 back-cut extending toward the tree) this excavation would extend 8' within the dripline at that point and 22' from the trunk. To determine the potential for negatively impacting the rootzone, it is recommended that a 14' deep exploratory trench be excavated across this quadrant at a distance of 22' from the trunk. This trench should be hand-excavated (shoring may be required for safety purposes during excavation) and any roots over 1.5" diameter carefully preserved and protected by wrapping with burlap after tunneling around each root to be saved. The project arborist will monitor this excavation and supply an impact determination with recommendations in regard to minimizing root impacts to this tree.

   It is my opinion that due to the porous soil profile (sandy-loam) it is not likely that a significant number of larger roots will be encountered this distance from the trunk. I believe that the majority of the root system will be deeply oriented and will not be impacted. If several larger roots are exposed during the hand trenching, the excavation plan will be modified to correspond to recommendations of the project's arborist and the City. This work shall be monitored by the project arborist and approved by the City Tree Specialist.

F. Mitigation Measures and Comments (Cont'd)

In order to avoid the removal of Tree #74 in the event that Santa Clarita Parkway be extended to Soledad Canyon Road, several atypical construction techniques would be required to be employed. Without such techniques the impact of remedial grading operations, due to the placement of the embankment, would result in the tree being removed. To preserve this tree, it is proposed that an 8-foot parkway and 19-foot, right-of-way (adjacent landscaped lot), be eliminated. Additionally, to reduce the amount of necessary remedial grading, it is recommended that a geogrid-supported crib wall, or equivalent, be used adjacent to the sidewalk along a portion of the easterly right-of-way. Future utilities in Santa Clarita Parkway should be located in the western side of the right-of –way in order to avoid the proposed geogrid and tree roots.

Should Santa Clarita Parkway be extended, it is likely that some degree of clearance pruning may be required to accommodate construction and provide vehicle clearances. This pruning must be monitored by the project arborist. The degree of pruning and the style of cuts must be determined and performed in accordance with International Society of Arboriculture, Pruning Standards and ANSI A-300 Pruning Guidelines.

3. Protective fencing shall be installed around all oaks not listed for removal. Place protective fencing at the PZ as shown on the TLM. The fencing can be re-positioned as needed to allow for grading near the oaks listed as "impacted". The project arborist must be present during the fence placement. Final fencing locations shall be inspected by the City prior to the commencement of development activities. Regular inspections of this fencing shall occur during site development (refer to "B" Protective Fencing).

4. An Oak Tree Information Packet including the City of Santa Clarita Oak Tree Protection and Preservation Guidelines must be available on-site during construction. The property owner and contractor should be familiar with the contents of these documents.

5. Vehicle travel along dirt roadways to and from the site may create a heavy coating of dust on the foliage of nearby oaks. These oaks should be hosed off periodically during construction activities.

6. All work performed within the Protective Zone (dripline plus 5') of any oak shall be accomplished by utilizing hand tools only and must be "monitored" by the project's Oak Tree Consultant.

7. All roots over 1.5" diameter will be clean cut at a 45 degree angle and treated by the Consulting Arborist.

8. No oaks outside the property line are to be impacted by this construction project.

F. Mitigation Measures and Comments (Cont'd)

9. The leaf-litter build-up under the canopies of the oaks on this site is ideal for healthy tree growth and root development. Do not alter or remove if possible. A three inch layer of mulch may be advisable in settings where leaf-litter has been lost.

10. Do not remove the aluminum tags numbering each oak on this site

11. No construction materials are to be stored or discarded within the PZ of any oak. Rinse water, concrete residue, liquid contaminates (paint, thinners, gasoline, oils, etc.) of any type shall not be deposited in any form at the base of an oak.

12. No vehicles shall be parked within the PZ of an oak. No construction vehicles are to be parked under the shade (within the PZ) of an oak.

OAK TRANSPLANTATION

The thirteen oaks listed for transplanting shall be professionally "boxed" and relocated on-site to the designated "storage area" (see TLM). A qualified transplant company shall perform the relocations (it is anticipated that Valley Crest Tree Company will be performing the relocations). To enhance the success of each tree for long-term survival the relocations will be monitored by the Project Arborist. The size of box for each tree will be determined by the Arborist and Valley Crest representative (see chart below). Consideration will be given to the buttress spread, as well as the trunk diameter. Generally, the larger the box the greater the probability of success. In every case where a decision is to be made between a smaller size box and a larger box, i.e., 180" or 192" box, the box of choice will be the 192" box.

PROPOSED TREE RELOCATION (RECOMMENDED BOX SIZE)

Tree #	Size Dec-02	Size May-03	Description
68	288" - 24'	336" – 28'	Quercus lobata
69	204" - 17'	216" – 18'	Quercus agrifolia
70	216" - 18'	240" – 20'	Quercus agrifolia
71	168" – 14'	192" – 16'	Quercus lobata
72	216" – 18'	228" – 19'	Quercus lobata
73	264" – 22'	288" – 24'	Quercus lobata
75	---------	264" – 22'	Quercus lobata
82	180" – 15'	216" – 18'	Quercus agrifolia
83	156" – 13'	168" – 14'	Quercus lobata
84	180" – 15'	180" – 15'	Quercus lobata
85	144" – 12'	168" – 14'	Quercus lobata
86	240" – 20'	264" – 22'	Quercus lobata
87	48"	48"	Quercus lobata

The above described trees were initially inspected on December 9, 2002. During this inspection each tree was sized for transplant as indicated. On May 12, 2003, a secondary inspection was performed and box sizes have been modified as agreed between the City of Santa Clarita (Mr. Robert Sartain, Tree Life Concern (Mr. Bob Wallace) and Valley Crest Tree Company (Mr. Brett Richardson)

OAK TRANSPLANTATION (Cont'd)

1. Under the direction of the Project Arborist, side-boxing/root-pruning operations shall take place during the months of November through January. These trees will then be maintained in situ for a 90-day period prior to bottom-board installation and relocation to the "storage site".

2. A "storage site" has been designated (see TLM) with a permanent water supply, which will be accessible to each boxed tree.

3. The Project Arborist (in conjunction with the relocation company) will determine if and when fungicides, fertilizer or soil amendments are needed. Each tree will be monitored for any condition that may require a specific treatment to enhance survivability before, during and after relocation.

4. Prior to side-boxing and root pruning the soil moisture content must be sufficient to maintain the rootball intact during this process.

5. Each oak should be lightly pruned at this point to remove deadwood, stubs, broken limbs, crossing limbs or for clearance purposes. The pruning will be monitored.

6. The excavation process will first begin with a back-hoe. As roots are encountered the back-hoe will be removed and roots 2" or larger will be hand excavated and clean-cut with a handsaw. The exposed cuts will treated with a bordeaux/linseed oil solution to help prevent desication. All roots shall be clean cut with pruning shears or by handsaw. Root balls that are exposed to full sun will be tarped until the side-box wall is installed.

7. After side-boxing/root-pruning operations the trees will remain in place for approximately 90 days before the bottom boards are installed.

8. The boxed trees will be hoisted by the box itself (not by the trunk) and carried to the storage area.

9. The orientation of each oak (north, south, east, west) will be carefully maintained during the storage process. The project arborist will mark each box for proper direction while in storage. This is important to prevent damage from sunburn.

10. Valley Crest shall guy-wire each tree as needed into the box and/or into the ground as needed. The storage area is notoriously windy and extra attention will be paid to securing the trees until planting. The guy-wires will be placed through hose-sections where they are in contact with the tree.

OAK TRANSPLANTATION (Cont'd)

11. When planting the oaks, the planter-hole (pit) location will be partially filled with loosened native soil. The size of the hole will be 2' larger than the box size. If drainage is determined to be a concern, PVC drain tubes will be installed in a rectangular fashion with breather ports attached at four locations. The bottom of the pit will be filled with 8" of gravel and a layer of permeable soil-cloth will be placed over the gravel.

An 8" layer of native soil will then be placed over the cloth and the tree installed/backfilled. This will allow for monitoring any possible water pooling at the base of each tree. Un-amended native soil will be utilized for the backfill unless a soil analysis indicates that amendments will be required.

A soil analysis will be performed at the planting site 30 days prior to relocation. The backfill soil will be compacted to normal (native-soil compaction).

The height of the root ball is critically important in the long-term survival of a transplanted oak. Each rootball will be placed at least 6" above existing grade. This will allow for settling and ensure that water does pool at the root collar.

12. Soil watering-basins will be constructed to properly irrigate the entire rootball of each tree. The trees will be monitored by relocation company and the Project Arborist on a weekly basis to determine current condition and maintenance requirements.

APPRAISAL

The appraised value of the oaks to be removed from this site was determined by utilizing the International Society of Arboriculture publication, "Guide for Plant Appraisal", Ninth Edition 2000, (refer to Chapter 5, Page 70, "Trunk Formula Method" and Page 60, "Replacement Cost Method".

Quercus agrifolia were given a Species Rating of 95% due to their commonality in the region. Q. lobata were rated at 98% and Q. douglasii at 100% based on their reduced numbers and regeneration statistics.

The Location Rating was given at 85%. This was the average of three factors: Site (85%), Contribution (85%), and Placement (85%).

Three nurseries were contacted to determine retail replacement tree and shrub values, (Sperling's in Calabasas, Treeland in Woodland Hills and Valley Crest Tree Co. in Arleta).

Note: Refer to the attached TreeCalc Appraisal Worksheets for specific tree appraisal procedures and values.

APPRAISAL (Cont'd)

Total Appraised Value of the 4 oaks to be Removed = **$18,100.00 (r.o.)**

Total Appraised Value of the Oaks to be Relocated = **$368,500.00 (r.o.)**

Total Appraised Value of the 87 Oaks on this site = **$1,158,000.00 (r.o.)**

OAK #3

My initial field inspection of the trees on this site took place in December 2001, for the purpose of gathering background information for this oak Tree Report. At that time, Oak #3 was rated "excellent" in health and vigor. It was noted that there was a soil build up at the base of the tree. This was obviously the result of natural erosion and sand build-up in the vicinity of this oak over a period of many years. This tree was growing in the lower end of a canyon and was exposed to run-off and erosion which apparently buried the root collar with sandy soil to a point approximately 2'above the root collar. It is not uncommon to find an oak growing in a dry streambed setting but oaks in this situation are in jeopardy of drowning during periods of high rainfall or from root disease caused by lack of oxygen and excess moisture in the rootzone. Unfortunately, this is what occurred to Oak #3. In January of this year, during an inspection of the site, I noticed that this oak had suddenly turned brown and was certainly dead (I had seen the oak in December 2002 and it appeared healthy). I excavated around the base of the tree to inspect tissue at the root collar region. The inner bark and recent sapwood rings were discolored and had been invaded by a white mycelium (fungus) that I could not identify. It did not appear to be Oak Root Fungus (*Armillaria mellea*) which is the most common killer of oaks in our region. I notified Mr. Glen Adamick and suggested that tissue samples be taken and submitted to a plant laboratory for analysis. I sent the tissue to Soil and Plant Laboratory, Inc., in Orange, CA. I described the setting to the pathologist and told him that the tree was "buried" and that the grade had been raised significantly by natural erosion. The reference in the lab analysis correspondence that "a grade change has predisposed the tree to infection" is accurate and it is this fact has undoubtedly led to the death of Oak #3. The fungus that was found is currently under study in several plant labs in California and we are still waiting for identification.

During a follow-up site inspection on 5-13-03, Mr. Bob Sartain requested that the root collar be fully exposed and additional tissue samples analyzed for pathogens. He would like to see a scientific determination on the causal factors relating to the death of this tree. The second excavation and tissue sampling will occur during the week of May 26th and the findings will be supplied to City Tree Specialist.

TREE VALUE APPRAISAL
(ALL ON-SITE OAKS)

TreeCalc Worksheet

Tree #	Tree Diameter (Up To 6 Trunks)							Adj.For 31"	Adj.For 24" Box	Adj.For 48" Box	(ATA x $66.00[24" Tree] or ATA x $63.60[48" Tree])							
	A	B	C	D	E	F	TA/ATA	Tree Or Equiv.	Replace.Tree	Replace.Tree	Species	Species %	Basic Value	Condition %	Location %	Tree Value	Damage %	TotalValue
1	19.0	11.0	9.0	4.0	0.0	0.0	454.75	FALSE	TRUE	FALSE	Q.agrifolia	95	375	80	85		0	
								454.75	451.75	451.75	$29,815.18	$28,324.42	$28,699.42	$22,959.54	$19,515.61	$19,515.61	$0.00	$19,515.61
2	26.0	0.0	0.0	0.0	0.0	0.0	530.93	FALSE	TRUE	FALSE	Q.lobata	98	375	90	85		0	
								530.93	527.93	527.93	$34,843.29	$34,146.43	$34,521.43	$31,069.29	$26,408.89	$26,408.89	$0.00	$26,408.89
3	41.0	0.0	0.0	0.0	0.0	0.0	1320.25	TRUE	FALSE	FALSE	Q.agrifolia	95	0	0	85		0	
								1191.17	1191.17	1191.17	$78,616.89	$74,686.05	$74,686.05	$0.00	$0.00	$0.00	$0.00	$0.00
4	6.0	6.0	4.0	4.0	3.0	3.0	95.82	FALSE	TRUE	FALSE	Q.berberidifolia	50	375	90	85		0	
								95.82	92.82	92.82	$6,126.02	$3,063.01	$3,438.01	$3,094.21	$2,630.08	$2,630.08	$0.00	$2,630.08
5	40.0	0.0	0.0	0.0	0.0	0.0	1256.64	TRUE	TRUE	FALSE	Q.agrifolia	95	375	90	85		0	
								1149.00	1146.00	1146.00	$75,636.00	$71,854.20	$72,229.20	$65,006.28	$55,255.34	$55,255.34	$0.00	$55,255.34
6	27.0	24.0	0.0	0.0	0.0	0.0	1024.94	TRUE	TRUE	FALSE	Q.agrifolia	95	375	70	85		0	
								979.27	976.27	976.27	$64,433.99	$61,212.29	$61,587.29	$43,111.10	$36,644.44	$36,644.44	$0.00	$36,644.44
7	11.0	10.0	7.0	0.0	0.0	0.0	212.06	FALSE	TRUE	FALSE	Q.agrifolia	95	375	80	85		0	
								212.06	209.06	209.06	$13,797.78	$13,107.89	$13,482.89	$10,786.32	$9,168.37	$9,168.37	$0.00	$9,168.37
8	27.0	0.0	0.0	0.0	0.0	0.0	572.55	FALSE	TRUE	FALSE	Q.agrifolia	95	375	60	85		0	
								572.55	569.55	569.55	$37,590.62	$35,711.08	$36,086.08	$21,651.65	$18,403.90	$18,403.90	$0.00	$18,403.90
9	26.0	0.0	0.0	0.0	0.0	0.0	530.93	FALSE	TRUE	FALSE	Q.agrifolia	95	375	60	85		0	
								530.93	527.93	527.93	$34,843.29	$33,101.13	$33,476.13	$20,085.68	$17,072.83	$17,072.83	$0.00	$17,072.83
10	0.0	0.0	0.0	0.0	0.0	0.0	0.00	FALSE	TRUE	FALSE	Q.be24"box@375	0	375	90	100		0	
								0.00	-3.00	-3.00	-$198.00	$0.00	$375.00	$337.50	$337.50	$337.50	$0.00	$337.50

Most commonly available replacement tree =
24" box @ $375.00 ($200 [cost of tree]+ $175 [cost of installation]) =
2" dia. tree (3 sq. in.) =
$200.00 divided by 3 sq.in. = $66.00
48" box @ $1800.00 ($900 [cost of tree]+ $900 [cost of installation]) =
6" dia. tree (28.3 sq. in.) =
$1800.00 divided by 28.3 sq.in. = $63.60

Total Valuation	**$185,436.95**
Total Damage Valuation	**$0.00**
Total Remaining Value	**$185,436.95**

PREPARED BY: ROBERT W. WALLACE
TREE LIFE CONCERN, INC.

Tree #	Tree Diameter (Up To 6 Trunks)							Adj.For 31"	Adj.For 24" Box	Adj.For 48" Box	(ATA x $66.00[24" Tree] or ATA x $63.60[48" Tree])							
	A	B	C	D	E	F	TA/ATA	Tree Or Equiv.	Replace.Tree	Replace.Tree	Species	Species %	Basic Value	Condition %	Location %	Tree Value	Damage %	TotalValue
11	0.0	0.0	0.0	0.0	0.0	0.0	0.00	FALSE	TRUE	FALSE	Q.be24"box@375	0	375	90	100		0	
								0.00	-3.00	-3.00	-$198.00	$0.00	$375.00	$337.50	$337.50	$337.50	$0.00	$337.50
12	0.0	0.0	0.0	0.0	0.0	0.0	0.00	FALSE	FALSE	FALSE	Q.be24"box@375	0	650	90	100		0	
								0.00	0.00	0.00	$0.00	$0.00	$650.00	$585.00	$585.00	$585.00	$0.00	$585.00
13	18.0	16.0	16.0	0.0	0.0	0.0	656.59	FALSE	TRUE	FALSE	Q.agrifolia	95	375	80	85		0	
								656.59	653.59	653.59	$43,137.09	$40,980.24	$41,355.24	$33,084.19	$28,121.56	$28,121.56	$0.00	$28,121.56
14	6.0	4.0	0.0	0.0	0.0	0.0	40.84	FALSE	TRUE	FALSE	Q.berberidifolia	50	375	80	85		0	
								40.84	37.84	37.84	$2,497.48	$1,248.74	$1,623.74	$1,298.99	$1,104.14	$1,104.14	$0.00	$1,104.14
15	19.0	11.0	0.0	0.0	0.0	0.0	378.56	FALSE	TRUE	FALSE	Q.agrifolia	95	375	90	85		0	
								378.56	375.56	375.56	$24,787.07	$23,547.71	$23,922.71	$21,530.44	$18,300.87	$18,300.87	$0.00	$18,300.87
16	24.0	0.0	0.0	0.0	0.0	0.0	452.39	FALSE	TRUE	FALSE	Q.agrifolia	95	375	90	85		0	
								452.39	449.39	449.39	$29,659.67	$28,176.69	$28,551.69	$25,696.52	$21,842.04	$21,842.04	$0.00	$21,842.04
17	13.0	12.0	0.0	0.0	0.0	0.0	245.83	FALSE	TRUE	FALSE	Q.agrifolia	95	375	80	85		0	
								245.83	242.83	242.83	$16,026.74	$15,225.40	$15,600.40	$12,480.32	$10,608.28	$10,608.28	$0.00	$10,608.28
18	0.0	0.0	0.0	0.0	0.0	0.0	0.00	FALSE	FALSE	TRUE	Q.be48"box@1800	0	1800	90	100		0	
								0.00	0.00	-28.30	-$1,799.88	$0.00	$1,800.00	$1,620.00	$1,620.00	$1,620.00	$0.00	$1,620.00
19	0.0	0.0	0.0	0.0	0.0	0.0	0.00	FALSE	FALSE	TRUE	Q.ag48"box@1800	0	1800	90	100		0	
								0.00	0.00	-28.30	-$1,799.88	$0.00	$1,800.00	$1,620.00	$1,620.00	$1,620.00	$0.00	$1,620.00
20	0.0	0.0	0.0	0.0	0.0	0.0	0.00	FALSE	FALSE	TRUE	Q.ag48"box@1800	0	1800	90	100		0	
								0.00	0.00	-28.30	-$1,799.88	$0.00	$1,800.00	$1,620.00	$1,620.00	$1,620.00	$0.00	$1,620.00

Most commonly available replacement tree =
24" box @ $375.00 ($200 [cost of tree]+ $175 [cost of installation]) =
2" dia. tree (3 sq. in.) =
$200.00 divided by 3 sq.in. = $66.00
48" box @ $1800.00 ($900 [cost of tree]+ $900 [cost of installation]) =
6" dia. tree (28.3 sq. in.) =
$1800.00 divided by 28.3 sq.in. = $63.60

Total Valuation	**$271,196.35**
Total Damage Valuation	**$0.00**
Total Remaining Value	**$271,196.35**

PREPARED BY: ROBERT W. WALLACE

TREE LIFE CONCERN, INC.

Tree #	Tree Diameter (Up To 6 Trunks)							Adj.For 31"	Adj.For 24" Box	Adj.For 48" Box	(ATA x $66.00[24" Tree] or ATA x $63.60[48" Tree])							
	A	B	C	D	E	F	TA/ATA	Tree Or Equiv.	Replace.Tree	Replace.Tree	Species	Species %	Basic Value	Condition %	Location %	Tree Value	Damage %	TotalValue
21	0.0	0.0	0.0	0.0	0.0	0.0	0.00	FALSE	FALSE	TRUE	Q.ag48"box@1800	0	1800	90	100		0	
								0.00	0.00	-28.30	-$1,799.88	$0.00	$1,800.00	$1,620.00	$1,620.00	$1,620.00	$0.00	$1,620.00
22	4.0	3.0	3.0	3.0	3.0	2.0	43.98	FALSE	FALSE	FALSE	Q.berberidifolia	50	0	90	85		0	
								43.98	43.98	43.98	$2,902.83	$1,451.41	$1,451.41	$1,306.27	$1,110.33	$1,110.33	$0.00	$1,110.33
23	6.0	6.0	0.0	0.0	0.0	0.0	56.55	FALSE	FALSE	FALSE	Q.berberidifolia	50	0	80	85		0	
								56.55	56.55	56.55	$3,732.21	$1,866.10	$1,866.10	$1,492.88	$1,268.95	$1,268.95	$0.00	$1,268.95
24	9.0	8.0	7.0	0.0	0.0	0.0	152.37	FALSE	FALSE	FALSE	Q.berberidifolia	50	0	80	85		0	
								152.37	152.37	152.37	$10,056.23	$5,028.11	$5,028.11	$4,022.49	$3,419.12	$3,419.12	$0.00	$3,419.12
25	7.0	6.0	2.0	2.0	0.0	0.0	73.04	FALSE	FALSE	FALSE	Q.berberidifolia	50	0	90	85		0	
								73.04	73.04	73.04	$4,820.77	$2,410.38	$2,410.38	$2,169.35	$1,843.94	$1,843.94	$0.00	$1,843.94
26	0.0	0.0	0.0	0.0	0.0	0.0	0.00	FALSE	TRUE	FALSE	Q.be48"box@1800	0	375	90	100		0	
								0.00	-3.00	-3.00	-$198.00	$0.00	$375.00	$337.50	$337.50	$337.50	$0.00	$337.50
27	0.0	12.0	0.0	0.0	0.0	0.0	113.10	FALSE	TRUE	FALSE	Q.be24"box@375	0	375	90	100		0	
								113.10	110.10	110.10	$7,266.42	$0.00	$375.00	$337.50	$337.50	$337.50	$0.00	$337.50
28	0.0	0.0	0.0	0.0	0.0	0.0	0.00	FALSE	FALSE	FALSE	Q.be36"box@650	0	650	90	100		0	
								0.00	0.00	0.00	$0.00	$0.00	$650.00	$585.00	$585.00	$585.00	$0.00	$585.00
29	6.0	0.0	0.0	0.0	0.0	0.0	28.27	FALSE	FALSE	FALSE	Q.berberidifolia	50	0	90	85		0	
								28.27	28.27	28.27	$1,866.10	$933.05	$933.05	$839.75	$713.78	$713.78	$0.00	$713.78
30	0.0	0.0	0.0	0.0	0.0	0.0	0.00	FALSE	FALSE	TRUE	Q.be48"box@1800	0	1800	90	100		0	
								0.00	0.00	-28.30	-$1,799.88	$0.00	$1,800.00	$1,620.00	$1,620.00	$1,620.00	$0.00	$1,620.00

Most commonly available replacement tree =
24" box @ $375.00 ($200 [cost of tree]+ $175 [cost of installation]) =
2" dia. tree (3 sq. in.) =
$200.00 divided by 3 sq.in. = $66.00
48" box @ $1800.00 ($900 [cost of tree]+ $900 [cost of installation]) =
6" dia. tree (28.3 sq. in.) =
$1800.00 divided by 28.3 sq.in. = $63.60

Total Valuation	**$284,052.48**
Total Damage Valuation	**$0.00**
Total Remaining Value	**$284,052.48**

PREPARED BY: ROBERT W. WALLACE
TREE LIFE CONCERN, INC.

Tree #	Tree Diameter (Up To 6 Trunks)							Adj.For 31"	Adj.For 24" Box	Adj.For 48" Box	(ATA x $66.00[24" Tree] or ATA x $63.60[48" Tree])							
	A	B	C	D	E	F	TA/ATA	Tree Or Equiv.	Replace.Tree	Replace.Tree	Species	Species %	Basic Value	Condition %	Location %	Tree Value	Damage %	TotalValue
31	9.0	9.0	8.0	6.0	5.0	0.0	225.41	FALSE	TRUE	FALSE	Q.berberidifolia	50	375	80	85		0	
								225.41	222.41	222.41	$14,679.00	$7,339.50	$7,714.50	$6,171.60	$5,245.86	$5,245.86	$0.00	$5,245.86
32	6.0	4.0	0.0	0.0	0.0	0.0	40.84	FALSE	TRUE	FALSE	Q.berberidifolia	50	375	80	85		0	
								40.84	37.84	37.84	$2,497.48	$1,248.74	$1,623.74	$1,298.99	$1,104.14	$1,104.14	$0.00	$1,104.14
33	7.0	6.0	6.0	6.0	4.0	0.0	135.87	FALSE	TRUE	FALSE	Q.berberidifolia	50	375	90	85		0	
								135.87	132.87	132.87	$8,769.67	$4,384.83	$4,759.83	$4,283.85	$3,641.27	$3,641.27	$0.00	$3,641.27
34	7.0	6.0	0.0	0.0	0.0	0.0	66.76	FALSE	TRUE	FALSE	Q.berberidifolia	50	375	90	85		0	
								66.76	63.76	63.76	$4,208.08	$2,104.04	$2,479.04	$2,231.14	$1,896.47	$1,896.47	$0.00	$1,896.47
35	8.0	6.0	6.0	0.0	0.0	0.0	106.81	FALSE	TRUE	FALSE	Q.berberidifolia	50	375	90	85		0	
								106.81	103.81	103.81	$6,851.73	$3,425.86	$3,800.86	$3,420.78	$2,907.66	$2,907.66	$0.00	$2,907.66
36	0.0	0.0	0.0	0.0	0.0	0.0	0.00	FALSE	FALSE	TRUE	Q.be48"box@1800	0	1800	80	100		0	
								0.00	0.00	-28.30	-$1,799.88	$0.00	$1,800.00	$1,440.00	$1,440.00	$1,440.00	$0.00	$1,440.00
37	9.0	7.0	6.0	6.0	0.0	0.0	158.65	FALSE	TRUE	FALSE	Q.berberidifolia	50	375	90	85		0	
								158.65	155.65	155.65	$10,272.92	$5,136.46	$5,511.46	$4,960.31	$4,216.27	$4,216.27	$0.00	$4,216.27
38	5.0	5.0	3.0	0.0	0.0	0.0	46.34	FALSE	TRUE	FALSE	Q.berberidifolia	50	375	70	85		0	
								46.34	43.34	43.34	$2,860.34	$1,430.17	$1,805.17	$1,263.62	$1,074.08	$1,074.08	$0.00	$1,074.08
39	0.0	0.0	0.0	0.0	0.0	0.0	0.00	FALSE	TRUE	FALSE	Q.be24"box@375	0	375	90	100		0	
								0.00	-3.00	-3.00	-$198.00	$0.00	$375.00	$337.50	$337.50	$337.50	$0.00	$337.50
40	3.0	2.0	2.0	2.0	2.0	0.0	19.63	FALSE	TRUE	FALSE	Q.berberidifolia	50	375	90	85		0	
								19.63	16.63	16.63	$1,097.91	$548.95	$923.95	$831.56	$706.82	$706.82	$0.00	$706.82

Most commonly available replacement tree =
24" box @ $375.00 ($200 [cost of tree]+ $175 [cost of installation]) =
2" dia. tree (3 sq. in.) =
$200.00 divided by 3 sq.in. = $66.00
48" box @ $1800.00 ($900 [cost of tree]+ $900 [cost of installation]) =
6" dia. tree (28.3 sq. in.) =
$1800.00 divided by 28.3 sq.in. = $63.60

Total Valuation	**$306,622.55**
Total Damage Valuation	**$0.00**
Total Remaining Value	**$306,622.55**

PREPARED BY: ROBERT W. WALLACE
TREE LIFE CONCERN, INC.

Tree #	Tree Diameter (Up To 6 Trunks)							Adj.For 31"	Adj.For 24" Box	Adj.For 48" Box	(ATA x $66.00[24" Tree] or ATA x $63.60[48" Tree])							
	A	B	C	D	E	F	TA/ATA	Tree Or Equiv.	Replace.Tree	Replace.Tree	Species	Species %	Basic Value	Condition %	Location %	Tree Value	Damage %	TotalValue
41	6	6	6	4	4	0	109.96	FALSE	TRUE	FALSE	Q.berberidifolia	50	375	90	85		0	
								109.96	106.96	106.96	$7,059.07	$3,529.54	$3,904.54	$3,514.08	$2,986.97	$2,986.97	$0.00	$2,986.97
42	0	0	0	0	0	0	0.00	FALSE	FALSE	TRUE	Q.be48"box@1800	0	1800	90	100		0	
								0.00	0.00	-28.30	-$1,799.88	$0.00	$1,800.00	$1,620.00	$1,620.00	$1,620.00	$0.00	$1,620.00
43	0	0	0	0	0	0	0.00	FALSE	FALSE	TRUE	Q.be48"box@1800	0	1800	90	100		0	
								0.00	0.00	-28.30	-$1,799.88	$0.00	$1,800.00	$1,620.00	$1,620.00	$1,620.00	$0.00	$1,620.00
44	7	6	5	0	0	0	86.39	FALSE	TRUE	FALSE	Q.berberidifolia	50	375	90	85		0	
								86.39	83.39	83.39	$5,503.99	$2,751.99	$3,126.99	$2,814.29	$2,392.15	$2,392.15	$0.00	$2,392.15
45	0	0	0	0	0	0	0.00	FALSE	FALSE	TRUE	Q.be48"box@1800	0	1800	80	100		0	
								0.00	0.00	-28.30	-$1,799.88	$0.00	$1,800.00	$1,440.00	$1,440.00	$1,440.00	$0.00	$1,440.00
46	0	0	0	0	0	0	0.00	FALSE	FALSE	TRUE	Q.be48"box@1800	0	1800	90	100		0	
								0.00	0.00	-28.30	-$1,799.88	$0.00	$1,800.00	$1,620.00	$1,620.00	$1,620.00	$0.00	$1,620.00
47	5	4	4	4	3	3	71.47	FALSE	TRUE	FALSE	Q.berberidifolia	50	375	90	85		0	
								71.47	68.47	68.47	$4,519.10	$2,259.55	$2,634.55	$2,371.09	$2,015.43	$2,015.43	$0.00	$2,015.43
48	6	6	5	5	5	3	122.52	FALSE	TRUE	FALSE	Q.berberidifolia	50	375	90	85		0	
								122.52	119.52	119.52	$7,888.45	$3,944.23	$4,319.23	$3,887.30	$3,304.21	$3,304.21	$0.00	$3,304.21
49	0	0	0	0	0	0	0.00	FALSE	FALSE	TRUE	Q.be48"box@1800	0	1800	80	100		0	
								0.00	0.00	-28.30	-$1,799.88	$0.00	$1,800.00	$1,440.00	$1,440.00	$1,440.00	$0.00	$1,440.00
50	3	2	2	2	2	2	22.78	FALSE	TRUE	FALSE	Q.berberidifolia	50	375	90	85		0	
								22.78	19.78	19.78	$1,305.25	$652.63	$1,027.63	$924.86	$786.13	$786.13	$0.00	$786.13

Most commonly available replacement tree =
24" box @ $375.00 ($200 [cost of tree]+ $175 [cost of installation]) =
2" dia. tree (3 sq. in.) =
$200.00 divided by 3 sq.in. = $66.00
48" box @ $1800.00 ($900 [cost of tree]+ $900 [cost of installation]) =
6" dia. tree (28.3 sq. in.) =
$1800.00 divided by 28.3 sq.in. = $63.60

Total Valuation	**$325,847.44**
Total Damage Valuation	**$0.00**
Total Remaining Value	**$325,847.44**

PREPARED BY: ROBERT W. WALLACE

TREE LIFE CONCERN, INC.

Tree #	Tree Diameter (Up To 6 Trunks)							Adj.For 31"	Adj.For 24" Box	Adj.For 48" Box	(ATA x $66.00[24" Tree] or ATA x $63.60[48" Tree])							
	A	B	C	D	E	F	TA/ATA	Tree Or Equiv.	Replace.Tree	Replace.Tree	Species	Species %	Basic Value	Condition %	Location %	Tree Value	Damage %	TotalValue
51	0	0	0	0	0	0	0.00	FALSE	FALSE	FALSE	Q.ber.36"box@650	0	650	90	100		0	
								0.00	0.00	0.00	$0.00	$0.00	$650.00	$585.00	$585.00	$585.00	$0.00	$585.00
52	0	0	0	0	0	0	0.00	FALSE	FALSE	TRUE	Q.be48"box@1800	0	1800	90	100		0	
								0.00	0.00	-28.30	-$1,799.88	$0.00	$1,800.00	$1,620.00	$1,620.00	$1,620.00	$0.00	$1,620.00
53	0	0	0	0	0	0	0.00	FALSE	FALSE	TRUE	Q.be60"box@4500	0	4500	90	100		0	
								0.00	0.00	-28.30	-$1,799.88	$0.00	$4,500.00	$4,050.00	$4,050.00	$4,050.00	$0.00	$4,050.00
54	4	4	3	3	3	2	49.48	FALSE	TRUE	FALSE	Q. berberidifolia	50	375	90	85		0	
								49.48	46.48	46.48	$3,067.68	$1,533.84	$1,908.84	$1,717.96	$1,460.26	$1,460.26	$0.00	$1,460.26
55	0	0	0	0	0	0	0.00	FALSE	FALSE	TRUE	Q.be48"box@1800	0	1800	90	100		0	
								0.00	0.00	-28.30	-$1,799.88	$0.00	$1,800.00	$1,620.00	$1,620.00	$1,620.00	$0.00	$1,620.00
56	0	0	0	0	0	0	0.00	FALSE	FALSE	TRUE	Q.be48"box@1800	0	1800	90	100		0	
								0.00	0.00	-28.30	-$1,799.88	$0.00	$1,800.00	$1,620.00	$1,620.00	$1,620.00	$0.00	$1,620.00
57	0	0	0	0	0	0	0.00	FALSE	FALSE	TRUE	Q.be48"box@1800	0	1800	90	100		0	
								0.00	0.00	-28.30	-$1,799.88	$0.00	$1,800.00	$1,620.00	$1,620.00	$1,620.00	$0.00	$1,620.00
58	0	0	0	0	0	0	0.00	FALSE	FALSE	TRUE	Q.be48"box@1800	0	1800	90	100		0	
								0.00	0.00	-28.30	-$1,799.88	$0.00	$1,800.00	$1,620.00	$1,620.00	$1,620.00	$0.00	$1,620.00
59	22	20	20	17	0	0	1235.43	TRUE	TRUE	FALSE	Q. agrifolia	95	375	90	85		0	
								1134.56	1131.56	1131.56	$74,682.74	$70,948.61	$71,323.61	$64,191.25	$54,562.56	$54,562.56	$0.00	$54,562.56
60	31	0	0	0	0	0	754.77	TRUE	TRUE	FALSE	Q. agrifolia	95	375	90	85		0	
								754.77	751.77	751.77	$49,616.62	$47,135.79	$47,510.79	$42,759.71	$36,345.75	$36,345.75	$0.00	$36,345.75

Most commonly available replacement tree =
24" box @ $375.00 ($200 [cost of tree]+ $175 [cost of installation]) =
2" dia. tree (3 sq. in.) =
$200.00 divided by 3 sq.in. = $66.00
48" box @ $1800.00 ($900 [cost of tree]+ $900 [cost of installation]) =
6" dia. tree (28.3 sq. in.) =
$1800.00 divided by 28.3 sq.in. = $63.60

Total Valuation	**$430,951.02**
Total Damage Valuation	**$0.00**
Total Remaining Value	**$430,951.02**

PREPARED BY: ROBERT W. WALLACE

TREE LIFE CONCERN, INC.

Tree #	Tree Diameter (Up To 6 Trunks)							Adj.For 31"	Adj.For 24" Box	Adj.For 48" Box	(ATA x $66.00[24" Tree] or ATA x $63.60[48" Tree])							
	A	B	C	D	E	F	TA/ATA	Tree Or Equiv.	Replace.Tree	Replace.Tree	Species	Species %	Basic Value	Condition %	Location %	Tree Value	Damage %	TotalValue
61	10	9	0	0	0	0	142.16	FALSE	TRUE	FALSE	Q.agrifolia	95	375	90	85		0	
								142.16	139.16	139.16	$9,184.36	$8,725.14	$9,100.14	$8,190.13	$6,961.61	$6,961.61	$0.00	$6,961.61
62	0	0	0	0	0	0	0.00	FALSE	FALSE	TRUE	Q.be.48"box@1800	0	1800	80	100		0	
								0.00	0.00	-28.30	-$1,799.88	$0.00	$1,800.00	$1,440.00	$1,440.00	$1,440.00	$0.00	$1,440.00
63	4	4	4	4	4	2	65.97	FALSE	TRUE	FALSE	Q.berberidifolia	50	375	90	85		0	
								65.97	62.97	62.97	$4,156.24	$2,078.12	$2,453.12	$2,207.81	$1,876.64	$1,876.64	$0.00	$1,876.64
64	0	0	0	0	0	0	0.00	FALSE	FALSE	TRUE	Q.be.48"box@1800	0	1800	90	100		0	
								0.00	0.00	-28.30	-$1,799.88	$0.00	$1,800.00	$1,620.00	$1,620.00	$1,620.00	$0.00	$1,620.00
65	19	17	0	0	0	0	510.51	FALSE	TRUE	FALSE	Q.agrifolia	95	375	80	85		0	
								510.51	507.51	507.51	$33,495.55	$31,820.78	$32,195.78	$25,756.62	$21,893.13	$21,893.13	$0.00	$21,893.13
66	17	0	0	0	0	0	226.98	FALSE	TRUE	FALSE	Q.agrifolia	95	375	90	85		0	
								226.98	223.98	223.98	$14,782.67	$14,043.54	$14,418.54	$12,976.68	$11,030.18	$11,030.18	$0.00	$11,030.18
67	34	0	0	0	0	0	907.92	TRUE	TRUE	FALSE	Q.agrifolia	95	375	90	85		0	
								881.94	878.94	878.94	$58,010.04	$55,109.54	$55,484.54	$49,936.08	$42,445.67	$42,445.67	$0.00	$42,445.67
68	40	0	0	0	0	0	1256.64	TRUE	TRUE	FALSE	Q.lobata	98	375	60	85		0	
								1149.00	1146.00	1146.00	$75,636.00	$74,123.28	$74,498.28	$44,698.97	$37,994.12	$37,994.12	$0.00	$37,994.12
69	28	8	0	0	0	0	666.02	FALSE	TRUE	FALSE	Q.lobata	98	375	90	85		0	
								666.02	663.02	663.02	$43,759.13	$42,883.94	$43,258.94	$38,933.05	$33,093.09	$33,093.09	$0.00	$33,093.09
70	17	15	15	15	10	0	835.66	TRUE	TRUE	FALSE	Q.lobata	98	375	80	85		0	
								817.06	814.06	814.06	$53,727.80	$52,653.25	$53,028.25	$42,422.60	$36,059.21	$36,059.21	$0.00	$36,059.21

Most commonly available replacement tree =
24" box @ $375.00 ($200 [cost of tree]+ $175 [cost of installation]) =
2" dia. tree (3 sq. in.) =
$200.00 divided by 3 sq.in. = $66.00
48" box @ $1800.00 ($900 [cost of tree]+ $900 [cost of installation]) =
6" dia. tree (28.3 sq. in.) =
$1800.00 divided by 28.3 sq.in. = $63.60

Total Valuation	**$625,364.66**
Total Damage Valuation	**$0.00**
Total Remaining Value	**$625,364.66**

PREPARED BY: ROBERT W. WALLACE
TREE LIFE CONCERN, INC.

Tree #	Tree Diameter (Up To 6 Trunks)							Adj.For 31"	Adj.For 24" Box	Adj.For 48" Box	(ATA x $66.00[24" Tree] or ATA x $63.60[48" Tree])							
	A	B	C	D	E	F	TA/ATA	Tree Or Equiv.	Replace.Tree	Replace.Tree	Species	Species %	Basic Value	Condition %	Location %	Tree Value	Damage %	TotalValue
71	15	11	11	10	0	0	445.32	FALSE	TRUE	FALSE	Q.lobata	98	375	80	85		0	
								445.32	442.32	442.32	$29,193.15	$28,609.28	$28,984.28	$23,187.43	$19,709.31	$19,709.31	$0.00	$19,709.31
72	16	15	12	11	6	0	614.18	FALSE	TRUE	FALSE	Q.lobata	98	375	80	85		0	
								614.18	611.18	611.18	$40,337.94	$39,531.18	$39,906.18	$31,924.94	$27,136.20	$27,136.20	$0.00	$27,136.20
73	33	0	0	0	0	0	855.30	TRUE	TRUE	FALSE	Q.lobata	98	375	90	85		0	
								835.09	832.09	832.09	$54,917.61	$53,819.26	$54,194.26	$48,774.83	$41,458.61	$41,458.61	$0.00	$41,458.61
74	48	0	0	0	0	0	1809.56	TRUE	TRUE	FALSE	Q.lobata	98	375	90	85		0	
								1467.56	1464.56	1464.56	$96,660.96	$94,727.74	$95,102.74	$85,592.47	$72,753.60	$72,753.60	$0.00	$72,753.60
75	35	0	0	0	0	0	962.11	TRUE	TRUE	FALSE	Q.lobata	98	375	60	85		0	
								928.13	925.13	925.13	$61,058.25	$59,837.09	$60,212.09	$36,127.25	$30,708.16	$30,708.16	$0.00	$30,708.16
76	21	16	0	0	0	0	547.42	FALSE	TRUE	FALSE	Q.douglasii	100	375	80	85		0	
								547.42	544.42	544.42	$35,931.86	$35,931.86	$36,306.86	$29,045.48	$24,688.66	$24,688.66	$0.00	$24,688.66
77	20	19	16	13	10	9	1073.64	TRUE	TRUE	FALSE	Q.agrifolia	95	375	80	85		0	
								1017.28	1014.28	1014.28	$66,942.57	$63,595.44	$63,970.44	$51,176.35	$43,499.90	$43,499.90	$0.00	$43,499.90
78	16	16	14	14	0	0	710.00	FALSE	TRUE	FALSE	Q.agrifolia	95	375	80	85		0	
								710.00	707.00	707.00	$46,661.96	$44,328.86	$44,703.86	$35,763.09	$30,398.62	$30,398.62	$0.00	$30,398.62
79	24	20	18	18	14	0	1429.42	TRUE	TRUE	FALSE	Q.agrifolia	95	375	70	85		0	
								1259.74	1256.74	1256.74	$82,944.78	$78,797.54	$79,172.54	$55,420.78	$47,107.66	$47,107.66	$0.00	$47,107.66
80	47	18	0	0	0	0	1989.41	TRUE	TRUE	FALSE	Q.agrifolia	95	375	80	85		0	
								1552.24	1549.24	1549.24	$102,249.78	$97,137.29	$97,512.29	$78,009.83	$66,308.36	$66,308.36	$0.00	$66,308.36

Most commonly available replacement tree =
24" box @ $375.00 ($200 [cost of tree]+ $175 [cost of installation]) =
2" dia. tree (3 sq. in.) =
$200.00 divided by 3 sq.in. = $66.00
48" box @ $1800.00 ($900 [cost of tree]+ $900 [cost of installation]) =
6" dia. tree (28.3 sq. in.) =
$1800.00 divided by 28.3 sq.in. = $63.60

Total Valuation	**$1,029,133.74**
Total Damage Valuation	**$0.00**
Total Remaining Value	**$1,029,133.74**

PREPARED BY: ROBERT W. WALLACE
TREE LIFE CONCERN, INC.

Tree #	Tree Diameter (Up To 6 Trunks)							Adj.For 31"	Adj.For 24" Box	Adj.For 48" Box	(ATA x $66.00[24" Tree] or ATA x $63.60[48" Tree])							
	A	B	C	D	E	F	TA/ATA	Tree Or Equiv.	Replace.Tree	Replace.Tree	Species	Species %	Basic Value	Condition %	Location %	Tree Value	Damage %	TotalValue
81	38	0	0	0	0	0	1134.11	TRUE	TRUE	FALSE	Q.lobata (dead)	98	375	0	85		0	
								1062.66	1059.66	1059.66	$69,937.56	$68,538.81	$68,913.81	$0.00	$0.00	$0.00	$0.00	$0.00
82	18	18	0	0	0	0	508.94	FALSE	TRUE	FALSE	Q.agrifolia	95	375	90	85		0	
								508.94	505.94	505.94	$33,391.88	$31,722.29	$32,097.29	$28,887.56	$24,554.42	$24,554.42	$0.00	$24,554.42
83	19	0	0	0	0	0	283.53	FALSE	TRUE	FALSE	Q.lobata	98	375	90	85		0	
								283.53	280.53	280.53	$18,514.88	$18,144.58	$18,519.58	$16,667.62	$14,167.48	$14,167.48	$0.00	$14,167.48
84	22	14	0	0	0	0	534.07	FALSE	TRUE	FALSE	Q.lobata	98	375	90	85		0	
								534.07	531.07	531.07	$35,050.64	$34,349.63	$34,724.63	$31,252.16	$26,564.34	$26,564.34	$0.00	$26,564.34
85	18	0	0	0	0	0	254.47	FALSE	TRUE	FALSE	Q.lobata	98	375	90	85		0	
								254.47	251.47	251.47	$16,596.94	$16,265.00	$16,640.00	$14,976.00	$12,729.60	$12,729.60	$0.00	$12,729.60
86	37	0	0	0	0	0	1075.21	TRUE	TRUE	FALSE	Q.lobata	98	375	90	85		0	
								1018.49	1015.49	1015.49	$67,022.01	$65,681.57	$66,056.57	$59,450.91	$50,533.28	$50,533.28	$0.00	$50,533.28
87	2	0	0	0	0	0	3.14	FALSE	TRUE	FALSE	Q.lobata	0	375	90	100		0	
								3.14	0.14	0.14	$9.34	$0.00	$375.00	$337.50	$337.50	$337.50	$0.00	$337.50
88	0	0	0	0	0	0	0.00	FALSE	FALSE	FALSE	0	0	0	0	0		0	
								0.00	0.00	0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
89	0	0	0	0	0	0	0.00	FALSE	FALSE	FALSE	0	0	0	0	0		0	
								0.00	0.00	0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
90	0	0	0	0	0	0	0.00	FALSE	FALSE	FALSE	0	0	0	0	0		0	
								0.00	0.00	0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00

Most commonly available replacement tree =
24" box @ $375.00 ($200 [cost of tree]+ $175 [cost of installation]) =
2" dia. tree (3 sq. in.) =
$200.00 divided by 3 sq.in. = $66.00
48" box @ $1800.00 ($900 [cost of tree]+ $900 [cost of installation]) =
6" dia. tree (28.3 sq. in.) =
$1800.00 divided by 28.3 sq.in. = $63.60

Total Valuation	**$1,158,020.37**
Total Damage Valuation	**$0.00**
Total Remaining Value	**$1,158,020.37**

PREPARED BY: ROBERT W. WALLACE
TREE LIFE CONCERN, INC.

TREE VALUE APPRAISAL
(OAK REMOVALS)

TreeCalc Worksheet

OAK REMOVALS

Tree #	Tree Diameter (Up To 6 Trunks)							Adj.For 31"	Adj.For 24" Box	Adj.For 48" Box	(ATA x $66.00[24" Tree] or ATA x $63.60[48" Tree])							
	A	B	C	D	E	F	TA/ATA	Tree Or Equiv.	Replace.Tree	Replace.Tree	Species	Species %	Basic Value	Condition %	Location %	Tree Value	Damage %	TotalValue
9L	26.0	0.0	0.0	0.0	0.0	0.0	530.93	FALSE	TRUE	FALSE	Q. agrifolia	95	375	60	85		0	
								530.93	527.93	527.93	$34,843.29	$33,101.13	$33,476.13	$20,085.68	$17,072.83	$17,072.83	$0.00	$17,072.83
10S	0.0	0.0	0.0	0.0	0.0	0.0	0.00	FALSE	TRUE	FALSE	Q.be. 24"box@375	0	375	90	100		0	
								0.00	-3.00	-3.00	-$198.00	$0.00	$375.00	$337.50	$337.50	$337.50	$0.00	$337.50
11S	0.0	0.0	0.0	0.0	0.0	0.0	0.00	FALSE	TRUE	FALSE	Q.be. 24"box@375	0	375	90	100		0	
								0.00	-3.00	-3.00	-$198.00	$0.00	$375.00	$337.50	$337.50	$337.50	$0.00	$337.50
12S	0.0	0.0	0.0	0.0	0.0	0.0	0.00	FALSE	TRUE	FALSE	Q.be. 24"box@375	0	375	90	100		0	
								0.00	-3.00	-3.00	-$198.00	$0.00	$375.00	$337.50	$337.50	$337.50	$0.00	$337.50
	0.0	0.0	0.0	0.0	0.0	0.0	0.00	FALSE	FALSE	FALSE	0	0	0	0	0		0	
								0.00	0.00	0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
	0.0	0.0	0.0	0.0	0.0	0.0	0.00	FALSE	FALSE	FALSE	0	0	0	0	0		0	
								0.00	0.00	0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
	0.0	0.0	0.0	0.0	0.0	0.0	0.00	FALSE	FALSE	FALSE	0	0	0	0	0		0	
								0.00	0.00	0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
	0.0	0.0	0.0	0.0	0.0	0.0	0.00	FALSE	FALSE	FALSE	0	0	0	0	0		0	
								0.00	0.00	0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
	0.0	0.0	0.0	0.0	0.0	0.0	0.00	FALSE	FALSE	FALSE	0	0	0	0	0		0	
								0.00	0.00	0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
	0.0	0.0	0.0	0.0	0.0	0.0	0.00	FALSE	FALSE	FALSE	0	0	0	0	0		0	
								0.00	0.00	0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
	0.0	0.0	0.0	0.0	0.0	0.0	0.00	FALSE	FALSE	FALSE	0	0	0	0	0		0	
								0.00	0.00	0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00

Most commonly available replacement tree =
24" box @ $375.00 ($200 [cost of tree]+ $175 [cost of installation]) =
2" dia. tree (3 sq. in.) =
$200.00 divided by 3 sq.in. = $66.00
48" box @ $1800.00 ($900 [cost of tree]+ $900 [cost of installation]) =
6" dia. tree (28.3 sq. in.) =
$1800.00 divided by 28.3 sq.in. = $63.60

Total Valuation	**$18,085.33**
Total Damage Valuation	**$0.00**
Total Remaining Value	**$18,085.33**

PREPARED BY: ROBERT W. WALLACE
TREE LIFE CONCERN, INC.

TREE VALUE APPRAISAL
(OAKS TO BE RELOCATED ON-SITE)

TreeCalc Worksheet

OAKS TO BE RELOCATED ON-SITE

Tree #	Tree Diameter (Up To 6 Trunks)							Adj.For 31"	Adj.For 24" Box	Adj.For 48" Box	(ATA x $66.00[24" Tree] or ATA x $63.60[48" Tree])							
	A	B	C	D	E	F	TA/ATA	Tree Or Equiv.	Replace.Tree	Replace.Tree	Species	Species %	Basic Value	Condition %	Location %	Tree Value	Damage %	TotalValue
68HV	40.0	8.0	6.0	0.0	0.0	0.0	1335.18	TRUE	TRUE	FALSE	Q. lobata	98	375	70	85		0	
								1200.81	1197.81	1197.81	$79,055.61	$77,474.49	$77,849.49	$54,494.65	$46,320.45	$46,320.45	$0.00	$46,320.45
69V	28.0	8.0	0.0	0.0	0.0	0.0	666.02	FALSE	TRUE	FALSE	Q. lobata	98	375	90	85		0	
								666.02	663.02	663.02	$43,759.13	$42,883.94	$43,258.94	$38,933.05	$33,093.09	$33,093.09	$0.00	$33,093.09
70V	17.0	15.0	15.0	15.0	10.0	0.0	835.66	TRUE	TRUE	FALSE	Q. lobata	98	375	80	85		0	
								817.06	814.06	814.06	$53,727.80	$52,653.25	$53,028.25	$42,422.60	$36,059.21	$36,059.21	$0.00	$36,059.21
71V	15.0	11.0	11.0	10.0	0.0	0.0	445.32	FALSE	TRUE	FALSE	Q. lobata	98	375	80	85		0	
								445.32	442.32	442.32	$29,193.15	$28,609.28	$28,984.28	$23,187.43	$19,709.31	$19,709.31	$0.00	$19,709.31
72V	16.0	15.0	12.0	11.0	6.0	0.0	614.18	FALSE	TRUE	FALSE	Q. lobata	98	375	80	85		0	
								614.18	611.18	611.18	$40,337.94	$39,531.18	$39,906.18	$31,924.94	$27,136.20	$27,136.20	$0.00	$27,136.20
73V	33.0	0.0	0.0	0.0	0.0	0.0	855.30	TRUE	TRUE	FALSE	Q. lobata	98	375	90	85		0	
								835.09	832.09	832.09	$54,917.61	$53,819.26	$54,194.26	$48,774.83	$41,458.61	$41,458.61	$0.00	$41,458.61
75HV	35.0	0.0	0.0	0.0	0.0	0.0	962.11	TRUE	TRUE	FALSE	Q. lobata	98	375	70	85		0	
								928.13	925.13	925.13	$61,058.25	$59,837.09	$60,212.09	$42,148.46	$35,826.19	$35,826.19	$0.00	$35,826.19
82L	18.0	18.0	0.0	0.0	0.0	0.0	508.94	FALSE	TRUE	FALSE	Q. agrifolia	95	375	90	85		0	
								508.94	505.94	505.94	$33,391.88	$31,722.29	$32,097.29	$28,887.56	$24,554.42	$24,554.42	$0.00	$24,554.42
83V	19.0	0.0	0.0	0.0	0.0	0.0	283.53	FALSE	TRUE	FALSE	Q. lobata	98	375	90	85		0	
								283.53	280.53	280.53	$18,514.88	$18,144.58	$18,519.58	$16,667.62	$14,167.48	$14,167.48	$0.00	$14,167.48
84V	22.0	14.0	0.0	0.0	0.0	0.0	534.07	FALSE	TRUE	FALSE	Q. lobata	98	375	90	85		0	
								534.07	531.07	531.07	$35,050.64	$34,349.63	$34,724.63	$31,252.16	$26,564.34	$26,564.34	$0.00	$26,564.34

Most commonly available replacement tree =
24" box @ $375.00 ($200 [cost of tree]+ $175 [cost of installation]) =
2" dia. tree (3 sq. in.) =
$200.00 divided by 3 sq.in. = $66.00
48" box @ $1800.00 ($900 [cost of tree]+ $900 [cost of installation]) =
6" dia. tree (28.3 sq. in.) =
$1800.00 divided by 28.3 sq.in. = $63.60

Total Valuation	**$304,889.30**
Total Damage Valuation	**$0.00**
Total Remaining Value	**$304,889.30**

PREPARED BY: ROBERT W. WALLACE
TREE LIFE CONCERN, INC.

Tree #	Tree Diameter (Up To 6 Trunks)							Adj.For 31"	Adj.For 24" Box	Adj.For 48" Box	(ATA x $66.00[24" Tree] or ATA x $63.60[48" Tree])							
	A	B	C	D	E	F	TA/ATA	Tree Or Equiv.	Replace.Tree	Replace.Tree	Species	Species %	Basic Value	Condition %	Location %	Tree Value	Damage %	TotalValue
85V	18.0	0.0	0.0	0.0	0.0	0.0	254.47	FALSE	TRUE	FALSE	Q.lobata	98	375	90	85		0	
								254.47	251.47	251.47	$16,596.94	$16,265.00	$16,640.00	$14,976.00	$12,729.60	$12,729.60	$0.00	$12,729.60
86HV	37.0	0.0	0.0	0.0	0.0	0.0	1075.21	TRUE	TRUE	FALSE	Q.lobata	98	375	90	85		0	
								1018.49	1015.49	1015.49	$67,022.01	$65,681.57	$66,056.57	$59,450.91	$50,533.28	$50,533.28	$0.00	$50,533.28
87V	2.0	0.0	0.0	0.0	0.0	0.0	3.14	FALSE	TRUE	FALSE	Q.lob24"box@$375	0	375	90	100		0	
								3.14	0.14	0.14	$9.34	$0.00	$375.00	$337.50	$337.50	$337.50	$0.00	$337.50
0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	FALSE	FALSE	FALSE	0	0	0	0	0		0	
								0.00	0.00	0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	FALSE	FALSE	FALSE	0	0	0	0	0		0	
								0.00	0.00	0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	FALSE	FALSE	FALSE	0	0	0	0	0		0	
								0.00	0.00	0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	FALSE	FALSE	FALSE	0	0	0	0	0		0	
								0.00	0.00	0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	FALSE	FALSE	FALSE	0	0	0	0	0		0	
								0.00	0.00	0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	FALSE	FALSE	FALSE	0	0	0	0	0		0	
								0.00	0.00	0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	FALSE	FALSE	FALSE	0	0	0	0	0		0	
								0.00	0.00	0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00

Most commonly available replacement tree =
24" box @ $375.00 ($200 [cost of tree]+ $175 [cost of installation]) =
2" dia. tree (3 sq. in.) =
$200.00 divided by 3 sq.in. = $66.00
48" box @ $1800.00 ($900 [cost of tree]+ $900 [cost of installation]) =
6" dia. tree (28.3 sq. in.) =
$1800.00 divided by 28.3 sq.in. = $63.60

Total Valuation	**$368,489.68**
Total Damage Valuation	**$0.00**
Total Remaining Value	**$368,489.68**

PREPARED BY: ROBERT W. WALLACE

TREE LIFE CONCERN, INC.

CANOPY SPREAD FORMS

CANOPY SPREAD AT THE DRIPLINE (feet)

Tree Number		N	N/W	W	S/W	S	S/E	E	N/E	
1		18	17	15	16	18	20	20	20	
2		24	21	9	12	20	30	31	29	
3	DEAD	31	22	39	23	34	44	28	36	
4		14	13	12	13	13	13	12	14	
5		37	41	29	28	26	27	7	28	
6		21	18	0	18	33	30	7	28	
7		8	14	15	15	13	8	7	3	
8		13	18	8	17	24	20	12	0	
9		20	24	23	17	9	17	21	22	
10		6	5	4	7	7	8	7	7	
11		5	6	7	8	8	7	4	7	
12		7	7	6	6	4	7	6	6	
13		7	20	18	41	38	28	31	30	
14		4	7	11	20	21	21	18	18	
15		3	7	18	12	13	31	28	21	

GROUND TO CANOPY HEIGHT

1		5	3	12	8	7	2			
2		5	4	18		18	8	6	5	
3	DEAD	6	25	10	30	5	1	14	6	
4		6	4	6	4			6		
5		5	20	2	3	4	2	25	7	
6		25	5		25	12		20	4	
7		7	8	7	6	4	1	2	1	
8		35	7	14	8	8	8			
9		6	28	18	7	14	3	13	7	
10		2	3	3	4	4	3	4	4	
11		5	5	6	4	2	3	6	2	
12		6	5	6	2	2	2	3	3	
13		15	6	6	1	2	4	2	6	
14		10	6	8	20	6	14	4	4	
15		12	9	25	15	18	5	12	4	

Robert W. Wallace

CANOPY SPREAD AT THE DRIPLINE (feet)

Tree Number		N	N/W	W	S/W	S	S/E	E	N/E	
16		25	28	29	24	12	13	28	17	
17		17	18	15	12	8	9	5	18	
18		8	6	6	10	7	7	7	12	
19		5	3	3	2	7	12	9	8	
20		7	6	4	3	4	4	4	4	
21		7	8	4	3	5	6	7	7	
22		13	7	7	12	11	11	6	7	
23		4	10	10	12	13	13	1	1	
24		14	14	15	14	13	7	10	12	
25		7	7	10	12	8	9	8	8	
26		4	7	8	8	7	7	3	4	
27		2	4	5	5	1	0	0	0	
28		0	0	6	7	6	4	3	1	
29		4	4	3	9	7	6	0	2	
30		0	0	13	4	0	0	0	0	

GROUND TO CANOPY HEIGHT

16		12	6	13	9	20	14	7	12	
17		7	7	15	10	14	6	8	6	
18		6	7	5	7	2	4	7	7	
19		12	7	7	7	5	12	6	10	
20		12	12	7	2	4	7	7	7	
21		5	6	5	4	3	1	1	5	
22		6	10	11	7	6	7	7	7	
23		5	10	11	12	5	6	0	5	
24		2	6	7	4	6	4	11	6	
25		6	7	6	8	4	6	7	5	
26		4	10	12	7	7	5	5	5	
27		2	3	10	10	1	0	0	0	
28		0	0	7	7	3	5	4	4	
29		5	5	1	6	6	3	0	5	
30		0	0	12	6	0	0	0	0	

Robert W. Wallace

CANOPY SPREAD AT THE DRIPLINE (feet)

Number		N	N/W	W	S/W	S	S/E	E	N/E	
31		15	13	12	13	14	20	18	12	
32		8	12	12	1	0	0	0	0	
33		6	20	18	16	15	7	10	7	
34		10	7	10	10	4	0	0	2	
35		10	8	10	7	5	4	6	17	
36		3	5	8	12	5	4	2	4	
37		8	9	12	13	13	12	9	9	
38		4	4	4	4	2	7	7	6	
39		7	7	7	7	7	7	7	7	
40		7	7	7	7	7	7	7	7	
41		7	7	8	6	13	8	12	13	
42		12	12	12	4	2	1	1	7	
43		8	5	6	6	7	8	6	0	
44		13	7	7	7	6	0	2	7	
45		7	7	7	6	6	6	7	8	

GROUND TO CANOPY HEIGHT

31		12	12	13	7	14	4	8	7	
32		7	9	12	5	0	0	0	0	
33		10	7	7	5	6	12	7	12	
34		5	10	5	12	5	0	0	5	
35		8	12	12	10	12	12	10	4	
36		1	12	10	12	4	3	2	3	
37		6	5	10	7	10	4	0	0	
38		3	3	2	3	1	2	4	3	
39		2	2	2	3	3	3	2	3	
40		2	3	3	3	3	3	3	2	
41		12	10	7	7	6	5	4	6	
42		1	8	12	7	5	1	1	1	
43		6	4	2	3	3	4	3	0	
44		5	10	12	12	8	0	8	3	
45		4	5	5	8	7	2	2	2	

Robert W. Wallace

CANOPY SPREAD AT THE DRIPLINE (feet)

Tree Number		N	N/W	W	S/W	S	S/E	E	N/E	
46		7	7	7	6	1	2	2	4	
47		4	7	12	12	13	12	10	6	
48		12	12	11	10	12	13	13	13	
49		8	8	7	6	5	11	7	6	
50		7	8	8	8	7	6	5	7	
51		1	7	7	6	5	4	3	2	
52		6	6	5	5	5	1	2	8	
53		8	7	7	7	6	7	8	7	
54		8	7	7	8	5	7	6	7	
55		7	7	6	5	4	4	6	5	
56		7	7	6	6	0	6	6	8	
57		8	7	7	7	7	7	7	7	
58		7	7	7	7	7	7	7	7	
59		31	23	25	27	24	28	33	28	
60		21	21	27	28	25	27	27	28	

GROUND TO CANOPY HEIGHT

46		3	3	3	3	1	2	2	1	
47		4	4	5	8	12	10	5	7	
48		7	12	5	12	12	12	7	7	
49		4	3	4	10	10	10	8	5	
50		3	4	6	2	3	4	6	7	
51			4	4	4	4	4	2	5	
52		3	7	10	10	8	7	10	10	
53		6	5	4	2	4	1	4	8	
54		7	4	4	3	4	5	6	7	
55		4	4	4	2	2	7	6	4	
56		2	2	2	4		4	3	6	
57		5	4	3	3	2	2	2	2	
58		4	3	5	3	3	2	2	2	
59		7	9	22	18	6	8		4	
60		7	7	8	7	7	1	2	4	

Robert W. Wallace

CANOPY SPREAD AT THE DRIPLINE (feet)

Tree Number		N	N/W	W	S/W	S	S/E	E	N/E	
61		15	10	11	12	12	10	10	12	
62		14	13	7	3	0	2	4	8	
63		7	12	8	8	11	8	8	7	
64		7	7	7	7	7	7	7	4	
65		26	21	21	20	18	17	7	7	
66		13	7	1	2	17	21	21	21	
67		12	16	14	17	18	17	16	13	
68		29	40	32	33	31	28	27	33	
69		31	24	27	21	16	18	23	31	
70		26	31	26	26	28	25	21	24	
71		14	14	14	12	15	15	17	13	
72		20	21	17	17	17	17	21	20	
73		23	25	25	27	27	30	24	17	
74		32	31	39	30	27	29	21	27	
75		7	17	24	31	36	24	17	17	

GROUND TO CANOPY HEIGHT

61		6	7	8	5	7	7	12	3	
62		7	7	14	15		5	4	6	
63		1	1	1	1	1	1	1	1	
64		1	1	1	1	2	2	2	4	
65		7	15	11	3	4	4	15	20	
66		8	12	12	12	6	4	5	5	
67		12	13	6	0	3	6	10	11	
68		8	0	1	5	14	10	6	4	
69		18	13	15	8	4	3	20	15	
70		2	2	4	8	6	5	4	4	
71		15	12	16	15	4	10	15	15	
72		6	4	24	14	6	15	14	3	
73		35	35	35	20	0	2	18	20	
74		3	8	15	12	18	4	7	15	
75		30	30	30	25	14	25	18	8	

Robert W. Wallace

CANOPY SPREAD AT THE DRIPLINE (feet)

Tree Number		N	N/W	W	S/W	S	S/E	E	N/E	
76		24	20	21	14	17	21	20	22	
77		27	21	22	21	24	22	26	20	
78		22	15	23	24	16	21	20	13	
79		31	31	27	32	31	27	20	18	
80		27	28	25	18	18	20	31	27	
81	Dead									
82		25	17	12	17	21	21	20	17	
83		18	8	7	6	6	13	21	18	
84		17	24	13	14	13	17	26	19	
85		21	15	15	14	8	17	18	14	
86		30	21	21	27	23	20	29	30	

GROUND TO CANOPY HEIGHT

76		2	8	18	4	6	4	12	14	
77		12	4	0	2	0	15	12	12	
78		25	0	5	13	4	8	4	0	
79		28	17	14	24	18	10	6	6	
80		7	7	8	5	6	12	0	13	
81	Dead									
82		5	7	3	8	4	0	0	8	
83		24	8	12	10	8	8	15	30	
84		30	25	30	30	25	15	14	15	
85		12	14	15	20	18	12	4	15	
86		4	10	3	22	12	15	16	30	

Robert W. Wallace

PHOTOGRAPHS

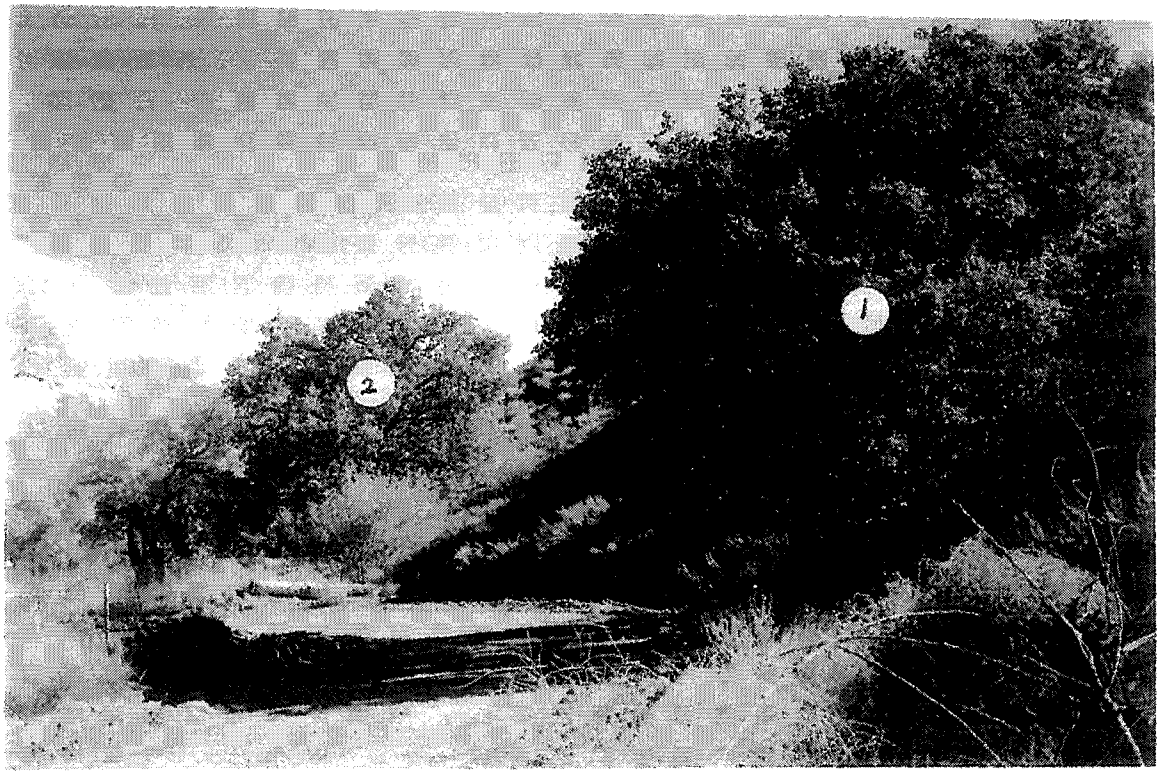


Photo #1 – Looking north from edge of dirt road

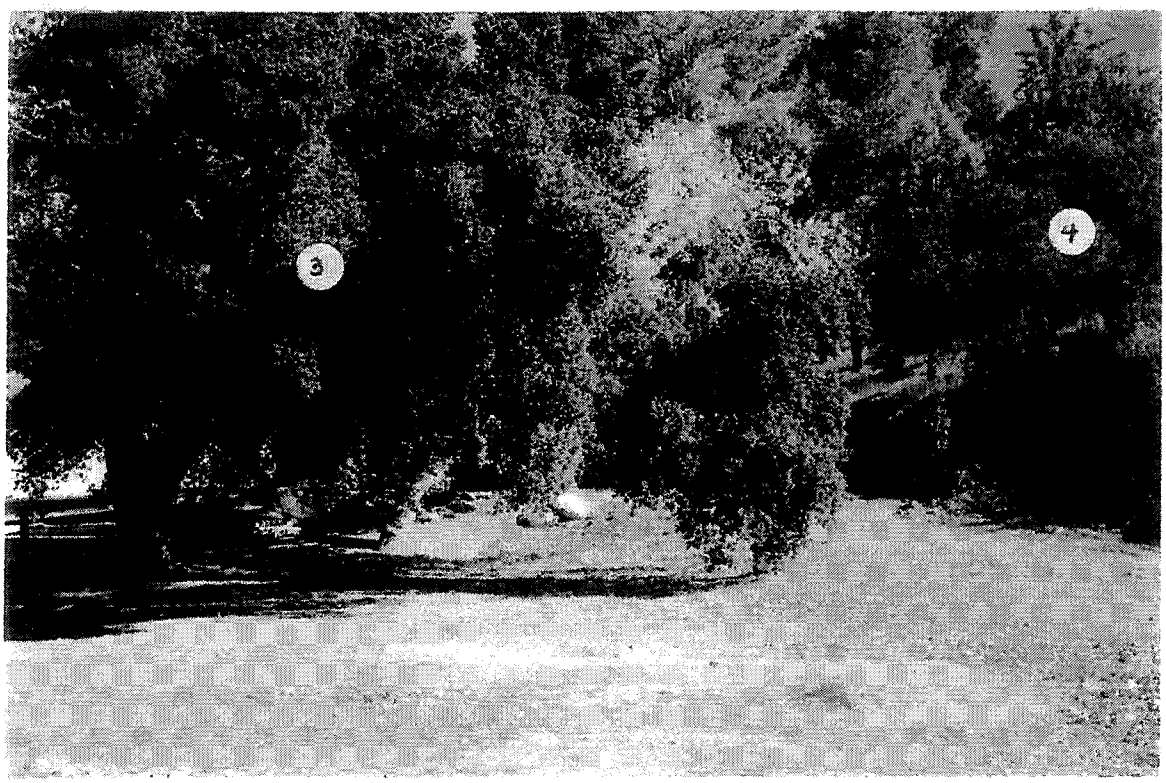


Photo #2 – Looking northeastward

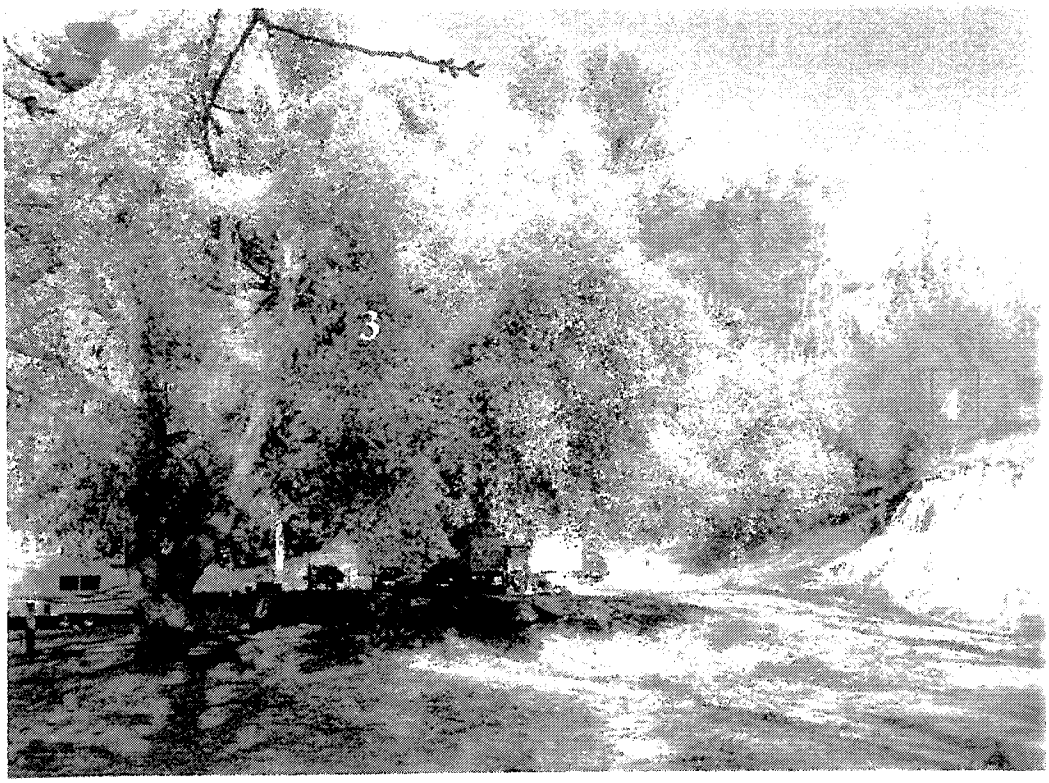


Photo #2A - Looking northeastward -
Oak recently died (likely from Oak Root Fungus)

Photo #2B - Dead zylem and sapwood at base of oak exposed by chisel

Photo #3 – Looking east at scrub oak

Photo #4 – Looking northeastward

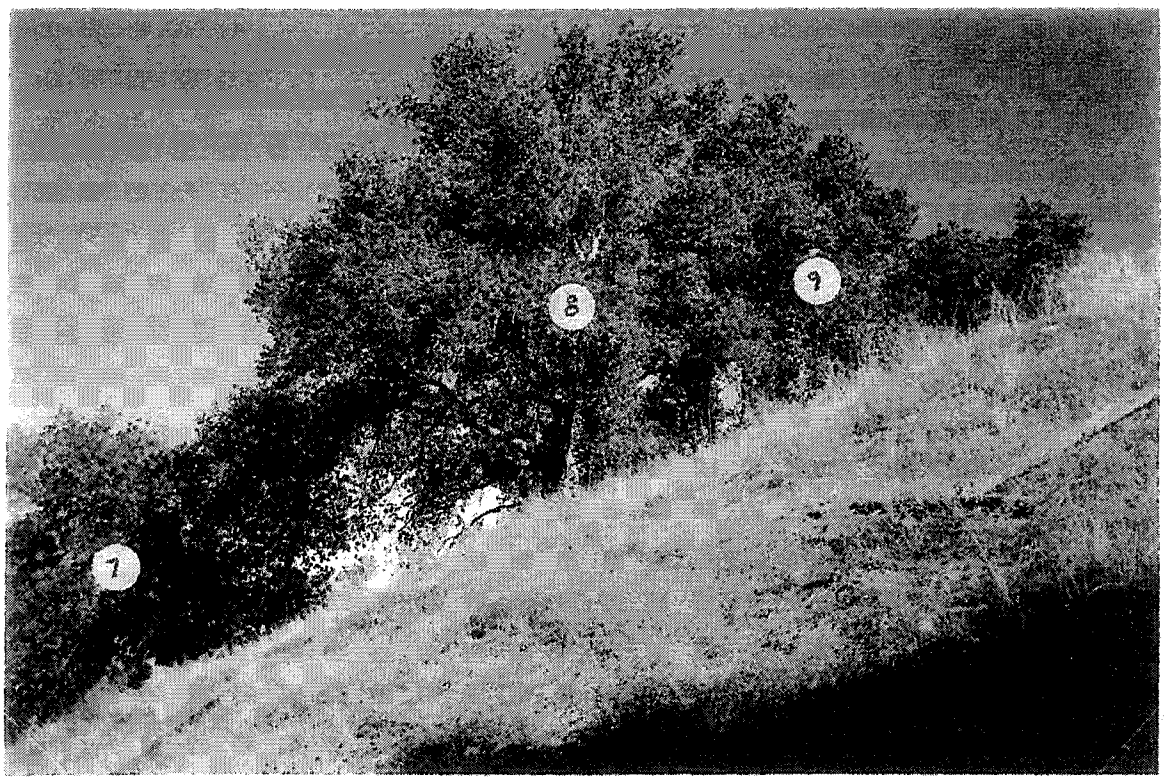


Photo #5 – Looking north

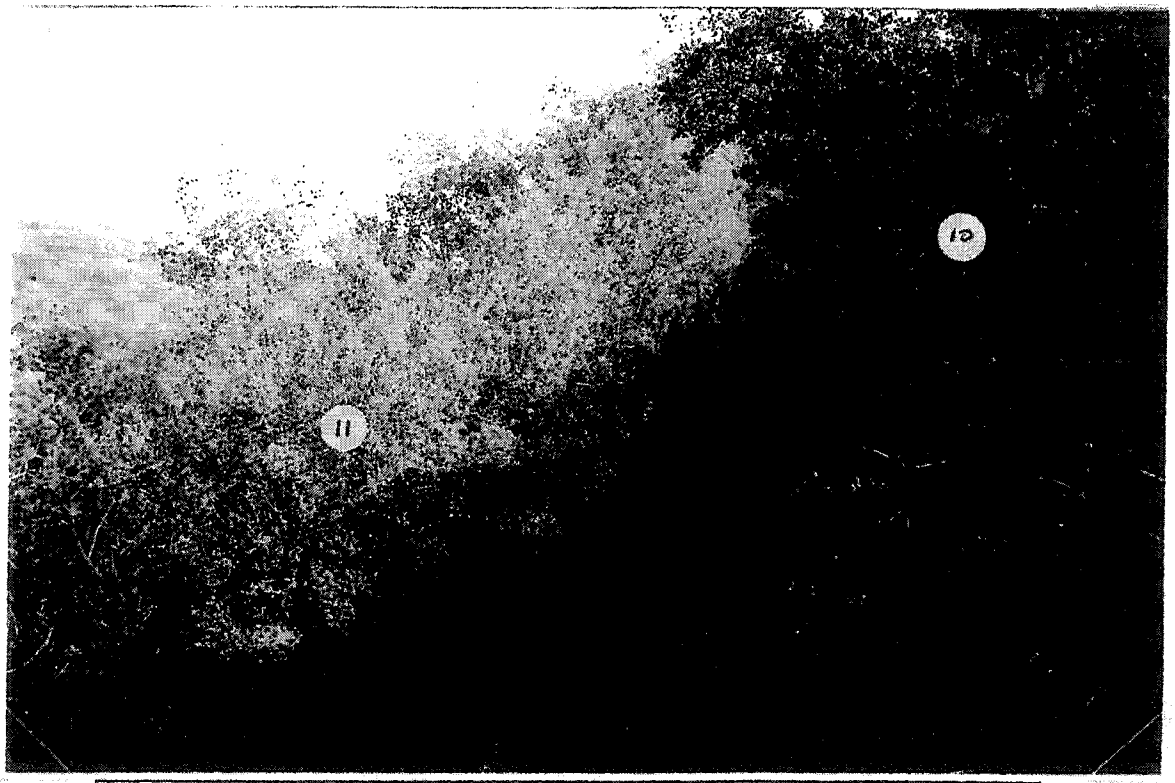


Photo #6 – Looking northeastward

Photo #7– Looking northward

Photo #8 – Looking northward

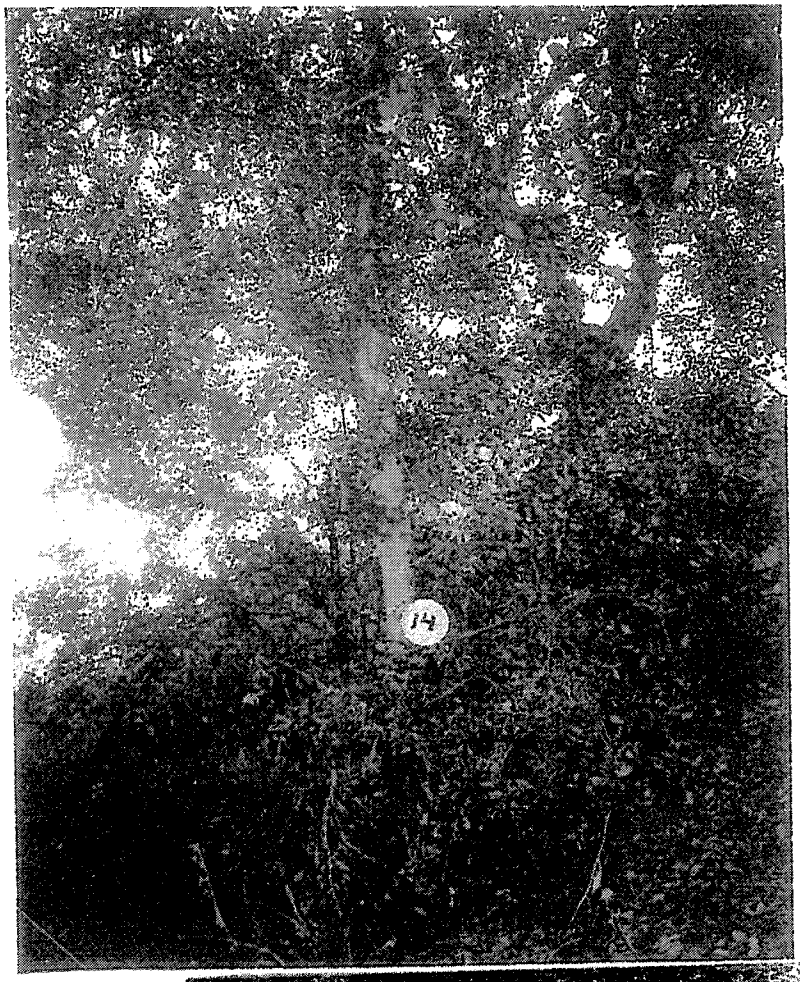


Photo # 9 – Looking northward

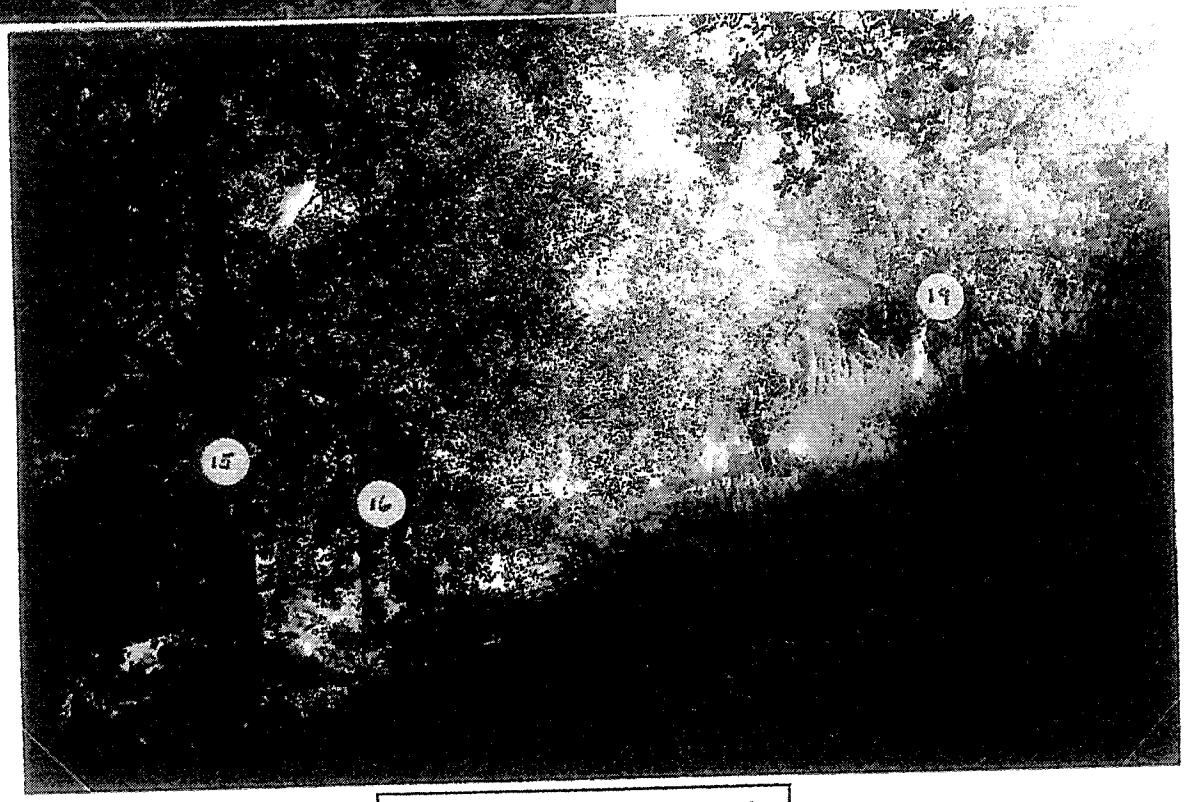


Photo # 10 –Looking northward

Photo #11– Looking northward

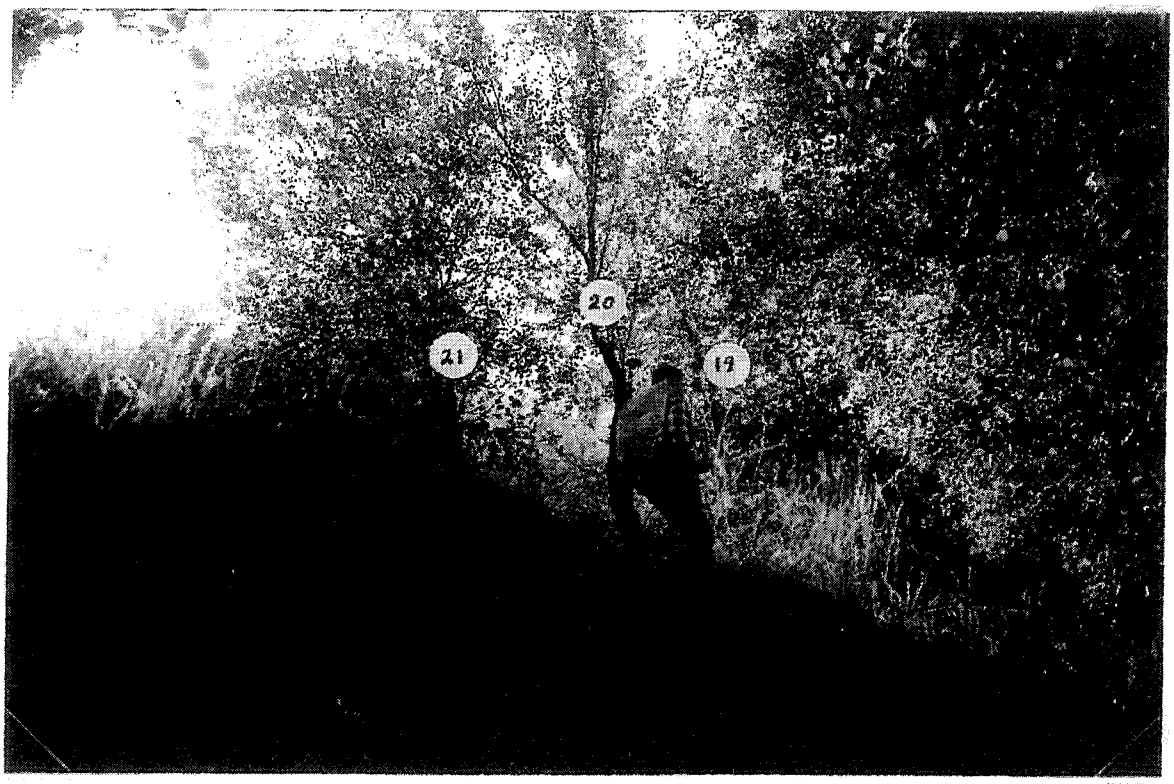


Photo #12 – Looking southeast

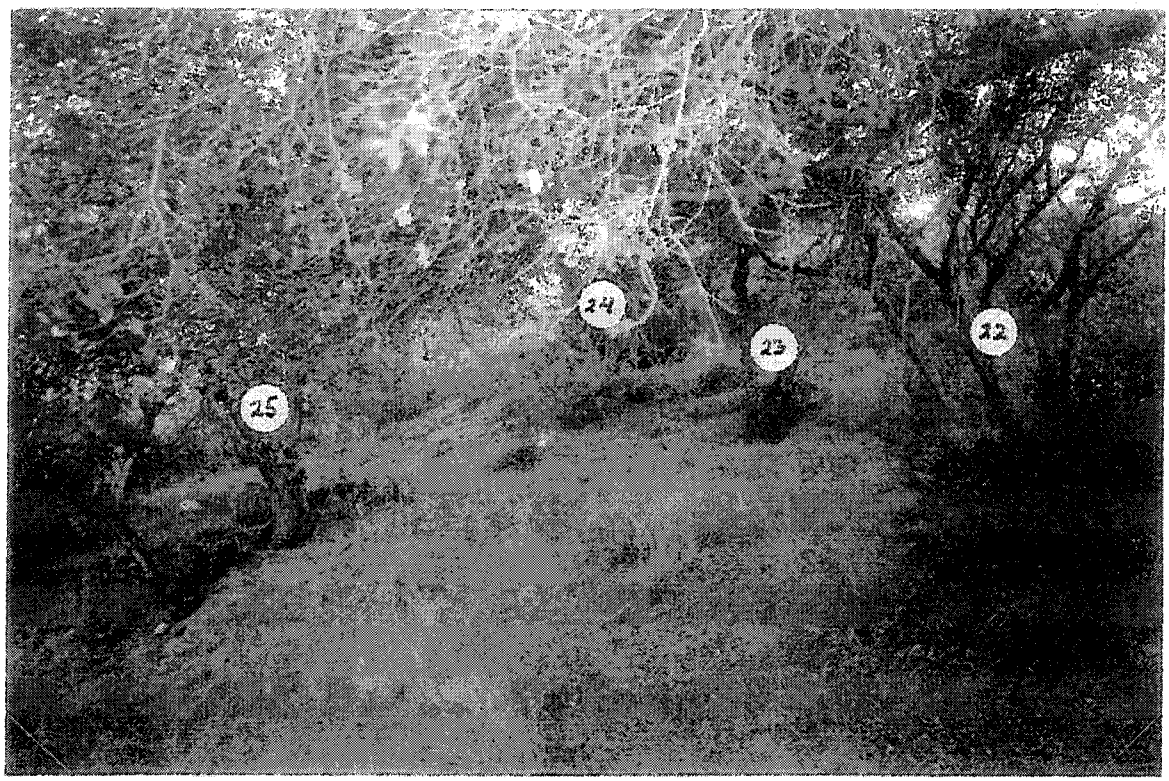


Photo #13– Looking eastward

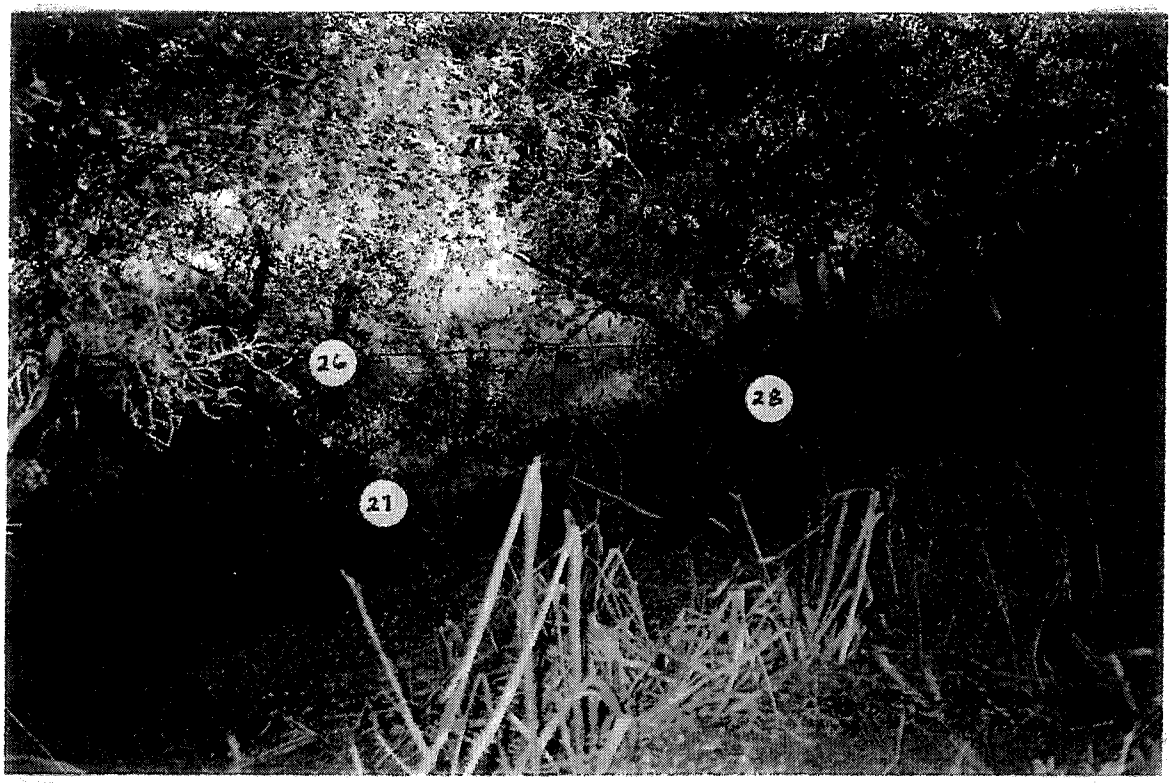


Photo #14 – Looking northward

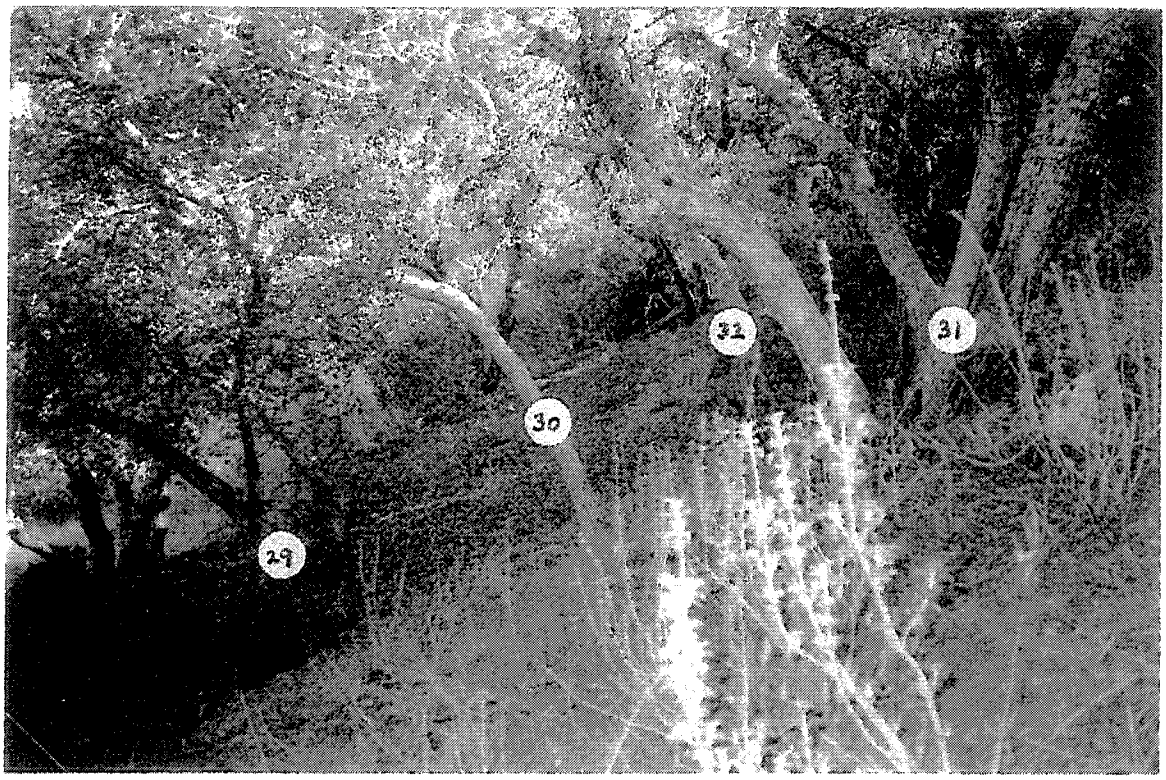


Photo #15– Looking northward

Photo #16 – Looking northeast

Photo #17– Looking eastward

Photo #18 – Looking southward

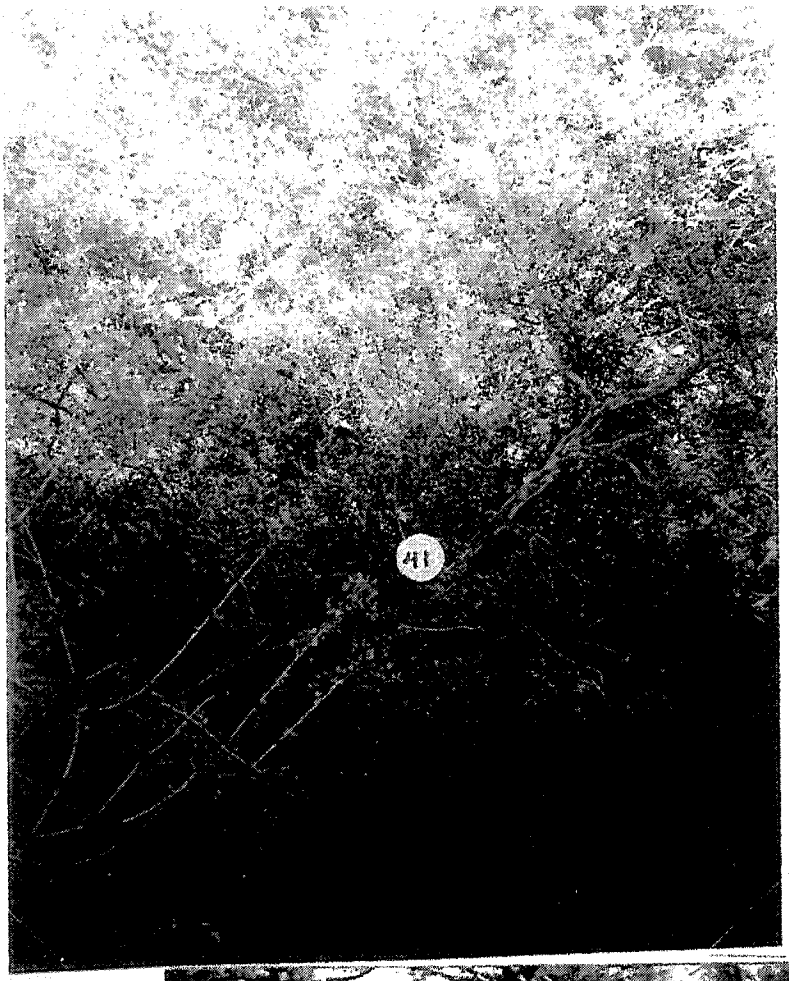


Photo # 19 – Looking northwestward

Photo #20 – Looking eastward

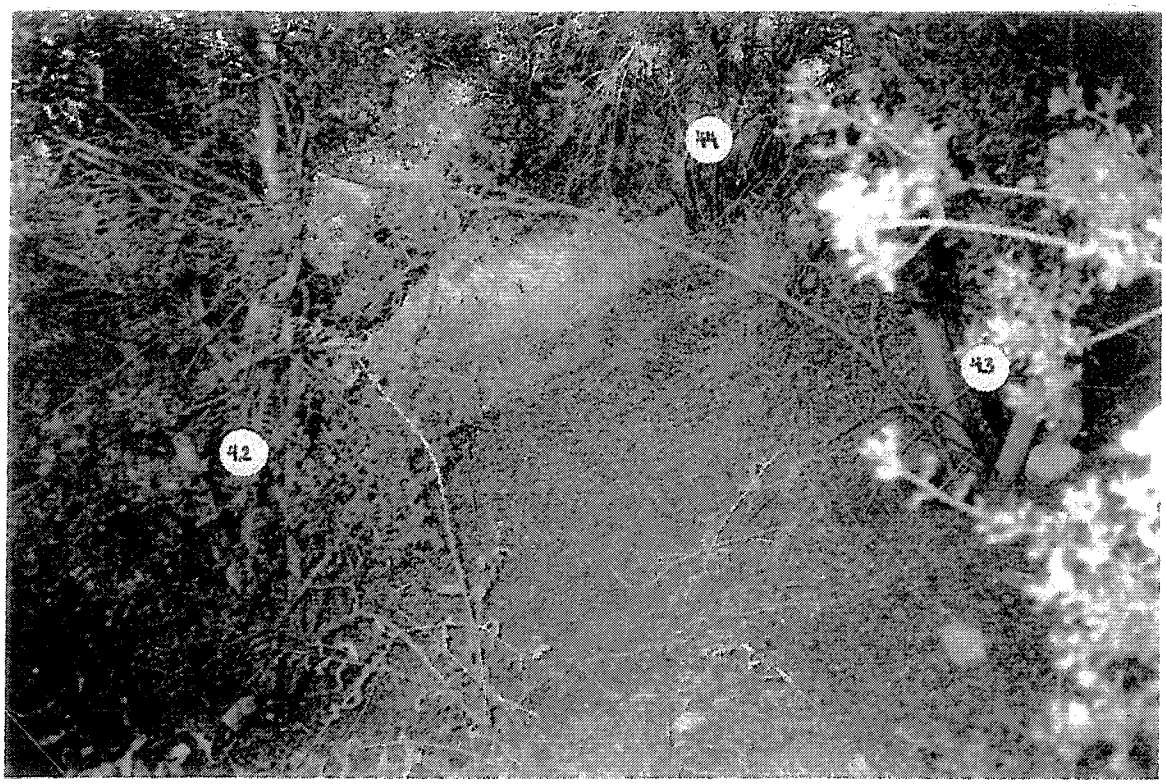


Photo #21– Looking northward

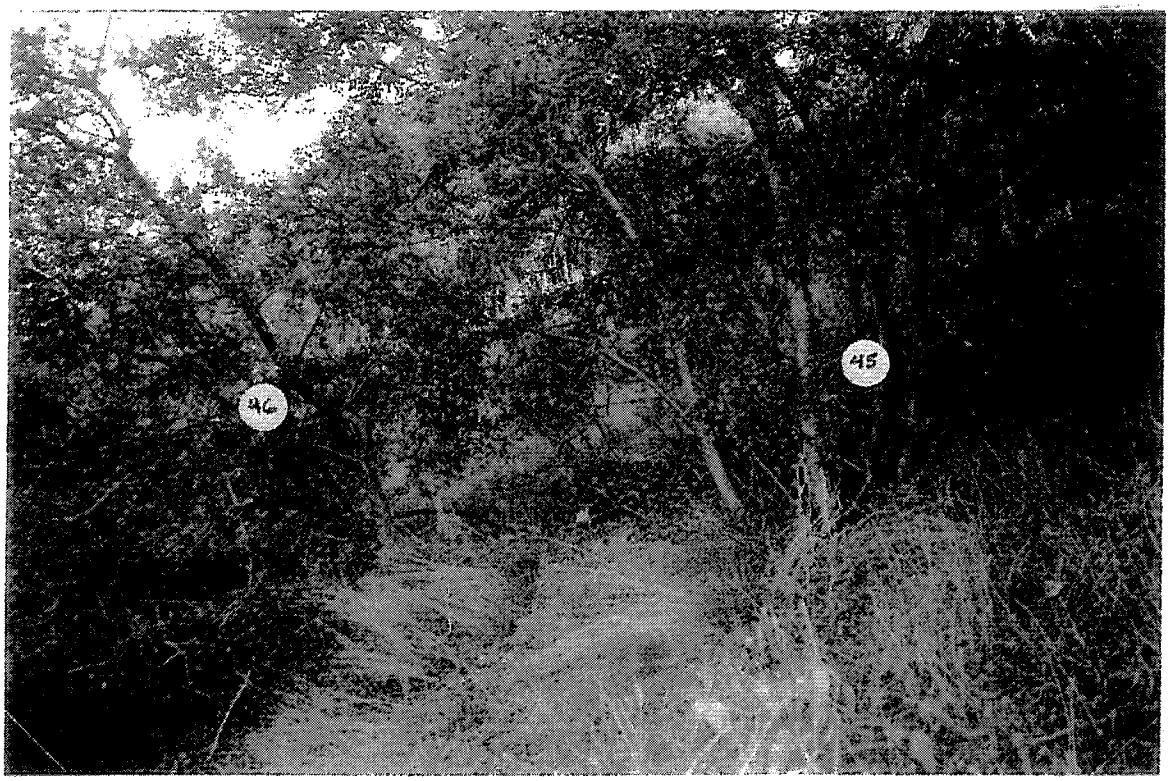


Photo #22 – Looking eastward

Photo #23– Looking eastward

Photo #24 – Looking eastward

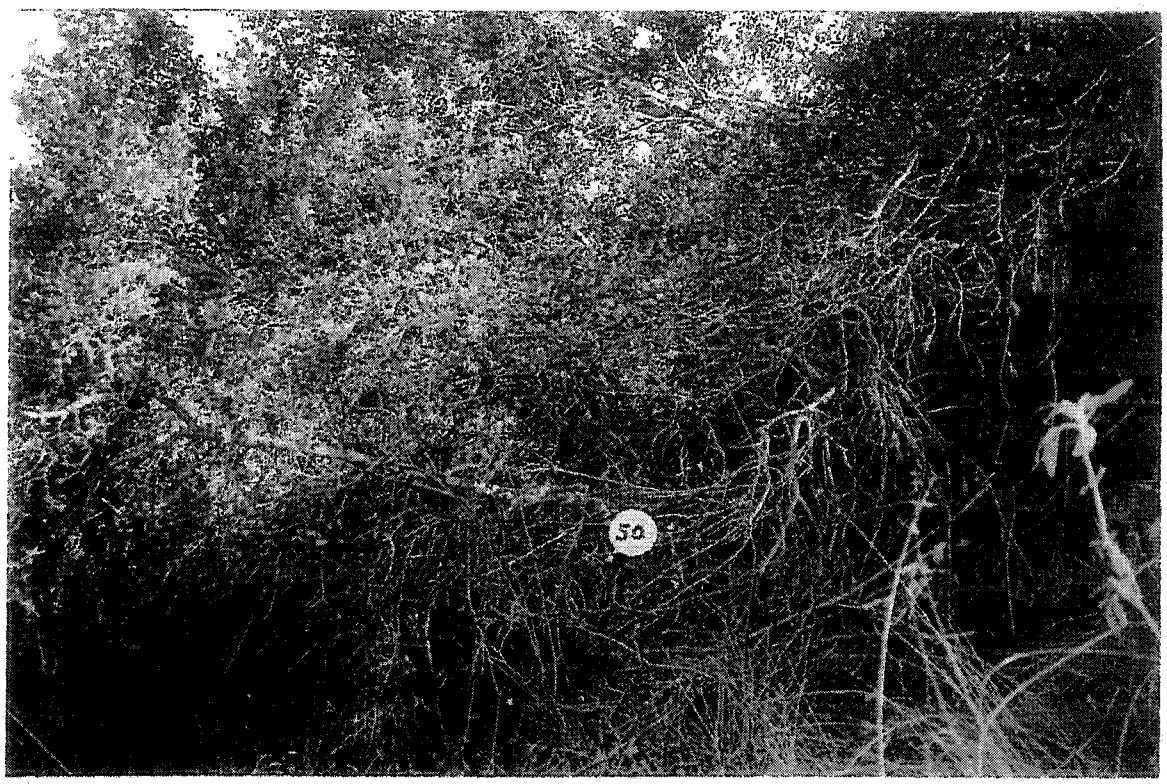


Photo #25– Looking northeastward

Photo #26 – Looking eastward

Photo #27– Looking northward

Photo #28 – Looking eastward

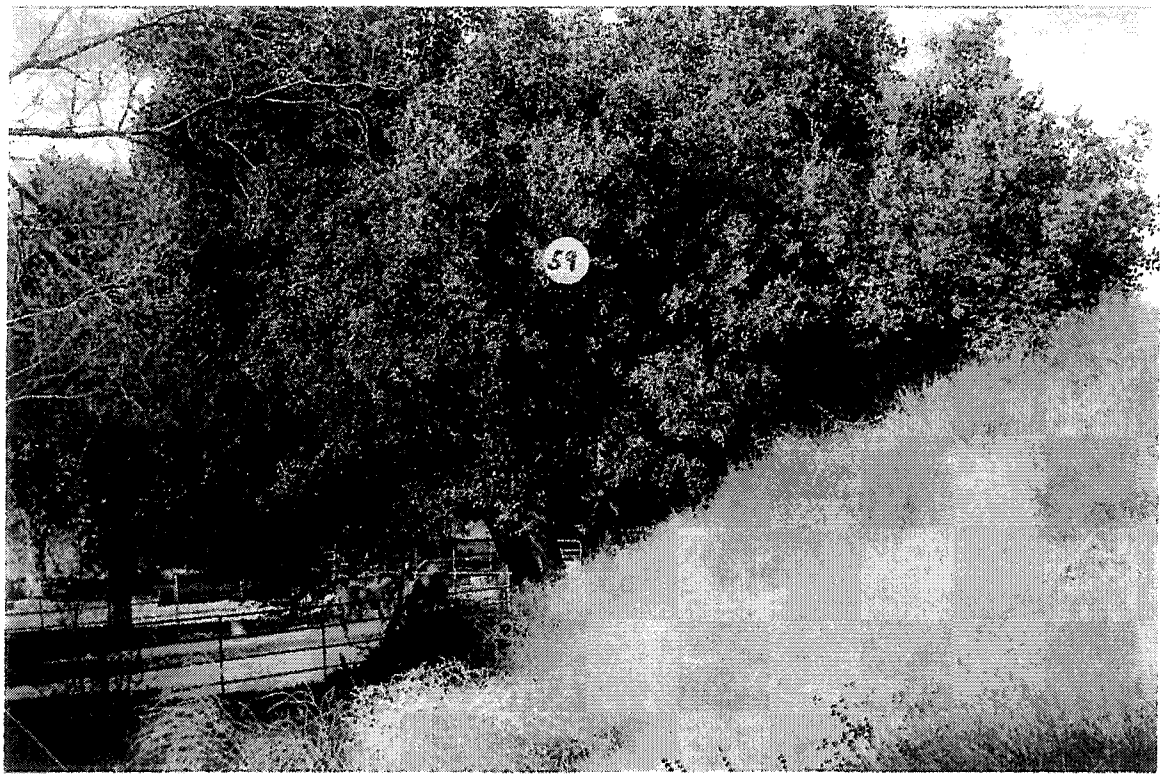


Photo #29– Looking northward

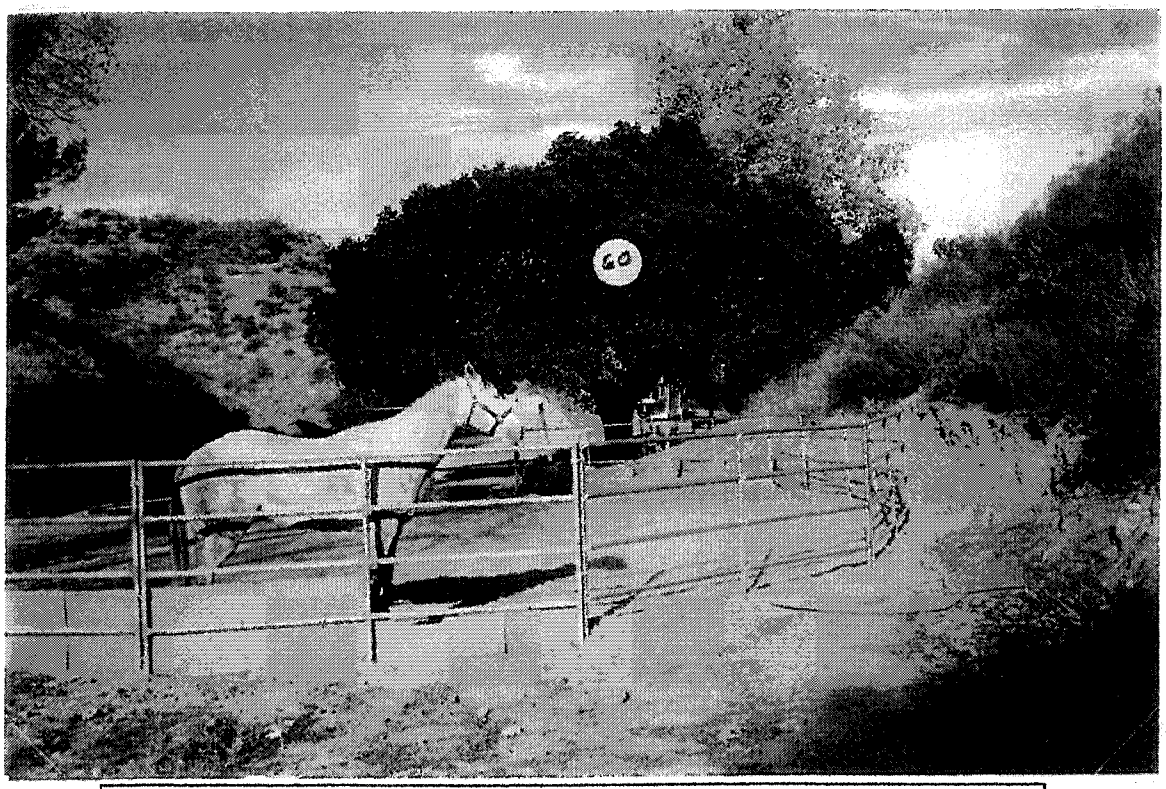


Photo #30 – Looking north

Photo #31 – Looking northward

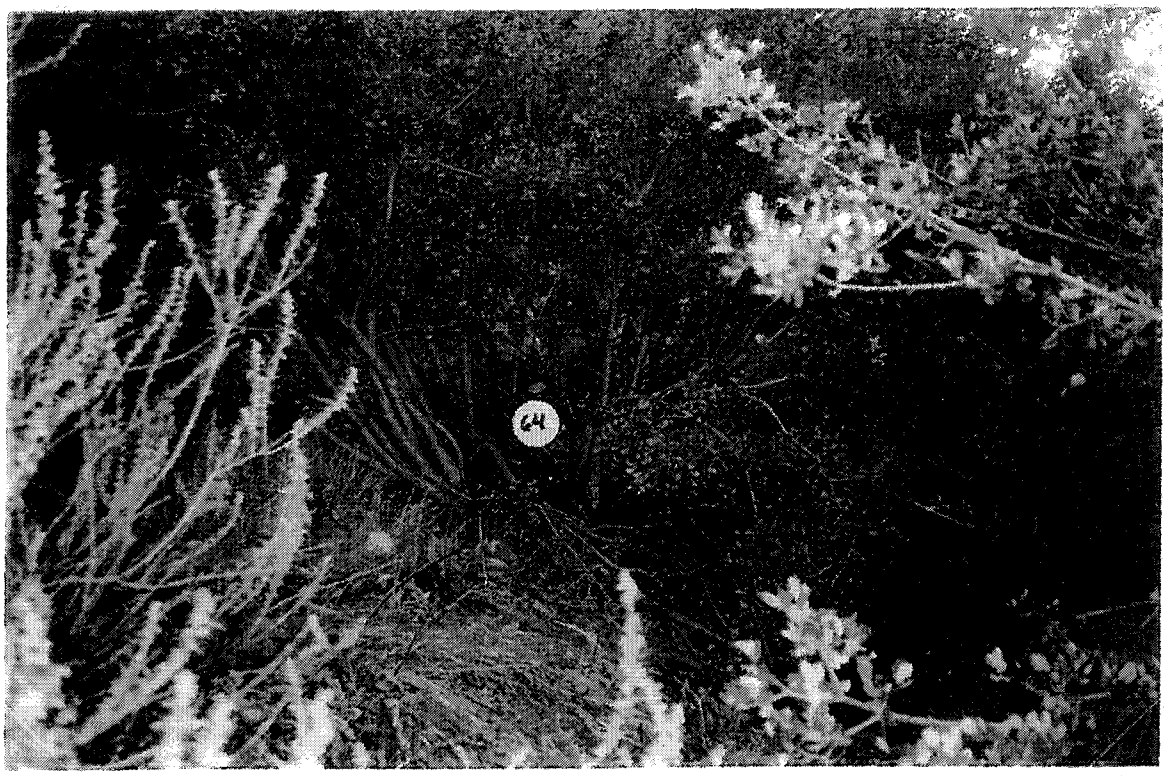


Photo #32 – Looking southwest

Photo #33 – Looking northward

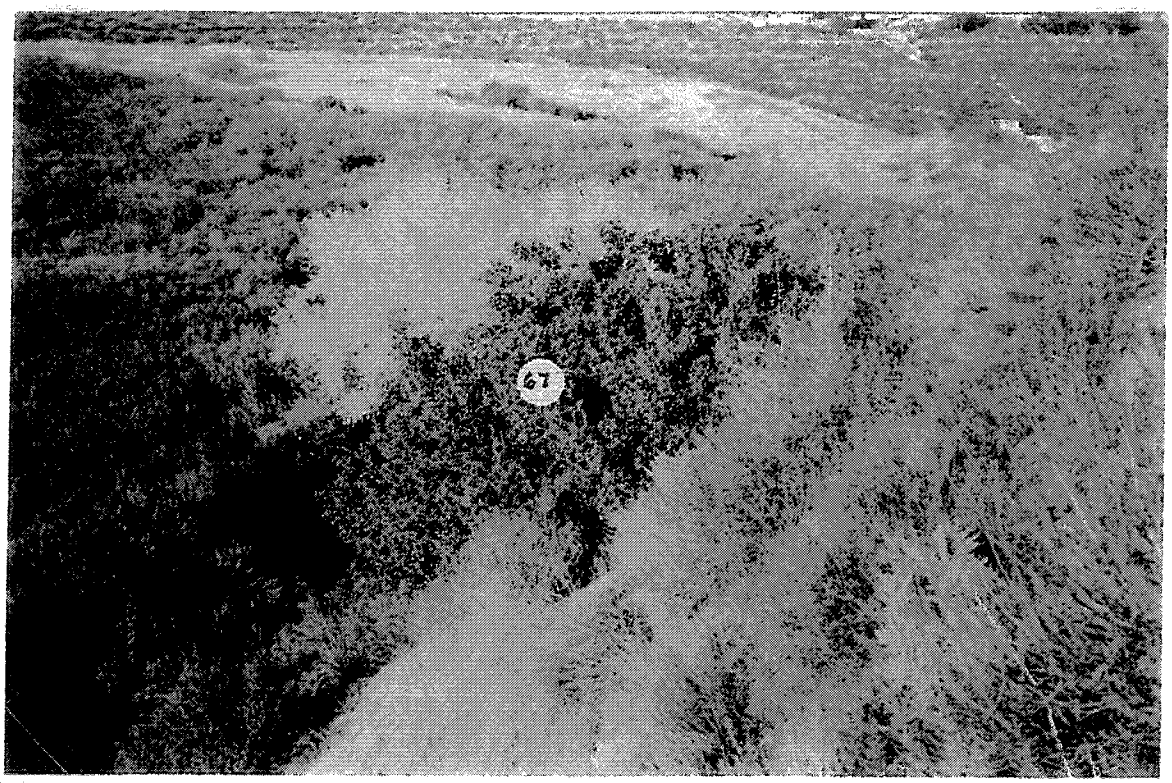


Photo #34 – Looking northeast

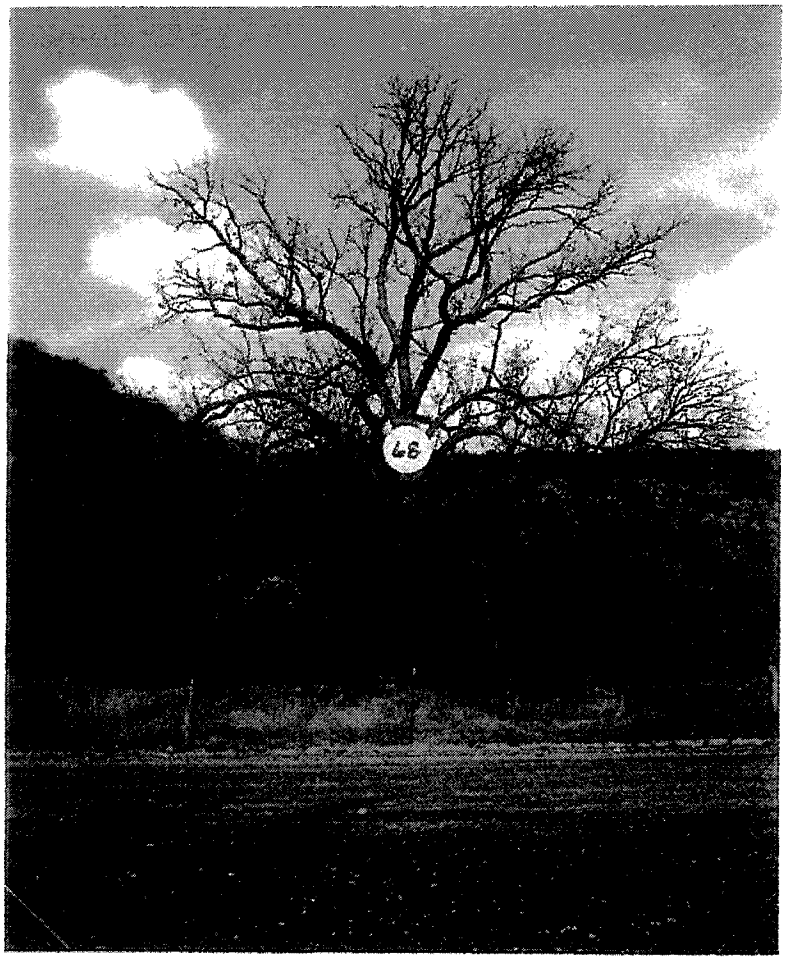


Photo #35 – Looking northward

Photo #36 – Looking eastward at Valley oaks

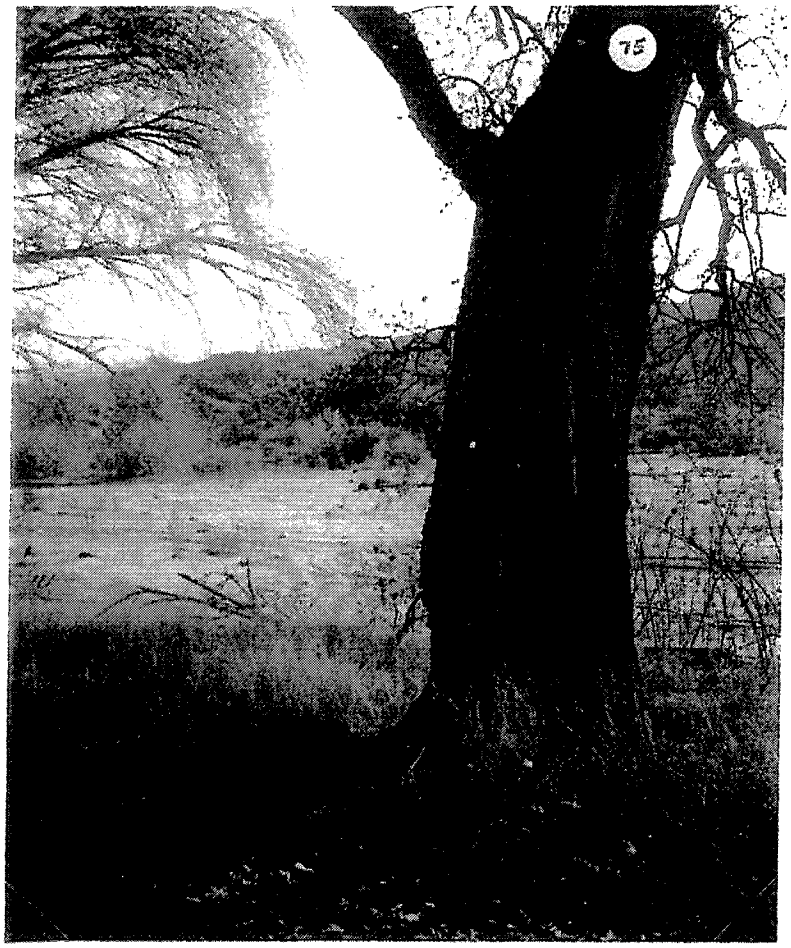


Photo #37 – Looking southeast

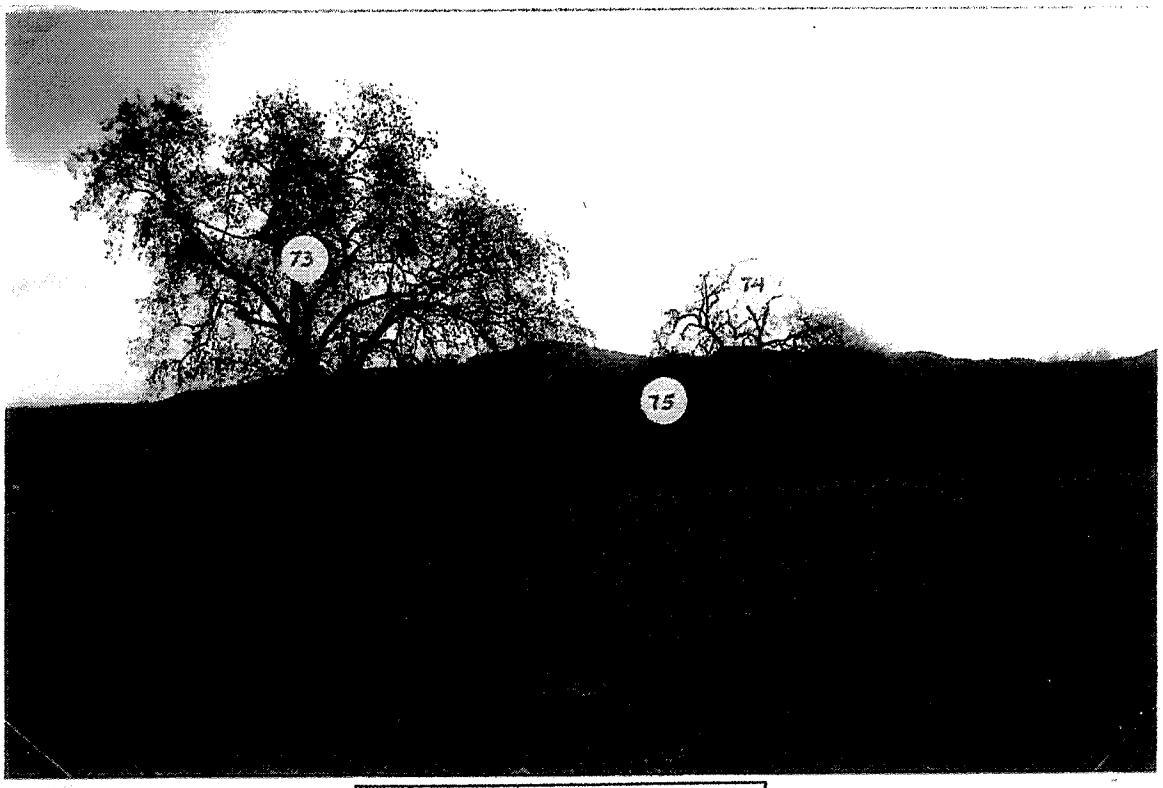


Photo #38 – Looking southward at Valley oaks

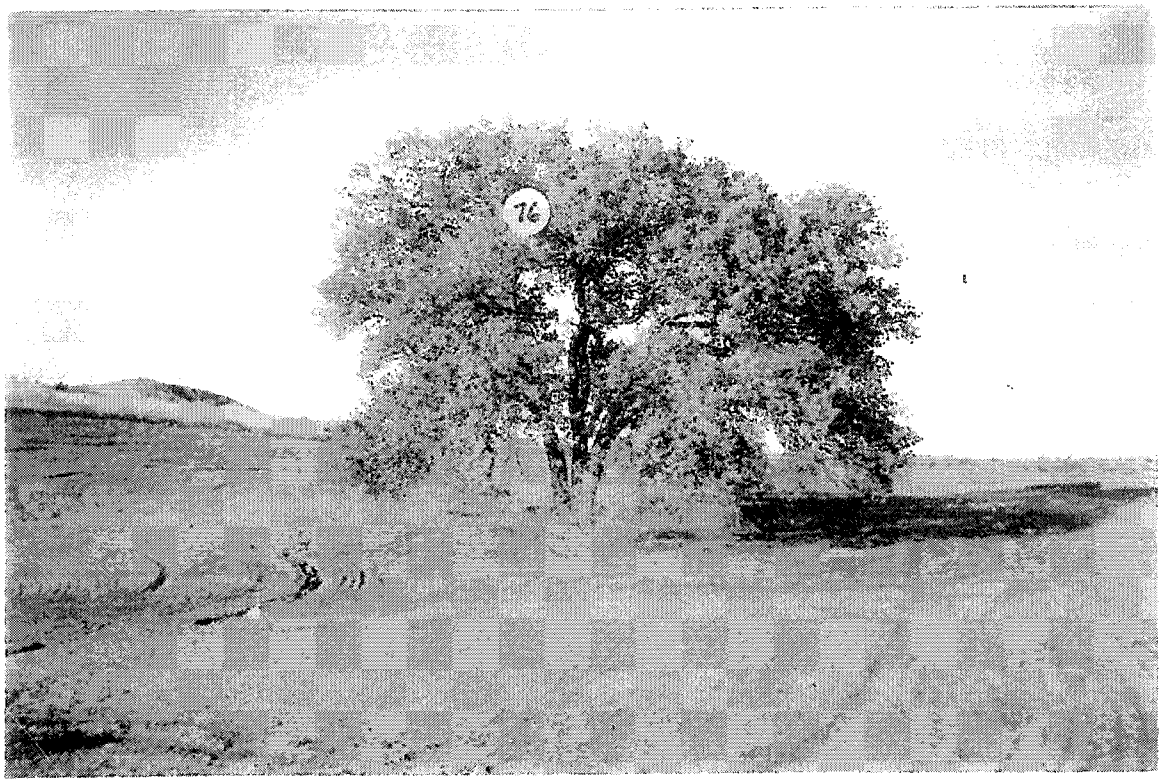


Photo #39 – Looking northward at single Blue oak (*Quercus douglasii*) on this site

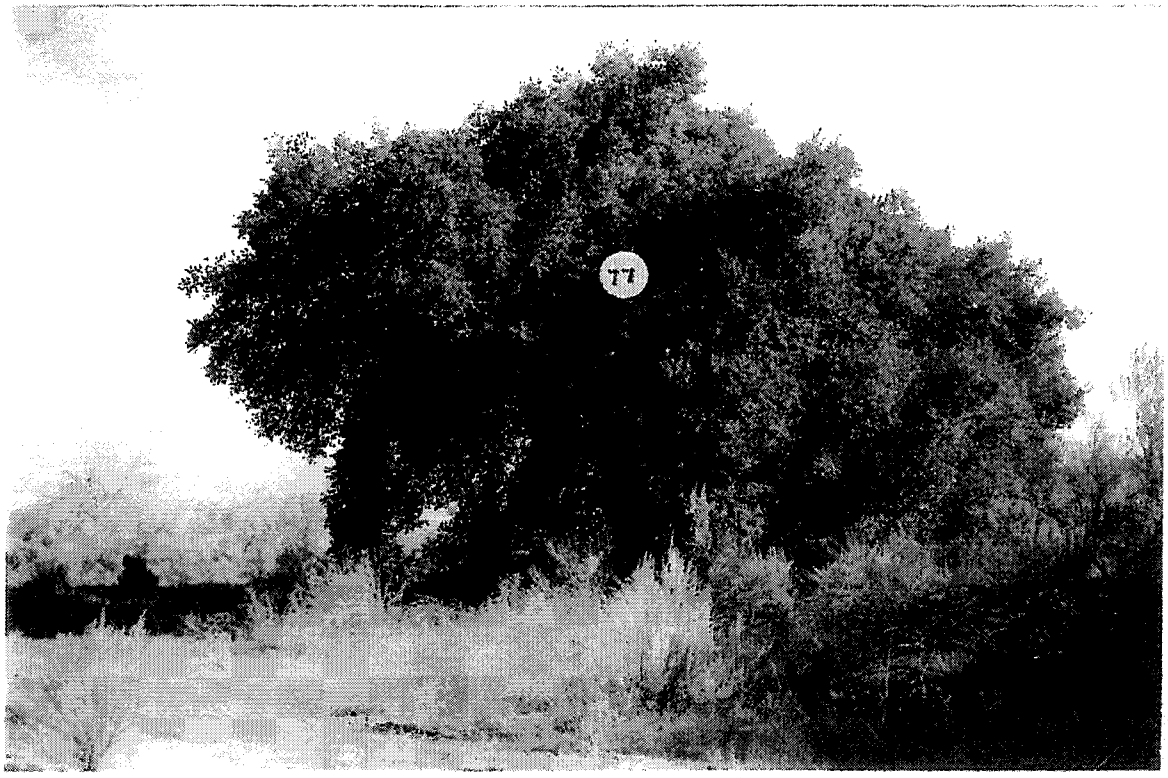


Photo #40 – Looking southeast

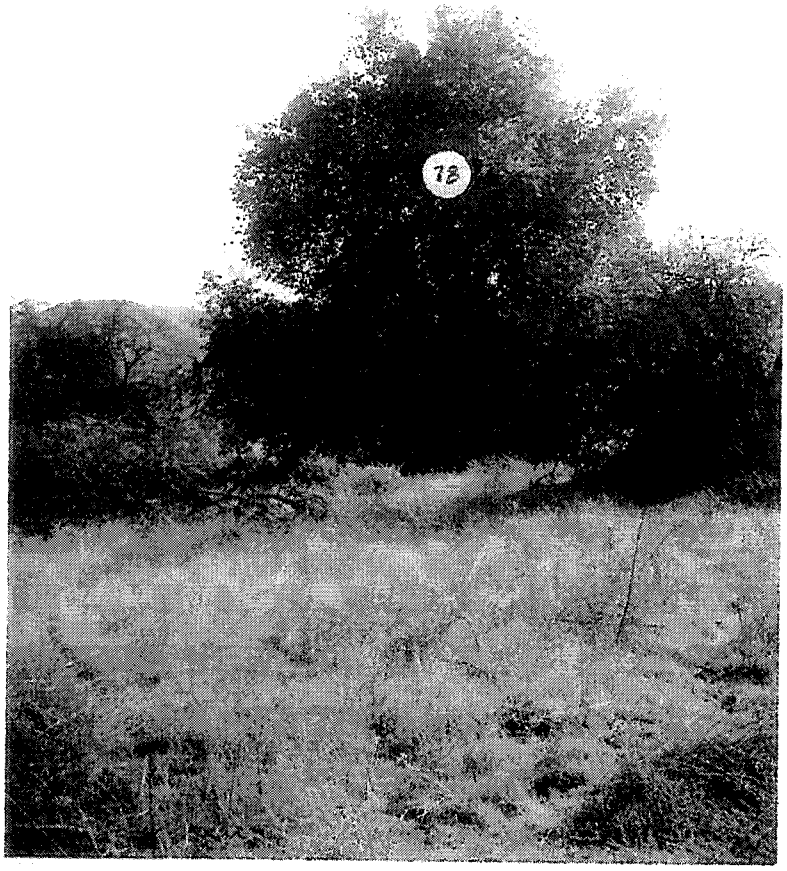


Photo #41 – Looking south

Photo #42 – Looking southward at Live oak growing along dry creekbed

Photo #43 – Looking southward at exposed root system (tree is likely to uproot)

Photo #44 – Looking northwest

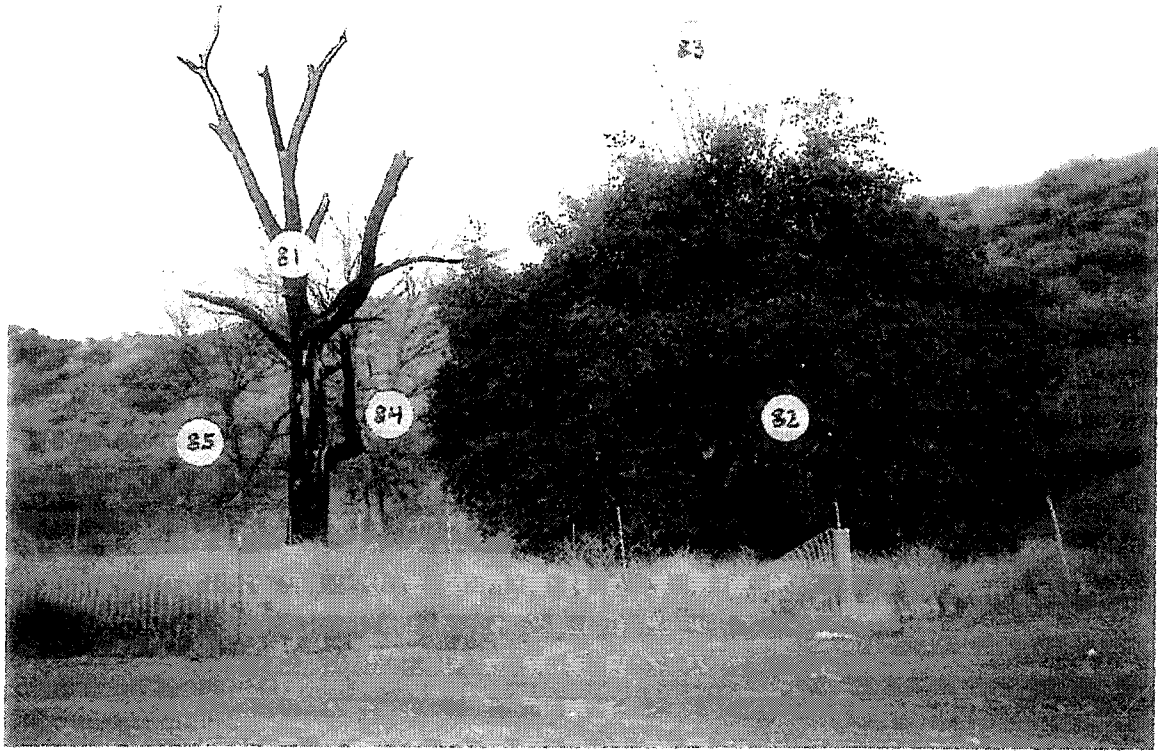


Photo #45 – Looking northeast

Photo #46 – Looking eastward at two Valley oaks (one large and one small)

LAB RESULTS (OAK #3) AND ARTICLES ON CARE OF OAKS

SOIL AND PLANT LABORATORY, INC.

Orange Office
Path No. 246
Lab No. 46211
April 15, 2003

Tree Life Concern, Inc.
Attn: Bob Wallace
8458 Eton Avenue
Canoga Park, CA 91304

PATHOLOGY RESULTS: QUERCUS AGRIFOLIA **(OAK #3)**

Examination and culturing of the plant specimen(s) delivered to our laboratory on 3/31/03 found the following microorganisms.

Tissues examined and cultured: portion of punky bark/wood with white mycelium present

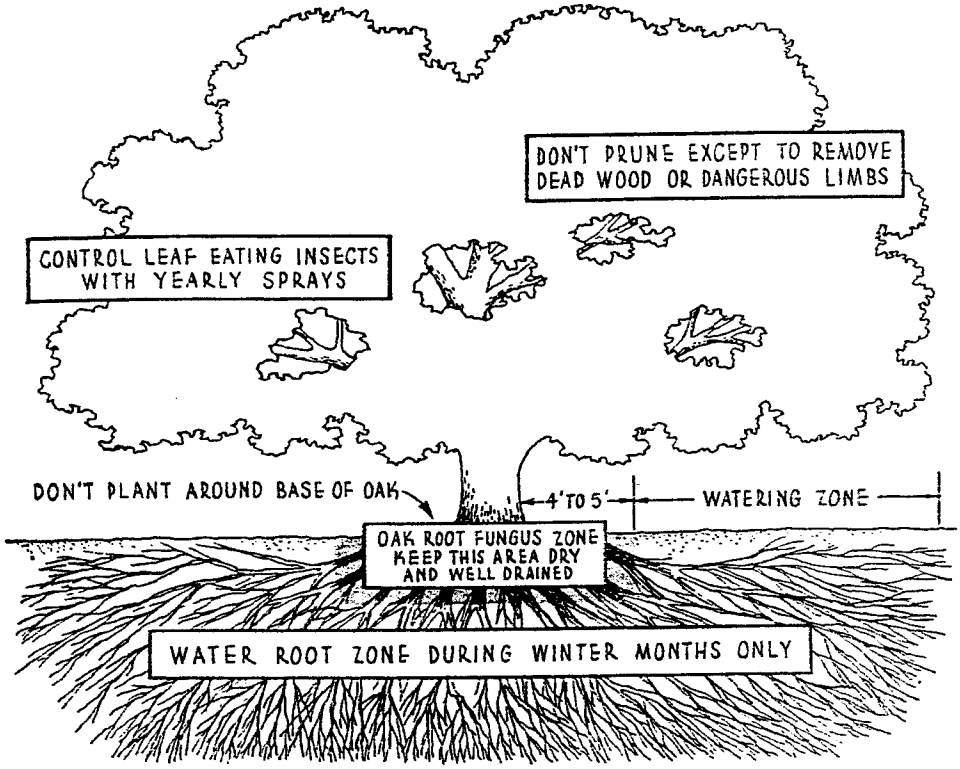
Pathogens (disease causing organisms) isolated: an unknown Basidiomycete fungus was recovered from the bark/wood sample. Armillaria was not isolated from the samples.

Due to the fact that it is very difficult to get Basidiomycete fungi to produce spores/fruiting bodies in artificial culture, we were unable to determine the identity of this fungus. Visual characters noted in the samples and photographs provided, as well as the description of the problem in the field, lead me to suspect this might be the same fungus noted by Bob Hansen. In both cases it appears that a grade change has predisposed the trees to infection, which culminates in the eventual decline of the oak. If anything, this clearly demonstrates the severe deleterious effects of grade changes on oaks.

Please call if you have any questions.

Paul F. Santos, M.S.
Plant Pathologist

P.O. Box 6566, Orange, California 92863-6566 (714) 282-8777 • FAX (714) 282-8575
P.O. Box 153, Santa Clara, California 95052-0153 (408) 727-0330 • FAX (408) 727-5125
P.O. Box 1648, Bellevue, Washington 98009-1648 (425) 746-6665 • FAX (425) 562-9531



The handsome *coast live oak is an asset to your property, worthy of a little extra care*

SOUTHERN CALIFORNIA PROBLEM . . .

How to keep a live oak alive

Although it has proved to be one of our most picturesque garden trees, the coast live oak poses some tricky problems of garden care. Now that Southern California is going into the tenth year of a long-term drought, the decline and loss of these oaks in gardens calls for some review of the rules for their care.

Watch for oak root fungus

Inspect your oak tree for oak root fungus each year. It prevails in many areas. It's an easy disease to identify and, if you do find it on your tree, there are ways to stop it. If it hasn't gone too far, you can take steps to prevent further damage.

If clusters of mushrooms appear at the base of the tree in late fall and winter, these usually indicate an advanced stage of the disease. Cleavage lines in the bark at the base of the trunk are a strong indication of severe damage. You can also identify this disease by the wide, cream colored, fan-shaped fungus layer that grows between the bark and wood.

To determine which are the damaged areas, you have to cut the bark in small test areas around the root crown and pull it away from the trunk and roots. In active stages of development, the fresh, watery, soft tissues of the fungus invade the wood and bark and give off a sharp, mushroom odor.

Controlling this oak root fungus disease is difficult, but if you can check the early stages of infection, the life of the tree can be prolonged.

Carefully remove the diseased roots and tissue. Then disinfect the cuts, and feed the tree. The photographs on pages 158 and 159 show how you can check the growth of this fungus by digging away the soil from the trunks and root crowns. The exposure to air and the drying will aid considerably in arresting the advance of the fungus.

Live oaks prefer winter watering

You help prevent or arrest oak root fungus growth when you try to water your oak trees in a manner to which they were accustomed before you took over their maintenance. Under their natural

How to recognize oak root fungus

WILLIAM APLIN

1. *Deep splits such as these in the bark at the base of trunk are often strong indications of an active oak root fungus*

2. *This cream colored, fan-shaped growth under tree bark and on exposed roots shows oak root fungus active*

WILLIAM APLIN

Surgical control *of oak root fungus means cutting away all infected bark or wood, disinfecting and keeping the areas exposed*

Galvanized metal *is used to hold soil back in this tree well. Very economical and easy to install. Will last for many years*

growing conditions, they usually receive the majority of their moisture during the winter months. They are not as happy when they receive a lot of water during the dry summer months.

In years of normal rainfall, the soil usually takes in sufficient moisture during the winter months to carry these trees over the balance of the year. But during the last 10 years, lack of rainfall has practically eliminated any water table that might help even these deep-rooted trees.

In gardens, the walks, structures of all kinds, and lack of natural mulches also cut off much natural absorption. This lack has brought on a progressive deterioration of the roots as well as the tops.

In a weakened condition, the oaks are much more susceptible to some diseases and insects. The best possible remedy seems to be deep winter irrigation to provide the trees with a more normal water supply.

For deep irrigations from December to April, you might use a soil soaker or a sprinkler, or run water in a deep trench just inside the drip line for a period of 10 to 12 hours each winter month as long as drought conditions exist. Another possibility is to use sub-irrigating attachments that can be pushed into the soil around the trees and allowed to run for at least 6 or 8 hours in four or five positions at the drip line of the tree.

Should you plant around the base?

Common sense seems to indicate that trees without underplanting can lead a more normal life; they don't have to put up with shallow waterings that tend to keep the root areas moist at all times. These waterings create out-of-season moisture problems and are an invitation to oak root fungus troubles.

If you must plant around the base of oaks, use plant material that goes dormant during the summer months—shade loving natives such as evergreen currant *(Ribes viburnifolium)*, fuchsia flowered gooseberry *(Ribes speciosum)*, island alum root *(Heuchera maxima)*, and wild strawberry *(Fragaria chiloensis)*. Even these should be planted at least 6 feet from the tree trunk.

Moisture loving plants, such as tuberous begonias, camellias, rhododendrons, and ferns should never be planted near oaks—constant moisture at the base of the trunk makes the tree vulnerable to crown rot and oak root fungus, and rots primary as well as feeder roots.

You will hear pros and cons on the matter of growing a lawn under oaks. In deep, sandy, well drained soil, you probably will not run into trouble if: (1) you provide a natural grade away from the tree; and (2) you divert water from sprinklers away from the trunk.

Heavy adobe or clay soils present additional problems. A dense turf or compacted soil can greatly reduce aeration in the soil. Reduced aeration, plus excessive water, favors development of harmful soil organisms such as oak root fungus, which may be present in an inactive state until stimulated by favorable growing conditions or even mechanical root injury.

Heavy pruning can be hard on oaks

Don't prune your trees just to make them look more attractive. Pruning excessively or thinning limbs to expose the stem pattern may kill the tree. Prune only to remove dead wood or dangerous branches.

Experience has shown that any pruning of coast live oaks should be done only during July and August. A relatively low amount of new growth takes place at this time, compared to the heavy flush in the spring months. Also, there is least likelihood of mildew, which usually has a decided weakening effect on oaks during the spring months.

Heavy pruning and mildew attacks have often been mentioned as principal reasons for oak trees' decline in vigor. The excessive pruning often begins a vicious cycle of forced new growth, which becomes subject to attack by diseases—primarily a powdery mildew which occurs on the new shoots and leaves. This is called tip mildew. The surface of these new shoots and leaves becomes covered with a powdery, white growth.

These diseased shoots develop as a cluster of shortened, fleshy, main stem and lateral branches bearing tiny stunted leaves. They later turn brown and dry, and shrivel up.

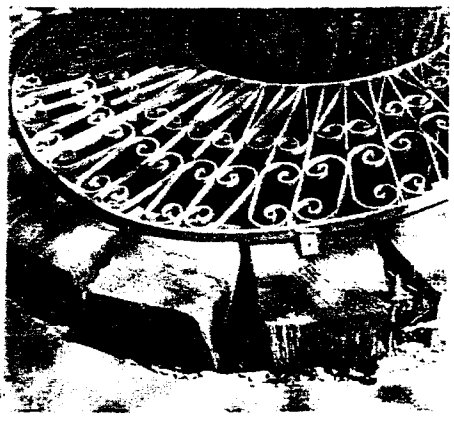
Control the destructive insects

Three oak insects seem to cause the greatest amount of trouble: the larvae of the leaf eating California oak moth, the twig killing larvae of the oak twig girdler, and the common nuisance, the crown whitefly.

Oak moth. This is the most common and the most serious insect contributing to the decline of oak trees. It can consume the full leaf or portions of it, leaving only a network of veins. With serious infestations the entire tree, or a portion of it, may be defoliated.

The larvae that do the chewing are about an inch long and olive green with a prominent black and yellow stripe on the side

Exposed roots *at the base of oak trees will help prevent fungus attacks on healthy trees and further spread on diseased ones*



Tree well *of 6-inch redwood posts and ornamental grating protect base of oak in a patio 6 feet above the natural soil level*

and back. Two broods usually develop—in spring and summer. The adult moths appear and lay their eggs in October and November. The eggs hatch during the later winter and spring months. Then the spring-hatched larvae become mature moths and lay another crop of eggs, which in turn hatch and become leaf-eating larvae for the second time during the year.

To get effective control of both the adults and larvae on large trees, it is necessary to spray thoroughly with a power sprayer. Most spray companies use 50 per cent wettable DDT powder at the rate of 2 pounds per 100 gallons of water.

Others use malathion or chlordane alone or as additives. The spray should be applied when leaf damage is noted, from the middle of March through April or May, and then possibly again when the moths are flying in June, July, or August. In gardens where fish pools are located under oak trees, use cryolite (it doesn't kill fish), or cover the pool with a sheet of polyethylene film during the spraying.

Oak twig girdler. This is the next most damaging insect. In the photograph shown below, the injury is indicated by patches of dead leaves on various parts of the tree. On a severely infested tree, all the leaves may be dead. The leaves die because their source of water and nutrients has been cut off by this insect's twig girdling. Usually, the damaged twigs will be less than half an inch in diameter.

WILLIAM APLIN

Patches of dead *leaves throughout tree are indication of oak twig girdler. Sprays to control are only effective in May and June*

You can find the twig girdler's burrow by peeling the bark from a dead twig. Since the mature larva works inside the twig, the only way to control its activity is to destroy it when it emerges in May and June. Since the life cycle occupies two years, there is only about 1 month in 24 in which the insect is outside the twig and can be contacted with a spray.

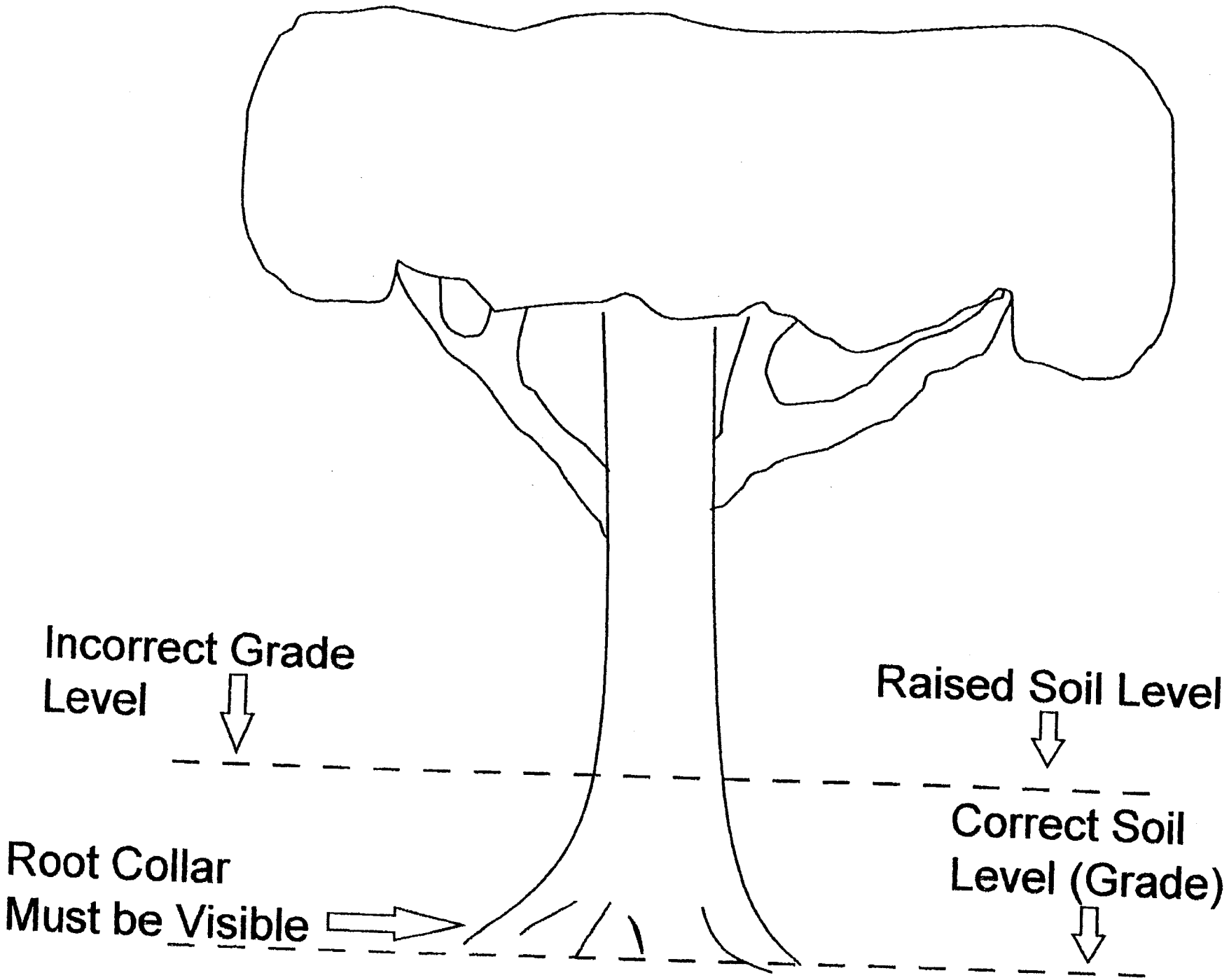
Presently, DDT in the same formula used on oak moth is used as a control spray. Cryolite is not effective. Best control is obtained when you continue this program over a period of at least 3 to 4 years. Where there is heavy infestation, 2 yearly sprayings are recommended. The first of these should be applied during the latter part of May or the first part of June, and the second during the latter half of June and the first half of July.

Crown whitefly. Swarms of this tiny, white, gnat-like insect appear mostly during the spring months and suck sap from the leaves. When they take over a healthy tree, little harm is done. But when they attack sickly or damaged trees, they add their bit to the decline of the tree. In most cases the damage is slight, and specific control measures are rarely necessary. Spraying these insects in early spring has often been found more harmful than beneficial to tender foliage.

Spraying a large 50 to 75-foot oak tree is no job for the home sprayer. Only power sprayers have the capacity to reach into these large trees and apply the spray where it's needed. Commercial spray companies have become well acquainted with the oak tree insects and understand their type of damage and the best timing of controls.

Your money will be well spent if you hire a commercial spray operator to spray at the proper times. He can usually work out your oak tree spraying program on a yearly basis, watching your trees and coming in whenever spraying is necessary. Your trees will be sprayed even while you're on a trip or vacation. Some spray companies include free consultation with their contract.

For more help on live oak problems, read *If you own a native California oak* in the April 1955 *Sunset*.


Incorrect Grade Level
Raised Soil Level
Correct Soil Level (Grade)
Root Collar Must be Visible

RESUME

ROBERT W. WALLACE
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Liability Insured

DEGREES AND LICENSES

Certified Crop Advisor (California/National)
California State licensed Pest Control Advisor (since 1979)
International Society of Arboriculture - Certified Arborist (since 1989)
California Pesticide Applicator's license (since 1979)
A.S. Degree in Horticulture - Pierce Junior College, Woodland Hills, California
Qualified as a Tree Surgeon by the City of Los Angeles – 1969 & 1989

AFFILIATIONS AND MEMBERSHIPS

Owner	Tree Life Concern, Inc.
Member	American Society of Consulting Arborists
Member	California Agricultural Production Consultants Assoc.
Member	California Native Plant Society
Member	California Oak Foundation
Member	Professional Association of Pesticide Applicators
Member	Western Chapter International Society of Arboriculture

PROFESSIONAL RECOGNITION

City of Beverly Hills	Tree Expert
County of Los Angeles	Oak Tree Consultant
City of Los Angeles	Qualified Oak Tree Experts
City of Santa Clarita	Oak Tree Consultant
City of Calabasas	Oak Tree Consultant
Faculty Member	Learning Tree University, Chatsworth, CA., Classes taught;
(1991-1994)	Preserving the California Oak Tree, Environmentally Safe Pest Control, Tree Pruning
Tree People (Los Angeles)	Lecturer (Pruning, Insect and Disease I.D.) Monitor "Dr. Tree Hotline"
Seminar speaker	Professional Assoc. of Pesticide Applicators (PAPA)

WORK EXPERIENCE

1993 - 2001	City Arborist Consultant (1 of 4) - City of Calabasas, CA
1989 - Present	Arboricultural Consultant/Owner Tree Life Concern, Inc. Expert Witness and Litigation Consultant
1979 - 1989	Owner/Operator Wagner Pest Control Company - Diagnosis and treatment of insect, disease, weed, and nutrient deficiency problems for large estate landscapes, corporations, and residential properties; horticultural consultant
1978 - 1979	Foreman - Line Clearing Crew, Farrens Tree Surgeons, GA
1975 - 1978	Tree Trimmer Working Foreman, City of Los Angeles, CA
1974 - 1975	Tree Surgeon - City of Los Angeles
1970 - 1974	USAF
1969 - 1970	Tree Surgeon - City of Los Angeles
1968 - 1969	Tree Trimmer Assistant - City of Los Angeles
1958 - 1968	Groundman - Family Tree Business, Canoga Park, CA

GLOSSARY

APPENDIX

GLOSSARY OF TERMS

Terminolgy utilized in Summary of Field Inspection worksheets

Form

1. Tree Number – The number on the TLM coincides with the tag number attached to each tree in the study area.

Size

2. Trunk Diameter - Most of the oaks were measured at 4 ½ feet above grade or diameter at breast height (DBH). Those trees where measurement at 4 ½ feet would not produce an accurate width due to a tree crotch or anomaly at that height, were then measured below the main crotch (BMC). This will usually result in a more accurate picture of the actual size of a tree. All oak trees where the main stem equaled 2" diameter or more were included in the study as required by the Oak Tree Ordinance.

3. Height & Canopy Spread – Tree height was calculated using a clinometer. In areas of rough terrain or where canopies were crowded, heights were estimated. The canopy spreads were measured by rangefinder or measuring tape. In areas of difficult terrain or where tree canopies were naturally pleached, the spreads were estimated.

Physical Condition

4. Tree Declining – The health and condition of the tree is declining. This could be the result of many influences such as: end of life span, disease, drought, insect attack, nutrient deficiency, cultural impacts (over-watering, etc.). An X in this column is usually referring to an irreversible condition.

5. Mainstem Dieback – An area of deadwood at the upper or outer edge of the canopy. This is usually a symptom of tree decline. In many cases the tree may recover on its own or with the help of remedial measures.

6. Soil Buildup at Base – Soil has been raised naturally (as on a slope) or unnaturally by construction or landscaping activities. Oak trees are very sensitive to grade changes, particularly near the root collar. Many oaks die from slight grade changes that obscure the root collar by even a few inches.

Rating

10. Health – This is an assessment of each tree's overall condition and vigor based on a visual, above-ground inspection (A.Excellent, B. Good, C. Fair, D. Poor, E. Nearly Dead, F. Dead)

11. Aethetics and Conformity – An appraisal of the tree's form and its association with adjacent trees or objects (wall, homes, etc.). Example: an oak may be poorly balanced and deformed due to growing in close proximity (or under) a larger oak. This tree would receive a "D" (Poor) rating in this column.

12. Balance – This rating is based on the archetypical form (stout, straight trunk) for the species being appraised. Oaks with an unnatural lean of 20 degrees or greater would receive a "C" or "D" rating.

Protective Zone (PZ) = The zone of protection around an oak tree where all proposed construction activities are to be documented, authorized and monitored. The City of Santa Clarita Oak Tree Ordinance describes this zone as that point 5 feet outside the dripline (outer edge of canopy) peripherally or 15 feet from the trunk, whichever is farther. Any construction activity that enters into this zone is considered encroachment and does require a Permit and/or Oak Tree Report.

Robert W. Wallace
Registered Consulting Arborist

CONCERN INC.

"Dedicated to the Protection and Preservation of Trees"

September 18, 2003

Newhall Land and Farming Co.
23823 Valencia Blvd.
Valencia, CA 91355
Attn: Mr. Glenn E. Adamick

RE: **Oak Tree Report ADDENDUM #1 – River Park Project** - Tract No. 53425

This addendum letter will address changes to the existing OTR (dated 5-22-03). One oak (#9L) will be taken from the removal list and added to the impacted list, one oak (#73H) will be removed from the relocation list and one oak (#74) will be removed from the impacted list. I have reviewed the plan changes and concur with these adjustments

1. Santa Clarita Parkway, which is proposed to pass through the center of the Riverpark Project has been shortened by approximately 700'. This change will result in the preservation of Heritage Oak #73. This tree will not be impacted or encroached upon. It will require protective fencing prior to construction activities. The Parkway will end approximately 190' north of its northern PZ. This tree is now removed from the list of proposed relocations.

2. In addition to this tree preservation, Oak #74 will not be encroached upon. The construction of the Parkway was going to noticeably impact this tree by encroachment well within its dripline. Santa Clarita Parkway will end approximately 600' north of this tree. This tree will be fenced prior to construction.

3. Oak #9 was listed as a removal. It will now be preserved and encroached upon at its eastern quadrant. The grading of the existing nearby slope will occur 5' within the PZ on the uphill side 17' from the trunk (see attached Section View). In my opinion, this impact will be minor and the tree should be affected short-term or long-term by this activity. The grading and slope work within the PZ will be monitored.

Robert W. Wallace
Registered Consulting Arborist

TABLE 1 : SUMMARY OF DATA (Oak trees)

(ADDENDUM #1)

Total number of Oak trees listed on map (over 2" diameter).....	87
Total number of dead Oak trees at site.....(#3HL & 81HV).....	2
Total number of Oak trees to be removed or relocated (not including dead trees)..... (Remove - #10S,11S,12S and Relocate - 68HV,69V,70V,71V,72V,75HV,82V,83V,84V,85V,86HV,87V)	15
Total number of Oak trees to be impacted by construction (within driplines)...(#6HL,9L,13L).....	3
Total number of Oak trees not dead, not to be removed/relocated and/or not to be impacted.....	67
Total number of trees to be relocated on-site...(#68HV,69V,70V,71V,72V,75HV,82V,83V,84V,85V,86HV,87V).....	13

TABLE 2 : SCHEDULE OF PROPOSED REMOVALS OR RELOCATIONS (Oak trees)

Tree No.	Health Rating	General location	Reason for removal	My Recommendation: Save	Remove	Re-locate
10S	A	See map (Area A-2, Detail 1)	For C&F slope devel. At west edge of Lot 276 (Proposed elev. 1260') Tree at elev. of 1267'		X	
11S	A	See map (Area A-2, Detail 1)	Within pad at west edge of Lot 276 (Proposed elev. 1254') Tree at elevation of 1261')		X	
12S	A	See map (Area A-2, Detail 1)	For pad construction - Lot 275 (Proposed elev. 1254') Tree at elev. of 1274'		X	
68HV	C	See map (Area A-2, Detail 8)	For pad construction - Lot 325 (Proposed elev. 1221') Tree at elev. of 1210'			X
69V	A	See map (Area A-2, Detail 8)	For pad construction - Lot 323 (Proposed elev. 1235') Tree at elev. of 1210'			X
70V	B	See map (Area A-2, Detail 8)	For pad construction - Lot 322 (Proposed elev. 1236') Tree at elev. of 1210'			X
71V	B	See map (Area A-2, Detail 8)	For pad construction - Lot 319 (Proposed elev. 1239') Tree at elev. Of 1210'			X
72V	B	See map (Area A2, Detail 9)	Lot 316 (Proposed elev. 1240') At edge of pad and top of slope - Tree at elev. Of 1215'			X

TABLE 1 : SUMMARY OF DATA (Oak trees)

(ADDENDUM #1)

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68HV	C	See map (Area A-2, Detail 8)	For pad construction - Lot 325 (Proposed elev. 1221') Tree at elev. of 1210'			X
69V	A	See map (Area A-2, Detail 8)	For pad construction - Lot 323 (Proposed elev. 1235') Tree at elev. of 1210'			X
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72V	B	See map (Area A2, Detail 9)	Lot 316 (Proposed elev. 1240') At edge of pad and top of slope - Tree at elev. Of 1215'			X

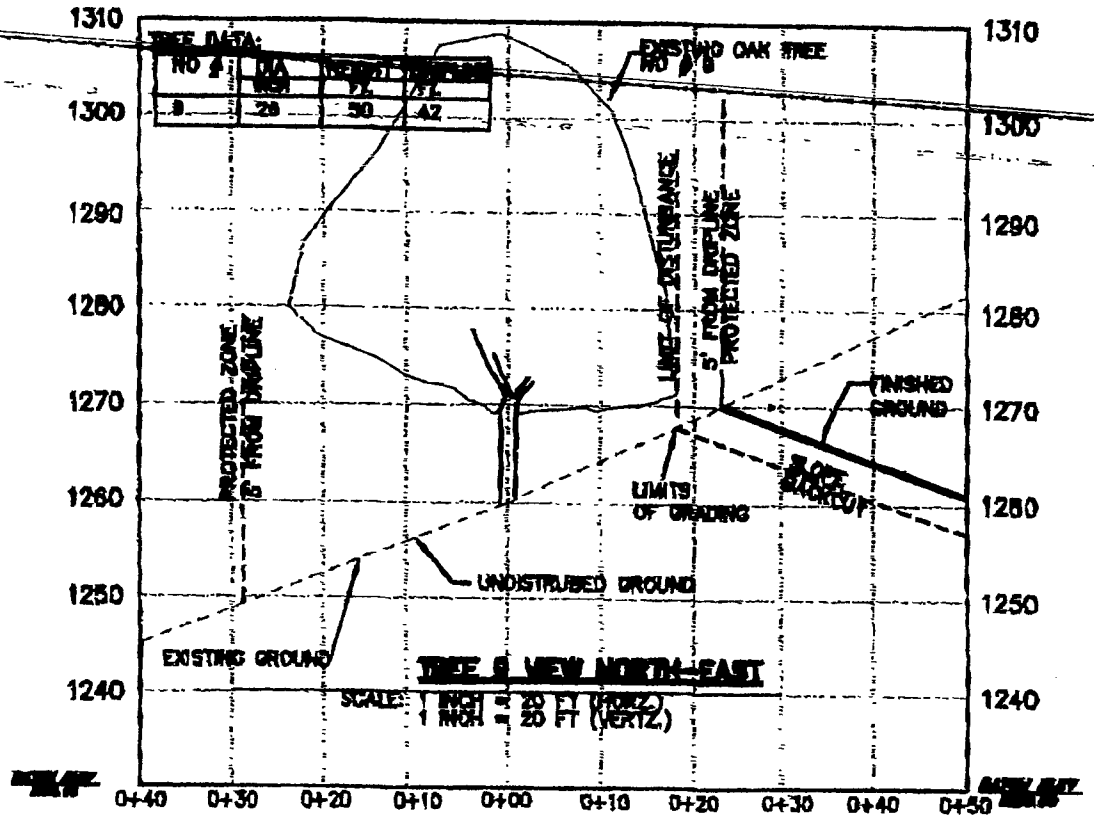
GPS

GPS

FIELD SURVEY

F TRUNK
TYPE

SECTION A'



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TREE LIFE CONCERN NO.576 P.SE 04

RARE PLANT SURVEYS

RIVER PARK
NEWHALL RANCH/VALENCIA COMPANY PROJECT SITES
LOS ANGELES COUNTY, CA

Submitted to:

IMPACT SCIENCES, INC.
30343 Canwood Street, Suite 210
Agoura Hills, CA 91301
ATTN: Jeff Johnson

Submitted by:

Anuja Parikh, Ph.D., PWS
Nathan Gale, Ph.D., PWS
FL*x*
1215 Bajada
Santa Barbara, CA 93109
Tel/FAX: 805-564-1352

June 2003

1. INTRODUCTION

The River Park site in the Newhall Ranch/Valencia Company project area, Los Angeles County, California, was surveyed for rare plant species and vegetation types in Spring 2003. The site is located about 2.5 miles east of the junction of Interstate 5 and Magic Mountain Parkway. It is bounded on the south by Soledad Canyon Road and on the west by Bouquet Canyon Road. Commercial and residential development occurs in most of the area surrounding the site. The project area contains a mixture of previously disturbed and undisturbed areas. The Santa Clara River runs through the southern part of the site in an east-west direction.

A team of two consultants from FL*x* (Dr. Anuja Parikh and Dr. Nathan Gale) conducted the vegetation and rare plant surveys from April 9 through April 19, 2003. Surveys also were conducted for later-flowering species on May 23 and June 16. Vegetation types and plant species associations were mapped for the site during previous surveys conducted by FL*x* in April 2002. As part of the 2003 surveys, the vegetation map was confirmed and a new list of plant species, including rare and commonly occurring plants observed at the site, was compiled (see Appendix A). Plant community descriptions in this report follow Holland (1986) where applicable; species nomenclature follows Hickman (1993).

2. VEGETATION TYPES AND PLANT SPECIES ASSOCIATIONS

The River Park project area is composed of variable terrain, ranging from relatively flat riverwash, secondary washes, and terrace areas, to previously disturbed flat areas or fields above the banks of the Santa Clara River, to hillslopes in the northern part of the site.

Disked Fields. Many areas of the project site comprise fields that have been disturbed previously by disking. These fields now have grass cover and ruderal vegetation with native and non-native species. Species observed included bromegrasses (*Bromus diandrus*, *B. madritensis* ssp. *rubens*), hare barley (*Hordeum murinum*), shortpod mustard (*Hirschfeldia incana*), red-stemmed filaree (*Erodium cicutarium*), goosefoot (*Chenopodium album*, *C. californicum*), rancher's fireweed (*Amsinckia menziesii*), poverty weed (*Iva axillaris* ssp. *robustior*), and Jimson weed (*Datura wrightii*).

Non-Native Grassland. This community occurs on relatively flat terrain and sometimes on gentle hillslopes throughout the River Park site. Annual introduced grasses up to about 0.5 m tall are dominant in non-native grasslands; annual herb species also are found. Flowering occurs in spring, and the plants mostly are dead in summer and fall. Non-native grasslands occur on fine-textured, usually clay soils, that are moist to wet in the winter but dry in the summer and fall (Holland, 1986). Grass species found at the site include mainly bromegrasses (*Bromus diandrus*, *B. madritensis* ssp. *rubens*, *B. hordeaceus*) and wild oats (*Avena barbata*, *A. fatua*). Introduced herbaceous ruderal species also are found, and commonly include red-stemmed filaree (*Erodium cicutarium*), small-seed sandmat (*Chamaesyce polycarpa*), and shortpod mustard (*Hirschfeldia incana*). Scattered native plants found in this community include wishbone bush (*Mirabilis californica*), California fuschia (*Epilobium canum*), tansy phacelia (*Phacelia tanacetifolia*), and California thistle (*Cirsium occidentale* var. *californicum*).

Non-Native Grassland with Scattered Shrubs. In a few areas covered with non-native grasses, also on relatively flat terrain and on gentle slopes, shrubs are sparsely distributed in the grassland. These native

shrubs include California buckwheat (*Eriogonum fasciculatum*), goldenbush (*Ericameria palmeri* var. *pachylepis*), skunkbrush (*Rhus trilobata*), and California sagebrush (*Artemisia californica*).

Planted Scrub. In the northwestern part of the River Park project area, several slopes have been cut or graded for the installation of water lines and concrete-lined drainage channels. These relatively steep slopes have been restored by planting native shrubs, primarily California buckwheat (*Eriogonum fasciculatum*); some California sagebrush (*Artemisia californica*) also occurs.

Riversidian Sage Scrub. This community is the most xeric type of coastal sage scrub south of Point Conception in California (Holland, 1986), and is found along the coastal side of the Transverse and Peninsular Ranges. It contains low, soft-woody shrubs up to 1 m tall. Plant growth occurs in late winter and spring after the rains, with most species flowering in spring and summer. Typical stands are relatively open and dominated by California sagebrush (*Artemisia californica*), California buckwheat (*Eriogonum fasciculatum*), and annual grasses such as foxtail chess (*Bromus madritensis* ssp. *rubens*), each attaining 20 percent or greater cover. Riversidian sage scrub is found on xeric sites such as steep slopes, severely drained soils, or relatively clayey soils that are slow to release moisture. It intergrades with several southern California chaparrals. On the River Park site, this community is found on sloping terrain throughout the site; the dominant species is California buckwheat (*Eriogonum fasciculatum* var. *foliolosum*). Other less dominant plants include thickleaf yerba santa (*Eriodictyon crassifolium* var. *nigrescens*), California sagebrush (*Artemisia californica*), sages (*Salvia mellifera, S. apiana, S. leucophylla*), goldenbush (*Ericameria palmeri* var. *pachylepis*), encelias (*Encelia actoni, E. californica*), chaparral mallow (*Malacothamnus fasciculatus*), Our Lord's candle (*Yucca whipplei*), linear-leaved stillingia (*Stillingia linearifolia*), California-aster (*Lessingia filaginifolia* var. *filaginifolia*), California broom (*Lotus scoparius*), beavertail cactus (*Opuntia basilaris* var. *basilaris*), giant wild-rye (*Leymus condensatus*), and cotton-thorn (*Tetradymia comosa*). Introduced annual grasses prevalent in the understory are dominated by foxtail chess (*Bromus madritensis* ssp. *rubens*) and slender wild oat (*Avena barbata*). Native needlegrasses (*Nassella cernua, N. lepida*) also are scattered in the understory. Among herbaceous species found in this community, the non-native shortpod mustard (*Hirschfeldia incana*), red-stemmed filaree (*Erodium cicutarium*), and tocalote (*Centaurea melitensis*) is present, as well as the native wishbone bush (*Mirabilis californica*), fascicled tarweed (*Hemizonia fasciculata*), woolly-fruited lomatium (*Lomatium dasycarpum* ssp. *dasycarpum*), malacothrix (*Malacothrix saxatilis* var. *tenuifolia*), and chia (*Salvia columbariae*). With respect to sensitivity status, Riversidian sage scrub has been state-ranked as S3.1 (10,000 to 50,000 acres, very threatened) by the CNDDB.

Chamise Chaparral. This type of chaparral is found in small scattered patches on flat to sloping terrain, mostly in the northeastern part of the River Park site. Chamise chaparral is the most common type of chaparral in southern California, and is dominated by chamise (*Adenostoma fasciculatum*) shrubs 1 to 3 m tall. It is often dense and impenetrable and has a sparse understory (Holland, 1986). It is adapted to repeated fires, and is found on shallow, dry soils on xeric slopes and ridges. Growth is highest in the spring and reduced in the summer; flowering occurs from late winter to early summer. Typically, several other native shrubs also occur in this chaparral, but at the River Park site, the small patches of this community are made up almost exclusively of chamise (*Adenostoma fasciculatum*). With respect to sensitivity status, chamise chaparral has been state-ranked as S4 (apparently secure) by the CNDDB.

Coastal Sage - Chaparral Scrub. In some areas of the site, on mostly west-facing slopes, a mix of Riversidian sage scrub and chamise chaparral species occurs. The overstory is relatively open, and the understory in these areas often has annual grasses and herbaceous species. Common species include chamise (*Adenostoma fasciculatum*), California buckwheat (*Eriogonum fasciculatum* var. *foliolosum*), California sagebrush (*Artemisia californica*), chaparral mallow (*Malacothamnus fasciculatus*) and black sage (*Salvia mellifera*).

Holly-Leaf Cherry Scrub. In the northeastern corner of the site on relatively flat terrain, a unique stand of holly-leaf cherry scrub is found. It occurs on the low terraces of a secondary wash that leads to the Santa Clara River. The stand is dominated by relatively large, mature shrubs of holly-leaf cherry (*Prunus ilicifolia* ssp. *ilicifolia*), 3 to 5 m in height; other shrub associates are skunkbrush (*Rhus trilobata*) and spiny redberry (*Rhamnus crocea*). Other native species found in the understory of these shrubs include woolly star (*Eriastrum densifolium* ssp. *elongatum*), scarlet bugler (*Penstemon centranthifolius*), and linear-leaved stillingia (*Stillingia linearifolia*). Also found in this community are the species red-stemmed filaree (*Erodium cicutarium*), lastarriaea (*Lastarriaea coriacea*), valley lessingia (*Lessingia glandulifera* var. *glandulifera*), Mediterranean schismus (*Schismus barbatus*), beavertail cactus (*Opuntia basilaris* var. *basilaris*), and primroses (*Camissonia micrantha, C. californica*). With respect to sensitivity status, mainland cherry forest has been state-ranked as S1.1 (<2,000 acres, very threatened) by the CNDDB. The canopy cover of the holly-leaf cherry shrubs at this site did not amount to a forest canopy. Holly-leaf cherry scrub, as identified in this survey, is not defined in Holland (1986), and therefore, it has no assigned ranking. However, it should be recognized as a unique and sensitive community at the site.

Mule Fat Scrub. Several very small patches of this community occur mostly in the western part of the River Park site, adjacent to the river floodplain. Mule fat scrub typically is a tall, semi-woody and herbaceous riparian scrub, and is relatively species-poor. An early seral community, it often grades to riparian woodland or forest (Holland, 1986). The dominant species found in this community is the native species mule fat (*Baccharis salicifolia*). The understory includes mostly introduced species such as bromegrasses (*Bromus* spp.) and shortpod mustard (*Hirschfeldia incana*). With respect to sensitivity status, mule fat scrub has been state-ranked as S4 (apparently secure) by the CNDDB.

Southern Willow Scrub. Several small patches of this community occur in tributary drainages of the River Park site. Willow scrub is a broadleaved, winter-deciduous riparian community, typically too dense to allow understory development. It is a relatively early seral community, succeeding to cottonwood-sycamore forests (Holland, 1996). In the project area, this community includes willows (*Salix lasiolepis, S. exigua*), Fremont cottonwood (*Populus fremontii* ssp. *fremontii*), Mexican elderberry (*Sambucus mexicana*), tree tobacco (*Nicotiana glauca*), mule fat (*Baccharis salicifolia*), and western poison oak (*Toxicodendron diversilobum*). The understory is sparse or absent, but sometimes includes species such as Mexican rush (*Juncus mexicanus*), western ragweed (*Ambrosia psilostachya*), and giant wild-rye (*Leymus condensatus*). With respect to sensitivity status, southern willow scrub has been state-ranked as S2.1 (2,000 to 10,000 acres, very threatened) by the CNDDB.

Southern Riparian Scrub. This community is found on the Santa Clara River floodplain, on relatively flat terraces immediately adjacent to the riverbed; some branched channels of the river cross this community. A combination of mule fat scrub and southern willow scrub species is found on the terraces, including mule fat (*Baccharis salicifolia*), willows (*Salix exigua, S. lasiolepis, S. laevigata*), Fremont cottonwood (*Populus*

fremontii ssp. *fremontii*), tamarisk (*Tamarix* sp.), scale-broom (*Lepidospartum squamatum*), and arundo (*Arundo donax*). In addition, other native species include Great Basin sagebrush (*Artemisia tridentata*), shadscale (*Atriplex canescens* ssp. *linearis*), Mexican elderberry (*Sambucus mexicana*), thickleaf yerba santa (*Eriodictyon crassifolium* var. *nigrescens*), cholla (*Opuntia prolifera*), and mugwort (*Artemisia douglasiana*). With respect to sensitivity status, southern riparian scrub has been state-ranked as S3.2 (10,000 to 50,000 acres, threatened) by the CNDDB.

Riverwash. The main channel of the Santa Clara River is sparsely vegetated and is subject to scouring. Soils are sandy riverwash and gravel, and in places form sand bars and low terraces within the channel. No well-defined plant community is found here, although scattered elements of southern riparian scrub were observed. Shrub species found in the dry riverbed are mule fat (*Baccharis salicifolia*), tamarisk (*Tamarix* sp.), scale-broom (*Lepidospartum squamatum*), arundo (*Arundo donax*), California broom (*Lotus scoparius*), woolly star (*Eriastrum densifolium* ssp. *elongatum*), and California buckwheat (*Eriogonum fasciculatum* var. *foliolosum*). Smaller plants growing in the riverbed include buckwheat (*Eriogonum baileyi*), Mediterranean schismus (*Schismus barbatus*), cryptantha (*Cryptantha micrantha*), hairy goldenaster (*Heterotheca sessiliflora* ssp. *fastigiata*), tumble mustard (*Sisymbrium altissimum*), foxtail chess (*Bromus madritensis* ssp. *rubens*), slender pectocarya (*Pectocarya linearis* ssp. *ferocula*), and annual bur-sage (*Ambrosia acanthicarpa*). Fremont cottonwoods (*Populus fremontii* ssp. *fremontii*) and willows (*Salix* spp.) are found scattered individually or in small clumps in the channel; no riparian forest is found.

Oak Woodland. Small patches of oak woodland occur in the central part of the River Park site, mostly on or at the base of north-facing and west-facing slopes. Typically, oak woodlands have a single dominant species, but at the River Park site, three species are found intermixed in the oak woodland areas: the evergreen coast live oak (*Quercus agrifolia* var. *agrifolia*) and Tucker's oak (*Quercus john-tuckeri*), and the winter-deciduous valley oak (*Quercus lobata*). Coast live oaks (*Quercus agrifolia* var. *agrifolia*) can reach 10 to 25 m in height, and occur away from the direct influence of the ocean in shaded canyons and on north-facing slopes (Holland, 1986). Tucker's oak (*Quercus john-tuckeri*) is a shrubby oak that grows 2 to 5 m tall, and is relatively uncommon and restricted in range to interior southern California locations. Valley oaks (*Quercus lobata*) are California's largest broad-leaved tree, reaching 15 to 35 m in height, and occur on alluvial soils in valleys, and also on slopes in the South Coast Ranges. At the River Park site, some large mature individuals of valley oak (*Quercus lobata*) also are scattered in disked fields. The shrub layer in oak woodlands generally is poorly developed, and the herb layer often has annual grasses, which have replaced the native perennial grasses once commonly associated with this community.

Developed Area with Mixed Trees. In the central part of the River Park site, there is an area that apparently was used as a camp in the past. Currently, it is occupied by a construction company, with buildings, trailers, and equipment storage areas. Many large and mature native and non-native trees occur in this area, some of which may be plantings, and some natural. Species observed include western sycamore (*Platanus racemosa*), Fremont cottonwood (*Populus fremontii* ssp. *fremontii*), Mexican elderberry (*Sambucus mexicana*), eucalyptus (*Eucalyptus* spp.), Peruvian pepper tree (*Schinus molle*), and various conifers.

3. RARE PLANT SPECIES

The rare plant surveys were carried out from April to June to accommodate the blooming periods of various species found in the region, or previously reported by the CNDDB. A list of target species potentially

occurring at the site is presented in Table 1; these species were searched for during the focused rare plant surveys.

TABLE 1: SENSITIVE PLANT SPECIES POTENTIALLY OCCURRING ON THE RIVER PARK SITE

Scientific Name	Common Name	Family	Status* Federal/State/CNPS
Astragalus brauntonii	Braunton's milk-vetch	Fabaceae	FE/-/1B
Berberis nevinii	Nevin's barberry	Berberidaceae	FE/SE/1B
Calochortus clavatus var. *gracilis*	Slender mariposa lily	Liliaceae	-/-/1B
Calochortus plummerae	Plummer's mariposa lily	Liliaceae	-/-/1B
Calochortus weedii var. *vestus*	Late-flowered mariposa lily	Liliaceae	-/-/1B
Calystegia peirsonii	Peirson's morning-glory	Convolvulaceae	-/-/4
Centromadia parryi ssp. *australis*	Southern tarplant	Asteraceae	-/-/1B
Chorizanthe parryi var. *fernandina*	San Fernando Valley spineflower	Polygonaceae	FC/SE/1B
Deinandra minthornii	Santa Susana tarplant	Asteraceae	-/SR/1B
Delphinium parryi ssp. *blochmaniae*	Dune larkspur	Ranunculaceae	FSC/-/1B
Dodecahema leptoceras	Slender-horned spineflower	Polygonaceae	FE/SE/1B
Dudleya blochmaniae ssp. *blochmaniae*	Blochman's dudleya	Crassulaceae	-/-/1B
Dudleya multicaulis	Many-stemmed dudleya	Crassulaceae	-/-/1B
Dudleya parva	Conejo dudleya	Crassulaceae	FT/-/1B
Erodium macrophyllum	Round-leaved filaree	Geraniaceae	-/-/2
Harpagonella palmeri	Palmer's grappling hook	Boraginaceae	-/-/4
Helianthus nuttallii ssp. *parishii*	Los Angeles sunflower	Asteraceae	-/-/1A
Juglans californica	Southern California black walnut	Juglandaceae	-/-/4
Juncus acutus ssp. *leopoldii*	Southwestern spiny rush	Juncaceae	-/-/4
Malacothamnus davidsonii	Davidson's bush mallow	Malvaceae	FSC/-/1B
Navarretia fossalis	Spreading navarretia	Polemoniaceae	FT/-/1B
Nolina cismontana	Chaparral nolina	Liliaceae	-/-/1B
Opuntia basilaris var. *brachyclada*	Short-joint beavertail	Cactaceae	-/-/1B
Orcuttia californica	California Orcutt grass	Poaceae	FE/SE/1B
Pentachaeta lyonii	Lyon's pentachaeta	Asteraceae	FE/SE/1B
Perideridia pringlei	Pringle's yampah	Apiaceae	-/-/4
Senecio aphanactis	Rayless ragwort	Asteraceae	-/-/2

* - = No listing
FE = Federal endangered
FT = Federal threatened
FC = Federal candidate
FSC = Federal species of concern
SE = State/California endangered
SR = State/California rare
1A = CNPS List 1A, plants presumed extinct in California
1B = CNPS List 1B, plants rare, threatened, or endangered in California and elsewhere
2 = CNPS List 2, plants rare, threatened, or endangered in California, but more common elsewhere
4 = CNPS List 4, plants of limited distribution, a watch list

Five sensitive species were found in the project area during the current surveys: slender mariposa lily (*Calochortus clavatus* var. *gracilis*), Plummer's mariposa lily (*Calochortus plummerae*), Peirson's morning-glory (*Calystegia peirsonii*), Palmer's grappling hook (*Harpagonella palmeri*), and southern California black walnut (*Juglans californica*). Slender mariposa lily (*Calochortus clavatus* var. *gracilis*) and Plummer's mariposa lily (*Calochortus plummerae*) are CNPS List 1B species, the other three are CNPS List 4 species; none is a state- or federally-listed species. In addition, a sixth species that may be sensitive was found at the site. This plant is a larkspur with some characteristics of the common species Parry's larkspur (*Delphinium parryi* ssp. *parryi*), as well as characteristics of the CNPS List 1B species dune larkspur (*Delphinium parryi* ssp. *blochmaniae*). Specimens of the plant have been sent to a species expert to confirm its identification.

Locations of sensitive species observed in 2002 were checked and their numbers verified or updated. This information, along with a summary of all new populations of sensitive species located at the site, is included in the following sections. The population locations, as numbered below, have been marked on the accompanying map.

Slender mariposa lily (*Calochortus clavatus* var. *gracilis*) was found in 12 locations in relatively small numbers, mostly on north-facing slopes and ridges. The plants most often were found in openings within coastal sage scrub, on sandy clay soils. Elevations ranged from 1235 feet to 1350 feet. Most plants were flowering.

1. 1 plant, with *Eriogonum fasciculatum*.
2. 1 plant, with *Bromus madritensis* ssp. *rubens* and *Eriogonum fasciculatum*.
3. 5 plants, with *Salvia leucophylla*, *Eriogonum fasciculatum*, *Artemisia californica*, and *Malacothamnus fasciculatus*.
4. 1 plant, with *Eriogonum fasciculatum* and *Artemisia californica*.
5. 1 plant, with *Eriogonum fasciculatum*, *Artemisia californica* and *Bromus madritensis* ssp. *rubens*.
6. 3 plants, with *Eriogonum fasciculatum*, *Artemisia californica* and *Bromus diandrus*.
7. ~50 plants, with *Eriogonum fasciculatum*, *Artemisia californica* and *Bromus madritensis* ssp. *rubens*.
8. 3 plants, with *Artemisia californica*, *Bromus diandrus*, and *Yucca whipplei*.
9. 1 plant, with *Bromus madritensis* ssp. *rubens*, and *Eriogonum fasciculatum*.
10. 10 plants, with *Eriogonum fasciculatum*, *Artemisia californica*, *Melica imperfecta*, and *Bromus madritensis* ssp. *rubens*.
11. 3 plants, with *Avena barbata* and *Eriogonum fasciculatum*.
12. 1 plant, with *Avena barbata* and *Eriogonum fasciculatum*.

Plummer's mariposa lily (*Calochortus plummerae*) was found in three locations in small numbers, mostly on south-facing slopes and ridges. The plants were found in coastal sage scrub, on sandy clay soils with gravel and stones. Elevations ranged from 1225 feet to 1335 feet. All plants were flowering, and some were fruiting.

1. 3 plants, with *Salvia mellifera* and *Artemisia californica*.
2. 1 plant, with *Eriogonum fasciculatum*, *Erodium cicutarium*, and *Bromus madritensis* ssp. *rubens*.
3. 3 plants, with *Eriogonum fasciculatum*, *Hemizonia fasciculata*, *Hirschfeldia incana*, *Erodium cicutarium*, and *Bromus madritensis* ssp. *rubens*.

Peirson's morning-glory (*Calystegia peirsonii*) populations were found in 29 locations on relatively gentle slopes (generally south-facing) or in flat areas. The plants are associated with various grassland and coastal sage scrub species. Elevations range from 1250 feet to 1450 feet, and the soils are sandy to gravelly/stony in texture. Most plants were in vegetative form; some were flowering.

1. ~50 plants, with *Bromus madritensis* ssp. *rubens*, *Bromus hordeaceus*, *Hirschfeldia incana*, near *Eriogonum fasciculatum*.
2. ~300 plants, with *Eriogonum fasciculatum*, *Bromus madritensis* ssp. *rubens*, near *Salvia mellifera*.
3. ~100 plants, with *Bromus madritensis* ssp. *rubens*, *Avena barbata*, *Hirschfeldia incana*, near *Eriogonum fasciculatum*.
4. ~300 plants, with *Bromus madritensis* ssp. *rubens*, *Avena barbata*, *Lotus scoparius*, near *Artemisia californica* and *Malacothamnus fasciculatus*.
5. ~100 plants, with *Eriogonum fasciculatum*, *Bromus madritensis* ssp. *rubens*, near *Sambucus mexicana*.
6. ~50 plants, with *Bromus diandrus*, *Hirschfeldia incana*, and *Ericameria palmeri* var. *pachylepis*.
7. ~20 plants, with *Bromus diandrus* and *Hirschfeldia incana*.
8. ~700 plants, with *Bromus madritensis* ssp. *rubens*, near *Eriogonum fasciculatum* and *Salvia leucophylla*.
9. ~250 plants, with *Bromus madritensis* ssp. *rubens*, near *Salvia leucophylla* and *Yucca whipplei*.
10. ~250 plants, with *Bromus madritensis* ssp. *rubens*, *Salvia mellifera*, and *Eriogonum fasciculatum*.
11. ~100 plants, with *Bromus madritensis* ssp. *rubens*, *Avena barbata*, and *Eriogonum fasciculatum*.
12. ~100 plants, with *Bromus madritensis* ssp. *rubens*, near *Malacothamnus fasciculatus*.
13. ~100 plants, with *Bromus madritensis* ssp. *rubens*, *Eriogonum fasciculatum*, and *Encelia californica*.
14. ~200 plants, with *Nassella lepida*, *Bromus madritensis* ssp. *rubens*, *Bromus diandrus*, and *Hirschfeldia incana*.
15. ~100 plants, with *Bromus diandrus*, *Hirschfeldia incana*, near *Sambucus mexicana*.
16. ~200 plants, with *Melica imperfecta*, *Avena barbata*, *Bromus madritensis* ssp. *rubens*, near *Malacothamnus fasciculatus* and *Salvia apiana*.
17. ~100 plants, with *Yucca whipplei*, *Bromus madritensis* ssp. *rubens*, *Hirschfeldia incana*, near *Eriogonum fasciculatum* and *Lotus scoparius*.
18. ~50 plants, in disturbed bare ground near *Eriogonum fasciculatum*.
19. ~800 plants, with *Bromus diandrus*, *Avena barbata*, *Bromus madritensis* ssp. *rubens*, near *Salvia* spp., *Artemisia tridentata*, and *Eriodictyon crassifolium*.
20. ~350 plants, with *Bromus hordeaceus*, *Bromus madritensis* ssp. *rubens*, *Avena barbata*, near *Yucca whipplei* and *Artemisia californica*.

21. ~100 plants, with *Bromus diandrus*, *Avena barbata*, *Eriogonum fasciculatum*, *Artemisia californica*, near *Eriodictyon crassifolium*.
22. ~150 plants, with *Eriogonum fasciculatum*, *Bromus madritensis* ssp. *rubens*, and *Lotus scoparius*.
23. ~250 plants, with *Bromus diandrus*, *Eriogonum fasciculatum*, near *Acourtia microcephala* and *Lotus scoparius*.
24. ~250 plants, with *Hirschfeldia incana*, *Bromus madritensis* ssp. *rubens*, near *Encelia actoni* and *Artemisia californica*.
25. ~800 plants, with *Erodium cicutarium*, *Chamaesyce polycarpa*, *Mirabilis californica*, and *Bromus madritensis* ssp. *rubens*.
26. ~100 plants, with *Salvia mellifera*, *Artemisia californica*, and *Eriogonum fasciculatum*.
27. ~50 plants, with *Salvia mellifera* and *Eriogonum fasciculatum*.
28. ~500 plants, with *Salvia leucophylla*, *Yucca whipplei*, *Eriogonum fasciculatum*, and *Bromus madritensis* ssp. *rubens*.
29. ~500 plants, with *Bromus diandrus* and *Adenostoma fasciculatum*.

Palmer's grappling hook (*Harpagonella palmeri*) populations were found in 11 locations on south-facing slopes and ridges. The plants were found in relatively sparsely vegetated and exposed areas within coastal sage scrub on sandy clay soils with gravel, stones, and rocks. Elevations ranged from 1320 feet to 1430 feet. Most plants had flowers and fruit.

1. ~250 plants, with *Hemizonia fasciculata*, *Plantago erecta*, *Eriogonum fasciculatum*, *Bromus madritensis* ssp. *rubens*, and *Hirschfeldia incana*.
2. 5 plants, with *Artemisia californica*, *Hemizonia fasciculata*, *Erodium cicutarium*, and *Plantago erecta*.
3. ~100 plants, with *Hemizonia fasciculata*, *Eriogonum fasciculatum*, *Pectocarya linearis* ssp. *ferocula*, and *Lasthenia californica*.
4. ~500 plants, with *Salvia mellifera*, *Artemisia californica*, *Yucca whipplei*, *Hirschfeldia incana*, *Hemizonia fasciculata*, and *Eriogonum fasciculatum*.
5. ~500 plants, with *Hemizonia fasciculata*, *Eriogonum fasciculatum*, *Yucca whipplei*, *Lotus strigosus*, *Salvia columbariae*, and *Chorizanthe staticoides*.
6. 10 plants, with *Hirschfeldia incana*, *Bromus madritensis* ssp. *rubens*, *Hemizonia fasciculata*, *Yucca whipplei*, and *Salvia columbariae*.
7. ~100 plants, with *Pectocarya linearis* ssp. *ferocula*, *Pectocarya setosa*, *Eriogonum fasciculatum*, *Opuntia basilaris*, *Bromus madritensis* ssp. *rubens*, and *Chorizanthe staticoides*.
8. ~50 plants, with *Hemizonia fasciculata*, *Plantago erecta*, *Pectocarya linearis* ssp. *ferocula*, and *Bromus madritensis* ssp. *rubens*.
9. ~25 plants, with *Eriogonum fasciculatum*, *Hemizonia fasciculata*, *Bromus madritensis* ssp. *rubens*, and *Filago californica*.
10. ~1000 plants, with *Eriogonum fasciculatum*, *Salvia leucophylla*, *Artemisia californica*, and *Hemizonia fasciculata*.
11. ~100 plants, with *Hemizonia fasciculata*, *Plantago erecta*, and *Eriogonum fasciculatum*.

Southern California black walnut (*Juglans californica*) trees occur in three small populations in the developed area of the River Park site used previously as a camp. The area occurs in a valley in the central part of the site, where several other tree species also are found. The walnut trees occur on relatively flat terrain at an elevation of about 1200 feet. Some trees may have been planted; others appear to have grown naturally. The three populations have 5, 4, and 12 trees, respectively. A solitary black walnut tree occurs at the edge of the north bank of the river, among cottonwood trees.

Larkspur (*Delphinium parryi*) was found in 8 locations on north-facing slopes. The plants were observed in openings within coastal sage scrub. Elevations ranged from 1250 feet to 1320 feet. Most plants were flowering.

1. ~20 plants, with *Eriogonum fasciculatum*, *Salvia leucophylla*, and *Artemisia californica*.
2. ~100 plants, with *Salvia leucophylla*, *Eriogonum fasciculatum*, *Artemisia californica*, and *Malacothamnus fasciculatus*.
3. ~50 plants, with *Salvia leucophylla*, *Eriogonum fasciculatum*, *Artemisia californica*, and *Cercocarpus betuloides*.
4. ~100 plants, with *Eriogonum fasciculatum* and *Artemisia californica*.
5. ~25 plants, with *Bromus diandrus* and *Artemisia californica*.
6. ~100 plants, with *Eriogonum fasciculatum*, *Artemisia californica*, and *Melica imperfecta*.
7. ~25 plants, with *Artemisia californica*, *Cercocarpus betuloides*, and *Bromus diandrus*.
8. ~25 plants, with *Eriogonum fasciculatum*, *Artemisia californica*, and *Bromus madritensis* ssp. *rubens*.

The holly-leaf cherry scrub community found in the northeastern corner of the site on relatively flat wash terraces has several understory species that are associates of the sensitive **slender-horned spineflower (*Dodecahema leptoceras*)**, as observed previously from a known population in the region. These species include lastarriaea (*Lastarriaea coriacea*), valley lessingia (*Lessingia glandulifera* var. *glandulifera*), red-stemmed filaree (*Erodium cicutarium*), Mediterranean schismus (*Schismus barbatus*), beavertail cactus (*Opuntia basilaris* var. *basilaris*), and primroses (*Camissonia micrantha*, *C. californica*). At this specific location in the River Park site, the soils are medium to coarse terrace/riverwash sands, also similar to areas where slender-horned spineflower (*Dodecahema leptoceras*) is found. A known location (not on Newhall property) of this sensitive species was checked in April 2003 as a reference; the species had germinated and some plants were flowering. If slender-horned spineflower (*Dodecahema leptoceras*) exists at the River Park site, it should have been observable in 2003, but it was not found.

A known population of the sensitive **San Fernando Valley spineflower (*Chorizanthe parryi* var. *fernandina*)** also was field-checked as a reference in April 2003. This species had germinated and was observed flowering. Although potential habitat exists for this plant at the River Park site, the species was not found.

4. REFERENCES

Hickman, J.C. (Editor). 1993. The Jepson Manual, Higher Plants of California. University of California Press, Berkeley, California.

Holland, R.F. 1986. Preliminary Descriptions of the Terrestrial Natural Communities of California. Unpublished Report. State of California, The Resources Agency, Department of Fish and Game, Natural Heritage Division, Sacramento, California.

APPENDIX A

PLANT SPECIES LIST,
RIVER PARK SITE, LOS ANGELES COUNTY, CALIFORNIA

PLANT SPECIES LIST
RIVER PARK SITE, LOS ANGELES COUNTY, CALIFORNIA

SCIENTIFIC NAME	COMMON NAME	GROWTH FORM
FERNS AND FERN-ALLIES		
Pteridaceae	**Brake Family**	
Pellaea andromedifolia	Coffee fern	PH
Pentagramma triangularis ssp. *triangularis*	Goldenback fern	PH
Selaginellaceae	**Spike-Moss Family**	
Selaginella bigelovii	Bigelow's spike-moss	PH
ANGIOSPERMS - MONOCOTS		
Cyperaceae	**Sedge Family**	
*Cyperus involucratus**	Umbrella plant	PH
Juncaceae	**Rush Family**	
Juncus macrophyllus	Long-leaved rush	PH
Juncus mexicanus	Mexican rush	PH
Liliaceae	**Lily Family**	
Allium haematochiton	Red-skinned onion	PH
Bloomeria crocea	Common goldenstar	PH
Calochortus clavatus var. *gracilis* ■	Slender mariposa lily	PH
Calochortus plummerae ■	Plummer's mariposa lily	PH
Calochortus splendens	Splendid mariposa lily	PH
Chlorogalum pomeridianum var. *pomeridianum*	Wavy-leaved soap plant	PH
Dichelostemma capitatum	Blue dicks	PH
Yucca whipplei	Our Lord's candle	Ss
Poaceae	**Grass Family**	
Achnatherum speciosum	Desert needlegrass	PG
*Arundo donax**	Giant reed	PG
*Avena barbata**	Slender wild oat	AG
*Avena fatua**	Wild oat	AG
*Avena sativa**	Cultivated oat	AG
*Bromus diandrus**	Ripgut grass	AG
*Bromus hordeaceus**	Soft chess	AG
Bromus madritensis ssp. *rubens**	Foxtail chess	AG
*Bromus tectorum**	Cheat grass, Downy brome	AG
*Cynodon dactylon**	Bermuda grass	PG
Distichlis spicata	Saltgrass	PG
Hordeum murinum ssp. *leporinum**	Hare barley	AG
Leymus condensatus	Giant wild-rye	PG
Leymus triticoides	Beardless wild-rye	PG
*Lolium multiflorum**	Italian ryegrass	AG, BG
Melica imperfecta	Coast range melic	PG
Muhlenbergia rigens	Deergrass	PG
Nassella cernua	Nodding needlegrass	PG
Nassella lepida	Foothill needlegrass	PG
Nassella pulchra	Purple needlegrass	PG

PLANT SPECIES LIST
RIVER PARK SITE, LOS ANGELES COUNTY, CALIFORNIA

SCIENTIFIC NAME	COMMON NAME	GROWTH FORM
*Piptatherum miliaceum**	Smilo grass	PG
Poa secunda ssp. *secunda*	One-sided bluegrass	PG
*Polypogon monspeliensis**	Annual beard grass	AG
*Schismus barbatus**	Mediterranean schismus	AG
*Triticum aestivum**	Wheat	AG
Vulpia microstachys var. *pauciflora*	Nuttall's fescue	AG
Vulpia myuros var. *hirsuta**	Rat-tail fescue	AG
Vulpia octoflora var. *octoflora*	Tufted fescue	AG
ANGIOSPERMS - DICOTS		
Anacardiaceae	**Sumac or Cashew Family**	
Rhus trilobata	Skunkbrush	S
*Schinus molle**	Peruvian pepper tree	T
Toxicodendron diversilobum	Western poison oak	S
Apiaceae	**Carrot Family**	
Apiastrum angustifolium	Wild-celery	AH
*Conium maculatum**	Poison hemlock	BH
Daucus pusillus	Rattlesnake weed	AH
Lomatium dasycarpum ssp. *dasycarpum*	Woolly-fruited lomatium	PH
Lomatium mohavense	Desert parsley	PH
Asclepiadaceae	**Milkweed Family**	
Asclepias fascicularis	Narrow-leaf milkweed	PH
Asteraceae	**Sunflower Family**	
Acourtia microcephala	Perezia	PH
Ambrosia acanthicarpa	Annual bur-sage	AH
Ambrosia psilostachya	Western ragweed	AH
Ancistrocarphus filagineus	Woolly fishhooks	AH
Artemisia californica	California sagebrush	S
Artemisia douglasiana	Mugwort	PH
Artemisia dracunculus	Tarragon	PH
Artemisia tridentata ssp. *tridentata*	Big sagebrush	S
Baccharis emoryi	Emory's baccharis	S
Baccharis pilularis	Coyote brush, Chaparral broom	S
Baccharis salicifolia	Mule fat, Seep-willow, Water-wally	S
*Carduus pycnocephalus**	Italian thistle	AH, BH
*Centaurea melitensis**	Tocalote	AH
*Centaurea solstitialis**	Yellow star-thistle	AH
Chaenactis glabriuscula var. *glabriuscula*	Yellow pincushion	AH
*Chamomilla suaveolens**	Pineapple weed, Rayless chamomile	AH
Chrysothamnus nauseosus ssp. *hololeucus*	Rubber rabbitbrush	S
Cirsium occidentale var. *californicum*	California thistle	BH
Cirsium occidentale var. *occidentale*	Cobwebby thistle	BH
*Cirsium vulgare**	Bull thistle	BH

PLANT SPECIES LIST
RIVER PARK SITE, LOS ANGELES COUNTY, CALIFORNIA

SCIENTIFIC NAME	COMMON NAME	GROWTH FORM
*Cnicus benedictus**	Blessed thistle	AH
Conyza canadensis	Horseweed	AH
*Cotula australis**	Australian brass-buttons	AH
Encelia actoni	Acton's encelia	S
Encelia californica	California encelia	S
Ericameria palmeri var. *pachylepis*	Palmer's goldenbush	S
Erigeron foliosus var. *foliosus*	Fleabane aster	Ss
Eriophyllum confertiflorum var. *confertiflorum*	Golden-yarrow	Ss, S
Filago californica	California filago	AH
*Filago gallica**	Narrow-leaved filago	AH
Gnaphalium californicum	California everlasting	AH, BH
Gnaphalium canescens ssp. *microccephalum*	Felty everlasting	BH, PH
Gutierrezia californica	California matchweed	Ss
Hazardia squarrosa var. *grindelioides*	Saw-toothed goldenbush	S
Helianthus annuus	Common sunflower	AH
Helianthus gracilentus	Slender sunflower	PH
Hemizonia fasciculata	Fascicled tarweed	AH
Heterotheca grandiflora	Telegraph weed	AH, PH
Heterotheca sessiliflora ssp. *fastigiata*	Hairy goldenaster	PH
*Hypochaeris glabra**	Smooth cat's-ear	AH
*Lactuca serriola**	Prickly lettuce	AH
Lasthenia californica	Coastal goldfields	AH
Layia glandulosa	White layia	AH
Lepidospartum squamatum	Scale-broom	S
Lessingia filaginifolia var. *filaginifolia*	California-aster	PH, Ss
Lessingia glandulifera var. *glandulifera*	Valley lessingia	AH
Malacothrix saxatilis var. *tenuifolia*	Cliff malacothrix	PH
Psilocarphus tenellus var. *tenellus*	Slender woolly-heads	AH
Rafinesquia californica	California chicory	AH
Senecio flaccidus var. *douglasii*	Bush senecio	Ss
*Senecio vulgaris**	Common groundsel	AH
*Silybum marianum**	Milk thistle	AH, BH
Sonchus asper ssp. *asper**	Prickly sow thistle	AH
*Sonchus oleraceus**	Common sow thistle	AH
Stephanomeria virgata	Wand chicory	AH
Stylocline gnaphaloides	Everlasting nest straw	AH
Tetradymia comosa	Cotton-thorn	S
Uropappus lindleyi	Silver puffs	AH
Xanthium strumarium	Cocklebur	AH
Boraginaceae	**Borage Family**	
Amsinckia menziesii var. *intermedia*	Rancher's fireweed	AH
Amsinckia menziesii var. *menziesii*	Rancher's fireweed	AH

PLANT SPECIES LIST
RIVER PARK SITE, LOS ANGELES COUNTY, CALIFORNIA

SCIENTIFIC NAME	COMMON NAME	GROWTH FORM
Cryptantha intermedia	Large-flowered popcorn flower	AH
Cryptantha micrantha	Hairy purpleroot cryptantha	AH
Cryptantha microstachys	Tejon cryptantha	AH
Cryptantha muricata	Prickly popcorn flower	AH
Cryptantha nevadensis	Nevada cryptantha	AH
Harpagonella palmeri ■	Palmer's grappling hook	AH
Heliotropium curassavicum	Salt heliotrope	PH
Pectocarya linearis ssp. *ferocula*	Slender pectocarya	AH
Pectocarya penicillata	Winged pectocarya	AH
Pectocarya recurvata	Recurved pectocarya	AH
Pectocarya setosa	Bristly pectocarya	AH
Plagiobothrys arizonicus	Popcornflower	AH
Plagiobothrys canescens	Rusty popcornflower	AH
Plagiobothrys nothofulvus	Popcornflower	AH
Brassicaceae	**Mustard Family**	
*Brassica nigra**	Black mustard	AH
Descurainia pinnata ssp. *halictorum*	Western tansy mustard	AH
*Hirschfeldia incana**	Shortpod mustard	BH, PH
Lepidium densiflorum var. *elongatum*	Peppergrass	BH
*Sisymbrium altissimum**	Tumble or Jim Hill mustard	AH
*Sisymbrium irio**	London rocket	AH
Cactaceae	**Cactus Family**	
Opuntia basilaris var. *basilaris*	Beavertail	S
Opuntia littoralis	Coast prickly-pear	S
Opuntia prolifera	Cholla	S
Capparaceae	**Caper Family**	
Isomeris arborea	Bladderpod	S
Caprifoliaceae	**Honeysuckle Family**	
Sambucus mexicana	Blue elderberry	S
Caryophyllaceae	**Pink Family**	
Herniaria hirsuta ssp. *cinerea**	Gray herniaria	AH
Loeflingia squarrosa var. *squarrosa*	California loeflingia	AH
*Spergularia bocconii**	Boccone's sand-spurrey	AH
Chenopodiaceae	**Goosefoot Family**	
Atriplex canescens ssp. *canescens*	Fourwing saltbush, Shad-scale	S
*Atriplex semibaccata**	Australian saltbush	PH, S
*Chenopodium album**	Lamb's quarters, Pigweed	AH
Chenopodium berlandieri	Pitseed goosefoot	AH
Chenopodium californicum	California goosefoot	PH
*Chenopodium murale**	Nettle-leaved goosefoot	AH
*Salsola tragus**	Russian thistle, Tumbleweed	AH

PLANT SPECIES LIST
RIVER PARK SITE, LOS ANGELES COUNTY, CALIFORNIA

SCIENTIFIC NAME	COMMON NAME	GROWTH FORM
Convolvulaceae	**Morning-Glory Family**	
Calystegia peirsonii■	Peirson's morning-glory	PH
Crassulaceae	**Stonecrop Family**	
Crassula connata	Pygmy-weed	AH
Dudleya lanceolata	Lance-leaf live-forever	PH
Cucurbitaceae	**Gourd Family**	
Marah macrocarpus var. *macrocarpus*	Wild cucumber	PH
Cuscutaceae	**Dodder Family**	
Cuscuta californica var. *californica*	California dodder	AV
Euphorbiaceae	**Spurge Family**	
Chamaesyce albomarginata	Rattlesnake weed	PH
Chamaesyce polycarpa	Small-seed sandmat	PH
Eremocarpus setigerus	Dove weed, Turkey mullein	AH
*Ricinus communis**	Castor bean	S
Stillingia linearifolia	Linear-leaved stillingia	PH
Fabaceae	**Legume Family**	
Astragalus didymocarpus var. *didymocarpus*	Two-seeded milkvetch	AH
Astragalus didymocarpus var. *obispoensis*	Two-seeded milkvetch	AH
Astragalus gambelianus	Gambell's locoweed	AH
Astragalus trichopodus var. *phoxus*	Santa Barbara locoweed	PH
Lotus hamatus	San Diego lotus	AH
Lotus salsuginosus var. *salsuginosus*	Coastal lotus	AH
Lotus scoparius var. *scoparius*	California broom	PH, S
Lotus strigosus	Strigose lotus	AH
Lotus wrangelianus	Chilean lotus	AH
Lupinus bicolor	Miniature lupine	AH
Lupinus concinnus	Bajada lupine	AH
Lupinus excubitus var. *excubitus*	Grape soda lupine	S
Lupinus hirsutissimus	Stinging lupine	AH
Lupinus microcarpus var. *densiflorus*	Chick lupine	AH
Lupinus microcarpus var. *microcarpus*	Chick lupine	AH
Lupinus sparsiflorus	Coulter's lupine	AH
Lupinus succulentus	Arroyo lupine	AH
Lupinus truncatus	Collar lupine	AH
*Medicago polymorpha**	California burclover	AH
*Melilotus albus**	White sweetclover	AH, BH
*Melilotus indicus**	Sourclover	AH
*Parkinsonia aculeata**	Mexican palo verde	T
Trifolium albopurpureum var. *albopurpureum*	Rancheria clover	AH
Trifolium gracilentum var. *gracilentum*	Pinpoint clover	AH
*Trifolium hirtum**	Rose clover	AH
Vicia villosa ssp. *varia**	Hairy or winter vetch	AH

PLANT SPECIES LIST
RIVER PARK SITE, LOS ANGELES COUNTY, CALIFORNIA

SCIENTIFIC NAME	COMMON NAME	GROWTH FORM
Fagaceae	**Oak Family**	
Quercus agrifolia var. *agrifolia*	Coast live oak	T
Quercus john-tuckeri	Tucker's oak	S, T
Quercus lobata	Valley oak, Roble	T
Geraniaceae	**Geranium Family**	
*Erodium botrys**	Long-beaked filaree	AH
*Erodium cicutarium**	Red-stemmed filaree	AH
Grossulariaceae	**Gooseberry Family**	
Ribes aureum var. *gracillimum*	Golden currant	S
Hydrophyllaceae	**Waterleaf Family**	
Emmenanthe penduliflora	Whispering bells	AH
Eriodictyon crassifolium var. *nigrescens*	Thickleaf yerba santa	S
Eucrypta chrysanthemifolia	Common eucrypta	AH
Phacelia cicutaria var. *hispida*	Caterpillar phacelia	AH
Phacelia distans	Fern-leaf phacelia	AH
Phacelia minor	Wild canterbury-bell	AH
Phacelia ramosissima	Branching phacelia	PH
Phacelia tanacetifolia	Tansy phacelia	AH
Juglandaceae	**Walnut Family**	
Juglans californica■	Southern California black walnut	S, T
Lamiaceae	**Mint Family**	
*Marrubium vulgare**	Horehound	PH
Salvia apiana	White sage	Ss
Salvia columbariae	Chia	AH
Salvia leucophylla	Purple sage	S
Salvia mellifera	Black sage	S
Trichostema lanatum	Woolly bluecurls	S
Malvaceae	**Mallow Family**	
Malacothamnus fasciculatus	Chaparral mallow	S
*Malva nicaeensis**	Bull mallow	AH, BH
*Malva parviflora**	Cheeseweed, Little mallow	AH
Myrtaceae	**Myrtle Family**	
*Eucalyptus globulus**	Blue gum	T
Nyctaginaceae	**Four O'clock Family**	
Mirabilis californica	Wishbone bush	PH, Ss
Onagraceae	**Evening Primrose Family**	
Camissonia bistorta	California sun cup	AH, PH
Camissonia californica	Mustard evening primrose	AH
Camissonia campestris ssp. *campestris*	Mojave sun cup	AH
Camissonia confusa	Sun cup	AH
Camissonia hirtella	Sun cup	AH
Camissonia micrantha	Small evening primrose	AH

PLANT SPECIES LIST
RIVER PARK SITE, LOS ANGELES COUNTY, CALIFORNIA

SCIENTIFIC NAME	COMMON NAME	GROWTH FORM
Camissonia strigulosa	Contorted evening primrose	AH
Clarkia purpurea ssp. *quadrivulnera*	Four-spot clarkia	AH
Clarkia unguiculata	Elegant clarkia	AH
Epilobium canum	California fuchsia, Zauschneria	PH, Ss
Oenothera californica ssp. *californica*	California evening primrose	PH
Papaveraceae	**Poppy Family**	
Eschscholzia californica	California poppy	AH, PH
Plantaginaceae	**Plantain Family**	
Plantago erecta	California plantain	AH
Platanaceae	**Sycamore Family**	
Platanus racemosa	Western sycamore	T
Polemoniaceae	**Phlox Family**	
Eriastrum densifolium ssp. *elongatum*	Mesa phlox	PH
Eriastrum densifolium ssp. *mohavense*	Mesa phlox	PH
Eriastrum sapphirinum	Sapphire woolly-star	AH
Gilia angelensis	Grassland gilia	AH
Gilia capitata ssp. *abrotanifolia*	Globe gilia	AH
Polygonaceae	**Buckwheat Family**	
Chorizanthe staticoides	Turkish rugging	AH
Eriogonum baileyi var. *baileyi*	Buckwheat	AH
Eriogonum brachyanthum	Buckwheat	AH
Eriogonum elongatum var. *elongatum*	Long-stemmed buckwheat	Ss, S
Eriogonum fasciculatum var. *foliolosum*	California buckwheat	S
Eriogonum fasciculatum var. *polifolium*	California buckwheat	S
Eriogonum gracile var. *gracile*	Slender buckwheat	AH
Eriogonum thurberii	Buckwheat	AH
Lastarriaea coriacea	Lastarriaea	AH
*Polygonum arenastrum**	Common knotweed, Doorweed	AH, PH
Pterostegia drymarioides	California thread-stem	AH
*Rumex conglomeratus**	Green dock	PH
*Rumex crispus**	Curly dock	PH
Rumex hymenosepalus	Wild-rhubarb	PH
*Rumex obtusifolius**	Bitter dock	PH
Portulacaceae	**Purslane Family**	
Calandrinia ciliata	Red maids	AH
Calyptridium monandrum	Common calyptridium	PH
Claytonia perfoliata ssp. *perfoliata*	Miner's lettuce	AH
Ranunculaceae	**Buttercup Family**	
Delphinium parryi	Larkspur	PH
Rhamnaceae	**Buckthorn Family**	
Rhamnus crocea	Spiny redberry	S

PLANT SPECIES LIST
RIVER PARK SITE, LOS ANGELES COUNTY, CALIFORNIA

SCIENTIFIC NAME	COMMON NAME	GROWTH FORM
Rosaceae	**Rose Family**	
Adenostoma fasciculatum	Chamise	S
Cercocarpus betuloides var. *betuloides*	Birch-leaf mountain-mahogany	S
Heteromeles arbutifolia	Toyon, Christmas berry	S, T
Prunus fasciculata var. *fasciculata*	Desert almond	S
Prunus ilicifolia ssp. *ilicifolia*	Holly-leafed cherry, Islay	S, T
Rubiaceae	**Madder Family**	
Galium angustifolium ssp. *angustifolium*	Narrow-leaved bedstraw	PH
Salicaceae	**Willow Family**	
Populus fremontii ssp. *fremontii*	Fremont or Alamo cottonwood	T
Salix exigua	Narrow-leaved willow	S
Salix laevigata	Red willow	T
Salix lasiolepis	Arroyo willow	S, T
Scrophulariaceae	**Figwort Family**	
Antirrhinum coulterianum	White snapdragon	AH
Castilleja exserta	Purple owl's-clover	AH
Castilleja foliolosa	Woolly Indian paintbrush	PH, Ss
Penstemon centranthifolius	Scarlet bugler	PH
Veronica peregrina ssp. *xalapensis*	Purslane speedwell	AH
Solanaceae	**Nightshade Family**	
Datura wrightii	Jimson weed	AH, PH
*Nicotiana glauca**	Tree tobacco	T
Nicotiana quadrivalvis	Wallace's tobacco	AH
Solanum douglasii	White nightshade	PH, Ss
Solanum xanti	Purple nightshade	PH, Ss
Tamaricaceae	**Tamarisk Family**	
*Tamarix parviflora**	Small-flowered tamarisk	S, T
*Tamarix ramosissima**	Mediterranean tamarisk	S, T
Urticaceae	**Nettle Family**	
Urtica dioica ssp. *holosericea*	Hoary nettle	PH
Viscaceae	**Mistletoe Family**	
Phoradendron macrophyllum	Big leaf mistletoe	S
Phoradendron villosum	Oak mistletoe	S

NOTES:

1. Species observed during field surveys conducted by FL*x*, April 9 through April 19, May 23, and June 16, 2003.

2. Scientific and common names are from Hickman (1993), Smith (1998), and Skinner and Pavlik (1994). Additional common plant names are taken from Abrams (1923, 1944), Abrams and Ferris (1951, 1960), Beauchamp (1986), McAuley (1996), Munz (1974), Raven (1986), Roberts (1989), and Sawyer and Keeler-Wolf (1995).

3. Growth Form indicates species growth habit:
AG = Annual Grass; AH = Annual Herb; AV = Annual Vine; BG = Biennial Grass; BH = Biennial Herb; PG = Perennial Grass; PH = Perennial Herb; PV = Perennial Vine; Ss = Subshrub; S = Shrub; T = Tree.

* Non-native plant species
▪ Sensitive plant species

APPENDIX B

CNDDB DATA FORMS

Mail to:
California Natural Diversity Database
Department of Fish and Game
1807 13th Street, Suite 202
Sacramento, CA 95814
Fax: (916) 324-0475
http://www.dfg.ca.gov/whdab/natspec.pdf

Date of Field Work: 4 - 25 - 2003

For Office Use Only
Source Code _____ Quad Code _____
Elm Code _____ Occ. No. _____
EO Index No. _____ Map Index No. _____

California Native Species Field Survey Form

Scientific Name: *Calochortus clavatus var. gracilis*

Common Name: Slender mariposa lily

Species Found? ☑ Yes ☐ No _____ If not, why?

Total No. Individuals 80 Subsequent Visit? ☐ yes ☑ no
Is this an existing NDDB occurrence? _____ Yes, Occ. # ☑ no ☐ unk.

Collection? If yes: _____ Number _____ Museum / Herbarium

Reporter: Anuja Parikh, Nathan Gale, FLx
Address: 1215 Bajada, Santa Barbara, CA 93109

E-mail Address: flx.sb@cox.net
Phone: (805) 564-1352

Plant Information

Phenology: 10.00 % vegetative 90.00 % flowering _____ % fruiting

Animal Information

_____ # adults _____ # juveniles _____ # larvae _____ # egg masses _____ # unknown

☐ breeding ☐ wintering ☐ burrow site ☐ rookery ☐ nesting ☐ other

Location Description ***(please attach map AND/OR fill out your choice of coordinates, below)***

County: Los Angeles Landowner / Mgr.: Newhall Land and Farming Co.
Quad Name: Newhall Elevation: 1300 ft
T____ R __ Sec ____ , ____ ¼ of _____ ¼, Meridian: H☐ M☐ S☐ Source of Coordinates (GPS, topo. map & type): GPS
T____ R __ Sec ____ , ____ ¼ of _____ ¼, Meridian: H☐ M☐ S☐ GPS Make & Model Garmin Etrex Legend
Datum: NAD27 ☐ NAD83 ☑ WGS84 ☐ Horizontal Accuracy 5 meters meters/feet
Coordinate System: UTM Zone 10 ☐ UTM Zone 11 ☑ *OR* Geographic (Latitude & Longitude) ☐
Coordinates: Easting/Longitude 0359593 Northing/Latitude 3810487

Habitat Description *(plant communities, dominants, associates, substrates/soils, aspects/slope):*

Openings in coastal sage scrub, with Eriogonum fasciculatum, Artemisia californica, Salvia leucophylla, Salvia mellifera, and Bromus madritensis ssp. rubens. Sandy clay soils with gravel and stones. North-facing slopes, 20 to 30 degrees.

Other rare species?

Site Information Overall site quality: ☐ Excellent ☑ Good ☐ Fair ☐ Poor

Current / surrounding land use: Commercial and residential

Visible disturbances:

Threats: Development

Comments: Plants found in 12 locations with few plants in each location. Data provided are for the largest population of about 50 plants

Determination: *(check one or more, and fill in blanks)*
☐ Keyed (cite reference): Jepson Manual
☐ Compared with specimen housed at: _____
☐ Compared with photo / drawing in: _____
☐ By another person (name): _____
☐ Other: Personal experience

Photographs: *(check one or more)* Slide Print
Plant / animal ☐ ☐
Habitat ☐ ☐
Diagnostic feature ☐ ☐

May we obtain duplicates at our expense? ☐ yes ☐ no

Mail to:
California Natural Diversity Database
Department of Fish and Game
1807 13th Street, Suite 202
Sacramento, CA 95814
Fax: (916) 324-0475
http://www.dfg.ca.gov/whdab/natspec.pdf

Date of Field Work: 6 - 16 - 2003

For Office Use Only
Source Code _____ Quad Code _____
Elm Code _____ Occ. No. _____
EO Index No. _____ Map Index No. _____

California Native Species Field Survey Form

Scientific Name: *Calochortus plummerae*

Common Name: Plummer's mariposa lily

Species Found? ☑ Yes ☐ No _____ If not, why?

Total No. Individuals 7 Subsequent Visit? ☐ yes ☑ no
Is this an existing NDDB occurrence? _____ Yes, Occ. # ☑ no ☐ unk.

Collection? If yes: _____ Number _____ Museum / Herbarium

Reporter: Anuja Parikh, Nathan Gale, FLx
Address: 1215 Bajada, Santa Barbara, CA 93109
E-mail Address: flx.sb@cox.net
Phone: (805) 564-1352

Plant Information

Phenology: _____ % vegetative 50.00 % flowering 50.00 % fruiting

Animal Information

_____ # adults _____ # juveniles _____ # larvae _____ # egg masses _____ # unknown

☐ breeding ☐ wintering ☐ burrow site ☐ rookery ☐ nesting ☐ other

Location Description ***(please attach map AND/OR fill out your choice of coordinates, below)***

County: Los Angeles Landowner / Mgr.: Newhall Land and Farming Co.
Quad Name: Newhall Elevation: 1225-1335ft
T____ R __ Sec ____ , ____ ¼ of _____ ¼, Meridian: H☐ M☐ S☐ Source of Coordinates (GPS, topo. map & type): GPS
T____ R __ Sec ____ , ____ ¼ of _____ ¼, Meridian: H☐ M☐ S☐ GPS Make & Model Garmin Etrex Legend
Datum: NAD27 ☐ NAD83 ☑ WGS84 ☐ Horizontal Accuracy 5 meters meters/feet
Coordinate System: UTM Zone 10 ☐ UTM Zone 11 ☑ *OR* Geographic (Latitude & Longitude) ☐
Coordinates: Easting/Longitude 0360675, 0360534, 0360099 Northing/Latitude 3810163, 3810149, 3809754

Habitat Description *(plant communities, dominants, associates, substrates/soils, aspects/slope):*

Three locations, as specified above by the coordinates, with 3, 1, and 3 plants, respectively.
Plants at all locations in coastal sage scrub, with Eriogonum fasciculatum, Artemisia californica, Salvia mellifera, Hemizonia fasciculata, Hirschfeldia incana, Erodium cicutarium, and Bromus madritensis ssp. rubens. Calochortus splendens plants were present nearby on earlier visits. Sandy clay soil with gravel and stones. South- and southwest-facing slopes and ridgetops, 0 to 15 degrees.

Other rare species?

Site Information Overall site quality: ☐ Excellent ☑ Good ☐ Fair ☐ Poor

Current / surrounding land use: Commercial and residential

Visible disturbances:

Threats: Development

Comments:

Determination: *(check one or more, and fill in blanks)*
☐ Keyed (cite reference): Jepson Manual
☐ Compared with specimen housed at: _____
☐ Compared with photo / drawing in: _____
☐ By another person (name): _____
☐ Other: Personal experience

Photographs: *(check one or more)* Slide Print
Plant / animal ☐ ☐
Habitat ☐ ☐
Diagnostic feature ☐ ☐

May we obtain duplicates at our expense? ☐ yes ☐ no

FLx. ***Rare Plant Surveys and Vegetation Mapping Riverpark.*** **May 2002b.**

RARE PLANT SURVEYS
AND VEGETATION MAPPING

RIVER PARK
NEWHALL RANCH/VALENCIA COMPANY PROJECT SITES
LOS ANGELES COUNTY, CA

Submitted to:

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May 2002

1. INTRODUCTION

The River Park site in the Newhall Ranch/Valencia Company project area, Los Angeles County, California, was surveyed for rare plant species and vegetation types from April 24 through April 27, 2002. The site is located about 2.5 miles east of the junction of Interstate 5 and Magic Mountain Parkway. It is bounded on the south by Soledad Canyon Road and on the west by Bouquet Canyon Road. Commercial and residential development occurs in most of the area surrounding the site. The project area contains a mixture of previously disturbed and undisturbed areas. The Santa Clara River runs through the southern part of the site in an east-west direction.

A team of two consultants from FL*x* (Dr. Anuja Parikh and Dr. Nathan Gale) conducted the vegetation and rare plant surveys. Vegetation types and plant species associations were mapped for the site during the walk-over surveys, and additionally by viewing the area from vantage points on ridges or hilltops. A list of plant species including rare and commonly occurring plants observed at the site was compiled. Plant community descriptions in this report follow Holland (1986) where applicable; species nomenclature follows Hickman (1993).

2. VEGETATION TYPES AND PLANT SPECIES ASSOCIATIONS

The River Park project area is composed of variable terrain, ranging from relatively flat riverwash, secondary washes, and terrace areas, to previously disturbed flat areas or fields above the banks of the Santa Clara River, to hillslopes in the northern part of the site.

Disked Fields. Many areas of the project site comprise fields that have been disturbed previously by disking. These fields now have grass cover and ruderal vegetation with native and non-native species. Species observed included bromegrasses (*Bromus diandrus*, *B. madritensis* ssp. *rubens*), hare barley (*Hordeum murinum*), shortpod mustard (*Hirschfeldia incana*), red-stemmed filaree (*Erodium cicutarium*), goosefoot (*Chenopodium album*, *C. californicum*), rancher's fireweed (*Amsinckia menziesii*), poverty weed (*Iva axillaris* ssp. *robustior*), and Jimson weed (*Datura wrightii*).

Non-Native Grassland. This community occurs on relatively flat terrain and sometimes on gentle hillslopes throughout the River Park site. Annual introduced grasses up to about 0.5 m tall are dominant in non-native grasslands; annual herb species also are found. Flowering occurs in spring, and the plants mostly are dead in summer and fall. Non-native grasslands occur on fine-textured, usually clay soils, that are moist to wet in the winter but dry in the summer and fall (Holland, 1986). Grass species found at the site include mainly bromegrasses (*Bromus diandrus*, *B. madritensis* ssp. *rubens*, *B. hordeaceus*) and wild oats (*Avena barbata*, *A. fatua*). Introduced herbaceous ruderal species also are found, and commonly include red-stemmed filaree (*Erodium cicutarium*), small-seed sandmat (*Chamaesyce polycarpa*), and shortpod mustard (*Hirschfeldia incana*). Scattered native plants found in this community include wishbone bush (*Mirabilis californica*), California fuschia (*Epilobium canum*), tansy phacelia (*Phacelia tanacetifolia*), and California thistle (*Cirsium occidentale* var. *californicum*).

Non-Native Grassland with Scattered Shrubs. In a few areas covered with non-native grasses, also on relatively flat terrain and on gentle slopes, shrubs are sparsely distributed in the grassland. These native shrubs include California buckwheat (*Eriogonum fasciculatum*), goldenbush (*Ericameria palmeri* var. *pachylepis*), skunkbrush (*Rhus trilobata*), and California sagebrush (*Artemisia californica*).

Planted Scrub. In the northwestern part of the River Park project area, several slopes have been cut or graded for the installation of water lines and concrete-lined drainage channels. These relatively steep slopes have been restored by planting native shrubs, primarily California buckwheat (*Eriogonum fasciculatum*); some California sagebrush (*Artemisia californica*) also occurs.

Riversidian Sage Scrub. This community is the most xeric type of coastal sage scrub south of Point Conception in California (Holland, 1986), and is found along the coastal side of the Transverse and Peninsular Ranges. It contains low, soft-woody shrubs up to 1 m tall. Plant growth occurs in late winter and spring after the rains, with most species flowering in spring and summer. Typical stands are relatively open and dominated by California sagebrush (*Artemisia californica*), California buckwheat (*Eriogonum fasciculatum*), and annual grasses such as foxtail chess (*Bromus madritensis* ssp. *rubens*), each attaining 20 percent or greater cover. Riversidian sage scrub is found on xeric sites such as steep slopes, severely drained soils, or relatively clayey soils that are slow to release moisture. It intergrades with several southern California chaparrals. On the River Park site, this community is found on sloping terrain throughout the site; the dominant species is California buckwheat (*Eriogonum fasciculatum* var. *foliolosum*). Other less dominant plants include thickleaf yerba santa (*Eriodictyon crassifolium* var. *nigrescens*), California sagebrush (*Artemisia californica*), sages (*Salvia mellifera*, *S. apiana S. leucophylla*), goldenbush (*Ericameria palmeri* var. *pachylepis*), encelias (*Encelia actoni*, *E. californica*), chaparral mallow (*Malacothamnus fasciculatus*), Our Lord's candle (*Yucca whipplei*), linear-leaved stillingia (*Stillingia linearifolia*), California-aster (*Lessingia filaginifolia* var. *filaginifolia*), California broom (*Lotus scoparius*), beavertail cactus (*Opuntia basilaris* var. *basilaris*), giant wild-rye (*Leymus condensatus*), and cotton-thorn (*Tetradymia comosa*). Introduced annual grasses prevalent in the understory are dominated by foxtail chess (*Bromus madritensis* ssp. *rubens*) and slender wild oat (*Avena barbata*). Native needlegrasses (*Nassella cernua*, *N. lepida*) also are scattered in the understory. Among herbaceous species found in this community, the non-native shortpod mustard (*Hirschfeldia incana*), red-stemmed filaree (*Erodium cicutarium*), and tocalote (*Centaurea melitensis*) is present, as well as the native wishbone bush (*Mirabilis californica*), fascicled tarweed (*Hemizonia fasciculata*), woolly-fruited lomatium (*Lomatium dasycarpum* ssp. *dasycarpum*), malacothrix (*Malacothrix saxatilis* var. *tenuifolia*), and chia (*Salvia columbariae*). With respect to sensitivity status, Riversidian sage scrub has been state-ranked as S3.1 (10,000 to 50,000 acres, very threatened) by the CNDDB.

Chamise Chaparral. This type of chaparral is found in small scattered patches on flat to sloping terrain, mostly in the northeastern part of the River Park site. Chamise chaparral is the most common type of chaparral in southern California, and is dominated by chamise (*Adenostoma fasciculatum*) shrubs 1 to 3 m tall. It is often dense and impenetrable and has a sparse understory (Holland, 1986). It is adapted to repeated fires, and is found on shallow, dry soils on xeric slopes and ridges. Growth is highest in the spring and reduced in the summer; flowering occurs from late winter to early summer. Typically, several other native shrubs also occur in this chaparral, but at the River Park site, the small patches of this community are made up almost exclusively of chamise (*Adenostoma fasciculatum*). With respect to sensitivity status, chamise chaparral has been state-ranked as S4 (apparently secure) by the CNDDB.

Coastal Sage - Chaparral Scrub. In some areas of the site, on mostly west-facing slopes, a mix of Riversidian sage scrub and chamise chaparral species occurs. The overstory is relatively open, and the understory in these areas often has annual grasses and herbaceous species. Common species include chamise (*Adenostoma fasciculatum*), California buckwheat (*Eriogonum fasciculatum* var. *foliolosum*), California sagebrush (*Artemisia californica*), chaparral mallow (*Malacothamnus fasciculatus*) and black

sage (*Salvia mellifera*).

Holly-Leaf Cherry Scrub. In the northeastern corner of the site on relatively flat terrain, a unique stand of holly-leaf cherry scrub is found. It occurs on the low terraces of a secondary wash that leads to the Santa Clara River. The stand is dominated by relatively large, mature shrubs of holly-leaf cherry (*Prunus ilicifolia* ssp. *ilicifolia*), 3 to 5 m in height; other shrub associates are skunkbrush (*Rhus trilobata*) and spiny redberry (*Rhamnus crocea*). Other native species found in the understory of these shrubs include woolly star (*Eriastrum densifolium* ssp. *elongatum*), scarlet bugler (*Penstemon centranthifolius*), and linear-leaved stillingia (*Stillingia linearifolia*). Also found in this community are the species red-stemmed filaree (*Erodium cicutarium*), lastarriaea (*Lastarriaea coriacea*), valley lessingia (*Lessingia glandulifera* var. *glandulifera*), Mediterranean schismus (*Schismus barbatus*), beavertail cactus (*Opuntia basilaris* var. *basilaris*), and primroses (*Camissonia micrantha, C. californica*). With respect to sensitivity status, mainland cherry forest has been state-ranked as S1.1 (<2,000 acres, very threatened) by the CNDDB. The canopy cover of the holly-leaf cherry shrubs at this site did not amount to a forest canopy. Holly-leaf cherry scrub, as identified in this survey, is not defined in Holland (1986), and therefore, it has no assigned ranking. However, it should be recognized as a unique and sensitive community at the site.

Mule Fat Scrub. Several very small patches of this community occur mostly in the western part of the River Park site, adjacent to the river floodplain. Mule fat scrub typically is a tall, semi-woody and herbaceous riparian scrub, and is relatively species-poor. An early seral community, it often grades to riparian woodland or forest (Holland, 1986). The dominant species found in this community is the native species mule fat (*Baccharis salicifolia*). The understory includes mostly introduced species such as bromegrasses (*Bromus* spp.) and shortpod mustard (*Hirschfeldia incana*). With respect to sensitivity status, mule fat scrub has been state-ranked as S4 (apparently secure) by the CNDDB.

Southern Willow Scrub. Several small patches of this community occur in tributary drainages of the River Park site. Willow scrub is a broadleaved, winter-deciduous riparian community, typically too dense to allow understory development. It is a relatively early seral community, succeeding to cottonwood-sycamore forests (Holland, 1996). In the project area, this community includes willows (*Salix lasiolepis, S. exigua*), Fremont cottonwood (*Populus fremontii* ssp. *fremontii*), Mexican elderberry (*Sambucus mexicana*), tree tobacco (*Nicotiana glauca*), mule fat (*Baccharis salicifolia*), and western poison oak (*Toxicodendron diversilobum*). The understory is sparse or absent, but sometimes includes species such as Mexican rush (*Juncus mexicanus*), western ragweed (*Ambrosia psilostachya*), and giant wild-rye (*Leymus condensatus*). With respect to sensitivity status, southern willow scrub has been state-ranked as S2.1 (2,000 to 10,000 acres, very threatened) by the CNDDB.

Southern Riparian Scrub. This community is found on the Santa Clara River floodplain, on relatively flat terraces immediately adjacent to the riverbed; some branched channels of the river cross this community. A combination of mule fat scrub and southern willow scrub species is found on the terraces, including mule fat (*Baccharis salicifolia*), willows (*Salix exigua, S. lasiolepis, S. laevigata*), Fremont cottonwood (*Populus fremontii* ssp. *fremontii*), tamarisk (*Tamarix* sp.), scale-broom (*Lepidospartum squamatum*), and arundo (*Arundo donax*). In addition, other native species include Great Basin sagebrush (*Artemisia tridentata*), shad-scale (*Atriplex canescens* ssp. *linearis*), Mexican elderberry (*Sambucus mexicana*), thickleaf yerba santa (*Eriodictyon crassifolium* var. *nigrescens*), cholla (*Opuntia prolifera*), and mugwort (*Artemisia douglasiana*). With respect to sensitivity status, southern

riparian scrub has been state-ranked as S3.2 (10,000 to 50,000 acres, threatened) by the CNDDB.

Riverwash. The main channel of the Santa Clara River is sparsely vegetated and is subject to scouring by the river. Soils are sandy riverwash and gravel, and in places form sand bars and low terraces within the channel. No well-defined plant community is found here, although scattered elements of southern riparian scrub were observed. Shrub species found in the dry riverbed are mule fat (*Baccharis salicifolia*), tamarisk (*Tamarix* sp.), scale-broom (*Lepidospartum squamatum*), arundo (*Arundo donax*), California broom (*Lotus scoparius*), woolly star (*Eriastrum densifolium* ssp. *elongatum*), and California buckwheat (*Eriogonum fasciculatum* var. *foliolosum*). Smaller plants growing in the riverbed include buckwheat (*Eriogonum baileyi*), Mediterranean schismus (*Schismus barbatus*), cryptantha (*Cryptantha micrantha*), hairy goldenaster (*Heterotheca sessiliflora* ssp. *fastigiata*), tumble mustard (*Sisymbrium altissimum*), foxtail chess (*Bromus madritensis* ssp. *rubens*), slender pectocarya (*Pectocarya linearis* ssp. *ferocula*), and annual bur-sage (*Ambrosia acanthicarpa*). Fremont cottonwoods (*Populus fremontii* ssp. *fremontii*) and willows (*Salix* spp.) are found scattered individually or in small clumps in the channel; no riparian forest is found.

Oak Woodland. Small patches of oak woodland occur in the central part of the River Park site, mostly on or at the base of north-facing and west-facing slopes. Typically, oak woodlands have a single dominant species, but at the River Park site, three species are found intermixed in the oak woodland areas: the evergreen coast live oak (*Quercus agrifolia* var. *agrifolia*) and Tucker's oak (*Quercus john-tuckeri*), and the winter-deciduous valley oak (*Quercus lobata*). Coast live oaks (*Quercus agrifolia* var. *agrifolia*) can reach 10 to 25 m in height, and occur away from the direct influence of the ocean in shaded canyons and on north-facing slopes (Holland, 1986). Tucker's oak (*Quercus john-tuckeri*) is a shrubby oak that grows 2 to 5 m tall, and is relatively uncommon and restricted in range to interior southern California locations. Valley oaks (*Quercus lobata*) are California's largest broad-leaved tree, reaching 15 to 35 m in height, and occur on alluvial soils in valleys, and also on slopes in the South Coast Ranges. At the River Park site, some large mature individuals of valley oak (*Quercus lobata*) also are scattered in disked fields. The shrub layer in oak woodlands generally is poorly developed, and the herb layer often has annual grasses, which have replaced the native perennial grasses once commonly associated with this community.

Developed Area with Mixed Trees. In the central part of the River Park site, there is an area that apparently was used as a camp in the past. Currently, it is occupied by a construction company, with buildings, trailers, and equipment storage areas. Many large and mature native and non-native trees occur in this developed area, some of which may be plantings, and some natural. Species observed include western sycamore (*Platanus racemosa*), Fremont cottonwood (*Populus fremontii* ssp. *fremontii*), Mexican elderberry (*Sambucus mexicana*), eucalyptus (*Eucalyptus* spp.), Peruvian pepper tree (*Schinus molle*), and various conifers.

3. RARE PLANT SPECIES

The rare plant surveys were carried out in late April to accommodate the blooming periods of various species potentially occurring in the region, or previously reported by the CNDDB. Surveys were conducted earlier than typically would be the case (May through July), due to a very low rainfall year in southern California that has resulted in annual plants having a particularly short-lived season. A list of target species potentially occurring at the site is presented in Table 1; these species were searched for

during the focused rare plant surveys.

TABLE 1: SENSITIVE PLANT SPECIES POTENTIALLY OCCURRING ON THE NEWHALL RANCH/VALENCIA COMPANY PROPERTY SITES

Scientific Name	Common Name	Family	Status* Federal/State/CNPS
Astragalus brauntonii	Braunton's milk-vetch	Fabaceae	FE/-/1B
Berberis nevinii	Nevin's barberry	Berberidaceae	FE/SE/1B
Calochortus clavatus var. *gracilis*	Slender mariposa lily	Liliaceae	FSC/-/1B
Calochortus plummerae	Plummer's mariposa lily	Liliaceae	FSC/-/1B
Calystegia peirsonii	Peirson's morning-glory	Convolvulaceae	FSC/-/4
Chorizanthe parryi var. *fernandina*	San Fernando Valley spineflower	Polygonaceae	FC/SE/1B
Deinandra minthornii	Santa Susana tarplant	Asteraceae	FSC/SR/1B
Delphinium parryi ssp. *blochmaniae*	Dune larkspur	Ranunculaceae	-/-/1B
Dodecahema leptoceras	Slender-horned spineflower	Polygonaceae	FE/SE/1B
Dudleya blochmaniae ssp. *blochmaniae*	Blochman's dudleya	Crassulaceae	FSC/-/1B
Dudleya multicaulis	Many-stemmed dudleya	Crassulaceae	FSC/-/1B
Harpagonella palmeri var. *palmeri*	Palmer's grappling hook	Boraginaceae	FSC/-/4
Juglans californica var. *californica*	Southern California black walnut	Juglandaceae	-/-/4
Juncus acutus ssp. *leopoldii*	Southwestern spiny rush	Juncaceae	-/-/4
Opuntia basilaris var. *brachyclada*	Short-joint beavertail	Cactaceae	FSC/-/1B
Perideridia pringlei	Pringle's yampah	Apiaceae	-/-/4
Senecio aphanactis	Rayless ragwort	Asteraceae	-/-/2

* FE = Federal endangered
FC = Federal candidate
FSC = Federal species of concern
SE = State/California endangered
SR = State/California rare
1B = CNPS List 1B, rare or endangered in California and elsewhere
2 = CNPS List 2, rare or endangered in California, more common elsewhere
4 = CNPS List 4, plants of limited distribution

Two sensitive species were found in the project area during the current surveys: Peirson's morning-glory (*Calystegia peirsonii*) and southern California black walnut (*Juglans californica* var. *californica*), both CNPS List 4 species. A summary of the populations of these species located at the site is provided below. These population locations, as numbered below, have been marked on the accompanying topographical map.

Peirson's morning-glory (*Calystegia peirsonii*) populations were found in 24 locations on relatively gentle slopes (generally south-facing) or in flat areas. The plants are associated with various grassland and coastal sage scrub species. Elevations range from 1250 feet to 1450 feet, and the soils are sandy to gravelly/stony in texture. Most plants were in vegetative form; some were flowering.

1. 5 plants, with *Bromus madritensis* ssp. *rubens*, *Bromus hordeaceus*, *Hirschfeldia incana*, near *Eriogonum fasciculatum*.
2. ~300 plants, with *Eriogonum fasciculatum*, *Bromus madritensis* ssp. *rubens*, near *Salvia*

mellifera.

3. ~100 plants, with *Bromus madritensis* ssp. *rubens*, *Avena barbata*, *Hirschfeldia incana*, near *Eriogonum fasciculatum.*
4. ~300 plants, with *Bromus madritensis* ssp. *rubens*, *Avena barbata*, *Lotus scoparius*, near *Artemisia californica* and *Malacothamnus fasciculatus.*
5. ~100 plants, with *Eriogonum fasciculatum*, *Bromus madritensis* ssp. *rubens*, near *Sambucus mexicana.*
6. ~50 plants, with *Bromus diandrus*, *Hirschfeldia incana*, and *Ericameria palmeri* var. *pachylepis.*
7. ~20 plants, with *Bromus diandrus* and *Hirschfeldia incana.*
8. ~700 plants, with *Bromus madritensis* ssp. *rubens*, near *Eriogonum fasciculatum* and *Salvia leucophylla.*
9. ~100 plants, with *Bromus madritensis* ssp. *rubens*, near *Salvia leucophylla* and *Yucca whipplei.*
10. ~40 plants, with *Bromus madritensis* ssp. *rubens*, *Avena barbata*, and *Eriogonum fasciculatum.*
11. ~100 plants, with *Bromus madritensis* ssp. *rubens*, *Avena barbata*, *Eriogonum fasciculatum*, near *Sambucus mexicana.*
12. ~40 plants, with *Bromus madritensis* ssp. *rubens*, near *Malacothamnus fasciculatus.*
13. ~100 plants, with *Bromus madritensis* ssp. *rubens*, *Eriogonum fasciculatum*, and *Encelia californica.*
14. ~100 plants, with *Nassella lepida*, *Bromus madritensis* ssp. *rubens*, *Bromus diandrus*, and *Hirschfeldia incana.*
15. ~100 plants, with *Bromus diandrus*, *Hirschfeldia incana*, near *Sambucus mexicana.*
16. ~200 plants, with *Melica imperfecta*, *Avena barbata*, *Bromus madritensis* ssp. *rubens*, near *Malacothamnus fasciculatus* and *Salvia apiana.*
17. ~100 plants, with *Yucca whipplei*, *Bromus madritensis* ssp. *rubens*, *Hirschfeldia incana*, near *Eriogonum fasciculatum* and *Lotus scoparius.*
18. ~40 plants, in disturbed bare ground near *Eriogonum fasciculatum.*
19. ~800 plants, with *Bromus diandrus*, *Avena barbata*, *Bromus madritensis* ssp. *rubens*, near *Salvia* spp., *Artemisia tridentata*, and *Eriodictyon crassifolium.*
20. ~350 plants, with *Bromus hordeaceus*, *Bromus madritensis* ssp. *rubens*, *Avena barbata*, near *Yucca whipplei* and *Artemisia californica.*
21. ~100 plants, with *Bromus diandrus*, *Avena barbata*, *Eriogonum fasciculatum*, *Artemisia californica*, near *Eriodictyon crassifolium.*
22. ~150 plants, with *Eriogonum fasciculatum*, *Bromus madritensis* ssp. *rubens*, and *Lotus scoparius.*
23. ~250 plants, with *Bromus diandrus*, *Eriogonum fasciculatum*, near *Acourtia microcephala* and *Lotus scoparius.*
24. ~250 plants, with *Hirschfeldia incana*, *Bromus madritensis* ssp. *rubens*, near *Encelia actoni* and *Artemisia californica.*

Southern California black walnut (*Juglans californica* var. *californica*) trees occur in three small populations in the developed area of the River Park site used previously as a camp. The area occurs in a valley in the central part of the site, where several other tree species also are found. The walnut trees occur on relatively flat terrain at an elevation of about 1200 feet. Some trees may have been planted; others appear to have grown naturally. The three populations have 5, 4, and 12 trees, respectively.

The holly-leaf cherry scrub community found in the northeastern corner of the site on relatively flat

wash terraces has several understory species that are associates of the sensitive **slender-horned spineflower (*Dodecahema leptoceras*)**, as observed previously from a known population in the region. These species include lastarriaea (*Lastarriaea coriacea*), valley lessingia (*Lessingia glandulifera* var. *glandulifera*), red-stemmed filaree (*Erodium cicutarium*), Mediterranean schismus (*Schismus barbatus*), beavertail cactus (*Opuntia basilaris* var. *basilaris*), and primroses (*Camissonia micrantha*, *C. californica*). At this specific location in the River Park site, the soils are medium to coarse terrace/riverwash sands, also similar to areas where slender-horned spineflower (*Dodecahema leptoceras*) is found. A known location of this sensitive species was checked in late April 2002 as a reference, but no plants were seen, possibly because it did not germinate due to low rainfall this winter season. Therefore, if slender-horned spineflower (*Dodecahema leptoceras*) exists at the River Park site, it may not be observable in 2002. We recommend that the holly-leaf cherry scrub area be surveyed again for this species after a better rainfall season.

A known population of the sensitive **San Fernando Valley spineflower (*Chorizanthe parryi* var. *fernandina*)** also was field-checked as a reference in late April 2002. Despite the low rainfall, this species had germinated and was observed flowering. Although potential habitat exists for this plant at the River Park site, the species was not found.

4. PLANT SPECIES LIST

Plant species observed in the River Park project site are listed below.

ANGIOSPERMS
DICOTYLEDONS
Anacardiaceae
Rhus trilobata
*Schinus molle**
Toxicodendron diversilobum
Apiaceae
+Lomatium dasycarpum ssp. *dasycarpum*
Asclepiadaceae
Asclepias fascicularis
Asteraceae
Acourtia microcephala
Ambrosia acanthicarpa
Ambrosia psilostachya
Artemisia californica
Artemisia douglasiana
Artemisia dracunculus
+Artemisia tridentata
Baccharis pilularis
Baccharis salicifolia
*Centaurea melitensis**
*Centaurea solstitialis**
+Chaenactis glabriuscula var. *glabriuscula*
+Cirsium occidentale var. *californicum*
+Encelia actoni

Encelia californica
+Ericameria palmeri var. *pachylepis*
Eriophyllum confertiflorum
Gnaphalium californicum
Grindelia ?camporum
Hemizonia fasciculata
Heterotheca grandiflora
+Heterotheca sessiliflora ssp. *fastigiata*
*Hypochaeris glabra**
+Iva axillaris ssp. *robustior*
Lepidospartum squamatum
Lessingia filaginifolia
+Lessingia glandulifera var. *glandulifera*
+Malacothrix saxatilis var. *tenuifolia*
*Sisymbrium altissimum**
Sonchus asper ssp. *asper**
*Sonchus oleraceus**
Tetradymia comosa

Boraginaceae
Amsinckia menziesii
Cryptantha intermedia
Cryptantha micrantha
Heliotropium curassavicum
Pectocarya linearis ssp. *ferocula*

Brassicaceae
*Brassica nigra**
*Hirschfeldia incana**

Cactaceae
+Opuntia basilaris var. *basilaris*
Opuntia littoralis
Opuntia prolifera

Caprifoliaceae
Sambucus mexicana

Chenopodiaceae
+Atriplex canescens ssp. *linearis*
*Atriplex semibaccata**
*Chenopodium album**
Chenopodium californicum
*Salsola tragus**

Convolvulaceae
+Calystegia peirsonii[†]

Cucurbitaceae
+Marah macrocarpus var. *macrocarpus*

Euphorbiaceae
Chamaesyce polycarpa
Eremocarpus setigerus

Stillingia linearifolia
Fabaceae
Lotus scoparius
Lupinus hirsutissimus
*Medicago polymorpha**
*Melilotus albus**
*Melilotus indicus**

Fagaceae
Quercus agrifolia var. *agrifolia*
+Quercus john-tuckeri
Quercus lobata
Geraniaceae
*Erodium botrys**
*Erodium cicutarium**
Grossulariaceae
+Ribes aureum var. *gracillimum*
Hydrophyllaceae
Emmenanthe penduliflora
+Eriodictyon crassifolium var. *nigrescens*
Phacelia tanacetifolia
Juglandaceae
Juglans californica var. *californica*[†]
Lamiaceae
*Marrubium vulgare**
Salvia apiana
Salvia columbariae
Salvia leucophylla
Salvia mellifera
Trichostema lanatum
Malvaceae
Malacothamnus fasciculatus
*Malva parviflora**
Myrtaceae
Eucalyptus spp.*
*Eucalyptus globulus**
Nyctaginaceae
Mirabilis californica
Onagraceae
Camissonia californica
Camissonia micrantha
Epilobium canum
+Oenothera californica ssp. *californica*
Platanaceae
Platanus racemosa
Polemoniaceae

+*Eriastrum densifolium* ssp. *elongatum*
+*Eriastrum densifolium* ssp. *mohavense*
Eriastrum sapphirinum
Polygonaceae
+*Eriogonum baileyi*
+*Eriogonum fasciculatum* var. *foliolosum*
+*Eriogonum fasciculatum* var. *polifolium*
Lastarriaea coriacea
Rhamnaceae
Rhamnus crocea
Rosaceae
Adenostoma fasciculatum
Cercocarpus betuloides var. *betuloides*
Heteromeles arbutifolia
Prunus ilicifolia ssp. *ilicifolia*
Salicaceae
Populus fremontii ssp. *fremontii*
Salix exigua
Salix laevigata
Salix lasiolepis
Scrophulariaceae
Penstemon centranthifolius
Solanaceae
Datura wrightii
*Nicotiana glauca**
Solanum douglasii
Solanum xanti
Tamaricaceae
Tamarix species*

ANGIOSPERMS
MONOCOTYLEDONS
Juncaceae
Juncus mexicanus
Liliaceae
+*Chlorogalum pomeridianum* var. *pomeridianum*
Yucca whipplei
Poaceae
*Arundo donax**
*Avena barbata**
*Avena fatua**
*Bromus diandrus**
*Bromus hordeaceus**
+*Bromus madritensis* ssp. *rubens**
*Bromus tectorum**
Distichlis spicata

*Hordeum murinum**
Leymus condensatus
*Lolium multiflorum**
Melica imperfecta
Muhlenbergia rigens
Nassella cernua
Nassella lepida
*Polypogon monspeliensis**
*Schismus barbatus**

NOTE:
* Non-native plant species
\+ Species not listed on the ISI Floral Compendium
† Sensitive species

5. REFERENCES

Hickman, J.C. (Editor). 1993. The Jepson Manual, Higher Plants of California. University of California Press, Berkeley, California.

Holland, R.F. 1986. Preliminary Descriptions of the Terrestrial Natural Communities of California. Unpublished Report. State of California, The Resources Agency, Department of Fish and Game, Natural Heritage Division, Sacramento, California.

Bruyea Biological Consulting

43146 Sampson Court
Hemet, California 92544

June 15, 2003

Jeff Johnson
Impact Sciences, Inc.
30343 Canwood Street, Suite 210
Agoura Hills, California 91301

Subject: Results of Butterfly Survey for River Park SEATAC Biota Project.

Dear Mr. Johnson:

Introduction

At the request of Impact Sciences, Inc. (ISI), Guy P. Bruyea (GPB) conducted a field survey of the above-referenced site in the Santa Clarita area near the intersection of Bouquet Canyon Road and Soledad Canyon Road in northwestern Los Angeles County, California. The specific goal of this survey is to assess potential suitability of the River Park site as habitat to support the San Emigdio blue butterfly (*Plebulina emigdionis*, herein referred to as SEB), a federal species of concern. Additional searches were conducted for habitat that may support the federally endangered Quino checkerspot butterfly (*Euphydryas editha quino*, herein QCB), historically known from other areas of Los Angeles County south of the project site. In addition to surveys for habitat that may support the aforementioned butterfly taxa, a general butterfly inventory was performed during a three-day survey in May 2003. This report briefly describes the relevant vegetation, topography, and present land use throughout the River Park site in an effort to assess the overall quality of the habitat as it pertains to the SEB, QCB and potential butterfly diversity on the site.

Sensitive Butterfly Species Background Information

Many butterflies are becoming increasingly scarce in southern California, especially in coastal and valley areas were natural habitats have been converted for human uses or have been adversely impacted by various anthropogenic disturbances. Additionally, in the relatively less disturbed foothill and mountain areas the spread of invasive non-native weedy vegetation, grazing, fire suppression, and off-road vehicle activity is threatening many native plants, including butterfly host plants.

There are approximately 135 recorded butterfly species from Los Angeles County, of which approximately 120 are considered resident. Some species have adapted well to ornamental landscapes, but many formerly common species have now become increasingly rare over the past few decades due to urban expansion and other factors. Several butterflies presently (and/or historically) found in Los Angeles County are now protected or are considered species of special concern (Table 1). At least three butterflies that once occurred in Los Angeles County are now presumably extinct. These include, 1) the unsilvered fritillary (*Speyeria adiaste atossa*), which was last observed near Mt. Pinos in 1959, 2) a very localized race of the Sonoran blue (*Philotes sonorensis*) that once occurred in the upper San Gabriel wash above Azusa (to 1968), and 3) the Palos Verdes blue (*Glaucopsyche lygdamus palosverdesensis*, herein referred to as PVB), which was last observed on the Palos Verdes peninsula in 1983.

Three butterflies known from Los Angeles County are now on the federal list of endangered wildlife. These include the El Segundo blue (*Euphilotes battoides allyni*, herein referred to as ESB[1]), the QCB, and the PVB.

[1] Some researchers consider the ESB to be a subspecies of *Euphilotes bernardino*, not *E. battoides*. The ESB is listed as endangered by the U.S. Fish & Wildlife Service as *E. **battoides** allyni*.

No relatively recent records for QCB exist from Los Angeles County. Populations of QCB are historically known from two locations in the Santa Monica Mountains, 1) Tapia Camp (1947), and 2) Point Dume (1954). Both of these colonies appear to have been extirpated, as adults have not been observed at or in the vicinity of either location in approximately 35 years. Most extant populations of QCB are known from southwestern Riverside County in the vicinity of Temecula and Murrieta, and southern San Diego County in the vicinity of Otay Mountain.

Table 1.
Los Angeles County Sensitive Butterflies

Common Name	Scientific Name	Status	Range*
Quino Checkerspot	*Euphydryas editha quino*	FE	N
El Segundo Blue	*Euphilotes battoides allyni*	FE	N
Palos Verdes Blue	*Glaucopsyche lygdamus palosverdesensis*	FE	N
San Emigdio Blue	*Plebulina emigdionis*	C	Y
Bright Blue Copper	*Lycaena heteronea clara*	R	N
San Gabriel Mountain Sonoran Blue	*Philotes sonorensis* form	X	N
Veined Blue	*Icaricia neurona*	R	N
Green (=Skinner's) Blue	*Icaricia lupini chlorina*	R	N
Santa Monica Mountains Hairstreak	*Satyrium auretorum fumosum*	C	N
Emmel's Elfin	*Callophrys mossii* (new subspecies?)	R	N
Wandering Skipper	*Panoquina errans*	C	N
Alkali Skipper	*Pseudocopaeodes eunus*	C	N
Tehachapi Mountains Silverspot	*Speyeria egleis tehachapina*	C	N
Unsilvered Fritillary	*Speyeria adiaste atossa*	X	N
Monarch Butterfly	*Danaus plexippus*	[1]	Y

*Indicates whether survey area is within known range of indicated taxon (Y=yes, N=no)
FE=Federally endangered, C=Concern, X=Presumed extinct (no status), R=Highly restricted range
[1] Overwintering (or nesting) sites should be protected, butterfly probably not at risk currently

The ESB is restricted to the coastal dune systems in southwestern Los Angeles County. The ESB is presently known from only three locations: 1) the dunes west of the Los Angeles International Airport (LAX); 2) the dunes west of the Chevron Oil refinery; and, 3) Malaga Cove north of the Palos Verdes peninsula. This butterfly is strongly associated with the flower heads of its host plant, coastal or dune buckwheat (*Eriogonum parviflorum*). Adults are active in a single brood from mid-July to early September.

The PVB was restricted to the Palos Verdes peninsula where it flew in a single generation during February and March. This butterfly was strongly associated with its principal host plant, milkvetch (*Astragalus trichopodus* var. *lonchus*). The closest relative of the PVB is the southern blue (*Glaucopsyche lygdamus australis*), which occurs throughout most of the remainder of southern California. The southern blue is known to feed in the larval stage primarily on deerweed (*Lotus scoparius*), although larvae occasionally have been found on milkvetch.

The PVB was believed to have become extinct in 1983 when the last known large stand (approximately 120 plants) of milkvetch was eliminated by construction of a baseball field at Hesse Park on the peninsula. In the spring of 1994, a colony of what is considered by some researchers to be the PVB was discovered at a slightly more inland locality on Navy property in San Pedro. At this locality the butterflies are associated with both milkvetch and deerweed. Some researchers maintain that it is possible that genetic differences exist between seaward-facing peninsular populations (PVB) and the extant Navy colony.

Several other butterflies are considered uncommon in Los Angeles County, some having federal or state status (i.e., species of special concern), and others that warrant careful monitoring due to declining populations or extremely limited ranges within Los Angeles County. These include the San Emigdio blue (*Plebulina emigdionis*), the Santa Monica Mountains hairstreak *(Satyrium auretorum fumosum*), the wandering skipper (*Panoquina errans*), and the Tehachapi Mountain silverspot (*Speyeria egleis tehachapina*).

Several other butterfly species that appear to be declining (or may be extirpated) in Los Angeles County, but remain common in other areas of their respective ranges include the purplish copper (*Lycaena helloides*), giant copper (*Lycaena xanthoides*), Columella hairstreak (*Strymon columella istapa*), southern sylvan hairstreak (*Satyrium sylvinum sylvinum*), western tailed blue (*Everes amyntula*), coastal arrowhead blue (*Glaucopsyche piasus sagittigera*), California ringlet (*Ceonympha tullia californica*), and sylvan satyr (*Cercyonis sthenele sylvestris*).

Sensitive butterflies considered to have potential for occurrence on the subject property, based on known ranges, the presence of associated vegetation communities, elevations on site, host plant availability within the general vicinity, and other requirements, are discussed in more detail below.

Sensitive Butterfly Species Background Information
San Emigdio Blue Butterfly (*Plebulina emigdionis*)
The SEB is restricted to southern California in lower Sonoran and riparian habitats from the Owens Valley south to the Mojave River and west to northern Ventura and Los Angeles Counties. This butterfly can be locally abundant in association with its primary host plant, four-wing saltbush (*Atriplex canescens*). The limited distribution of SEB was perplexing to early researchers based on the abundance and widespread distribution of its host plant, which occurs throughout the western United States. SEB larvae have formed a symbiotic relationship with at least one ant species, *Formica pilicornis* (Ballmer *et al*, 1991). This may account for, at least in part, SEB's limited range. These ants presumably extract droplets from SEB larvae and the ants offer the larvae protection from predators. This relationship is actually quite common among other members of the butterfly family Lycaendidae, to which the SEB belongs. The male butterfly is small (approximately 20-25 millimeters in wingspan) and is blue with a wide brown border on the dorsal wing surface. The slightly larger female is primarily brown with blue at the wing bases and orange bands on the edges of the dorsal wing surface. The ventral wing surface of both sexes is primarily white with small black dots, with smaller blue dots along the hind wing edges.

SEB adults are active from late April to early September. The SEB can have up to three broods per year with the first brood in late April to May, the second brood from late June to early July, and the third brood in August to early September (Emmel & Emmel, 1973). Adults are generally observed perching on their host plant or on other plants in the immediate vicinity, and have also been observed nectaring on nearby flowers. The females deposit single echinoid eggs on the leaves of the host plant after mating. These eggs hatch in about eight to ten days and the larvae begin feeding on the leaves immediately. Diapause normally occurs in the late or last instar of larval development, presumably in the second and/or third broods depending on climatic conditions. The mature larva is variable in color from blue, green, brown, and combinations thereof, and is densely covered with fine white hairs. Retractile glands located on the eleventh larval segment can be protruded when stimulated. Researchers believe these organs are attractive to ants (Emmel & Emmel, 1973).

There are several other Lycaenid butterflies classified as 'blues' (subfamily Polyommatinae) that occur with the SEB in portions of its range. Some of these species are similarly sized and contain markings that can be easily confused with SEB. Commonly observed sympatric butterfly species include the blue copper (*Lycaena heteronea*), southern blue (*Glaucopsyche lygdamus australis*), Boisduval's blue (*Icaricia icaroides*), acmon blue (*Icaricia acmon*), western tailed-blue (*Everes amyntula*), marine blue (*Leptotes marina*), pigmy blue (*Brephidium exilis*), Bernardino blue (*Euphilotes bernardino*), and

square-spotted blue (*Euphilotes battoides*). SEB can be initially distinguished from many of these species by its relatively large size and its strong association with four-wing saltbush.

Due to its extremely limited distribution in southern California and its propensity for isolated small colonies, the SEB can be easily impacted by anthropogenic disturbances. Many colonies in the Mojave Desert and Owens Valley are isolated and are probably not under any immediate threat, but other colonies found closer to growing desert communities and suburban Los Angeles cities are situated near major roads, railroad tracks and other developments. Some of these populations have already been extirpated; others are threatened by various developments.

Some of the known localities for this species include the Lower Haiwee Reservoir in Inyo County, Mojave River area near Victorville, and Bouquet and Mint Canyons in Los Angeles County. Although populations in the Mint Canyon area near Santa Clarita were extirpated by housing developments in the late 1980's and early 1990's, GPB did observe one extant SEB population in nearby Soledad Canyon as recently as August 1999.

Quino Checkerspot Butterfly (*Euphydryas editha quino*)

The United States Fish and Wildlife Service (Service) added this rare butterfly to the federal list of endangered wildlife in early 1997. The Quino Checkerspot Butterfly (QCB) is a geographic race (subspecies) of *Euphydryas editha*, whose combined ranges extend from northern Baja California to Canada along the Pacific coast, and east to Colorado (Bauer, 1975). The QCB is presently known to exist only as several, probably isolated, colonies in southwestern Riverside County, southern San Diego County and northern Baja California, Mexico.

This butterfly is associated with sparsely vegetated or bare areas usually characterized by clay or cryptobiotic soil deposits that develop a hard crust within southern California sage scrub vegetation communities. Low-growing herbaceous annuals including the QCB's primary larval host plant, dot-seed plantain, *Plantago erecta* (Plantaginaceae), typically inhabit these areas. Other potential QCB host plants (considered secondary) may occupy these areas and include owl's clover (*Castilleja exserta*) and white snapdragon (*Antirrhinum coulterianum*), both in the plant family Schrophulariaceae.

GPB did not conduct a focused survey for the QCB during the present survey. GPB currently holds a valid section 10(a)(1)(A) QCB recovery permit for QCB issued under the Endangered Species Act of 1973, as amended (Permit Number TE-837439-4).

Methods

The River Park property was visited by GPB on May 14, 26 and 27, 2003. Detailed survey times are presented in Table 2.

Table 2.
River Park SEATAC Butterfly Survey Information
May 2003

Date	Time PST	Weather	Wind	Biologist	Results
5/14/03	0900-1500	Partly Cloudy, 71-92 °F	0-1 F	GB	No SEB or QCB
5/26/03	0900-1500	Sunny, 81-104 °F	0-1 F	GB	No SEB or QCB
5/27/03	0700-1400	Sunny, 68-102 °F	0-2 F	GB	No SEB or QCB

This survey primarily consisted of determining the presence or absence of SEB, QCB and their associated host plants. Special consideration was given to areas containing native vegetation that may support specific larval host plant habitat requirements for any of the aforementioned sensitive species.

The presence or absence of invasive, non-native plant species was noted in an effort to assess the level of previous anthropogenic disturbance in a given area. Other habitat requirements including the presence of potential nectar resources and the overall quality of the site as it pertains to potential QCB topographical resources (i.e., hilltops) were assessed.

This field survey was conducted during daylight hours from 0700 to 1500 Pacific Daylight (Savings) Time (PDT). Temperatures recorded during the survey ranged from 68 to 104 °F (degrees Fahrenheit) and conditions ranged from partly cloudy to sunny with little or light winds (at or less than 2 Beaufort scale). Digital photographs were taken to record the condition of the site during the present survey and are available on request. Plant and animal (including some invertebrate and all butterfly) species were identified in the field by GPB or later identified using various texts. In addition, all observed plant and animal species and any additional biological information relevant to this study were recorded on field forms.

Daily weather data were noted on field forms and/or a digital audio recorder roughly once per hour during survey visits. Weather data were recorded using a digital anemometer (Beaufort scale of wind speed measurement), thermometer, and by visual observation and estimation of cloud cover and other pertinent daily weather characteristics (rain, drizzle, marine layer, etc.). Digital recordings were later transcribed to field forms.

Not all plants and/or associated butterfly species that may have been present on site were necessarily observable (or identified) during this survey. For an exhaustive assessment of the butterfly fauna of a given area, surveys are best performed throughout the year to achieve a complete inventory. GPB's general knowledge of the butterfly diversity for this area was utilized in an effort to locate specific habitats for some butterfly species. A California Natural Diversity Database (CNDDB) records search was conducted by ISI prior to the start of this survey to determine the probability that sensitive butterfly species may be present on the site.

Nomenclature primarily used in this report comes from Hickman (1993) for plants; Emmel et al. (1973) and Howe (1975) for butterflies; and Arnett (2000) for other insects. Additional resources may be found at the end of this report.

Site Description

The River Park site and survey area is generally located along the Santa Clara River north of Soledad Canyon Road and east of Bouquet Canyon Road. The River Park property contains ± 692 acres and primarily consists of alluvial fan sage scrub vegetation associated with the Santa Clara River basin, portions of which remain naturally unconfined. During the present survey, a persistent water flow was not observed within most of the Santa Clara River bottom except in one small area at the southeastern portion of the site. Surface flow in this area was limited to approximately 10 to 20 meters and was less than 2 meters wide.

Topographically, much of the site is primarily flat in association with the Santa Clara River basin. Gently to steeply sloping hills and ridgelines are present along the northern portions of the site. The River Park site contains a combined maximum vertical relief of roughly 295 feet between its highest and lowest on-site elevation points, with a reduction in elevation throughout the site from north to south. Elevations on the site range from approximately 1165 to 1460 feet above mean sea level (AMSL).

Adjacent land use varies considerably within and adjacent to the survey area, including anthropogenic disturbances such as actively cultivated in-use agricultural fields, fallow fields, industrial and commercial areas, paved and unimproved roads, pipelines, and other developments. Other disturbances associated with off-road vehicle (ORV) use, illegal dumping, and target shooting were observed.

Vegetation Characteristics
Areas of relatively undisturbed coastal sage chaparral scrub, alluvial fan sage scrub, and riparian vegetation communities inhabit the subject site. Much of the site is inhabited by open, relatively sparsely vegetated alluvial fan sage scrub. Riparian vegetation is present along the Santa Clara River at the southern portion of the site. Non-native grasses and other weedy annuals have invaded many open (some previously disturbed) areas of the site, and have also invaded sage scrub portions along the northern portion of the site, possibly choking out many native low-growing forbs. Valley oak (*Quercus lobata*) was observed on the eastern portion of the subject property.

Alluvial Fan Sage Scrub (Holland Element Code 32720)
Alluvial fan sage scrub (AFSS) contains mostly drought-deciduous shrubs with soft leaves, and occurs in association with washes and gently sloping alluvial fans. Areas containing AFSS are usually subject to periodic flooding, and mature phases of this vegetation community can contain significant cover of larger perennials. Scalebroom (*Lepidospartum squamatum*) is typically an indicator plant species of this vegetation community. This vegetation community was present in association with the Santa Clara River basin on the subject property, and was the most predominant vegetation community on the site. Other larger perennial plants observed within AFSS on the subject property include thick-leaved yerba santa (*Eriodictyon crassifolium*) and great basin sage (*Artemisia tridentata*).

Smaller shrubs such as flat top buckwheat, tarragon (*Artemesia dracunculus*), jimsonweed (*Datura wrightii*), telegraph weed (*Heterotheca grandiflora*), cholla (*Opuntia* sp.), tree tobacco (*Nicotiana glauca*), and blue elderberry (*Sambucus mexicana*) were present. Mustard evening primrose (*Camisonia californica*) was found abundantly throughout most AFSS areas of the site.

Several plants typically associated with alkali playa were observed scattered throughout the subject property, including four-wing saltbush, wild heliotrope (*Heliotropium curassavicum*), saltgrass (*Distichlis spictata*), and alkali weed (*Cressa truxillensis*).

Coastal Sage-Chaparral Scrub (Holland Element Code 37G00)
Coastal sage chaparral scrub (CSCS) contains a mixture of sclerophyllous low chaparral shrubs and drought-deciduous sage scrub species, and is regarded as an ecotone between the two communities. This area contains floristic elements of both coastal sage scrub and lower chaparral, including shrubs such as chamise (*Adenostoma fasciculatum*), flat top buckwheat (*Eriogonum fasciculatum*), California sagebrush (*Artemisia californica*), purple sage (*Salvia leucophylla*), black sage (*Salvia mellifera*), white sage (*Salvia apiana*), and chaparral yucca (*Yucca whipplei*).

Scattered throughout this vegetation community, less dense (and open) areas are present that contain native species such as blue dicks (*Dichelostemma capitatum*), forget-me-not (*Cryptantha* sp.), tarplant (*Hemizonia* sp.), Turkish rugging (*Chorizanthe staticoides*), chia (*Salvia columbariae*), deerweed (*Lotus scoparius*), bush mallow (*Malacothamnus fasciculatus*), wild cucumber (*Marah macrocarpus*), wooly aster (*Lessingia filaginifolia*), wishbone bush (*Mirabilis californica*), and other herbaceous annuals. Non-native grasses found abundantly in CSCS areas included slender wild oats (*Avena barbata*), foxtail chess (*Bromus madritensis* ssp. *rubens*), Mediterranean grass (*Schismus barbatus*).

Southern Arroyo Willow Riparian (Holland Element Code 61320)
Mulefat Scrub (Holland Element Code 63310)
Some riparian communities observed within portions of the Santa Clara River are characterized by various willow (*Salix* species), Fremont's cottonwood (*Populus fremontii*) and western sycamore (*Platanus racemosa*). On the River Park project site, sandbar willow (*Salix exigua*), arroyo willow (*Salix lasiolepis*), and Fremont's cottonwood were observed. Other plants observed on the subject

property in association with wet areas include basketbush *(Rhus trilobata)*, stinging nettle (*Urtica dioica*), giant reed (*Arundo donax*), and cattail (*Typha* sp.).

Mulefat scrub is dependent on periodic flooding and is characterized by the presence of mulefat (*Baccharis salicifolia*), which was observed commonly on the River Park site. Stands of this series mix with other wetland communities inhabited by larger trees along the Santa Clara River, and mix with smaller shrubs inhabiting CSCS slope areas on the site.

Disturbed / Ruderal Habitat (Holland Element Code 11300)
Disturbed habitat includes areas that contain mostly non-native plant species including ornamentals and ruderal exotics. Mostly non-native, weedy species have invaded portions of the site adjacent to paved and unimproved roads, commercial developments, and other site disturbances. The most common invasive plants observed included short-pod mustard (*Hirschfeldia incana*), horehound (*Marrubium vulgare*), tocalote (*Centaurea melitensis*), cheeseweed (*Malva parviflora*), sourclover (*Melilotus indica*), knotweed (*Polygonum aviculare*), sow thistle (*Sonchus oleraceus*), and various filaree species (*Erodium*). Other plants including Russian thistle (*Salsola tragus*), milk thistle (*Silybum marianum*), annual sunflower (*Helianthus annuus*), doveweed (*Eremocarpus setigerus*), tamarisk (*Tamarix* sp.), and various non-native grasses including foxtail chess, slender wild oat, and Mediterranean grass are present throughout these disturbed areas. A few native species that are tolerant of disturbance such as fiddleneck (*Amsinckia menziesii*) and dove lupine (*Lupinus bicolor*) were locally abundant along road and fence margins, and in other open areas of the site.

Results
SEB was not observed during the present study but its larval host plant (*Atriplex canescens*) is present within alluvial fan sage scrub areas of the site along the Santa Clara River. Based on the presence of other sympatric and synchronous butterfly species observed during the present study, conditions appeared to be conducive to SEB seasonal flight activity. Although SEB can appear as early as late April in any given year, relatively cool conditions throughout April and into early May likely delayed its flight season to about mid or late May in 2003. This species is strongly associated with its larval host plant where it occurs, and all *Atriplex* on the subject property were carefully surveyed by GPB visually and/or by tapping on *Atriplex* plants to stir up potentially resting butterflies.

Although historic records exist for areas north of the site in Bouquet Canyon and east of the site in Soledad and Mint Canyons, this species is presumed extirpated in the region due to increased human-related activities including commercial and residential developments, agricultural operations, ORV use, and other disturbances. It is GPB's understanding that no SEB have been observed in the Santa Clarita area in recent years.

The present study indicates that the property does not currently contain high quality potential habitat for QCB. This is primarily based on the lack of historical QCB data from this region of Los Angeles County, and the apparent absence of its primary host plant, dot-seed plantain, which was not detected during the present study. Additionally, QCB was historically known from two locations in the Santa Monica Mountains approximately 25 to 30 miles south and southwest of the subject property, but has not been observed in those areas since 1954. Extant QCB populations are found much further south and southeast in Riverside and San Diego Counties. It is highly unlikely that QCB once occupied the Santa Clarita area due to a lack of records indicating its presence in the northern portion of Los Angeles County.

To GPB's knowledge no recent data indicates that occupied habitat exists on any portion of the River Park property for the sensitive butterfly species discussed in this report.

Other Lepidoptera Observations

A total of seventeen (17) relatively common butterfly species were observed on the property during the present survey (Table 3). In general the River Park property appears to represent a relatively average site for diversity of butterfly fauna in the area. However, this may be due in part to atypically cool conditions throughout the spring months and just before the start of the present survey, and/or the limits of the present study. Only one common hilltopping species (*Pontia protodice*) was observed during the present study in association with a low elevation hilltop area at the north-central portion of the site. GPB believes that this topographic feature of the River Park site and adjacent areas is a resource for hilltopping butterfly species in the area. Other hilltops and ridgelines are present near this hilltop on and adjacent to the subject property, and are probably equally utilized as hilltopping resources for butterfly species in the general vicinity.

Table 3.
River Park SEATAC Lepidoptera Observations
March – May 2003

Common Name / Scientific Name		**May**		
		14	26	27
Western Tiger Swallowtail (*Papilio rutulus*)				x
Checkered White (*Pontia protodice*)		x		
Cabbage White (*Pieris rapae*)		x		
Sara Orange-tip (*Anthocharis sara*)		x		
Alfalfa Sulfur (*Colias eurytheme*)			x	x
Painted Lady (*Vanessa cardui*)		x	x	x
Red Admiral (*Vanessa atalanta*)				x
West Coast Lady (*Vanessa annabella*)			x	x
Buckeye Butterfly (*Junonia coenia*)		x		
Mourning Cloak (*Nymphalis antiopa*)			x	x
Large White Skipper (*Heliopetes ericetorum*)			x	x
W. Checkered Skipper (*Pyrgus c. albescens*)		x	x	
Acmon Blue (*Icaricia acmon*)		x	x	x
Pygmy Blue (*Brephidium exilis*)		x	x	x
Great Copper (*Lycaena xanthoides*)			x	x
Bernardino Blue (*Euphilotes bernardino*)			x	x
Common Hairstreak (*Strymon melinus*)		x		
17 Species Total	Total Observed/Day	9	10	11

Interestingly, the great copper (*Lycaena xanthoides*) was abundant on the subject property. Due to urban expansion and confinement of natural creek flow patterns throughout Los Angeles County, this butterfly has become increasingly uncommon in this region of southern California. The flight season of this single-brooded butterfly is typically in April and May, and into June and July at upper elevations. The larval host plant is various *Rumex* species, which were observed commonly on the subject property. This species is now mostly confined to the mountain foothills of the Santa Ana Mountains in Los Angeles County (Mattoni, 1998).

A list of butterfly species that could potentially occur on the project site (based on known historical and current ranges) is provided as part of this report (Appendix A).

Other Sensitive Resources

One special status wildlife species observed while conducting butterfly surveys at the River Park project site is the black-tailed jackrabbit (*Lepus californicus*, herein referred to as BTJ). The California Department of Fish and Game considers the BTJ a special species of concern to California.

Sensitive species observations by GPB occurred incidentally while conducting butterfly surveys at the River Park site. Focused surveys were not conducted for the above-referenced sensitive resource during the present survey.

Conclusion

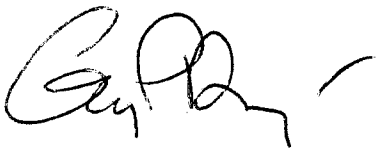
During the three-day survey period, the entire River Park property was specifically surveyed for the sensitive butterfly species named above. Additionally, a general butterfly inventory (both observed and expected to occur) was performed.

Although conditions during the present field season were conducive to SEB seasonal flight activity, SEB population densities may be relatively low throughout its range in 2003 due to previous 2000-2002 drought conditions. As such, population density and/or the relative frequency of potentially dispersing SEB adults in the area may not have been adequately assessed during the present 2003 flight season. However, the absence of SEB adult observations during the present survey indicates that the River Park property does not appear to be currently occupied by SEB. Although the site supports sufficient larval host plant resources for the biological development of SEB, no adults, larvae, or pupae were detected during the present study and none are expected to occur based on the lack of SEB records from the Santa Clarita area since the extirpation of known colonies.

Based on the lack of recent QCB observations for Los Angeles County, the apparent absence of primary larval host plants (i.e. *P. erecta*) and lack of suitable high quality habitat, and the site location (not known to be within the historical range of QCB), it is highly unlikely that a QCB breeding population or the occasional dispersing individual QCB would utilize the subject property.

If I can be of any further assistance regarding this project and report, please do not hesitate to contact me.

Sincerely,
Bruyea Biological Consulting



Guy P. Bruyea
Entomologist / Principal Biologist

References and Citations

Arnett, Ross H. Jr. 2000. American Insects: A Handbook of the Insects of America North of Mexico. CRC Press, New York, New York. 1003pp.

Ballmer, G. R. and G. Pratt. 1991. Quantification of Ant Attendance (Myrmecophily) of Lycaenid Larvae. Jour. Research on the Lepidoptera 30(1-2):95-112.

Ballmer, G. R., D. Hawks, K. Osborne, G. Pratt. 1998. The Quino Checkerspot (*Euphydryas editha quino*). Unpublished manuscript for UCR Quino Workshop.

Bruyea, Guy P. 2003. Field notes for the River Park SEATAC Biota survey. May 14-27.

Emmel, T. C. and J. F. Emmel. 1973. *The Butterflies of Southern California.* The Natural History Museum of Los Angeles County, Science Series 26.

Hickman, James C. (editor). 1993. The Jepson Manual: Higher Plants of California. University of California Press, Berkeley and Los Angeles.

Howe, William H. 1975. The Butterflies of North America. Doubleday & Company, Inc. Garden City, New York. 633pp.

Mattoni, Rudi and Greg Ballmer. 1990. Butterflies of Greater Los Angeles County. Lepidoptera Research Foundation, Inc.

Orsak, L. J. 1977. *The Butterflies of Orange County, California.* University of California, Irvine, California.

Parker, Robert *et al.* 1999. *Weeds of the West.* The Western Society of Weed Science. Newark, California. 630pp.

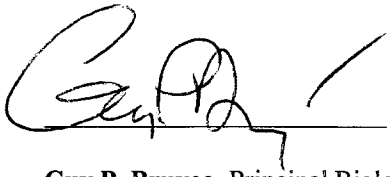
Sawyer, John O. and Todd Keeler-Wolf. 1995. *A Manual of California Vegetation.* California Native Plant Society, Sacramento, California. 471pp.

Scott, J. A. 1986. *The Butterflies of North America, a Natural History and Field Guide.* Stanford University Press, Stanford, California. 583pp.

Certification and Signature Page

River Park Site
Los Angeles County, California
June 15, 2003

I hereby certify that the statements furnished above and in the attached exhibits present the data and information required for this biological evaluation, and that the facts, statements, and information presented are true and correct to the best of my knowledge and belief.



Date 6-15-03

Guy P. Bruyea, Principal Biologist
43146 Sampson Court
Hemet, California 92544

Appendix A

Butterfly Species with potential for occurrence on the **River Park SEATAC** Project Site **(N=62*)**
Los Angeles County, California
May 2003

Family / Scientific Name	Common Name
Order Lepidoptera	Butterflies and Moths
Papilionidae	**Swallowtails**
Papilio rutulus	Western Tiger Swallowtail **
Papilio eurymedon	Pale Swallowtail
Papilio multicaudatus	Two-tailed Swallowtail
Papilio zelicaon	Anise Swallowtail **
Nymphalidae	**Brush-footed Butterflies**
Danaus gilippus	Striated Queen **
Danaus plexippus	Monarch **
Ceonympha tullia californica	California Ringlet
Agraulis vanillae incarnata	Gulf Fritillary
Basilarchia lorquini	Lorquin's Admiral **
Adelphia bredowii californica	California Sister
Euphydryas chalcedona	Chalcedon Checkerspot
Euphydryas editha quino	Quino Checkerspot
Junonia coenia	Buckeye **
Charidryas gabbii	Gabb's Checkerspot
Phyciodes mylitta	Mylitta Crescent
Polygonia satyrus	Satyr Anglewing **
Nymphalis californica	California Tortoise-shell
Nymphalis milberti	Milbert's Tortoise-shell
Nymphalis antiopa	Mourning Cloak **
Vanessa virginiensis	Virginia Lady **
Vanessa atalanta	Red Admiral **
Vanessa cardui	Painted Lady **
Vanessa annabella	West Coast Lady **
Ceonympha tullia californica	California Ringlet
Cercyonis sthenele silvestris	California Wood Nymph
Pieridae	**Whites and Sulfurs**
Colias eurydice	California Dogface
Colias alexandra harfordii	Harford's Sulfur
Colias eurytheme	Alfalfa Sulfur **
Nathalis iole	Dwarf Yellow
Anthocharis cethura	Felder's Orange-tip
Anthocharis sara sara	Sara Orange-tip **
Eurema nicippe	Nicippe Yellow
Phoebis sennae	Cloudless Sulfur
Pontia protodice	Checkered White **
Pieris rapae	Cabbage White **

Appendix A (Continued)

Family / Scientific Name	Common Name
Order Lepidoptera	Butterflies and Moths
Lycaenidae	**Blue, Hairstreaks, Coppers**
Atlides halesus	Great Purple Hairstreak **
Callophrys perplexa	Bramble Hairstreak **
Euphilotes bernardino	Bernardino Blue **
Incisalia augustinus iroides	Western Elfin
Icaricia acmon	Acmon Blue **
Everes amyntula	Western Tailed-blue
Glaucopsyche lygdamus australis	Southern Blue**
Hemiargus ceraunus gyas	Edward's Blue
Hemiargus isola alce	Mexican Blue
Leptotes marina	Marine Blue **
Brephidium exilis	Pygmy Blue **
Lycaena helloides	Purplish Copper
Lycaena xanthoides	Great Copper **
Plebulina emigdionis	San Emigdio Blue
Satyrium californica	California Hairstreak
Satyrium sylvinus sylvinus (or *sylvinus dryope*)	Sylvan Hairstreak
Strymon melinus	Common Hairstreak **
Riodinidae	**Metalmarks**
Apodemia mormo virgulti	Behr's Metalmark**
Hesperiidae	**Skippers**
Lerodea eufala	Eufala Skipper **
Paratrytone melane	Umber Skipper **
Hylephila phyleus	Fiery Skipper **
Atalopedes campestris	Field Skipper **
Polites sabuleti	Sandhill Skipper
Erynnis funeralis	Funereal Duskywing **
Erynnis tristes	Mournful Duskywing
Heliopetes ericetorum	Large White Skipper **
Pyrgus communis albescens	Western Checkered Skipper **

Note:
* Butterfly species included on this list have varying degrees of potential for occurrence on the subject property. ** Indicates a high potential for occurrence (doesn't indicate residence) based on a combination of known ranges (historical and present), host plant presence/absence, and other factors. This list does not include rare stray species (i.e. from Mexico or out of State) that occasionally show up in the region.

Compliance Biology. Letter summarizing the results of Focused Surveys for the Unarmored Threespine Stickleback. May 2003b.

compliance·biology

May 30, 2003

Mr. Jeff Johnson
Impact Sciences, Inc.
30343 Canwood Street
Suite 210
Agoura Hills, California 91301

Dear Mr. Johnson,

The purpose of this letter is to provide you with results of focused surveys conducted for the federally-listed endangered unarmored threespine stickleback (*Gasterosteus aculeatus williamsoni*) (UTS) in a portion of the Santa Clara River on project site located in Los Angeles County, California. Specifically, the survey area is known as the River Park project, located east of Bouquet Canyon.

The focused survey was conducted on May 28, 2003. The portion of the Santa Clara River occurring within the River Park project site is ephemeral to seasonal in nature; typically supporting surface flows only for a short time following storm events. However, even during dry periods, this stream course does have a potential to support small pools for extended periods of time.

At the time of the surveys, there were no surface flows within the drainage. However, the entire length of the river, between its outer banks, were all walked in search of any remnant surface pools that could potentially support fish. The only standing water detected on the entire site was a small persistent pool resulting from off-site runoff that results from adjacent development. This small pool occurs immediately adjacent to and east of the Los Angeles aqueduct crossing on the south side of the project. The entire surface area of the standing water was approximately 20 feet in length, a maximum of five feet wide, and a maximum of 4 inches deep. The pool occurred in the path of a dirt access road that appeared to support relatively regular vehicular traffic. There was no evidence of any fish or other aquatic fauna with the exception of a few insect larvae within the pool. As such, it is concluded that there are currently no UTS within the River Park project boundaries.

During storm events, when surface flows occur through the project site, it is expected that some UTS occurring upstream of the project site, would occur within the project boundaries. As such, it is recommended that any project construction in or adjacent to the river channel occur during dry periods. If this can be accomplished, it is expected that there would be no adverse impacts to UTS. Further, in order to minimize potential impacts to seasonally occurring UTS, it is recommended that project related drainage designs meet all state water quality standards for discharge into sensitive habitat areas.

Please feel free to contact me if you have any questions regarding this information.

Sincerely,

Dave Crawford
Principal Biologist

compliance·biology

January 24, 2003

Ms. Susan Tebo
Impact Sciences, Inc.
30343 Canwood St.
Suite 210
Agoura Hills, California 91301

Subject: **Results of Focused Surveys for Coastal California Gnatcatcher Surveys; River Park Project. Santa Clarita, Los Angeles County, California.**

Dear Ms. Tebo,

This letter report summarizes the methodology and findings of surveys for the federally-listed threatened coastal California gnatcatcher (*Polioptila californica californica*) conducted in Los Angeles County, California by Compliance Biology for Impact Sciences, Inc. The surveys were conducted to determine the presence and distribution (if present) of the species within the River Park study area. A USGS-based survey area location map (**Figure 1**) is included to provide the U.S. Fish and Wildlife Service (Service) with specific survey locality information.

SURVEY LOCATION

Compliance Biology was retained to conduct California gnatcatcher surveys on an approximately 664 acre project site that supports approximately 80 acres of suitable to marginally suitable coastal sage scrub habitat located in Los Angeles County, California. The project site located on the Newhall, California U.S.G.S. 7.5-minute quadrangle map at T4N, R16W, situated west of Sections 18 and 19 (Figure 1). The survey area is located on the north side of Soledad Canyon Road, east of Bouquet Canyon Road. Most of the project site includes a portion of the Santa Clara River and the Los Angeles Aqueduct crosses the river in the eastern portion of the site. The survey area is comprised of variable terrain, ranging from relatively flat riverwash, secondary washes and terrace areas, to previously disturbed flat areas or fields above the banks of the Santa Clara River, to hillslopes in the northern portion of the site. Elevation in the survey area ranges from approximately 1200 feet in the river bed to 1580 feet above mean sea level (MSL) in the northeastern portion of the site.

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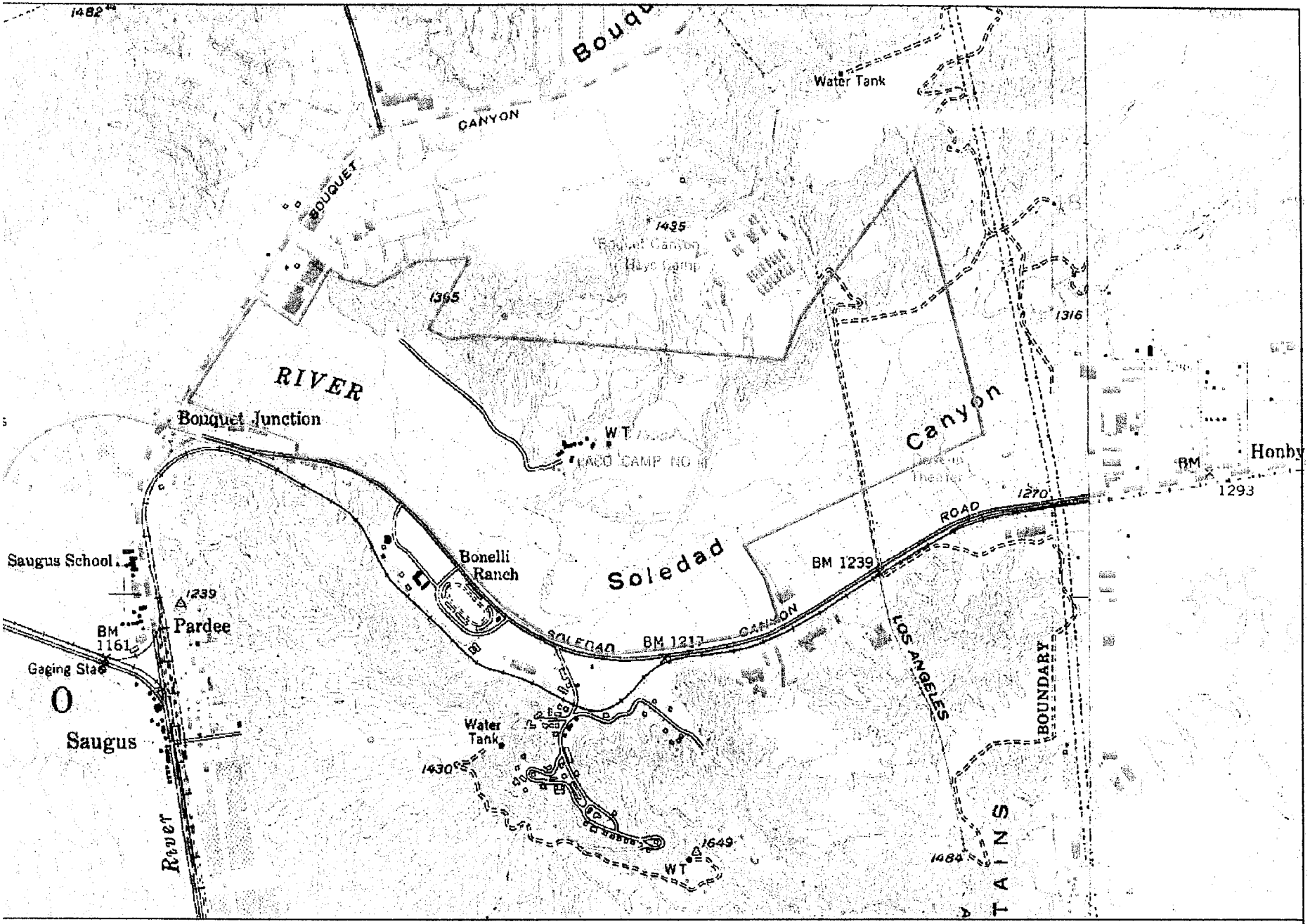

Name: NEWHALL
Date: 2/5/2003
Scale: 1 inch equals 1666 feet

Location: 034° 25' 17.4" N 118° 31' 09.8" W
Caption: FIGURE 1
Survey Site Location

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PLANT COMMUNITIES

The following provides a summary of some of the plant communities present on the site. Other plant assemblages occur, including cottonwood woodland, willow riparian and riparian scrub. However, these habitats were separated from any suitable gnatcatcher habitats on site and were not included in the gnatcatcher survey area. These riparian areas, associated with the Santa Clara River, have been surveyed separately for special-status riparian bird species by another permitted biologist. The following summaries are taken from the Rare Plant Surveys report prepared by Drs. Anuja Parikh and Nathan Gale that discusses results of surveys conducted on the River Park project site in May 2002.

Riversidian Sage Scrub

This community is the most xeric type of coastal sage scrub south of Point Conception in California (Holland, 1986), and is found along the coastal side of the Transverse and Peninsular Ranges. It supports low, soft-woody shrubs up to 1 m tall. Typical stands are relatively open and dominated by California sagebrush (*Artimisa californica*), California buckwheat (*Eriogonum fasciculatum*), and annual grasses such as foxtail chess (*Bromus madritensis*), each attaining 20 percent or greater cover. On the River Park site, this community occurs on gradual to steeply sloping terrain. The dominant species present is California buckwheat (*E. f.* var. *foliolosum*). Other commonly occurring native species include thickleaf yerba sanda (*Eriodictyon crassifolium* var. *nigrescens*), California sagebrush, sages (*Salvia mellifera, S. apiana,* and *S. leucophylla*), goldenbush (*Ericameria palmeri* var. *pachylepis*), encelias (*Encelia actoni, E. californica*), chaparral mallow (*Malacothamnus fasciculatus*), Our Lord's candle (*Yucca whipplei*), linear-leaved stillingia (*Stillingia linearifolia*), California-aster (*Lessingia filaginifolia* var. *filaginifolia*), California broom (*Lotus scoparius*), beavertail cactus (*Opuntia basilaris* var. *basilaris*), giant wild-rye (*Leymus condensatus*), and cotton-thorn (*Tetradymia comosa*). Introduced annual grasses prevalent in the understory are dominated by foxtail chess, and slender wild oat (*Avena barbata*). Native needlegrasses (*Nassella cernua, N. lepida*) are also scattered in the understory. Non-native herbaceous species found in this community include shortpod mustard (*Hirschfeldia incana*), red-stemmed filaree (*Erodium cicutarium*), and tocalote (*Centaurea melitensis*). Native herbaceous species include wishbone bush (*Mirabilis californica*), fascicled tarweed (*Hemizonia fasciculate*), woolly-fruited lomatium (*Lomatium dasycarpum* ssp. *dasycarpum*), malacothrix (*Malacothrix saxitilis* var. *tenuifolia*), and chia (*Salvia columbariae*).

Chamise Chaparral

This type of chaparral is found in small scattered patches on flat to sloping terrain, mostly in the northeastern part of the River Park site. Chamise chaparral is the most common type of chaparral in southern California, and is dominated by chamise (*Adenostoma fasciculatum*) shrubs from 1 to 3 m tall. It is typically dense and impenetrable and has a sparse understory (Holland, 1986). It is adapted to repeated fires, and is found on shallow, dry soils on xeric slopes and ridges. Typically, seveal other native shrub species also occur in this assemblage. However, at the River Park site, the small patches of this community are made up almost exclusively of chamise.

Coastal Sage – Chaparral Scrub

In some areas of the site, on mostly west-facing slopes, a mix of Riversidian sage scrub and chamise chaparral species occur. The overstory is relatively open, and the understory in these areas often includes annual grasses and herbaceous species. Common species in this community include chamise, California buckwheat, California sagebrush, chaparral mallow, and black sage (*S. mellifera*).

Planted Scrub

In the northwestern part of the River Park site, several slopes have been cut or graded for the installation of water lines and concrete-lined drainage channels. These relatively steep slopes have been re-vegetated with native shrubs, primarily California buckwheat. Some California sagebrush also occurs.

Holly-Leaf Cherry Scrub

In the northeastern corner of the site, on relatively flat terrain, a unique stand of holly-leaf cherry scrub occurs. It is situated on the low terraces of a secondary wash that drains to the Santa Clara River. The stand is dominated by relatively large, mature shrubs of holly-leaf cherry (*Prunus ilicifolia* ssp. *ilicifolia*), 3 to 5 m in height. Other shrub associates in this community include skunkbrush (*Rhus trilobata*) and spiny redberry (*Rhamnus crocea*). Other native species found in the understory include woolly star (*Eriastrum densifolium* ssp. *elongatum*), scarlet bugler (*Penstemon centranthifolius*), and linear-leaved stillingia. Also present in this community are lastarriaea (*Lastarriaea coriacea*), valley lessingia (*L. glandulifera* var. *glandulifera*), Mediterranean schismus (*Schismus barbatus*), beavertail cactus, primroses (*Camissonia micrantha, C. californica*), and red-stemmed filaree.

METHODOLOGY

Service recommended survey guidelines stipulate a minimum of six surveys shall be conducted at least one week apart between March 15 through June 30, and from July 1 through March 14, a minimum of nine surveys shall be conducted at least two weeks apart. Further stipulations include that surveys should be completed between 6:00 a.m. and 12 p.m.; surveys shall avoid periods of inclement weather or excessive heat, rain, wind, and fog; and the rate of coverage should be no more than 80 acres per day per permitted biologist.

Based on the aforementioned guidelines, nine protocol gnatcatcher surveys were conducted within potentially suitable on-site coastal sage scrub, and adjacent scrub habitats, with at least a 14-day interval between site visits. All of the field surveys were performed by David Crawford under the authority of individual federal permit number TE-821229-3.

Surveys were conducted on October 4 and 18, November 1, 15, and 29, December 13 and 27, and January 10 and 24. Each survey covered areas supporting coastal sage scrub communities considered potentially suitable for gnatcatcher habitation. Approximately 80 acres of scrub habitat and immediately adjacent habitats were surveyed each day. All potential habitat areas were systematically surveyed on foot by walking slowly and methodically along varyied transect routes. The location of transects and survey points along each transect were based on the vegetation and topographic conditions (size, location, and shape of habitat) of the area to be surveyed to ensure complete sage scrub coverage. Calling points were separated by approximately 200-feet intervals, or as needed, depending upon the vegetation and topography in each area. A combination of taped vocalizations (played at 30-60 second increments) and "pishing" sounds were used at each calling point.

Weather conditions during the surveys varied from cool to very warm and were generally conducive to a high level of bird activity. Because of the temperatures on some of the survey dates were relatively low early morning, surveys on those days were conducted between the hours of about 7:00 to 7:30 and approximately 1:00 p.m. On warmer days, surveys were conducted between the hours of about 6:30 a.m. to 12:30 pm. Temperatures varied from approximately 52 degrees Fahrenheit (F) to a maximum of about 80 degrees F.

Wind speed ranged from 0 to 15 M.P.H. during the surveys, averaging between 0 to 5 M.P.H. over the survey period. Cloud cover varied from completely overcast to sunny. On most days cloud cover typically "burned-off" by mid-morning.

RESULTS

A total of 46 different bird species were identified on the River Park site during the protocol survey effort. No coastal California gnatcatchers or any other federal or state-listed endangered, threatened, or candidate species were recorded on the project site during the focused protocol surveys conducted by Compliance Biology. However, three avian species considered to be state Species of Special Concern and/or federal Species of Concern were observed or detected. A complete list of all vertebrate species observed during the survey efforts is included as **Attachment A.**

A northern harrier (*Circus cyaneus*) was observed on a single occasion foraging over scrub and riverwash habitats. The hawk was observed soaring over the site for approximately 15 minutes, but did not land. At least two individual Bell's sage sparrow (*Amphispiza belli belli*) were observed in the northeastern portion of the site on two occasions and loggerhead shrike (*Lanius ludovicianus*) was observed perching and foraging on six of the nine survey dates. Additionally, though not observed during this survey effort, southern California rufous-crowned sparrow (*Aimophila ruficeps canescens*), has been detected in scrub habitat on site during previous biological evaluations.

Additional observations included at least two individual blue-gray gnatcatchers (*Polioptila caerulea*) observed on three occasions. Twice, these birds were observed in the re-vegetated scrub. Also, at least two male brown-headed cowbirds were observed on two occasions. No females were detected.

Please feel free to contact me at the letterhead address/phone if you have any questions regarding the contents of this report.

Sincerely,

Dave Crawford
Permit #**TE-821229-3**

REFERENCES

Hickman, J.C. (Editor). 1993. The Jepson Manual, Higher Plants of California. University of California Press, Berkeley, California.

Holland, R.F. 1986. Preliminary Descriptions of the Terrestrial Natural Communities of California. Unpublished Report. State of California, The Resources Agency, Department of Fish and Game, Natural Heritage Division, Sacramento, California.

Parikh, Anuja, Ph.D. and Nathan Gale, Ph.D. 2002. Rare Plant Surveys and Vegetation Mapping. River Park Newhall Ranch/Valencia Company Project Sites, Los Angeles County, CA. Prepared for Impact Sciences Inc. May 2002.

U.S. Fish and Wildlife Service. 1997. Survey Protocol for the Coastal California Gnatcatcher. February 28, 1997.

Attachment A

Vertebrate Species Observed or Detected on the River Park Project Site[1]

Scientific Name[2]	Common Name[2]	Status[3]
BIRDS		
Cathartidae	**New World Vultures**	
Cathartes aura	Turkey vulture	
Accipitridae	**Hawks**	
Circus cyaneus	Northern harrier	CSC/--- (nesting)
Buteo lineatus	Red-shouldered hawk	
Buteo jamaicensis	Red-tailed hawk	
Falconidae	**Falcons**	
Falco sparverius	American kestrel	
Phasianidae	**Grouse, Pheasants & Quails**	
Callipepla californica	California quail	
Charadriidae	**Plovers**	
Charadrius vociferus	Killdeer	
Laridae	**Gulls & Terns**	
Larus occidentalis	Western gull	
Columbidae	**Pigeons & Doves**	
*Columba livia**	Rock dove	
Zenaida macroura	Mourning dove	
Cuculidae	**Cuckoos & Roadrunners**	
Geococcyx californianus	Greater roadrunner	
Tytonidae	**Barn Owls**	
Tyto alba	Barn owl	
Strigidae	**True Owls**	
Bubo virginianus	Great horned owl	
Trochilidae	**Hummingbirds**	
Archilochus alexandri	Black-chinned hummingbird	
Calypte anna	Anna's hummingbird	
Picidae	**Woodpeckers**	
Melanerpes formicivorus	Acorn woodpecker	
Picoides pubescens	Downy woodpecker	
Colaptes auratus	Northern flicker	
Tyrannidae	**Tyrant Flycatchers**	
Contopus sordidulus	Western wood-pewee	
Sayornis nigricans	Black phoebe	
Tyrannus vociferans	Cassin's kingbird	
Tyrannus verticalis	Western kingbird	
Hirundinidae	**Swallows**	
Hirundo pyrrhonota	Cliff swallow	
Corvidae	**Jays & Crows**	
Aphelocoma coerulescens	Scrub jay	
Corvus brachyrhynchos	American crow	
Corvus corax	Common raven	
Aegithalidae	**Bushtits**	
Psaltriparus minimus	Bushtit	

Attachment A (continued)
Vertebrate Species Observed or Detected on the River Park Project Site[1]

Scientific Name[2]	Common Name[2]	Status[3]
Troglodytidae	**Wrens**	
Thryomanes bewickii	Bewick's wren	
Muscicapidae	**Kinglets, Gnatcatchers, Thrushes & Babblers**	
Regulus calendula	Ruby-crowned kinglet	
Polioptila caerulea	Blue-gray gnatcatcher	
Chamaea fasciata	Wrentit	
Mimidae	**Thrashers**	
Mimus polyglottos	Northern mockingbird	
Toxostoma redivivum	California thrasher	
Laniidae	**Shrikes**	
Lanius ludovicianus	Loggerhead shrike	CSC/[FSC]
Sturnidae	**Starlings**	
*Sturnus vulgaris**	European starling	
Emberizidae	**Wood Warblers, Tanagers, Buntings & Blackbirds**	
Dendroica coronata	Yellow-rumped warbler	
Dendroica nigrescens	Black-throated gray warbler	
Pipilo erythrophthalmus	Spotted towhee	
Pipilo crissalis	California towhee	
Chondestes grammacus	Lark sparrow	
Amphispiza belli belli	Bell's sage sparrow	CSC/[FSC]
Zonotrichia leucophrys	White-crowned sparrow	
Sturnella neglecta	Western meadowlark	
Molothrus ater	Brown-headed cowbird	
Fringillidae	**Finches**	
Carpodacus mexicanus	House finch	
Carduelis psaltria	Lesser goldfinch	
REPTILES		
Iguanidae	**Iguanid Lizards**	
Sceloporus occidentalis	Western fence lizard	
Uta stansburiana	Side-blotched lizard	
Anguidae	**Alligator Lizards**	
Elgaria multicarinata webbii	San Diego alligator lizard	
Colubridae	**Colubrid Snakes**	
Lampropeltis getulua californiae	California kingsnake	
MAMMALS		
Leporidae	**Hares & Rabbits**	
Sylvilagus audubonii	Desert cottontail	
Sylvilagus bachmani	Brush rabbit	
Sciuridae	**Squirrels**	
Spermophilus beecheyi	California ground squirrel	
Geomyidae	**Pocket Gophers**	
Thomomys bottae	Botta's pocket gopher	
Canidae	**Wolves & Foxes**	
Canis latrans	Coyote	

Attachment A (continued)
Vertebrate Species Observed or Detected on the River Park Project Site[1]

Scientific Name[2]	Common Name[2]	Status[3]
Mustelidae	**Weasels, Skunks & Otters**	
Mephitis mephitis	Striped skunk	
Felidae	**Cats**	
*Felis catus**	Domestic (feral) cat	
Lynx rufus	Bobcat	
Cervidae	**Deers**	
Odocoileus hemionus	Mule deer	

KEY:

[1] Occurrences documented during focused CAGN surveys conducted on site from October 18 through January 24, 2002.

[2] Scientific and common names are from Society for the Study of Amphibians and Reptiles (2000) for amphibians and reptiles, American Ornithologist's Union (2000) for birds, and Jones et al. (1992) for mammals.

[3] Status: CSC = California Species of Special Concern
[FSC] = Federal Species of Concern:
Species denoted with this term primarily include those considered C2 species under the old classification system. This term is only to be used as a "term-of-art" and is not to imply any legal protection or inclusion on the Federal ESA list.

* Non-native or introduced species

Compliance Biology. Letter summarizing the results of Focused Surveys for the Coastal California Gnatcatcher; Prospective Water Tank Locations, River Park Project. April 2003

compliance·biology

April 23, 2003

Ms. Susan Tebo
Impact Sciences, Inc.
30343 Canwood Street
Suite 210
Agoura Hills, California 91301

Subject: **Results of Focused Coastal California Gnatcatcher Surveys; Prospective Water Tank Locations, River Park Project, Los Angeles County, California**

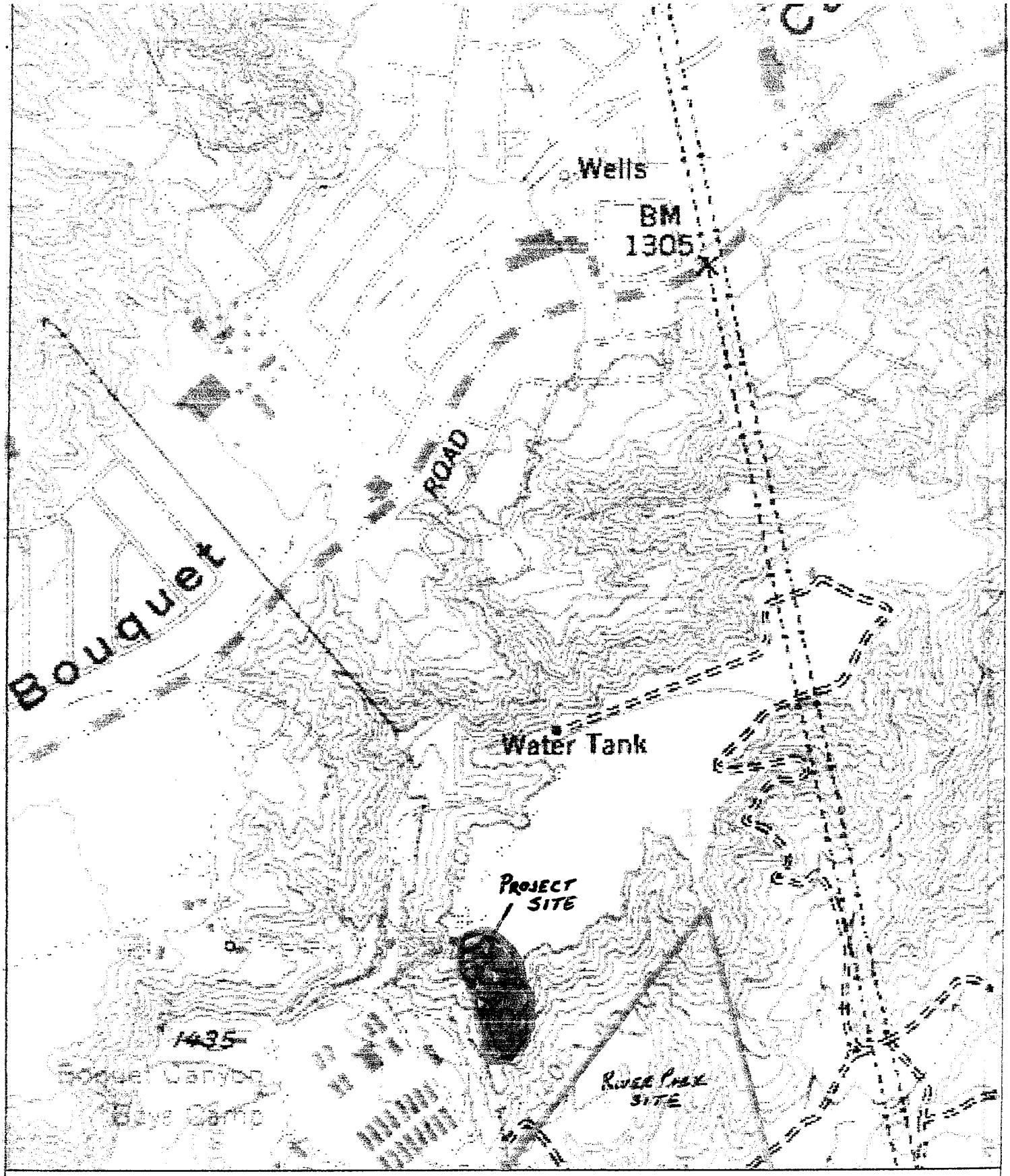
Dear Ms. Tebo,

This letter report summarizes the methodology and findings of surveys for the federally-listed Threatened California gnatcatcher (*Polioptila californica*) (herein CAGN) conducted by Compliance Biology associated with the River Park project, Santa Clarita, Los Angeles County, California. The surveys were conducted to determine the presence or absence of CAGN within the study area.

SURVEY LOCATION

Compliance Biology was retained to conduct CAGN surveys on a project site totaling approximately two (2) acres. The site consists of two prospective sites for the installation of water storage tanks. The site is located immediately west of Section 13 on the Newhall, California U.S.G.S. 7.5-minute quadrangle maps at T4N, R16W (**Exhibit 1**). The survey site is located to the immediate east of the Castaic Lake water treatment facility (previously the Bouquet Canyon Boys Camp), south of Bouquet Canyon Road and north of the Santa Clara River. The site is situated near the northeast corner of the proposed River Park project..

With the exception of the water treatment facility to the west, the only other surrounding development is an existing water tank and accessory structures to the north that are associated the treatment plant. Topography of the site includes a hilltop that slopes dramatically downward in all directions. Elevation on the survey site ranges from approximately 1475 feet to 1600 feet above mean sea level (MSL).



Name: NEWHALL
Date: 3/4/2003
Scale: 1 inch equals 800 feet

Location: 034° 26' 16.8" N 118° 30' 41.9" W
Caption: FIGURE 1

Project Location

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VEGETATION

The survey site supports two relatively distinct habitat types that coincide with the two proposed water tank locations. The northern half of the site is predominantly a southwest-facing slope that supports non-native grassland with pine trees along the top of the slope and remnant sage scrub along the bottom. Dominant plant species include wild oats (Avena sp.), ripgut brome (*Bromus rigidus*), shortpod mustard (*Hirschfeldia incana*), pine trees (*Pinus* sp.), and California sagebrush (*Artemesia californica*).

The southern portion of the site is most accurately described as a hilltop and supports species consistent with a Riversidian sage scrub community. Dominant plant species include California buckwheat (*Eriogonum fasciculatum*), thick-leaf yerba santa (*Eriodictyon crassifolium*), purple sage (*Salvia leucophylla*), California sagebrush, and chamise (*Adenostoma fasciculatum*). Less dominant species present also include native blue dicks (*Dichelostemma capitatum*), popcorn flower (*Plagiobothrys* sp.), and Our Lord's candle (*Yucca whipplei*). Non-native filaree (*Erodium* sp.) and brome grasses (*Bromus* spp.) were also common as ground cover between shrubs.

There is very little suitable CAGN habitat within the project boundaries as the vegetation has been disturbed, the site is situated on a hilltop that is frequently exposed to winds, and because of noise and human activity associated with the adjacent water treatment facility. However, if was determined that surveys should still be conducted as CAGN have been identified in the Santa Clarita area and because the site is situated in the vicinity of relatively high quality sage scrub habitat.

METHODOLOGY

Service recommended survey guidelines stipulate a minimum of six surveys shall be conducted at least one week apart between March 15 through June 30, and from July 1 through March 14, a minimum of nine surveys shall be conducted at least two weeks apart. Guidelines also recommend that surveys be completed between 6:00 a.m. and 12 p.m.; that they shall avoid periods of inclement weather or excessive heat, rain, wind, and fog; and the rate of coverage should be no more than 80 acres per day per permitted biologist.

Based on the aforementioned guidelines, six focused surveys were conducted within potentially suitable on-site coastal sage scrub habitats with at least a seven-day interval between site visits. All field surveys were performed by David Crawford under the authority of his individual Endangered Species Recovery Permit (# TE-821229-3).

Surveys were conducted on March 14 (authorization was obtained from FWS to begin surveys a day early), 21, and 28 and April 4, 11, and 18, 2003. The entire two-acre site and a surrounding buffer zone were surveyed each day. All potential habitat areas were systematically surveyed on foot by walking slowly and methodically along random transect routes. The location of transects and survey points along each transect were based on the vegetation and topographic conditions (size, location, and shape of habitat) of the area to be surveyed to ensure complete coverage. A combination of taped vocalizations (played at 30-60 second increments) and "pishing" sounds were used at each calling point.

Weather conditions during the surveys were generally conducive to a high level of bird activity. Surveys were typically conducted between the hours of about 7:00 a.m. and approximately 11:00 a.m. Temperatures varied from approximately 55 degrees Fahrenheit (F) to a maximum of about 77 degrees F. Wind speed ranged from 0 to 15 M.P.H. during the surveys. Cloud cover varied from clear to overcast.

RESULTS

A total of 19 avian species was observed or detected on the subject property. No California gnatcatchers or any other federal or state-listed endangered, threatened, or candidate species were recorded on the project site during the focused protocol surveys. A complete list of all vertebrate species observed or detected during the survey efforts is included as **Attachment A.**

Although none of the individual birds observed are afforded protection under the state or federal endangered species acts, several of the species observed are protected under the federal Migratory Bird Species Treaty Act while actively nesting. As such, grading and/or any other activity resulting in

the removal of vegetation should be conducted outside the typical nesting season (March 1 through July 30). Should such activities be required during this period of time, it is recommended that nesting bird surveys be conducted no greater than 10 days prior to vegetation removal to ensure compliance with federal laws protecting nesting birds.

Further, based on the existing conditions of the two prospective sites, with respect to biological considerations only, the northern site would result in fewer impacts as very little sage scrub habitat would be disturbed.

Thank you for the opportunity to provide Impact Sciences with biological services. Please feel free to contact me if you have any questions regarding the contents of this report.

Sincerely,

Dave Crawford
Principal Biologist

REFERENCES

California Department of Fish and Game. 2003. "Special Animals (670 taxa)." January 2003 update. Prepared by the Wildlife and habitat Data Analysis Branch. California Natural Diversity Database.

California Department of Fish and Game. 2003. Natural Diversity Data Base, Rarefind Application. Electronic Reports for the Newhall 7.5-minute quadrangle maps. Dated January 2003. Sacramento, California.

Hickman, J.C. (Editor). 1993. *The Jepson Manual, Higher Plants of California.* University of California Press, Berkeley, California.

Holland, R.F. 1986. "Preliminary Descriptions of the Terrestrial Natural Communities of California." Unpublished Report. State of California, The Resources Agency, Department of Fish and Game, Natural Heritage Division, Sacramento, California.

Jones, J. K., Jr., D. C. Carter, H. H. Genoways, R. S. Hoffman, and D. W. Rice. 1982. *Revised Checklist of North American Mammals North of Mexico, 1982.* Museum of Texas Tech University. Occasional Paper, No. 80.

U.S. Fish and Wildlife Service. 1997. "Survey Protocol for the Coastal California Gnatcatcher." February 28.

U.S. Fish and Wildlife Service. 1996. *Endangered and Threatened Wildlife and Plants; Animal Candidate Review for Listing as Endangered or Threatened Species; Proposed Rule* Federal Register 50, CFR Part 17. U.S. Department of the Interior. Washington, D.C.

U.S. Fish and Wildlife Service. 1985. *Migratory Bird Treaty Act.* 16 U.S.C. 703-712.

ATTACHEMENT A

Vertebrate Species Observed or Detected

Appendix A

Vertebrate Species Observed or Detected on the River Park Prospective Water Tank Sites[1]

Scientific Name[2]	Common Name[2]	Status[3]
BIRDS		
Accipitridae	**Hawks**	
Buteo jamaicensis	Red-tailed hawk	
Phasianidae	**Grouse, Pheasants & Quails**	
Callipepla californica	California quail	
Trochilidae	**Hummingbirds**	
Calypte anna	Anna's hummingbird	
Tyrannidae	**Tyrant Flycatchers**	
Tyrannus verticalis	Western kingbird	
Hirundinidae	**Swallows**	
Hirundo pyrrhonota	Cliff swallow	
Corvidae	**Jays & Crows**	
Aphelocoma coerulescens	Scrub jay	
Corvus brachyrhynchos	American crow	
Corvus corax	Common raven	
Aegithalidae	**Bushtits**	
Psaltriparus minimus	Bushtit	
Troglodytidae	**Wrens**	
Thryomanes bewickii	Bewick's wren	
Mimidae	**Thrashers**	
Mimus polyglottos	Northern mockingbird	
Ptilogonatidae	**Silky-Flycatchers**	
Phainopepla nitens	Phainopepla	
Emberizidae	**Wood Warblers, Tanagers, Buntings & Blackbirds**	
Pipilo erythrophthalmus	Spotted towhee	
Pipilo crissalis	California towhee	
Passerculus sandwichensis	Savannah sparrow	
Zonotrichia leucophrys	White-crowned sparrow	
Sturnella neglecta	Western meadowlark	
Fringillidae	**Finches**	
Carpodacus mexicanus	House finch	
Carduelis psaltria	Lesser goldfinch	
REPTILES		
Sceloporus occidentalis	Western fence lizard	
Uta stansburiana	Side-blotched lizard	
MAMMALS		
Sylvilagus audubonii	Desert cottontail	
Canis latrans	Coyote	
Odocoileus hemionus	Mule deer	

KEY:

[1] Occurrences documented during focused CAGN surveys conducted on site from March 14 through April 18, 2003.

[2] Scientific and common names are from American Ornithologist's Union (2000) for birds, Society for the Study of Amphibians and Reptiles (2000) for reptiles, and Jones et al. (1992) for mammals.

[3] Status: Sensitivity/listing status by state and federal agencies

* Non-native or introduced species

Guthrie, Daniel. *Bird Surveys of the Proposed Panhandle Development Area Near Valencia, California.* June 2003.

BIRD SURVEYS OF THE PROPOSED PANHANDLE DEVELOPMENT AREA

NEAR VALENCIA, CALIFORNIA, 2003

Prepared for:

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June 4, 2003

Bird Surveys of the Proposed Panhandle Development Area near Valencia, California, 2003

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Nature and Scope of Surveys

The survey area consisted of the channel of the Santa Clara River upstream from Bouquet Canyon Rd crossing to the water pipeline crossing the river, a distance of approximately 2 miles. The upland portion of the survey covered the slopes on the north side of the river along this section, extending from one quarter to one half mile north of the river channel. Three surveys were conducted. The survey on May 19th included only the river channel and the survey on May 30th covered only the upland portion of the study site. The June 4th survey covered both areas.

Each survey was conducted on foot by observers well acquainted with visual, auditory and behavioral characteristics of southern California birds. Survey routes were designed to cover all areas of the project. All surveys occurred between 6:00 and 10:00 a.m. Personnel for the surveys were Daniel A. Guthrie (May 30, June 4) and Judith A. Sugden May 19, June 4), both working under Federal Fish and Wildlife Service Permit number TE810394-1, issued under section 10(a)(1)(A) of the Endangered Species Act.

Habitat Condition and Bird Observations.

Because of the timing of surveys, nearly all birds observed were either resident or summering species. A complete list of species sighted is presented in Table 1. The river channel in this section consists of a broad, flat, dry wash with narrow margins of dry riparian woodland. Within the channel are areas of coastal sage scrub habitat. This section of the Santa Clara River in past years has been wet only briefly during spring rains and due to water release from pumps one mile upstream from Bouquet Canyon Road. This section was completely dry during all surveys this year. This resulted in the almost complete absence of riparian species such as song sparrow and yellowthroat. Aside from migrants, most of the other birds observed in this section are characteristic of coastal sage and dry riparian woodlands

The upland portion of this survey consists of coastal sage scrub and planted grass fields. Except for a yellowthroat and red-winged blackbirds visiting the area from reservoirs just north of the site, all birds observed here were characteristic of coastal sage.

The Southern California rufous-crowned sparrow, considered a California Special Concern species by the Department of Fish and Game and also a Federal Special Concern species was fairly common. Other species of concern that might be looked for include Bell's sage sparrow, horned lark, Lawrence's goldfinch and California gnatcatcher. Despite careful searches in appropriate habitat, none of these species were found. A single observation of summer tanager in trees along the north side of the river channel on May 19th is believed to have been of a migrant as the bird could not be found on subsequent visits to the area.

Table 1. BIRD SURVEYS OF THE SANTA CLARA RIVER BASIN, 2003: Santa Clara River from Boquet Canyon Bridge upstream for two miles and hills on north side of river

Endangered Species and Species of Concern Shaded

SPECIES	STATUS	Dates of Surveys 19-May	30-May	4-Jun
Red-tailed Hawk	r	2	2	2
American Kestrel	r		1	1
California Quail	r	27	25	39
Rock Dove	r			8
Mourning Dove	r	18	34	60
Black-chinned Hummingbird	s	6		1
Anna's Hummingbird	s	5	3	6
Costa's Hummingbird	s			2
Nuttall's Woodpecker	r	8	2	5
Northern Flicker	r		1	
Black Phoebe	r		2	2
Say's Phoebe	r			2
Ash-throated Flycatcher	s	1	3	5
Western Kingbird	s	2	2	5
Western Scrub Jay	r	15	5	7
American Crow	r		2	2
Common Raven	r	9	7	8
N. Rough-winged Swallow	s	2	6	5
Cliff Swallow	s	3	25	40
Oak Titmouse	r	1	1	
Bushtit	r	9		
Bewick's Wren	r	50	37	44
House Wren	r	4	3	
Western Bluebird	r	3	4	3
Wrentit	r	5	4	12
Northern Mockingbird	r	10	8	12
California Thrasher	r	2	2	4
European Starling	r	2	7	15
Phainopepla	r	5	2	7
Common Yellowthroat	r	2		
Wilson's Warbler	m	2		
Spotted Towhee	r	6	17	31
California Towhee	r	15	23	42
Rufous-crowned Sparrow	r		8	15
Summer Tanager	s	1		
Lazuli Bunting	s	1	1	
Red-winged Blackbird	s			8
Brown-headed Cowbird	s	2	2	
Bullock's Oriole	s		3	15
House Finch	r	38	24	45
Lesser Goldfinch	r		2	6
House Sparrow	r	4		5

Status: m, migrant; r, resident; s, summer only

Guthrie, Daniel. *Bird Surveys Along a Portion of the Santa Clara River and Its Tributaries Upstream from the Castaic Creek Confluence.* July 2002.

BIRD SURVEYS ALONG A PORTION OF THE SANTA CLARA RIVER AND ITS TRIBUTARIES UPSTREAM FROM THE CASTAIC CREEK CONFLUENCE, NEAR VALENCIA, CALIFORNIA, 2002

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July 19, 2002

DRAFT

Bird Surveys along a Portion of the Santa Clara River Upstream from the Castaic Creek Confluence, near Valencia, California, 2002

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Nature and Scope of Surveys

During the spring and early summer of 2002 surveys were conducted along a section of the Santa Clara River and its tributaries near Valencia, California (Figure 1). Surveys were focused on determining presence or absence of yellow-billed cuckoo, least Bell's vireo and southwestern willow flycatcher, and followed U.S. Fish and Wildlife Service Guidelines for the latter two species. Numbers of all species observed were noted, and, in addition to the three species noted above, special attention was placed on locating species considered rare and endangered or of Special Concern, and on determining numbers of brown-headed cowbirds.

Each survey was conducted on foot by observers well acquainted with visual, auditory and behavioral characteristics of southern California birds. Survey routes were designed to cover all areas of each section of the river, with emphasis placed on wetter habitats where least Bell's vireos and other sensitive riparian species are most likely to occur. All surveys occurred between 6:00 and 10:00 a.m. If focus species (yellow-billed cuckoo, least Bell's vireo, and southwestern willow flycatcher), were not visually observed, tapes of their calls were played in an attempt to elicit a response. Personnel for all surveys were Daniel A. Guthrie and Judith A. Sugden, both working under Federal Fish and Wildlife Service Permit number TE810394-1, issued under section 10(a)(1)(A) of the Endangered Species Act.

To facilitate surveys and observe the coverage guidelines for focus species, the area was divided into eight sections (Figure 1). Delineation of the eight areas and comments on each follow. Surveys of all sections of the river system were conducted five times during the nesting season and followed the Revised Protocol (Fish And Wildlife Service, July 2000) for southwestern willow flycatcher. Several sections of the river (Areas 4, 6-8) had no running water or wet riparian vegetation and were not considered suitable habitat for least Bell's vireo. However, areas 1-3,5 had flowing water and wet riparian vegetation. These sections were surveyed according to the protocol for least Bell's vireo as outlined by the Fish and Wildlife Service. This latter protocol requires 8 surveys between April 10 and July 31st, at least 10 days apart.

Habitat Condition and Bird Observations.

The riparian zone of the Santa Clara River, as described here, consists of two major habitat types, a wet riparian zone and a dry riparian woodland. The wet riparian zone consists of obligatory wet plants such as cattail and watercress found in continually moist soils along the active river channel and some willow, tamarisk and *Baccharis* shrubs also found in this zone. This zone is usually flooded during winter rains with the removal of much of the annual vegetation. Although this results in bare areas in April and early May, by June and July, most of this wet riparian vegetation has been reestablished. The dry riparian woodland consists of larger willow and cottonwood forests along the margins of the wet riparian zone and occurring on soils above the flood plain that are normally not damaged in winter floods. The 2001-2002 winter and spring seasons were the driest on record in southern California. As a result, there was no flooding. All annual vegetation away from the permanently flowing sections of the river failed to show any development, except near runoff drains from nearby suburban areas. Many perennial plants showed the effects of drought. Some smaller perennials died while older trees dropped branches.

Observations of all birds are shown in Tables 1-8. The numbers shown are of birds seen and heard, with heard individuals forming the majority of the observations. Numbers vary between censuses. Bird activity varies with season. Different species breed at different times of the year. In general, species are most easily observed when they are actively defending territories by song during the establishment of breeding pairs. Once pairs are established and nesting begins song often decreases and the numbers of birds observed, therefore, also decreases. After young leave the nest, numbers observed may increase. Thus, for most resident species, numbers of adult birds are most accurately censused in April and May, when territorial activity is at a maximum. A few species such as Anna's hummingbird that nest early in the season may be underestimated. Numbers of some nesting species, such as yellow warbler may be higher than normal in May due to migratory birds passing through the area. Numbers may also increase in late June and July when young birds leave the nest.

Due to drought conditions, more migratory birds than usual were observed in wet areas along the river. However, in dry sections not only were migrants absent but many resident species, especially insect feeders were less numerous than usual. The following sections contain specific comments on the habitat and bird observations in each area.

Area 1 (Table 1). Santa Clara River; The Old Road Bridge to the mouth of Castaic Creek.

Length of section, 3.5 miles. The Santa Clara River flows continuously in this section and is augmented by the Valencia waste water outfall near the upstream end of this section and by some irrigation runoff from Magic Mountain and agricultural fields along the north side.

Along most of this section, wet riparian vegetation forms a narrow strip along the main channel of the Santa Clara River. There was no scouring of this vegetation during the winter, and

wet riparian vegetation was very well developed. A section of dense willows along The Old Road, protected from spring flooding by a dike and irrigated by runoff from agricultural fields was the site of nesting by two pairs of least Bell's vireos (Figure 3).

Construction at the Valencia Waste water outfall throughout the survey period, plus the drought conditions, limited observations of species normally found in dry riparian forests. A cowbird trap was in operation just north of the Valencia Waste water outfall during the latter half of the study period.

Area 2 (Table 2). Santa Clara River; McBean Parkway downstream to The Old Road.

Length of section, 1.4 miles. The Santa Clara River flows continuously in this section and additional water is provided by irrigation runoff from industrial parks along the north side. There was no scouring of the channel be winter flooding, but dry conditions limited vegetation to a narrow band along the flowing stream. The wet willow forest near the mouth of San Francisquito Creek was carefully surveyed for focus species as migrating willow flycatcher have been seen here in previous years. None were found this year.

Area 3 (Table 3). Santa Clara River; Bouquet Canyon Road downstream to McBean Parkway

Length of section, 1.2 miles. Water, supplied by the Saugus wastewater outfall at the Bouquet Canyon Bridge, is continuous in this section of the Santa Clara River. A small amount of additional water is provided from irrigation runoff coming from Bouquet Canyon and suburban development along the north side of the Santa Clara River. Drought conditions resulted in green vegetation being restricted to a narrow band along the flowing river. Cottonwood plantings along both sides of the river showed signs of drought with many smaller trees dying. A single willow flycatcher was observed along this section of the river on May 18th (Figure 2) but could not be found on subsequent visits. This sighting is thought to be of an individual migrating through the area rather than of a breeding individual.

Area 4 (Table 4). Santa Clara River; Bouquet Canyon Road upstream to DWP transmission lines.

Length of section, 2.3 miles. The river channel in this section consists of a broad, flat, dry wash with narrow margins of dry riparian woodland. Within the channel are areas of coastal sage scrub habitat. This section of the Santa Clara River in past years has been wet only briefly during spring rains and due to water release from pumps one mile upstream from Bouquet Canyon Road. This section was completely dry during all surveys this year. This resulted in the almost complete absence of riparian species such as song sparrow and yellowthroat. A single yellow warbler was observed during migration and two rufous-crowned sparrows, resident on hillsides along the river, were observed once in the stream channel. Aside from migrants, most

of the other birds observed in this section are characteristic of coastal sage and dry riparian woodlands.

Area 5 (Table 5). Castaic Creek; Route 126 to Interstate 5.

Length of section, 1.8 miles. Except for pockets of wet vegetation formed near irrigation runoff channels, and remnant puddles near the middle of this section, the creek was dry much of this spring. Despite this lack of permanent water flow, many wet riparian species (song sparrow, yellowthroat, nested successfully. Swallows nested under the three bridges that cross this section of the river. The extensive willow forest on this section where least Bell's vireo once nested has matured and was dry much of this year. No vireos have been seen here the last four years and the area no longer seems suitable habitat due to its age and lack of permanent water. A single willow flycatchers was observed in this section on May 19th. As this bird was not singing and could not be relocated on subsequent visits, it is considered to be a migrant passing through the area.

Area 6 (Table 6). San Francisquito Creek; Santa Clara River upstream to Copper Hill Drive Crossing.

Length of section, 2.5 miles. Along most of this section the riparian zone consists of a broad sandy channel. In the upper part of this section the creek is bordered by land undergoing development. Coastal sage scrub plants occur within the channel as do sections of dry riparian woodland consisting mostly of cottonwoods. *Arundo* and tamarisk are common along this section as well. The lower ½ mile of San Francisquito Creek is wet due to runoff from adjacent development and is the only portion of this section where species preferring wet riparian habitat were observed. Although some water releases from upstream dams occurred during the winter months, no water was present during the survey period. Bridge construction across San Francisquito Creek affected one narrow section of the survey area and pumping in this area created limited water flow in about a 1/4 mile stretch of the stream.

Area 7 (Table 7). South Fork of the Santa Clara River; McBean Parkway to Magic Mountain Parkway (Route 126).

Length of section, 1.0 miles. The channel along this section of the South Fork is narrow and very sandy. Along most of this section vegetation is restricted to a narrow band of dry woodland and at each side of the channel and a few pockets of wet vegetation supported by runoff from adjacent development. Near the confluence with the main channel of the Santa Clara River a more extensive area of woodland exists on the north side of this section and a small cattail marsh is present.

Area 8 (Table 8). South Fork of the Santa Clara River, Route 126 upstream to Newhall Creek.

Length of section, 1.4 miles. This section of the river consists of a wide sandy channel intersected by several concrete sills designed to restrict sand movement and flood damage. The river is entirely bordered by developed areas but contains small islands of dry riparian vegetation

and some wet riparian areas formed by runoff from culverts along the sides of the creek. No flooding has occurred on this section of the river in recent years and riparian vegetation around these culverts continues to develop into areas of cottonwood and willow woodland, resulting in the continued increase in riparian species along this section of the river.

Comments on Threatened and Endangered Species

Yellow-billed Cuckoo

The Yellow-billed Cuckoo is listed as a State Endangered Species. Despite playing taped calls of this species during June and July surveys, no individuals of this species were observed in 2002.

Southwestern Willow Flycatcher

This subspecies is listed under the Federal Endangered Species Act. Willow Flycatchers were once widespread in wet riparian woodland in southern California but now only a few individuals exist. Following the Revised Protocol (Fish And Wildlife Service, July 2000) five surveys were conducted specifically for Southwestern willow flycatcher. All surveys occurred between 6:00 and 10:00 am. and used taped calls to elicit a response if flycatchers were not first observed.

Five willow flycatchers were observed at locations shown on Figure 2. None of these birds were calling, but did respond to tapes. Despite attempts on subsequent visits to elicit responses none of these birds could be relocated. Based on lack of singing and subsequent observations, these sightings are considered to be of migrants passing through the area. The report forms required for this species have been forwarded to the Ventura Office of the U.S. Fish and Wildlife Service.

Least Bell's Vireo

Surveys of the wet riparian areas (Areas 1-3,5) followed U.S. Fish and Wildlife Service Guidelines for least Bell's vireo. Eight surveys were conducted between April 10 and July 31 (see Tables 1-3,5 for dates). All surveys occurred between 6:00 and 10:00 am. and taped vireo calls were played if no vireos were heard or seen. The only vireos observed were on the Santa Clara River at Castaic Junction in an extensive stand of willows. Vireos were heard in at least 5 locations (Figure 3) but sere present at only two of the locations throughout the study period. Single observations at other sights on May 18th were at the height of migration and may have been of birds passing through the area.

Comments on Sensitive Species

Great Blue Heron

Great blue herons are listed on the California Natural Diversity Data Base as a species that warrants monitoring. Individuals of this species were observed sparingly along the river after the breeding season. No nesting was observed and herons were absent during the nesting season.

Great Egret

The great egret is listed on the California Natural Diversity Data Base as a species that warrants monitoring. A few individuals were observed along the river during migration and after the breeding season.

White-tailed Kite

This species, formerly the black-shouldered kite, is considered a Species of Special Concern by the State of California. Kites were infrequently observed along the river and there was no evidence of nesting this year.

Sharp-shinned Hawk

This species is considered a Species of Special Concern by the State of California. Sharp-shinned hawks regularly winter in southern California and the bird observed on May 7th is thought to be a late migrant through the area.

Cooper's Hawk

Cooper's hawk is considered a Species of Special Concern by the State of California. Cooper's hawks were observed rarely along the main river in 2002 and may have nested near Castaic Junction.

California Horned Lark

This is a California Special Concern species. Although none were observed nesting on the study site, horned larks are ground nesters that prefer bare hillsides and abandoned fields. A few were observed feeding on bare fields and construction areas along Castaic Creek

Yellow Warbler

The yellow warbler is considered a Species of Special Concern by the State of California. Yellow warblers prefer wet riparian habitat but are also found in large cottonwoods in drier riparian areas. Singing yellow warblers were observed along the continuously wet sections of the survey area during nesting season, but were observed in other dry sections of the river only during migration.

Yellow-breasted Chat

The yellow-breasted chat is considered a Species of Special Concern by the State of California. A few chats nested along the wet sections of the Santa Clara River.

Southern California Rufous-crowned Sparrow

This species is considered a California Special Concern species by the Department of Fish and Game and is also a Federal Special Concern species. Because of drought conditions a few rufous-crowned sparrows were visitors to the riparian zone from the surrounding coastal sage habitat where this species is a breeding resident.

Lawrence's Goldfinch

This species is a highest priority species on the Audubon Birds to Watch list for 1996 and is a Bird of Management Concern for the Fish and Wildlife Service. Although a species of the coastal sage, small flocks of this species visited the riparian zone of the Santa Clara River during early spring and summer.

Comments of Brown-headed Cowbirds

Although not a Species of Concern, comments about this species are warranted due to its influence on several endangered species. Cowbirds were regularly observed along all sections of the Santa Clara River, usually flying along the riparian corridor searching for either mates or potential nests to parasitize. Cowbird females often responded to taped calls of least Bell's Vireo. Cowbird traps were operated throughout the study period just north of the Valencia Wastewater outfall (section 1).

Summary

No yellow-billed cuckoos were observed in 2002. Five southwestern willow flycatchers were observed but could not be relocated on subsequent surveys. This failure, and their behavior suggests that these were migrant birds passing through the area. Two pairs of Least Bell's vireos were regularly observed and probably nested at Castaic Junction. Additional individuals of this species observed only on May 18th were probably migrants.

Three riparian Species of Concern, Cooper's hawk, yellow warbler and yellow-breasted chat nested in small numbers along wet sections of the river. Other Species of Concern include three migrant or wintering species; great blue heron, great egret and sharp-shinned hawk, and three visitors from nearly coastal sage scrub habitat; horned lark, rufous-crowned sparrow, and Lawrence's goldfinch. Cowbirds were numerous along the river and probably contributed to the small numbers of yellow warblers and least Bell's vireos observed.

Table 1. BIRDS OF THE SANTA CLARA RIVER BASIN, 2002: Santa Clara River from Old Road downstream to the mouth of Castaic Creek.

Endangered Species and Species of Concern Shaded

SPECIES	STATUS	Dates of Surveys 18-Apr	7-May	18-May	3-Jun	14-Jun	24-Jun	4-Jul	14-Jul
Great Blue Heron	m,w	0	0	0	0	0	1	0	0
Great Egret	m	0	1	0	0	0	0	0	0
Green Heron	r	0	6	3	6	0	2	7	6
American Bittern	m	0	7	0	0	0	0	0	0
Turkey Vulture	r	0	1	0	10	0	0	0	0
Mallard	r	6	0	4	0	0	0	0	0
Sharp-shinned Hawk	w	0	1	0	0	0	0	0	0
Cooper's Hawk	r	0	1	2	0	0	0	0	3
Red-shouldered Hawk	r	2	5	1	0	4	3	3	3
Red-tailed Hawk	r	0	2	4	2	1	0	3	0
American Kestrel	r	0	0	1	3	0	0	2	0
California Quail	r	8	28	19	3	0	4	34	16
Killdeer	r	3	9	13	3	8	0	2	0
Spotted Sandpiper	s	0	2	0	2	2	0	1	0
Least Sandpiper	m	1	0	0	0	0	0	0	0
Rock Dove	r	2	0	7	0	8	0	3	0
Mourning Dove	r	13	47	42	38	35	21	44	14
Great Horned Owl	r	0	1	0	0	0	0	0	0
Vaux's Swift	m	8	12	0	0	0	0	0	0
White-throated Swift	r	0	0	0	1	10	0	0	3
Selasphorus sp.	r	0	0	0	0	1	0	2	3
Black-chinned Hummingbird	s	0	0	2	2	4	1	1	2
Anna's Hummingbird	r	3	3	8	4	13	8	25	13
Costa's Hummingbird	s	0	0	1	1	0	0	1	3
Belted Kingfisher	m,w	1	1	0	0	0	0	0	0
Acorn Woodpecker	r	0	0	0	0	0	2	0	0
Nuttall's Woodpecker	r	1	9	9	11	13	11	10	16
Downy Woodpecker	r	0	5	7	6	10	4	7	9
Hairy Woodpecker	r	1	0	3	3	2	1	4	0
Northern Flicker	r	0	0	0	1	0	0	0	0
Western Wood-Pewee	m	0	0	1	3	0	0	0	0
Willow Flycatcher	m	0	0	2	0	0	0	0	0
Black Phoebe	r	3	0	0	4	12	4	4	2
Say's Phoebe	r	0	0	0	1	0	0	0	0
Ash-throated Flycatcher	s	6	13	11	10	13	13	11	8
Cassin's Kingbird	s	0	0	0	0	0	0	5	1
Western Kingbird	s	0	0	1	1	9	2	4	3
Bell's Vireo	s	2	1	6	0	2	1	1	2
Warbling Vireo	m	0	3	1	0	0	0	0	0
Western Scrub Jay	r	2	11	11	25	17	8	11	5
American Crow	r	2	2	2	1	1	0	6	2
Common Raven	r	4	19	7	13	25	19	14	29

Table 1 (cont.). BIRDS OF THE SANTA CLARA RIVER BASIN, 2002: Santa Clara River from the Old Road downstream to the mouth of Castaic Creek.

Endangered Species and Species of Concern Shaded

		Dates of Surveys							
SPECIES	STATUS	18-Apr	7-May	18-May	3-Jun	14-Jun	24-Jun	4-Jul	14-Jul
Tree Swallow	s	0	2	4	3	0	1	1	0
White-breasted Nuthatch	r	0	0	0	0	0	2	0	1
Bewick's Wren	r	7	41	24	17	33	20	18	23
House Wren	r	2	11	20	48	0	6	0	1
Western Bluebird	r	2	3	5	2	4	3	10	5
Swainson's Thrush	m	0	3	1	0	0	0	0	0
American Robin	r	1	2	1	0	0	2	0	0
Wrentit	r	0	0	3	6	16	10	11	11
Northern Mockingbird	r	2	0	0	0	0	0	0	0
California Thrasher	r	0	0	4	1	4	2	8	7
European Starling	r	2	10	19	13	1	3	3	1
Phainopepla	r	0	4	5	5	28	17	2	0
Orange-crowned Warbler	m	2	3	0	2	1	0	0	1
Yellow Warbler	s,m	1	30	12	13	13	4	6	0
Townsend's Warbler	m	0	1	0	0	0	0	0	0
Yellow-rumped Warbler	w,m	3	0	0	0	0	0	0	0
Common Yellowthroat	r	6	61	36	122	112	40	23	63
Wilson's Warbler	m	0	8	10	1	0	0	0	0
Yellow-breasted Chat	s	0	0	3	6	0	5	0	1
Western Tanager	m	1	2	1	0	0	0	0	0
Spotted Towhee	r	3	25	25	43	24	14	4	5
California Towhee	r	8	27	64	91	55	23	18	26
Lark Sparrow	r	0	0	2	0	10	0	5	2
Savannah Sparrow	w,m	9	0	0	0	0	0	0	0
Song Sparrow	r	36	144	106	122	57	33	40	81
White-crowned Sparrow	w,m	9	0	0	0	0	0	0	0
Black-headed Grosbeak	s	3	12	17	21	19	16	21	4
Blue Grosbeak	s	1	3	8	7	2	9	5	6
Indigo Bunting	m	0	1	0	1	0	0	0	0
Lazuli Bunting	s	0	1	0	0	0	0	0	0
Red-winged Blackbird	s	35	55	80	17	1	0	1	2
Brewer's Blackbird	r	0	3	0	0	0	0	0	0
Great-tailed Grackle	s	0	0	2	0	0	0	0	0
Brown-headed Cowbird	s	4	32	39	11	11	2	4	4
Hooded Oriole	s	0	6	0	0	13	3	0	3
Bullock's Oriole	s	2	8	1	1	14	7	3	1
House Finch	r	5	17	52	68	129	196	123	72
Lesser Goldfinch	r	11	38	15	18	38	5	16	13
Lawrence's Goldfinch	r	0	0	2	0	0	0	0	0
American Goldfinch	w,m,r	8	0	0	0	2	0	0	1
House Sparrow	r	0	1	0	0	0	0	1	0

Status: m, migrant; r, resident; s, summer only; w, winter

Table 2. BIRDS OF THE SANTA CLARA RIVER BASIN, 2002: Santa Clara River from McBean Highway to The Old Road.

Endangered Species and Species of Concern Shaded

		Dates of Surveys							
SPECIES	STATUS	18-Apr	7-May	18-May	3-Jun	14-Jun	24-Jun	4-Jul	14-Jul
Great Egret	m,w	0	1	0	0	0	0	0	0
Snowy Egret	m,w	0	1	0	0	0	0	0	0
Green Heron	r	0	0	2	1	2	2	3	4
Canada Goose	r	3	0	0	0	0	0	0	0
Mallard	r	1	1	5	0	0	0	2	0
Turkey Vulture	s	0	0	1	0	0	0	0	0
Red-shouldered Hawk	r	1	0	0	2	2	0	1	0
Red-tailed Hawk	r	0	0	1	1	1	0	0	0
California Quail	r	4	8	2	12	3	4	0	2
Killdeer	r	8	2	0	2	0	0	0	0
Mourning Dove	r	6	6	6	13	4	6	7	10
Vaux's Swift	m	3	0	0	0	0	0	0	0
White-throated Swift	r	0	0	10	0	0	0	0	0
Selaphorus sp.	s	0	0	0	0	0	0	1	0
Anna's Hummingbird	r	2	1	1	0	1	0	2	0
Nuttall's Woodpecker	r	4	3	2	1	4	4	8	3
Downy Woodpecker	r	3	0	0	0	0	2	0	0
Hairy Woodpecker	r	1	1	0	0	0	0	0	0
Northern Flicker	r	0	0	1	0	0	0	1	0
Western Wood-pewee	m	0	4	3	0	0	0	0	0
Black Phoebe	r	0	3	0	3	3	2	0	0
Ash-throated Flycatcher	s	9	2	2	3	5	3	8	5
Western Kingbird	s	0	0	0	1	0	0	1	3
Plumbeous Vireo	m	0	1	0	0	0	0	0	0
Warbling Vireo	m	0	4	1	0	0	0	0	0
Western Scrub Jay	r	2	7	3	5	6	2	4	2
American Crow	r	0	0	2	3	4	2	6	0
Common Raven	r	4	2	0	4	0	2	8	0
N. Rough-winged Swallow	s	0	4	37	7	14	2	5	2
Cliff Swallow	s	5	50	45	40	24	30	50	15
Barn Swallow	s	0	0	1	0	2	8	4	3
Oak Titmouse	r	0	0	0	0	2	3	0	6
Bushtit	r	7	4	2	0	0	3	0	0
Bewick's Wren	r	8	10	7	3	5	0	3	11
House Wren	r	6	7	5	0	0	0	0	0
Western Bluebird	r	3	4	0	0	4	0	0	0
Swainson's Thrush	m	0	1	2	0	0	0	0	0
Wrentit	r	0	0	1	0	0	0	0	0
Northern Mockingbird	r	0	0	1	1	0	0	0	0
California Thrasher	r	0	3	2	0	1	2	1	3
European Starling	r	4	4	4	3	14	8	10	0
Cedar Waxwing	w,m	10	23	0	0	0	0	0	0
Phainopepla	r	0	3	2	5	16	35	34	62

Table 2 (cont.). BIRDS OF THE SANTA CLARA RIVER BASIN, 2002: Santa Clara River from McBean Highway to The Old Road.

Endangered Species and Species of Concern Shaded

SPECIES	STATUS	Dates of Surveys 18-Apr	7-May	18-May	3-Jun	14-Jun	24-Jun	4-Jul	14-Jul
Orange-crowned Warbler	w,m	7	4	0	0	0	0	0	0
Yellow Warbler	s,m	0	2	4	0	0	0	1	0
Black-throated Gray Warbler	m	1	0	0	0	0	0	0	0
Townsend's Warbler	m	0	1	0	0	0	0	0	0
Yellow-rumped Warbler	w,m	1	0	0	0	0	0	0	0
Common Yellowthroat	r	5	12	34	21	18	30	38	8
McGillivray's Warbler	m	1	1	0	0	0	0	0	0
Wilson's Warbler	m	0	6	10	0	0	0	0	0
Yellow-breasted Chat	s	0	2	0	1	1	3	2	0
Western Tanager	s	0	4	0	0	0	0	0	0
Spotted Towhee	r	2	4	5	12	7	3	7	0
California Towhee	r	1	1	0	2	0	2	10	8
Song Sparrow	r	30	50	52	52	40	36	36	52
Black-headed Grosbeak	s	1	4	4	5	9	6	3	2
Blue Grosbeak	s	0	1	0	0	0	3	7	12
Red-winged Blackbird	s	5	45	50	10	13	0	15	0
Brown-headed Cowbird	s	8	13	4	3	3	10	9	6
Hooded Oriole	s	0	0	1	0	0	0	0	0
Bullock's Oriole	s	0	1	1	0	0	0	1	2
House Finch	r	4	2	3	6	11	12	26	50
Lesser Goldfinch	r	29	3	3	2	3	2	0	0
American Goldfinch	w,m,r	47	4	0	0	0	1	0	0

Status: m, migrant; r, resident; s, summer only; w, winter

Table 3. BIRDS OF THE SANTA CLARA RIVER BASIN, 2002: Santa Clara River from Boquet Canyon Bridge to McBean Parkway Bridge

Endangered Species and Species of Concern Shaded

SPECIES	STATUS	Dates of Surveys 18-Apr	7-May	18-May	3-Jun	14-Jun	24-Jun	4-Jul	14-Jul
Green Heron	r	0	1	0	0	0	0	0	0
Cattle Egret	m	0	0	0	0	6	0	0	0
Mallard	r	7	3	2	2	2	0	0	0
Red-shouldered Hawk	r	2	0	0	1	0	0	0	0
Red-tailed Hawk	r	0	0	0	0	0	3	0	0
California Quail	r	30	8	2	1	22	11	18	18
Killdeer	r	12	2	2	2	0	2	0	0
Spotted Sandpiper	s	0	0	1	0	0	0	0	0
Least Sandpiper	m	12	0	0	0	0	0	0	0
Mourning Dove	r	15	17	7	8	6	8	12	8
Greater Roadrunner	r	0	0	1	0	0	0	0	0
Vaux's Swift	m	0	4	0	0	0	0	0	0
Black-chinned Hummingbird	s	0	1	0	0	0	0	2	0
Anna's Hummingbird	r	2	1	3	2	0	0	2	3
Costa's Hummingbird	s	0	0	0	0	0	0	0	1
Nuttall's Woodpecker	r	2	0	2	0	1	1	1	0
Northern Flicker	r	1	0	0	0	0	0	0	2
Western Wood-Pewee	m	0	0	1	0	0	0	0	0
Willow Flycatcher	m	0	0	1	0	0	0	0	0
Black Phoebe	r	1	2	4	0	1	2	1	5
Ash-throated Flycatcher	s	5	3	2	2	1	0	5	5
Warbling Vireo	m	0	0	2	0	0	0	0	0
Western Scrub Jay	r	2	1	5	3	3	3	4	2
American Crow	r	0	0	1	0	1	2	3	2
Common Raven	r	55	20	14	14	4	6	6	8
N. Rough-winged Swallow	s	0	18	7	6	4	4	12	3
Cliff Swallow	s	6	65	14	27	6	18	36	20
Barn Swallow	s	0	2	1	2	0	6	0	0
Oak Titmouse	r	0	0	0	0	0	0	1	2
Bushtit	r	4	2	4	0	5	0	0	0
Bewick's Wren	r	6	2	7	4	5	0	4	5
House Wren	r	1	0	0	0	0	0	0	0
Western Bluebird	r	2	0	0	0	0	0	0	0
Northern Mockingbird	r	0	0	0	2	0	0	0	1
California Thrasher	r	1	0	1	0	1	2	0	0
European Starling	r	2	4	3	0	2	4	9	0
Phainopepla	r	0	0	0	1	1	5	0	0
Orange-crowned Warbler	w,m	4	0	0	0	0	0	0	0
Yellow Warbler	s,m	4	1	10	1	2	0	0	0
Yellow-rumped Warbler	w,m	2	0	0	0	0	0	0	0
Common Yellowthroat	r	31	12	8	14	13	14	6	2
McGillivray's Warbler	m	0	0	1	0	0	0	0	0
Wilson's Warbler	m	11	0	20	0	0	0	0	0

Table 3 (cont.). BIRDS OF THE SANTA CLARA RIVER BASIN, 2002: Santa Clara River from Boquet Canyon Bridge to McBean Parkway Bridge

Endangered Species and Species of Concern Shaded

SPECIES	STATUS	Dates of Surveys 18-Apr	7-May	18-May	3-Jun	14-Jun	24-Jun	4-Jul	14-Jul
Western Tanager	m	0	1	0	0	0	0	0	0
Spotted Towhee	r	5	3	4	9	5	3	3	1
California Towhee	r	8	0	2	0	0	0	6	4
Lincoln's Sparrow	w,m	2	0	0	0	0	0	0	0
Savannah Sparrow	w,m	0	1	0	0	0	0	0	0
Song Sparrow	r	47	20	24	14	24	14	12	24
White-crowned Sparrow	w,m	2	0	0	0	0	0	0	0
Black-headed Grosbeak	s	0	3	4	2	2	1	0	0
Blue Grosbeak	s	0	1	1	0	0	0	1	3
Great-tailed Grackle	r	1	0	2	0	0	0	0	0
Red-winged Blackbird	r	90	90	50	60	14	28	50	173
Brewer's Blackbird	r	6	0	0	0	0	0	0	0
Brown-headed Cowbird	s	25	4	2	2	5	3	3	3
Hooded Oriole	s	2	0	0	0	0	0	0	0
Bullock's Oriole	s	3	0	0	2	4	0	2	0
House Finch	r	25	15	17	19	18	10	75	66
Lesser Goldfinch	r	4	6	0	7	3	5	0	2
American Goldfinch	w,m,r	11	1	0	0	0	0	1	0

Status: m, migrant; r, resident; s, summer only; w, winter

Table 4. BIRD SURVEYS OF THE SANTA CLARA RIVER BASIN, 2002: Santa Clara River from Boquet Canyon Bridge upstream for two miles.

Endangered Species and Species of Concern Shaded

SPECIES	STATUS	Dates of Surveys 17-May	8-Jun	22-Jun	2-Jul	12-Jul
Green Heron	r	0	0	0	0	1
Red-shouldered Hawk	r	1	3	0	1	0
Red-tailed Hawk	r	1	2	2	3	2
American Kestrel	r	1	3	0	0	0
California Quail	r	0	57	0	0	3
Killdeer	r	5	6	1	0	0
Rock Dove	r	0	2	0	0	0
Mourning Dove	r	11	74	12	12	10
Black-chinned Hummingbird	s	0	0	0	0	1
Anna's Hummingbird	s	2	6	1	2	2
Nuttall's Woodpecker	r	1	2	3	3	4
Northern Flicker	r	0	0	0	0	3
Western Wood-Pewee	m	1	0	0	0	0
Black Phoebe	r	1	1	0	0	0
Say's Phoebe	r	0	1	0	0	0
Ash-throated Flycatcher	s	1	2	0	1	0
Western Kingbird	s	1	0	0	2	3
Western Scrub Jay	r	9	18	5	13	11
American Crow	r	0	2	0	0	0
Common Raven	r	1	22	8	4	6
N. Rough-winged Swallow	s	0	6	0	1	1
Cliff Swallow	s	0	8	0	0	0
Barn Swallow	s	0	1	0	0	0
Oak Titmouse	r	0	5	0	1	0
Bushtit	r	0	10	5	0	15
Bewick's Wren	r	9	12	3	3	4
House Wren	r	1	0	0	0	0
Western Bluebird	r	2	0	0	0	0
Wrentit	r	3	8	4	1	1
Northern Mockingbird	r	4	10	19	9	4
California Thrasher	r	2	10	2	3	1
European Starling	r	0	5	12	3	1
Phainopepla	r	2	47	8	15	6
Yellow Warbler	s	1	0	0	0	0
Wilson's Warbler	m	5	0	0	0	0
Spotted Towhee	r	4	20	9	1	3
California Towhee	r	4	11	10	4	12
Rufous-crowned Sparrow	r	0	2	0	0	0
Song Sparrow	r	0	6	0	0	0
Black-headed Grosbeak	s	1	0	1	0	0
Red-winged Blackbird	s	0	0	2	0	0
Brown-headed Cowbird	s	4	0	0	0	0
Bullock's Oriole	s	5	10	5	2	1
House Finch	r	18	78	21	21	43
Lesser Goldfinch	r	2	4	0	0	3

Table 4 (cont.). BIRD SURVEYS OF THE SANTA CLARA RIVER BASIN, 2002: Santa Clara River from Boquet Canyon Bridge upstream for two miles.

Endangered Species and Species of Concern Shaded

SPECIES	STATUS	Dates of Surveys 17-May	8-Jun	22-Jun	2-Jul	12-Jul
House Sparrow	r	0	0	0	6	0

Status: m, migrant; r, resident; s, summer only

Table 5. BIRDS OF THE SANTA CLARA RIVER BASIN, 2002: Castaic Creek from I-5 to the Santa Clara River

Endangered Species and Species of Concern Shaded

SPECIES	STATUS	Dates of Surveys 25-Apr	9-May	19-May	4-Jun	14-Jun	25-Jun	5-Jul	16-Jul
Great Blue Heron	m,w	0	0	2	0	0	0	0	0
Green Heron	r	0	0	0	0	1	0	0	0
Red-shouldered Hawk	r	0	0	0	0	0	0	1	0
Red-tailed Hawk	r	1	2	1	5	2	2	2	0
American Kestrel	r	1	1	1	2	0	0	0	0
California Quail	r	31	26	44	10	87	9	55	92
Killdeer	r	2	2	4	4	5	3	1	1
Common Snipe	m	0	0	1	0	0	0	0	0
Rock Dove	r	4	0	41	8	6	0	3	0
Mourning Dove	r	38	30	27	35	21	17	24	74
Barn Owl	r	1	0	0	0	0	0	0	0
Vaux's Swift	m	3	0	0	0	0	0	0	0
White-throated Swift	r	0	1	0	0	0	0	0	0
Black-chinned Hummingbird	s	3	0	0	4	2		3	6
Anna's Hummingbird	r	7	1	12	13	10	17	10	7
Costa's Hummingbird	s	1	0	0	1	0	0	2	4
Nuttall's Woodpecker	r	6	10	3	14	5	5	4	1
Downy Woodpecker	r	2	2	1	10	2	2	0	2
Hairy Woodpecker	r	0	0	0	0	0	0	0	2
Northern Flicker	r	0	2	0	1	0	0	0	0
Western Wood-pewee	m	0	0	1	0	0	0	0	0
Willow Flycatcher	m	0	0	1	0	0	0	0	0
Pacific slope Flycatcher	s	0	0	0	0	2	0	0	0
Black Phoebe	r	0	0	1	0	0	2	2	0
Ash-throated Flycatcher	s	10	10	10	9	18	7	4	2
Cassin's Kingbird	s	0	0	0	0	0	0	6	0
Western Kingbird	s	6	2	15	27	13	23	10	0
Warbling Vireo	m	2	3	0	1	0	0	0	0
Western Scrub Jay	r	11	28	20	15	14	14	20	8
American Crow	r	2	17	4	16	0	0	3	0
Common Raven	r	7	5	15	6	5	23	57	34
Horned Lark	r	0	0	12	4	0	0	0	0
N. Rough-winged Swallow	s	80	40	62	18	40	2	21	8
Cliff Swallow	s	220	525	320	102	296	424	89	41
Barn Swallow	s	6	1	0	1	2	2	2	2
Oak Titmouse	r	2	10	2	10	5	10	3	7
Bushtit	r	11	11	21	8	26	39	20	23
Bewick's Wren	r	30	35	22	26	8	10	12	13
House Wren	r	8	9	2	13	2	0	0	0
Western Bluebird	r	4	2	2	2	1	4	0	2
Swainson's Thrush	s	0	1	0	0	0	0	0	0
Wrentit	r	0	0	2	2	3	2	7	6

Table 5 (cont.). BIRDS OF THE SANTA CLARA RIVER BASIN, 2002: Castaic Creek from I-5 to the Santa Clara River

Endangered Species and Species of Concern Shaded

SPECIES	STATUS	Dates of Surveys 25-Apr	9-May	19-May	4-Jun	14-Jun	25-Jun	5-Jul	16-Jul
Northern Mockingbird	r	1	3	4	0	0	1	1	0
California Thrasher	r	2	2	0	5	10	4	2	2
European Starling	r	13	10	22	18	60	15	38	2
Phainopepla	r	0	0	2	4	0	1	0	1
Orange-crowned Warbler	w,m	3	2	0	0	0	0	0	0
Nashville Warbler	m	1	0	0	0	0	0	0	0
Yellow Warbler	s	4	5	14	2	8	1	1	0
Black-throated Gray Warbler	m	1	0	0	0	0	0	0	0
Townsend's Warbler	m	0	1	0	0	0	0	0	0
Common Yellowthroat	r	26	3	0	8	12	13	6	13
Wilson's Warbler	m	6	10	12	0	0	0	0	0
Yellow-breasted Chat	s	0	0	0	0	0	1	0	0
Western Tanager	m	0	6	0	0	0	0	0	0
Spotted Towhee	r	25	34	14	32	9	3	2	5
California Towhee	r	31	25	27	47	23	16	20	21
Rufous-crowned Sparrow	r	0	0	0	0	2	0	0	0
Lark Sparrow	r	0	0	0	4	2	1	0	5
Song Sparrow	r	26	21	22	37	43	38	22	8
White-crowned Sparrow	w,m	1	0	0	0	0	0	0	0
Black-headed Grosbeak	s	12	13	12	13	12	7	5	0
Blue Grosbeak	s	1	0	0	2	3	7	8	23
Lazuli Bunting	s	4	0	0	0	4	1	0	15
Red-winged Blackbird	s	57	24	50	14	59	5	35	2
Brewer's Blackbird	r	4	1	0	4	0	0	0	0
Brown-headed Cowbird	s	17	17	16	18	19	4	26	8
Hooded Oriole	s	0	2	3	0	11	9	1	1
Bullock's Oriole	s	6	3	7	8	12	14	3	0
House Finch	r	34	24	20	42	39	75	39	146
Lesser Goldfinch	r	7	9	0	23	15	20	18	5
American Goldfinch	w,m,r	0	0	0	1	0	0	0	2
House Sparrow	r	0	10	16	3	3	10	2	2

Status: m, migrant; r, resident; s, summer only; w, winter

Table 6. BIRDS OF THE SANTA CLARA RIVER BASIN, 2002: San Franciscquito Creek from Santa Clara River to Copper Hill Drive.

Endangered Species and Species of Concern Shaded

SPECIES	STATUS	Dates of Surveys 15-May	6-Jun	23-Jun	3-Jul	13-Jul
Red-shouldered Hawk	r	1	0	0	1	0
Red-tailed Hawk	r	1	2	3	4	4
California Quail	r	28	12	5	3	4
Killdeer	r	2	6	5	1	0
Mourning Dove	r	45	20	30	63	32
Barn Owl	r	0	0	1	0	1
Selasphorus sp.	m	0	0	0	0	2
Black-chinned Hummingbird	s	0	0	2	1	3
Anna's Hummingbird	r	4	3	6	4	16
Costa's Hummingbird	s	0	0	1	0	0
Nuttall's Woodpecker	r	6	3	7	2	1
Northern Flicker	r	0	0	0	0	1
Western Wood-Pewee	m	3	0	0	0	0
Willow Flycatcher	m	0	1	0	0	0
Black Phoebe	r	6	3	2	0	1
Ash-throated Flycatcher	s	4	1	6	9	6
Western Kingbird	s	2	0	3	0	0
Warbling Vireo	m	3	0	0	0	0
Western Scrub Jay	r	15	16	3	8	10
American Crow	r	2	2	0	5	18
Common Raven	r	13	2	5	1	5
N. Rough-winged Swallow	s	8	0	3	0	11
Cliff Swallow	s	10	56	36	0	26
Barn Swallow	s	0	0	0	0	4
Oak Titmouse	r	3	2	0	2	0
Bushtit	r	10	12	0	0	0
Bewick's Wren	r	19	7	2	4	3
Western Bluebird	r	3	4	1	0	0
Swainson's Thrush	m	1	0	0	0	0
Wrentit	r	0	0	0	1	0
Northern Mockingbird	r	5	0	7	0	4
California Thrasher	r	1	4	1	0	1
European Starling	r	2	2	0	5	0
Phainopepla	r	6	25	43	13	18
Common Yellowthroat	r	1	2	2	1	1
Wilson's Warbler	m	18	0	0	0	0
Yellow-breasted Chat	s	0	1	0	0	0
Western Tanager	m	4	0	0	0	0
Spotted Towhee	r	14	12	7	4	1
California Towhee	r	20	22	16	14	14
Lark Sparrow	r	0	2	0	0	0
Song Sparrow	r	5	10	2	4	2

Table 6 (cont.). BIRDS OF THE SANTA CLARA RIVER BASIN, 2002: San Francisquito Creek from Santa Clara River to Copper Hill Drive.

Endangered Species and Species of Concern Shaded

SPECIES	STATUS	Dates of Surveys 15-May	6-Jun	23-Jun	3-Jul	13-Jul
Black-headed Grosbeak	s	2	1	1	0	0
Blue Grosbeak	s	0	3	1	2	3
Red-winged Blackbird	r	28	21	14	2	4
Brewer's Blackbird	r	3	0	0	0	0
Brown-headed Cowbird	s	1	2	0	4	1
Bullock's Oriole	s	7	6	5	1	2
House Finch	r	42	48	118	67	137
Lesser Goldfinch	r	9	7	6	9	2
Lawrence's Goldfinch	r					

Status: m, migrant; r, resident; s, summer only; w, winter

Table 7. BIRDS OF THE SANTA CLARA RIVER BASIN, 2002: South Fork from Rte. 126 to the McBean Crossing.

Endangered Species and Species of Concern Shaded

SPECIES	STATUS	Dates of Surveys 15-May	6-Jun	23-Jun	3-Jul	13-Jul
Cooper's Hawk	r	0	0	0	0	1
Red-shouldered Hawk	r	1	0	0	1	0
Red-tailed Hawk	r	1	2	0	2	1
American Kestrel	r	1	0	0	0	0
California Quail	r	6	2	2	0	0
Killdeer	r	0	0	1	1	0
Mourning Dove	r	12	23	34	16	33
Black-chinned Hummingbird	s	0	0	4	0	0
Anna's Hummingbird	r	1	4	4	1	9
Nuttall's Woodpecker	r	0	0	2	0	3
Black Phoebe	r	0	7	3	1	1
Ash-throated Flycatcher	s	3	0	2	3	1
Western Kingbird	s	0	0	2	2	0
Western Scrub Jay	r	3	5	5	3	1
American Crow	r	2	0	0	5	0
Common Raven	r	18	7	14	20	8
N. Rough-winged Swallow	s	4	4	14	3	2
Cliff Swallow	s	0	0	0	3	3
Oak Titmouse	r	0	2	4	0	0
Bushtit	r	0	0	4	0	16
Bewick's Wren	r	6	4	7	5	5
House Wren	r	2	0	1	0	0
Swainson's Thrush	m,s	5	0	0	0	0
Northern Mockingbird	r	2	2	1	1	3
California Thrasher	r	0	1	0	1	0
European Starling	r	3	4	6	7	1
Phainopepla	r	0	0	0	2	3
Yellow Warbler	s,m	1	0	0	0	0
Common Yellowthroat	r	0	0	4	0	0
Wilson's Warbler	m	1	0	0	0	0
Spotted Towhee	r	7	4	0	2	0
California Towhee	r	11	4	9	7	0
Song Sparrow	r	5	0	0	0	0
Red-winged Blackbird	s	0	0	0	4	0
Brewer's Blackbird	r	0	0	1	3	0
Brown-headed Cowbird	s	0	0	0	3	0
Hooded Oriole	s	0	0	3	0	0
Bullock's Oriole	s	1	0	0	0	2
House Finch	r	34	21	42	50	15
Lesser Goldfinch	r	6	10	4	0	3
House Sparrow	r	6	1	1	0	0

Status: m, migrant; r, resident; s, summer only; w, winter

Table 8. BIRDS OF THE SANTA CLARA RIVER BASIN, 2002: South Fork of the Santa Clara River from Route 126 upstream to Coyote Creek.

Endangered Species and Species of Concern Shaded

SPECIES	STATUS	Dates of Surveys 15-May	6-Jun	23-Jun	3-Jul	13-Jul
Red-tailed Hawk	r	0	1	0	1	0
Red-shouldered Hawk	r	1	0	0	0	10
American Kestrel	r	0	1	0	0	0
California Quail	r	20	12	9	0	0
Killdeer	r	4	0	1	1	2
Rock Dove	r	0	0	2	0	3
Mourning Dove	r	24	50	28	30	30
White-throated Swift	r	10	6	1	1	6
Black-chinned Hummingbird	s	1	1	3	1	1
Anna's Hummingbird	r	11	12	9	8	14
Costa's Hummingbird	s	0	0	1	0	0
Nuttall's Woodpecker	r	2	0	5	2	1
Downy Woodpecker	r	0	0	0	1	0
Western Wood-Pewee	s	1	0	0	0	0
Pacific slope Flycatcher	m,s	0	1	0	0	0
Black Phoebe	r	4	3	1	2	1
Say's Phoebe	r	0	2	0	0	0
Ash-throated Flycatcher	s	1	2	0	0	0
Cassin's Kingbird	s	0	0	0	1	0
Western Kingbird	s	0	0	6	1	0
Warbling Vireo	m	2	0	0	0	0
Western Scrub Jay	r	7	9	5	12	10
American Crow	r	0	2	1	1	0
Common Raven	r	3	10	12	95	136
N. Rough-winged Swallow	s	8	38	10	2	6
Cliff Swallow	s	0	2	6	4	8
Oak Titmouse	r	3	1	1	0	2
Bushtit	r	7	4	6	4	17
Bewick's Wren	r	11	8	5	3	4
American Robin	r	0	0	0	1	0
Swainson's Thrush	m	2	0	0	0	0
Wrentit	r	2	3	1	2	1
Northern Mockingbird	r	3	6	3	3	6
California Thrasher	r	1	2	3	0	4
European Starling	r	11	31	15	2	3
Phainopepla	r	1	1	0	0	0
Yellow Warbler	s,m	3	0	0	1	0
Common Yellowthroat	r	3	5	3	3	0
Wilson's Warbler	m	16	0	0	0	0
Western Tanager	m	2	0	0	0	1
Spotted Towhee	r	9	4	1	2	2
California Towhee	r	16	9	18	8	7
Song Sparrow	r	10	11	2	3	2

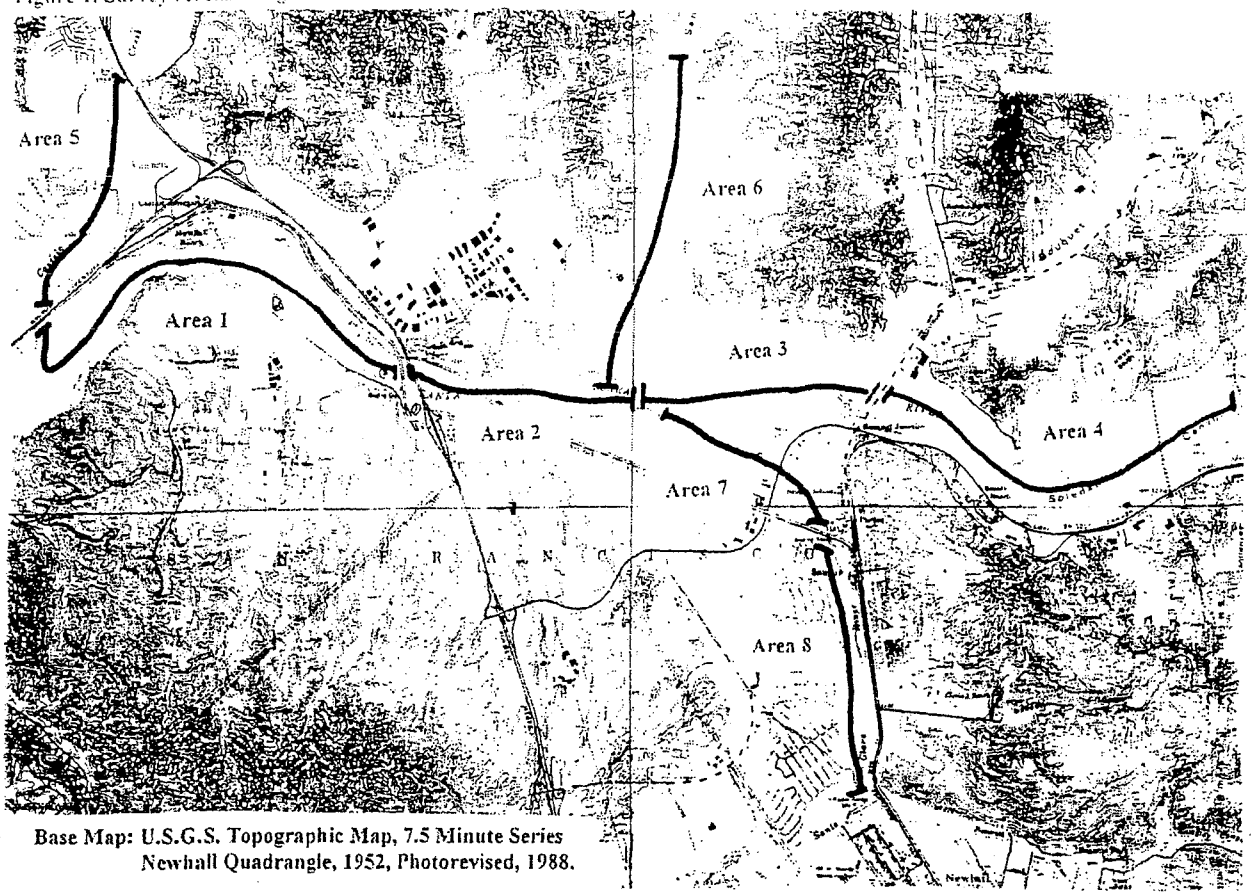
Table 8(cont.). BIRDS OF THE SANTA CLARA RIVER BASIN, 2002: South Fork of the Santa Clara River from Route 126 upstream to Coyote Creek.

Endangered Species and Species of Concern Shaded

SPECIES	STATUS	Dates of Surveys 15-May	6-Jun	23-Jun	3-Jul	13-Jul
Black-headed Grosbeak	s	2	2	1	0	0
Brewer's Blackbird	r	0	0	1	0	0
Brown-headed Cowbird	s	2	0	2	3	0
Hooded Oriole	s	0	0	0	0	1
Bullock's Oriole	s	2	2	5	0	4
House Finch	r	46	36	35	25	43
Lesser Goldfinch	r	16	14	30	7	10
House Sparrow	r	0	1	3	8	5

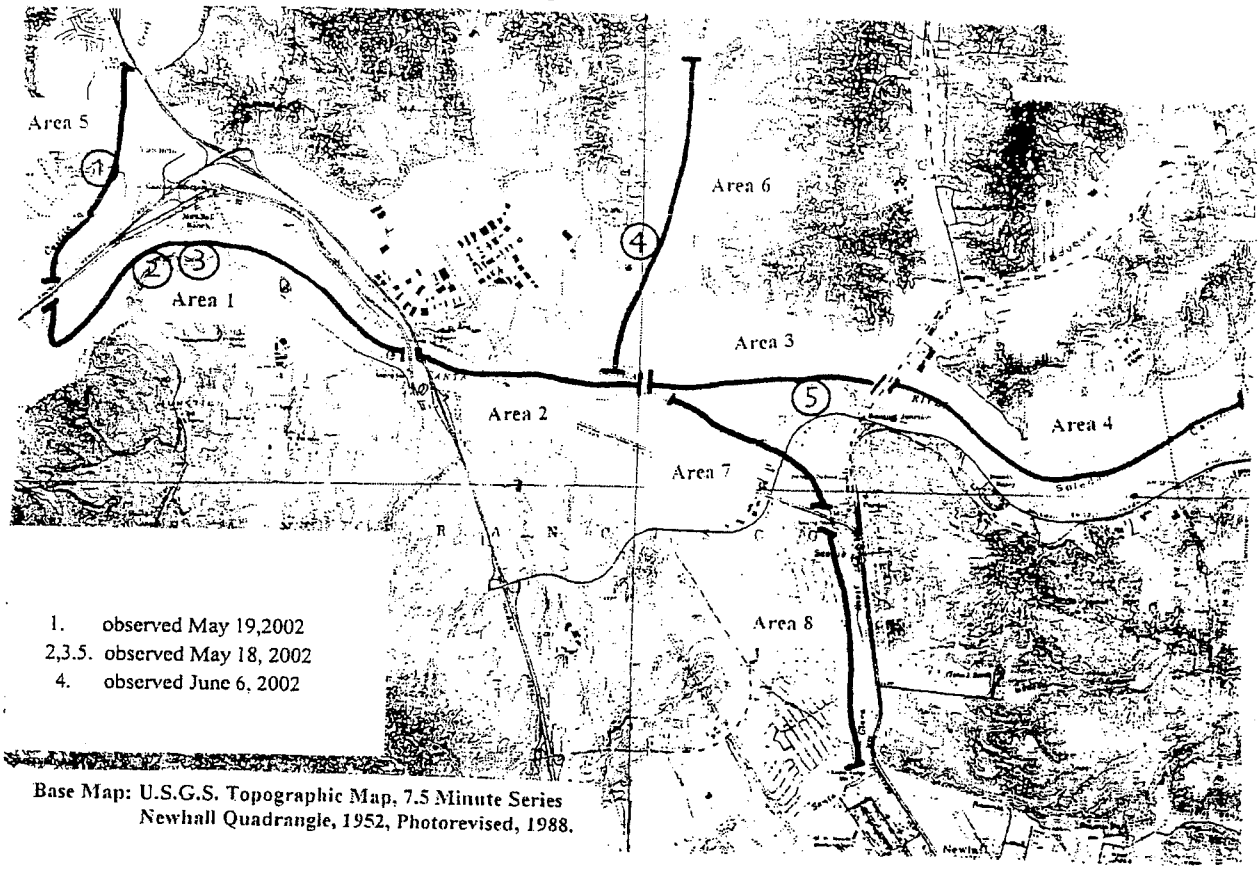
Status: m, migrant; r, resident; s, summer only; w, winter

Figure 1. Survey Areas along the Santa Clara River and Tributaries.



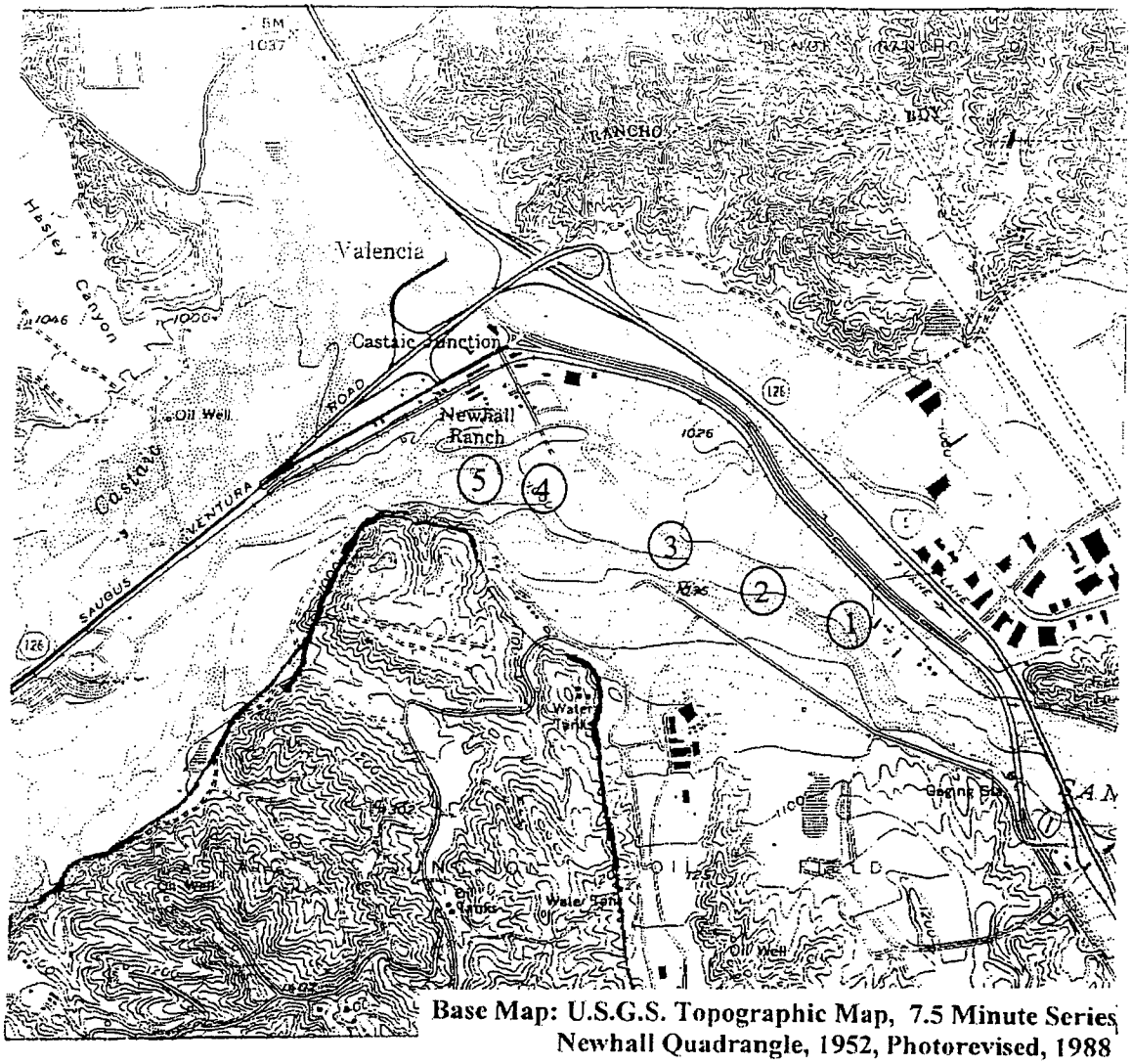
Base Map: U.S.G.S. Topographic Map, 7.5 Minute Series
Newhall Quadrangle, 1952, Photorevised, 1988.

Figure 2. Southwestern Willow Flycatcher Sightings during 2002.



Base Map: U.S.G.S. Topographic Map, 7.5 Minute Series
Newhall Quadrangle, 1952, Photorevised, 1988.

Figure 3. Observations of Least Bell's Vireo during 2002.

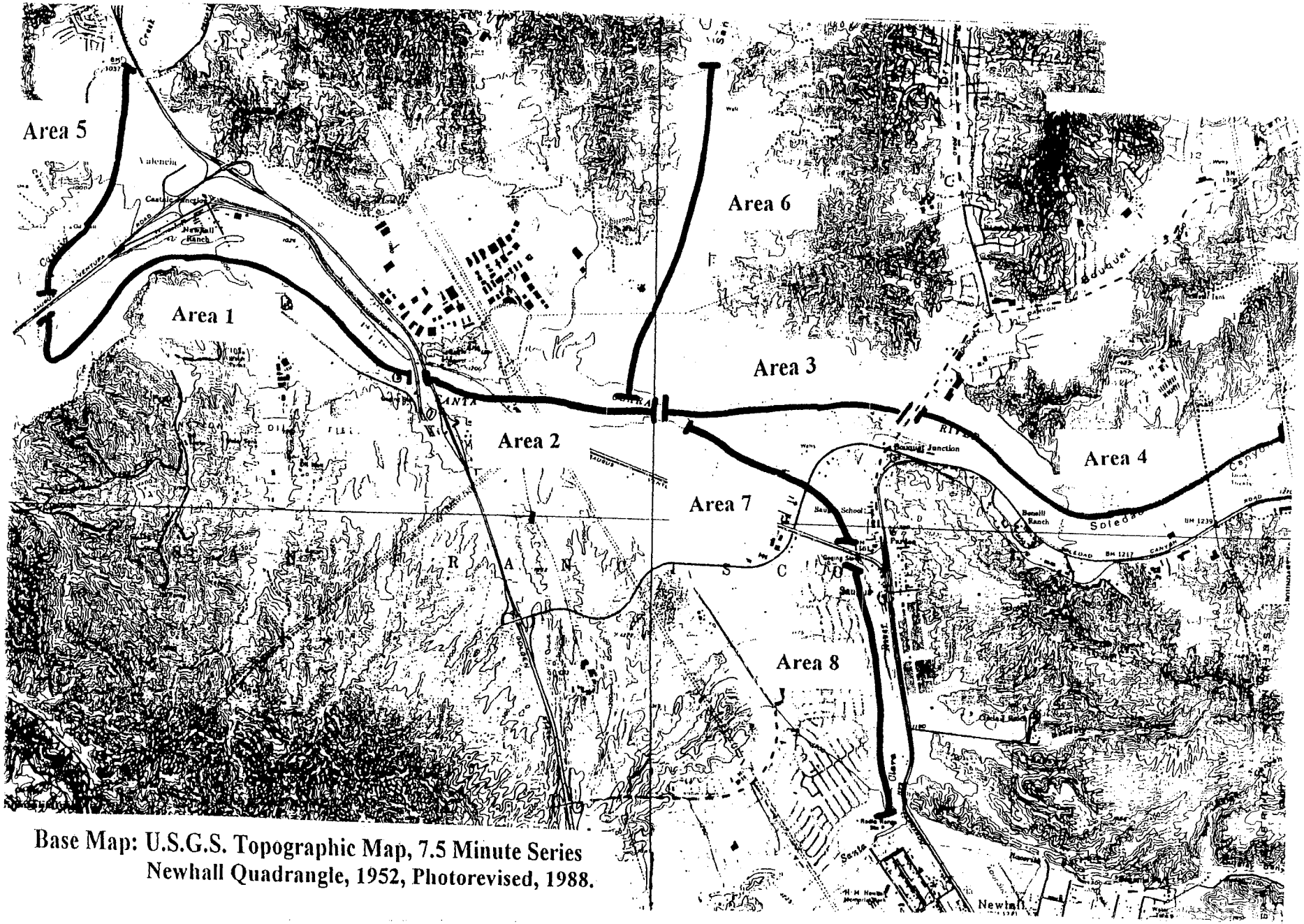


Base Map: U.S.G.S. Topographic Map, 7.5 Minute Series Newhall Quadrangle, 1952, Photorevised, 1988

Dates of vireo observations.

1. - 4/18, 5/7, 5/18, 6/14, 7/14
2,4,5 - 5/18
3 - 4/18, 5/18, 6/14, 7/4

Figure 1. Survey Areas along the Santa Clara River and Tributaries.



Base Map: U.S.G.S. Topographic Map, 7.5 Minute Series
Newhall Quadrangle, 1952, Photorevised, 1988.

2002 Upper River Area 1

BIRDS OF Santa Clara River System

Locality Old Rd → Castaic Cr. Date 4/18 Time 650–915

Count	Species
	Great Blue Heron
	Green Heron
(6) 2 1 2 1	Mallard
	Turkey Vulture
	White-tailed Kite
	Sharp-shinned Hawk
	Cooper's Hawk
(2) 11	Red-shouldered Hawk
	Red-tailed Hawk
	American Kestrel
(8) 6 2	California Quail
	American Coot
(3) 111	Killdeer
	Spotted Sandpiper
(1)	Least Sandpiper
	Common Snipe
(2)	Rock Dove
(13) 4 7 11	Mourning Dove
	Greater Roadrunner
	Barn Owl
	Great Horned Owl
	White-throated Swift
	Black-ch. Hummingbird
(3) 111	Anna's Hummingbird
	Costa's Hummingbird
(1)	Belted Kingfisher
	Acorn Woodpecker
(1)	Nuttall's Woodpecker
	Downy Woodpecker
(1)	Hairy Woodpecker
	Northern Flicker
	Western Wood-Pewee
	Willow Flycatcher
	Pacific Slope Flycatcher
(3) 12	Black Phoebe
	Say's Phoebe
(6) 𝍸1	Ash-throated Flycatcher
	Cassin's Kingbird
	Western Kingbird
	Horned Lark
	Tree Swallow
	Violet-green Swallow
(14) 8 4 2	N. Rough-winged Swallow
(82) 40 39	Cliff Swallow
(2)	Barn Swallow
(3) 11	Scrub Jay
(2)	American Crow
(4) 2 11	Common Raven
	Plain Titmouse
	Bushtit
(7) 2 𝍸	Bewick's Wren
(2) 11	House Wren
	Ruby-crowned Kinglet
	California Gnatcatcher
	Blue-gray Gnatcatcher
(2)	Western Bluebird
	Swainson's Thrush
	Hermit Thrush
(1)	American Robin
	Wrentit
(2) 11	Northern Mockingbird
	California Thrasher
	American Pipit
	Cedar Waxwing
	Phainopepla
	Loggerhead Shrike
(1)	European Starling
(1)	**Bell's Vireo**
	Solitary Vireo
	Warbling Vireo
(2)	Orange-crowned Warbler
(1)	Yellow Warbler
(3) 1 2	Yellow-rumped Warbler
(6) 1 𝍸	Common Yellowthroat
	Wilson's Warbler
	Yellow-breasted Chat
(1)	Western Tanager
(3) 111	Black-headed Grosbeak
(1)	Blue Grosbeak
	Lazuli Bunting
(3) 111	Rufous-sided Towhee
(8) 2 2 2 2	California Towhee
	Lark Sparrow
(9) 4 5	Savannah Sparrow
(36) 4 4 4 4 4 4 2 2 2 2 𝍸	Song Sparrow
	Lincoln's Sparrow
(9) 2 3 3 1	White-crowned Sparrow
(35) 20 10 X	Red-winged Blackbird
	Western Meadowlark
	Brewer's Blackbird
(4) 11	Brown-headed Cowbird
	Hooded Oriole
(2)	Northern Oriole
(5) 1 4	House Finch
	Pine Siskin
(12) 6 3 ~	Lesser Goldfinch
	Lawrence's Goldfinch
(8)	American Goldfinch
	House Sparrow
(8)	Vaux Swift

No evidence of winter Brant / breeders in - except narrow waters

Bobcat!

1 Deer

Deer 3 11

BIRDS OF Santa Clara River System

Locality Old Hwy 5 to Castaic Date 5/7/02 Time

- Great Blue Heron
- (6) 1 2 Green Heron
- (7) 2 2 2 Mallard
- (1) Turkey Vulture
- White-tailed Kite
- (1) Sharp-shinned Hawk
- (1) Cooper's Hawk
- (5) 2 Red-shouldered Hawk
- (2) 4 Red-tailed Hawk
- American Kestrel
- (28) 8, 20 California Quail
- American Coot
- (9) 2 Killdeer
- (2) Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- Rock Dove
- (47) 2 4 8 8 2 2 2 4 2 Mourning Dove
- Greater Roadrunner
- Barn Owl
- Great Horned Owl
- White-throated Swift
- Black-ch. Hummingbird
- (3) Anna's Hummingbird
- Costa's Hummingbird
- (1) Belted Kingfisher
- Acorn Woodpecker
- (9) Nuttall's Woodpecker
- (5) Downy Woodpecker
- Hairy Woodpecker
- Northern Flicker
- Western Wood-Pewee
- **Willow Flycatcher**
- Pacific Slope Flycatcher
- Black Phoebe
- Say's Phoebe
- (13) Ash-throated Flycatcher
- Cassin's Kingbird
- Western Kingbird
- Horned Lark
- (2) 1 Tree Swallow
- (10) 2 2 Violet-green Swallow
- (48) 6 6 4 9 8 2 7 N. Rough-winged Swallow
- (90) 10, 20, 20, 20, 20 Cliff Swallow
- (3) 2 Barn Swallow
- (11) Scrub Jay
- American Crow
- (19) 2 2 4 2 2 Common Raven
- (5) Plain Titmouse
- (14) 2 6 2 2 Bushtit
- (41) 1 8 8 8 4 2 Bewick's Wren
- (11) 4 2 House Wren
- Ruby-crowned Kinglet
- California Gnatcatcher
- Blue-gray Gnatcatcher
- (3) Western Bluebird
- (3) Swainson's Thrush
- Hermit Thrush
- (7) American Robin
- Wrentit
- Northern Mockingbird
- California Thrasher
- American Pipit
- Cedar Waxwing
- (4) Phainopepla
- Loggerhead Shrike
- (10) 2 European Starling
- 1 **Bell's Vireo** SAME as Last
- Solitary Vireo
- (3) Warbling Vireo
- (3) Orange-crowned Warbler
- (30) 2 2 2 2 2 Yellow Warbler
- Yellow-rumped Warbler
- (61) 6 6 6 4 4 6 6 4 6 6 Common Yellowthroat
- Wilson's Warbler
- (8) Yellow-breasted Chat
- (2) Western Tanager
- (12) Black-headed Grosbeak
- (3) Blue Grosbeak
- (1) Lazuli Bunting
- (25) Rufous-sided Towhee
- (27) California Towhee
- Lark Sparrow
- (144) Savannah Sparrow
- 8 8 8 8 8 8 6 6 4 6 8 8 6 4 6 2 4 6 3 Song Sparrow
- Lincoln's Sparrow
- White-crowned Sparrow
- (55) 8 2 6 8 8 6 0 4 6 2 Red-winged Blackbird
- Western Meadowlark
- (3) Brewer's Blackbird
- (32) 8 2 Brown-headed Cowbird
- (6) 1 Hooded Oriole
- (8) 1 2 3 Northern Oriole
- (17) 2 4 2 2 4 House Finch
- Pine Siskin
- (38) 2 6 2 2 2 2 2 8 2 4 2 2 Lesser Goldfinch
- Lawrence's Goldfinch
- American Goldfinch
- (1) House Sparrow
- (1) Townsend's Warbler
- (1) Great Egret
- (12) 4 or 2 VAUX Swift
- (1) INDIGO BUNTING
- (2) Great Horned Owl

plus 8 cowbirds in trap – NW side sewage

1 Bobcat

BIRDS OF Santa Clara River System

Locality Magic Mountain area to Castaic Date 5/18/02 Time 7:00 – 11:15

- Great Blue Heron
- (3) III Green Heron
- (4) 22 Mallard
- Turkey Vulture
- White-tailed Kite
- Sharp-shinned Hawk
- (2) II Cooper's Hawk
- I Red-shouldered Hawk
- (4) IIII Red-tailed Hawk
- (1) American Kestrel
- (19) 6812 California Quail
- American Coot
- (13) 12 IIII 44 Killdeer
- Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- (7) 16 Rock Dove
- 6 4886 22 2 2 (42) Mourning Dove
- Greater Roadrunner
- Barn Owl
- Great Horned Owl
- White-throated Swift
- (2) III Black-ch. Hummingbird
- (8) III IIII Anna's Hummingbird
- (1) Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- (9) 3 I IIII Nuttall's Woodpecker
- (2) III 2 Downy Woodpecker
- (3) III Hairy Woodpecker
- Northern Flicker
- (1) Western Wood-Pewee
- (2) II **Willow Flycatcher** 88884
- Pacific Slope Flycatcher
- (1) Black Phoebe
- Say's Phoebe
- (11) 22 2 12 Ash-throated Flycatcher
- Cassin's Kingbird
- (1) Western Kingbird
- (2) Horned Lark
- (4) 4 Tree Swallow
- (2) II Violet-green Swallow
- (7) II 2 2 N. Rough-winged Swallow
- (39) 8 8 8 8 1 4 2 Cliff Swallow
- (7) 22 III Barn Swallow
- (11) I 22 2 I 2 Scrub Jay
- (2) II American Crow
- (7) 2 2 I 2 Common Raven
- (3) III Plain Titmouse
- (2) Bushtit
- (24) 4 8 2 4 I 4 Bewick's Wren
- (20) 6 8 4 2 House Wren
- Ruby-crowned Kinglet
- California Gnatcatcher
- Blue-gray Gnatcatcher
- (5) I 2 Western Bluebird
- (1) Swainson's Thrush
- Hermit Thrush
- (1) American Robin
- (3) III Wrentit
- Northern Mockingbird
- (4) IIII California Thrasher
- American Pipit
- Cedar Waxwing
- (5) 23 Phainopepla
- Loggerhead Shrike
- (19) 4 64 12 European Starling
- (6) IIII Bell's Vireo
- Solitary Vireo
- (1) Warbling Vireo
- Orange-crowned Warbler
- (12) I 222 III Yellow Warbler
- Yellow-rumped Warbler
- (36) 4 8 9 4 8 Common Yellowthroat
- (10) 7 III Wilson's Warbler
- (2) II Yellow-breasted Chat
- (1) Western Tanager
- (17) II 4 III Black-headed Grosbeak
- (8) Blue Grosbeak flock
- Lazuli Bunting
- (25) 42 4 26 4 Rufous-sided Towhee
- (64) 48 8 8 8 4 California Towhee
- (2) Lark Sparrow
- Savannah Sparrow
- (106) 8 8 8 8 8 8 8 8 Song Sparrow
- Lincoln's Sparrow
- White-crowned Sparrow
- (80) 30, 30, 26, 5 II Red-winged Blackbird
- Western Meadowlark
- Brewer's Blackbird
- (39) 4 6 4 6 4 2 III 2 Brown-headed Cowbird
- Hooded Oriole
- (1) Northern Oriole
- (52) 4, 30, 8 4 II 4 House Finch
- Pine Siskin
- (15) 2 2 2 8 I 2 2 Lesser Goldfinch
- (2) Lawrence's Goldfinch
- American Goldfinch
- House Sparrow
- (2) Grackles flying over
- ~~Band tails in field~~

BIRDS OF Santa Clara River System

Locality_____ Date_____Time_____

_____Great Blue Heron
_____Green Heron
_____Mallard
_____Turkey Vulture
_____White-tailed Kite
_____Sharp-shinned Hawk
_____Cooper's Hawk
_____Red-shouldered Hawk
_____Red-tailed Hawk
_____American Kestrel
_____California Quail
_____American Coot
_____Killdeer
_____Spotted Sandpiper
_____Least Sandpiper
_____Common Snipe
_____Rock Dove
_____Mourning Dove
_____Greater Roadrunner
_____Barn Owl
_____Great Horned Owl
_____White-throated Swift
_____Black-ch. Hummingbird
_____Anna's Hummingbird
_____Costa's Hummingbird
_____Belted Kingfisher
_____Acorn Woodpecker
_____Nuttall's Woodpecker
_____Downy Woodpecker
_____Hairy Woodpecker
_____Northern Flicker
_____Western Wood-Pewee
_____**Willow Flycatcher**
_____Pacific Slope Flycatcher
_____Black Phoebe
_____Say's Phoebe
_____Ash-throated Flycatcher
_____Cassin's Kingbird
_____Western Kingbird
_____Horned Lark
_____Tree Swallow
_____Violet-green Swallow
_____N. Rough-winged Swallow
_____Cliff Swallow
_____Barn Swallow
_____Scrub Jay
_____American Crow
_____Common Raven
_____Plain Titmouse
_____Bushtit
_____Bewick's Wren
_____House Wren
_____Ruby-crowned Kinglet

_____**California Gnatcatcher**
_____Blue-gray Gnatcatcher
_____Western Bluebird
_____Swainson's Thrush
_____Hermit Thrush
_____American Robin
_____Wrentit
_____Northern Mockingbird
_____California Thrasher
_____American Pipit
_____Cedar Waxwing
_____Phainopepla
_____Loggerhead Shrike
_____European Starling
_____**Bell's Vireo**
_____Solitary Vireo
_____Warbling Vireo
_____Orange-crowned Warbler
_____Yellow Warbler
_____Yellow-rumped Warbler
_____Common Yellowthroat
_____Wilson's Warbler
_____Yellow-breasted Chat
_____Western Tanager
_____Black-headed Grosbeak
_____Blue Grosbeak
_____Lazuli Bunting
_____Rufous-sided Towhee
_____California Towhee
_____Lark Sparrow
_____Savannah Sparrow
_____Song Sparrow
_____Lincoln's Sparrow
_____White-crowned Sparrow
_____Red-winged Blackbird
_____Western Meadowlark
_____Brewer's Blackbird
_____Brown-headed Cowbird
_____Hooded Oriole
_____Northern Oriole
_____House Finch
_____Pine Siskin
_____Lesser Goldfinch
_____Lawrence's Goldfinch
_____American Goldfinch
_____House Sparrow
_____
_____
_____
_____
_____
_____

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BIRDS OF Santa Clara River System

Locality McBean to Castaic Date 6/3/02 Time 6:50

- Great Blue Heron
- 12 Green Heron
- Mallard
- 3 Turkey Vulture
- White-tailed Kite
- Sharp-shinned Hawk
- Cooper's Hawk
- Red-shouldered Hawk
- 2 Red-tailed Hawk
- 3 American Kestrel
- 2 California Quail
- American Coot
- 1 Killdeer
- 2 Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- Rock Dove
- 12 Mourning Dove
- Greater Roadrunner
- Barn Owl
- Great Horned Owl
- 1 White-throated Swift
- 2 Black-ch. Hummingbird
- 5 Anna's Hummingbird
- 1 Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- 8 Nuttall's Woodpecker
- 2 Downy Woodpecker
- 2 Hairy Woodpecker
- 1 Northern Flicker
- 2 Western Wood-Pewee
- **Willow Flycatcher**
- Pacific Slope Flycatcher
- 2 Black Phoebe
- 1 Say's Phoebe
- 10 Ash-throated Flycatcher
- Cassin's Kingbird
- 1 Western Kingbird
- Horned Lark
- 2 Tree Swallow
- 2 Violet-green Swallow
- 9 N. Rough-winged Swallow
- 26 Cliff Swallow
- 2 Barn Swallow
- 12 Scrub Jay
- 1 American Crow
- 12 Common Raven
- 5 Plain Titmouse
- 6 Bushtit
- 12 Bewick's Wren
- 8 House Wren
- Ruby-crowned Kinglet
- **California Gnatcatcher**
- Blue-gray Gnatcatcher
- 2 Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- American Robin
- 2 Wrentit
- Northern Mockingbird
- 1 California Thrasher
- American Pipit
- Cedar Waxwing
- 1 Phainopepla
- Loggerhead Shrike
- 12 European Starling
- **Bell's Vireo**
- Solitary Vireo
- Warbling Vireo
- 2 Orange-crowned Warbler
- 22 Yellow Warbler
- Yellow-rumped Warbler
- 42 Common Yellowthroat
- 1 Wilson's Warbler
- 5 Yellow-breasted Chat
- Western Tanager
- 4 Black-headed Grosbeak
- 2 Blue Grosbeak
- 1 Lazuli Bunting
- 8 Rufous-sided Towhee
- 8 California Towhee
- Lark Sparrow
- Savannah Sparrow
- 4 Song Sparrow
- Lincoln's Sparrow
- White-crowned Sparrow
- 6 Red-winged Blackbird
- Western Meadowlark
- Brewer's Blackbird
- 6 Brown-headed Cowbird
- Hooded Oriole
- 1 Northern Oriole
- 4 House Finch
- Pine Siskin
- 2 Lesser Goldfinch
- Lawrence's Goldfinch
- American Goldfinch
- House Sparrow

BIRDS OF Santa Clara River System

Saturday

Locality Magic Dragon Date 6/15/02 Time 6:45-

- Great Blue Heron
- Green Heron
- Mallard
- Turkey Vulture
- White-tailed Kite
- Sharp-shinned Hawk
- Cooper's Hawk
- 1 1 2 Red-shouldered Hawk
- 1 Red-tailed Hawk
- American Kestrel
- California Quail
- American Coot
- 1 2 1 3 Killdeer
- 2 Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- 5 11 Rock Dove
- 48 24 8 4 2 2 Mourning Dove
- Greater Roadrunner
- Barn Owl
- Great Horned Owl
- 2 6 11 White-throated Swift
- 1 1 1 1 Black-ch. Hummingbird
- 1 3 1 2 1 1 Anna's Hummingbird
- Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- 21 Nuttall's Woodpecker
- Downy Woodpecker
- 1 1 Hairy Woodpecker
- Northern Flicker
- Western Wood-Pewee
- **Willow Flycatcher**
- Pacific Slope Flycatcher
- 11 Black Phoebe
- Say's Phoebe
- 11 1 2 1 1 2 2 Ash-throated Flycatcher
- Cassin's Kingbird
- 5 4 Western Kingbird
- 2 2 Horned Lark
- Tree Swallow
- 1 Violet-green Swallow
- 8 8 4 6 4 N. Rough-winged Swallow
- 8 8 8 8 1 1 6 6 Cliff Swallow
- 8 1 1 1 2 Barn Swallow
- 12 2 1 1 2 1 1 2 Scrub Jay
- 1 American Crow
- 3 4 2 2 5 2 6 Common Raven
- 4 1 2 2 1 2 2 1 2 Plain Titmouse
- 4 8 Bushtit
- 1 1 1 2 6 2 1 66 Bewick's Wren
- House Wren
- Ruby-crowned Kinglet
- **California Gnatcatcher**
- Blue-gray Gnatcatcher
- 2 11 Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- American Robin
- 2 4 2 4 1 1 2 Wrentit
- Northern Mockingbird
- 2 11 California Thrasher
- American Pipit
- Cedar Waxwing
- 4 1 1 2 5 4 3 Phainopepla
- Loggerhead Shrike
- 1 European Starling
- 11 **Bell's Vireo**
- Solitary Vireo
- Warbling Vireo
- 1 Orange-crowned Warbler
- 2 1 2 2 2 1 2 Yellow Warbler
- Yellow-rumped Warbler
- 8 8 8 8 2 4 8 11 8 5 6 4 11 Common Yellowthroat
- Wilson's Warbler
- Yellow-breasted Chat
- Western Tanager
- 4 1 1 3 1 1 1 2 Black-headed Grosbeak
- 2 Blue Grosbeak
- Lazuli Bunting
- 11 8 1 1 2 1 1 Rufous-sided Towhee
- 4 8 1 8 8 1 8 5 1 1 2 California Towhee
- 2 2 2 11 Lark Sparrow
- Savannah Sparrow
- 8 5 8 8 8 8 1 1 1 4 Song Sparrow
- Lincoln's Sparrow
- White-crowned Sparrow
- 1 Red-winged Blackbird
- Western Meadowlark
- Brewer's Blackbird
- 1 1 3 2 1 1 Brown-headed Cowbird
- 35 1 1 2 Hooded Oriole
- 1 1 3 4 1 1 3 Northern Oriole
- 8 8 8 8 8, 10, 30, 25, 1 2 House Finch
- Pine Siskin
- 1 1 1 2 8 8 2 4 5 2 2 Lesser Goldfinch
- Lawrence's Goldfinch
- 2 American Goldfinch
- House Sparrow
- 1 Allen's Hummingbird / Rufus

BIRDS OF Santa Clara River System

Locality Hwy 99 to Castaic. — Magic Mountain Date Monday June 24 02 Time 6:15 -

1 Great Blue Heron
II Green Heron
Mallard
Turkey Vulture
White-tailed Kite
Sharp-shinned Hawk
Cooper's Hawk
III Red-shouldered Hawk
Red-tailed Hawk
American Kestrel
4 California Quail
American Coot
Killdeer
Spotted Sandpiper
Least Sandpiper
Common Snipe
Rock Dove
2 4 6 2 2 32 Mourning Dove
Greater Roadrunner
Barn Owl
Great Horned Owl
White-throated Swift
1 Black-ch. Hummingbird
IIII IIII Anna's Hummingbird
Costa's Hummingbird
Belted Kingfisher
2 Acorn Woodpecker
1 IIII IIII Nuttall's Woodpecker
IIII Downy Woodpecker
1 Hairy Woodpecker
Northern Flicker
Western Wood-Pewee
Willow Flycatcher
Pacific Slope Flycatcher
II 2 Black Phoebe
Say's Phoebe
21 IIII II Ash-throated Flycatcher
Cassin's Kingbird
2 Western Kingbird
Horned Lark
1 Tree Swallow
2 Violet-green Swallow
IIII I 2 N. Rough-winged Swallow
40, 20, 8 40, 40, 8 8 2 4 Cliff Swallow
Barn Swallow
IIII IIII Scrub Jay
American Crow
66 II 2 Common Raven
1 1 2 IIII IIII Plain Titmouse
6 8 6 2 Bushtit
1 1 6 2 IIII IIII Bewick's Wren
II 2 House Wren
Ruby-crowned Kinglet

California Gnatcatcher
Blue-gray Gnatcatcher
2 Western Bluebird
Swainson's Thrush
Hermit Thrush
II American Robin
1 1 2 2 2 Wrentit
Northern Mockingbird
II California Thrasher
American Pipit
Cedar Waxwing
4 1 1 2 4 5 Phainopepla
Loggerhead Shrike
12 European Starling
Bell's Vireo
Solitary Vireo
Warbling Vireo
Orange-crowned Warbler
IIII Yellow Warbler
Yellow-rumped Warbler
4 4 4 2 1 1 2 4 6 4 IIII Common Yellowthroat
Wilson's Warbler
IIII Yellow-breasted Chat
Western Tanager
1 1 2 IIII 2 1 2 1 2 Black-headed Grosbeak
3 1 IIII Blue Grosbeak
Lazuli Bunting
1 1 1 IIII IIII Rufous-sided Towhee
1 6 IIII 4 IIII 2 California Towhee
Lark Sparrow
Savannah Sparrow
4 4 IIII 9 6 4 6 Song Sparrow
Lincoln's Sparrow
White-crowned Sparrow
Red-winged Blackbird
Western Meadowlark
Brewer's Blackbird
II Brown-headed Cowbird
1 2 Hooded Oriole
II IIII Northern Oriole
8 8 8 4 IIII 4 House Finch
Pine Siskin
IIII Lesser Goldfinch
Lawrence's Goldfinch
American Goldfinch
House Sparrow
2 white breasted nuthatch

BIRDS OF Santa Clara River System

Locality Old Rd Bridge-to Castaic =Magic Mt. Date 7/19/02 Time 6:00 am

- Great Blue Heron
- (6) Green Heron
- Mallard
- Turkey Vulture
- White-tailed Kite
- Sharp-shinned Hawk
- (5) Cooper's Hawk
- (3) Red-shouldered Hawk
- Red-tailed Hawk
- American Kestrel
- (16) California Quail
- American Coot
- Killdeer
- Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- Rock Dove
- (14) Mourning Dove
- Greater Roadrunner
- Barn Owl
- Great Horned Owl
- (3) White-throated Swift
- (2) Black-ch. Hummingbird
- (13) Anna's Hummingbird
- 3 Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- (16) Nuttall's Woodpecker
- (9) Downy Woodpecker
- Hairy Woodpecker
- Northern Flicker
- Western Wood-Pewee
- **Willow Flycatcher**
- Pacific Slope Flycatcher
- 2 Black Phoebe
- Say's Phoebe
- (8) Ash-throated Flycatcher
- Cassin's Kingbird
- Western Kingbird
- (10) Horned Lark
- Tree Swallow
- Violet-green Swallow
- (53) N. Rough-winged Swallow
- (33) Cliff Swallow
- (5) Barn Swallow
- (5) Scrub Jay
- American Crow
- (2) Common Raven
- (7) Plain Titmouse
- (37) Bushtit
- (23) Bewick's Wren
- House Wren
- Ruby-crowned Kinglet
- California Gnatcatcher
- Blue-gray Gnatcatcher
- (5) Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- American Robin
- (11) Wrentit
- Northern Mockingbird
- (7) California Thrasher
- American Pipit
- Cedar Waxwing
- Phainopepla
- Loggerhead Shrike
- European Starling
- (2) **Bell's Vireo**
- Solitary Vireo
- Warbling Vireo
- Orange-crowned Warbler
- Yellow Warbler
- (63) Yellow-rumped Warbler
- Common Yellowthroat
- Wilson's Warbler
- Yellow-breasted Chat
- Western Tanager
- (4) Black-headed Grosbeak
- (6) Blue Grosbeak
- Lazuli Bunting
- (5) Rufous-sided Towhee
- (26) California Towhee
- (2) Lark Sparrow
- Savannah Sparrow
- (81) Song Sparrow
- Lincoln's Sparrow
- White-crowned Sparrow
- (2) Red-winged Blackbird
- Western Meadowlark
- Brewer's Blackbird
- (4) Brown-headed Cowbird
- (3) Hooded Oriole
- Northern Oriole
- (72) House Finch
- Pine Siskin
- (13) Lesser Goldfinch
- Lawrence's Goldfinch
- American Goldfinch
- House Sparrow
- 3 Ruby/Gallows Hummingbird
- White breasted nuthatch

1 Deer

BIRDS OF Santa Clara River System

Locality Old Hwy 99 — Castaic = Mgzc. Mountain section Date 7/4/02 Time 6:00 -

- Great Blue Heron
- (7) 2 23 Green Heron
- Mallard
- Turkey Vulture
- White-tailed Kite
- Sharp-shinned Hawk
- Cooper's Hawk
- (3) III Red-shouldered Hawk
- (3) I Red-tailed Hawk
- American Kestrel
- (34) 6, 20, 8 California Quail
- American Coot
- (2) I Killdeer
- (1) Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- (3) 12 Rock Dove
- $68 88 22 2 (44) Mourning Dove
- Greater Roadrunner
- Barn Owl
- Great Horned Owl
- White-throated Swift
- (1) Black-ch. Hummingbird
- (25) III 648 III Anna's Hummingbird
- (1) Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- (10) III III Nuttall's Woodpecker
- (7) II III Downy Woodpecker
- (4) III Hairy Woodpecker
- Northern Flicker
- Western Wood-Pewee
- **Willow Flycatcher**
- Pacific Slope Flycatcher
- (2) III Black Phoebe
- Say's Phoebe
- (11) III III Ash-throated Flycatcher
- (5) III 2 Cassin's Kingbird
- (4) 12 Western Kingbird
- (2) Horned Lark
- (1) Tree Swallow
- (2) II Violet-green Swallow
- (29) 3486 N. Rough-winged Swallow
- (17) 65 Cliff Swallow
- (8) 1 4 12 Barn Swallow
- (11) I III III Scrub Jay
- 42 American Crow
- (6) (19) 3 3 2 III 3 Common Raven
- (5) III Plain Titmouse
- (54) 6, 10, 20, 40 6 Bushtit
- (18) III III Bewick's Wren
- House Wren
- Ruby-crowned Kinglet
- California Gnatcatcher
- Blue-gray Gnatcatcher
- (10) 2223 Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- American Robin
- (11) 2 2 22 II Wrentit
- Northern Mockingbird
- (8) II 222 California Thrasher
- American Pipit
- Cedar Waxwing
- (2) II Phainopepla
- Loggerhead Shrike
- (3) III European Starling
- (1) **Bell's Vireo**
- Solitary Vireo
- Warbling Vireo
- Orange-crowned Warbler
- (6) I III Yellow Warbler
- Yellow-rumped Warbler
- (23) 1 4 III 3 Common Yellowthroat
- Wilson's Warbler
- Yellow-breasted Chat
- Western Tanager
- (21) II III 4 I III Black-headed Grosbeak
- (5) N 2 Blue Grosbeak
- Lazuli Bunting
- (4) III I Rufous-sided Towhee
- (18) III 2 II California Towhee
- 22 Lark Sparrow
- (5) Savannah Sparrow
- (40) 6 3 4 5 3 4 2 III 3 Song Sparrow
- Lincoln's Sparrow
- White-crowned Sparrow
- (1) Red-winged Blackbird
- Western Meadowlark
- Brewer's Blackbird
- (4) I III Brown-headed Cowbird
- Hooded Oriole
- (3) III Northern Oriole
- (123) 2, 20, 4 8 8 8 4 House Finch
- Pine Siskin
- (16) 12 III III 2 Lesser Goldfinch
- Lawrence's Goldfinch
- American Goldfinch
- (1) House Sparrow
- (2) Rufus/Allens Hummingbirds

2002 Upper River Area 3

BIRDS OF Santa Clara River System

Locality Bouque to McBean Date 4/18/02 Time

(7) 124 Mallard
Turkey Vulture
White-tailed Kite
Sharp-shinned Hawk
Cooper's Hawk
(2) || Red-shouldered Hawk
Red-tailed Hawk
American Kestrel
(30) 69246|| California Quail
American Coot
(12) 2721|| Killdeer
Spotted Sandpiper
(12) 75 Least Sandpiper
Common Snipe
Rock Dove
(15) 42223 Mourning Dove
Greater Roadrunner
Barn Owl
Great Horned Owl
White-throated Swift
Black-ch. Hummingbird
(2) || Anna's Hummingbird
Costa's Hummingbird
Belted Kingfisher
Acorn Woodpecker
(2) || Nuttall's Woodpecker
Downy Woodpecker
Hairy Woodpecker
(1) | Northern Flicker
Western Wood-Pewee
Willow Flycatcher
Pacific Slope Flycatcher
(1) Black Phoebe
Say's Phoebe
(5) 112 Ash-throated Flycatcher
Cassin's Kingbird
Western Kingbird
Horned Lark
Tree Swallow
Violet-green Swallow
N. Rough-winged Swallow
(6) Cliff Swallow
Barn Swallow
(2) || Scrub Jay
American Crow
(55) 10,13,32 Common Raven
Plain Titmouse
(4) 22 Bushtit
(6) 112 Bewick's Wren
(1) House Wren
Ruby-crowned Kinglet

California Gnatcatcher
Blue-gray Gnatcatcher
(2) Western Bluebird
Swainson's Thrush
Hermit Thrush
American Robin
Wrentit
Northern Mockingbird
(1) California Thrasher
American Pipit
Cedar Waxwing
Phainopepla
Loggerhead Shrike
(2) || European Starling
Bell's Vireo
Solitary Vireo
Warbling Vireo
(4) 13 Orange-crowned Warbler
(4) ||| Yellow Warbler
(2) || Yellow-rumped Warbler
(31) 6041|22112 Common Yellowthroat
(11) ||3|| Wilson's Warbler
Yellow-breasted Chat
Western Tanager
Black-headed Grosbeak
Blue Grosbeak
Lazuli Bunting
(5) 112 Rufous-sided Towhee
(8) ||123 California Towhee
Lark Sparrow
Savannah Sparrow
(47) 6483968 Song Sparrow
(2) Lincoln's Sparrow
(2) White-crowned Sparrow
(90) 1,48 86888 Red-winged Blackbird
Western Meadowlark
(6) Brewer's Blackbird
(25) || 46292 Brown-headed Cowbird
(2) Hooded Oriole
(3) 2 Northern Oriole
(25) 26643 House Finch
Pine Siskin
(4) 112 Lesser Goldfinch
Lawrence's Goldfinch
(11) 29 American Goldfinch
House Sparrow
(1) Grackle sp ??

BIRDS OF Santa Clara River System

Locality BOQ → McB Date 5-7 Time 6 30 – 8 AM

- Great Blue Heron
- (1) Green Heron
- (3) Mallard
- Turkey Vulture
- White-tailed Kite
- Sharp-shinned Hawk
- Cooper's Hawk
- Red-shouldered Hawk
- Red-tailed Hawk
- American Kestrel
- (8) California Quail
- American Coot
- (2) 11 Killdeer
- Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- Rock Dove
- (17) 23444 Mourning Dove
- Greater Roadrunner
- Barn Owl
- Great Horned Owl
- White-throated Swift
- (1) Black-ch. Hummingbird
- (1) Anna's Hummingbird
- Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- Nuttall's Woodpecker
- Downy Woodpecker
- Hairy Woodpecker
- Northern Flicker
- Western Wood-Pewee
- **Willow Flycatcher**
- Pacific Slope Flycatcher
- (2) 11 Black Phoebe
- Say's Phoebe
- (3) 111 Ash-throated Flycatcher
- Cassin's Kingbird
- Western Kingbird
- Horned Lark
- Tree Swallow
- Violet-green Swallow
- (18) 10 6 2 N. Rough-winged Swallow
- (65) 50 15 Cliff Swallow
- (2) Barn Swallow
- (1) Scrub Jay
- American Crow
- (20) 5 10 2 3 Common Raven
- Plain Titmouse
- (2) Bushtit
- (2) 11 Bewick's Wren
- House Wren
- Ruby-crowned Kinglet
- **California Gnatcatcher**
- Blue-gray Gnatcatcher
- Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- American Robin
- Wrentit
- Northern Mockingbird
- California Thrasher
- American Pipit
- Cedar Waxwing
- Phainopepla
- Loggerhead Shrike
- (4) European Starling
- **Bell's Vireo**
- Solitary Vireo
- Warbling Vireo
- Orange-crowned Warbler
- (1) Yellow Warbler
- Yellow-rumped Warbler
- (12) 11 2222 22 Common Yellowthroat
- Wilson's Warbler
- Yellow-breasted Chat
- (1) Western Tanager
- (3) 111 Black-headed Grosbeak
- (1) Blue Grosbeak
- Lazuli Bunting
- (3) 111 Rufous-sided Towhee
- California Towhee
- Lark Sparrow
- (1) Savannah Sparrow
- (20) 2 4444 1 Song Sparrow
- Lincoln's Sparrow
- White-crowned Sparrow
- (90) 20 20 10 20 10 10 4 Red-winged Blackbird
- Western Meadowlark
- Brewer's Blackbird
- (4) 22 Brown-headed Cowbird
- Hooded Oriole
- Northern Oriole
- (15) 2 4 2 3 House Finch
- Pine Siskin
- (6) 222 Lesser Goldfinch
- Lawrence's Goldfinch
- (1) American Goldfinch
- House Sparrow
- (4) VAUX SWIFT

BIRDS OF Santa Clara River System

Locality BOGUST + McBean Date 5/18 Time 645 – 8

_____ Great Blue Heron
_____ Green Heron
(2) || Mallard
_____ Turkey Vulture
_____ White-tailed Kite
_____ Sharp-shinned Hawk
_____ Cooper's Hawk
_____ Red-shouldered Hawk
_____ Red-tailed Hawk
_____ American Kestrel
(2) California Quail
_____ American Coot
(4) Killdeer
(1) Spotted Sandpiper
_____ Least Sandpiper
_____ Common Snipe
_____ Rock Dove
(7) 2 2 1 2 Mourning Dove
(1) Greater Roadrunner
_____ Barn Owl
_____ Great Horned Owl
_____ White-throated Swift
_____ Black-ch. Hummingbird
(3) ||| Anna's Hummingbird
_____ Costa's Hummingbird
_____ Belted Kingfisher
_____ Acorn Woodpecker
(2) || Nuttall's Woodpecker
_____ Downy Woodpecker
_____ Hairy Woodpecker
_____ Northern Flicker
(1) Western Wood-Pewee
(1) **Willow Flycatcher**
_____ Pacific Slope Flycatcher
(4) 2 1 Black Phoebe
_____ Say's Phoebe
(2) || Ash-throated Flycatcher
_____ Cassin's Kingbird
_____ Western Kingbird
_____ Horned Lark
_____ Tree Swallow
_____ Violet-green Swallow
(7) 6 1 N. Rough-winged Swallow
(14) 6 8 Cliff Swallow
(1) Barn Swallow
(5) 1 2 || Scrub Jay
_____ American Crow
(14) 10 2 || Common Raven
_____ Plain Titmouse
(4) Bushtit
(7) || || Bewick's Wren
_____ House Wren
_____ Ruby-crowned Kinglet

_____ **California Gnatcatcher**
_____ Blue-gray Gnatcatcher
_____ Western Bluebird
_____ Swainson's Thrush
_____ Hermit Thrush
_____ American Robin
_____ Wrentit
_____ Northern Mockingbird
(1) California Thrasher
_____ American Pipit
_____ Cedar Waxwing
_____ Phainopepla
_____ Loggerhead Shrike
(3) 2 1 European Starling
_____ **Bell's Vireo**
_____ Solitary Vireo
(2) || Warbling Vireo
_____ Orange-crowned Warbler
(10) 2 3 2 ||| Yellow Warbler
_____ Yellow-rumped Warbler
(8) 2 2 2 2 Common Yellowthroat
(20) 4 4 4 3 | Wilson's Warbler
_____ Yellow-breasted Chat
_____ Western Tanager
(4) ||| | Black-headed Grosbeak
(1) Blue Grosbeak
_____ Lazuli Bunting
(4) |||| Rufous-sided Towhee
(2) California Towhee
_____ Lark Sparrow
_____ Savannah Sparrow
(24) 4 4 4 4 4 Song Sparrow
_____ Lincoln's Sparrow
_____ White-crowned Sparrow
(50) 20 20 10 Red-winged Blackbird
_____ Western Meadowlark
_____ Brewer's Blackbird
(2) || Brown-headed Cowbird
_____ Hooded Oriole
_____ Northern Oriole
(17) 9 2 3 4 4 House Finch
_____ Pine Siskin
_____ Lesser Goldfinch
_____ Lawrence's Goldfinch
_____ American Goldfinch
_____ House Sparrow
(2) CA TOWHEE GRACKLE
(1) MCGILLIVRAY'S

WILLOW FLY 200 YDS W/ BOGUST — NO SINGING.

BIRDS OF Santa Clara River System

3

Locality BOQUET → McBean Date 6-4 Time 6:45-7:45

_____ Great Blue Heron
_____ Green Heron
11 Mallard
_____ Turkey Vulture
_____ White-tailed Kite
_____ Sharp-shinned Hawk
_____ Cooper's Hawk
1 Red-shouldered Hawk
_____ Red-tailed Hawk
_____ American Kestrel
1 California Quail
_____ American Coot
2 Killdeer
_____ Spotted Sandpiper
_____ Least Sandpiper
_____ Common Snipe
_____ Rock Dove
4-2-2 Mourning Dove
_____ Greater Roadrunner
_____ Barn Owl
_____ Great Horned Owl
_____ White-throated Swift
_____ Black-ch. Hummingbird
2 Anna's Hummingbird
_____ Costa's Hummingbird
_____ Belted Kingfisher
_____ Acorn Woodpecker
1 Nuttall's Woodpecker
_____ Downy Woodpecker
_____ Hairy Woodpecker
_____ Northern Flicker
_____ Western Wood-Pewee
_____ **Willow Flycatcher**
_____ Pacific Slope Flycatcher
_____ Black Phoebe
_____ Say's Phoebe
2 Ash-throated Flycatcher
_____ Cassin's Kingbird
_____ Western Kingbird
_____ Horned Lark
_____ Tree Swallow
_____ Violet-green Swallow
51 N. Rough-winged Swallow
10 10 61 Cliff Swallow
2 Barn Swallow
111 Scrub Jay
_____ American Crow
8222 Common Raven
_____ Plain Titmouse
_____ Bushtit
1111 Bewick's Wren
_____ House Wren
_____ Ruby-crowned Kinglet

_____ **California Gnatcatcher**
_____ Blue-gray Gnatcatcher
_____ Western Bluebird
_____ Swainson's Thrush
_____ Hermit Thrush
_____ American Robin
_____ Wrentit
2 Northern Mockingbird
_____ California Thrasher
_____ American Pipit
_____ Cedar Waxwing
1 Phainopepla
_____ Loggerhead Shrike
_____ European Starling
_____ **Bell's Vireo**
_____ Solitary Vireo
_____ Warbling Vireo
_____ Orange-crowned Warbler
1 Yellow Warbler
_____ Yellow-rumped Warbler
22222211 Common Yellowthroat
_____ Wilson's Warbler
_____ Yellow-breasted Chat
_____ Western Tanager
11 Black-headed Grosbeak
_____ Blue Grosbeak
_____ Lazuli Bunting
211 Rufous-sided Towhee
_____ California Towhee
_____ Lark Sparrow
_____ Savannah Sparrow
2444 Song Sparrow
_____ Lincoln's Sparrow
_____ White-crowned Sparrow
20 20 16 Red-winged Blackbird
_____ Western Meadowlark
_____ Brewer's Blackbird
1 Brown-headed Cowbird
_____ Hooded Oriole
2 Northern Oriole
4 10 2 3 House Finch
_____ Pine Siskin
421 Lesser Goldfinch
_____ Lawrence's Goldfinch
_____ American Goldfinch
_____ House Sparrow

BIRDS OF Santa Clara River System

Locality BOG — ½ NCB Date 6-14 Time 640 — 715

- Great Blue Heron
- Green Heron
- 2 Mallard
- Turkey Vulture
- White-tailed Kite
- Sharp-shinned Hawk
- Cooper's Hawk
- Red-shouldered Hawk
- Red-tailed Hawk
- American Kestrel
- 87 4 5 California Quail
- American Coot
- Killdeer
- Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- Rock Dove
- 24 Mourning Dove
- Greater Roadrunner
- Barn Owl
- Great Horned Owl
- White-throated Swift
- Black-ch. Hummingbird
- Anna's Hummingbird
- Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- 1 Nuttall's Woodpecker
- Downy Woodpecker
- Hairy Woodpecker
- Northern Flicker
- Western Wood-Pewee
- **Willow Flycatcher**
- Pacific Slope Flycatcher
- 1 Black Phoebe
- Say's Phoebe
- 1 Ash-throated Flycatcher
- Cassin's Kingbird
- Western Kingbird
- Horned Lark
- Tree Swallow
- Violet-green Swallow
- 4 N. Rough-winged Swallow
- 6 Cliff Swallow
- Barn Swallow
- 12 Scrub Jay
- 1 American Crow
- 22 Common Raven
- Plain Titmouse
- 5 Bushtit
- ~~HHH~~ Bewick's Wren
- House Wren
- Ruby-crowned Kinglet

- **California Gnatcatcher**
- Blue-gray Gnatcatcher
- Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- American Robin
- Wrentit
- Northern Mockingbird
- 1 California Thrasher
- American Pipit
- Cedar Waxwing
- 1 Phainopepla
- Loggerhead Shrike
- 2 European Starling
- **Bell's Vireo**
- Solitary Vireo
- Warbling Vireo
- Orange-crowned Warbler
- 11 Yellow Warbler
- Yellow-rumped Warbler
- 21 22 22 22 Common Yellowthroat
- Wilson's Warbler
- Yellow-breasted Chat
- Western Tanager
- 11 Black-headed Grosbeak
- Blue Grosbeak
- Lazuli Bunting
- ~~HHH~~ Rufous-sided Towhee
- California Towhee
- Lark Sparrow
- Savannah Sparrow
- 4 4 4 4 4 Song Sparrow
- Lincoln's Sparrow
- White-crowned Sparrow
- 14 Red-winged Blackbird
- Western Meadowlark
- Brewer's Blackbird
- 13 Brown-headed Cowbird
- Hooded Oriole
- 2 2 Northern Oriole
- 4 6 2 2 4 House Finch
- Pine Siskin
- 3 Lesser Goldfinch
- Lawrence's Goldfinch
- American Goldfinch
- House Sparrow

6 CATTLE Egret

BIRDS OF Santa Clara River System

Locality MCB BOQ → McB Date 6/24 Time 6–7

	Great Blue Heron		California Gnatcatcher
	Green Heron		Blue-gray Gnatcatcher
	Mallard		Western Bluebird
	Turkey Vulture		Swainson's Thrush
	White-tailed Kite		Hermit Thrush
	Sharp-shinned Hawk		American Robin
	Cooper's Hawk		Wrentit
	Red-shouldered Hawk		Northern Mockingbird
2	Red-tailed Hawk	II	California Thrasher
	American Kestrel		American Pipit
7	California Quail		Cedar Waxwing
	American Coot	4	Phainopepla
2	Killdeer		Loggerhead Shrike
	Spotted Sandpiper	4	European Starling
	Least Sandpiper		**Bell's Vireo**
	Common Snipe		Solitary Vireo
	Rock Dove		Warbling Vireo
4	Mourning Dove		Orange-crowned Warbler
	Greater Roadrunner		Yellow Warbler
	Barn Owl		Yellow-rumped Warbler
	Great Horned Owl	4 4 ~~4~~	Common Yellowthroat
	White-throated Swift		Wilson's Warbler
	Black-ch. Hummingbird		Yellow-breasted Chat
	Anna's Hummingbird		Western Tanager
	Costa's Hummingbird	I	Black-headed Grosbeak
	Belted Kingfisher		Blue Grosbeak
	Acorn Woodpecker		Lazuli Bunting
I	Nuttall's Woodpecker	III	Rufous-sided Towhee
	Downy Woodpecker		California Towhee
	Hairy Woodpecker		Lark Sparrow
	Northern Flicker		Savannah Sparrow
	Western Wood-Pewee	4 4 4	Song Sparrow
	Willow Flycatcher		Lincoln's Sparrow
	Pacific Slope Flycatcher		White-crowned Sparrow
II	Black Phoebe	10 10 4 4	Red-winged Blackbird
	Say's Phoebe		Western Meadowlark
	Ash-throated Flycatcher		Brewer's Blackbird
	Cassin's Kingbird	2	Brown-headed Cowbird
	Western Kingbird		Hooded Oriole
	Horned Lark		Northern Oriole
	Tree Swallow	4 4 2	House Finch
	Violet-green Swallow		Pine Siskin
4	N. Rough-winged Swallow	3 2	Lesser Goldfinch
10 8	Cliff Swallow		Lawrence's Goldfinch
4	Barn Swallow		American Goldfinch
III	Scrub Jay		House Sparrow
2	American Crow		
2 2 2	Common Raven		
	Plain Titmouse		
	Bushtit		
	Bewick's Wren		
	House Wren		
	Ruby-crowned Kinglet		

5 Cmplt

BIRDS OF Santa Clara River System

Locality BOQ → McB Date 7-4 Time 6-7

_____ Great Blue Heron
_____ Green Heron
_____ Mallard
_____ Turkey Vulture
_____ White-tailed Kite
_____ Sharp-shinned Hawk
_____ Cooper's Hawk
_____ Red-shouldered Hawk
_____ Red-tailed Hawk
_____ American Kestrel
(18) California Quail
_____ American Coot
_____ Killdeer
_____ Spotted Sandpiper
_____ Least Sandpiper
_____ Common Snipe
_____ Rock Dove
2 2 2 4 2 Mourning Dove
(12) _____ Greater Roadrunner
_____ Barn Owl
_____ Great Horned Owl
_____ White-throated Swift
_____ Black-ch. Hummingbird
(2) II Anna's Hummingbird
_____ Costa's Hummingbird
_____ Belted Kingfisher
_____ Acorn Woodpecker
(1) Nuttall's Woodpecker
_____ Downy Woodpecker
_____ Hairy Woodpecker
_____ Northern Flicker
_____ Western Wood-Pewee
_____ **Willow Flycatcher**
_____ Pacific Slope Flycatcher
(1) Black Phoebe
_____ Say's Phoebe
(5) IIII Ash-throated Flycatcher
_____ Cassin's Kingbird
_____ Western Kingbird
_____ Horned Lark
_____ Tree Swallow
_____ Violet-green Swallow
(12) 6 6 N. Rough-winged Swallow
(36) 20 16 Cliff Swallow
_____ Barn Swallow
(4) III Scrub Jay
(3) 2 1 American Crow
(6) 2 2 2 Common Raven
_____ 1 Plain Titmouse
_____ Bushtit
(4) IIII Bewick's Wren
_____ House Wren
_____ [illegible]-crowned Kinglet

_____ California Gnatcatcher
_____ Blue-gray Gnatcatcher
_____ Western Bluebird
_____ Swainson's Thrush
_____ Hermit Thrush
_____ American Robin
_____ Wrentit
_____ Northern Mockingbird
_____ California Thrasher
_____ American Pipit
_____ Cedar Waxwing
_____ Phainopepla
(9) _____ Loggerhead Shrike
_____ European Starling
_____ **Bell's Vireo**
_____ Solitary Vireo
_____ Warbling Vireo
_____ Orange-crowned Warbler
_____ Yellow Warbler
_____ Yellow-rumped Warbler
(6) 2 I 2 Common Yellowthroat
_____ Wilson's Warbler
_____ Yellow-breasted Chat
_____ Western Tanager
_____ Black-headed Grosbeak
(1) _____ Blue Grosbeak
_____ Lazuli Bunting
(3) III Rufous-sided Towhee
(6) 2 2 2 California Towhee
_____ Lark Sparrow
_____ Savannah Sparrow
(12) 4 4 4 Song Sparrow
_____ Lincoln's Sparrow
_____ White-crowned Sparrow
20 5 36 Red-winged Blackbird
(50) _____ Western Meadowlark
_____ Brewer's Blackbird
(3) 2 1 Brown-headed Cowbird
_____ Hooded Oriole
(2) Northern Oriole
20 20 20 20 5 House Finch
(75) _____ Pine Siskin
_____ Lesser Goldfinch
_____ Lawrence's Goldfinch
(1) _____ American Goldfinch
_____ House Sparrow

BIRDS OF Santa Clara River System

Locality BOQUET → McBean Date 7-14 Time 545 — 645

- ____ Great Blue Heron
- ____ Green Heron
- ____ Mallard
- ____ Turkey Vulture
- ____ White-tailed Kite
- ____ Sharp-shinned Hawk
- ____ Cooper's Hawk
- ____ Red-shouldered Hawk
- ____ Red-tailed Hawk
- ____ American Kestrel
- (18) California Quail
- ____ American Coot
- ____ Killdeer
- ____ Spotted Sandpiper
- ____ Least Sandpiper
- ____ Common Snipe
- ____ Rock Dove
- (8) 6 2 Mourning Dove
- ____ Greater Roadrunner
- ____ Barn Owl
- ____ Great Horned Owl
- ____ White-throated Swift
- (2) II Black-ch. Hummingbird
- (3) III Anna's Hummingbird
- (1) Costa's Hummingbird
- ____ Belted Kingfisher
- ____ Acorn Woodpecker
- ____ Nuttall's Woodpecker
- ____ Downy Woodpecker
- ____ Hairy Woodpecker
- (2) Northern Flicker
- ____ Western Wood-Pewee
- ____ **Willow Flycatcher**
- ____ Pacific Slope Flycatcher
- (5) III Black Phoebe
- ____ Say's Phoebe
- (5) IIII Ash-throated Flycatcher
- ____ Cassin's Kingbird
- ____ Western Kingbird
- ____ Horned Lark
- ____ Tree Swallow
- ____ Violet-green Swallow
- ____ N. Rough-winged Swallow
- (20) Cliff Swallow
- ____ Barn Swallow
- (4) II Scrub Jay
- (2) American Crow
- (8) 6 2 Common Raven
- (2) Plain Titmouse
- ____ Bushtit
- (5) IIII Bewick's Wren
- ____ House Wren
- ____ Ruby-crowned Kinglet
- ____ **California Gnatcatcher**
- ____ Blue-gray Gnatcatcher
- ____ Western Bluebird
- ____ Swainson's Thrush
- ____ Hermit Thrush
- ____ American Robin
- ____ Wrentit
- (1) Northern Mockingbird
- ____ California Thrasher
- ____ American Pipit
- ____ Cedar Waxwing
- ____ Phainopepla
- ____ Loggerhead Shrike
- ____ European Starling
- ____ **Bell's Vireo**
- ____ Solitary Vireo
- ____ Warbling Vireo
- ____ Orange-crowned Warbler
- ____ Yellow Warbler
- ____ Yellow-rumped Warbler
- (2) Common Yellowthroat
- ____ Wilson's Warbler
- ____ Yellow-breasted Chat
- ____ Western Tanager
- ____ Black-headed Grosbeak
- (3) III Blue Grosbeak
- ____ Lazuli Bunting
- (1) Rufous-sided Towhee
- (4) 2 California Towhee
- ____ Lark Sparrow
- ____ Savannah Sparrow
- (24) 8 8 4 4 Song Sparrow
- ____ Lincoln's Sparrow
- ____ White-crowned Sparrow
- (173) 30 8 4 1 Red-winged Blackbird
- ____ Western Meadowlark
- ____ Brewer's Blackbird
- (3) 2 1 Brown-headed Cowbird
- ____ Hooded Oriole
- (66) Northern Oriole
- 10 8 8 8 4 4 House Finch
- ____ Pine Siskin
- (2) Lesser Goldfinch
- ____ Lawrence's Goldfinch
- ____ American Goldfinch
- ____ House Sparrow

20 30 60 20 10 10

Pg 3 of 4

2002 Upper River Area 2

BIRDS OF Santa Clara River System

Locality McBean To Old Hyway Date 4/18/02 Time _____

- _____ Great Blue Heron
- _____ Green Heron
- (1) Mallard
- _____ Turkey Vulture
- _____ White-tailed Kite
- _____ Sharp-shinned Hawk
- _____ Cooper's Hawk
- (1) Red-shouldered Hawk
- _____ Red-tailed Hawk
- _____ American Kestrel
- (4) 12 California Quail
- _____ American Coot
- (8) 6 Killdeer
- _____ Spotted Sandpiper
- _____ Least Sandpiper
- _____ Common Snipe
- _____ Rock Dove
- (6) 212 Mourning Dove
- _____ Greater Roadrunner
- _____ Barn Owl
- _____ Great Horned Owl
- _____ White-throated Swift
- _____ Black-ch. Hummingbird
- (2) Anna's Hummingbird
- _____ Costa's Hummingbird
- _____ Belted Kingfisher
- _____ Acorn Woodpecker
- (4) Nuttall's Woodpecker
- (3) Downy Woodpecker
- (1) Hairy Woodpecker
- _____ Northern Flicker
- _____ Western Wood-Pewee
- _____ **Willow Flycatcher**
- _____ Pacific Slope Flycatcher
- _____ Black Phoebe
- _____ Say's Phoebe
- ? (9) Ash-throated Flycatcher
- _____ Cassin's Kingbird
- _____ Western Kingbird
- _____ Horned Lark
- _____ Tree Swallow
- _____ Violet-green Swallow
- _____ N. Rough-winged Swallow
- (5) Cliff Swallow
- _____ Barn Swallow
- (2) Scrub Jay
- _____ American Crow
- (2) 12 Common Raven
- _____ Plain Titmouse
- (7) 222 Bushtit
- (8) Bewick's Wren
- (6) 14 House Wren
- _____ Ruby-crowned Kinglet
- _____ **California Gnatcatcher**
- _____ Blue-gray Gnatcatcher
- (3) Western Bluebird
- _____ Swainson's Thrush
- _____ Hermit Thrush
- _____ American Robin
- _____ Wrentit
- _____ Northern Mockingbird
- _____ California Thrasher
- _____ American Pipit
- (10) Cedar Waxwing
- _____ Phainopepla
- _____ Loggerhead Shrike
- (4) European Starling
- _____ **Bell's Vireo**
- _____ Solitary Vireo
- _____ Warbling Vireo
- (7) Orange-crowned Warbler
- _____ Yellow Warbler
- (1) Yellow-rumped Warbler
- (5) 12 Common Yellowthroat
- _____ Wilson's Warbler
- _____ Yellow-breasted Chat
- _____ Western Tanager
- (1) Black-headed Grosbeak
- _____ Blue Grosbeak
- _____ Lazuli Bunting
- (2) Rufous-sided Towhee
- (1) California Towhee
- _____ Lark Sparrow
- _____ Savannah Sparrow
- (30) 166728 Song Sparrow
- _____ Lincoln's Sparrow
- _____ White-crowned Sparrow
- (5) 13 Red-winged Blackbird
- _____ Western Meadowlark
- _____ Brewer's Blackbird
- (8) Brown-headed Cowbird
- _____ Hooded Oriole
- _____ Northern Oriole
- (1) House Finch
- _____ Pine Siskin
- (29) 8247182 Lesser Goldfinch
- _____ Lawrence's Goldfinch
- (47), 40, 214 American Goldfinch
- _____ House Sparrow
- (3) Canada Geese (low fly over) (tall gliders)
- (3) VAUX SWIFT (mid size brown with lighter belly throat w/ dark eye area)
- (1) McGillivray Warbler (grey head)
- (1) Black Throated Grey W.

BIRDS OF Santa Clara River System

Locality: Mc B→ Old Rd Date: 5-7 Time: 8 – 915

Count	Species
	Great Blue Heron
	Green Heron
1	Mallard
	Turkey Vulture
	White-tailed Kite
	Sharp-shinned Hawk
	Cooper's Hawk
	Red-shouldered Hawk
	Red-tailed Hawk
	American Kestrel
8	California Quail
	American Coot
2	Killdeer
	Spotted Sandpiper
	Least Sandpiper
	Common Snipe
	Rock Dove
6	Mourning Dove
	Greater Roadrunner
	Barn Owl
	Great Horned Owl
	White-throated Swift
	Black-ch. Hummingbird
1	Anna's Hummingbird
	Costa's Hummingbird
	Belted Kingfisher
	Acorn Woodpecker
2	Nuttall's Woodpecker
	Downy Woodpecker
1	Hairy Woodpecker
	Northern Flicker
4	Western Wood-Pewee
	Willow Flycatcher
	Pacific Slope Flycatcher
3	Black Phoebe
	Say's Phoebe
2	Ash-throated Flycatcher
	Cassin's Kingbird
	Western Kingbird
	Horned Lark
	Tree Swallow
	Violet-green Swallow
4	N. Rough-winged Swallow
50	Cliff Swallow
	Barn Swallow
7	Scrub Jay
	American Crow
2	Common Raven
	Plain Titmouse
4	Bushtit
10	Bewick's Wren
7	House Wren
	Ruby-crowned Kinglet
	California Gnatcatcher
	Blue-gray Gnatcatcher
4	Western Bluebird
1	Swainson's Thrush
	Hermit Thrush
	American Robin
	Wrentit
	Northern Mockingbird
3	California Thrasher
	American Pipit
23	Cedar Waxwing
3	Phainopepla
	Loggerhead Shrike
4	European Starling
	Bell's Vireo
1	Solitary Vireo PLUMBE
4	Warbling Vireo
4	Orange-crowned Warbler
2	Yellow Warbler
	Yellow-rumped Warbler
12	Common Yellowthroat
6	Wilson's Warbler
2	Yellow-breasted Chat
4	Western Tanager
4	Black-headed Grosbeak
1	Blue Grosbeak
	Lazuli Bunting
4	Rufous-sided Towhee
1	California Towhee
	Lark Sparrow
	Savannah Sparrow
50	Song Sparrow
	Lincoln's Sparrow
	White-crowned Sparrow
45	Red-winged Blackbird
	Western Meadowlark
	Brewer's Blackbird
13	Brown-headed Cowbird
	Hooded Oriole
1	Northern Oriole
2	House Finch
	Pine Siskin
3	Lesser Goldfinch
	Lawrence's Goldfinch
4	American Goldfinch
	House Sparrow
1	SNOWY EGRET
1	MCGILLIVRAY'S W
1	TOWNSENDS W
1	GT EGRET

BIRDS OF Santa Clara River System

Locality McB → old Rd' Date 5-18 Time 8 → 9:15

- Great Blue Heron
- (2) Green Heron
- (5) (2) Mallard
- (1) Turkey Vulture
- White-tailed Kite
- Sharp-shinned Hawk
- Cooper's Hawk
- Red-shouldered Hawk
- Red-tailed Hawk
- American Kestrel
- (2) California Quail
- American Coot
- Killdeer
- Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- Rock Dove
- (6) 2 1 2 Mourning Dove
- Greater Roadrunner
- Barn Owl
- Great Horned Owl
- (10) White-throated Swift
- Black-ch. Hummingbird
- (1) Anna's Hummingbird
- Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- (2) Nuttall's Woodpecker
- Downy Woodpecker
- Hairy Woodpecker
- (1) Northern Flicker
- (3) Western Wood-Pewee
- **Willow Flycatcher**
- Pacific Slope Flycatcher
- Black Phoebe
- Say's Phoebe
- (2) Ash-throated Flycatcher
- Cassin's Kingbird
- Western Kingbird
- Horned Lark
- Tree Swallow
- Violet-green Swallow
- (37) 15 10 6 6 N. Rough-winged Swallow
- 10 25 Cliff Swallow
- (45) (1) Barn Swallow
- (3) 2 | Scrub Jay
- (2) American Crow
- Common Raven
- Plain Titmouse
- Bushtit
- (7) Bewick's Wren
- (3) House Wren
- Ruby-crowned Kinglet
- **California Gnatcatcher**
- Blue-gray Gnatcatcher
- Western Bluebird
- (2) Swainson's Thrush
- Hermit Thrush
- American Robin
- (1) Wrentit
- (1) Northern Mockingbird
- (2) California Thrasher
- American Pipit
- Cedar Waxwing
- (4) 2 2 Phainopepla
- Loggerhead Shrike
- (4) European Starling
- **Bell's Vireo**
- Solitary Vireo
- (1) Warbling Vireo
- Orange-crowned Warbler
- (4) Yellow Warbler
- Yellow-rumped Warbler
- (34) 4 4 4 4 4 4 4 4 2 Common Yellowthroat
- (10) 2 4 4 Wilson's Warbler
- Yellow-breasted Chat
- Western Tanager
- (4) Black-headed Grosbeak
- Blue Grosbeak
- Lazuli Bunting
- (5) Rufous-sided Towhee
- California Towhee
- Lark Sparrow
- Savannah Sparrow
- (52) 4 4 4 4 4 4 4 4 4 4 4 4 4 Song Sparrow
- Lincoln's Sparrow
- White-crowned Sparrow
- (50) 20 10 10 Red-winged Blackbird
- Western Meadowlark
- Brewer's Blackbird
- (4) 3 1 Brown-headed Cowbird
- (1) Hooded Oriole
- (1) Northern Oriole
- (5) House Finch
- Pine Siskin
- (3) Lesser Goldfinch
- Lawrence's Goldfinch
- American Goldfinch
- House Sparrow

deer

BIRDS OF Santa Clara River System

Locality McB → Old Rd Date 6-4 3 Time 745 – 845

- Great Blue Heron
- 1 Green Heron
- Mallard
- Turkey Vulture
- White-tailed Kite
- Sharp-shinned Hawk
- Cooper's Hawk
- 2 Red-shouldered Hawk
- 1 Red-tailed Hawk
- American Kestrel
- 12 California Quail
- American Coot
- 2 Killdeer
- Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- Rock Dove
- 3 4 4 2 Mourning Dove
- Greater Roadrunner
- Barn Owl
- Great Horned Owl
- White-throated Swift
- Black-ch. Hummingbird
- Anna's Hummingbird
- Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- 1 Nuttall's Woodpecker
- Downy Woodpecker
- Hairy Woodpecker
- Northern Flicker
- Western Wood-Pewee
- **Willow Flycatcher**
- Pacific Slope Flycatcher
- 11 Black Phoebe
- Say's Phoebe
- 111 Ash-throated Flycatcher
- Cassin's Kingbird
- 1 Western Kingbird
- Horned Lark
- Tree Swallow
- Violet-green Swallow
- 7 N. Rough-winged Swallow
- 20 20 Cliff Swallow
- Barn Swallow
- 1 1 2 1 Scrub Jay
- 3 American Crow
- 2 2 Common Raven
- Plain Titmouse
- Bushtit
- 3 Bewick's Wren
- House Wren
- Ruby-crowned Kinglet
- **California Gnatcatcher**
- Blue-gray Gnatcatcher
- Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- American Robin
- Wrentit
- 1 Northern Mockingbird
- California Thrasher
- American Pipit
- Cedar Waxwing
- 2 1 2 Phainopepla
- Loggerhead Shrike
- 3 European Starling
- **Bell's Vireo**
- Solitary Vireo
- Warbling Vireo
- Orange-crowned Warbler
- Yellow Warbler
- Yellow-rumped Warbler
- 4 4 4 1 4 Common Yellowthroat
- Wilson's Warbler
- 1 Yellow-breasted Chat
- Western Tanager
- 11 Black-headed Grosbeak
- Blue Grosbeak
- Lazuli Bunting
- 2 2 1 2 2 2 Rufous-sided Towhee
- 2 California Towhee
- Lark Sparrow
- Savannah Sparrow
- 8 8 8 8 4 4 Song Sparrow
- Lincoln's Sparrow
- White-crowned Sparrow
- 10 Red-winged Blackbird
- Western Meadowlark
- Brewer's Blackbird
- 3 Brown-headed Cowbird
- Hooded Oriole
- Northern Oriole
- 4 2 House Finch
- Pine Siskin
- 2 Lesser Goldfinch
- Lawrence's Goldfinch
- American Goldfinch
- House Sparrow

1 dies

BIRDS OF Santa Clara River System

Locality McB → ocd Rd Date 5/17 Time 7:15—8:15

- Great Blue Heron
- || Green Heron
- Mallard
- Turkey Vulture
- White-tailed Kite
- Sharp-shinned Hawk
- Cooper's Hawk
- || Red-shouldered Hawk
- | Red-tailed Hawk
- American Kestrel
- 3 California Quail
- American Coot
- Killdeer
- Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- Rock Dove
- 22 Mourning Dove
- Greater Roadrunner
- Barn Owl
- Great Horned Owl
- White-throated Swift
- Black-ch. Hummingbird
- | Anna's Hummingbird
- Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- |||| Nuttall's Woodpecker
- Downy Woodpecker
- Hairy Woodpecker
- Northern Flicker
- Western Wood-Pewee
- **Willow Flycatcher**
- Pacific Slope Flycatcher
- 2 | Black Phoebe
- Say's Phoebe
- 2 Ash-throated Flycatcher
- Cassin's Kingbird
- Western Kingbird
- Horned Lark
- Tree Swallow
- Violet-green Swallow
- 6 4 N. Rough-winged Swallow
- 4 Cliff Swallow
- Barn Swallow
- 2 2 Scrub Jay
- 2 American Crow
- Common Raven
- 2 Plain Titmouse
- Bushtit
- 23 Bewick's Wren
- House Wren
- Ruby-crowned Kinglet

- California Gnatcatcher
- Blue-gray Gnatcatcher
- ||| Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- American Robin
- Wrentit
- Northern Mockingbird
- | California Thrasher
- American Pipit
- Cedar Waxwing
- 4 5 2 2 || Phainopepla
- Loggerhead Shrike
- 5 5 4 European Starling
- **Bell's Vireo**
- Solitary Vireo
- Warbling Vireo
- Orange-crowned Warbler
- Yellow Warbler
- Yellow-rumped Warbler
- 2 4 2 2 2 2 Common Yellowthroat
- Wilson's Warbler
- 1 Yellow-breasted Chat
- Western Tanager
- 1 1 2 |||| Black-headed Grosbeak
- Blue Grosbeak
- Lazuli Bunting
- 1 1 |||| Rufous-sided Towhee
- California Towhee
- Lark Sparrow
- Savannah Sparrow
- 4 4 4 4 4 4 4 4 4 4 Song Sparrow
- Lincoln's Sparrow
- White-crowned Sparrow
- 5 4 Red-winged Blackbird
- Western Meadowlark
- Brewer's Blackbird
- 2 | Brown-headed Cowbird
- Hooded Oriole
- Northern Oriole
- 5 6 House Finch
- Pine Siskin
- 3 Lesser Goldfinch
- Lawrence's Goldfinch
- American Goldfinch
- House Sparrow

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BIRDS OF Santa Clara River System

Locality MCB → Ocd Rd Date 6-24 Time 7—815

- ___ Great Blue Heron
- 1 Green Heron
- ___ Mallard
- ___ Turkey Vulture
- ___ White-tailed Kite
- ___ Sharp-shinned Hawk
- ___ Cooper's Hawk
- ___ Red-shouldered Hawk
- ___ Red-tailed Hawk
- ___ American Kestrel
- ~2 California Quail
- ___ American Coot
- ___ Killdeer 666 4 + 3 2 4
- ___ Spotted Sandpiper
- ___ Least Sandpiper
- ___ Common Snipe
- ___ Rock Dove
- ~22 Mourning Dove
- ___ Greater Roadrunner
- ___ Barn Owl
- ___ Great Horned Owl
- ___ White-throated Swift 4 4 4 4 4 4 4 2
- ___ Black-ch. Hummingbird
- ___ Anna's Hummingbird
- ___ Costa's Hummingbird
- ___ Belted Kingfisher
- ___ Acorn Woodpecker
- 1111 Nuttall's Woodpecker
- 11 Downy Woodpecker
- ___ Hairy Woodpecker
- ___ Northern Flicker
- ___ Western Wood-Pewee
- ___ **Willow Flycatcher** 4 4 4 4 4 4 4 4
- ___ Pacific Slope Flycatcher
- 11 Black Phoebe
- ___ Say's Phoebe
- 111 Ash-throated Flycatcher
- ___ Cassin's Kingbird
- ___ Western Kingbird
- ___ Horned Lark
- ___ Tree Swallow
- ___ Violet-green Swallow
- 2 N. Rough-winged Swallow
- 30 Cliff Swallow
- 4 4 Barn Swallow
- 1 Scrub Jay
- 2 American Crow
- 2 Common Raven
- 21 Plain Titmouse
- ___ Bushtit
- 1 2 Bewick's Wren
- ___ House Wren
- ___ Ruby-crowned Kinglet
- ___ California Gnatcatcher
- ___ Blue-gray Gnatcatcher
- ___ Western Bluebird
- ___ Swainson's Thrush
- ___ Hermit Thrush
- ___ American Robin
- ___ Wrentit
- ___ Northern Mockingbird
- 11 California Thrasher
- ___ American Pipit
- ___ Cedar Waxwing
- 4 Phainopepla
- ___ Loggerhead Shrike
- 8 European Starling
- ___ **Bell's Vireo**
- ___ Solitary Vireo
- ___ Warbling Vireo
- ___ Orange-crowned Warbler
- ___ Yellow Warbler
- ___ Yellow-rumped Warbler
- 4 2 Common Yellowthroat
- ___ Wilson's Warbler
- 111 Yellow-breasted Chat
- ___ Western Tanager
- 1 111 Black-headed Grosbeak
- 12 Blue Grosbeak
- ___ Lazuli Bunting
- 12 Rufous-sided Towhee
- 2 California Towhee
- ___ Lark Sparrow
- ___ Savannah Sparrow
- 44 Song Sparrow
- ___ Lincoln's Sparrow
- ___ White-crowned Sparrow
- ___ Red-winged Blackbird
- ___ Western Meadowlark
- ___ Brewer's Blackbird
- ~11 4 2 Brown-headed Cowbird
- ___ Hooded Oriole
- ___ Northern Oriole
- 6 6 House Finch
- ___ Pine Siskin
- 2 Lesser Goldfinch
- ___ Lawrence's Goldfinch
- 1 American Goldfinch
- ___ House Sparrow

BIRDS OF Santa Clara River System

Locality MCB → OLD Rd Date 7-14 Time 645-8

- Great Blue Heron
- (4) 2 || Green Heron
- Mallard
- Turkey Vulture
- White-tailed Kite
- Sharp-shinned Hawk
- Cooper's Hawk
- Red-shouldered Hawk
- Red-tailed Hawk
- American Kestrel
- (2) California Quail
- American Coot
- Killdeer
- Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- Rock Dove
- (16) 4 4 2 Mourning Dove
- Greater Roadrunner
- Barn Owl
- Great Horned Owl
- White-throated Swift
- Black-ch. Hummingbird
- Anna's Hummingbird
- Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- (3) ||| Nuttall's Woodpecker
- Downy Woodpecker
- Hairy Woodpecker
- Northern Flicker
- Western Wood-Pewee
- **Willow Flycatcher**
- Pacific Slope Flycatcher
- Black Phoebe
- Say's Phoebe
- (5) 2 || Ash-throated Flycatcher
- Cassin's Kingbird
- (3) 2 | Western Kingbird
- Horned Lark
- Tree Swallow
- Violet-green Swallow
- (2) N. Rough-winged Swallow
- (15) Cliff Swallow
- (3) Barn Swallow
- (2) || Scrub Jay
- American Crow
- Common Raven
- (6) 2 2 2 Plain Titmouse
- Bushtit
- (11) 2 | | Bewick's Wren
- House Wren
- [illegible]-crowned Kinglet
- California Gnatcatcher
- Blue-gray Gnatcatcher
- Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- American Robin
- Wrentit
- Northern Mockingbird
- (3) ||| California Thrasher
- American Pipit
- Cedar Waxwing
- 4 6 6 Phainopepla
- Loggerhead Shrike
- European Starling
- **Bell's Vireo**
- Solitary Vireo
- Warbling Vireo
- Orange-crowned Warbler
- Yellow Warbler
- Yellow-rumped Warbler
- (8) 4 4 Common Yellowthroat
- Wilson's Warbler
- Yellow-breasted Chat
- Western Tanager
- (2) Black-headed Grosbeak
- (12) 2 2 3 | | Blue Grosbeak
- (4) 2 2 Lazuli Bunting
- Rufous-sided Towhee
- (8) 4 2 2 California Towhee
- Lark Sparrow
- Savannah Sparrow
- 4 4 8 8 8 8 4 Song Sparrow
- (52) Lincoln's Sparrow
- White-crowned Sparrow
- Red-winged Blackbird
- Western Meadowlark
- Brewer's Blackbird
- (6) 2 2 2 Brown-headed Cowbird
- Hooded Oriole
- 2 Northern Oriole
- 10 20 20 House Finch
- Pine Siskin
- (50) Lesser Goldfinch
- Lawrence's Goldfinch
- American Goldfinch
- House Sparrow

8 6 8 8 8 8 4 (62)

someone drove down river in last week

BIRDS OF Santa Clara River System

Locality McB... ald Rd Date 7-4 Time 7 — 810

(3) 1 Great Blue Heron
1 Green Heron
(2) 2 Mallard
Turkey Vulture
White-tailed Kite
Sharp-shinned Hawk
Cooper's Hawk
(1) Red-shouldered Hawk
Red-tailed Hawk
American Kestrel
California Quail
American Coot
Killdeer
Spotted Sandpiper
Least Sandpiper
Common Snipe
Rock Dove
1 2 22 Mourning Dove
(7) Greater Roadrunner
Barn Owl
Great Horned Owl
White-throated Swift
Black-ch. Hummingbird
(2) 11 Anna's Hummingbird
Costa's Hummingbird
Belted Kingfisher
Acorn Woodpecker
(8) 2 1 ~~1111~~ Nuttall's Woodpecker
Downy Woodpecker
Hairy Woodpecker
(1) Northern Flicker
Western Wood-Pewee
Willow Flycatcher
Pacific Slope Flycatcher
Black Phoebe
Say's Phoebe
(8) 2 ~~1111~~ Ash-throated Flycatcher
Cassin's Kingbird
(1) Western Kingbird
Horned Lark
Tree Swallow
Violet-green Swallow
(5) N. Rough-winged Swallow
(50) 20 10 20 Cliff Swallow
(4) 2 1 1 Barn Swallow
(4) 1 2 1 Scrub Jay
(6) 2 2 American Crow
(8) 2 Common Raven
Plain Titmouse
Bushtit
(3) 111 Bewick's Wren
House Wren
Ruby-crowned Kinglet

California Gnatcatcher
Blue-gray Gnatcatcher
Western Bluebird
Swainson's Thrush
Hermit Thrush
American Robin
Wrentit
Northern Mockingbird
(1) California Thrasher
American Pipit
Cedar Waxwing
8 6 4 8 4 4 (34) Phainopepla
Loggerhead Shrike
(10) 8 2 European Starling
Bell's Vireo
Solitary Vireo
Warbling Vireo
Orange-crowned Warbler
(1) Yellow Warbler
Yellow-rumped Warbler
4 8 4 4 4 4 4 2 2 2 (38) Common Yellowthroat
Wilson's Warbler
(2) 11 Yellow-breasted Chat
Western Tanager
(3) 111 Black-headed Grosbeak
(7) 11 ~~1111~~ Blue Grosbeak
[illegible] Lazuli Bunting
(7) 11 ~~1111~~ Rufous-sided Towhee
(10) 4 4 2 California Towhee
Lark Sparrow
Savannah Sparrow
4 4 4 4 4 4 4 4 4 (36) Song Sparrow
Lincoln's Sparrow
White-crowned Sparrow
(15) 15 Red-winged Blackbird
Western Meadowlark
Brewer's Blackbird
(9) 2 3 1 1 2 Brown-headed Cowbird
Hooded Oriole
(1) Northern Oriole
(26) 6 8 6 6 House Finch
Pine Siskin
Lesser Goldfinch
Lawrence's Goldfinch
American Goldfinch
House Sparrow

(1) SELASPHORUS

Some ground fire burnt off

2002 Upper Reach Area 4

BIRDS OF Santa Clara River System

Locality ABW BOQUET Date 5-17 Time 630 – 800

- ____ Great Blue Heron
- ____ Green Heron
- ____ Mallard
- ____ Turkey Vulture
- ____ White-tailed Kite
- ____ Sharp-shinned Hawk
- (1) ____ Cooper's Hawk
- (2) ____ Red-shouldered Hawk
- (1) ____ Red-tailed Hawk
- ____ American Kestrel
- ____ California Quail
- ____ American Coot
- (5) 2 2 1 Killdeer
- ____ Spotted Sandpiper
- ____ Least Sandpiper
- ____ Common Snipe
- ____ Rock Dove
- (11) 4 33 1 Mourning Dove
- ____ Greater Roadrunner
- ____ Barn Owl
- ____ Great Horned Owl
- ____ White-throated Swift
- ____ Black-ch. Hummingbird
- (2) || Anna's Hummingbird
- ____ Costa's Hummingbird
- ____ Belted Kingfisher
- ____ Acorn Woodpecker
- (1) ____ Nuttall's Woodpecker
- ____ Downy Woodpecker
- ____ Hairy Woodpecker
- ____ Northern Flicker
- (1) ____ Western Wood-Pewee
- ____ **Willow Flycatcher**
- ____ Pacific Slope Flycatcher
- (1) ____ Black Phoebe
- ____ Say's Phoebe
- (1) ____ Ash-throated Flycatcher
- ____ Cassin's Kingbird
- (1) ____ Western Kingbird
- ____ Horned Lark
- ____ Tree Swallow
- ____ Violet-green Swallow
- ____ N. Rough-winged Swallow
- ____ Cliff Swallow
- ____ Barn Swallow
- (9) 2 2 2 2 1 Scrub Jay
- ____ American Crow
- (1) ____ Common Raven
- ____ Plain Titmouse
- ____ Bushtit
- (9) 1 1 1 1111 Bewick's Wren
- (1) ____ House Wren
- ____ Ruby-crowned Kinglet
- ____ **California Gnatcatcher**
- ____ Blue-gray Gnatcatcher
- (2) ____ Western Bluebird
- ____ Swainson's Thrush
- ____ Hermit Thrush
- ____ American Robin
- (3) ||| Wrentit
- (4) (2) |||| || Northern Mockingbird / California Thrasher
- ____ American Pipit
- ____ Cedar Waxwing
- (2) ____ Phainopepla
- ____ Loggerhead Shrike
- ____ European Starling
- ____ **Bell's Vireo**
- ____ Solitary Vireo
- ____ Warbling Vireo
- ____ Orange-crowned Warbler
- (1) ____ Yellow Warbler
- ____ Yellow-rumped Warbler
- ____ Common Yellowthroat
- (5) 2 2 1 Wilson's Warbler
- ____ Yellow-breasted Chat
- ____ Western Tanager
- (1) ____ Black-headed Grosbeak
- ____ Blue Grosbeak
- ____ Lazuli Bunting
- (4) |||| Rufous-sided Towhee
- (4) ~ 2 California Towhee
- ____ Lark Sparrow
- ____ Savannah Sparrow
- ____ Song Sparrow
- ____ Lincoln's Sparrow
- ____ White-crowned Sparrow
- ____ Red-winged Blackbird
- ____ Western Meadowlark
- ____ Brewer's Blackbird
- (8) 2 || Brown-headed Cowbird
- ____ Hooded Oriole
- (5) ~ 2 2 1 Northern Oriole
- (18) 4 3 4 4 3 House Finch
- ____ Pine Siskin
- (2) ____ Lesser Goldfinch
- ____ Lawrence's Goldfinch
- ____ American Goldfinch
- ____ House Sparrow

No H2O on Coyote

SUN 60° NNE

1 Deer
1 Coyote skinny/sick front right paw

Hot, very dry

BIRDS OF Santa Clara River System

Locality Upper Upper – Recycling to Bouquet Date 6/8/02 Friday Time 6:00 am to 8:15

_____ Great Blue Heron
_____ Green Heron
_____ Mallard
_____ Turkey Vulture
_____ White-tailed Kite
_____ Sharp-shinned Hawk
_____ Cooper's Hawk
|||| Red-shouldered Hawk
|| Red-tailed Hawk
12 American Kestrel
82688488111 2 California Quail
_____ American Coot
51 Killdeer
_____ Spotted Sandpiper
_____ Least Sandpiper
_____ Common Snipe
2 Rock Dove
),20, 44248424 2 Mourning Dove
_____ Greater Roadrunner
_____ Barn Owl
_____ Great Horned Owl
_____ White-throated Swift
_____ Black-ch. Hummingbird
/ 12 Anna's Hummingbird
_____ Costa's Hummingbird
_____ Belted Kingfisher
_____ Acorn Woodpecker
2 Nuttall's Woodpecker
_____ Downy Woodpecker
_____ Hairy Woodpecker
_____ Northern Flicker
_____ Western Wood-Pewee
_____ **Willow Flycatcher**
_____ Pacific Slope Flycatcher
/ Black Phoebe
| Say's Phoebe
/ / Ash-throated Flycatcher
_____ Cassin's Kingbird
_____ Western Kingbird
_____ Horned Lark
_____ Tree Swallow
_____ Violet-green Swallow
6 N. Rough-winged Swallow
8 Cliff Swallow
| Barn Swallow
44222 11 Scrub Jay
|| American Crow
81 4224 2 Common Raven
22 Plain Titmouse
28 Bushtit
|||2|2| Bewick's Wren
_____ House Wren
_____ Ruby-crowned Kinglet

_____ **California Gnatcatcher**
_____ Blue-gray Gnatcatcher
_____ Western Bluebird
_____ Swainson's Thrush
_____ Hermit Thrush
_____ American Robin
2 111 2 Wrentit
|| |||| 3 Northern Mockingbird
2 12 ||| California Thrasher
_____ American Pipit
_____ Cedar Waxwing
6 4 2 111 4 6 4 4 6 Phainopepla
_____ Loggerhead Shrike
2 || European Starling
_____ **Bell's Vireo**
_____ Solitary Vireo
_____ Warbling Vireo
_____ Orange-crowned Warbler
_____ Yellow Warbler
_____ Yellow-rumped Warbler
_____ Common Yellowthroat
_____ Wilson's Warbler
_____ Yellow-breasted Chat
_____ Western Tanager
_____ Black-headed Grosbeak
_____ Blue Grosbeak
_____ Lazuli Bunting
2 |||2 4 9 ||| Rufous-sided Towhee
|| 2 ||| 2 California Towhee
_____ Lark Sparrow
_____ Savannah Sparrow
222 Song Sparrow
_____ Lincoln's Sparrow
_____ White-crowned Sparrow
_____ Red-winged Blackbird
_____ Western Meadowlark
_____ Brewer's Blackbird
_____ Brown-headed Cowbird
_____ Hooded Oriole
|||2|2| Northern Oriole
88888111688 42 House Finch
_____ Pine Siskin
22 Lesser Goldfinch
_____ Lawrence's Goldfinch
_____ American Goldfinch
_____ House Sparrow
2 Rufus Crowned Sparrows

BIRDS OF Santa Clara River System

Locality ABOVE BOQUET Date 6-72 Time 6-715

_____ Great Blue Heron
_____ Green Heron
_____ Mallard
_____ Turkey Vulture
_____ White-tailed Kite
_____ Sharp-shinned Hawk
_____ Cooper's Hawk
_____ Red-shouldered Hawk
|| Red-tailed Hawk
_____ American Kestrel
_____ California Quail
_____ American Coot
| Killdeer
_____ Spotted Sandpiper
_____ Least Sandpiper
_____ Common Snipe
_____ Rock Dove
2 2 2 3 2 | Mourning Dove
_____ Greater Roadrunner
_____ Barn Owl
_____ Great Horned Owl
_____ White-throated Swift
_____ Black-ch. Hummingbird
) Anna's Hummingbird
_____ Costa's Hummingbird
_____ Belted Kingfisher
_____ Acorn Woodpecker
||| Nuttall's Woodpecker
_____ Downy Woodpecker
_____ Hairy Woodpecker
_____ Northern Flicker
_____ Western Wood-Pewee
_____ **Willow Flycatcher**
_____ Pacific Slope Flycatcher
_____ Black Phoebe
_____ Say's Phoebe
_____ Ash-throated Flycatcher
_____ Cassin's Kingbird
_____ Western Kingbird
_____ Horned Lark
_____ Tree Swallow
_____ Violet-green Swallow
_____ N. Rough-winged Swallow
_____ Cliff Swallow
_____ Barn Swallow
2 ||| Scrub Jay
_____ American Crow
8 Common Raven
_____ Plain Titmouse
| 4 Bushtit
||| Bewick's Wren
_____ House Wren
_____ Ruby-crowned Kinglet

_____ **California Gnatcatcher**
_____ Blue-gray Gnatcatcher
_____ Western Bluebird
_____ Swainson's Thrush
_____ Hermit Thrush
_____ American Robin
2 || Wrentit
2 2 2 2 2 || Northern Mockingbird
|| California Thrasher
_____ American Pipit
_____ Cedar Waxwing
2 4 || Phainopepla
_____ Loggerhead Shrike
12 European Starling
_____ **Bell's Vireo**
_____ Solitary Vireo
_____ Warbling Vireo
_____ Orange-crowned Warbler
_____ Yellow Warbler
_____ Yellow-rumped Warbler
_____ Common Yellowthroat
_____ Wilson's Warbler
_____ Yellow-breasted Chat
_____ Western Tanager
| Black-headed Grosbeak
_____ Blue Grosbeak
_____ Lazuli Bunting
12 2 2 || Rufous-sided Towhee
2 2 2 2 2 California Towhee
_____ Lark Sparrow
_____ Savannah Sparrow
_____ Song Sparrow
_____ Lincoln's Sparrow
_____ White-crowned Sparrow
2 Red-winged Blackbird
_____ Western Meadowlark
_____ Brewer's Blackbird
_____ Brown-headed Cowbird
_____ Hooded Oriole
||| 2 Northern Oriole
3 3 2 4 3 3 2 3 House Finch
_____ Pine Siskin
_____ Lesser Goldfinch
_____ Lawrence's Goldfinch
_____ American Goldfinch
_____ House Sparrow

BIRDS OF Santa Clara River System

Locality ABOVE BOQUET Date 1-2 Time 615-730

- ____ Great Blue Heron
- ____ Green Heron
- ____ Mallard
- ____ Turkey Vulture
- ____ White-tailed Kite
- ____ Sharp-shinned Hawk
- (1) Cooper's Hawk
- (1) Red-shouldered Hawk
- (3) III Red-tailed Hawk
- ____ American Kestrel
- ____ California Quail
- ____ American Coot
- ____ Killdeer
- ____ Spotted Sandpiper
- ____ Least Sandpiper
- ____ Common Snipe
- ____ Rock Dove
- (12) 12 IIII Mourning Dove
- ____ Greater Roadrunner
- ____ Barn Owl
- ____ Great Horned Owl
- ____ White-throated Swift
- ____ Black-ch. Hummingbird
- (2) II Anna's Hummingbird
- ____ Costa's Hummingbird
- ____ Belted Kingfisher
- ____ Acorn Woodpecker
- (3) III Nuttall's Woodpecker
- ____ Downy Woodpecker
- ____ Hairy Woodpecker
- ____ Northern Flicker
- ____ Western Wood-Pewee
- ____ **Willow Flycatcher**
- ____ Pacific Slope Flycatcher
- ____ Black Phoebe
- ____ Say's Phoebe
- (1) Ash-throated Flycatcher
- ____ Cassin's Kingbird
- (2) Western Kingbird
- ____ Horned Lark
- ____ Tree Swallow
- ____ Violet-green Swallow 34
- (1) N. Rough-winged Swallow
- ____ Cliff Swallow
- ____ Barn Swallow
- (13) 22 IIII Scrub Jay
- ____ American Crow
- (4) 22 Common Raven
- (1) Plain Titmouse
- ____ Bushtit
- (3) III Bewick's Wren
- ____ House Wren
- ____ Ruby-crowned Kinglet

- ____ **California Gnatcatcher**
- ____ Blue-gray Gnatcatcher
- ____ Western Bluebird
- ____ Swainson's Thrush
- ____ Hermit Thrush
- (1) American Robin
- (1) Wrentit
- (9) IIII Northern Mockingbird
- (3) III California Thrasher
- ____ American Pipit
- ____ Cedar Waxwing
- (15) 4322 Phainopepla
- ____ Loggerhead Shrike
- (3) European Starling
- ____ **Bell's Vireo**
- ____ Solitary Vireo
- ____ Warbling Vireo
- ____ Orange-crowned Warbler
- ____ Yellow Warbler
- ____ Yellow-rumped Warbler
- ____ Common Yellowthroat
- ____ Wilson's Warbler
- ____ Yellow-breasted Chat
- ____ Western Tanager
- ____ Black-headed Grosbeak
- ____ Blue Grosbeak
- ____ Lazuli Bunting
- (1) Rufous-sided Towhee
- (4) 22 California Towhee
- ____ Lark Sparrow
- ____ Savannah Sparrow
- ____ Song Sparrow
- ____ Lincoln's Sparrow
- ____ White-crowned Sparrow
- ____ Red-winged Blackbird
- ____ Western Meadowlark
- ____ Brewer's Blackbird
- ____ Brown-headed Cowbird
- ____ Hooded Oriole
- 2 Northern Oriole
- 23 House Finch
- (21) 333 3
- ____ Pine Siskin
- ____ Lesser Goldfinch
- ____ Lawrence's Goldfinch
- ____ American Goldfinch
- (6) House Sparrow

BIRDS OF Santa Clara River System

Locality Above BOUET Date 7/12 Time 6-720

- Great Blue Heron
- (1) Green Heron
- Mallard
- Turkey Vulture
- White-tailed Kite
- Sharp-shinned Hawk
- Cooper's Hawk
- Red-shouldered Hawk
- (2) || Red-tailed Hawk
- American Kestrel
- (3) 2 | California Quail
- American Coot
- Killdeer
- Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- Rock Dove
- (10) 4 2 3 | Mourning Dove
- Greater Roadrunner
- Barn Owl
- Great Horned Owl
- White-throated Swift
- (1) Black-ch. Hummingbird
- (2) || Anna's Hummingbird
- Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- (4) |||| Nuttall's Woodpecker
- Downy Woodpecker
- Hairy Woodpecker
- (3) 1 2 Northern Flicker
- Western Wood-Pewee
- **Willow Flycatcher**
- Pacific Slope Flycatcher
- Black Phoebe
- Say's Phoebe
- Ash-throated Flycatcher
- (3) Cassin's Kingbird
- 1 2 Western Kingbird
- Horned Lark
- Tree Swallow 3 4 4 3 8
- Violet-green Swallow
- (12) N. Rough-winged Swallow
- 2 Cliff Swallow
- (11) Barn Swallow
- 1 ||| ||| Scrub Jay
- 1 American Crow
- (6) 4 2 Common Raven
- Plain Titmouse
- (16) 8 8 Bushtit
- (4) || 2 Bewick's Wren
- House Wren
- Ruby-crowned Kinglet
- **California Gnatcatcher**
- Blue-gray Gnatcatcher
- Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- American Robin
- (1) Wrentit
- (4) ||| Northern Mockingbird
- (1) California Thrasher
- American Pipit
- Cedar Waxwing
- (6) 2 2 2 Phainopepla
- Loggerhead Shrike
- European Starling
- **Bell's Vireo**
- Solitary Vireo
- Warbling Vireo
- Orange-crowned Warbler
- Yellow Warbler
- Yellow-rumped Warbler
- Common Yellowthroat
- Wilson's Warbler
- Yellow-breasted Chat
- Western Tanager
- Black-headed Grosbeak
- Blue Grosbeak
- Lazuli Bunting
- (3) 1 1 1 Rufous-sided Towhee
- 2 2 2 1 2 2 California Towhee
- (12) Lark Sparrow
- Savannah Sparrow
- Song Sparrow
- Lincoln's Sparrow
- White-crowned Sparrow
- Red-winged Blackbird
- Western Meadowlark
- Brewer's Blackbird
- Brown-headed Cowbird
- (1) Hooded Oriole
- (1) Northern Oriole
- (13) 4 4 2 3 3 2 3 House Finch
- Pine Siskin
- (3) Lesser Goldfinch
- Lawrence's Goldfinch
- American Goldfinch
- House Sparrow

2002 Upper River Area 5

BIRDS OF Santa Clara River System

Locality: Castaic Creek — Date: 4/25/02 — Time: 6:45 - 9:00

Count	Species
	Great Blue Heron
	Green Heron
	Mallard
	Turkey Vulture
	White-tailed Kite
	Sharp-shinned Hawk
	Cooper's Hawk
	Red-shouldered Hawk
1	Red-tailed Hawk
1	American Kestrel
31	California Quail
	American Coot
2	Killdeer
	Spotted Sandpiper
	Least Sandpiper
	Common Snipe
4	Rock Dove
38	Mourning Dove
	Greater Roadrunner
1	Barn Owl under Fwy
	Great Horned Owl
	White-throated Swift
3	Black-ch. Hummingbird
7	Anna's Hummingbird
1	Costa's Hummingbird
	Belted Kingfisher
	Acorn Woodpecker
6	Nuttall's Woodpecker
2	Downy Woodpecker
	Hairy Woodpecker
	Northern Flicker
	Western Wood-Pewee
	Willow Flycatcher
	Pacific Slope Flycatcher
	Black Phoebe
	Say's Phoebe
10	Ash-throated Flycatcher
	Cassin's Kingbird
6	Western Kingbird
	Horned Lark
	Tree Swallow
	Violet-green Swallow
80	N. Rough-winged Swallow (80 = 40 nests in light holes under hywy bridge 127)
220	Cliff Swallow (50, 22 + nests across field = culvert; in center ridge 80 good nests)
6	Barn Swallow + 150 nests starting under hywy Castaic Bridge 127
11	Scrub Jay
2	American Crow
7	Common Raven
2	Plain Titmouse
11	Bushtit
30	Bewick's Wren
8	House Wren
	Ruby-crowned Kinglet
	California Gnatcatcher
	Blue-gray Gnatcatcher
4	Western Bluebird
	Swainson's Thrush
	Hermit Thrush
	American Robin
	Wrentit
1	Northern Mockingbird
2	California Thrasher
	American Pipit
	Cedar Waxwing
	Phainopepla
	Loggerhead Shrike
13	European Starling
	Bell's Vireo
	Solitary Vireo
2	Warbling Vireo
3	Orange-crowned Warbler
4	Yellow Warbler
	Yellow-rumped Warbler
26	Common Yellowthroat
6	Wilson's Warbler
	Yellow-breasted Chat
	Western Tanager
12	Black-headed Grosbeak
1	Blue Grosbeak
4	Lazuli Bunting
25	Rufous-sided Towhee
31	California Towhee
	Lark Sparrow
	Savannah Sparrow
26	Song Sparrow
	Lincoln's Sparrow
1	White-crowned Sparrow
57	Red-winged Blackbird (30, 10, 36)
	Western Meadowlark
4	Brewer's Blackbird
17	Brown-headed Cowbird
	Hooded Oriole
8	Northern Oriole
34	House Finch
	Pine Siskin
7	Lesser Goldfinch
	Lawrence's Goldfinch
	American Goldfinch
	House Sparrow
1	Nashville Warbler
1	Black-throated grey
3	Vaux Swift

DR4

BIRDS OF Santa Clara River System

Locality Castaic Creek Date 5/9/02 Time 6:45

- Great Blue Heron
- Green Heron
- Mallard
- Turkey Vulture
- White-tailed Kite
- Sharp-shinned Hawk
- Cooper's Hawk
- Red-shouldered Hawk
- (2) Red-tailed Hawk
- American Kestrel
- (16) California Quail
- American Coot
- (2) Killdeer
- Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- Rock Dove
- Mourning Dove
- Greater Roadrunner
- (30) Barn Owl
- Great Horned Owl
- White-throated Swift
- Black-ch. Hummingbird
- Anna's Hummingbird
- Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- (10) Nuttall's Woodpecker
- (2) Downy Woodpecker
- Hairy Woodpecker
- Northern Flicker
- Western Wood-Pewee
- **Willow Flycatcher**
- Pacific Slope Flycatcher
- Black Phoebe
- Say's Phoebe
- (10) Ash-throated Flycatcher
- Cassin's Kingbird
- (2) Western Kingbird
- Horned Lark
- Tree Swallow
- Violet-green Swallow
- N. Rough-winged Swallow
- Cliff Swallow
- Barn Swallow
- Scrub Jay
- (17) American Crow
- Common Raven
- (10) Plain Titmouse
- (11) Bushtit
- (35) Bewick's Wren
- House Wren
- Ruby-crowned Kinglet
- **California Gnatcatcher**
- Blue-gray Gnatcatcher
- (2) Western Bluebird
- (1) Swainson's Thrush
- Hermit Thrush
- American Robin
- Wrentit
- (3) Northern Mockingbird
- (2) California Thrasher
- American Pipit
- Cedar Waxwing
- Phainopepla
- Loggerhead Shrike
- (10) European Starling
- **Bell's Vireo**
- Solitary Vireo
- (3) Warbling Vireo
- (2) Orange-crowned Warbler
- (5) Yellow Warbler
- Yellow-rumped Warbler
- (3) Common Yellowthroat
- (10) Wilson's Warbler
- Yellow-breasted Chat
- (6) Western Tanager
- (13) Black-headed Grosbeak
- Blue Grosbeak
- Lazuli Bunting
- (34) Rufous-sided Towhee
- California Towhee
- (25) Lark Sparrow
- Savannah Sparrow
- Song Sparrow
- (21) Lincoln's Sparrow
- White-crowned Sparrow
- (24) Red-winged Blackbird
- Western Meadowlark
- (1) Brewer's Blackbird
- (18) Brown-headed Cowbird
- (3) Hooded Oriole
- (3) Northern Oriole
- (24) House Finch
- Pine Siskin
- (9) Lesser Goldfinch
- Lawrence's Goldfinch
- American Goldfinch
- (10) House Sparrow
- (3) Townsends Warbler

1 Fat Coyote

BIRDS OF Santa Clara River System

Locality CASTAIC Date 5/19/02 Time 6:45 – 9:16

- 2 Great Blue Heron fly over
- Green Heron
- Mallard
- Turkey Vulture
- White-tailed Kite
- Sharp-shinned Hawk
- Cooper's Hawk
- Red-shouldered Hawk
- 1 Red-tailed Hawk
- 1 American Kestrel
- (44) (30, 62) 222 California Quail
- American Coot
- (4) 13 Killdeer
- Spotted Sandpiper
- Least Sandpiper
- 1 Common Snipe fly over
- (41) 2698 Rock Dove
- (27) 1129 Mourning Dove
- Greater Roadrunner
- Barn Owl
- Great Horned Owl
- White-throated Swift
- Black-ch. Hummingbird
- (12) Anna's Hummingbird
- Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- (3) Nuttall's Woodpecker
- 1 Downy Woodpecker
- Hairy Woodpecker
- Northern Flicker
- 1 Western Wood-Pewee
- 1 **Willow Flycatcher** Southwestern!
- Pacific Slope Flycatcher
- 1 Black Phoebe
- Say's Phoebe
- (10) 22222 Ash-throated Flycatcher
- Cassin's Kingbird
- (15) 22263 Western Kingbird
- (12) 228 Horned Lark in weedy corner field/pad
- Tree Swallow
- Violet-green Swallow
- (62) (50, 426) N. Rough-winged Swallow
- (320) (200, 50, 50, 20,) Cliff Swallow
- Barn Swallow
- (20) 2329 Scrub Jay
- (4) 31 American Crow
- (15) 3462 Common Raven
- 2 Plain Titmouse
- (21) (16, 2211) Bushtit
- (22) 1246 Bewick's Wren
- 2 House Wren
- Ruby-crowned Kinglet

- California Gnatcatcher
- Blue-gray Gnatcatcher
- 2 Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- American Robin
- 2 Wrentit
- (4) 22 Northern Mockingbird
- California Thrasher
- American Pipit
- Cedar Waxwing
- 2 Phainopepla
- Loggerhead Shrike
- (22) 4428 European Starling
- **Bell's Vireo**
- Solitary Vireo
- Warbling Vireo
- Orange-crowned Warbler
- (14) 22221 Yellow Warbler
- Yellow-rumped Warbler
- Common Yellowthroat
- (12) 11 Wilson's Warbler
- Yellow-breasted Chat
- Western Tanager
- (12) 15 Black-headed Grosbeak
- Blue Grosbeak
- Lazuli Bunting
- (14) 2223 Rufous-sided Towhee
- (27) 22112 California Towhee
- Lark Sparrow
- Savannah Sparrow
- (22) 24612 Song Sparrow
- Lincoln's Sparrow
- White-crowned Sparrow
- (50) (6, 30, 86) Red-winged Blackbird
- Western Meadowlark
- Brewer's Blackbird
- (16) 1461 Brown-headed Cowbird
- (3) 2 Hooded Oriole
- (7) 1122 Northern Oriole
- (20) 8642 House Finch
- Pine Siskin
- Lesser Goldfinch
- Lawrence's Goldfinch
- American Goldfinch
- (16) 64 House Sparrow

BIRDS OF Santa Clara River System

Locality Castaic Creek Date 6/4/02 Time 6:45-

- Great Blue Heron
- Green Heron
- Mallard
- Turkey Vulture
- White-tailed Kite
- Sharp-shinned Hawk
- Cooper's Hawk
- Red-shouldered Hawk
- (5) 1112 Red-tailed Hawk
- (2) 2 American Kestrel
- (10) 2242 California Quail
- American Coot
- (4) 13 Killdeer
- Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- (8) 43 Rock Dove
- 5 6 4 6 6 4 6 12 Mourning Dove
- Greater Roadrunner
- Barn Owl
- Great Horned Owl
- White-throated Swift
- (4) 111 Black-ch. Hummingbird
- (13) 62 Anna's Hummingbird
- (1) Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- (14) 12 1142 1 Nuttall's Woodpecker
- (10) 11422 Downy Woodpecker
- Hairy Woodpecker
- (1) Northern Flicker
- Western Wood-Pewee
- **Willow Flycatcher**
- Pacific Slope Flycatcher
- Black Phoebe
- Say's Phoebe
- (9) 1222 Ash-throated Flycatcher
- Cassin's Kingbird
- (27) 84861 Western Kingbird usual
- (4) Horned Lark in corner flat, old
- Tree Swallow building pad
- Violet-green Swallow
- (18) 12168 N. Rough-winged Swallow
- (102) 80, 44424 Cliff Swallow
- (1) Barn Swallow
- (15) 2 1112221 2 Scrub Jay
- (16) 22624 American Crow
- (6) 42 Common Raven
- (10) 12121 2 Plain Titmouse
- (8) 2 12 Bushtit
- (28) 46 1184 11 Bewick's Wren
- (13) 2416 House Wren
- Ruby-crowned Kinglet
- **California Gnatcatcher**
- Blue-gray Gnatcatcher
- (2) 11 Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- American Robin
- (2) 2 Wrentit
- Northern Mockingbird
- (5) 111 California Thrasher
- American Pipit
- Cedar Waxwing
- (4) 31 Phainopepla
- Loggerhead Shrike
- (18) 864 European Starling
- **Bell's Vireo**
- Solitary Vireo
- (1) Warbling Vireo
- Orange-crowned Warbler
- (2) 11 Yellow Warbler
- Yellow-rumped Warbler
- (8) 421 Common Yellowthroat
- Wilson's Warbler
- Yellow-breasted Chat
- Western Tanager
- (13) 124 111 Black-headed Grosbeak
- (2) Blue Grosbeak
- Lazuli Bunting
- (32) 4222211 2466 Rufous-sided Towhee
- (47) 66896 64 1123 California Towhee
- (4) 31 Lark Sparrow
- Savannah Sparrow
- (37) 8888 111 Song Sparrow
- Lincoln's Sparrow
- White-crowned Sparrow
- (14) 2424 Red-winged Blackbird
- Western Meadowlark
- (4) Brewer's Blackbird
- (18) 43 1341 2 Brown-headed Cowbird
- Hooded Oriole
- (8) 1241 Northern Oriole
- (42) 42246 44644 22 House Finch
- Pine Siskin
- (23) 411116 111 Lesser Goldfinch
- Lawrence's Goldfinch
- (1) American Goldfinch
- (3) 12 House Sparrow

Many flying in/out of fields
wet & fallowed / weedy

BIRDS OF Santa Clara River System

Locality Castaic Date 6/14/02 Time 6:45 - 8:45

- Great Blue Heron
- (1) Green Heron
- Mallard
- Turkey Vulture
- White-tailed Kite
- Sharp-shinned Hawk
- Cooper's Hawk
- Red-shouldered Hawk
- (2) 11 Red-tailed Hawk
- American Kestrel
- (87) 26, 40, 20, 2 California Quail
- American Coot
- (5) 14 Killdeer
- Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- (6) 1131 Rock Dove
- (21) 4242211112 Mourning Dove
- Greater Roadrunner
- Barn Owl
- Great Horned Owl
- White-throated Swift
- (2) 11 Black-ch. Hummingbird
- (10) 1111112 Anna's Hummingbird
- Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- (5) 111 Nuttall's Woodpecker
- (2) 11 Downy Woodpecker
- Hairy Woodpecker
- Northern Flicker
- Western Wood-Pewee
- **Willow Flycatcher**
- (2) Pacific Slope Flycatcher
- Black Phoebe
- (18) Say's Phoebe
- 2121112222 Ash-throated Flycatcher
- Cassin's Kingbird
- (13) 454 Western Kingbird
- Horned Lark
- Tree Swallow
- Violet-green Swallow
- (40) 20, 8246 N. Rough-winged Swallow
- 296 60, 25, 25, 88 4 6624 Cliff Swallow
- (2) Barn Swallow
- (14) 11122123 Scrub Jay
- American Crow
- (5) 124 Common Raven
- (5) 121 Plain Titmouse
- (26) 20, 6 Bushtit
- (8) 111 111 Bewick's Wren
- (2) 11 House Wren
- Ruby-crowned Kinglet
- **California Gnatcatcher**
- Blue-gray Gnatcatcher
- (1) 1 Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- American Robin
- (3) 12 Wrentit
- Northern Mockingbird
- (10) 1111112 California Thrasher
- American Pipit
- Cedar Waxwing
- Phainopepla
- Loggerhead Shrike
- (60) 3, 30, 6 88 European Starling
- **Bell's Vireo**
- Solitary Vireo
- Warbling Vireo
- Orange-crowned Warbler
- (8) 12212 Yellow Warbler
- Yellow-rumped Warbler
- (12) 2121212 Common Yellowthroat
- Wilson's Warbler
- Yellow-breasted Chat
- Western Tanager
- (12) 1111111 Black-headed Grosbeak
- (3) 111 Blue Grosbeak
- (4) 211 Lazuli Bunting
- (9) 1111111 Rufous-sided Towhee
- 23 2411 3261112 California Towhee
- (2) Lark Sparrow
- Savannah Sparrow
- (43) 8882 Song Sparrow
- Lincoln's Sparrow
- White-crowned Sparrow
- 59 5, 25, 4, 8, 6 Red-winged Blackbird
- Western Meadowlark
- Brewer's Blackbird
- (19) 1112212111 Brown-headed Cowbird
- (11) 146 Hooded Oriole
- (12) 1112311 Northern Oriole
- (39) 88851221 House Finch
- Pine Siskin
- (15) 4222113 Lesser Goldfinch
- Lawrence's Goldfinch
- American Goldfinch
- (3) 21 House Sparrow
- (2) Rufous Crowned Sparrow

Water = all paved housing development runoff -

BIRDS OF Santa Clara River System

Locality Castaic Date 6/25/02 Tuesday Time 6:15-

- Great Blue Heron
- Green Heron
- Mallard
- Turkey Vulture
- White-tailed Kite
- Sharp-shinned Hawk
- Cooper's Hawk
- Red-shouldered Hawk
- Red-tailed Hawk
- American Kestrel
- 14112 California Quail
- American Coot
- 12 Killdeer
- Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- Rock Dove
- 6 ||||222 Mourning Dove
- Greater Roadrunner
- Barn Owl
- Great Horned Owl
- White-throated Swift
- Black-ch. Hummingbird
- 11 |||| |||| Anna's Hummingbird
- Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- |||| Nuttall's Woodpecker
- || Downy Woodpecker
- Hairy Woodpecker
- Northern Flicker
- Western Wood-Pewee
- **Willow Flycatcher**
- Pacific Slope Flycatcher
- || Black Phoebe
- Say's Phoebe
- 13 |||| Ash-throated Flycatcher
- Cassin's Kingbird
- 6557 Western Kingbird
- Horned Lark
- Tree Swallow
- Violet-green Swallow
- || N. Rough-winged Swallow
- 200, 20, 200, 4 Cliff Swallow
- || Barn Swallow
- |||| 12 |||| 12 Scrub Jay
- American Crow
- 6 43 |||| |||| Common Raven
- 32 |||| Plain Titmouse
- 20, 10, 8 | Bushtit
- |||| |||| Bewick's Wren
- House Wren
- Ruby-crowned Kinglet
- **California Gnatcatcher**
- Blue-gray Gnatcatcher
- 112 Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- American Robin
- 2 Wrentit
- | Northern Mockingbird
- |||| California Thrasher
- American Pipit
- Cedar Waxwing
- | Phainopepla
- Loggerhead Shrike
- 8 4 3 European Starling
- **Bell's Vireo**
- Solitary Vireo
- Warbling Vireo
- Orange-crowned Warbler
- | Yellow Warbler
- Yellow-rumped Warbler
- 4 23 Common Yellowthroat
- Wilson's Warbler
- | Yellow-breasted Chat
- Western Tanager
- 2 |||| Black-headed Grosbeak
- |||| 3 | Blue Grosbeak
- | Lazuli Bunting
- || Rufous-sided Towhee
- 1 |||| |||| |||| California Towhee
- | Lark Sparrow
- Savannah Sparrow
- 6 8 8 8 6 Song Sparrow
- Lincoln's Sparrow
- White-crowned Sparrow
- 23 Red-winged Blackbird
- Western Meadowlark
- Brewer's Blackbird
- | 2 Brown-headed Cowbird
- |||| 3 |||| Hooded Oriole
- |||| 5 |||| 4 | Northern Oriole
- 8, 40, 8 8 4 2 |||| 6 House Finch
- Pine Siskin
- 5 4 6 |||| Lesser Goldfinch
- Lawrence's Goldfinch
- American Goldfinch
- 6 || 2 House Sparrow

• Wild animal ~~scat~~ Scat = looks sick greenish lumps then almost pure bloody.

BIRDS OF Santa Clara River System

Locality Costal 2 Date 7/5/02 Time 6:00

_____ Great Blue Heron
_____ Green Heron
_____ Mallard
_____ Turkey Vulture
_____ White-tailed Kite
_____ Sharp-shinned Hawk
_____ Cooper's Hawk
(1) Red-shouldered Hawk
(2) || Red-tailed Hawk
_____ American Kestrel
(55) 9,1,1,25,8,6,4,2 California Quail
_____ American Coot
(1) Killdeer
_____ Spotted Sandpiper
_____ Least Sandpiper
_____ Common Snipe
(3) Rock Dove
(24) 8 4 2 |||| 22 Mourning Dove
_____ Greater Roadrunner
_____ Barn Owl
_____ Great Horned Owl
_____ White-throated Swift
(3) || Black-ch. Hummingbird
(10) |||| |||| Anna's Hummingbird
(2) || Costa's Hummingbird
_____ Belted Kingfisher
_____ Acorn Woodpecker
(4) |||| Nuttall's Woodpecker
_____ Downy Woodpecker
_____ Hairy Woodpecker
_____ Northern Flicker
_____ Western Wood-Pewee
_____ **Willow Flycatcher**
_____ Pacific Slope Flycatcher
(2) || Black Phoebe
_____ Say's Phoebe
(4) |||| Ash-throated Flycatcher
(6) 2 4 Cassin's Kingbird
(10) 2 6 2 Western Kingbird
_____ Horned Lark
_____ Tree Swallow
_____ Violet-green Swallow
(21) 8,3,6,4 N. Rough-winged Swallow
(89) 25,50,6,8 Cliff Swallow
(2) Barn Swallow
(20) 12 4 8 |||| Scrub Jay
(3) 12 American Crow
(57) 25,8 8 8 2 6 Common Raven all flying westish
(3) 12 Plain Titmouse
(20) 10,8, 2 Bushtit
(12) 4 2 1 |||| Bewick's Wren
_____ House Wren
_____ Ruby-crowned Kinglet

_____ California Gnatcatcher
_____ Blue-gray Gnatcatcher
_____ Western Bluebird
_____ Swainson's Thrush
_____ Hermit Thrush
_____ American Robin
(7) 2 2 2 Wrentit
(1) Northern Mockingbird
(2) || California Thrasher
_____ American Pipit
_____ Cedar Waxwing
_____ Phainopepla
_____ Loggerhead Shrike
(38) 25,8 || 3 European Starling
_____ **Bell's Vireo**
_____ Solitary Vireo
_____ Warbling Vireo
_____ Orange-crowned Warbler
(1) Yellow Warbler
_____ Yellow-rumped Warbler
(5) 2 3 | Common Yellowthroat
_____ Wilson's Warbler
_____ Yellow-breasted Chat
_____ Western Tanager
(5) |||| Black-headed Grosbeak
(8) 2 1 | Blue Grosbeak
_____ Lazuli Bunting
(2) || Rufous-sided Towhee
(20) 5 4 |||| California Towhee
_____ Lark Sparrow
_____ Savannah Sparrow
(22) 2 8 4 8 Song Sparrow
_____ Lincoln's Sparrow
_____ White-crowned Sparrow
(35) 10,25, Red-winged Blackbird
_____ Western Meadowlark
_____ Brewer's Blackbird
(26) 2 6 4 || 8 |||| Brown-headed Cowbird
(1) Hooded Oriole
(3) ||| Northern Oriole
(39) 8 6 8 || 4 6 5 House Finch
_____ Pine Siskin
(18) 1 8 4 |||| Lesser Goldfinch
_____ Lawrence's Goldfinch
_____ American Goldfinch
(2) House Sparrow

1 Bobcat

BIRDS OF Santa Clara River System

Locality Castaic Creek Date 7/16/02 Time 5:45-

- Great Blue Heron
- Green Heron
- Mallard
- Turkey Vulture
- White-tailed Kite
- Sharp-shinned Hawk
- Cooper's Hawk
- Red-shouldered Hawk
- Red-tailed Hawk
- American Kestrel
- (92, 30, 25, 15, 12) California Quail
- American Coot
- (1) Killdeer
- Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- Rock Dove
- (74, 8, 25, 22, 20) 4 2 1 4 6 Mourning Dove
- Greater Roadrunner
- Barn Owl
- Great Horned Owl
- White-throated Swift
- (6) 1 IIII Black-ch. Hummingbird
- (7) II 4 Anna's Hummingbird
- (4) IIII Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- (1) Nuttall's Woodpecker
- (2) Downy Woodpecker
- (2) II Hairy Woodpecker
- Northern Flicker
- Western Wood-Pewee
- **Willow Flycatcher**
- Pacific Slope Flycatcher
- Black Phoebe
- Say's Phoebe
- (2) II Ash-throated Flycatcher
- Cassin's Kingbird
- Western Kingbird
- Horned Lark
- Tree Swallow
- Violet-green Swallow
- (8) N. Rough-winged Swallow
- (41, 25, 88) Cliff Swallow
- (2) Barn Swallow
- (8) IIII N Scrub Jay
- American Crow
- (34, 20) 2 4 6 2 Common Raven
- (7) 5 2 Plain Titmouse
- (23) 8 9 6 Bushtit
- (13) II IIII 3 2 1 Bewick's Wren
- House Wren
- California Gnatcatcher
- Blue-gray Gnatcatcher
- (2) II Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- American Robin
- (6) 15 Wrentit
- Northern Mockingbird
- (2) II California Thrasher
- American Pipit
- Cedar Waxwing
- (1) Phainopepla
- Loggerhead Shrike
- (2) II European Starling
- **Bell's Vireo**
- Solitary Vireo
- Warbling Vireo
- Orange-crowned Warbler
- Yellow Warbler
- Yellow-rumped Warbler
- (13) II 6 IIII Common Yellowthroat
- Wilson's Warbler
- Yellow-breasted Chat
- Western Tanager
- Black-headed Grosbeak
- (23) 5 4 8 2 2 1 Blue Grosbeak
- (15) 5 4 6 Lazuli Bunting
- (5) III Rufous-sided Towhee
- (21) IIII IIII 2 1 3 California Towhee
- 5 Lark Sparrow
- Savannah Sparrow
- (8) III IIII Song Sparrow
- Lincoln's Sparrow
- White-crowned Sparrow
- (2) II Red-winged Blackbird
- Western Meadowlark
- Brewer's Blackbird
- (8) 26 Brown-headed Cowbird
- (1) Hooded Oriole
- Northern Oriole
- (146, 40, 30, 35) IIII 6 2 3 House Finch
- Pine Siskin
- (5) 4 Lesser Goldfinch
- Lawrence's Goldfinch
- (2) II American Goldfinch
- (2) II House Sparrow

2002 Upper River Area 6

BIRDS OF Santa Clara River System

Locality SAN FRANCIS QUILT Date 5-15 Time 7:15 → 9

- Great Blue Heron
- Green Heron
- Mallard
- Turkey Vulture
- White-tailed Kite
- Sharp-shinned Hawk
- Cooper's Hawk
- (1) Red-shouldered Hawk
- (1) Red-tailed Hawk
- (28) American Kestrel
- 4 4 6 4 4 6 California Quail
- American Coot
- (2) II Killdeer
- Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- 10 (45) Rock Dove
- 10 6 3 23 1 Mourning Dove
- Greater Roadrunner
- 10 Barn Owl
- Great Horned Owl
- White-throated Swift
- Black-ch. Hummingbird
- (4) IIII Anna's Hummingbird
- Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- (6) III Nuttall's Woodpecker
- Downy Woodpecker
- Hairy Woodpecker
- Northern Flicker
- (3) III Western Wood-Pewee
- **Willow Flycatcher**
- Pacific Slope Flycatcher
- (6) 2 II Black Phoebe
- Say's Phoebe
- (4) IIII Ash-throated Flycatcher
- Cassin's Kingbird
- (2) Western Kingbird
- Horned Lark
- Tree Swallow
- Violet-green Swallow
- (8) 6 2 N. Rough-winged Swallow
- (10) 4 6 Cliff Swallow
- Barn Swallow
- (15) 2 2 2 2 2 II Scrub Jay
- (2) 2 American Crow
- (3) 4 2 2 1 Common Raven N
- (3) 1 2 Plain Titmouse
- (10) 3 1 6 Bushtit
- VIII III III Bewick's Wren
- III (19) House Wren
- Ruby-crowned Kinglet

- California Gnatcatcher
- Blue-gray Gnatcatcher
- (3) 1 2 Western Bluebird
- (1) Swainson's Thrush
- Hermit Thrush
- American Robin
- Wrentit
- (5) IIII Northern Mockingbird
- (1) California Thrasher
- American Pipit
- Cedar Waxwing
- (6) 2 2 2 Phainopepla
- Loggerhead Shrike
- (2) European Starling
- **Bell's Vireo**
- Solitary Vireo
- (3) III Warbling Vireo
- Orange-crowned Warbler
- Yellow Warbler
- Yellow-rumped Warbler
- (1) Common Yellowthroat
- (18) 2 2 2 2 2 2 2 2 Wilson's Warbler
- Yellow-breasted Chat
- (4) Western Tanager
- (2) II Black-headed Grosbeak
- Blue Grosbeak
- Lazuli Bunting
- (14) 2 II 3 1 IIII Rufous-sided Towhee
- 2 4 4 2 2 2 2 2 2 (20) California Towhee
- Lark Sparrow
- Savannah Sparrow
- (5) 2 1 2 Song Sparrow
- Lincoln's Sparrow
- White-crowned Sparrow
- (28) 10 6 12 Red-winged Blackbird
- Western Meadowlark
- (3) Brewer's Blackbird
- (1) Brown-headed Cowbird
- Hooded Oriole
- (7) 2 1 2 2 Northern Oriole
- (42) 4 6 4 6 8 8 3 House Finch
- Pine Siskin
- (9) 3 2 3 1 Lesser Goldfinch
- Lawrence's Goldfinch
- American Goldfinch
- House Sparrow

TO COPPER HILL DRIVE

Upper Area 6 ON

2 days / cont. Area 6 ON

BIRDS OF Santa Clara River System

Locality *San Francisquito* Date *6-6* Time *645 — 830*

Count	Species
	Great Blue Heron
	Green Heron
(1)	Mallard
	Turkey Vulture
	White-tailed Kite
	Sharp-shinned Hawk
	Cooper's Hawk
	Red-shouldered Hawk
11	Red-tailed Hawk
	American Kestrel
4 4 4	California Quail
	American Coot
2 2 (1)1	Killdeer
	Spotted Sandpiper
	Least Sandpiper
	Common Snipe
	Rock Dove
10 6 2 2	Mourning Dove
	Greater Roadrunner
	Barn Owl
	Great Horned Owl
	White-throated Swift
1	Black-ch. Hummingbird
111	Anna's Hummingbird
	Costa's Hummingbird
	Belted Kingfisher
	Acorn Woodpecker
111	Nuttall's Woodpecker
	Downy Woodpecker
	Hairy Woodpecker
	Northern Flicker
	Western Wood-Pewee
1	**Willow Flycatcher**
	Pacific Slope Flycatcher
1 1 (1)	Black Phoebe
	Say's Phoebe
1	Ash-throated Flycatcher
	Cassin's Kingbird
	Western Kingbird
	Horned Lark
	Tree Swallow
	Violet-green Swallow
	N. Rough-winged Swallow
6 (50)	Cliff Swallow
	Barn Swallow
2 2 2 1111	Scrub Jay
2	American Crow
11	Common Raven
2	Plain Titmouse
10 2	Bushtit
2 1111	Bewick's Wren
	House Wren
	Ruby-crowned Kinglet
	California Gnatcatcher
	Blue-gray Gnatcatcher
11 2	Western Bluebird
	Swainson's Thrush
	Hermit Thrush
	American Robin
	Wrentit
	Northern Mockingbird
1 111	California Thrasher
	American Pipit
	Cedar Waxwing
6 6 6 7 3	Phainopepla
	Loggerhead Shrike
2	European Starling
	Bell's Vireo
	Solitary Vireo
	Warbling Vireo
	Orange-crowned Warbler
	Yellow Warbler
	Yellow-rumped Warbler
11	Common Yellowthroat
	Wilson's Warbler
(1)	Yellow-breasted Chat
	Western Tanager
1	Black-headed Grosbeak
(37) 1	Blue Grosbeak
	Lazuli Bunting
2 1111 1111	Rufous-sided Towhee
4 4 4 4 4 2	California Towhee
2	Lark Sparrow
	Savannah Sparrow
11 4 (4)	Song Sparrow
	Lincoln's Sparrow
	White-crowned Sparrow
5 5 5 6	Red-winged Blackbird
	Western Meadowlark
	Brewer's Blackbird
2	Brown-headed Cowbird
	Hooded Oriole
2 2 1 1	Northern Oriole
10 20 4 4 2 4 2 2	House Finch
	Pine Siskin
3 2 2	Lesser Goldfinch
	Lawrence's Goldfinch
	American Goldfinch
	House Sparrow

Just above new bridge 2nd bridge

(0) = Pond on SCR + SF Creek – by Homes

BIRDS OF Santa Clara River System

Locality SAN FRANCIS Date 6-23 Time 6:10 — 8:00

- ____ Great Blue Heron
- ____ Green Heron
- ____ Mallard
- ____ Turkey Vulture
- ____ White-tailed Kite
- ____ Sharp-shinned Hawk
- ____ Cooper's Hawk
- ____ Red-shouldered Hawk
- III Red-tailed Hawk
- ____ American Kestrel
- 5 California Quail
- ____ American Coot
- 3 11 Killdeer
- ____ Spotted Sandpiper
- ____ Least Sandpiper
- ____ Common Snipe
- ____ Rock Dove
- 6 4 4 2 3 23 Mourning Dove
- ____ Greater Roadrunner
- X Barn Owl Dead
- ____ Great Horned Owl
- ____ White-throated Swift
- II Black-ch. Hummingbird
- 1 2 II Anna's Hummingbird
- I Costa's Hummingbird
- ____ Belted Kingfisher
- ____ Acorn Woodpecker
- 2 IIII Nuttall's Woodpecker
- ____ Downy Woodpecker
- ____ Hairy Woodpecker
- ____ Northern Flicker
- ____ Western Wood-Pewee
- ____ **Willow Flycatcher**
- ____ Pacific Slope Flycatcher
- II Black Phoebe
- ____ Say's Phoebe
- 1 IIII Ash-throated Flycatcher
- ____ Cassin's Kingbird
- 12 Western Kingbird
- ____ Horned Lark
- ____ Tree Swallow
- ____ Violet-green Swallow
- 3 N. Rough-winged Swallow
- 10 10 10 6 Cliff Swallow
- ____ Barn Swallow
- 12 Scrub Jay
- ____ American Crow
- IIII Common Raven
- ____ Plain Titmouse
- ____ Bushtit
- II Bewick's Wren
- ____ House Wren
- ____ Ruby-crowned Kinglet

5 10 6 6 6 6 Phainopepla

20 20 20 10 30 6 6 6 4

- ____ California Gnatcatcher
- ____ Blue-gray Gnatcatcher
- I Western Bluebird
- ____ Swainson's Thrush
- ____ Hermit Thrush
- ____ American Robin
- ____ Wrentit
- 1 P 2 II Northern Mockingbird
- I California Thrasher
- ____ American Pipit
- ____ Cedar Waxwing
- ____ Loggerhead Shrike
- ____ European Starling
- ____ **Bell's Vireo**
- ____ Solitary Vireo
- ____ Warbling Vireo
- ____ Orange-crowned Warbler
- ____ Yellow Warbler
- ____ Yellow-rumped Warbler
- II Common Yellowthroat
- ____ Wilson's Warbler
- ____ Yellow-breasted Chat
- ____ Western Tanager
- I Black-headed Grosbeak
- I Blue Grosbeak
- ____ Lazuli Bunting
- II IIII Rufous-sided Towhee
- 4 4 4 4 California Towhee
- ____ Lark Sparrow
- ____ Savannah Sparrow
- 2 Song Sparrow
- ____ Lincoln's Sparrow
- ____ White-crowned Sparrow
- 68 Red-winged Blackbird
- ____ Western Meadowlark
- ____ Brewer's Blackbird
- ____ Brown-headed Cowbird
- ____ Hooded Oriole
- 32 Northern Oriole
- 88 House Finch
- ____ Pine Siskin
- 33 Lesser Goldfinch
- ____ Lawrence's Goldfinch
- ____ American Goldfinch
- ____ House Sparrow

BIRDS OF Santa Clara River System

Locality SAN FRANCISQUITO Date 7-13 Time 6 — 745

Count	Species
	Great Blue Heron
	Green Heron
	Mallard
	Turkey Vulture
	White-tailed Kite
	Sharp-shinned Hawk
	Cooper's Hawk
	Red-shouldered Hawk
(4) ||||	Red-tailed Hawk
	American Kestrel
(4) 2 2	California Quail
	American Coot
	Killdeer
	Spotted Sandpiper
	Least Sandpiper
	Common Snipe
(32)	Rock Dove
20 8 2 8 2 1 1	Mourning Dove
	Greater Roadrunner
(1)	Barn Owl
	Great Horned Owl
	White-throated Swift
(3) 2 1	Black-ch. Hummingbird
(15) 2 2 2 2 2 1 1 2	Anna's Hummingbird
	Costa's Hummingbird
	Belted Kingfisher
	Acorn Woodpecker
(1)	Nuttall's Woodpecker
	Downy Woodpecker
	Hairy Woodpecker
(1)	Northern Flicker
	Western Wood-Pewee
	Willow Flycatcher
	Pacific Slope Flycatcher
(1)	Black Phoebe
	Say's Phoebe
(6) | 卌	Ash-throated Flycatcher
	Cassin's Kingbird
	Western Kingbird
	Horned Lark
	Tree Swallow
	Violet-green Swallow
(11) 6 2 3 1	N. Rough-winged Swallow
(26) 20 6	Cliff Swallow
(4) 2 1 1	Barn Swallow
(10) 2 1 1 2 2 2	Scrub Jay
3 1 5 8 1	American Crow
(5) 1 2 2	Common Raven
	Plain Titmouse
	Bushtit
(3) 1 1 1	Bewick's Wren
	House Wren
	Ruby-crowned Kinglet
	California Gnatcatcher
	Blue-gray Gnatcatcher
	Western Bluebird
	Swainson's Thrush
	Hermit Thrush
	American Robin
	Wrentit
(4) 2 1 1	Northern Mockingbird
(1)	California Thrasher
	American Pipit
	Cedar Waxwing
(18) 4 8 6	Phainopepla
	Loggerhead Shrike
	European Starling
	Bell's Vireo
	Solitary Vireo
	Warbling Vireo
	Orange-crowned Warbler
	Yellow Warbler
	Yellow-rumped Warbler
(1)	Common Yellowthroat
	Wilson's Warbler
	Yellow-breasted Chat
	Western Tanager
	Black-headed Grosbeak
(3) 1 1 1	Blue Grosbeak
	Lazuli Bunting
(1)	Rufous-sided Towhee
(14) 2 2 2 2 2 2 2	California Towhee
	Lark Sparrow
	Savannah Sparrow
(2)	Song Sparrow
	Lincoln's Sparrow
	White-crowned Sparrow
(4) 2 2	Red-winged Blackbird
	Western Meadowlark
	Brewer's Blackbird
(1)	Brown-headed Cowbird
	Hooded Oriole
(2)	Northern Oriole
(137) 6 6 4 20 50 8 10 4 4 4 4 4 3 10	House Finch
	Pine Siskin
(2)	Lesser Goldfinch
	Lawrence's Goldfinch
	American Goldfinch
	House Sparrow
(2)	SELASPHORUS

½ mile N.O. culvts field

HG = MFN Trail

END = COPPER HILL

DECORO = NEW CROSSING 1120

BIRDS OF Santa Clara River System

Locality SAN FRANCISQUITO Date 7-3 Time 650 – 745

- Great Blue Heron
- Green Heron
- Mallard
- Turkey Vulture
- White-tailed Kite
- Sharp-shinned Hawk
- Cooper's Hawk
- (1) Red-shouldered Hawk
- (4) |||| Red-tailed Hawk
- American Kestrel
- (6) |– California Quail
- American Coot
- (1) Killdeer
- Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- Rock Dove
- 245 |–– Mourning Dove
- 6 (63) Greater Roadrunner
- Barn Owl
- Great Horned Owl
- White-throated Swift
- (1) Black-ch. Hummingbird
- (4) |||| Anna's Hummingbird
- Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- (2) || Nuttall's Woodpecker
- Downy Woodpecker
- Hairy Woodpecker
- Northern Flicker
- Western Wood-Pewee
- **Willow Flycatcher**
- Pacific Slope Flycatcher
- Black Phoebe
- Say's Phoebe
- (9) |||| Ash-throated Flycatcher
- Cassin's Kingbird
- Western Kingbird
- Horned Lark
- Tree Swallow
- Violet-green Swallow
- N. Rough-winged Swallow
- Cliff Swallow
- Barn Swallow
- (8) 21 23 Scrub Jay
- (5) 2 12 American Crow
- (1) Common Raven
- (2) Plain Titmouse
- Bushtit
- (4) |||| Bewick's Wren
- House Wren
- Ruby-crowned Kinglet

- California Gnatcatcher
- Blue-gray Gnatcatcher
- Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- American Robin
- (1) Wrentit
- Northern Mockingbird
- California Thrasher
- American Pipit
- Cedar Waxwing
- (13) 32 – 6 2 Phainopepla
- (5) Loggerhead Shrike
- European Starling
- **Bell's Vireo**
- Solitary Vireo
- Warbling Vireo
- Orange-crowned Warbler
- Yellow Warbler
- Yellow-rumped Warbler
- (1) Common Yellowthroat
- Wilson's Warbler
- Yellow-breasted Chat
- Western Tanager
- Black-headed Grosbeak
- (2) Blue Grosbeak
- Lazuli Bunting
- (4) |||| Rufous-sided Towhee
- 2222 California Towhee
- Lark Sparrow
- (14) Savannah Sparrow
- (4) 22 Song Sparrow
- Lincoln's Sparrow
- White-crowned Sparrow
- (2) Red-winged Blackbird
- Western Meadowlark
- Brewer's Blackbird
- (4) || 2 Brown-headed Cowbird
- Hooded Oriole
- (1) Northern Oriole
- (67) 20 2 6 6 6 6 3 House Finch
- Pine Siskin
- (9) 2 3 22 Lesser Goldfinch
- Lawrence's Goldfinch
- American Goldfinch
- House Sparrow

SOB

SAN LUIS

2002 Upper River Area 8

BIRDS OF Santa Clara River System

Locality Upper South Fork Date 5/15/02 Time 7:45 - 9:00

- Great Blue Heron
- Green Heron
- Mallard
- Turkey Vulture
- White-tailed Kite
- Sharp-shinned Hawk
- Cooper's Hawk
- (1) Red-shouldered Hawk
- Red-tailed Hawk
- American Kestrel
- (20) 8 4 9 California Quail
- American Coot
- (4) Killdeer
- Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- Rock Dove
- (24) 8 9 11 24 Mourning Dove
- Greater Roadrunner
- Barn Owl
- Great Horned Owl
- (28) 28 White-throated Swift
- (1) Black-ch. Hummingbird
- (11) Anna's Hummingbird
- Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- (2) Nuttall's Woodpecker
- Downy Woodpecker
- Hairy Woodpecker
- Northern Flicker
- (1) Western Wood-Pewee
- **Willow Flycatcher**
- Pacific Slope Flycatcher
- (4) Black Phoebe
- Say's Phoebe
- Ash-throated Flycatcher
- Cassin's Kingbird
- (1) Western Kingbird
- Horned Lark
- Tree Swallow
- Violet-green Swallow
- (8) N. Rough-winged Swallow
- Cliff Swallow
- Barn Swallow
- (7) Scrub Jay
- American Crow
- (3) Common Raven
- (3) Plain Titmouse
- (7) Bushtit
- (11) Bewick's Wren
- House Wren
- Ruby-crowned Kinglet
- **California Gnatcatcher**
- Blue-gray Gnatcatcher
- (1) Western Bluebird
- (27) Swainson's Thrush
- Hermit Thrush
- American Robin
- (2) Wrentit
- (3) Northern Mockingbird
- (1) California Thrasher
- American Pipit
- Cedar Waxwing
- (1) Phainopepla
- Loggerhead Shrike
- (15) European Starling
- **Bell's Vireo**
- Solitary Vireo
- (12) Warbling Vireo
- Orange-crowned Warbler
- (3) Yellow Warbler
- Yellow-rumped Warbler
- (3) Common Yellowthroat
- (16) Wilson's Warbler
- Yellow-breasted Chat
- (2) Western Tanager
- (2) Black-headed Grosbeak
- Blue Grosbeak
- Lazuli Bunting
- (9) Rufous-sided Towhee
- (16) California Towhee
- Lark Sparrow
- Savannah Sparrow
- (10) Song Sparrow
- Lincoln's Sparrow
- White-crowned Sparrow
- Red-winged Blackbird
- Western Meadowlark
- Brewer's Blackbird
- (2) Brown-headed Cowbird
- Hooded Oriole
- (2) Northern Oriole
- (46) 8 8 8 4 2 5 House Finch
- Pine Siskin
- (16) 8 Lesser Goldfinch
- Lawrence's Goldfinch
- American Goldfinch
- House Sparrow

BIRDS OF Santa Clara River System

Locality Upper South Fork Date 6/6/02 Time 7:45 - 8:30

- Great Blue Heron
- Green Heron
- Mallard
- Turkey Vulture
- White-tailed Kite
- Sharp-shinned Hawk
- Cooper's Hawk
- Red-shouldered Hawk
- 1 Red-tailed Hawk
- 1 American Kestrel
- 2262 California Quail
- American Coot
- Killdeer
- Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- Rock Dove
- 86 88884 Mourning Dove
- Greater Roadrunner
- Barn Owl
- Great Horned Owl
- 6 White-throated Swift nesting under new upper bridge
- 1 Black-ch. Hummingbird
- 11 Anna's Hummingbird
- Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- Nuttall's Woodpecker
- Downy Woodpecker
- Hairy Woodpecker
- Northern Flicker
- Western Wood-Pewee
- **Willow Flycatcher**
- 1 Pacific Slope Flycatcher
- 3 Black Phoebe
- 2 Say's Phoebe nesting
- 2 Ash-throated Flycatcher
- Cassin's Kingbird
- Western Kingbird
- Horned Lark
- Tree Swallow
- Violet-green Swallow
- 98896 N. Rough-winged Swallow
- 2 Cliff Swallow
- Barn Swallow
- 21122 Scrub Jay
- 2 American Crow
- 32221 Common Raven
- 1 Plain Titmouse
- 22 Bushtit
- 11 Bewick's Wren
- House Wren
- Ruby-crowned Kinglet
- **California Gnatcatcher**
- Blue-gray Gnatcatcher
- Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- American Robin
- 12 Wrentit
- 1 Northern Mockingbird
- 2 California Thrasher
- 2 American Pipit
- Cedar Waxwing
- 1 Phainopepla
- 1 Loggerhead Shrike
- 25.6 European Starling
- **Bell's Vireo**
- Solitary Vireo
- Warbling Vireo
- Orange-crowned Warbler
- Yellow Warbler
- Yellow-rumped Warbler
- 1124 Common Yellowthroat
- Wilson's Warbler
- Yellow-breasted Chat
- Western Tanager
- 2 Black-headed Grosbeak
- Blue Grosbeak
- Lazuli Bunting
- 3 Rufous-sided Towhee
- 22 California Towhee
- Lark Sparrow
- Savannah Sparrow
- 12223 Song Sparrow
- Lincoln's Sparrow
- White-crowned Sparrow
- Red-winged Blackbird
- Western Meadowlark
- Brewer's Blackbird
- Brown-headed Cowbird
- Hooded Oriole
- Northern Oriole
- 13 44 8 1546 House Finch
- Pine Siskin
- 22424 Lesser Goldfinch
- Lawrence's Goldfinch
- American Goldfinch
- 1 House Sparrow

BIRDS OF Santa Clara River System

Locality ~~Upper~~ South Fork Upper Date Sunday 6/23/02 Time _____

____	Great Blue Heron
____	Green Heron
____	Mallard
____	Turkey Vulture
____	White-tailed Kite
____	Sharp-shinned Hawk
____	Cooper's Hawk
____	Red-shouldered Hawk
____	Red-tailed Hawk
____	American Kestrel
4	California Quail
____	American Coot
1	Killdeer
____	Spotted Sandpiper
____	Least Sandpiper
____	Common Snipe
2	Rock Dove
28	Mourning Dove
____	Greater Roadrunner
____	Barn Owl
____	Great Horned Owl
1	White-throated Swift
3	Black-ch. Hummingbird
9	Anna's Hummingbird
1	Costa's Hummingbird
____	Belted Kingfisher
____	Acorn Woodpecker
5	Nuttall's Woodpecker
____	Downy Woodpecker
____	Hairy Woodpecker
____	Northern Flicker
____	Western Wood-Pewee
____	**Willow Flycatcher**
____	Pacific Slope Flycatcher
1	Black Phoebe
____	Say's Phoebe
____	Ash-throated Flycatcher
____	Cassin's Kingbird
6	Western Kingbird
____	Horned Lark
____	Tree Swallow
____	Violet-green Swallow
10	N. Rough-winged Swallow
6	Cliff Swallow
____	Barn Swallow
5	Scrub Jay
1	American Crow
12	Common Raven
1	Plain Titmouse
6	Bushtit
5	Bewick's Wren
____	House Wren
____	Ruby-crowned Kinglet

____	California Gnatcatcher
____	Blue-gray Gnatcatcher
____	Western Bluebird
____	Swainson's Thrush
____	Hermit Thrush
____	American Robin
1	Wrentit
3	Northern Mockingbird
3	California Thrasher
____	American Pipit
____	Cedar Waxwing
____	Phainopepla
15	Loggerhead Shrike
____	European Starling
____	**Bell's Vireo**
____	Solitary Vireo
____	Warbling Vireo
____	Orange-crowned Warbler
____	Yellow Warbler
____	Yellow-rumped Warbler
3	Common Yellowthroat
____	Wilson's Warbler
____	Yellow-breasted Chat
____	Western Tanager
1	Black-headed Grosbeak
1	Blue Grosbeak
½	Lazuli Bunting
1	Rufous-sided Towhee
18	California Towhee
____	Lark Sparrow
____	Savannah Sparrow
2	Song Sparrow
____	Lincoln's Sparrow
____	White-crowned Sparrow
____	Red-winged Blackbird
____	Western Meadowlark
1	Brewer's Blackbird
2	Brown-headed Cowbird
2	Hooded Oriole
5	Northern Oriole
35	House Finch
____	Pine Siskin
30	Lesser Goldfinch
____	Lawrence's Goldfinch
____	American Goldfinch
3	House Sparrow

BIRDS OF Santa Clara River System

Locality Upper South Fork Date 7/13/02 Time 5:45

- Great Blue Heron
- Green Heron
- Mallard
- Turkey Vulture
- White-tailed Kite
- Sharp-shinned Hawk
- Cooper's Hawk
- Red-shouldered Hawk
- Red-tailed Hawk
- American Kestrel
- (10) 28 California Quail
- American Coot
- (2) II Killdeer
- Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- (3) Rock Dove
- (30) 861 4226 Mourning Dove
- Greater Roadrunner
- Barn Owl
- Great Horned Owl
- (6) White-throated Swift
- Black-ch. Hummingbird
- (14) Anna's Hummingbird
- Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- (1) Nuttall's Woodpecker
- Downy Woodpecker
- Hairy Woodpecker
- Northern Flicker
- Western Wood-Pewee
- **Willow Flycatcher**
- Pacific Slope Flycatcher
- (1) Black Phoebe
- Say's Phoebe
- Ash-throated Flycatcher
- Cassin's Kingbird
- Western Kingbird
- Horned Lark
- Tree Swallow
- Violet-green Swallow
- (6) N. Rough-winged Swallow
- (8) Cliff Swallow
- Barn Swallow
- (10) Scrub Jay
- American Crow
- 5, 1, 13, 8, 22, 12, 14, 5, 6 Common Raven
- (2) II Plain Titmouse
- (17) 2, 3, 4, 6, 2 Bushtit
- (4) Bewick's Wren
- House Wren
- Ruby-crowned Kinglet
- California Gnatcatcher
- Blue-gray Gnatcatcher
- Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- American Robin
- (1) Wrentit
- (6) (2) Northern Mockingbird
- (4) California Thrasher
- American Pipit
- Cedar Waxwing
- Phainopepla
- Loggerhead Shrike
- (3) European Starling
- **Bell's Vireo**
- Solitary Vireo
- Warbling Vireo
- Orange-crowned Warbler
- Yellow Warbler
- Yellow-rumped Warbler
- Common Yellowthroat
- Wilson's Warbler
- Yellow-breasted Chat
- (1) Western Tanager
- Black-headed Grosbeak
- (1) Blue Grosbeak
- Lazuli Bunting
- (2) II Rufous-sided Towhee
- (7) II California Towhee
- Lark Sparrow
- Savannah Sparrow
- (2) II Song Sparrow
- Lincoln's Sparrow
- White-crowned Sparrow
- Red-winged Blackbird
- Western Meadowlark
- Brewer's Blackbird
- Brown-headed Cowbird
- (1) Hooded Oriole
- (4) II Northern Oriole
- (43) 88 3 II 2324 House Finch
- Pine Siskin
- (10) 4231 Lesser Goldfinch
- Lawrence's Goldfinch
- American Goldfinch
- (6) House Sparrow

BIRDS OF Santa Clara River System

Locality Upper South Fork Date 7/3/02 Time 5:45- Wed.

_____ Great Blue Heron
_____ Green Heron
_____ Mallard
_____ Turkey Vulture
_____ White-tailed Kite
_____ Sharp-shinned Hawk
_____ Cooper's Hawk
_____ Red-shouldered Hawk
(1) Red-tailed Hawk
_____ American Kestrel
_____ California Quail
_____ American Coot
(1) Killdeer
_____ Spotted Sandpiper
_____ Least Sandpiper
_____ Common Snipe
_____ Rock Dove
(30) 26 4 08 II 2 Mourning Dove
_____ Greater Roadrunner
_____ Barn Owl
_____ Great Horned Owl
(1) White-throated Swift
(1) Black-ch. Hummingbird
(8) 2 I III Anna's Hummingbird
_____ Costa's Hummingbird
_____ Belted Kingfisher
_____ Acorn Woodpecker
(2) II Nuttall's Woodpecker
(1) Downy Woodpecker
_____ Hairy Woodpecker
_____ Northern Flicker
_____ Western Wood-Pewee
_____ **Willow Flycatcher**
_____ Pacific Slope Flycatcher
(2) 3 II Black Phoebe
_____ Say's Phoebe
_____ Ash-throated Flycatcher
(1) Cassin's Kingbird
(1) Western Kingbird
_____ Horned Lark
_____ Tree Swallow
_____ Violet-green Swallow
(2) 3 II N. Rough-winged Swallow
(4) Cliff Swallow
_____ Barn Swallow
(12) 2 I 4 II 2 Scrub Jay
1 American Crow
pll 3 3 6 8 7 9 4 3 3 Common Raven all flying upriver
(43)
_____ Plain Titmouse
(4) 22 Bushtit
(3) II Bewick's Wren
_____ House Wren
_____ Ruby-crowned Kinglet

_____ California Gnatcatcher
_____ Blue-gray Gnatcatcher
_____ Western Bluebird
_____ Swainson's Thrush
_____ Hermit Thrush
(1) American Robin
(2) Wrentit
(3) (1) II Northern Mockingbird
_____ California Thrasher
_____ American Pipit
_____ Cedar Waxwing
_____ Phainopepla
(2) Loggerhead Shrike
(2) II European Starling
_____ **Bell's Vireo**
_____ Solitary Vireo
_____ Warbling Vireo
_____ Orange-crowned Warbler
(1) Yellow Warbler
_____ Yellow-rumped Warbler
(3) III Common Yellowthroat
_____ Wilson's Warbler
_____ Yellow-breasted Chat
_____ Western Tanager
_____ Black-headed Grosbeak
(1) Blue Grosbeak
_____ Lazuli Bunting
(2) II Rufous-sided Towhee
(8) II III California Towhee
_____ Lark Sparrow
_____ Savannah Sparrow
(3) II Song Sparrow
_____ Lincoln's Sparrow
_____ White-crowned Sparrow
_____ Red-winged Blackbird
_____ Western Meadowlark
_____ Brewer's Blackbird
(3) Brown-headed Cowbird
_____ Hooded Oriole
_____ Northern Oriole
(25) 6 9 2, 34 House Finch
_____ Pine Siskin
(2) 2 4 Lesser Goldfinch
_____ Lawrence's Goldfinch
_____ American Goldfinch
(8) 2 6 House Sparrow

— Hot, sunny
new houses with lawn above

relatively lush for dry year

2002 Upper River Area 7

BIRDS OF Santa Clara River System

Locality Lower South Fork Date 5/15/02 Time 9:00-10:00

- Great Blue Heron
- Green Heron
- Mallard
- Turkey Vulture
- White-tailed Kite
- Sharp-shinned Hawk
- Cooper's Hawk
- (1) Red-shouldered Hawk
- (1) Red-tailed Hawk
- (1) American Kestrel
- (6) 22 California Quail
- American Coot
- Killdeer
- Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- Rock Dove
- (12) 28 Mourning Dove
- Greater Roadrunner
- Barn Owl
- Great Horned Owl
- White-throated Swift
- Black-ch. Hummingbird
- (1) Anna's Hummingbird
- Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- Nuttall's Woodpecker
- Downy Woodpecker
- Hairy Woodpecker
- Northern Flicker
- Western Wood-Pewee
- **Willow Flycatcher**
- Pacific Slope Flycatcher
- Black Phoebe
- Say's Phoebe
- (3) III Ash-throated Flycatcher
- Cassin's Kingbird
- Western Kingbird
- Horned Lark
- Tree Swallow
- Violet-green Swallow
- (4) 12 N. Rough-winged Swallow
- Cliff Swallow
- Barn Swallow
- (3) 12 Scrub Jay
- (2) 2 American Crow
- (18) 048 Common Raven
- Plain Titmouse
- Bushtit
- (6) 124 Bewick's Wren
- (1) House Wren
- Ruby-crowned Kinglet
- **California Gnatcatcher**
- Blue-gray Gnatcatcher
- Western Bluebird
- (5) 3 III Swainson's Thrush
- Hermit Thrush
- American Robin
- Wrentit
- (2) II Northern Mockingbird
- (2) California Thrasher
- American Pipit
- Cedar Waxwing
- Phainopepla
- Loggerhead Shrike
- (3) III European Starling
- **Bell's Vireo**
- Solitary Vireo
- Warbling Vireo
- Orange-crowned Warbler
- (1) Yellow Warbler
- Yellow-rumped Warbler
- Common Yellowthroat
- (1) Wilson's Warbler
- Yellow-breasted Chat
- Western Tanager
- Black-headed Grosbeak
- Blue Grosbeak
- Lazuli Bunting
- (7) 24 Rufous-sided Towhee
- (41) 422 California Towhee
- Lark Sparrow
- Savannah Sparrow
- (5) IIII Song Sparrow
- Lincoln's Sparrow
- White-crowned Sparrow
- Red-winged Blackbird
- Western Meadowlark
- Brewer's Blackbird
- Brown-headed Cowbird
- Hooded Oriole
- (1) Northern Oriole
- (34) 3664 House Finch
- Pine Siskin
- (6) 122 Lesser Goldfinch
- Lawrence's Goldfinch
- American Goldfinch
- (2) House Sparrow

BIRDS OF Santa Clara River System

Locality LOWER SOUTH FORK Date 6/6/02 Time 8:30-9:10

- ____ Great Blue Heron
- ____ Green Heron
- ____ Mallard
- ____ Turkey Vulture
- ____ White-tailed Kite
- ____ Sharp-shinned Hawk
- ____ Cooper's Hawk
- ____ Red-shouldered Hawk
- 2 Red-tailed Hawk
- ____ American Kestrel
- || California Quail
- ____ American Coot
- ____ Killdeer
- ____ Spotted Sandpiper
- ____ Least Sandpiper
- ____ Common Snipe
- ____ Rock Dove
- 62722434 Mourning Dove
- ____ Greater Roadrunner
- ____ Barn Owl
- ____ Great Horned Owl
- ____ White-throated Swift
- ____ Black-ch. Hummingbird
- |||| Anna's Hummingbird
- ____ Costa's Hummingbird
- ____ Belted Kingfisher
- ____ Acorn Woodpecker
- ____ Nuttall's Woodpecker
- ____ Downy Woodpecker
- ____ Hairy Woodpecker
- ____ Northern Flicker
- ____ Western Wood-Pewee
- ____ **Willow Flycatcher**
- ____ Pacific Slope Flycatcher
- 5 || Black Phoebe
- | Say's Phoebe
- ____ Ash-throated Flycatcher
- ____ Cassin's Kingbird
- ____ Western Kingbird
- ____ Horned Lark
- ____ Tree Swallow
- ____ Violet-green Swallow
- | 3 N. Rough-winged Swallow
- ____ Cliff Swallow
- ____ Barn Swallow
- |||2 Scrub Jay
- ____ American Crow
- | 2||2 Common Raven
- 2 Plain Titmouse
- ____ Bushtit
- ||| Bewick's Wren
- ____ House Wren
- ____ Ruby-crowned Kinglet
- ____ **California Gnatcatcher**
- ____ Blue-gray Gnatcatcher
- ____ Western Bluebird
- ____ Swainson's Thrush
- ____ Hermit Thrush
- ____ American Robin
- ____ Wrentit
- || Northern Mockingbird
- | California Thrasher
- ____ American Pipit
- ____ Cedar Waxwing
- ____ Phainopepla
- ____ Loggerhead Shrike
- 3 | European Starling
- ____ **Bell's Vireo**
- ____ Solitary Vireo
- ____ Warbling Vireo
- ____ Orange-crowned Warbler
- ____ Yellow Warbler
- ____ Yellow-rumped Warbler
- ____ Common Yellowthroat
- ____ Wilson's Warbler
- ____ Yellow-breasted Chat
- ____ Western Tanager
- ____ Black-headed Grosbeak
- ____ Blue Grosbeak
- ____ Lazuli Bunting
- || 2 Rufous-sided Towhee
- |||| California Towhee
- ____ Lark Sparrow
- ____ Savannah Sparrow
- ____ Song Sparrow
- ____ Lincoln's Sparrow
- ____ White-crowned Sparrow
- ____ Red-winged Blackbird
- ____ Western Meadowlark
- ____ Brewer's Blackbird
- ____ Brown-headed Cowbird
- ____ Hooded Oriole
- ____ Northern Oriole
- 4||||2296 House Finch
- ____ Pine Siskin
- 1 2 |||| Lesser Goldfinch
- ____ Lawrence's Goldfinch
- ____ American Goldfinch
- | House Sparrow

BIRDS OF Santa Clara River System

Locality Lower South Fork Date Sunday 6/23/02 Time _____

_____ Great Blue Heron
_____ Green Heron
_____ Mallard
_____ Turkey Vulture
_____ White-tailed Kite
_____ Sharp-shinned Hawk
_____ Cooper's Hawk
_____ Red-shouldered Hawk
_____ Red-tailed Hawk
_____ American Kestrel
2 California Quail
_____ American Coot
| Killdeer
_____ Spotted Sandpiper
_____ Least Sandpiper
_____ Common Snipe
_____ Rock Dove
98 24623 Mourning Dove
_____ Greater Roadrunner
_____ Barn Owl
_____ Great Horned Owl
_____ White-throated Swift
||| Black-ch. Hummingbird
||| Anna's Hummingbird
_____ Costa's Hummingbird
_____ Belted Kingfisher
_____ Acorn Woodpecker
2 Nuttall's Woodpecker
_____ Downy Woodpecker
_____ Hairy Woodpecker
_____ Northern Flicker
_____ Western Wood-Pewee
_____ **Willow Flycatcher**
_____ Pacific Slope Flycatcher
||| Black Phoebe
_____ Say's Phoebe
|| Ash-throated Flycatcher
_____ Cassin's Kingbird
2 Western Kingbird
_____ Horned Lark
_____ Tree Swallow
_____ Violet-green Swallow
662 N. Rough-winged Swallow
_____ Cliff Swallow
_____ Barn Swallow
2||| Scrub Jay
_____ American Crow
86 Common Raven
|| Plain Titmouse
4 Bushtit
|| Bewick's Wren
| House Wren
_____ Ruby-crowned Kinglet

_____ California Gnatcatcher
_____ Blue-gray Gnatcatcher
_____ Western Bluebird
_____ Swainson's Thrush
_____ Hermit Thrush
_____ American Robin
_____ Wrentit
| Northern Mockingbird
_____ California Thrasher
_____ American Pipit
_____ Cedar Waxwing
_____ Phainopepla
_____ Loggerhead Shrike
6 European Starling
_____ **Bell's Vireo**
_____ Solitary Vireo
_____ Warbling Vireo
_____ Orange-crowned Warbler
_____ Yellow Warbler
_____ Yellow-rumped Warbler
||2 Common Yellowthroat
_____ Wilson's Warbler
_____ Yellow-breasted Chat
_____ Western Tanager
_____ Black-headed Grosbeak
_____ Blue Grosbeak
_____ Lazuli Bunting
_____ Rufous-sided Towhee
||42 California Towhee
_____ Lark Sparrow
_____ Savannah Sparrow
_____ Song Sparrow
_____ Lincoln's Sparrow
_____ White-crowned Sparrow
_____ Red-winged Blackbird
_____ Western Meadowlark
| Brewer's Blackbird
_____ Brown-headed Cowbird
3 Hooded Oriole
_____ Northern Oriole
488 64-26 House Finch
_____ Pine Siskin
||| Lesser Goldfinch
_____ Lawrence's Goldfinch
_____ American Goldfinch
| House Sparrow

BIRDS OF Santa Clara River System

Locality Lower South Fork Date 7/15/02 Time _____

_____ Great Blue Heron
_____ Green Heron
_____ Mallard
_____ Turkey Vulture
_____ White-tailed Kite
_____ Sharp-shinned Hawk
1 Cooper's Hawk young
_____ Red-shouldered Hawk
1 Red-tailed Hawk
_____ American Kestrel
_____ California Quail
_____ American Coot
_____ Killdeer
_____ Spotted Sandpiper
_____ Least Sandpiper
_____ Common Snipe
_____ Rock Dove
33, 25, 11 2 12 Mourning Dove
_____ Greater Roadrunner
_____ Barn Owl
_____ Great Horned Owl
_____ White-throated Swift
_____ Black-ch. Hummingbird
9 11 2 ||| Anna's Hummingbird
_____ Costa's Hummingbird
_____ Belted Kingfisher
_____ Acorn Woodpecker
3 2 Nuttall's Woodpecker
_____ Downy Woodpecker
_____ Hairy Woodpecker
_____ Northern Flicker
_____ Western Wood-Pewee
_____ **Willow Flycatcher**
_____ Pacific Slope Flycatcher
1 Black Phoebe
_____ Say's Phoebe
1 Ash-throated Flycatcher
_____ Cassin's Kingbird
_____ Western Kingbird
_____ Horned Lark
_____ Tree Swallow
_____ Violet-green Swallow
2 N. Rough-winged Swallow
3 Cliff Swallow
_____ Barn Swallow
1 Scrub Jay
_____ American Crow
9 2 2 2 Common Raven
_____ Plain Titmouse
16 12, 4 Bushtit
5 ||| Bewick's Wren
_____ House Wren
_____ Ruby-crowned Kinglet

_____ California Gnatcatcher
_____ Blue-gray Gnatcatcher
_____ Western Bluebird
_____ Swainson's Thrush
_____ Hermit Thrush
_____ American Robin
_____ Wrentit
3 1 2 Northern Mockingbird
_____ California Thrasher
_____ American Pipit
_____ Cedar Waxwing
3 Phainopepla
_____ Loggerhead Shrike
1 European Starling
_____ **Bell's Vireo**
_____ Solitary Vireo
_____ Warbling Vireo
_____ Orange-crowned Warbler
_____ Yellow Warbler
_____ Yellow-rumped Warbler
_____ Common Yellowthroat
_____ Wilson's Warbler
_____ Yellow-breasted Chat
_____ Western Tanager
_____ Black-headed Grosbeak
_____ Blue Grosbeak
_____ Lazuli Bunting
_____ Rufous-sided Towhee
1 California Towhee
_____ Lark Sparrow
_____ Savannah Sparrow
_____ Song Sparrow
_____ Lincoln's Sparrow
_____ White-crowned Sparrow
_____ Red-winged Blackbird
_____ Western Meadowlark
_____ Brewer's Blackbird
_____ Brown-headed Cowbird
_____ Hooded Oriole
_____ Northern Oriole
15 3 2 1 1 6 House Finch
_____ Pine Siskin
3 1 2 Lesser Goldfinch
_____ Lawrence's Goldfinch
_____ American Goldfinch
_____ House Sparrow

Some low ground fog

BIRDS OF Santa Clara River System

Locality Lower South Fork Date 7/3/02 Time _____

- _____ Great Blue Heron
- _____ Green Heron
- (1) Mallard fly over
- _____ Turkey Vulture
- _____ White-tailed Kite
- _____ Sharp-shinned Hawk
- _____ Cooper's Hawk
- (1) Red-shouldered Hawk
- (2) || Red-tailed Hawk
- _____ American Kestrel
- _____ California Quail
- _____ American Coot
- (1) Killdeer
- (1) Spotted Sandpiper
- _____ Least Sandpiper
- _____ Common Snipe
- _____ Rock Dove
- (16) (62) |||| || Mourning Dove
- _____ Greater Roadrunner
- _____ Barn Owl
- _____ Great Horned Owl
- _____ White-throated Swift
- _____ Black-ch. Hummingbird
- (1) Anna's Hummingbird
- _____ Costa's Hummingbird
- _____ Belted Kingfisher
- _____ Acorn Woodpecker
- _____ Nuttall's Woodpecker
- _____ Downy Woodpecker
- _____ Hairy Woodpecker
- _____ Northern Flicker
- _____ Western Wood-Pewee
- _____ **Willow Flycatcher**
- _____ Pacific Slope Flycatcher
- (1) Black Phoebe
- _____ Say's Phoebe
- (3) || Ash-throated Flycatcher
- _____ Cassin's Kingbird
- (2) | Western Kingbird
- _____ Horned Lark
- _____ Tree Swallow
- _____ Violet-green Swallow
- (3) 2 | N. Rough-winged Swallow
- (3) Cliff Swallow
- _____ Barn Swallow
- (3) 2 | Scrub Jay
- (5) 23 American Crow
- (20) (6) F63 | Common Raven
- _____ Plain Titmouse
- _____ Bushtit
- (5) |||| Bewick's Wren
- _____ House Wren
- _____ Ruby-crowned Kinglet
- _____ California Gnatcatcher
- _____ Blue-gray Gnatcatcher
- _____ Western Bluebird
- _____ Swainson's Thrush
- _____ Hermit Thrush
- _____ American Robin
- _____ Wrentit
- _____ Northern Mockingbird
- (1) California Thrasher
- _____ American Pipit
- _____ Cedar Waxwing
- (2) || Phainopepla
- _____ Loggerhead Shrike
- (2) (6) European Starling
- _____ **Bell's Vireo**
- _____ Solitary Vireo
- _____ Warbling Vireo
- _____ Orange-crowned Warbler
- _____ Yellow Warbler
- _____ Yellow-rumped Warbler
- _____ Common Yellowthroat
- _____ Wilson's Warbler
- _____ Yellow-breasted Chat
- _____ Western Tanager
- _____ Black-headed Grosbeak
- _____ Blue Grosbeak
- _____ Lazuli Bunting
- (2) || Rufous-sided Towhee
- (7) |||| || California Towhee
- _____ Lark Sparrow
- _____ Savannah Sparrow
- _____ Song Sparrow
- _____ Lincoln's Sparrow
- _____ White-crowned Sparrow
- (4) Red-winged Blackbird
- _____ Western Meadowlark
- (3) 2 | Brewer's Blackbird
- (3) ||| Brown-headed Cowbird
- _____ Hooded Oriole
- (2) || Northern Oriole
- (50) (26) 25 House Finch
- _____ Pine Siskin
- _____ Lesser Goldfinch
- _____ Lawrence's Goldfinch
- _____ American Goldfinch
- _____ House Sparrow

2002 Upper River Area 8

BIRDS OF Santa Clara River System

Locality Upper South Fork Date 5/15/02 Time 7:45 - 9:00

- Great Blue Heron
- Green Heron
- Mallard
- Turkey Vulture
- White-tailed Kite
- Sharp-shinned Hawk
- Cooper's Hawk
- (1) Red-shouldered Hawk
- Red-tailed Hawk
- American Kestrel
- (20) 849 California Quail
- American Coot
- (4) Killdeer
- Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- Rock Dove
- (24) 88112 Mourning Dove
- Greater Roadrunner
- Barn Owl
- Great Horned Owl
- (10) 28 White-throated Swift
- (1) Black-ch. Hummingbird
- (11) 12 Anna's Hummingbird
- Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- (2) Nuttall's Woodpecker
- Downy Woodpecker
- Hairy Woodpecker
- Northern Flicker
- (1) Western Wood-Pewee
- **Willow Flycatcher**
- Pacific Slope Flycatcher
- (4) 12 Black Phoebe
- Say's Phoebe
- Ash-throated Flycatcher
- Cassin's Kingbird
- (1) Western Kingbird
- Horned Lark
- Tree Swallow
- Violet-green Swallow
- (8) 24 N. Rough-winged Swallow
- Cliff Swallow
- Barn Swallow
- (7) 2212 Scrub Jay
- American Crow
- (3) 21 Common Raven
- (3) 12 Plain Titmouse
- (7) 2122 Bushtit
- (11) 24 Bewick's Wren
- House Wren
- Ruby-crowned Kinglet
- **California Gnatcatcher**
- Blue-gray Gnatcatcher
- Western Bluebird
- (2) Swainson's Thrush
- Hermit Thrush
- American Robin
- (2) Wrentit
- (3) Northern Mockingbird
- (1) California Thrasher
- American Pipit
- Cedar Waxwing
- (1) Phainopepla
- Loggerhead Shrike
- (15) 24 European Starling
- **Bell's Vireo**
- Solitary Vireo
- (2) Warbling Vireo
- Orange-crowned Warbler
- (3) 12 Yellow Warbler
- Yellow-rumped Warbler
- (3) Common Yellowthroat
- (16) Wilson's Warbler
- Yellow-breasted Chat
- (2) Western Tanager
- (3) Black-headed Grosbeak
- Blue Grosbeak
- Lazuli Bunting
- (9) 2221 Rufous-sided Towhee
- (16) 22222 California Towhee
- Lark Sparrow
- Savannah Sparrow
- (10) 12 Song Sparrow
- Lincoln's Sparrow
- White-crowned Sparrow
- Red-winged Blackbird
- Western Meadowlark
- Brewer's Blackbird
- (2) Brown-headed Cowbird
- Hooded Oriole
- (2) Northern Oriole
- (46) 88842 House Finch
- Pine Siskin
- (18) 8222 Lesser Goldfinch
- Lawrence's Goldfinch
- American Goldfinch
- House Sparrow

BIRDS OF Santa Clara River System

Locality Upper South Fork Date 6/6/02 Time 7:45 - 8:30

- Great Blue Heron
- Green Heron
- Mallard
- Turkey Vulture
- White-tailed Kite
- Sharp-shinned Hawk
- Cooper's Hawk
- Red-shouldered Hawk
- 1 Red-tailed Hawk
- 1 American Kestrel
- 2262 California Quail
- American Coot
- Killdeer
- Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- Rock Dove
- 86 88884 Mourning Dove
- Greater Roadrunner
- Barn Owl
- Great Horned Owl
- 6 White-throated Swift nesting under new upper bridge
- 1 Black-ch. Hummingbird
- 11 Anna's Hummingbird
- Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- Nuttall's Woodpecker
- Downy Woodpecker
- Hairy Woodpecker
- Northern Flicker
- Western Wood-Pewee
- **Willow Flycatcher**
- 1 Pacific Slope Flycatcher
- 3 Black Phoebe
- 2 Say's Phoebe nesting
- 2 Ash-throated Flycatcher
- Cassin's Kingbird
- Western Kingbird
- Horned Lark
- Tree Swallow
- Violet-green Swallow
- 98886 N. Rough-winged Swallow
- 2 Cliff Swallow
- Barn Swallow
- 21122 Scrub Jay
- 2 American Crow
- 32221 Common Raven
- 1 Plain Titmouse
- 22 Bushtit
- 11 Bewick's Wren
- House Wren
- Ruby-crowned Kinglet
- **California Gnatcatcher**
- Blue-gray Gnatcatcher
- Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- American Robin
- 12 Wrentit
- 1 Northern Mockingbird
- 2 California Thrasher
- American Pipit
- Cedar Waxwing
- 1 Phainopepla
- 1 Loggerhead Shrike
- 26.6 European Starling
- **Bell's Vireo**
- Solitary Vireo
- Warbling Vireo
- Orange-crowned Warbler
- Yellow Warbler
- Yellow-rumped Warbler
- 1121 Common Yellowthroat
- Wilson's Warbler
- Yellow-breasted Chat
- Western Tanager
- 2 Black-headed Grosbeak
- Blue Grosbeak
- Lazuli Bunting
- 3 Rufous-sided Towhee
- 22 California Towhee
- Lark Sparrow
- Savannah Sparrow
- 12223 Song Sparrow
- Lincoln's Sparrow
- White-crowned Sparrow
- Red-winged Blackbird
- Western Meadowlark
- Brewer's Blackbird
- Brown-headed Cowbird
- Hooded Oriole
- 1 Northern Oriole
- 13548 1546 House Finch
- Pine Siskin
- 22424 Lesser Goldfinch
- Lawrence's Goldfinch
- American Goldfinch
- 1 House Sparrow

BIRDS OF Santa Clara River System

Locality ~~Upper~~ South Fork Upper Date Sunday 6/23/02 Time _____

	Great Blue Heron		California Gnatcatcher
	Green Heron		Blue-gray Gnatcatcher
	Mallard		Western Bluebird
	Turkey Vulture		Swainson's Thrush
	White-tailed Kite		Hermit Thrush
	Sharp-shinned Hawk		American Robin
	Cooper's Hawk	1	Wrentit
	Red-shouldered Hawk	3	Northern Mockingbird
	Red-tailed Hawk	3	California Thrasher
	American Kestrel		American Pipit
4	California Quail		Cedar Waxwing
	American Coot		Phainopepla
1	Killdeer	15	Loggerhead Shrike
	Spotted Sandpiper		European Starling
	Least Sandpiper		**Bell's Vireo**
	Common Snipe		Solitary Vireo
2	Rock Dove		Warbling Vireo
28	Mourning Dove		Orange-crowned Warbler
	Greater Roadrunner		Yellow Warbler
	Barn Owl		Yellow-rumped Warbler
	Great Horned Owl	3	Common Yellowthroat
1	White-throated Swift		Wilson's Warbler
3	Black-ch. Hummingbird		Yellow-breasted Chat
9	Anna's Hummingbird		Western Tanager
1	Costa's Hummingbird	1	Black-headed Grosbeak
	Belted Kingfisher	1	Blue Grosbeak
	Acorn Woodpecker	4	Lazuli Bunting
5	Nuttall's Woodpecker	1	Rufous-sided Towhee
	Downy Woodpecker	18	California Towhee
	Hairy Woodpecker		Lark Sparrow
	Northern Flicker		Savannah Sparrow
	Western Wood-Pewee	2	Song Sparrow
	Willow Flycatcher		Lincoln's Sparrow
	Pacific Slope Flycatcher		White-crowned Sparrow
1	Black Phoebe		Red-winged Blackbird
	Say's Phoebe		Western Meadowlark
	Ash-throated Flycatcher	1	Brewer's Blackbird
	Cassin's Kingbird	2	Brown-headed Cowbird
6	Western Kingbird	2	Hooded Oriole
	Horned Lark	5	Northern Oriole
	Tree Swallow	35	House Finch
	Violet-green Swallow		Pine Siskin
10	N. Rough-winged Swallow	30	Lesser Goldfinch
6	Cliff Swallow		Lawrence's Goldfinch
	Barn Swallow		American Goldfinch
5	Scrub Jay	3	House Sparrow
1	American Crow		
12	Common Raven		
1	Plain Titmouse		
6	Bushtit		
5	Bewick's Wren		
	House Wren		
	Ruby-crowned Kinglet		

BIRDS OF Santa Clara River System

Locality Upper South Fork Date 7/13/08 Time 5:45

- Great Blue Heron
- Green Heron
- Mallard
- Turkey Vulture
- White-tailed Kite
- Sharp-shinned Hawk
- Cooper's Hawk
- Red-shouldered Hawk
- Red-tailed Hawk
- American Kestrel
- (10) 28 California Quail
- American Coot
- (2) 4 Killdeer
- Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- (3) Rock Dove
- (30) 86 4226 Mourning Dove
- Greater Roadrunner
- Barn Owl
- Great Horned Owl
- (6) White-throated Swift
- Black-ch. Hummingbird
- (14) Anna's Hummingbird
- Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- (1) Nuttall's Woodpecker
- Downy Woodpecker
- Hairy Woodpecker
- Northern Flicker
- Western Wood-Pewee
- **Willow Flycatcher**
- Pacific Slope Flycatcher
- (1) Black Phoebe
- Say's Phoebe
- Ash-throated Flycatcher
- Cassin's Kingbird
- Western Kingbird
- Horned Lark
- Tree Swallow
- Violet-green Swallow
- (6) N. Rough-winged Swallow
- (8) Cliff Swallow
- Barn Swallow
- (10) Scrub Jay
- American Crow
- (17) 1,3,8,22,12,14,5,6 Common Raven
- (2) Plain Titmouse
- (17) 2,3,4,6,2 Bushtit
- (4) Bewick's Wren
- House Wren
- Ruby-crowned Kinglet
- California Gnatcatcher
- Blue-gray Gnatcatcher
- Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- American Robin
- (1) Wrentit
- (6) Northern Mockingbird
- (4) California Thrasher
- American Pipit
- Cedar Waxwing
- Phainopepla
- Loggerhead Shrike
- (3) European Starling
- **Bell's Vireo**
- Solitary Vireo
- Warbling Vireo
- Orange-crowned Warbler
- Yellow Warbler
- Yellow-rumped Warbler
- Common Yellowthroat
- Wilson's Warbler
- Yellow-breasted Chat
- (1) Western Tanager
- Black-headed Grosbeak
- (1) Blue Grosbeak
- Lazuli Bunting
- (2) Rufous-sided Towhee
- (7) California Towhee
- Lark Sparrow
- Savannah Sparrow
- (2) Song Sparrow
- Lincoln's Sparrow
- White-crowned Sparrow
- Red-winged Blackbird
- Western Meadowlark
- Brewer's Blackbird
- Brown-headed Cowbird
- (1) Hooded Oriole
- (4) Northern Oriole
- (43) 88 House Finch
- Pine Siskin
- (10) Lesser Goldfinch
- Lawrence's Goldfinch
- American Goldfinch
- (5) House Sparrow

BIRDS OF Santa Clara River System

Wed.

Locality Upper South Fork Date 7/3/02 Time 5:45 -

_____ Great Blue Heron
_____ Green Heron
_____ Mallard
_____ Turkey Vulture
_____ White-tailed Kite
_____ Sharp-shinned Hawk
_____ Cooper's Hawk
_____ Red-shouldered Hawk
(1) Red-tailed Hawk
_____ American Kestrel
_____ California Quail
_____ American Coot
(1) Killdeer
_____ Spotted Sandpiper
_____ Least Sandpiper
_____ Common Snipe
_____ Rock Dove
(30) 26 4 6 1 12 Mourning Dove
_____ Greater Roadrunner
_____ Barn Owl
_____ Great Horned Owl
(1) White-throated Swift
(1) Black-ch. Hummingbird
(8) 2 1 IIII Anna's Hummingbird
_____ Costa's Hummingbird
_____ Belted Kingfisher
_____ Acorn Woodpecker
(2) II Nuttall's Woodpecker
(1) Downy Woodpecker
_____ Hairy Woodpecker
_____ Northern Flicker
_____ Western Wood-Pewee
_____ **Willow Flycatcher**
_____ Pacific Slope Flycatcher
(2) II Black Phoebe
_____ Say's Phoebe
_____ Ash-throated Flycatcher
(3) Cassin's Kingbird
(1) Western Kingbird
_____ Horned Lark
_____ Tree Swallow
_____ Violet-green Swallow
(2) II N. Rough-winged Swallow
(4) Cliff Swallow
_____ Barn Swallow
(12) 2 1 4 1 2 Scrub Jay
(1) American Crow
10 + 3 6 8 7 9 4 3 3 Common Raven all flying up river
_____ Plain Titmouse
(4) 22 Bushtit
(3) II Bewick's Wren
_____ House Wren
_____ Ruby-crowned Kinglet

_____ California Gnatcatcher
_____ Blue-gray Gnatcatcher
_____ Western Bluebird
_____ Swainson's Thrush
_____ Hermit Thrush
(1) American Robin
(2) Wrentit
(3) II Northern Mockingbird
_____ California Thrasher
_____ American Pipit
_____ Cedar Waxwing
_____ Phainopepla
(2) Loggerhead Shrike
(2) II European Starling
_____ **Bell's Vireo**
_____ Solitary Vireo
_____ Warbling Vireo
_____ Orange-crowned Warbler
(1) Yellow Warbler
_____ Yellow-rumped Warbler
(3) III Common Yellowthroat
_____ Wilson's Warbler
_____ Yellow-breasted Chat
_____ Western Tanager
_____ Black-headed Grosbeak
(1) Blue Grosbeak
_____ Lazuli Bunting
(2) II Rufous-sided Towhee
(8) IIII California Towhee
_____ Lark Sparrow
_____ Savannah Sparrow
(3) II Song Sparrow
_____ Lincoln's Sparrow
_____ White-crowned Sparrow
_____ Red-winged Blackbird
_____ Western Meadowlark
_____ Brewer's Blackbird
(3) Brown-headed Cowbird
_____ Hooded Oriole
_____ Northern Oriole
(25) 6 9 3 3 4 1 House Finch
_____ Pine Siskin
(2) 2 4 1 Lesser Goldfinch
_____ Lawrence's Goldfinch
_____ American Goldfinch
(8) 2 6 House Sparrow

BIRD SURVEYS ALONG A PORTION OF THE SANTA CLARA RIVER AND ITS TRIBUTARIES UPSTREAM FROM THE CASTAIC CREEK CONFLUENCE, NEAR VALENCIA, CALIFORNIA, 2001

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September 14, 2001

CORRECTED VERSION

Bird Surveys along a Portion of the Santa Clara River Upstream from the Castaic Creek Confluence, near Valencia, California, 2001

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Nature and Scope of Surveys

During the spring and early summer of 2001 surveys were conducted along a section of the Santa Clara River and its tributaries near Valencia, California (Figure 1). Surveys were focused on determining presence or absence of yellow-billed cuckoo, least Bell's vireo and southwestern willow flycatcher, and followed U.S. Fish and Wildlife Service Guidelines for the latter two species. Numbers of all species observed were noted, and, in addition to the three species noted above, special attention was placed on locating species considered rare and endangered or of Special Concern, and on determining numbers of brown-headed cowbirds.

Each survey was conducted on foot by observers well acquainted with visual, auditory and behavioral characteristics of southern California birds. Survey routes were designed to cover all areas of each section of the river, with emphasis placed on wetter habitats where least Bell's vireos and other sensitive riparian species are most likely to occur. All surveys occurred between 6:00 and 10:00 a.m. If focus species (yellow-billed cuckoo, least Bell's vireo, and southwestern willow flycatcher), were not visually observed, tapes of their calls were played in an attempt to elicit a response. Personnel for all surveys were Daniel A. Guthrie and Judith A. Sugden, both working under Federal Fish and Wildlife Service Permit number TE810394-1, issued under section 10(a)(1)(A) of the Endangered Species Act.

To facilitate surveys and observe the coverage guidelines for focus species, the area was divided into eight sections (Figure 1). Delineation of the eight areas and comments on each follow. Surveys of all sections of the river system were conducted five times during the nesting season and followed the Revised Protocol (Fish And Wildlife Service, July 2000) for southwestern willow flycatcher. Several sections of the river (Areas 4, 6-8) had no running water or wet riparian vegetation and were not considered suitable habitat for least Bell's vireo. However, areas 1-3,5 had flowing water and wet riparian vegetation. These sections were surveyed according to the protocol for least Bell's vireo as outlined by the Fish and Wildlife Service. This latter protocol requires 8 surveys between April 10 and July 31st, approximately 2 weeks apart, except when interrupted by periods of poor weather.

Habitat Condition and Bird Observations.

The riparian zone of the Santa Clara River, as described here, consists of two major habitat types, a wet riparian zone and a dry riparian woodland. The wet riparian zone consists of obligatory wet plants such as cattail and watercress found in continually moist soils along the active river channel and some willow, tamarisk and *Baccharis* shrubs also found in this zone. This zone is usually flooded during winter rains with the removal of much of the annual vegetation. Although this results in bare areas in April and early May, by June and July, most of this wet riparian vegetation has been reestablished. The dry riparian woodland consists of larger willow and cottonwood forests along the margins of the wet riparian zone and occurring on soils above the flood plain that are normally not damaged in winter floods. During the spring of 2001 much of the wet riparian vegetation was scoured from the river channel by floods. The result was poor development of streamside wet riparian vegetation during April and May. Except for one cold spell in April, there was little spring rain, with the result that in the dry riparian woodlands smaller trees died and there was little development of annual plants.

Observations of all birds are shown in Tables 1-8. The numbers shown are of birds seen and heard, with heard individuals forming the majority of the observations. Numbers vary between censuses. Bird activity varies with season. Different species breed at different times of the year. In general, species are most easily observed when they are actively defending territories by song during the establishment of breeding pairs. Once pairs are established and nesting begins song often decreases and the numbers of birds observed, therefore, also decreases. After young leave the nest, numbers observed may increase. Thus, for most resident species, numbers of adult birds are most accurately censused in April and May, when territorial activity is at a maximum. A few species such as Anna's hummingbird that nest early in the season may be underestimated. Numbers of some nesting species, such as yellow warbler may be higher than normal in May due to migratory birds passing through the area. Numbers may also increase in late June and July when young birds leave the nest.

The following sections contain specific comments on the habitat and bird observations in each area.

Area 1 (Table 1). Santa Clara River; The Old Road Bridge to the mouth of Castaic Creek.

Length of section, 3.5 miles. The Santa Clara River flows continuously in this section and is augmented by the Valencia waste water outfall near the upstream end of this section and by some irrigation runoff from Magic Mountain and agricultural fields along the north side.

Along most of this section, wet riparian vegetation forms a narrow strip along the main channel of the Santa Clara River. Although this vegetation was scoured by spring flooding, leaving extensive sand flats, numbers of wet riparian species were similar to those found in previous years. A section of dense willows along The Old Road, protected from spring flooding by a dike and irrigated by runoff from agricultural fields was the site of nesting by two pairs of least Bell's vireos (Figure 3).

Extensive dry riparian forests occur near the Valencia Waste water outfall, near Magic mountain, and near the Valencia Travel Village. Cooper's Hawk and white-tailed kite were rarely seen in these areas.

Species such as rufous-crowned sparrow and Lawrence's goldfinch visit this section of the Santa Clara River during late summer from the coastal sage scrub community on the south side of the river. A red-tailed hawk, ravens, and cliff swallows nested on cliffs along the south side of the river near the mouth of Castaic Creek.

Area 2 (Table 2). Santa Clara River; McBean Parkway downstream to The Old Road.

Length of section, 1.4 miles. The Santa Clara River flows continuously in this section and additional water is provided by irrigation runoff from industrial parks along the north side. The channel was scoured by spring flooding resulting in removal of most wet riparian vegetation. A small area of coastal sage scrub borders the river just east of Interstate 5, but along the rest of this section the river is now bordered by commercial development.

The wet willow forest near the mouth of San Francisquito Creek was carefully surveyed for focus species as migrating willow flycatcher have been seen here in previous years. None were found this year. Cowbird traps were operated along this section of the river throughout the study period.

Area 3 (Table 3). Santa Clara River; Bouquet Canyon Road downstream to McBean Parkway

Length of section, 1.2 miles. Water, supplied by the Saugus wastewater outfall at the Bouquet Canyon Bridge, is continuous in this section of the Santa Clara River. A small amount of additional water is provided from irrigation runoff coming from Bouquet Canyon. Flooding during the spring removed all wet riparian vegetation from this section of the river. Today dry riparian vegetation is restricted to a narrow zone on the north side of the river near McBean Parkway, to some islands of vegetation within the river channel, and a more extensive forest near the athletic park on the south side. Wet riparian vegetation consists of a narrow zone along the outflow from the Saugus outfall. An extensive willow forest in the flood control channel at the mouth of Bouquet Canyon Creek was removed during the winter to facilitate water movement. Cowbird traps were operated in the section just above the McBean Bridge throughout the census period.

A single willow flycatcher was observed along this section of the river on June 12,th (Figure 2) but could not be found on subsequent visits. This sighting is thought to be of an individual migrating through the area rather than of a breeding individual.

Area 4 (Table 4). Santa Clara River; Bouquet Canyon Road upstream to DWP transmission lines.

Length of section, 2.3 miles. The river channel in this section consists of a broad, flat, dry wash with narrow margins of dry riparian woodland. Within the channel are areas of coastal sage scrub habitat. This section of the Santa Clara River in past years has been wet only briefly during spring rains and due to water release from pumps one mile upstream from Bouquet Canyon Road. This section was completely dry during all surveys this year. This resulted in the almost complete absence of riparian species such as song sparrow and yellowthroat. Most birds observed in this section are characteristic of coastal sage and dry riparian woodlands.

Area 5 (Table 5). Castaic Creek; Route 126 to Interstate 5.

Length of section, 1.8 miles. Water was released from upstream dams during April through June but not continuously. Except for pockets of wet vegetation formed near irrigation runoff channels, and remnant puddles near the middle of this section, the creek was dry much of this spring. Despite this lack of permanent water flow, many wet riparian species (song sparrow, yellowthroat, nested successfully. Swallows nested under the three bridges that cross this section of the river. The extensive willow forest on this section where least Bell's vireo once nested has matured and was dry much of this year. No vireos have been seen here the last four years and the area no longer seems suitable habitat due to its age and lack of permanent water. Two willow flycatchers were observed in this section, one on June 7 and another on June 17. As they were in different places, not singing, and could not be relocated on subsequent visits, these individuals are considered migrant birds passing through the area.

Area 6 (Table 6). San Francisquito Creek; Santa Clara River upstream 2.5 miles.

Length of section, 2.5 miles. Along most of this section the riparian zone consists of a broad sandy channel. Once bordered by coastal sage scrub habitat, the channel is now bordered by developed areas. In the upper part of this section, however, coastal sage scrub plants still occur within the channel as do sections of dry riparian woodland consisting mostly of cottonwoods. *Arundo* and tamarisk are common along this section along the stream channel. The lower ½ mile of San Francisquito Creek is wet due to runoff from adjacent development and is the only portion of this section where species preferring wet riparian habitat were observed.

Area 7 (Table 7). South Fork of the Santa Clara River; McBean Parkway to Magic Mountain Parkway (Route 126).

Length of section, 1.0 miles. The channel along this section of the South Fork is narrow and very sandy. Along most of this section vegetation is restricted to a narrow band of dry woodland and at each side of the channel and a few pockets of wet vegetation supported by runoff from adjacent development. Near the confluence with the main channel of the Santa Clara River a more extensive area of woodland exists on the north side of this section and a small cattail marsh is present.

Area 8 (Table 8). South Fork of the Santa Clara River, Route 126 upstream to Newhall Creek.

Length of section, 1.4 miles. This section of the river consists of a wide sandy channel intersected by several concrete sills designed to restrict sand movement and flood damage. The river is entirely bordered by developed areas but contains small islands of dry riparian vegetation and some wet riparian areas formed by runoff from culverts along the sides of the creek. No flooding has occurred on this section of the river in recent years and riparian vegetation around these culverts continues to develop into areas of cottonwood and willow woodland, resulting in the continued increase in riparian species along this section of the river.

Comments on Threatened and Endangered Species

Yellow-billed Cuckoo

The Yellow-billed Cuckoo is listed as a State Endangered Species. Despite playing taped calls of this species during June and July surveys, no individuals of this species were observed in 2001.

Southwestern Willow Flycatcher

This subspecies is listed under the Federal Endangered Species Act. Willow Flycatchers were once widespread in wet riparian woodland in southern California but now only a few individuals exist. Following the Revised Protocol (Fish And Wildlife Service, July 2000) five surveys were conducted specifically for Southwestern willow flycatcher. All surveys occurred between 6:00 and 10:00 am. and used taped calls to elicit a response if flycatchers were not first observed.

Two willow flycatchers were observed at locations shown on Figure 2. One was observed along Castaic Creek on June 7th and one was observed along the Santa Clara River between Bouquet Bridge and McBean Parkway on June 12th. Neither bird was singing or responded to tapes. Although these birds were in potential nesting habitat for this species, neither could be relocated on subsequent visits. Based on lack of singing and territorial defense, both observations are considered migrants passing through the area. The report forms required by the U.S. Fish and Wildlife Service Protocol for this species are attached to this report.

Least Bell's Vireo

Surveys of the wet riparian areas (Areas 1-3,5) followed U.S. Fish and Wildlife Service Guidelines for least Bell's vireo. Eight surveys were conducted between April 10 and July 31

(see Tables 1-3,5 for dates). All surveys occurred between 6:00 and 10:00 am. and taped vireo calls were played if no vireos were heard or seen. The only vireos observed were on the Santa Clara River at Castaic Junction in an extensive stand of willows. Vireos were heard in two locations (Figure 3, loc. 1,2) and were present throughout most of the study period.

The willow forest in which vireo sightings occurred is along the north side of the Santa Clara River in an area cut off from the main channel of the river by a dike created during the spring of 1998. The dike was designed to redirect the river away from the Old Road along the northeastern edge of the river channel, thus protecting it from further erosion. The willows that have developed in this section are now three years old and form an ideal habitat for least Bell's vireo. However, the dike that protects this area from flooding is slowly being destroyed by spring river floods.

Comments on Sensitive Species

Great Blue Heron

Great Blue Herons are listed on the California Natural Diversity Data Base as a species that warrants monitoring. Individuals of this species were observed sparingly along the river after the breeding season. No nesting was observed and herons were absent during the nesting season.

Great Egret

The Great egret is listed on the California Natural Diversity Data Base as a species that warrants monitoring. A few individuals were observed along the river during migration and after the breeding season.

White-tailed Kite

This species, formerly the Black-shouldered Kite, is considered a Species of Special Concern by the State of California. Kites were infrequently observed along the river and there was no evidence of nesting this year.

Cooper's Hawk

Cooper's Hawk is considered a Species of Special Concern by the State of California. Cooper's Hawks were observed rarely along the main river in 2000 and there was no evidence of successful nesting.

Prairie Falcon

The prairie falcon is considered a Species of Special Concern by the State of California. A single prairie falcon was observed along Castaic Creek on July 2nd and is considered a migrant passing through the area.

California Horned Lark

This is a California Special Concern species. Although none were observed nesting on the study site, horned larks are ground nesters that prefer bare hillsides and abandoned fields. A few were observed feeding on bare fields and construction areas along Castaic Creek

Yellow Warbler

The Yellow Warbler is considered a Species of Special Concern by the State of California. Yellow Warblers prefer wet riparian habitat but are also found in large cottonwoods in drier riparian areas. Singing yellow warblers were observed along the continuously wet sections of the survey area during nesting season, but were observed in other dry sections of the river only during migration.

Yellow-breasted Chat

The Yellow-breasted Chat is considered a Species of Special Concern by the State of California. A few chats nested along the wet sections of the Santa Clara River.

Tricolored Blackbird

The Tricolored Blackbird is a California Special Concern species and a Bird of Management Concern for the U.S. Fish and Wildlife Service. A few individuals, probably wintering birds, were observed in early April and a single individual, probably a returning migrant, was observed in July.

Southern California Rufous-crowned Sparrow

This species is considered a California Special Concern species by the Department of Fish and Game and is also a Federal Special Concern species. In late summer rufous-crowned sparrows were an uncommon visitor to the riparian zone from the surrounding coastal sage habitat where this species is a breeding resident.

Lawrence's Goldfinch

This species is a highest priority species on the Audubon Birds to Watch list for 1996 and is a Bird of Management Concern for the Fish and Wildlife Service. Although a species of the coastal sage, small flocks of this species visited the riparian zone of the Santa Clara River during early spring and summer.

Comments of Brown-headed Cowbirds

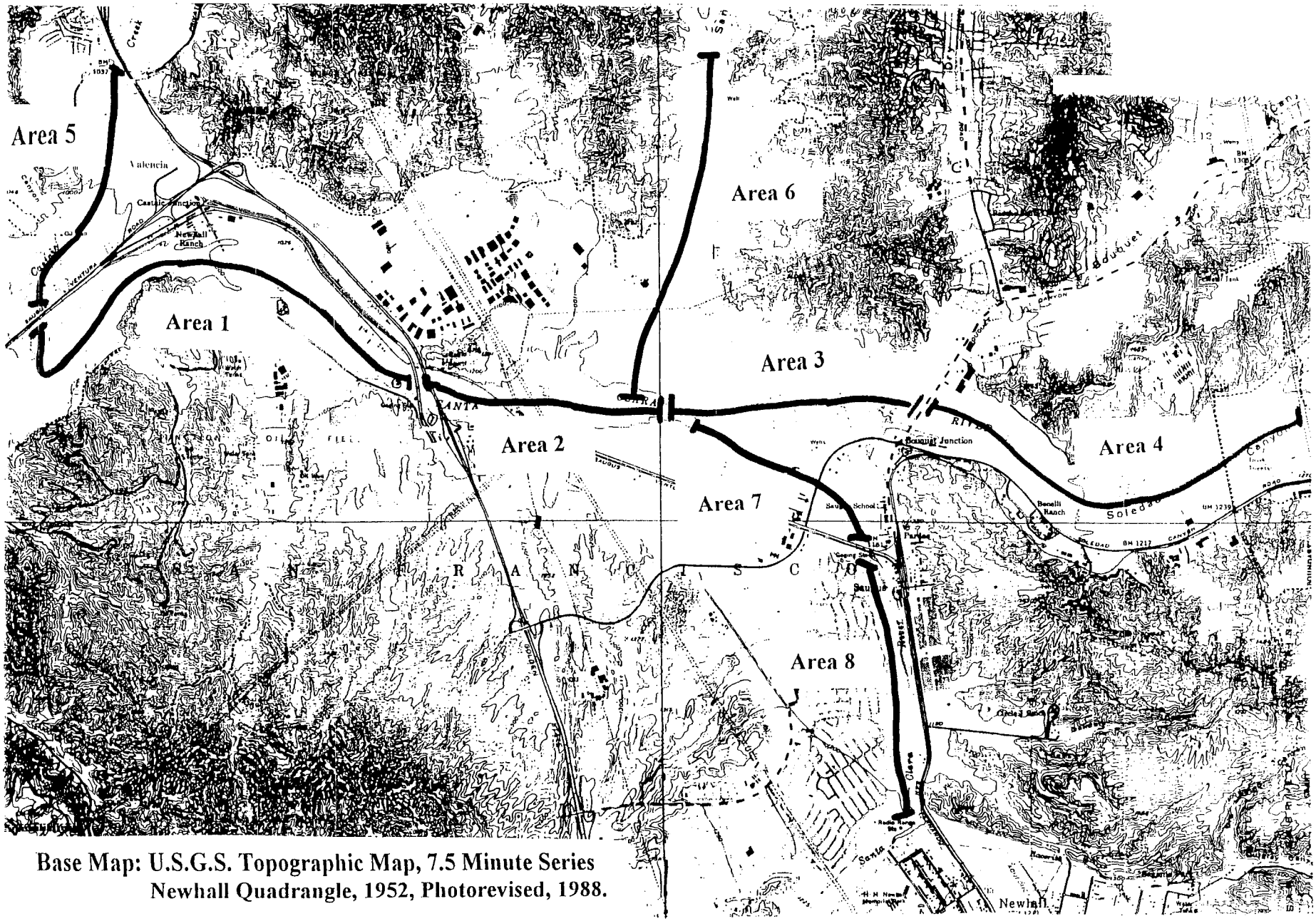
Although not a Species of Concern, comments about this species are warranted due to its influence on several endangered species. Cowbirds were regularly observed along all sections of the Santa Clara River, usually flying along the riparian corridor searching for either mates or potential nests to parasitize. Cowbird females often responded to taped calls of Least Bell's Vireo. Cowbird traps were operated throughout the study period between Bouquet Canyon Bridge and Interstate 5 (Sections 2 and 3). Numbers of cowbirds observed along these sections were normal in April but greatly diminished after late May. Numbers did not show much change along other sections were trapping did not occur.

Summary

No yellow-billed cuckoos were observed in 2001. Two individual southwestern willow flycatchers were observed but could not be relocated on subsequent surveys. This failure, and their behavior suggests that these were migrant birds passing through the area. Least Bell's vireos nested at Castaic Junction. This area was the site of nesting also in 2000.

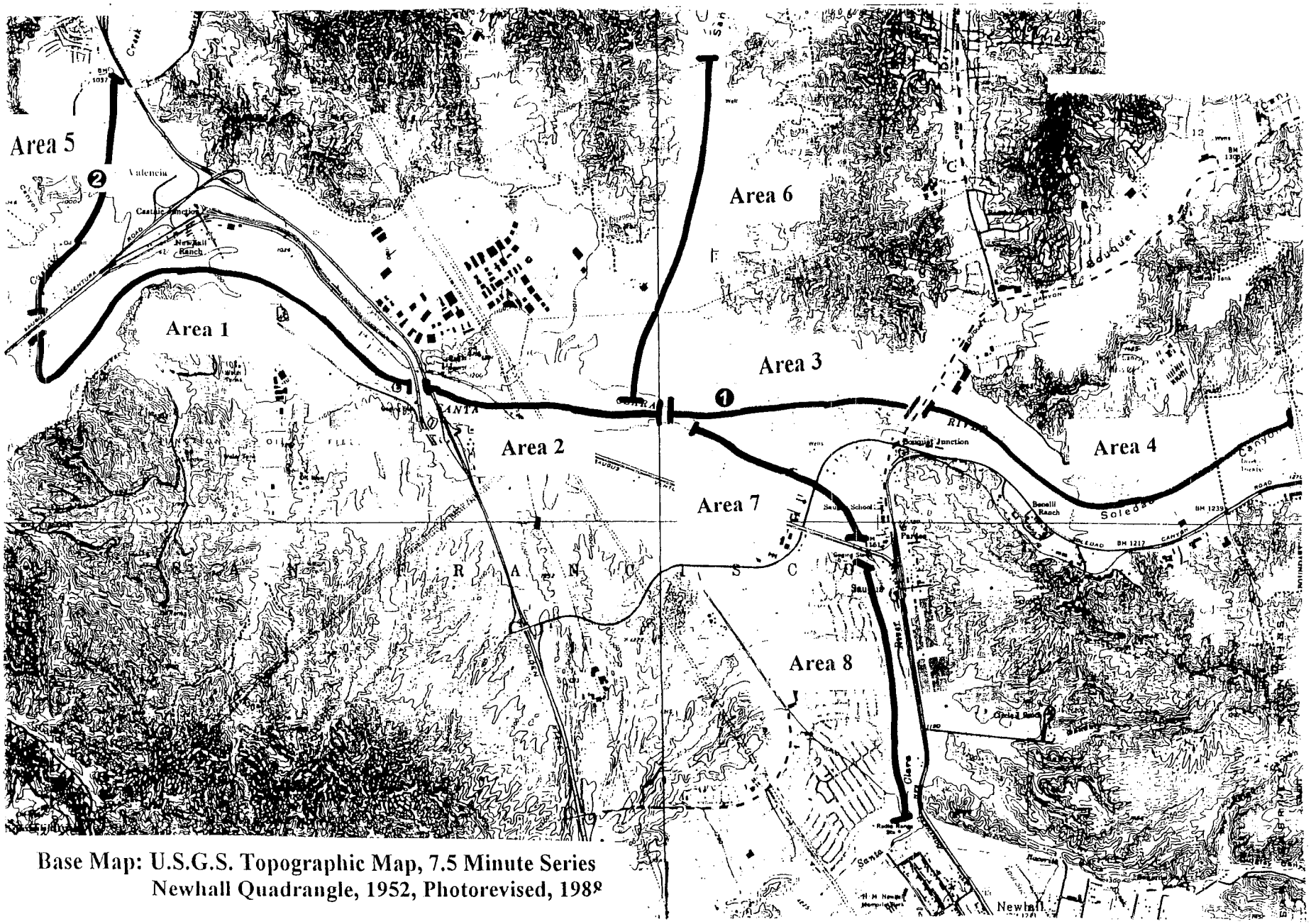
Two riparian Species of Concern, yellow warbler and yellow-breasted chat nested in small numbers along wet sections of the river. Other Species of Concern great blue heron, Cooper's Hawk, white-tailed kite, prairie falcon, horned lark, rufous-crowned sparrow, tricolored redwing and Lawrence's goldfinch visited the river sporadically but there was no evidence of nesting for any of these species. Cowbirds were numerous along the river and probably contributed to the small numbers of yellow warblers and least Bell's vireos observed.

Figure 1. Survey Areas along the Santa Clara River and Tributaries.



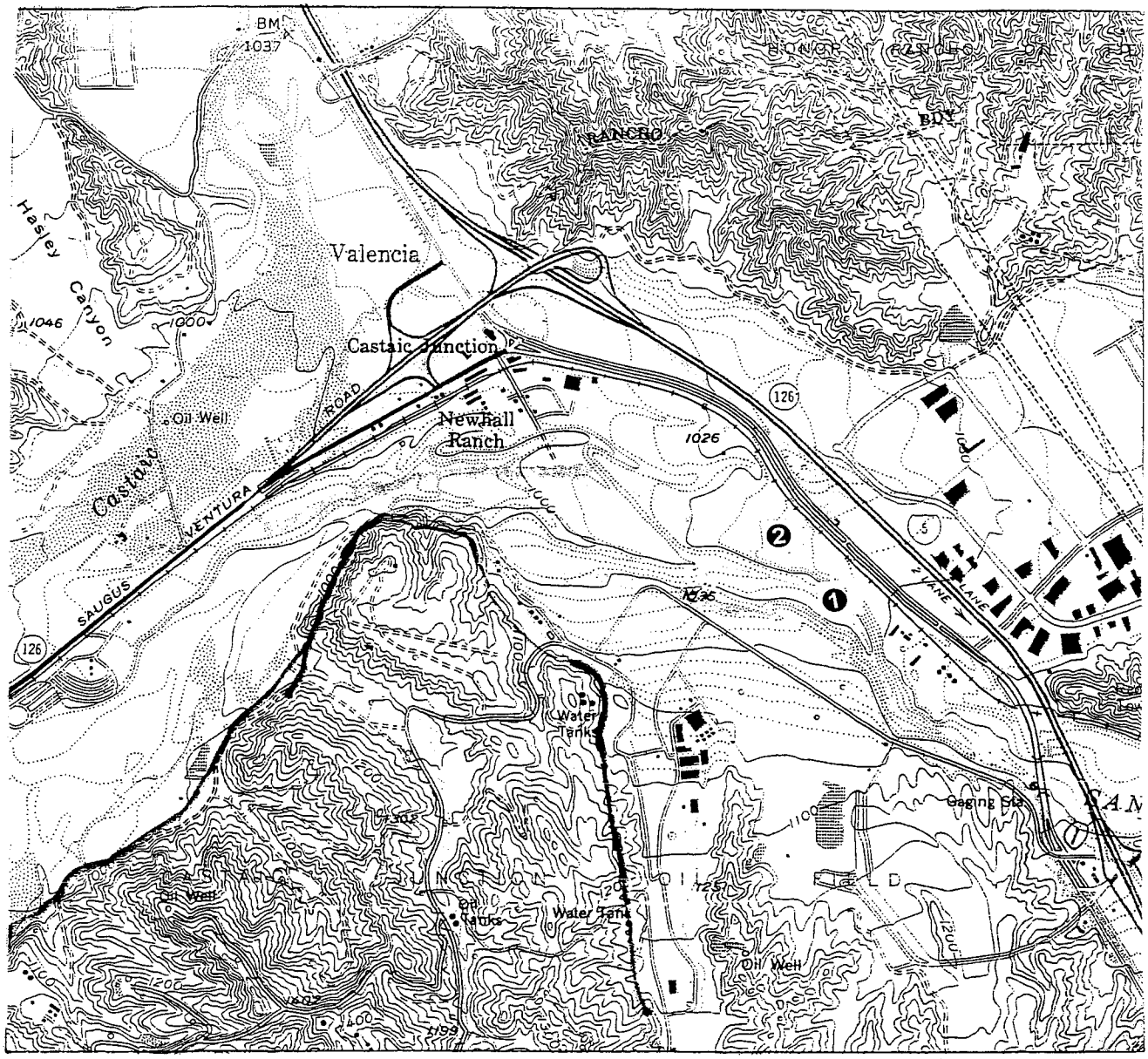
Base Map: U.S.G.S. Topographic Map, 7.5 Minute Series
Newhall Quadrangle, 1952, Photorevised, 1988.

Figure 2. Southwestern willow flycatcher sightings during 2001. Each number represents locality of sighting.



Base Map: U.S.G.S. Topographic Map, 7.5 Minute Series
Newhall Quadrangle, 1952, Photorevised, 1988

Figure 3. Least Bell's Vireo sightings during 2001. Each number represents a locality of sighting.



Base Map: U.S.G.S. Topographic Map, 7.5 Minute Series
Newhall Quadrangle, 1952, Photorevised, 1988.

Table 1. BIRDS OF THE SANTA CLARA RIVER BASIN, 2001: Santa Clara River from Old Road to the Mouth of Castaic Creek.

Endangered Species and Species of Concern Shaded

		Dates of Surveys							
SPECIES	STATUS	7-Apr	26-Apr	9-May	17-May	12-Jun	24-Jun	5-Jul	15-Jul
Great Blue Heron	m,w	0	0	0	0	0	0	1	0
Snowy Egret	m,w	0	4	1	0	0	0	0	0
Green Heron	r	0	2	2	2	0	4	5	1
American Bittern	m	1	0	0	0	0	0	0	0
Black-crowned Night-heron	m,w	0	0	1	0	0	0	0	0
Turkey Vulture	r	0	0	0	1	0	0	0	1
Mallard	r	2	7	14	6	2	0	0	0
Cinnamon Teal	m,w	0	2	0	0	0	0	0	0
White-tailed Kite	r	1	0	0	0	0	0	0	0
Cooper's Hawk	r	0	0	0	0	0	0	0	1
Red-shouldered Hawk	r	1	1	1	1	2	2	1	3
Red-tailed Hawk	r	0	1	3	3	1	2	2	2
American Kestrel	r	0	1	0	1	0	0	0	0
California Quail	r	2	19	22	20	12	2	58	42
Killdeer	r	0	11	17	19	11	6	27	2
Spotted Sandpiper	s	0	2	5	8	0	0	5	0
Rock Dove	r	0	0	0	0	6	0	0	0
Mourning Dove	r	4	14	6	16	7	13	24	22
Great Horned Owl	r	0	0	0	0	0	0	0	2
White-throated Swift	r	0	0	2	25	0	0	0	0
Black-chinned Hummingbird	s	0	0	1	0	0	1	8	3
Anna's Hummingbird	r	3	2	1	1	11	12	6	15
Costa's Hummingbird	s	0	0	0	0	0	0	3	2
Belted Kingfisher	m,w	1	1	0	0	0	0	0	0
Nuttall's Woodpecker	r	2	3	3	5	4	6	9	8
Downy Woodpecker	r	1	0	1	1	2	6	3	5
Hairy Woodpecker	r	0	0	0	1	1	3	2	2
Northern Flicker	r	0	0	0	1	0	1	0	0
Pacific Slope Flycatcher	s	0	0	0	1	0	0	0	0
Black Phoebe	r	1	0	1	1	4	4	13	5
Ash-throated Flycatcher	s	5	6	5	12	6	10	24	16
Western Kingbird	s	0	3	4	2	2	0	2	0
Bell's Vireo	s	1	0	0	0	2	2	1	0
Warbling Vireo	m	0	0	0	0	0	0	1	0
Western Scrub Jay	r	7	7	5	10	4	8	16	15
American Crow	r	10	4	7	2	16	10	21	14
Common Raven	r	3	6	2	5	10	5	5	15
N. Rough-winged Swallow	s	11	3	9	20	11	9	1	0
Cliff Swallow	s	40	45	90	77	34	9	3	22
Barn Swallow	s	0	0	0	0	0	2	5	0
Oak Titmouse	r	0	8	9	6	6	9	10	15
Bushtit	r	6	6	8	4	0	8	10	2
White-breasted Nuthatch	r	0	1	0	0	0	1	0	0
Bewick's Wren	r	16	26	25	17	18	41	25	20
House Wren	r	2	3	9	5	0	12	0	13

Table 1 (cont.). BIRDS OF THE SANTA CLARA RIVER BASIN, 2001: Santa Clara River from Old Road to the Mouth of Castaic Creek.

Endangered Species and Species of Concern Shaded

SPECIES	STATUS	Dates of Surveys 7-Apr	26-Apr	9-May	17-May	12-Jun	24-Jun	5-Jul	15-Jul
Phainopepla	r	0	0	0	1	0	0	3	3
Nashville Warbler	m,w	1	0	0	0	0	0	0	0
Yellow Warbler	s,m	4	2	3	2	8	6	4	4
Yellow-rumped Warbler	w,m	2	2	0	0	0	0	0	0
Common Yellowthroat	r	7	4	2	7	70	36	67	13
Wilson's Warbler	m	0	1	0	0	0	0	0	0
Yellow-breasted Chat	s	0	0	1	0	4	2	4	1
Western Tanager	m	0	2	0	0	0	0	0	0
Spotted Towhee	r	7	12	15	12	7	20	21	13
California Towhee	r	5	4	2	0	20	17	13	18
Rufous-crowned Sparrow	r	0	0	1	0	0	0	0	0
Lark Sparrow	r	0	0	0	0	0	1	2	0
Savannah Sparrow	w,m	20	0	0	0	0	0	0	0
Song Sparrow	r	44	50	92	76	84	54	144	76
White-crowned Sparrow	w,m	13	0	0	0	0	0	0	0
Black-headed Grosbeak	s	5	11	17	13	6	7	12	15
Blue Grosbeak	s	4	0	1	2	0	0	4	5
Lazuli Bunting	s	0	0	0	1	0	0	18	0
Red-winged Blackbird	s	8	0	0	5	26	3	12	0
Tricolored Blackbird	s	0	0	0	0	0	0	1	0
Brewer's Blackbird	r	0	0	0	0	20	3	0	0
Great-tailed Grackle	s	0	0	0	0	0	2	0	0
Brown-headed Cowbird	s	15	17	10	6	10	7	22	5
Hooded Oriole	s	0	0	0	0	0	0	3	0
Bullock's Oriole	s	2	5	2	1	0	10	10	4
House Finch	r	16	4	5	6	18	38	10	52
Pine Siskin	w,m	0	16	0	0	0	0	0	0
Lesser Goldfinch	r	14	20	0	4	11	8	7	13
Lawrence's Goldfinch	r	0	0	0	0	2	0	3	0
American Goldfinch	w,m,r	0	21	0	0	5	2	0	0
House Sparrow	r	0	0	0	0	0	0	4	0

Status: m, migrant; r, resident; s, summer only; w, winter

Table 2. BIRDS OF THE SANTA CLARA RIVER BASIN, 2001: Santa Clara River from McBean Highway to The Old Road.

Endangered Species and Species of Concern Shaded

SPECIES	STATUS	Dates of Surveys 17-Apr	28-Apr	11-May	17-May	12-Jun	23-Jun	6-Jul	16-Jul
Great Blue Heron	m,w	0	0	0	0	1	0	0	0
Green Heron	r	0	0	0	1	2	0	0	0
Mallard	r	0	0	0	0	0	1	0	0
Red-shouldered Hawk	r	2	2	2	1	1	2	1	2
Red-tailed Hawk	r	1	1	2	0	1	1	3	2
California Quail	r	4	7	7	8	5	14	7	18
Killdeer	r	3	4	8	11	3	6	6	2
Rock Dove	r	0	0	0	14	4	0	0	0
Mourning Dove	r	12	10	14	13	9	12	15	14
Greater Roadrunner	r	0	0	1	0	0	0	0	0
Western Screech Owl	r	0	0	0	0	1	0	0	0
White-throated Swift	r	0	0	0	3	0	0	0	0
Black-chinned Hummingbird	s	0	0	2	0	0	1	0	1
Anna's Hummingbird	r	3	1	5	6	1	2	3	5
Costa's Hummingbird	s	0	1	1	0	0	0	0	1
Acorn Woodpecker	r	0	0	0	0	0	0	0	2
Nuttall's Woodpecker	r	2	4	9	3	6	3	2	8
Downy Woodpecker	r	3	3	5	3	5	1	3	6
Hairy Woodpecker	r	0	0	1	1	2	0	1	0
Western Wood-pewee	m	0	0	1	0	0	0	0	0
Black Phoebe	r	3	0	0	1	4	7	7	9
Say's Phoebe	r	0	0	0	0	0	0	0	1
Ash-throated Flycatcher	s	3	3	5	5	5	12	3	1
Western Kingbird	s	0	0	4	0	2	0	3	3
Western Scrub Jay	r	4	5	13	12	8	9	10	7
American Crow	r	14	3	9	8	14	7	4	2
Common Raven	r	2	4	8	10	2	10	0	2
Tree Swallow	s	0	0	0	3	0	0	0	0
Violet-green Swallow	s	0	0	0	2	0	0	0	0
N. Rough-winged Swallow	s	18	0	6	4	7	0	0	2
Cliff Swallow	s	106	8	14	33	24	4	16	20
Barn Swallow	s	1	0	0	0	0	0	0	2
Oak Titmouse	r	4	4	3	1	5	18	0	9
Bushtit	r	0	4	6	3	2	2	23	0
Bewick's Wren	r	24	26	35	20	28	32	11	16
House Wren	r	16	9	12	4	2	10	4	0
Western Bluebird	r	0	4	4	0	0	0	1	2
American Robin	r	0	0	1	0	0	0	0	0
Wrentit	r	0	2	0	0	0	3	0	0
California Thrasher	r	0	2	4	5	2	0	7	3
European Starling	r	14	10	16	19	10	6	29	6
Phainopepla	r	0	0	0	0	11	2	2	1
Orange-crowned Warbler	w,m	7	7	0	0	0	0	0	0
Yellow Warbler	s,m	2	10	3	3	0	1	0	0

Table 2 (cont.). BIRDS OF THE SANTA CLARA RIVER BASIN, 2001: Santa Clara River from McBean Highway to The Old Road.

Endangered Species and Species of Concern Shaded

SPECIES	STATUS	Dates of Surveys 17-Apr	28-Apr	11-May	17-May	12-Jun	23-Jun	6-Jul	16-Jul
Lark Sparrow	r	0	0	0	0	0	0	0	2
Song Sparrow	r	67	66	88	62	34	34	54	11
Black-headed Grosbeak	s	1	3	6	8	5	4	5	2
Red-winged Blackbird	s	0	0	0	14	0	1	1	2
Brown-headed Cowbird	s	31	12	15	9	2	0	6	5
Bullock's Oriole	s	1	0	0	1	0	0	5	2
House Finch	r	16	4	25	8	6	25	38	116
Lesser Goldfinch	r	10	4	4	3	0	0	3	32
American Goldfinch	w,m,r	64	2	0	0	0	0	0	0

Status: m, migrant; r, resident; s, summer only; w, winter

Table 3. BIRDS OF THE SANTA CLARA RIVER BASIN, 2001: Santa Clara River from Boquet Canyon Bridge to McBean Parkway Bridge

Endangered Species and Species of Concern Shaded

		Dates of Surveys							
SPECIES	STATUS	17-Apr	26-Apr	11-May	17-May	12-Jun	23-Jun	6-Jul	16-Jul
Green Heron	r	1	0	0	0	0	0	0	0
Turkey Vulture	r	1	0	0	0	0	0	0	0
Mallard	r	0	0	2	2	2	0	0	9
Cooper's Hawk	r	1	0	0	0	1	1	0	0
Red-shouldered Hawk	r	0	0	0	0	0	1	0	0
Red-tailed Hawk	r	1	1	0	0	0	1	3	1
California Quail	r	0	10	12	16	8	21	0	4
Killdeer	r	5	7	7	3	6	6	10	4
Spotted Sandpiper	s	0	1	0	0	0	0	0	0
Rock Dove	r	0	13	3	3	0	0	8	0
Mourning Dove	r	9	10	11	10	7	15	14	27
Black-chinned Hummingbird	s	0	4	1	0	0	3	0	3
Anna's Hummingbird	r	2	2	3	5	5	7	6	4
Costa's Hummingbird	s	0	0	0	0	0	1	0	0
Nuttall's Woodpecker	r	4	3	2	4	2	0	3	2
Downy Woodpecker	r	4	1	2	0	0	0	3	4
Northern Flicker	r	0	0	1	2	1	0	0	0
Willow Flycatcher	m	0	0	0	0	1	0	0	0
Black Phoebe	r	2	3	1	2	1	2	10	8
Ash-throated Flycatcher	s	0	4	4	4	3	2	2	1
Western Kingbird	s	0	0	0	0	0	1	5	0
Western Scrub Jay	r	5	7	5	7	5	3	6	5
American Crow	r	0	1	1	2	2	1	4	1
Common Raven	r	31	23	14	10	24	84	19	27
N. Rough-winged Swallow	s	0	1	0	8	16	7	1	0
Cliff Swallow	s	0	5	50	22	28	8	45	16
Barn Swallow	s	0	2	0	0	2	1	1	3
Oak Titmouse	r	1	2	0	3	5	0	0	2
Bushtit	r	0	2	4	2	4	0	0	0
Bewick's Wren	r	17	18	8	13	17	3	7	1
House Wren	r	3	3	3	4	0	0	0	0
Western Bluebird	r	0	2	0	1	0	0	1	0
American Robin	r	2	0	0	0	0	0	0	0
Wrentit	r	0	0	0	1	1	3	0	0
Northern Mockingbird	r	1	0	0	0	0	0	0	0
California Thrasher	r	1	1	0	0	3	6	1	3
European Starling	r	22	3	0	3	2	0	30	18
Phainopepla	r	0	0	2	1	0	0	0	0
Orange-crowned Warbler	w,m	2	3	0	0	0	0	0	0
Yellow Warbler	s,m	0	4	2	1	1	0	0	1
Yellow-rumped Warbler	w,m	1	0	0	0	0	0	0	0
Common Yellowthroat	r	18	18	6	9	7	4	18	24
Wilson's Warbler	m	0	2	0	0	0	0	0	0
Western Tanager	m	0	1	0	1	0	0	0	0
Spotted Towhee	r	2	11	9	9	10	5	10	0
California Towhee	r	16	18	16	12	10	9	8	10

Table 3 (cont.).BIRDS OF THE SANTA CLARA RIVER BASIN, 2001: Santa Clara River from Boquet Canyon Bridge to McBean Parkway Bridge

Endangered Species and Species of Concern Shaded

		Dates of Surveys							
SPECIES	**STATUS**	**17-Apr**	**26-Apr**	**11-May**	**17-May**	**12-Jun**	**23-Jun**	**6-Jul**	**16-Jul**
Brown-headed Cowbird	s	13	12	11	7	3	5	5	2
Bullock's Oriole	s	0	4	1	1	0	0	0	1
Purple Finch	w,m	0	1	0	0	0	0	0	0
House Finch	r	18	12	2	21	14	24	28	51
Lesser Goldfinch	r	21	7	2	14	2	11	1	5
American Goldfinch	w,m,r	8	2	1	0	0	0	0	0
House Sparrow	r	0	0	0	1	0	0	0	2

Status: m, migrant; r, resident; s, summer only; w, winter

Table 4. BIRD SURVEYS OF THE SANTA CLARA RIVER BASIN, 2001: Santa Clara River from Boquet Canyon Bridge upstream for two miles.
Endangered Species and Species of Concern Shaded

		Dates of Surveys				
SPECIES	STATUS	15-May	13-Jun	26-Jun	6-Jul	16-Jul
Mallard	r	0	2	0	0	0
Red-shouldered Hawk	r	0	1	0	1	0
Red-tailed Hawk	r	4	1	5	4	4
California Quail	r	21	25	25	15	16
Killdeer	r	4	14	13	4	0
Rock Dove	r	1	8	0	3	0
Mourning Dove	r	17	38	11	10	14
Greater Roadrunner	r	0	0	1	0	0
Black-chinned Hummingbird	s	0	1	0	0	0
Anna's Hummingbird	s	0	6	5	3	1
Costa's Hummingbird	s	0	0	1	1	0
Nuttall's Woodpecker	r	5	3	1	1	1
Northern Flicker	r	3	1	0	0	0
Black Phoebe	r	0	3	2	0	0
Say's Phoebe	r	0	0	2	0	0
Ash-throated Flycatcher	s	3	3	2	1	0
Western Kingbird	s	5	2	0	0	0
Western Scrub Jay	r	16	7	21	9	7
American Crow	r	0	0	0	4	1
Common Raven	r	2	7	6	6	4
N. Rough-winged Swallow	s	0	0	44	0	0
Cliff Swallow	s	0	0	18	0	6
Oak Titmouse	r	1	13	4	0	0
Bushtit	r	4	14	4	2	0
Bewick's Wren	r	28	6	18	2	6
Western Bluebird	r	2	4	2	0	0
Wrentit	r	0	5	6	2	3
Northern Mockingbird	r	5	6	15	13	6
California Thrasher	r	4	10	2	6	6
European Starling	r	0	18	0	0	0
Phainopepla	r	2	8	13	4	13
Common Yellowthroat	r	0	1	0	0	0
Wilson's Warbler	m	1	0	0	0	0
Spotted Towhee	r	8	5	19	10	6
California Towhee	r	8	15	22	5	2
Rufous-crowned Sparrow	r	0	0	9	0	0
Black-headed Grosbeak	s	0	0	8	0	1
Lazuli Bunting	s	0	0	1	0	0
Red-winged Blackbird	s	0	0	0	0	25
Brown-headed Cowbird	s	1	0	0	0	0
Bullock's Oriole	s	2	0	4	1	0
House Finch	r	19	30	68	16	11
Lesser Goldfinch	r	4	3	10	0	11
Lawrence's Goldfinch	r	0	0	5	0	0
House Sparrow	r	0	5	0	0	0

Status: m, migrant; r, resident; s, summer only

Table 5. BIRDS OF THE SANTA CLARA RIVER BASIN, 2001: Castaic Creek from I-5 to the Santa Clara River

Endangered Species and Species of Concern Shaded

SPECIES	STATUS	Dates of Surveys 14-Apr	24-Apr	7-May	18-May	7-Jun	27-Jun	2-Jul	13-Jul
Great Egret	m,w	0	1	0	0	0	0	0	0
Green Heron	r	0	1	0	0	0	0	0	0
Mallard	r	2	0	0	0	0	0	0	0
Cooper's Hawk	r	0	0	0	0	1	0	0	0
Red-shouldered Hawk	r	2	1	0	1	1	0	1	0
Red-tailed Hawk	r	1	1	2	0	1	0	1	0
American Kestrel	r	0	0	0	0	0	1	0	0
Prairie Falcon	m	0	0	0	0	0	0	1	0
California Quail	r	9	37	22	52	25	158	51	35
Killdeer	r	0	2	0	4	0	0	0	3
Rock Dove	r	29	70	125	3	4	0	2	0
Mourning Dove	r	3	19	19	15	18	7	17	28
Greater Roadrunner	r	0	0	0	0	0	0	0	1
Barn Owl	r	1	0	0	0	0	0	1	0
Black-chinned Hummingbird	s	0	0	0	1	0	0	1	2
Anna's Hummingbird	r	6	4	5	7	5	3	10	11
Costa's Hummingbird	s	1	1	0	0	0	1	1	2
Nuttall's Woodpecker	r	4	5	2	5	3	3	4	8
Downy Woodpecker	r	3	3	2	3	1	3	4	8
Northern Flicker	r	0	0	0	0	0	0	4	0
Western Wood-pewee	m	0	0	0	1	0	0	0	0
Willow Flycatcher	m	0	0	0	0	1	0	0	0
Black Phoebe	r	1	1	1	2	0	0	0	3
Ash-throated Flycatcher	s	0	5	5	5	9	6	11	1
Cassin's Kingbird	s	1	0	1	0	0	0	4	0
Western Kingbird	s	0	0	0	0	4	1	11	0
Cassin's Vireo	m	1	0	0	0	0	0	0	0
Western Scrub Jay	r	10	7	10	10	6	12	15	16
American Crow	r	3	7	1	7	2	0	5	2
Common Raven	r	2	6	12	1	5	3	0	0
Horned Lark	r	0	3	0	0	0	0	0	0
N. Rough-winged Swallow	s	9	68	60	123	50	62	13	9
Cliff Swallow	s	48	200	306	86	40	26	198	55
Barn Swallow	s	0	0	0	0	0	0	1	0
Oak Titmouse	r	8	1	5	4	10	10	42	11
Bushtit	r	7	13	12	4	0	21	43	17
Bewick's Wren	r	27	18	16	51	12	10	19	10
House Wren	r	5	10	3	0	0	2	0	0
American Robin	r	0	2	1	0	0	0	0	0
Wrentit	r	0	5	0	2	0	3	4	2
Northern Mockingbird	r	1	1	0	3	0	0	0	0
California Thrasher	r	3	2	2	5	2	4	3	8
European Starling	r	6	14	2	5	16	0	0	7
Phainopepla	r	0	0	0	2	0	0	0	1
Orange-crowned Warbler	w,m	16	1	0	0	0	0	0	0

Table 5 (cont.). BIRDS OF THE SANTA CLARA RIVER BASIN, 2001: Castaic Creek from I-5 to the Santa Clara River

Endangered Species and Species of Concern Shaded

SPECIES	STATUS	Dates of Surveys 14-Apr	24-Apr	7-May	18-May	7-Jun	27-Jun	2-Jul	13-Jul
Nashville Warbler	m	1	0	0	0	0	0	0	0
Yellow Warbler	s	1	2	3	7	3	1	1	0
Yellow- rumped Warbler	w,m	35	3	0	0	0	0	0	0
Common Yellowthroat	r	18	2	20	17	7	5	11	0
Wilson's Warbler	m	0	0	0	1	0	0	0	0
Yellow-breasted Chat	s	0	0	0	1	0	0	0	0
Western Tanager	m	1	0	0	0	0	0	0	0
Spotted Towhee	r	11	32	15	40	7	11	8	21
California Towhee	r	18	28	29	51	14	17	23	18
Song Sparrow	r	35	59	44	51	22	12	14	6
White-crowned Sparrow	w,m	16	0	0	0	0	0	0	0
Black-headed Grosbeak	s	8	5	8	13	5	11	13	19
Blue Grosbeak	s	1	1	1	0	0	0	3	2
Lazuli Bunting	s	0	0	0	0	3	0	0	0
Red-winged Blackbird	s	82	45	51	32	20	29	1	1
Brewer's Blackbird	r	0	1	0	0	0	0	0	0
Brown-headed Cowbird	s	10	8	18	12	7	9	7	4
Hooded Oriole	s	3	0	0	2	2	0	0	0
Bullock's Oriole	s	12	0	4	3	3	3	5	2
House Finch	r	5	9	6	15	8	4	4	27
Lesser Goldfinch	r	40	6	8	0	0	5	2	5
American Goldfinch	w,m,r	0	2	2	0	0	2	0	1
House Sparrow	r	0	2	0	1	0	0	0	2

Status: m, migrant; r, resident; s, summer only; w, winter

Table 6. BIRDS OF THE SANTA CLARA RIVER BASIN, 2001: San Franciscquito Creek from Copper Hill Rd to the Santa Clara River.

Endangered Species and Species of Concern Shaded

SPECIES	STATUS	Dates of Surveys 15-May	14-Jun	25-Jun	7-Jul	17-Jul
Green Heron	r	1	0	0	0	0
Red-shouldered Hawk	r	0	0	1	0	0
Red-tailed Hawk	r	2	1	2	0	0
California Quail	r	20	65	12	17	2
Killdeer	r	2	3	3	2	1
Rock Dove	r	0	3	1	0	0
Mourning Dove	r	14	49	28	17	2
Greater Roadrunner	r	0	0	0	0	1
Barn Owl	r	1	2	1	0	0
Black-chinned Hummingbird	s	1	1	1	2	2
Anna's Hummingbird	r	5	12	16	15	3
Costa's Hummingbird	s	1	0	5	0	0
Acorn Woodpecker	r	1	0	0	0	0
Nuttall's Woodpecker	r	1	12	13	9	4
Downy Woodpecker	r	0	0	3	0	0
Hairy Woodpecker	r	1	0	0	0	0
Black Phoebe	r	2	3	2	1	0
Say's Phoebe	r	1	0	1	0	0
Ash-throated Flycatcher	s	3	6	16	9	2
Western Kingbird	s	4	5	0	9	2
Western Scrub Jay	r	8	12	14	11	8
American Crow	r	1	0	14	8	0
Common Raven	r	8	12	7	11	2
N. Rough-winged Swallow	s	0	6	3	18	1
Cliff Swallow	s	6	25	22	29	0
Barn Swallow	s	0	2	0	3	0
Oak Titmouse	r	3	2	11	0	
Bushtit	r	6	2	44	7	0
Bewick's Wren	r	26	26	23	12	3
House Wren	r	9	0	0	0	0
Western Bluebird	r	2	4	4	5	0
Wrentit	r	1	0	0	0	2
Northern Mockingbird	r	3	3	4	1	0
California Thrasher	r	3	15	4	3	3
European Starling	r	3	4	6	0	0
Phainopepla	r	0	9	8	4	1
Yellow Warbler	s m	1	1	0	0	0
Common Yellowthroat	r	16	0	9	0	0
Spotted Towhee	r	33	27	44	14	8
California Towhee	r	31	52	39	9	12
Song Sparrow	r	31	22	15	2	4
Black-headed Grosbeak	s	8	4	0	4	0
Blue Grosbeak	s	0	0	0	0	1
Lazuli Bunting	s	0	5	0	0	2
Brewer's Blackbird	r	5	0	0	0	0

Table 6 (cont.). BIRDS OF THE SANTA CLARA RIVER BASIN, 2001: San Franciscquito Creek from Copper Hill Rd to the Santa Clara River.

Endangered Species and Species of Concern Shaded

		Dates of Surveys				
SPECIES	**STATUS**	**15-May**	**14-Jun**	**25-Jun**	**7-Jul**	**17-Jul**
Brown-headed Cowbird	s	3	0	2	0	0
Hooded Oriole	s	0	1	0	0	0
Bullock's Oriole	s	1	5	11	6	0
House Finch	r	18	96	52	72	35
Lesser Goldfinch	r	20	20	19	9	9
Lawrence's Goldfinch	r	0	0	0	0	1

Status: m, migrant; r, resident; s, summer only; w, winter

Table 7. BIRDS OF THE SANTA CLARA RIVER BASIN, 2001: South Fork from rte 126 to McBean Crossing

Endangered Species and Species of Concern Shaded

SPECIES	STATUS	Dates of Surveys 15-May	16-Jun	27-Jun	7-Jul	17-Jul
Great Blue Heron	m,w	0	0	0	1	0
Mallard	r	0	1	0	0	0
Red-tailed Hawk	r	2	0	2	2	0
American Kestrel	r	1	1	0	0	0
California Quail	r	11	0	1	2	4
Killdeer	r	1	0	1	5	2
Rock Dove	r	0	0	1	0	0
Mourning Dove	r	22	9	14	8	9
Black-chinned Hummingbird	s	1	0	0	0	1
Anna's Hummingbird	r	3	1	1	0	3
Costa's Hummingbird	s	1	0	0	0	0
Nuttall's Woodpecker	r	0	1	2	1	3
Downy Woodpecker	r	1	0	0	1	2
Black Phoebe	r	2	2	0	7	1
Say's Phoebe	r	2	0	0	0	0
Ash-throated Flycatcher	s	1	0	4	1	2
Western Kingbird	s	1	0	4	4	0
Western Scrub Jay	r	5	2	4	6	4
American Crow	r	4	0	0	4	0
Common Raven	r	16	3	8	1	3
N. Rough-winged Swallow	s	6	5	1	8	3
Cliff Swallow	s	5	5	3	0	4
Barn Swallow	s	0	0	0	0	1
Oak Titmouse	r	2	0	0	1	0
Bushtit	r	2	0	0	0	0
Bewick's Wren	r	7	4	7	3	4
Western Bluebird	r	2	0	0	0	0
Wrentit	r	1	0	0	0	0
Northern Mockingbird	r	5	0	2	4	1
California Thrasher	r	2	2	0	0	2
European Starling	r	6	4	6	6	2
Phainopepla	r	3	1	0	0	0
Yellow Warbler	s,m	4	0	0	0	0
Common Yellowthroat	r	0	2	0	0	0
Spotted Towhee	r	3	1	1	1	0
California Towhee	r	8	5	6	8	5
Song Sparrow	r	4	2	4	3	0
Red-winged Blackbird	s	0	0	0	33	1
Tricolored Blackbird	s	3	0	0	0	0
Brewer's Blackbird	r	5	1	3	0	2
Brown-headed Cowbird	s	3	0	1	0	0
Hooded Oriole	s	0	0	2	0	0
Bullock's Oriole	s	0	0	0	5	2
House Finch	r	28	16	20	11	16

Table 7 (cont.). BIRDS OF THE SANTA CLARA RIVER BASIN, 2001: South Fork from rte 126 to McBean Crossing

Endangered Species and Species of Concern Shaded

SPECIES	STATUS	Dates of Surveys 15-May	16-Jun	27-Jun	7-Jul	17-Jul
Lesser Goldfinch	r	2	0	3	0	0
House Sparrow	r	10	0	2	0	1

Status: m, migrant; r, resident; s, summer only; w, winter

Table 8. BIRDS OF THE SANTA CLARA RIVER BASIN, 2001: South Fork of the Santa Clara River from Route 126 upstream to Coyote Creek.

Endangered Species and Species of Concern Shaded

		Dates of Surveys				
SPECIES	**STATUS**	**15-May**	**16-Jun**	**22-Jun**	**7-Jul**	**17-Jul**
Red-tailed Hawk	r	0	2	2	0	0
American Kestrel	r	1	0	0	0	0
California Quail	r	9	17	6	3	9
Killdeer	r	3	2	2	0	0
Mourning Dove	r	21	61	16	5	8
Black-chinned Hummingbird	s	1	0	1	0	0
Anna's Hummingbird	r	10	6	5	0	9
Costa's Hummingbird	s	0	1	2	0	0
Nuttall's Woodpecker	r	4	1	3	1	2
Downy Woodpecker	r	0	0	0	0	1
Black Phoebe	r	1	3	3	0	2
Ash-throated Flycatcher	s	3	0	1	0	0
Western Kingbird	s	2	1	0	0	0
Western Scrub Jay	r	11	6	4	7	9
American Crow	r	3	2	0	0	2
Common Raven	r	2	7	9	0	4
N. Rough-winged Swallow	s	6	3	0	0	1
Cliff Swallow	s	1	12	0	0	2
Oak Titmouse	r	2	1	3	0	2
Bushtit	r	10	8	0	4	5
Bewick's Wren	r	12	8	5	2	7
House Wren	r	3	0	0	0	0
Western Bluebird	r	0	0	1	0	0
Wrentit	r	1	0	0	0	0
Northern Mockingbird	r	8	6	2	5	3
California Thrasher	r	4	3	3	0	0
European Starling	r	11	3	2	0	1
Phainopepla	r	3	0	1	0	0
Yellow Warbler	s,m	6	0	0	0	0
Common Yellowthroat	r	1	1	2	0	0
Wilson's Warbler	m	1	0	0	0	0
Western Tanager	m	1	0	0	0	0
Spotted Towhee	r	2	3	2	0	1
California Towhee	r	19	20	20	1	10
Song Sparrow	r	7	0	2	4	0
Blue Grosbeak	s	0	0	2	0	0
Brown-headed Cowbird	s	6	0	0	0	0
Hooded Oriole	s	0	2	0	0	0
Bullock's Oriole	s	3	4	1	3	0
House Finch	r	61	24	52	14	30
Lesser Goldfinch	r	18	8	7	4	11
American Goldfinch	w,m,r	3	0	0	0	0
House Sparrow	r	23	45	2	3	0

Status: m, migrant; r, resident; s, summer only; w, winter

Fill in the following information completely. Submit original form. Retain copy for your records.

Name of Reporting Individual DANIEL GUINRIE Phone # 909 607 2836

Affiliation CLAREMONT COLLEGES Email DGUINRIE@CMC.CLAREMONT.EDU

Site Name SANTA CLARA R ABOVE CASTAIC Creek. VALENCIA CORPORATION

Did you verify that this site name is consistent with that used in previous years? (Yes) No ? (circle one)

Management Authority for Survey Area (circle one): Federal Municipal/County State Tribal (Private)

Name of Management Entity or Owner (e.g., Tonto National Forest) VALENCIA CORPORATION

Length of area surveyed: 15.1 mi (specify units, e.g., miles = mi, kilometers = km, meters = m)

Did you survey the same general area during each visit to this site this year? (Yes) No If no, summarize in comments below.

If site was surveyed last year, did you survey the same general area this year? (Yes) No If no, summarize in comments below.

Vegetation Characteristics: Overall, are the species in tree/shrub layer at this site comprised predominantly of (check one):

- ☐ Native broadleaf plants (entirely or almost entirely, includes high-elevation willow)
- ☒ Mixed native and exotic plants (mostly native)
- ☐ Mixed native and exotic plants (mostly exotic)
- ☐ Exotic/introduced plants (entirely or almost entirely)

Identify the 2-3 predominant tree/shrub species: WILLOW, COTTONWOOD / TAMARISK

Average height of canopy: 40 FT (specify units)

Was surface water or saturated soil present at or adjacent to site? Yes No (circle one) see MAP WATER IN AREAS 1-3,5
Distance from the site to surface water or saturated soil: _____ (specify units) NO WATER IN 4, 6-8

Did hydrological conditions change significantly among visits (did the site flood or dry out)? Yes (No) (circle one)
If yes, describe in comments section below.

Remember to attach a xerox copy of a USGS quad/topographical map (REQUIRED) of the survey area, noting the survey site and location of WIFL detections. You may also include a sketch or aerial photograph showing details of site location, patch shape, survey route in relation to patch, and location of any willow flycatchers or willow flycatcher nests detected. Such sketches or photographs are welcomed, but DO NOT substitute for the required USGS quad map.

Comments (attach additional sheets if necessary):

Willow Flycatcher Survey and Detection Form (rev. 4/98)

Site Name SANTA CLARA R. + TRIB. ABOVE CASTAIC CR. Total Site No _____

Was site surveyed in previous year? (Yes) No Drainage SANTA CLARA R.

If yes, what site name was used? _____

County LOS ANGELES State CA USGS Quad Name NEWHALL, CA

Is copy of USGS map marked with survey area and WIFL sightings attached (as required)? ☐ *Yes* ☐ *No*

Site Coordinates: Start: N _____ E _____ UTM

Stop: N _____ E _____ UTM Zone _____

Elevation 1000 – 1300 FT (feet) / meters (circle one)

**** Fill in additional site information on back of this page ****

Survey # / Observer(s)	Date (m/d/y) / Survey time	Number of WIFLs Found	Estimated Number of Pairs	Estimated Number of Territories	Nest(s) Found? Y or N	Cowbirds Detected? Y or N	Presence of Livestock, Recent sign Y or N	Comments about this survey (e.g., evidence of pairs or breeding, number of nests, nest contents or number of fledges seen; potential threats)
D GUSNAS J SUGDEN	Date 5/15-18 start 6 – stop 10 – total hrs 17	0	0	0	N	Y	N	
~~D GUSNAS~~ J SUGDEN	Date 6/7-16 Start 6 Stop 10 total hrs 17	2	0	0	N	Y	N	
~~D GUSNAS~~ J SUGDEN	Date 6/23-27 Start 6 Stop 10 total hrs 17	0	0	0	N	Y	N	
D GUSNAS J SUGDEN	Date 7/2-7 start 6 stop 10 total hrs 17	0	0	0	N	Y	N	
D GUSNAS J SUGDEN	Date 7/13-17 start 6 stop 10 total hrs 17	0	0	0	N	Y	N	

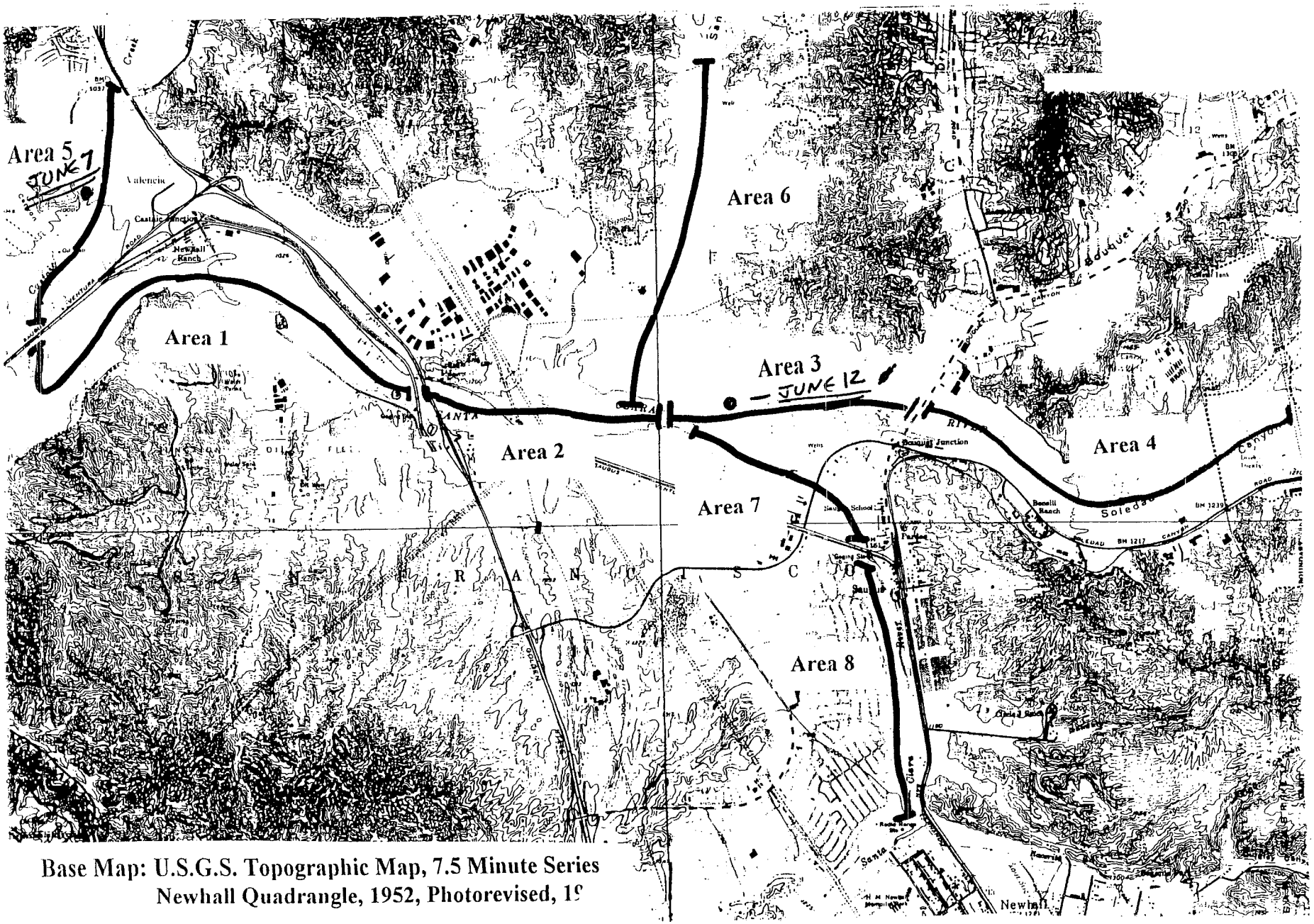
Overall Site Summary (Total only resident WIFLs)	Adults	Pairs	Territories	Nests	Were any WIFLs color-banded? Yes (No)
Total survey hrs 85	2	0	0	0	If yes, report color combination(s) in the comments section on back of form

Name of Reporting Individual DAN GUSNAS Date Report Completed 7/31/01

Submit the original of this form. Retain a copy for your records.

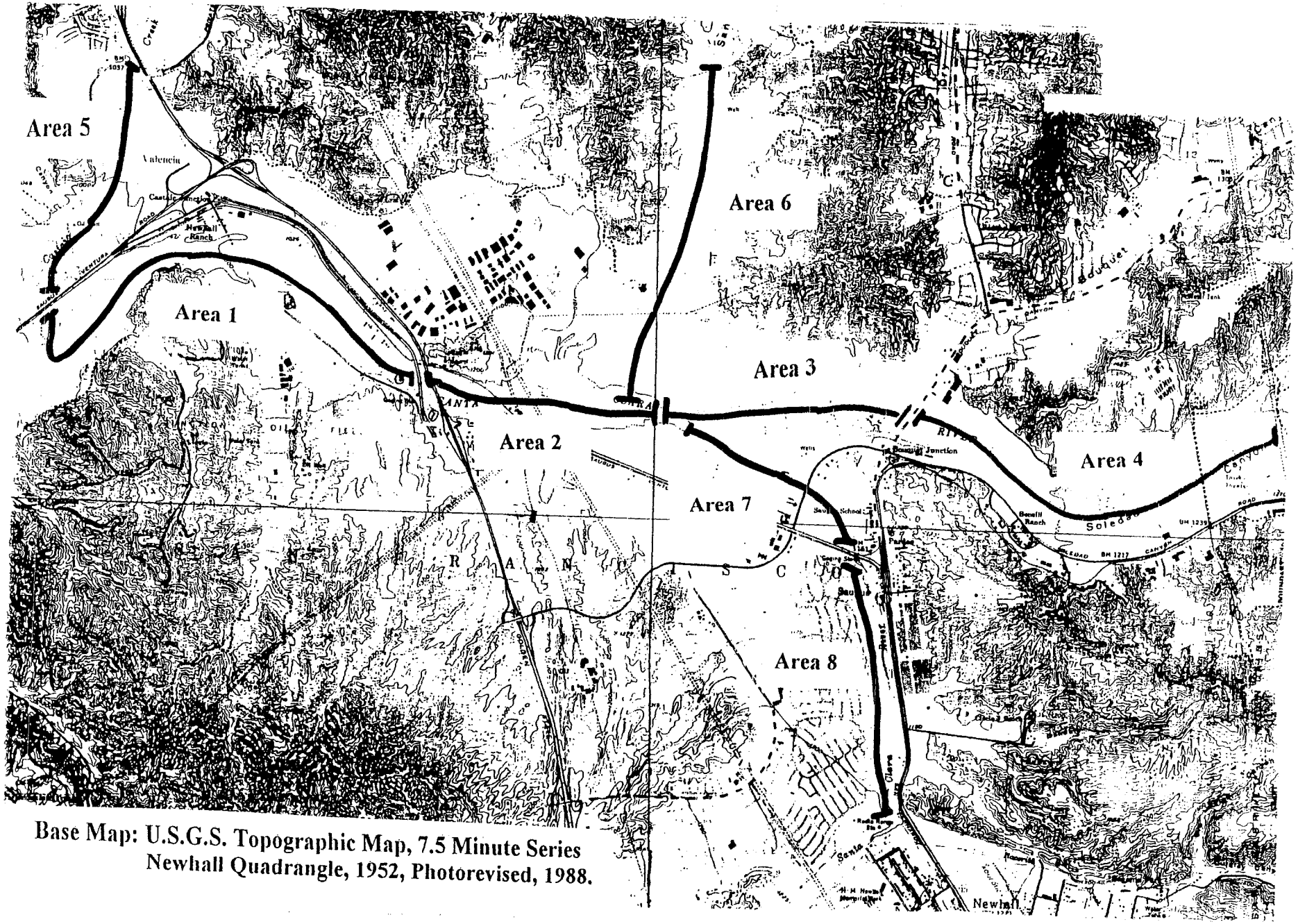
Figure 1. Survey Areas along the Santa Clara River and Tributaries.

WILLOW FLYCATCHER SIGHTINGS - 2001



Base Map: U.S.G.S. Topographic Map, 7.5 Minute Series
Newhall Quadrangle, 1952, Photorevised, 19

Figure 1. Survey Areas along the Santa Clara River and Tributaries.



Base Map: U.S.G.S. Topographic Map, 7.5 Minute Series
Newhall Quadrangle, 1952, Photorevised, 1988.

2001 Upper River - Area # 1

BIRDS OF Santa Clara River System

Locality OLDRd → CASTAIC **Date** 4/17 **Time** 7 → 930 N edge

- Great Blue Heron
- Green Heron
- (2) Mallard
- Turkey Vulture
- (1) White-tailed Kite
- Sharp-shinned Hawk
- Cooper's Hawk
- (1) Red-shouldered Hawk
- Red-tailed Hawk
- American Kestrel
- (2) California Quail
- American Coot
- Killdeer
- Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- Rock Dove
- (4) Mourning Dove
- Greater Roadrunner
- Barn Owl
- Great Horned Owl
- White-throated Swift
- Black-ch. Hummingbird
- (3) |||| Anna's Hummingbird
- Costa's Hummingbird
- (1) Belted Kingfisher
- Acorn Woodpecker
- (2) Nuttall's Woodpecker
- (1) Downy Woodpecker
- Hairy Woodpecker
- Northern Flicker
- Western Wood-Pewee
- **Willow Flycatcher**
- Pacific Slope Flycatcher
- (1) Black Phoebe
- Say's Phoebe
- (6) |||| Ash-throated Flycatcher
- Cassin's Kingbird
- Western Kingbird
- Horned Lark
- Tree Swallow
- Violet-green Swallow
- (11) 83 N. Rough-winged Swallow
- (40) 40 Cliff Swallow
- Barn Swallow
- (7) 2 |||| Scrub Jay
- (10) 6 2 |||| American Crow
- (3) + Common Raven
- (6) Plain Titmouse
- (16) 2 2 Bushtit
- 3 2 2 2 2 |||| Bewick's Wren
- (2) House Wren
- Ruby-crowned Kinglet
- **California Gnatcatcher**
- Blue-gray Gnatcatcher
- (2) Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- American Robin
- (1) Wrentit
- Northern Mockingbird
- (2) || California Thrasher
- American Pipit
- Cedar Waxwing
- Phainopepla
- Loggerhead Shrike
- (5) 2 3 European Starling
- **Bell's Vireo**
- Solitary Vireo
- Warbling Vireo
- Orange-crowned Warbler
- (4) |||| Yellow Warbler
- (1) Yellow-rumped Warbler
- (7) 2 2 2 2 Common Yellowthroat
- Wilson's Warbler
- Yellow-breasted Chat
- Western Tanager
- (5) |||| Black-headed Grosbeak
- (4) |||| Blue Grosbeak
- Lazuli Bunting
- (7) || ||| Rufous-sided Towhee
- (5) 3 2 California Towhee
- (20) Lark Sparrow
- (44) 15 3 2 Savannah Sparrow
- 4 4 4 4 4 4 4 2 2 2 2 2 2 Song Sparrow
- Lincoln's Sparrow
- (13) 8 2 2 | White-crowned Sparrow
- 6 2 Red-winged Blackbird
- (8) Western Meadowlark
- Brewer's Blackbird
- (15) 4 4 4 3 Brown-headed Cowbird
- Hooded Oriole
- (2) Northern Oriole
- (16) 8 4 House Finch
- Pine Siskin
- (14) 6 6 2 Lesser Goldfinch
- Lawrence's Goldfinch
- American Goldfinch
- House Sparrow
- (1) NASNUVILLE W
- (1) SM Bottom

BIRDS OF Santa Clara River System

Locality Old Rd → Castaic Date 4/26 Time 7—9:15

- Great Blue Heron
- (2) || Green Heron
- (7) 2 3 2 Mallard
- Turkey Vulture
- White-tailed Kite
- Sharp-shinned Hawk
- Cooper's Hawk
- (1) Red-shouldered Hawk
- (1) Red-tailed Hawk
- (1) American Kestrel
- (19) 2 2 3 6 2 2 2 California Quail
- American Coot
- (11) 1 2 2 2 2 2 Killdeer
- (2) || Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- Rock Dove
- (14) 2 2 1 2 2 2 1 2 Mourning Dove
- Greater Roadrunner
- Barn Owl
- Great Horned Owl
- White-throated Swift
- Black-ch. Hummingbird
- (2) || Anna's Hummingbird
- Costa's Hummingbird
- (1) | Belted Kingfisher
- Acorn Woodpecker
- (3) ||| Nuttall's Woodpecker
- Downy Woodpecker
- Hairy Woodpecker
- Northern Flicker
- Western Wood-Pewee
- **Willow Flycatcher**
- Pacific Slope Flycatcher
- Black Phoebe
- Say's Phoebe
- (6) 卌| Ash-throated Flycatcher
- Cassin's Kingbird
- (3) ||| Western Kingbird
- Horned Lark
- Tree Swallow
- Violet-green Swallow
- (3) 1 2 N. Rough-winged Swallow
- Cliff Swallow
- Barn Swallow
- (7) 1 1 1 2 Scrub Jay
- (4) 1 2 1 American Crow
- (6) 2 2 1 1 Common Raven
- (8) 2 2 2 2 Plain Titmouse
- (6) 2 2 2 Bushtit
- (26) 2 2 2 2 2 2 2 2 2 2 1 2 2 1 Bewick's Wren
- (3) ||| House Wren
- Ruby-crowned Kinglet
- **California Gnatcatcher**
- Blue-gray Gnatcatcher
- (3) 2 1 Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- (2) || American Robin
- (3) ||| Wrentit
- Northern Mockingbird
- (5) 1 1 2 1 California Thrasher
- American Pipit
- Cedar Waxwing
- Phainopepla
- Loggerhead Shrike
- (2) European Starling
- **Bell's Vireo**
- Solitary Vireo
- Warbling Vireo
- Orange-crowned Warbler
- (2) || Yellow Warbler
- (2) Yellow-rumped Warbler
- (4) |||| Common Yellowthroat
- (1) | Wilson's Warbler
- Yellow-breasted Chat
- (2) || Western Tanager
- (11) 1 2 1 2 2 1 1 Black-headed Grosbeak
- Blue Grosbeak
- Lazuli Bunting
- (12) 2 1 1 1 1 2 1 1 Rufous-sided Towhee
- (4) 2 2 California Towhee
- Lark Sparrow
- Savannah Sparrow
- (50) 2 4 4 4 4 4 4 4 4 4 4 4 2 2 2 2 Song Sparrow
- Lincoln's Sparrow
- White-crowned Sparrow
- Red-winged Blackbird
- Western Meadowlark
- Brewer's Blackbird
- (17) 2 2 2 1 2 2 2 2 2 Brown-headed Cowbird
- Hooded Oriole
- (5) 2 2 1 Northern Oriole
- (4) House Finch
- (16) 8 8 Pine Siskin
- (20) 4 4 6 6 Lesser Goldfinch
- Lawrence's Goldfinch
- (21) American Goldfinch
- House Sparrow
- (1) W B Nuthatch
- (4) Snowy Egret
- (2) Cinnamon Teal

5 sal [illegible] Rivers

Bernardino [illegible]

BIRDS OF Santa Clara River System

Locality Old Rd - Creek Crossing Date 5-9 Time 630 - 9 AM

- Great Blue Heron
- Green Heron
- Mallard
- Turkey Vulture
- White-tailed Kite
- Sharp-shinned Hawk
- Cooper's Hawk
- Red-shouldered Hawk
- Red-tailed Hawk
- American Kestrel
- California Quail
- American Coot
- Killdeer
- Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- Rock Dove
- Mourning Dove
- Greater Roadrunner
- Barn Owl
- Great Horned Owl
- White-throated Swift
- Black-ch. Hummingbird
- Anna's Hummingbird
- Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- Nuttall's Woodpecker
- Downy Woodpecker
- Hairy Woodpecker
- Northern Flicker
- Western Wood-Pewee
- **Willow Flycatcher**
- Pacific Slope Flycatcher
- Black Phoebe
- Say's Phoebe
- Ash-throated Flycatcher
- Cassin's Kingbird
- Western Kingbird
- Horned Lark
- Tree Swallow
- Violet-green Swallow
- N. Rough-winged Swallow
- Cliff Swallow
- Barn Swallow
- Scrub Jay
- American Crow
- Common Raven
- Plain Titmouse
- Bushtit
- Bewick's Wren
- House Wren
- Ruby-crowned Kinglet
- **California Gnatcatcher**
- Blue-gray Gnatcatcher
- Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- American Robin
- Wrentit
- Northern Mockingbird
- California Thrasher
- American Pipit
- Cedar Waxwing
- Phainopepla
- Loggerhead Shrike
- European Starling
- **Bell's Vireo**
- Solitary Vireo
- Warbling Vireo
- Orange-crowned Warbler
- Yellow Warbler
- Yellow-rumped Warbler
- Common Yellowthroat
- Wilson's Warbler
- Yellow-breasted Chat
- Western Tanager
- Black-headed Grosbeak
- Blue Grosbeak
- Lazuli Bunting
- Rufous-sided Towhee
- California Towhee
- Lark Sparrow
- Savannah Sparrow
- Song Sparrow
- Lincoln's Sparrow
- White-crowned Sparrow
- Red-winged Blackbird
- Western Meadowlark
- Brewer's Blackbird
- Brown-headed Cowbird
- Hooded Oriole
- Northern Oriole
- House Finch
- Pine Siskin
- Lesser Goldfinch
- Lawrence's Goldfinch
- American Goldfinch
- House Sparrow
- 1 RC Sparrow
- 1 BCN Hrs
- 1 SNOWY EGRET

BIRDS OF Santa Clara River System

Locality [illegible] Date 5-17 01 Time 7—930

- Great Blue Heron
- Green Heron
- Mallard
- Turkey Vulture
- White-tailed Kite
- Sharp-shinned Hawk
- Cooper's Hawk
- Red-shouldered Hawk
- Red-tailed Hawk
- American Kestrel
- California Quail
- American Coot
- Killdeer
- Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- Rock Dove
- Mourning Dove
- Greater Roadrunner
- Barn Owl
- Great Horned Owl
- White-throated Swift
- Black-ch. Hummingbird
- Anna's Hummingbird
- Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- Nuttall's Woodpecker
- Downy Woodpecker
- Hairy Woodpecker
- Northern Flicker
- Western Wood-Pewee
- **Willow Flycatcher**
- Pacific Slope Flycatcher
- Black Phoebe
- Say's Phoebe
- Ash-throated Flycatcher
- Cassin's Kingbird
- Western Kingbird
- Horned Lark
- Tree Swallow
- Violet-green Swallow
- N. Rough-winged Swallow
- Cliff Swallow
- Barn Swallow
- Scrub Jay
- American Crow
- Common Raven
- Plain Titmouse
- Bushtit
- Bewick's Wren
- House Wren
- Ruby-crowned Kinglet
- **California Gnatcatcher**
- Blue-gray Gnatcatcher
- Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- American Robin
- Wrentit
- Northern Mockingbird
- California Thrasher
- American Pipit
- Cedar Waxwing
- Phainopepla
- Loggerhead Shrike
- European Starling
- **Bell's Vireo**
- Solitary Vireo
- Warbling Vireo
- Orange-crowned Warbler
- Yellow Warbler
- Yellow-rumped Warbler
- Common Yellowthroat
- Wilson's Warbler
- Yellow-breasted Chat
- Western Tanager
- Black-headed Grosbeak
- Blue Grosbeak
- Lazuli Bunting
- Rufous-sided Towhee
- California Towhee
- Lark Sparrow
- Savannah Sparrow
- Song Sparrow
- Lincoln's Sparrow
- White-crowned Sparrow
- Red-winged Blackbird
- Western Meadowlark
- Brewer's Blackbird
- Brown-headed Cowbird
- Hooded Oriole
- Northern Oriole
- House Finch
- Pine Siskin
- Lesser Goldfinch
- Lawrence's Goldfinch
- American Goldfinch
- House Sparrow

BIRDS OF Santa Clara River System

Tuesday

Locality Magic Mountain Date 6/12/01 Time 6:15 - 10:30

_____ Great Blue Heron
_____ Green Heron
2 Mallard
_____ Turkey Vulture
_____ White-tailed Kite
_____ Sharp-shinned Hawk
_____ Cooper's Hawk
2 Red-shouldered Hawk
1 Red-tailed Hawk
_____ American Kestrel
8 12 California Quail
_____ American Coot
64 1 Killdeer
_____ Spotted Sandpiper
_____ Least Sandpiper
_____ Common Snipe
6 Rock Dove
IIII 2 Mourning Dove
_____ Greater Roadrunner
_____ Barn Owl
_____ Great Horned Owl
_____ White-throated Swift
_____ Black-ch. Hummingbird
11 IIII 3 Anna's Hummingbird
_____ Costa's Hummingbird
_____ Belted Kingfisher
_____ Acorn Woodpecker
III Nuttall's Woodpecker
II Downy Woodpecker
1 Hairy Woodpecker
_____ Northern Flicker
_____ Western Wood-Pewee
_____ **Willow Flycatcher**
_____ Pacific Slope Flycatcher
IIII Black Phoebe
_____ Say's Phoebe
III 2 Ash-throated Flycatcher
_____ Cassin's Kingbird
2 Western Kingbird
_____ Horned Lark
_____ Tree Swallow
1 Violet-green Swallow
11 26 N. Rough-winged Swallow
8888 2 Cliff Swallow
_____ Barn Swallow
III Scrub Jay
8 2 11 4 American Crow
2 6 2 Common Raven
1 IIII Plain Titmouse
_____ Bushtit
2 2 6 2 2 4 Bewick's Wren
_____ House Wren
_____ Ruby-crowned Kinglet

_____ California Gnatcatcher
_____ Blue-gray Gnatcatcher
6 Western Bluebird
_____ Swainson's Thrush
_____ Hermit Thrush
II American Robin
_____ Wrentit
_____ Northern Mockingbird
III California Thrasher
_____ American Pipit
_____ Cedar Waxwing
_____ Phainopepla
_____ Loggerhead Shrike
6 1 European Starling
II **Bell's Vireo** (gas station stretch)
_____ Solitary Vireo
_____ Warbling Vireo
_____ Orange-crowned Warbler
III IIII Yellow Warbler
_____ Yellow-rumped Warbler
4 8 8 8 8 8 8 8 6 4 Common Yellowthroat
_____ Wilson's Warbler
IIII Yellow-breasted Chat
_____ Western Tanager
1 IIII Black-headed Grosbeak
_____ Blue Grosbeak
_____ Lazuli Bunting
IIII 2 Rufous-sided Towhee
8 2 11 4 12 California Towhee
_____ Lark Sparrow
_____ Savannah Sparrow
8 8 8 8 8 8 8 6 Song Sparrow
_____ Lincoln's Sparrow
_____ White-crowned Sparrow
4 8 4 4 9 Red-winged Blackbird
_____ Western Meadowlark
20 Brewer's Blackbird
IIII IIII Brown-headed Cowbird
_____ Hooded Oriole
_____ Northern Oriole
2 8 6 4 2 House Finch
_____ Pine Siskin
2 2 2 1 2 2 Lesser Goldfinch
2 Lawrence's Goldfinch
2 III American Goldfinch
_____ House Sparrow

1 doe deer

BIRDS OF Santa Clara River System

Sunday

Locality Magic Mountain **Date** 6/29/0 **Time** 6:30 - 10:15

- Great Blue Heron
- IIII Green Heron
- Mallard
- Turkey Vulture
- White-tailed Kite
- Sharp-shinned Hawk
- Cooper's Hawk
- II Red-shouldered Hawk
- II Red-tailed Hawk
- American Kestrel
- 2 California Quail
- American Coot
- 6 Killdeer
- Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- Rock Dove
- 22 II 2 2 2 Mourning Dove
- Greater Roadrunner
- Barn Owl
- Great Horned Owl
- White-throated Swift
- I Black-ch. Hummingbird
- II IIII IIII Anna's Hummingbird
- Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- IIII Nuttall's Woodpecker
- III 2 Downy Woodpecker
- I 2 Hairy Woodpecker
- I Northern Flicker
- Western Wood-Pewee
- **Willow Flycatcher**
- Pacific Slope Flycatcher
- 2 II Black Phoebe
- Say's Phoebe
- 3 III 2 Ash-throated Flycatcher
- Cassin's Kingbird
- Western Kingbird
- Horned Lark
- Tree Swallow
- Violet-green Swallow
- 5 4 N. Rough-winged Swallow
- 8 Cliff Swallow
- 2 Barn Swallow
- II IIII Scrub Jay
- 6 2 2 American Crow
- 1 2 2 Common Raven
- 2 2 IIII Plain Titmouse
- 12, 8 Bushtit
- 6 IIII 6 6 6 6 2 2 2 Bewick's Wren
- 8 4 House Wren
- Ruby-crowned Kinglet
- California Gnatcatcher
- Blue-gray Gnatcatcher
- II 4 2 2 Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- American Robin
- Wrentit
- Northern Mockingbird
- III California Thrasher
- American Pipit
- Cedar Waxwing
- Phainopepla
- Loggerhead Shrike
- 8 8 8 European Starling
- II **Bell's Vireo**
- Solitary Vireo
- Warbling Vireo
- Orange-crowned Warbler
- II 2 I Yellow Warbler
- Yellow-rumped Warbler
- 6 6 6 6 6 6 Common Yellowthroat
- Wilson's Warbler
- II Yellow-breasted Chat
- Western Tanager
- 2 III Black-headed Grosbeak
- Blue Grosbeak
- Lazuli Bunting
- 5 IIII IIII IIII Rufous-sided Towhee
- 6 IIII 2 2 2 California Towhee
- I Lark Sparrow
- Savannah Sparrow
- 6 6 6 6 6 6 6 6 6 6 Song Sparrow
- Lincoln's Sparrow
- White-crowned Sparrow
- 2 I Red-winged Blackbird
- Western Meadowlark
- 3 Brewer's Blackbird
- II IIII I Brown-headed Cowbird
- Hooded Oriole
- 2 I 2 2 I Northern Oriole
- 8 8 8 I 6 6 House Finch
- Pine Siskin
- 4 2 2 Lesser Goldfinch
- Lawrence's Goldfinch
- 2 American Goldfinch
- House Sparrow
- 2 Grackles
- I White breasted nuthatch — mm Helen Dutch.

1 Deer
1 Coyote

BIRDS OF Santa Clara River System

Locality Magic Mountain section Date July 5/01 Time 6:30 - 10:15

- 1 Great Blue Heron
- 13 Green Heron (family of 3) 2 all stripy short tailed & young
- Mallard
- Turkey Vulture
- White-tailed Kite
- Sharp-shinned Hawk
- Cooper's Hawk
- 1 Red-shouldered Hawk
- 2 Red-tailed Hawk
- American Kestrel
- 15, 26, 10, 8 California Quail
- American Coot
- 6 4 6 Killdeer
- 12 1 Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- Rock Dove
- 222 224 Mourning Dove
- Greater Roadrunner
- Barn Owl
- Great Horned Owl
- White-throated Swift
- Black-ch. Hummingbird
- Anna's Hummingbird
- 4 Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- Nuttall's Woodpecker
- 3 Downy Woodpecker
- 2 Hairy Woodpecker heard only
- Northern Flicker
- Western Wood-Pewee
- Willow Flycatcher
- Pacific Slope Flycatcher
- N Black Phoebe
- Say's Phoebe
- 2 1 Ash-throated Flycatcher
- Cassin's Kingbird
- 2 Western Kingbird
- Horned Lark
- Tree Swallow
- Violet-green Swallow
- N. Rough-winged Swallow
- Cliff Swallow
- 5 Barn Swallow & family?
- 11 22 Scrub Jay
- 8 3 American Crow
- 32 Common Raven
- 24 Plain Titmouse
- 10 Bushtit
- Bewick's Wren
- House Wren
- Ruby-crowned Kinglet
- California Gnatcatcher
- Blue-gray Gnatcatcher
- 6 Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- American Robin
- Wrentit
- Northern Mockingbird
- 3 California Thrasher
- American Pipit
- Cedar Waxwing
- Phainopepla
- Loggerhead Shrike
- 8 European Starling
- Bell's Vireo about 5th tele pole down from power line crossing #2? Video
- Solitary Vireo
- Warbling Vireo
- Orange-crowned Warbler
- Yellow Warbler
- Yellow-rumped Warbler
- 8 8 9 8 6 6 4 Common Yellowthroat
- Wilson's Warbler
- Yellow-breasted Chat
- Western Tanager
- Black-headed Grosbeak
- Blue Grosbeak
- 6 2 Lazuli Bunting
- 4 6 2 Rufous-sided Towhee
- 12 4 22 California Towhee
- 2 Lark Sparrow
- Savannah Sparrow
- 8 8 2 4 Song Sparrow
- Lincoln's Sparrow
- White-crowned Sparrow
- 6 22 Red-winged Blackbird
- Western Meadowlark
- Brewer's Blackbird
- 2 3 Brown-headed Cowbird
- Hooded Oriole
- 25 Northern Oriole
- 4 24 House Finch
- Pine Siskin
- 32 Lesser Goldfinch
- 3 Lawrence's Goldfinch
- American Goldfinch
- 4 House Sparrow
- 1 tri-colored b.b.

1 coyote
2 Deer

BIRDS OF Santa Clara River System

Locality Magic Mountain South Side River bank etc. Date 7/14/01 Time 6:30 – 10:30

- Great Blue Heron
- 1 Green Heron
- Mallard
- 1 Turkey Vulture
- White-tailed Kite
- Sharp-shinned Hawk
- 1 Cooper's Hawk
- 11 Red-shouldered Hawk
- 11 Red-tailed Hawk
- American Kestrel
- 68 28 1 36 11 California Quail
- American Coot
- 11 Killdeer
- Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- Rock Dove
- 4 8 6 2 11 Mourning Dove
- Greater Roadrunner
- Barn Owl
- 2 Great Horned Owl
- White-throated Swift
- 111 Black-ch. Hummingbird
- 1 1111 4 111 Anna's Hummingbird
- 11 Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- 111 11 Nuttall's Woodpecker
- 111 Downy Woodpecker
- 11 Hairy Woodpecker
- Northern Flicker
- Western Wood-Pewee
- **Willow Flycatcher** 8 4 8 4 4 8 8 4 4 8 8 4 Song Sparrow
- Pacific Slope Flycatcher
- 11 11 Black Phoebe
- Say's Phoebe
- 1 2 2 2 2 11 111 Ash-throated Flycatcher
- Cassin's Kingbird
- Western Kingbird
- Horned Lark
- Tree Swallow
- Violet-green Swallow
- N. Rough-winged Swallow
- 6 8 8 Cliff Swallow
- Barn Swallow
- 11 4 12 15 Scrub Jay
- 1 2 1 22 11 2 American Crow
- 12 111 Common Raven
- 1 2 2 111 111 Plain Titmouse
- 11 Bushtit
- 2 2 2 2 2 111 111 Bewick's Wren
- 1 4 8 House Wren
- Ruby-crowned Kinglet
- California Gnatcatcher
- Blue-gray Gnatcatcher
- 11 Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- American Robin
- 1 2 2 2 11 2 2 Wrentit
- Northern Mockingbird
- 1 11 2 California Thrasher
- American Pipit
- Cedar Waxwing
- 111 Phainopepla
- Loggerhead Shrike
- 30, 2 11 European Starling
- **Bell's Vireo**
- Solitary Vireo
- Warbling Vireo
- Orange-crowned Warbler
- 11 2 Yellow Warbler
- Yellow-rumped Warbler
- 111 111 111 Common Yellowthroat
- Wilson's Warbler
- 1 Yellow-breasted Chat
- Western Tanager
- 1 11 3 6 2 1 Black-headed Grosbeak
- 11 2 Blue Grosbeak
- Lazuli Bunting
- 1 11 111 111 Rufous-sided Towhee
- 1 2 2 2 2 2 111 California Towhee
- Lark Sparrow
- Savannah Sparrow
- Lincoln's Sparrow
- White-crowned Sparrow
- Red-winged Blackbird
- Western Meadowlark
- Brewer's Blackbird
- 11 12 Brown-headed Cowbird
- Hooded Oriole
- 1 3 Northern Oriole
- 4 8 8 8 6 6 2 4 2 4 House Finch
- Pine Siskin
- 2 2 2 111 2 Lesser Goldfinch
- Lawrence's Goldfinch
- American Goldfinch
- House Sparrow

2001 Upper Rivers
Area 2

1 Peter Bloom cowbird trap (cage/birds inside)
714 544-6147

BIRDS OF Santa Clara River System

Locality McBean to Old Hwy 99 **Date** 4/17/01 **Time** _____

_____ Great Blue Heron
_____ Green Heron
_____ Mallard
_____ Turkey Vulture
_____ White-tailed Kite
_____ Sharp-shinned Hawk
_____ Cooper's Hawk
(2) || Red-shouldered Hawk
(1) Red-tailed Hawk
_____ American Kestrel
(4) California Quail
_____ American Coot
(3) ||| Killdeer
_____ Spotted Sandpiper
_____ Least Sandpiper
_____ Common Snipe
_____ Rock Dove
(12) 6+4+1 Mourning Dove
_____ Greater Roadrunner
_____ Barn Owl
_____ Great Horned Owl
_____ White-throated Swift
_____ Black-ch. Hummingbird
(3) ||| Anna's Hummingbird
_____ Costa's Hummingbird
_____ Belted Kingfisher
_____ Acorn Woodpecker
(2) || Nuttall's Woodpecker
(3) ||| Downy Woodpecker
_____ Hairy Woodpecker
_____ Northern Flicker
_____ Western Wood-Pewee
_____ **Willow Flycatcher**
_____ Pacific Slope Flycatcher
(3) ||| Black Phoebe
_____ Say's Phoebe
(3) ||| Ash-throated Flycatcher
_____ Cassin's Kingbird
_____ Western Kingbird
_____ Horned Lark
_____ Tree Swallow
_____ Violet-green Swallow
(18) 6,12 N. Rough-winged Swallow
196 20 20 76 Cliff Swallow 38 nests/McBean Bridge
(1) Barn Swallow
(4) ||| Scrub Jay
(14) 4+6+4 || American Crow
(2) || Common Raven
(4) 22 Plain Titmouse
_____ Bushtit
(24) 6+2+8+4 Bewick's Wren
(16) 2+1+4+2+2+2 House Wren
_____ Ruby-crowned Kinglet

_____ **California Gnatcatcher**
_____ Blue-gray Gnatcatcher
_____ Western Bluebird
_____ Swainson's Thrush
_____ Hermit Thrush
_____ American Robin
_____ Wrentit
_____ Northern Mockingbird
_____ California Thrasher
_____ American Pipit
_____ Cedar Waxwing
_____ Phainopepla
_____ Loggerhead Shrike
(14) 6+2+1+1+1+1 European Starling
_____ **Bell's Vireo**
_____ Solitary Vireo
_____ Warbling Vireo
(7) ||| Orange-crowned Warbler
(2) || Yellow Warbler
(2) || Yellow-rumped Warbler
(14) 6+2+4+1+1 Common Yellowthroat
_____ Wilson's Warbler
_____ Yellow-breasted Chat
_____ Western Tanager
(1) Black-headed Grosbeak
_____ Blue Grosbeak
_____ Lazuli Bunting
(1) Rufous-sided Towhee
(18) 2+1+2+4+7+1+1 California Towhee
_____ Lark Sparrow
_____ Savannah Sparrow
(67) 6+7+8+8+4+8+6+8+1 Song Sparrow
_____ Lincoln's Sparrow
_____ White-crowned Sparrow
_____ Red-winged Blackbird
_____ Western Meadowlark
_____ Brewer's Blackbird
(31) 2+4+1+6+6+5+2+1+1+1 Brown-headed Cowbird
_____ Hooded Oriole
(1) Northern Oriole
(16) 2+1+4+2+1 House Finch
_____ Pine Siskin
(10) 2+2+2+2 Lesser Goldfinch
_____ Lawrence's Goldfinch
(30, 4+4+2+8) American Goldfinch big flock feeding
_____ House Sparrow
(64) 8 16, Black Throated Gray Warbler
_____
_____
_____
_____
_____

Additionally in traps:
Cowbirds – 6, 7, 6

BIRDS OF Santa Clara River System

Thursday

Locality Upper McBean to Old Hwy 99 **Date** 4/28/01 **Time**

- Great Blue Heron
- Green Heron
- Mallard
- Turkey Vulture
- White-tailed Kite
- Sharp-shinned Hawk
- Cooper's Hawk
- (2) II Red-shouldered Hawk
- (1) Red-tailed Hawk
- American Kestrel
- (7) I 42 California Quail
- American Coot
- (4) 2 II Killdeer
- Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- Rock Dove
- (10) 6 24 Mourning Dove
- Greater Roadrunner
- Barn Owl
- Great Horned Owl
- White-throated Swift
- Black-ch. Hummingbird
- (1) Anna's Hummingbird
- (1) Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- (4) IIII Nuttall's Woodpecker
- (3) III Downy Woodpecker
- Hairy Woodpecker
- Northern Flicker
- Western Wood-Pewee
- **Willow Flycatcher** 4 8 8 4 16 8 2 4 2
- Pacific Slope Flycatcher (66)
- Black Phoebe
- Say's Phoebe
- (3) III Ash-throated Flycatcher
- Cassin's Kingbird
- Western Kingbird
- Horned Lark
- Tree Swallow
- Violet-green Swallow
- N. Rough-winged Swallow
- (8) 2 6 Cliff Swallow
- Barn Swallow
- (5) IIII Scrub Jay
- (3) III American Crow
- (4) 1 2 Common Raven
- (4) (4) 1 2 Plain Titmouse
- (4) 2 2 Bushtit
- (26) 26 + 2 4 2 4 II Bewick's Wren
- (9) 3 III House Wren
- Ruby-crowned Kinglet
- **California Gnatcatcher**
- Blue-gray Gnatcatcher
- (4) 2 2 Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- American Robin
- (2) Wrentit
- Northern Mockingbird
- (2) II California Thrasher
- American Pipit
- Cedar Waxwing
- Phainopepla
- Loggerhead Shrike
- (10) II 24 2 European Starling
- **Bell's Vireo**
- Solitary Vireo
- Warbling Vireo
- (7) II IIII Orange-crowned Warbler
- (10) IIII III Yellow Warbler
- Yellow-rumped Warbler
- (11) 4 16 Common Yellowthroat
- Wilson's Warbler
- Yellow-breasted Chat
- (1) Western Tanager
- (3) III Black-headed Grosbeak
- Blue Grosbeak
- Lazuli Bunting
- (16) II IIII IIII 4 Rufous-sided Towhee
- (21) IIII IIII IIII 6 California Towhee
- Lark Sparrow
- Savannah Sparrow
- Song Sparrow
- Lincoln's Sparrow
- White-crowned Sparrow
- Red-winged Blackbird
- Western Meadowlark
- Brewer's Blackbird
- (12) IIII IIII 2 Brown-headed Cowbird
- Hooded Oriole
- Northern Oriole
- (4) II I 2 House Finch
- Pine Siskin
- (4) 2 2 Lesser Goldfinch
- Lawrence's Goldfinch
- (2) American Goldfinch
- House Sparrow

≠ Cowbirds in Traps ≠6

BIRDS OF Santa Clara River System

Locality McBean to Old 99 Date 5/11/01 Friday Time 7:20-

_____ Great Blue Heron
_____ Green Heron
_____ Mallard
_____ Turkey Vulture
_____ White-tailed Kite
_____ Sharp-shinned Hawk
_____ Cooper's Hawk
(2) || Red-shouldered Hawk
(2) Red-tailed Hawk
_____ American Kestrel
(7) 115 California Quail
_____ American Coot
(8) 7 Killdeer
_____ Spotted Sandpiper
_____ Least Sandpiper
_____ Common Snipe
_____ Rock Dove
(14) 1222 Mourning Dove
(1) Greater Roadrunner
_____ Barn Owl
_____ Great Horned Owl
_____ White-throated Swift
(2) || Black-ch. Hummingbird
(5) Anna's Hummingbird
(1) Costa's Hummingbird
_____ Belted Kingfisher
_____ Acorn Woodpecker
(9) Nuttall's Woodpecker
(5) Downy Woodpecker
(1) Hairy Woodpecker
_____ Northern Flicker
(1) Western Wood-Pewee
_____ **Willow Flycatcher**
_____ Pacific Slope Flycatcher
_____ Black Phoebe
_____ Say's Phoebe
(5) 112 Ash-throated Flycatcher
_____ Cassin's Kingbird
(4) 22 Western Kingbird
_____ Horned Lark
_____ Tree Swallow
_____ Violet-green Swallow
(6) 6 N. Rough-winged Swallow
(14) 68 Cliff Swallow
_____ Barn Swallow
(13) Scrub Jay
(9) 621 American Crow
(8) 123 Common Raven
(3) 2 Plain Titmouse
(6) 222 Bushtit
46 Bewick's Wren
55 House Wren
(12) _____ Ruby-crowned Kinglet

_____ **California Gnatcatcher**
_____ Blue-gray Gnatcatcher
(4) 22 Western Bluebird
_____ Swainson's Thrush
_____ Hermit Thrush
(1) American Robin
_____ Wrentit
_____ Northern Mockingbird
(4) California Thrasher
_____ American Pipit
_____ Cedar Waxwing
_____ Phainopepla
_____ Loggerhead Shrike
(16) 682 European Starling
_____ **Bell's Vireo**
_____ Solitary Vireo
_____ Warbling Vireo
_____ Orange-crowned Warbler
(3) Yellow Warbler
_____ Yellow-rumped Warbler
(13) Common Yellowthroat
_____ Wilson's Warbler
(1) Yellow-breasted Chat
_____ Western Tanager
(6) Black-headed Grosbeak
_____ Blue Grosbeak
_____ Lazuli Bunting
(25) Rufous-sided Towhee
(26) California Towhee
_____ Lark Sparrow
_____ Savannah Sparrow
Song Sparrow
_____ Lincoln's Sparrow
(88) _____ White-crowned Sparrow
_____ Red-winged Blackbird
_____ Western Meadowlark
_____ Brewer's Blackbird
(15) Brown-headed Cowbird
_____ Hooded Oriole
_____ Northern Oriole
(25) House Finch
_____ Pine Siskin
(4) 2 Lesser Goldfinch
_____ Lawrence's Goldfinch
_____ American Goldfinch
_____ House Sparrow

Plus 56 Cowbirds in traps !!

BIRDS OF Santa Clara River System

Locality McBean to Old Hwy Bridge Date 5/17/01 Time ______

Count	Species	Count	Species
	Great Blue Heron		**California Gnatcatcher**
1	Green Heron		Blue-gray Gnatcatcher
	Mallard		Western Bluebird
	Turkey Vulture		Swainson's Thrush
	White-tailed Kite		Hermit Thrush
	Sharp-shinned Hawk		American Robin
	Cooper's Hawk		Wrentit
1	Red-shouldered Hawk		Northern Mockingbird
	Red-tailed Hawk	5	California Thrasher
	American Kestrel		American Pipit
8	California Quail		Cedar Waxwing
	American Coot		Phainopepla
11	Killdeer		Loggerhead Shrike
	Spotted Sandpiper	19	European Starling
	Least Sandpiper		**Bell's Vireo**
	Common Snipe		Solitary Vireo
14	Rock Dove		Warbling Vireo
13	Mourning Dove		Orange-crowned Warbler
	Greater Roadrunner	3	Yellow Warbler
	Barn Owl		Yellow-rumped Warbler
	Great Horned Owl	20	Common Yellowthroat
3	White-throated Swift		Wilson's Warbler
	Black-ch. Hummingbird		Yellow-breasted Chat
6	Anna's Hummingbird		Western Tanager
	Costa's Hummingbird	8	Black-headed Grosbeak
	Belted Kingfisher		Blue Grosbeak
	Acorn Woodpecker		Lazuli Bunting
3	Nuttall's Woodpecker	17	Rufous-sided Towhee
3	Downy Woodpecker	20	California Towhee
1	Hairy Woodpecker		Lark Sparrow
	Northern Flicker		Savannah Sparrow
	Western Wood-Pewee	62	Song Sparrow
	Willow Flycatcher		Lincoln's Sparrow
	Pacific Slope Flycatcher		White-crowned Sparrow
1	Black Phoebe	10	Red-winged Blackbird
	Say's Phoebe		Western Meadowlark
5	Ash-throated Flycatcher		Brewer's Blackbird
	Cassin's Kingbird	9	Brown-headed Cowbird
	Western Kingbird		Hooded Oriole
	Horned Lark	1	Northern Oriole
3	Tree Swallow	8	House Finch
2	Violet-green Swallow		Pine Siskin
4	N. Rough-winged Swallow	3	Lesser Goldfinch
33	Cliff Swallow		Lawrence's Goldfinch
	Barn Swallow		American Goldfinch
12	Scrub Jay		House Sparrow
8	American Crow		
10	Common Raven		
1	Plain Titmouse		
3	Bushtit		
29	Bewick's Wren		
4	House Wren		
	Ruby-crowned Kinglet		

#64 cowbirds 1 Towhee in traps

Heavy offroad vehicles down river this year.

BIRDS OF Santa Clara River System

Locality McBean to Old Hwy Bridge Date 6/12/01 Time 7:45 – 9:30

- (1) Great Blue Heron
- (2) Green Heron Adults & Juv together
- Mallard
- Turkey Vulture
- White-tailed Kite
- Sharp-shinned Hawk
- Cooper's Hawk
- (1) Red-shouldered Hawk
- (1) Red-tailed Hawk
- (1) American Kestrel
- (5) 211 California Quail
- American Coot
- (3) III Killdeer
- Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- (4) Rock Dove
- (9) 2122 Mourning Dove
- Greater Roadrunner
- Barn Owl
- Great Horned Owl
- White-throated Swift
- Black-ch. Hummingbird
- (1) Anna's Hummingbird
- Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- (6) I IIII Nuttall's Woodpecker
- (5) IIII Downy Woodpecker
- (2) Hairy Woodpecker
- Northern Flicker
- Western Wood-Pewee
- **Willow Flycatcher**
- Pacific Slope Flycatcher
- (4) IIII Black Phoebe
- Say's Phoebe
- (5) III2 Ash-throated Flycatcher
- Cassin's Kingbird
- (2) Western Kingbird
- Horned Lark
- Tree Swallow
- Violet-green Swallow
- (7) 214 N. Rough-winged Swallow
- (24) 8888 Cliff Swallow
- Barn Swallow
- (8) IIII 21 Scrub Jay
- (14) 2222 02 American Crow
- (2) Common Raven
- (5) I2 Plain Titmouse
- (2) Bushtit
- (28) 4262 21 24 Bewick's Wren
- (2) House Wren
- Ruby-crowned Kinglet
- California Gnatcatcher
- Blue-gray Gnatcatcher
- Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- American Robin
- Wrentit
- Northern Mockingbird
- (2) I California Thrasher
- American Pipit
- Cedar Waxwing
- (11) 5411 Phainopepla
- Loggerhead Shrike
- (10) 46 European Starling
- **Bell's Vireo**
- Solitary Vireo
- Warbling Vireo
- Orange-crowned Warbler
- Yellow Warbler
- Yellow-rumped Warbler
- (7) 411 Common Yellowthrat
- Wilson's Warbler
- Yellow-breasted Chat
- Western Tanager
- (5) III Black-headed Grosbeak
- Blue Grosbeak
- Lazuli Bunting
- (12) I IIII IIII Rufous-sided Towhee
- (15) 2 42 2221 California Towhee
- Lark Sparrow
- Savannah Sparrow
- (34) 4 4 4 4 1122 4 Song Sparrow
- Lincoln's Sparrow
- White-crowned Sparrow
- Red-winged Blackbird
- Western Meadowlark
- Brewer's Blackbird
- (2) II Brown-headed Cowbird
- Hooded Oriole
- Northern Oriole
- (6) 42 House Finch
- Pine Siskin
- Lesser Goldfinch
- Lawrence's Goldfinch
- American Goldfinch
- House Sparrow

(1) SCREECH OWL (FRESH remains (bagged) under S bridge)

+ 4 – cowbirds in traps !

• only trickle of water

BIRDS OF Santa Clara River System

Locality McBean to Old 5 Date 6/23/04 Time 9:30 – 11:00

_____ Great Blue Heron
_____ Green Heron
(1) Mallard
_____ Turkey Vulture
_____ White-tailed Kite
_____ Sharp-shinned Hawk
_____ Cooper's Hawk
(2) Red-shouldered Hawk
(1) Red-tailed Hawk
_____ American Kestrel
(14) California Quail
_____ American Coot
(6) Killdeer
_____ Spotted Sandpiper
_____ Least Sandpiper
_____ Common Snipe
_____ Rock Dove
(12) Mourning Dove
_____ Greater Roadrunner
_____ Barn Owl
_____ Great Horned Owl
_____ White-throated Swift
(1) Black-ch. Hummingbird
(2) Anna's Hummingbird
_____ Costa's Hummingbird
_____ Belted Kingfisher
_____ Acorn Woodpecker
(3) Nuttall's Woodpecker
(1) Downy Woodpecker
_____ Hairy Woodpecker
_____ Northern Flicker
_____ Western Wood-Pewee
_____ **Willow Flycatcher**
_____ Pacific Slope Flycatcher
(7) Black Phoebe
_____ Say's Phoebe
(12) Ash-throated Flycatcher
_____ Cassin's Kingbird
_____ Western Kingbird
_____ Horned Lark
_____ Tree Swallow
_____ Violet-green Swallow
_____ N. Rough-winged Swallow
(4) Cliff Swallow
_____ Barn Swallow
(9) Scrub Jay
(7) American Crow
(10) Common Raven
(18) Plain Titmouse
(2) Bushtit
(32) Bewick's Wren
(10) House Wren
_____ Ruby-crowned Kinglet

_____ **California Gnatcatcher**
_____ Blue-gray Gnatcatcher
_____ Western Bluebird
_____ Swainson's Thrush
_____ Hermit Thrush
_____ American Robin
(3) Wrentit
_____ Northern Mockingbird
_____ California Thrasher
_____ American Pipit
_____ Cedar Waxwing
(2) Phainopepla
_____ Loggerhead Shrike
(6) European Starling
_____ **Bell's Vireo**
_____ Solitary Vireo
_____ Warbling Vireo
_____ Orange-crowned Warbler
(1) Yellow Warbler
_____ Yellow-rumped Warbler
(14) Common Yellowthroat
_____ Wilson's Warbler
_____ Yellow-breasted Chat
_____ Western Tanager
(4) Black-headed Grosbeak
_____ Blue Grosbeak
_____ Lazuli Bunting
(3) Rufous-sided Towhee
(5) California Towhee
_____ Lark Sparrow
(34) Savannah Sparrow
55 Song Sparrow
_____ Lincoln's Sparrow
_____ White-crowned Sparrow
(1) Red-winged Blackbird
_____ Western Meadowlark
_____ Brewer's Blackbird
_____ Brown-headed Cowbird
_____ Hooded Oriole
_____ Northern Oriole
(25) House Finch
_____ Pine Siskin
_____ Lesser Goldfinch
_____ Lawrence's Goldfinch
_____ American Goldfinch
_____ House Sparrow

+ 5 cowbirds in trap

Rabbit.

BIRDS OF Santa Clara River System

Locality McBean to Old Hwy Date 7/6/01 Time 815 – 940

_____ Great Blue Heron
_____ Green Heron
_____ Mallard
_____ Turkey Vulture
_____ White-tailed Kite
_____ Sharp-shinned Hawk
_____ Cooper's Hawk
1 Red-shouldered Hawk
3 Red-tailed Hawk
_____ American Kestrel
7 43 California Quail
_____ American Coot
6 Killdeer
_____ Spotted Sandpiper
_____ Least Sandpiper
_____ Common Snipe
_____ Rock Dove
15 24 22 Mourning Dove
_____ Greater Roadrunner
_____ Barn Owl
_____ Great Horned Owl
_____ White-throated Swift
_____ Black-ch. Hummingbird
3 Anna's Hummingbird
_____ Costa's Hummingbird
_____ Belted Kingfisher
_____ Acorn Woodpecker
2 Nuttall's Woodpecker
3 Downy Woodpecker
1 Hairy Woodpecker
_____ Northern Flicker
_____ Western Wood-Pewee
_____ **Willow Flycatcher**
_____ Pacific Slope Flycatcher
7 Black Phoebe
_____ Say's Phoebe
3 Ash-throated Flycatcher
_____ Cassin's Kingbird
3 2 Western Kingbird
_____ Horned Lark
_____ Tree Swallow
_____ Violet-green Swallow
_____ N. Rough-winged Swallow
16 88 Cliff Swallow
_____ Barn Swallow
10 Scrub Jay
4 2 American Crow
_____ Common Raven
_____ Plain Titmouse
23 15,8 Bushtit
13 Bewick's Wren
4 4 House Wren
_____ Ruby-crowned Kinglet

_____ **California Gnatcatcher**
_____ Blue-gray Gnatcatcher
1 Western Bluebird
_____ Swainson's Thrush
_____ Hermit Thrush
_____ American Robin
_____ Wrentit
_____ Northern Mockingbird
7 California Thrasher
_____ American Pipit
_____ Cedar Waxwing
2 Phainopepla
_____ Loggerhead Shrike
29 38 8 4 24 European Starling
_____ **Bell's Vireo**
_____ Solitary Vireo
_____ Warbling Vireo
_____ Orange-crowned Warbler
_____ Yellow Warbler
_____ Yellow-rumped Warbler
9 Common Yellowthroat
_____ Wilson's Warbler
_____ Yellow-breasted Chat
_____ Western Tanager
5 22 Black-headed Grosbeak
_____ Blue Grosbeak
_____ Lazuli Bunting
13 Rufous-sided Towhee
10 2 2 2 California Towhee
_____ Lark Sparrow
_____ Savannah Sparrow
54 4 4 4 8 4 4 6 8 Song Sparrow
_____ Lincoln's Sparrow
_____ White-crowned Sparrow
1 Red-winged Blackbird
_____ Western Meadowlark
_____ Brewer's Blackbird
6 Brown-headed Cowbird
_____ Hooded Oriole
5 4 Northern Oriole
38 13,10,10,4 4 3 House Finch
_____ Pine Siskin
3 2 Lesser Goldfinch
_____ Lawrence's Goldfinch
_____ American Goldfinch
_____ House Sparrow

7, 12, 6 Cowbirds in traps 11

1 Buck

— Lots to new ORV tracks —

BIRDS OF Santa Clara River System

Locality M. Bean to Old 99 **Date** 7/16/01 **Time** 8:00

- Great Blue Heron
- Green Heron
- Mallard
- Turkey Vulture
- White-tailed Kite
- Sharp-shinned Hawk
- Cooper's Hawk
- (2) Red-shouldered Hawk
- (2) Red-tailed Hawk
- American Kestrel
- (18) California Quail
- American Coot
- (2) Killdeer
- Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- Rock Dove
- (14) Mourning Dove
- Greater Roadrunner
- Barn Owl
- Great Horned Owl
- White-throated Swift
- (1) Black-ch. Hummingbird
- (5) Anna's Hummingbird
- (1) Costa's Hummingbird
- Belted Kingfisher
- (2) Acorn Woodpecker
- (8) Nuttall's Woodpecker
- (6) Downy Woodpecker
- Hairy Woodpecker
- Northern Flicker
- Western Wood-Pewee
- **Willow Flycatcher**
- Pacific Slope Flycatcher
- (9) Black Phoebe
- (1) Say's Phoebe
- (1) Ash-throated Flycatcher
- Cassin's Kingbird
- (3) Western Kingbird
- Horned Lark
- Tree Swallow
- Violet-green Swallow
- (2) N. Rough-winged Swallow
- (20) Cliff Swallow
- (2) Barn Swallow
- (7) Scrub Jay
- (2) American Crow
- (2) Common Raven
- (9) Plain Titmouse
- Bushtit
- (16) Bewick's Wren
- House Wren
- Ruby-crowned Kinglet
- **California Gnatcatcher**
- Blue-gray Gnatcatcher
- (2) Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- American Robin
- Wrentit
- Northern Mockingbird
- (3) California Thrasher
- American Pipit
- Cedar Waxwing
- (1) Phainopepla
- Loggerhead Shrike
- (6) European Starling
- **Bell's Vireo**
- Solitary Vireo
- Warbling Vireo
- Orange-crowned Warbler
- Yellow Warbler
- Yellow-rumped Warbler
- (6) Common Yellowthroat
- Wilson's Warbler
- Yellow-breasted Chat
- Western Tanager
- (2) Black-headed Grosbeak
- Blue Grosbeak
- Lazuli Bunting
- (10) Rufous-sided Towhee
- (16) California Towhee
- (2) Lark Sparrow
- Savannah Sparrow
- (11) Song Sparrow
- Lincoln's Sparrow
- White-crowned Sparrow
- (2) Red-winged Blackbird
- Western Meadowlark
- Brewer's Blackbird
- (5) Brown-headed Cowbird
- Hooded Oriole
- (2) Northern Oriole
- (116) House Finch
- Pine Siskin
- (32) Lesser Goldfinch
- Lawrence's Goldfinch
- American Goldfinch
- House Sparrow

N.E. side channel now has NO willows!

2001 Upper River Area B

BIRDS OF Santa Clara River System

Locality Bouquet to McBean **Date** 4/17/01 **Time** 6:15

- Great Blue Heron
- (1) Green Heron
- Mallard
- (1) Turkey Vulture
- White-tailed Kite
- Sharp-shinned Hawk
- (1) Cooper's Hawk
- Red-shouldered Hawk
- (1) Red-tailed Hawk
- American Kestrel
- California Quail
- American Coot
- (5) Killdeer
- Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- Rock Dove
- (9) Mourning Dove
- Greater Roadrunner
- Barn Owl
- Great Horned Owl
- White-throated Swift
- Black-ch. Hummingbird
- (2) Anna's Hummingbird
- Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- (7) Nuttall's Woodpecker
- (4) Downy Woodpecker
- Hairy Woodpecker
- Northern Flicker
- Western Wood-Pewee
- **Willow Flycatcher**
- Pacific Slope Flycatcher
- (2) Black Phoebe
- Say's Phoebe
- Ash-throated Flycatcher
- Cassin's Kingbird
- Western Kingbird
- Horned Lark
- Tree Swallow
- Violet-green Swallow
- N. Rough-winged Swallow
- Cliff Swallow
- Barn Swallow
- (5) Scrub Jay
- American Crow
- (44) Common Raven
- (1) Plain Titmouse
- Bushtit
- (17) Bewick's Wren
- (3) House Wren
- Ruby-crowned Kinglet
- **California Gnatcatcher**
- Blue-gray Gnatcatcher
- Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- American Robin
- (2) Wrentit
- (1) Northern Mockingbird
- (1) California Thrasher
- American Pipit
- Cedar Waxwing
- Phainopepla
- Loggerhead Shrike
- (22) European Starling
- **Bell's Vireo**
- Solitary Vireo
- Warbling Vireo
- (2) Orange-crowned Warbler
- Yellow Warbler
- (1) Yellow-rumped Warbler
- (18) Common Yellowthroat
- Wilson's Warbler
- Yellow-breasted Chat
- Western Tanager
- (3) Black-headed Grosbeak
- Blue Grosbeak
- Lazuli Bunting
- (3) Rufous-sided Towhee
- (16) California Towhee
- Lark Sparrow
- Savannah Sparrow
- (38) Song Sparrow
- Lincoln's Sparrow
- White-crowned Sparrow
- (40) Red-winged Blackbird
- Western Meadowlark
- Brewer's Blackbird
- (13) Brown-headed Cowbird
- Hooded Oriole
- Northern Oriole
- (18) House Finch
- Pine Siskin
- (21) Lesser Goldfinch
- Lawrence's Goldfinch
- (8) American Goldfinch
- House Sparrow

B

Additional — in cowbird traps (2) cowbirds - 6,

Thursday

BIRDS OF Santa Clara River System

Locality Upper — Bogquet to McBean **Date** 4/26/01 **Time** 7:00

- Great Blue Heron
- Green Heron
- Mallard
- Turkey Vulture
- White-tailed Kite
- Sharp-shinned Hawk
- Cooper's Hawk
- Red-shouldered Hawk
- (1) Red-tailed Hawk
- American Kestrel
- (10) 8 California Quail
- American Coot
- (7) 5 Killdeer
- (1) Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- (13) 13 Rock Dove
- (10) 24 12 Mourning Dove
- Greater Roadrunner
- Barn Owl
- Great Horned Owl
- White-throated Swift
- (4) 12 Black-ch. Hummingbird
- (2) 11 Anna's Hummingbird
- Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- (3) 12 Nuttall's Woodpecker.
- (1) Downy Woodpecker carrying food
- Hairy Woodpecker
- Northern Flicker
- Western Wood-Pewee
- **Willow Flycatcher**
- Pacific Slope Flycatcher
- (3) 111 Black Phoebe
- Say's Phoebe
- (4) 1111 Ash-throated Flycatcher
- Cassin's Kingbird
- Western Kingbird
- Horned Lark
- Tree Swallow
- Violet-green Swallow
- (1) N. Rough-winged Swallow
- (5) 4 Cliff Swallow
- (2) 11 Barn Swallow
- (7) 12 1 2 Scrub Jay
- (1) American Crow
- (23) 6 5 4 6 2 Common Raven
- (2) Plain Titmouse
- (2) Bushtit
- (18) 2 4 4 1 6 Bewick's Wren
- (3) 111 House Wren
- Ruby-crowned Kinglet
- **California Gnatcatcher**
- (2) 11 Blue-gray Gnatcatcher
- Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- American Robin
- Wrentit
- Northern Mockingbird
- (1) California Thrasher
- American Pipit
- Cedar Waxwing
- Phainopepla
- Loggerhead Shrike
- (3) 12 European Starling
- **Bell's Vireo**
- Solitary Vireo
- Warbling Vireo
- (33) 111 Orange-crowned Warbler
- (4) 1111 Yellow Warbler
- Yellow-rumped Warbler
- (18) 3 2 3 6 4 Common Yellowthroat
- 11 Wilson's Warbler
- (2) Yellow-breasted Chat
- (1) Western Tanager
- (7) 1111 2 Black-headed Grosbeak
- Blue Grosbeak
- (3) 111 Lazuli Bunting
- (11) 1111 1111 2 Rufous-sided Towhee
- (18) 1111 4 2 6 California Towhee
- Lark Sparrow
- Savannah Sparrow
- (31) 1111 24 1846 Song Sparrow
- Lincoln's Sparrow
- White-crowned Sparrow
- (26) 8 4 8 6 Red-winged Blackbird
- Western Meadowlark
- Brewer's Blackbird
- (12) 9 1111 3 Brown-headed Cowbird
- Hooded Oriole
- (4) 1111 Northern Oriole
- (12) 4 1 1 4 2 House Finch
- Pine Siskin
- (7) 2 11 3 Lesser Goldfinch
- Lawrence's Goldfinch
- (2) American Goldfinch
- House Sparrow
- (1) Cormorant trying to land on river
- (1) Purple finch ♂

+ Cowbirds in Trapo, 84

BIRDS OF Santa Clara River System

FRIDAY

Locality Bouquet to ~~Road~~ McBean Date 5/11/01 Time 6:30-

- Great Blue Heron
- Green Heron
- (2) 2 Mallard
- Turkey Vulture
- White-tailed Kite
- Sharp-shinned Hawk
- Cooper's Hawk
- Red-shouldered Hawk
- Red-tailed Hawk
- American Kestrel
- (12) 192 California Quail
- American Coot
- (7) 2 22 Killdeer
- Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- (3) Rock Dove
- (11) 2222 3 Mourning Dove
- Greater Roadrunner
- Barn Owl
- Great Horned Owl
- White-throated Swift
- (1) Black-ch. Hummingbird
- (3) III Anna's Hummingbird
- Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- (2) II Nuttall's Woodpecker
- (2) II Downy Woodpecker
- Hairy Woodpecker
- (1) Northern Flicker
- Western Wood-Pewee
- **Willow Flycatcher**
- Pacific Slope Flycatcher
- (1) Black Phoebe
- Say's Phoebe
- (4) 2 II Ash-throated Flycatcher
- Cassin's Kingbird
- Western Kingbird
- Horned Lark
- Tree Swallow
- Violet-green Swallow
- N. Rough-winged Swallow
- (50) 20, 30 Cliff Swallow 16 nests under Bouquet
- Barn Swallow
- (5) III Scrub Jay
- (1) American Crow
- (14) 6222 II Common Raven
- Plain Titmouse
- (4) 22 Bushtit
- (8) III III Bewick's Wren
- (3) House Wren
- Ruby-crowned Kinglet
- **California Gnatcatcher**
- Blue-gray Gnatcatcher
- Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- American Robin
- Wrentit
- Northern Mockingbird
- California Thrasher
- American Pipit
- Cedar Waxwing
- (2) Phainopepla
- Loggerhead Shrike
- European Starling
- **Bell's Vireo**
- Solitary Vireo
- Warbling Vireo
- Orange-crowned Warbler
- (2) II Yellow Warbler
- Yellow-rumped Warbler
- (6) III 3 Common Yellowthroat
- Wilson's Warbler
- Yellow-breasted Chat
- Western Tanager
- (3) 2 Black-headed Grosbeak
- Blue Grosbeak
- Lazuli Bunting
- (9) 22 III Rufous-sided Towhee
- (16) 2 1 2 2 2 II 2 California Towhee
- Lark Sparrow
- Savannah Sparrow
- (31) 2 4 4 3 4 4 8 2 Song Sparrow
- Lincoln's Sparrow
- White-crowned Sparrow
- (20) 6 6 8 Red-winged Blackbird
- Western Meadowlark
- Brewer's Blackbird
- (11) III 6 Brown-headed Cowbird
- Hooded Oriole
- (1) Northern Oriole
- (2) House Finch
- Pine Siskin
- (2) II Lesser Goldfinch
- Lawrence's Goldfinch
- (1) American Goldfinch
- House Sparrow

BIRDS OF Santa Clara River System

Locality Rouquet to McBean Date 5/17/01 Time _____

- _____ Great Blue Heron
- _____ Green Heron
- (2) 2 Mallard
- _____ Turkey Vulture
- _____ White-tailed Kite
- _____ Sharp-shinned Hawk
- _____ Cooper's Hawk
- _____ Red-shouldered Hawk
- _____ Red-tailed Hawk
- _____ American Kestrel
- (16) 6225-2 California Quail
- _____ American Coot
- (3) III Killdeer
- _____ Spotted Sandpiper
- _____ Least Sandpiper
- _____ Common Snipe
- (3) 3 Rock Dove
- (16) IIII 22 Mourning Dove
- _____ Greater Roadrunner
- _____ Barn Owl
- _____ Great Horned Owl
- _____ White-throated Swift
- _____ Black-ch. Hummingbird
- (5) IIII Anna's Hummingbird
- _____ Costa's Hummingbird
- _____ Belted Kingfisher
- _____ Acorn Woodpecker
- (4) IIII Nuttall's Woodpecker
- _____ Downy Woodpecker
- _____ Hairy Woodpecker
- (2) II Northern Flicker
- _____ Western Wood-Pewee
- _____ **Willow Flycatcher**
- _____ Pacific Slope Flycatcher
- (2) II Black Phoebe
- _____ Say's Phoebe
- (4) IIII Ash-throated Flycatcher
- _____ Cassin's Kingbird
- _____ Western Kingbird
- _____ Horned Lark
- _____ Tree Swallow
- _____ Violet-green Swallow
- (8) 16 N. Rough-winged Swallow
- (22) 688 Cliff Swallow
- _____ Barn Swallow
- (7) III 2 Scrub Jay
- (2) 2 American Crow
- (19) 14, 2 2 Common Raven
- (3) 2 Plain Titmouse
- (2) Bushtit
- (13) IIII IIII Bewick's Wren
- (4) House Wren
- _____ Ruby-crowned Kinglet
- _____ **California Gnatcatcher**
- _____ Blue-gray Gnatcatcher
- (1) Western Bluebird
- _____ Swainson's Thrush
- _____ Hermit Thrush
- _____ American Robin
- (1) Wrentit
- _____ Northern Mockingbird
- _____ California Thrasher
- _____ American Pipit
- _____ Cedar Waxwing
- (1) Phainopepla
- _____ Loggerhead Shrike
- (3) III European Starling
- _____ **Bell's Vireo**
- _____ Solitary Vireo
- _____ Warbling Vireo
- _____ Orange-crowned Warbler
- (1) Yellow Warbler
- _____ Yellow-rumped Warbler
- (9) 2III2 Common Yellowthroat
- _____ Wilson's Warbler
- _____ Yellow-breasted Chat
- (1) Western Tanager
- _____ Black-headed Grosbeak
- _____ Blue Grosbeak
- _____ Lazuli Bunting
- (9) II 2III Rufous-sided Towhee
- (12) I IIII California Towhee
- _____ Lark Sparrow
- _____ Savannah Sparrow
- (29) 34824 Song Sparrow
- _____ Lincoln's Sparrow
- _____ White-crowned Sparrow
- (22) 2 1969 Red-winged Blackbird
- _____ Western Meadowlark
- (2) Brewer's Blackbird
- (7) II III Brown-headed Cowbird
- _____ Hooded Oriole
- (1) Northern Oriole
- (21) 12824 House Finch
- _____ Pine Siskin
- (14) 2 III 2 2 II Lesser Goldfinch
- _____ Lawrence's Goldfinch
- _____ American Goldfinch
- (1) House Sparrow

+8, 7 cowbirds in 2 traps +1 Thrasher

Sunny then overcast (60s?)
Not much water from water treatment —

BIRDS OF Santa Clara River System

Tuesday

Locality Bouquet to McBean Date 6/12/01 Time 6:00 —

- Great Blue Heron
- Green Heron
- (2) || Mallard
- Turkey Vulture
- White-tailed Kite
- Sharp-shinned Hawk
- (1) Cooper's Hawk looking at cbs in trap.
- Red-shouldered Hawk
- Red-tailed Hawk
- American Kestrel
- (8) 6 || California Quail
- American Coot
- (6) ||||' Killdeer
- Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- Rock Dove
- (7) ||| 22 Mourning Dove
- Greater Roadrunner
- Barn Owl
- Great Horned Owl
- White-throated Swift
- Black-ch. Hummingbird
- (5) |||| Anna's Hummingbird
- Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- (2) || Nuttall's Woodpecker
- Downy Woodpecker
- Hairy Woodpecker
- (1) Northern Flicker
- Western Wood-Pewee
- **Willow Flycatcher**
- Pacific Slope Flycatcher
- (1) Black Phoebe
- Say's Phoebe
- (3) ||| Ash-throated Flycatcher
- Cassin's Kingbird
- Western Kingbird
- Horned Lark
- Tree Swallow
- Violet-green Swallow
- (16) 88 N. Rough-winged Swallow
- (28) 8848 Cliff Swallow nests under McBean = about 5 fledged others are deserted.
- (2) || Barn Swallow
- (5) |||| Scrub Jay
- (2) American Crow
- (24) 8+4+2+6 Common Raven
- (5) 1 22 Plain Titmouse
- (4) 22 Bushtit
- (17) |||| |||| 2 22 Bewick's Wren
- House Wren
- Ruby-crowned Kinglet
- **California Gnatcatcher**
- Blue-gray Gnatcatcher
- Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- American Robin
- (1) Wrentit
- Northern Mockingbird
- (3) ||| California Thrasher
- American Pipit
- Cedar Waxwing
- Phainopepla
- Loggerhead Shrike
- (2) || European Starling
- **Bell's Vireo**
- Solitary Vireo
- Warbling Vireo
- Orange-crowned Warbler
- (1) Yellow Warbler
- Yellow-rumped Warbler
- (7) |||| 2 Common Yellowthroat
- Wilson's Warbler
- Yellow-breasted Chat
- Western Tanager
- (1) Black-headed Grosbeak
- Blue Grosbeak
- Lazuli Bunting
- (10) |||| |||| Rufous-sided Towhee
- (10) |||| |||| 2 California Towhee
- Lark Sparrow
- Savannah Sparrow
- (36) 4+8+8+4+4 Song Sparrow
- Lincoln's Sparrow
- White-crowned Sparrow
- (14) 4+2+6 Red-winged Blackbird
- Western Meadowlark
- Brewer's Blackbird
- (3) ||| Brown-headed Cowbird
- Hooded Oriole
- Northern Oriole
- (14) 2+4+ || 222 House Finch
- Pine Siskin
- (2) Lesser Goldfinch
- Lawrence's Goldfinch
- American Goldfinch
- House Sparrow
- (1) Dempid — no response to tape

BIRDS OF Santa Clara River System

Sat

Locality Bouquet to McBean Date 6/23/01 Time 8:30 - 9:30

_____ Great Blue Heron
_____ Green Heron
_____ Mallard
_____ Turkey Vulture
_____ White-tailed Kite
_____ Sharp-shinned Hawk
1 Cooper's Hawk
1 Red-shouldered Hawk
1 Red-tailed Hawk
_____ American Kestrel
(21) 8 7612 California Quail
_____ American Coot
(6) 1 IIII Killdeer
_____ Spotted Sandpiper
_____ Least Sandpiper
_____ Common Snipe
_____ Rock Dove
(15) 1 62 Mourning Dove
_____ Greater Roadrunner
_____ Barn Owl
_____ Great Horned Owl
_____ White-throated Swift
(3) III Black-ch. Hummingbird
(7) IIII Anna's Hummingbird
1 Costa's Hummingbird
_____ Belted Kingfisher
_____ Acorn Woodpecker
_____ Nuttall's Woodpecker
_____ Downy Woodpecker
_____ Hairy Woodpecker
_____ Northern Flicker
_____ Western Wood-Pewee
_____ **Willow Flycatcher**
_____ Pacific Slope Flycatcher
(2) II Black Phoebe
_____ Say's Phoebe
(2) II Ash-throated Flycatcher
_____ Cassin's Kingbird
1 Western Kingbird
_____ Horned Lark
_____ Tree Swallow
_____ Violet-green Swallow
(7) 25 N. Rough-winged Swallow
(8) 6 2 Cliff Swallow
1 Barn Swallow
(6) 3 III Scrub Jay
1 American Crow
(84) 44, 30, 10 Common Raven (Still in sky/view at once!)
_____ Plain Titmouse
_____ Bushtit
(3) III Bewick's Wren
_____ House Wren
_____ Ruby-crowned Kinglet

_____ **California Gnatcatcher**
_____ Blue-gray Gnatcatcher
_____ Western Bluebird
_____ Swainson's Thrush
_____ Hermit Thrush
_____ American Robin
(3) III Wrentit
1 Northern Mockingbird
(6) IIII California Thrasher
_____ American Pipit
_____ Cedar Waxwing
_____ Phainopepla
_____ Loggerhead Shrike
_____ European Starling
_____ **Bell's Vireo**
_____ Solitary Vireo
_____ Warbling Vireo
_____ Orange-crowned Warbler
_____ Yellow Warbler
_____ Yellow-rumped Warbler
(4) III Common Yellowthroat
_____ Wilson's Warbler
_____ Yellow-breasted Chat
_____ Western Tanager
(3) V Black-headed Grosbeak
_____ Blue Grosbeak
_____ Lazuli Bunting
(5) IIII Rufous-sided Towhee
(9) IIII-IIII California Towhee
_____ Lark Sparrow
_____ Savannah Sparrow
(22) I IIII-IIII 22222 Song Sparrow
_____ Lincoln's Sparrow
_____ White-crowned Sparrow
(5) 113 Red-winged Blackbird
_____ Western Meadowlark
1 Brewer's Blackbird
(5) III Brown-headed Cowbird
_____ Hooded Oriole
_____ Northern Oriole
(24) 66 5 4 2 House Finch
_____ Pine Siskin
(11) 6 IIII Lesser Goldfinch
_____ Lawrence's Goldfinch
_____ American Goldfinch
_____ House Sparrow

+ 7,7 Cowbirds in Trap 11#
Raccon up under bridge McBean
Rabbit

BIRDS OF Santa Clara River System

Locality Bouquet to McBean Date 7/28/01 Time 6:30 – 8:15

	Great Blue Heron	
	Green Heron	
	Mallard	
	Turkey Vulture	
	White-tailed Kite	
	Sharp-shinned Hawk	
	Cooper's Hawk	
	Red-shouldered Hawk	
(3)	2 Red-tailed Hawk	
	American Kestrel	
	California Quail	
	American Coot	
(10)	25 Killdeer	
	Spotted Sandpiper	
	Least Sandpiper	
	Common Snipe	
(8)	8 Rock Dove	
(14)	12 Mourning Dove	
	Greater Roadrunner	
	Barn Owl	
	Great Horned Owl	
	White-throated Swift	
	Black-ch. Hummingbird	
(6)	2 Anna's Hummingbird	
	Costa's Hummingbird	
	Belted Kingfisher	
	Acorn Woodpecker	
(3)	Nuttall's Woodpecker	
(3)	Downy Woodpecker	
	Hairy Woodpecker	
	Northern Flicker	
	Western Wood-Pewee	
	Willow Flycatcher	
	Pacific Slope Flycatcher	
(10)	2 N 3 Black Phoebe	
	Say's Phoebe	
(2)	2 Ash-throated Flycatcher	
	Cassin's Kingbird	
(5)	Western Kingbird	
	Horned Lark	
	Tree Swallow	
	Violet-green Swallow	
(1)	N. Rough-winged Swallow	
(45)	28 84 Cliff Swallow	
(1)	Barn Swallow	
(6)	Scrub Jay	
(4)	2 American Crow	
(19)	12 2 Common Raven	
	Plain Titmouse	
	Bushtit	
(7)	Bewick's Wren	
	House Wren	
	Ruby-crowned Kinglet	

	California Gnatcatcher	
	Blue-gray Gnatcatcher	
(1)	Western Bluebird	
	Swainson's Thrush	
	Hermit Thrush	
	American Robin	
	Wrentit	
	Northern Mockingbird	
(1)	California Thrasher	
	American Pipit	
	Cedar Waxwing	
	Phainopepla	
	Loggerhead Shrike	
(30)	25 32 European Starling	
	Bell's Vireo	
	Solitary Vireo	
	Warbling Vireo	
	Orange-crowned Warbler	
	Yellow Warbler	
	Yellow-rumped Warbler	
(18)	18 Common Yellowthroat	
	Wilson's Warbler	
	Yellow-breasted Chat	
	Western Tanager	
(2)	Black-headed Grosbeak	
	Blue Grosbeak	
	Lazuli Bunting	
(10)	Rufous-sided Towhee	
(8)	22 2 California Towhee	
	Lark Sparrow	
	Savannah Sparrow	
(47)	8 8 8 3 4 Song Sparrow	
	Lincoln's Sparrow	
	White-crowned Sparrow	
(16) (36)	N 6 8 Red-winged Blackbird	
	Western Meadowlark	
	Brewer's Blackbird	
(5)	Brown-headed Cowbird	
	Hooded Oriole	
	Northern Oriole	
(28)	3 8 8 1 House Finch	
	Pine Siskin	
(1)	Lesser Goldfinch	
	Lawrence's Goldfinch	
	American Goldfinch	
	House Sparrow	

87 Cowbirds in traps 11

1 Coyote pup at cowbird trap

BIRDS OF Santa Clara River System

Locality Bouquet to McBean **Date** 7/16/01 **Time** 7:00 - 8:00

	Great Blue Heron		**California Gnatcatcher**
	Green Heron		Blue-gray Gnatcatcher
(9)	19 Mallard		Western Bluebird
	Turkey Vulture		Swainson's Thrush
	White-tailed Kite		Hermit Thrush
	Sharp-shinned Hawk		American Robin
	Cooper's Hawk		Wrentit
	Red-shouldered Hawk		Northern Mockingbird
(1)	Red-tailed Hawk	(2)	II California Thrasher
	American Kestrel		American Pipit
(42)	21 California Quail		Cedar Waxwing
	American Coot		Phainopepla
(4)	2 Killdeer		Loggerhead Shrike
	Spotted Sandpiper	(18)	88 II European Starling
	Least Sandpiper		**Bell's Vireo**
	Common Snipe		Solitary Vireo
	Rock Dove		Warbling Vireo
(27)	94 II 62 Mourning Dove		Orange-crowned Warbler
	Greater Roadrunner	(1)	Yellow Warbler
	Barn Owl		Yellow-rumped Warbler
	Great Horned Owl	(24)	898 Common Yellowthroat
	White-throated Swift		Wilson's Warbler
(3)	III Black-ch. Hummingbird		Yellow-breasted Chat
(4)	III Anna's Hummingbird		Western Tanager
	Costa's Hummingbird		Black-headed Grosbeak
	Belted Kingfisher		Blue Grosbeak
	Acorn Woodpecker		Lazuli Bunting
(2)	II Nuttall's Woodpecker		Rufous-sided Towhee
(4)	IIII Downy Woodpecker	(10)	82 California Towhee
	Hairy Woodpecker		Lark Sparrow
	Northern Flicker		Savannah Sparrow
	Western Wood-Pewee	(14)	86 Song Sparrow
	Willow Flycatcher		Lincoln's Sparrow
	Pacific Slope Flycatcher		White-crowned Sparrow
(8)	3 2 II Black Phoebe	(7)	II 5 Red-winged Blackbird
	Say's Phoebe		Western Meadowlark
(1)	Ash-throated Flycatcher		Brewer's Blackbird
	Cassin's Kingbird	(2)	II Brown-headed Cowbird
	Western Kingbird		Hooded Oriole
	Horned Lark	(1)	Northern Oriole
	Tree Swallow	(51)	16, 20, 8 House Finch
	Violet-green Swallow		Pine Siskin
	N. Rough-winged Swallow	(5)	III 2 Lesser Goldfinch
(16)	6, 10, Cliff Swallow		Lawrence's Goldfinch
(3)	III Barn Swallow		American Goldfinch
(5)	II 2 Scrub Jay	(2)	House Sparrow
	American Crow		
(27)	12, 4 9 Common Raven		
(2)	II Plain Titmouse		
	Bushtit		
(1)	Bewick's Wren		
	House Wren		
	Ruby-crowned Kinglet		

2001 Upper River Area 4

BIRDS OF Santa Clara River System

Locality Upper Nature Report Pt Date 5/14 Time 7 – 8:30

_____ Great Blue Heron
_____ Green Heron
_____ Mallard
_____ Turkey Vulture
_____ White-tailed Kite
_____ Sharp-shinned Hawk
_____ Cooper's Hawk
_____ Red-shouldered Hawk
(4) 1 2 Red-tailed Hawk
4 4 2 4 3 2 2 California Quail
(21) _____ American Coot
(4) 2 2 Killdeer
_____ Spotted Sandpiper
_____ Least Sandpiper
_____ Common Snipe
1 Rock Dove
(7) 4 4 1 4 3 Mourning Dove
_____ Greater Roadrunner
_____ Barn Owl
_____ Great Horned Owl
_____ White-throated Swift
_____ Black-ch. Hummingbird
_____ Anna's Hummingbird
_____ Costa's Hummingbird
_____ Belted Kingfisher
_____ Acorn Woodpecker
(5) 1 1 1 1 Nuttall's Woodpecker
_____ Downy Woodpecker
_____ Hairy Woodpecker
(3) 1 2 Northern Flicker
_____ Western Wood-Pewee
_____ **Willow Flycatcher**
_____ Pacific Slope Flycatcher
_____ Black Phoebe
_____ Say's Phoebe
(3) 1 1 1 Ash-throated Flycatcher
_____ Cassin's Kingbird
(5) 2 3 Western Kingbird
_____ Horned Lark
_____ Tree Swallow
_____ Violet-green Swallow
_____ N. Rough-winged Swallow
_____ Cliff Swallow
_____ Barn Swallow
(16) 2 3 2 2 1 1 Scrub Jay
_____ American Crow
2 Common Raven
1 Plain Titmouse
(4) 2 2 Bushtit
4 4 4 2 2 2 2 2 2 2 1 1 Bewick's Wren
(28) _____ House Wren
_____ Ruby-crowned Kinglet

_____ **California Gnatcatcher**
_____ Blue-gray Gnatcatcher
(2) 2 Western Bluebird
_____ Swainson's Thrush
_____ Hermit Thrush
_____ American Robin
_____ Wrentit
(5) 1 1 1 1 Northern Mockingbird
(4) 1 1 1 California Thrasher
_____ American Pipit
_____ Cedar Waxwing
(2) 1 1 Phainopepla
_____ Loggerhead Shrike
_____ European Starling
_____ **Bell's Vireo**
_____ Solitary Vireo
_____ Warbling Vireo
_____ Orange-crowned Warbler
_____ Yellow Warbler
_____ Yellow-rumped Warbler
_____ Common Yellowthrat
1 Wilson's Warbler
_____ Yellow-breasted Chat
_____ Western Tanager
_____ Black-headed Grosbeak
_____ Blue Grosbeak
_____ Lazuli Bunting
(8) 2 1 1 1 1 Rufous-sided Towhee
(8) 2 2 2 2 California Towhee
_____ Lark Sparrow
_____ Savannah Sparrow
½ Song Sparrow
_____ Lincoln's Sparrow
_____ White-crowned Sparrow
_____ Red-winged Blackbird
_____ Western Meadowlark
_____ Brewer's Blackbird
(1) 1 Brown-headed Cowbird
_____ Hooded Oriole
(2) 1 1 Northern Oriole
(19) 4 4 3 4 4 House Finch
_____ Pine Siskin
(4) 2 2 Lesser Goldfinch
_____ Lawrence's Goldfinch
_____ American Goldfinch
_____ House Sparrow

NO water at all

• Lots of killdeer pair in drainages at start Cabo toads

1 coyote

BIRDS OF Santa Clara River System

Locality Upper, Upper Pipeline to Bonquet Date 6/13/0 Time 6:45 – 9:00

- Great Blue Heron
- Green Heron
- 2 Mallard
- Turkey Vulture
- White-tailed Kite
- Sharp-shinned Hawk
- Cooper's Hawk
- 1 Red-shouldered Hawk
- 1 Red-tailed Hawk
- American Kestrel
- 1111 2262 2222 111 California Quail
- American Coot
- 12, 2 Killdeer
- Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- 8 Rock Dove
- 48 7 2222 1111 22 Mourning Dove
- Greater Roadrunner
- Barn Owl
- Great Horned Owl
- White-throated Swift
- 1 Black-ch. Hummingbird
- 1 1111 Anna's Hummingbird
- Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- 111 Nuttall's Woodpecker
- Downy Woodpecker
- Hairy Woodpecker
- 1 Northern Flicker
- Western Wood-Pewee
- **Willow Flycatcher**
- Pacific Slope Flycatcher
- 12 Black Phoebe
- Say's Phoebe
- 12 Ash-throated Flycatcher
- Cassin's Kingbird
- 2 Western Kingbird
- Horned Lark
- Tree Swallow
- Violet-green Swallow
- N. Rough-winged Swallow
- Cliff Swallow
- Barn Swallow
- 11 1111 Scrub Jay
- American Crow
- 2122 Common Raven
- 45 1111 Plain Titmouse
- 86 Bushtit
- 1 1111 Bewick's Wren
- House Wren
- Ruby-crowned Kinglet
- California Gnatcatcher
- Blue-gray Gnatcatcher
- 22 Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- American Robin
- 2 111 Wrentit
- 1 1111 Northern Mockingbird
- 1111 4 California Thrasher
- American Pipit
- Cedar Waxwing
- 111 1111 Phainopepla
- Loggerhead Shrike
- 298 European Starling
- **Bell's Vireo**
- Solitary Vireo
- Warbling Vireo
- Orange-crowned Warbler
- Yellow Warbler
- Yellow-rumped Warbler
- 1 Common Yellowthroat
- 1 Wilson's Warbler
- Yellow-breasted Chat
- Western Tanager
- Black-headed Grosbeak
- Blue Grosbeak
- Lazuli Bunting
- 11 Rufous-sided Towhee
- 22 22 111 2 California Towhee
- Lark Sparrow 8
- Savannah Sparrow
- Song Sparrow
- Lincoln's Sparrow
- White-crowned Sparrow
- Red-winged Blackbird
- Western Meadowlark
- Brewer's Blackbird
- Brown-headed Cowbird
- Hooded Oriole
- Northern Oriole
- 31 4 82 6 1122 House Finch
- Pine Siskin
- 12 Lesser Goldfinch
- Lawrence's Goldfinch
- American Goldfinch
- 5 House Sparrow

4 Coyotes (1 mom + 3 ½ grown pups) High Clouds = cool

* Note: almost all birds here are in gooseberry, sage, mustard at river edges.

BIRDS OF Santa Clara River System

Locality Upper Upper – above Bouquet **Date** 6/20/10 **Time** 6:45 – 8:45

	Great Blue Heron		**California Gnatcatcher**
	Green Heron		Blue-gray Gnatcatcher
	Mallard	2	Western Bluebird
	Turkey Vulture		Swainson's Thrush
	White-tailed Kite		Hermit Thrush
	Sharp-shinned Hawk		American Robin
	Cooper's Hawk	1111 2	Wrentit
	Red-shouldered Hawk	2 22, 2 1111 22	Northern Mockingbird
2 III	Red-tailed Hawk	II	California Thrasher
	American Kestrel		American Pipit
11 2 4 8 8	California Quail		Cedar Waxwing
	American Coot	12 IIII II 2	Phainopepla
,13,	Killdeer		Loggerhead Shrike
	Spotted Sandpiper		European Starling
	Least Sandpiper		**Bell's Vireo**
	Common Snipe		Solitary Vireo
	Rock Dove		Warbling Vireo
1111 IIII 2	Mourning Dove		Orange-crowned Warbler
I	Greater Roadrunner		Yellow Warbler
	Barn Owl		Yellow-rumped Warbler
	Great Horned Owl		Common Yellowthrat
	White-throated Swift		Wilson's Warbler
	Black-ch. Hummingbird		Yellow-breasted Chat
IIII	Anna's Hummingbird		Western Tanager
I	Costa's Hummingbird	I IIII 2	Black-headed Grosbeak
	Belted Kingfisher		Blue Grosbeak
	Acorn Woodpecker	I	Lazuli Bunting
I	Nuttall's Woodpecker	1 IIII IIII III 3	Rufous-sided Towhee
	Downy Woodpecker	2222 2222 II	California Towhee
	Hairy Woodpecker		Lark Sparrow
	Northern Flicker		Savannah Sparrow
	Western Wood-Pewee		Song Sparrow
	Willow Flycatcher		Lincoln's Sparrow
	Pacific Slope Flycatcher		White-crowned Sparrow
II	Black Phoebe		Red-winged Blackbird
2	Say's Phoebe		Western Meadowlark
II	Ash-throated Flycatcher		Brewer's Blackbird
I	Cassin's Kingbird		Brown-headed Cowbird
	Western Kingbird		Hooded Oriole
	Horned Lark	3 II	Northern Oriole
	Tree Swallow	8 2 4 2 8 8 8 8 4	House Finch
	Violet-green Swallow		Pine Siskin
10, 10, 8 8 8	N. Rough-winged Swallow	8 II	Lesser Goldfinch
8 8 2	Cliff Swallow	5	Lawrence's Goldfinch
	Barn Swallow		American Goldfinch
22 2 22 IIII 3 IIII	Scrub Jay		House Sparrow
	American Crow	1111 IIII	Rufous Crowned sparrows
4 2	Common Raven		
N 2	Plain Titmouse		
22	Bushtit		
44 IIII III	Bewick's Wren		
	House Wren		
	Ruby-crowned Kinglet		

BIRDS OF Santa Clara River System

Locality ABOVE BOUQUET Date 1/6 Time 630 ~ 8:15

_____ Great Blue Heron
_____ Green Heron
_____ Mallard
_____ Turkey Vulture
_____ White-tailed Kite
_____ Sharp-shinned Hawk
_____ Cooper's Hawk
(1) | Red-shouldered Hawk
(4) 1 1 2 Red-tailed Hawk
_____ American Kestrel
(15) 6 3 2 2 2 California Quail
_____ American Coot
(9) 2 2 Killdeer
_____ Spotted Sandpiper
_____ Least Sandpiper
_____ Common Snipe
(3) 3 Rock Dove
(10) 2 2 1 2 Mourning Dove
_____ Greater Roadrunner
_____ Barn Owl
_____ Great Horned Owl
_____ White-throated Swift
1 Black-ch. Hummingbird
(3) 1 1 | Anna's Hummingbird
(1) Costa's Hummingbird
_____ Belted Kingfisher
_____ Acorn Woodpecker
(1) Nuttall's Woodpecker
_____ Downy Woodpecker
_____ Hairy Woodpecker
_____ Northern Flicker
_____ Western Wood-Pewee
_____ **Willow Flycatcher**
_____ Pacific Slope Flycatcher
_____ Black Phoebe
_____ Say's Phoebe
(1) Ash-throated Flycatcher
_____ Cassin's Kingbird
_____ Western Kingbird
_____ Horned Lark
_____ Tree Swallow
_____ Violet-green Swallow
_____ N. Rough-winged Swallow
_____ Cliff Swallow
_____ Barn Swallow
(9) 2 2 2 2 | Scrub Jay
(4) 3 1 American Crow
(6) 4 2 Common Raven
_____ Plain Titmouse
(2) Bushtit
(2) 1 1 Bewick's Wren
_____ House Wren
_____ Ruby-crowned Kinglet

_____ **California Gnatcatcher**
_____ Blue-gray Gnatcatcher
_____ Western Bluebird
_____ Swainson's Thrush
_____ Hermit Thrush
_____ American Robin
(2) 1 1 Wrentit
(13) 2 1 2 2 2 2 1 1 Northern Mockingbird
(6) 1 2 2 1 California Thrasher
_____ American Pipit
_____ Cedar Waxwing
(4) 2 1 1 Phainopepla
_____ Loggerhead Shrike
_____ European Starling
_____ **Bell's Vireo**
_____ Solitary Vireo
_____ Warbling Vireo
_____ Orange-crowned Warbler
_____ Yellow Warbler
_____ Yellow-rumped Warbler
_____ Common Yellowthroat
_____ Wilson's Warbler
_____ Yellow-breasted Chat
_____ Western Tanager
_____ Black-headed Grosbeak
_____ Blue Grosbeak
_____ Lazuli Bunting
(10) 2 2 2 2 1 1 Rufous-sided Towhee
(5) 2 1 2 California Towhee
_____ Lark Sparrow
_____ Savannah Sparrow
_____ Song Sparrow
_____ Lincoln's Sparrow
_____ White-crowned Sparrow
_____ Red-winged Blackbird
_____ Western Meadowlark
_____ Brewer's Blackbird
_____ Brown-headed Cowbird
(1) Hooded Oriole
_____ Northern Oriole
(16) 3 4 5 4 House Finch
_____ Pine Siskin
_____ Lesser Goldfinch
_____ Lawrence's Goldfinch
_____ American Goldfinch
_____ House Sparrow

_____
_____
_____
_____
_____
_____

clear
cool
HUMID
70 DB

BIRDS OF Santa Clara River System

Locality Ulker R Above Bogart Date 7/16 Time 6:50 - 8:20

60° OVERCAST

_____ Great Blue Heron
_____ Green Heron
_____ Mallard
_____ Turkey Vulture
_____ White-tailed Kite
_____ Sharp-shinned Hawk
_____ Cooper's Hawk
_____ Red-shouldered Hawk
13 Red-tailed Hawk
_____ American Kestrel
14-222 California Quail
_____ American Coot
_____ Killdeer
_____ Spotted Sandpiper
_____ Least Sandpiper
_____ Common Snipe
_____ Rock Dove
96 22 Mourning Dove
_____ Greater Roadrunner
_____ Barn Owl
_____ Great Horned Owl
_____ White-throated Swift
_____ Black-ch. Hummingbird
1 Anna's Hummingbird
_____ Costa's Hummingbird
_____ Belted Kingfisher
_____ Acorn Woodpecker
1 Nuttall's Woodpecker
_____ Downy Woodpecker
_____ Hairy Woodpecker
_____ Northern Flicker
_____ Western Wood-Pewee
_____ **Willow Flycatcher**
_____ Pacific Slope Flycatcher
_____ Black Phoebe
_____ Say's Phoebe
_____ Ash-throated Flycatcher
_____ Cassin's Kingbird
_____ Western Kingbird
_____ Horned Lark
_____ Tree Swallow
_____ Violet-green Swallow
_____ N. Rough-winged Swallow
6 Cliff Swallow
_____ Barn Swallow
12 Scrub Jay
1 American Crow
22 Common Raven
_____ Plain Titmouse
_____ Bushtit
1 22 1 Bewick's Wren
_____ House Wren
_____ Ruby-crowned Kinglet

_____ **California Gnatcatcher**
_____ Blue-gray Gnatcatcher
_____ Western Bluebird
_____ Swainson's Thrush
_____ Hermit Thrush
_____ American Robin
3 Wrentit
1 4 Northern Mockingbird
1 4 California Thrasher
_____ American Pipit
_____ Cedar Waxwing
2 9 3 Phainopepla
_____ Loggerhead Shrike
_____ European Starling
_____ **Bell's Vireo**
_____ Solitary Vireo
_____ Warbling Vireo
_____ Orange-crowned Warbler
_____ Yellow Warbler
_____ Yellow-rumped Warbler
_____ Common Yellowthroat
_____ Wilson's Warbler
_____ Yellow-breasted Chat
_____ Western Tanager
1 Black-headed Grosbeak
_____ Blue Grosbeak
_____ Lazuli Bunting
1 2 1 Rufous-sided Towhee
1 California Towhee
_____ Lark Sparrow
_____ Savannah Sparrow
_____ Song Sparrow
_____ Lincoln's Sparrow
_____ White-crowned Sparrow
25 Red-winged Blackbird
_____ Western Meadowlark
_____ Brewer's Blackbird
_____ Brown-headed Cowbird
_____ Hooded Oriole
_____ Northern Oriole
2 23 22 House Finch
_____ Pine Siskin
46 Lesser Goldfinch
_____ Lawrence's Goldfinch
_____ American Goldfinch
_____ House Sparrow

2001 Upper River Area 5

Sugden

BIRDS OF Santa Clara River System

Locality Castaic Creek 5 to 47a **Date** April 14 **Time** 7:00 –
Santa Clara River

- Great Blue Heron
- Green Heron
- (2) Mallard
- Turkey Vulture
- White-tailed Kite
- Sharp-shinned Hawk
- Cooper's Hawk
- (2) II Red-shouldered Hawk
- (1) Red-tailed Hawk
- American Kestrel
- (9) IIII 22 California Quail
- American Coot
- Killdeer
- Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- (27) 1, 3, 15, 4 6 Rock Dove
- (3) 2 Mourning Dove
- Greater Roadrunner
- (1) Barn Owl under 5 bridge
- Great Horned Owl
- White-throated Swift
- Black-ch. Hummingbird
- (6) 1 III Anna's Hummingbird
- (1) Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- (4) IIII Nuttall's Woodpecker
- (3) III Downy Woodpecker
- Hairy Woodpecker
- Northern Flicker
- Western Wood-Pewee
- **Willow Flycatcher**
- Pacific Slope Flycatcher
- (1) Black Phoebe
- Say's Phoebe
- Ash-throated Flycatcher
- (1) Cassin's Kingbird
- Western Kingbird
- Horned Lark
- Tree Swallow
- (9) Violet-green Swallow
- 2 2 4 N. Rough-winged Swallow
- (48) +25, 20, 1 Cliff Swallow nesting under Commercial, culverts below hill, 47 bridge
- Barn Swallow
- (10) IIII III Scrub Jay
- (3) American Crow
- (2) II Common Raven
- (7) (8) II III Plain Titmouse
- 1 22 Bushtit
- 11 III III 1 2 II 2 Bewick's Wren
- (27) (5) 1 2 House Wren
- Ruby-crowned Kinglet

- **California Gnatcatcher**
- Blue-gray Gnatcatcher
- Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- American Robin
- Wrentit
- (1) Northern Mockingbird
- (3) III California Thrasher
- American Pipit
- Cedar Waxwing
- Phainopepla
- Loggerhead Shrike
- (6) European Starling
- **Bell's Vireo**
- (1) Solitary Vireo
- Warbling Vireo
- (16) II III 4 III Orange-crowned Warbler
- (1) Yellow Warbler
- (35) III 6 4 6 6 8 Yellow-rumped Warbler
- (18) 1 III 6 2 4 Common Yellowthroat
- Wilson's Warbler
- Yellow-breasted Chat
- (1) Western Tanager
- (8) II 5 Black-headed Grosbeak
- (1) Blue Grosbeak
- Lazuli Bunting
- (11) I III III Rufous-sided Towhee
- (18) III III III II California Towhee
- Lark Sparrow
- Savannah Sparrow
- (35) III 1, 10, 10, 13 4 2 Song Sparrow
- Lincoln's Sparrow
- (16) 3 4 9 White-crowned Sparrow
- (82) 30, 1, 40, 64 Red-winged Blackbird
- Western Meadowlark
- Brewer's Blackbird
- (10) 4 13 Brown-headed Cowbird
- (3) 1 2 Hooded Oriole
- (12) I III II 2 Northern Oriole
- (5) 2 2 House Finch
- Pine Siskin
- (40) 30 6 6 6 8 2 Lesser Goldfinch
- Lawrence's Goldfinch
- American Goldfinch
- House Sparrow
- (1) Warbler (bright yellow under to chin, white eyes, white legs/vent) NASHVILLE

1 Bobcat east of Commerce Bridge

BIRDS OF Santa Clara River System Tuesday

Locality CASTAIC CREEK **Date** 4/24/01 **Time** 6:45

- Great Blue Heron
- (1) Green Heron
- Mallard
- Turkey Vulture
- White-tailed Kite
- Sharp-shinned Hawk
- Cooper's Hawk
- (1) Red-shouldered Hawk
- (1) Red-tailed Hawk
- (37) American Kestrel
- (12, 23422221121) California Quail
- American Coot
- (2) Killdeer
- Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- (70) (6, 40, 25) Rock Dove
- (19) (16, 1 4 2 11) Mourning Dove
- Greater Roadrunner
- Barn Owl
- Great Horned Owl
- White-throated Swift
- Black-ch. Hummingbird
- (4) IIII Anna's Hummingbird
- (1) Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- (5) IIII Nuttall's Woodpecker
- (3) III Downy Woodpecker
- Hairy Woodpecker
- Northern Flicker
- Western Wood-Pewee
- **Willow Flycatcher**
- Pacific Slope Flycatcher
- (1) Black Phoebe
- Say's Phoebe
- (5) IIII Ash-throated Flycatcher
- Cassin's Kingbird
- Western Kingbird
- (3) Horned Lark territorial singing
- Tree Swallow
- Violet-green Swallow
- (68) (60 8) N. Rough-winged Swallow
- (200 40, 60, 100) Cliff Swallow
- Barn Swallow
- (7) II IIII Scrub Jay
- (7) 2 1 3 American Crow
- (6) 1 2 1 2 Common Raven
- (1) Plain Titmouse
- (13) 2 1 2 2 2 1 2 Bushtit
- (18) III IIII IIII IIII Bewick's Wren
- (10) IIII IIII 2 House Wren
- Ruby-crowned Kinglet
- **California Gnatcatcher**
- Blue-gray Gnatcatcher
- Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- (2) 2 American Robin
- (5) (2) 2 2 1 Wrentit
- (1) Northern Mockingbird
- (2) II California Thrasher
- American Pipit
- Cedar Waxwing
- Phainopepla
- Loggerhead Shrike
- (14) III 2 4 2 1 2 European Starling
- **Bell's Vireo**
- Solitary Vireo
- Warbling Vireo
- (1) Orange-crowned Warbler
- (2) II Yellow Warbler
- (3) Yellow-rumped Warbler
- (2) II Common Yellowthroat
- Wilson's Warbler
- Yellow-breasted Chat
- Western Tanager
- (3) IIII Black-headed Grosbeak
- (1) Blue Grosbeak
- Lazuli Bunting
- (32) 4 8 4 4 1 2 1 1 6 1 Rufous-sided Towhee
- (28) III IIII 4 1 6 1 4 2 California Towhee
- Lark Sparrow
- Savannah Sparrow
- (59) 4 8 8 1 1 1 6 2 Song Sparrow
- 8 4 5 9
- Lincoln's Sparrow
- White-crowned Sparrow
- (45) 6, 20, 20 Red-winged Blackbird
- Western Meadowlark
- (1) Brewer's Blackbird
- (8) II IIII Brown-headed Cowbird
- Hooded Oriole
- Northern Oriole
- (9) 2 IIII 2 House Finch
- Pine Siskin
- (6) Lesser Goldfinch
- Lawrence's Goldfinch
- (2) American Goldfinch
- (2) House Sparrow
- (1) Great Egret

BIRDS OF Santa Clara River System

Locality Castaic (loops) Date 5/7/01 Monday Time 6:30 - 8:45

- Great Blue Heron
- Green Heron
- Mallard
- Turkey Vulture
- White-tailed Kite
- Sharp-shinned Hawk
- Cooper's Hawk
- Red-shouldered Hawk
- (2) || Red-tailed Hawk
- American Kestrel
- (22) 24422112 California Quail
- American Coot
- Killdeer
- Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- (125) 125 Rock Dove
- (17) (6) 2422 Mourning Dove
- Greater Roadrunner
- Barn Owl
- Great Horned Owl
- White-throated Swift
- Black-ch. Hummingbird
- (5) Anna's Hummingbird
- Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- (2) || Nuttall's Woodpecker
- (2) || Downy Woodpecker
- Hairy Woodpecker
- Northern Flicker
- Western Wood-Pewee
- **Willow Flycatcher**
- Pacific Slope Flycatcher
- (3) Black Phoebe
- Say's Phoebe
- (5) Ash-throated Flycatcher
- (1) Cassin's Kingbird
- Western Kingbird
- Horned Lark
- Tree Swallow
- Violet-green Swallow
- (60) N. Rough-winged Swallow
- (306, 100, 200, 6) Cliff Swallow
- Barn Swallow
- (10) Scrub Jay
- (1) American Crow
- (12) 2492 Common Raven
- (5) Plain Titmouse
- (12) 1222113 Bushtit
- (16) 1141412 Bewick's Wren
- (3) House Wren
- Ruby-crowned Kinglet
- **California Gnatcatcher**
- Blue-gray Gnatcatcher
- Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- (1) American Robin
- Wrentit
- Northern Mockingbird
- (2) California Thrasher
- American Pipit
- Cedar Waxwing
- Phainopepla
- Loggerhead Shrike
- (2) || European Starling
- **Bell's Vireo**
- Solitary Vireo
- Warbling Vireo
- Orange-crowned Warbler
- (2) || Yellow Warbler
- Yellow-rumped Warbler
- (20) 1161611 Common Yellowthroat
- Wilson's Warbler
- Yellow-breasted Chat
- Western Tanager
- (8) 1111 Black-headed Grosbeak
- (1) Blue Grosbeak
- Lazuli Bunting
- (15) 1111111 Rufous-sided Towhee
- (19) 16111112 California Towhee
- Lark Sparrow
- Savannah Sparrow
- (44) 9886616 Song Sparrow
- Lincoln's Sparrow
- White-crowned Sparrow
- (51) 25206 Red-winged Blackbird
- Western Meadowlark
- Brewer's Blackbird
- (18) 1146 Brown-headed Cowbird
- Hooded Oriole
- (4) 111 Northern Oriole
- (6) 12 House Finch
- Pine Siskin
- (8) 2211 Lesser Goldfinch
- Lawrence's Goldfinch
- (2) American Goldfinch
- House Sparrow

BIRDS OF Santa Clara River System

Locality Castaic Creek Date 5/18/01 Time 6:30-

- ____ Great Blue Heron
- ____ Green Heron
- ____ Mallard
- ____ Turkey Vulture
- ____ White-tailed Kite
- ____ Sharp-shinned Hawk
- ____ Cooper's Hawk
- (1) Red-shouldered Hawk
- ____ Red-tailed Hawk
- ____ American Kestrel
- (52) 20, 3 62 | 24 2 | 2 California Quail
- ____ American Coot
- (4) 13 Killdeer
- ____ Spotted Sandpiper
- ____ Least Sandpiper
- ____ Common Snipe
- ____ Rock Dove
- (15) 2 Mourning Dove
- ____ Greater Roadrunner
- ____ Barn Owl
- ____ Great Horned Owl
- ____ White-throated Swift
- (1) Black-ch. Hummingbird
- (7) 1 Anna's Hummingbird
- ____ Costa's Hummingbird
- ____ Belted Kingfisher
- ____ Acorn Woodpecker
- (5) Nuttall's Woodpecker
- (3) Downy Woodpecker
- ____ Hairy Woodpecker
- ____ Northern Flicker
- (1) Western Wood-Pewee
- ____ **Willow Flycatcher**
- ____ Pacific Slope Flycatcher
- (2) Black Phoebe
- ____ Say's Phoebe
- (5) Ash-throated Flycatcher
- ____ Cassin's Kingbird
- ____ Western Kingbird
- ____ Horned Lark
- ____ Tree Swallow
- ____ Violet-green Swallow
- ridge counter → 100, 103 23 N. Rough-winged Swallow
- (86) 50, 30, 6 Cliff Swallow
- ____ Barn Swallow
- (10) 5 Scrub Jay
- (7) 22 American Crow
- (1) Common Raven
- (4) 2 Plain Titmouse
- (4) 22 Bushtit
- (31) Bewick's Wren
- ____ House Wren
- ____ Ruby-crowned Kinglet
- ____ **California Gnatcatcher**
- ____ Blue-gray Gnatcatcher
- ____ Western Bluebird
- ____ Swainson's Thrush
- ____ Hermit Thrush
- ____ American Robin
- (2) Wrentit
- (3) Northern Mockingbird
- (5) California Thrasher
- ____ American Pipit
- ____ Cedar Waxwing
- (2) Phainopepla
- ____ Loggerhead Shrike
- (5) European Starling
- ____ **Bell's Vireo**
- ____ Solitary Vireo
- ____ Warbling Vireo
- ____ Orange-crowned Warbler
- (7) Yellow Warbler
- ____ Yellow-rumped Warbler
- (17) Common Yellowthroat
- (1) Wilson's Warbler
- (1) Yellow-breasted Chat
- ____ Western Tanager
- (13) 3 Black-headed Grosbeak
- ____ Blue Grosbeak
- ____ Lazuli Bunting
- (48) Rufous-sided Towhee
- (51) California Towhee
- ____ Lark Sparrow
- ____ Savannah Sparrow
- (51) Song Sparrow
- ____ Lincoln's Sparrow
- ____ White-crowned Sparrow
- (32) Red-winged Blackbird
- ____ Western Meadowlark
- ____ Brewer's Blackbird
- (12) Brown-headed Cowbird
- (2) Hooded Oriole
- (3) Northern Oriole
- (15) House Finch
- ____ Pine Siskin
- ____ Lesser Goldfinch
- ____ Lawrence's Goldfinch
- ____ American Goldfinch
- (1) House Sparrow

Sugden

BIRDS OF Santa Clara River System

Locality Castaic Creek **Date** 6/7/01 **Time** 6:30 – 9:30

- ____ Great Blue Heron
- ____ Green Heron
- ____ Mallard
- ____ Turkey Vulture
- ____ White-tailed Kite
- ____ Sharp-shinned Hawk
- (1) Cooper's Hawk
- (1) Red-shouldered Hawk
- (1) Red-tailed Hawk
- ____ American Kestrel
- 2 3 24 II California Quail
- (25) ____ American Coot
- ____ Killdeer
- ____ Spotted Sandpiper
- ____ Least Sandpiper
- ____ Common Snipe
- (4) Rock Dove
- 2 II 22 II 22 22 Mourning Dove
- (18) ____ Greater Roadrunner
- ____ Barn Owl
- ____ Great Horned Owl
- ____ White-throated Swift
- ____ Black-ch. Hummingbird
- (5) III Anna's Hummingbird
- ____ Costa's Hummingbird
- ____ Belted Kingfisher
- ____ Acorn Woodpecker
- (3) II Nuttall's Woodpecker
- (1) Downy Woodpecker
- ____ Hairy Woodpecker
- ____ Northern Flicker
- ____ Western Wood-Pewee
- ____ **Willow Flycatcher**
- ____ Pacific Slope Flycatcher
- ____ Black Phoebe
- ____ Say's Phoebe
- (9) 2 II III Ash-throated Flycatcher
- ____ Cassin's Kingbird
- (4) 22 Western Kingbird
- ____ Horned Lark
- ____ Tree Swallow
- ____ Violet-green Swallow
- ____ N. Rough-winged Swallow
- (40) 10 10 20 Cliff Swallow
- ____ Barn Swallow
- (6) I III Scrub Jay
- (2) II American Crow
- (5) III Common Raven
- (10) 3222 Plain Titmouse
- ____ Bushtit
- (12) 2 III III Bewick's Wren
- ____ House Wren
- ____ Ruby-crowned Kinglet
- ____ **California Gnatcatcher**
- ____ Blue-gray Gnatcatcher
- ____ Western Bluebird
- ____ Swainson's Thrush
- ____ Hermit Thrush
- ____ American Robin
- ____ Wrentit
- ____ Northern Mockingbird
- (2) II California Thrasher
- ____ American Pipit
- ____ Cedar Waxwing
- ____ Phainopepla
- ____ Loggerhead Shrike
- (16) 8 4 4 European Starling
- ____ **Bell's Vireo**
- ____ Solitary Vireo
- ____ Warbling Vireo
- ____ Orange-crowned Warbler
- (3) III Yellow Warbler
- ____ Yellow-rumped Warbler
- (7) II IIII Common Yellowthroat
- ____ Wilson's Warbler
- ____ Yellow-breasted Chat
- ____ Western Tanager
- (8) III Black-headed Grosbeak
- ____ Blue Grosbeak
- (3) II Lazuli Bunting
- (7) I III Rufous-sided Towhee
- (14) 22 2222 II California Towhee
- ____ Lark Sparrow
- ____ Savannah Sparrow
- 25 III 5 III Song Sparrow
- (22) ____ Lincoln's Sparrow
- ____ White-crowned Sparrow
- (20) Red-winged Blackbird
- ____ Western Meadowlark
- ____ Brewer's Blackbird
- (9) II III Brown-headed Cowbird
- (2) Hooded Oriole
- (2) Northern Oriole
- (8) II 22 2 House Finch
- ____ Pine Siskin
- ____ Lesser Goldfinch
- ____ Lawrence's Goldfinch
- ____ American Goldfinch
- ____ House Sparrow
- (1) Empid – tail up no vocal or response
- ____
- ____
- ____
- ____
- ____

BIRDS OF Santa Clara River System

Locality Castaic Creek   Date 6/27/01 Time 8:00 –

Count	Species
	Great Blue Heron
	Green Heron
	Mallard
	Turkey Vulture
	White-tailed Kite
	Sharp-shinned Hawk
	Cooper's Hawk
	Red-shouldered Hawk
	Red-tailed Hawk
1	American Kestrel
158 (0, 20, 20, 1, 8, 40, 8 8 8 1)	California Quail babies out
	American Coot
	Killdeer
	Spotted Sandpiper
	Least Sandpiper
	Common Snipe
	Rock Dove
7 (|| 2 2)	Mourning Dove
	Greater Roadrunner
	Barn Owl
	Great Horned Owl
	White-throated Swift
	Black-ch. Hummingbird
3	Anna's Hummingbird
1	Costa's Hummingbird
	Belted Kingfisher
	Acorn Woodpecker
3	Nuttall's Woodpecker
3	Downy Woodpecker
	Hairy Woodpecker
	Northern Flicker
	Western Wood-Pewee
	Willow Flycatcher
	Pacific Slope Flycatcher
	Black Phoebe
	Say's Phoebe
6	Ash-throated Flycatcher
	Cassin's Kingbird
1	Western Kingbird
	Horned Lark
	Tree Swallow
	Violet-green Swallow
	N. Rough-winged Swallow
26 (20, 6)	Cliff Swallow
	Barn Swallow
12	Scrub Jay
	American Crow
3	Common Raven
10	Plain Titmouse
21 (6 8 2 5)	Bushtit
10	Bewick's Wren
2	House Wren
	Ruby-crowned Kinglet
	California Gnatcatcher
	Blue-gray Gnatcatcher
	Western Bluebird
	Swainson's Thrush
	Hermit Thrush
	American Robin
3	Wrentit
	Northern Mockingbird
4 (2 ||)	California Thrasher
	American Pipit
	Cedar Waxwing
	Phainopepla
	Loggerhead Shrike
	European Starling
	Bell's Vireo
	Solitary Vireo
	Warbling Vireo
	Orange-crowned Warbler
1	Yellow Warbler
	Yellow-rumped Warbler
5	Common Yellowthroat
	Wilson's Warbler
	Yellow-breasted Chat
	Western Tanager
11	Black-headed Grosbeak
	Blue Grosbeak
	Lazuli Bunting
11	Rufous-sided Towhee
17	California Towhee
	Lark Sparrow
	Savannah Sparrow
12	Song Sparrow
	Lincoln's Sparrow
	White-crowned Sparrow
29 (8 8 8 |||||)	Red-winged Blackbird
	Western Meadowlark
	Brewer's Blackbird
9 (1 2 3 1 2)	Brown-headed Cowbird
	Hooded Oriole
3	Northern Oriole
	House Finch
	Pine Siskin
5 (1 2 2)	Lesser Goldfinch
	Lawrence's Goldfinch
2	American Goldfinch
	House Sparrow
1	Empid

1 Adult Bobcat

BIRDS OF Santa Clara River System — loops

Locality Castaic Creek Date 7/2/01 Time 6:30 - 9:15

- Great Blue Heron
- Green Heron
- Mallard
- Turkey Vulture
- White-tailed Kite
- Sharp-shinned Hawk
- Cooper's Hawk
- (1) Red-shouldered Hawk
- (1) Red-tailed Hawk
- American Kestrel
- (51) 22220, 2, 3 California Quail
- American Coot
- Killdeer
- Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- (2) Rock Dove
- (17) Mourning Dove
- Greater Roadrunner
- (1) Barn Owl
- Great Horned Owl
- White-throated Swift
- (1) Black-ch. Hummingbird
- (10) Anna's Hummingbird
- (1) Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- (4) Nuttall's Woodpecker
- (4) Downy Woodpecker
- Hairy Woodpecker
- (4) Northern Flicker
- Western Wood-Pewee
- **Willow Flycatcher**
- Pacific Slope Flycatcher
- Black Phoebe
- Say's Phoebe
- (11) Ash-throated Flycatcher
- (4) Cassin's Kingbird
- (11) 6 32 Western Kingbird
- Horned Lark
- Tree Swallow
- (13) Violet-green Swallow
- (198) 8 N. Rough-winged Swallow
- 100, 50, 8 Cliff Swallow
- (1) Barn Swallow
- (15) 2233 2 Scrub Jay
- (5) 31 American Crow
- Common Raven
- (12) 6666 6666 Plain Titmouse
- (43) 8, 20, 15 Bushtit
- (19) Bewick's Wren
- House Wren
- Ruby-crowned Kinglet
- **California Gnatcatcher**
- Blue-gray Gnatcatcher
- Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- American Robin
- (4) Wrentit
- Northern Mockingbird
- (4) California Thrasher
- American Pipit
- Cedar Waxwing
- Phainopepla
- Loggerhead Shrike
- European Starling
- **Bell's Vireo**
- Solitary Vireo
- Warbling Vireo
- Orange-crowned Warbler
- (1) Yellow Warbler
- Yellow-rumped Warbler
- (11) Common Yellowthroat
- Wilson's Warbler
- Yellow-breasted Chat
- Western Tanager
- (13) Black-headed Grosbeak
- (3) Blue Grosbeak
- Lazuli Bunting
- (8) Rufous-sided Towhee
- (23) 22222223 2 California Towhee
- Lark Sparrow
- Savannah Sparrow
- (14) Song Sparrow
- Lincoln's Sparrow
- White-crowned Sparrow
- (1) Red-winged Blackbird
- Western Meadowlark
- Brewer's Blackbird
- (7) 1 32 Brown-headed Cowbird
- Hooded Oriole
- (5) Northern Oriole
- (4) House Finch
- Pine Siskin
- (2) Lesser Goldfinch
- Lawrence's Goldfinch
- American Goldfinch
- House Sparrow
- (1) prairie falcon

BIRDS OF Santa Clara River System

Friday

Locality Castaic Creek Date 7/13/01 Time 6:30 - 8:30

_____ Great Blue Heron
_____ Green Heron
_____ Mallard
_____ Turkey Vulture
_____ White-tailed Kite
_____ Sharp-shinned Hawk
_____ Cooper's Hawk
_____ Red-shouldered Hawk
_____ Red-tailed Hawk
_____ American Kestrel
(35) 1, 20, 6 60 III California Quail
_____ American Coot
(3) __ II Killdeer
_____ Spotted Sandpiper
_____ Least Sandpiper
_____ Common Snipe
_____ Rock Dove
26 IIII 22 4 22 II Mourning Dove
(28) (1) Greater Roadrunner
_____ Barn Owl
_____ Great Horned Owl
_____ White-throated Swift
(2) II Black-ch. Hummingbird
(11) I IIII IIII Anna's Hummingbird
_____ II Costa's Hummingbird
(2) _____ Belted Kingfisher
_____ Acorn Woodpecker
(8) IIII IIII Nuttall's Woodpecker
(8) III IIII Downy Woodpecker
_____ Hairy Woodpecker
_____ Northern Flicker
_____ Western Wood-Pewee
_____ **Willow Flycatcher**
_____ Pacific Slope Flycatcher
(3) __ III Black Phoebe
_____ Say's Phoebe
(1) _____ Ash-throated Flycatcher
_____ Cassin's Kingbird
_____ Western Kingbird
_____ Horned Lark
_____ Tree Swallow
(9) _____ Violet-green Swallow
_____ 8 I N. Rough-winged Swallow
(55) 25, 8886 Cliff Swallow 2nd nesting
_____ Barn Swallow
(16) 5 IIII 22 Scrub Jay
(2) __ II American Crow
_____ Common Raven
(11) II 3 4 2 Plain Titmouse
(17) II 6 9 Bushtit
(10) IIII IIII Bewick's Wren
_____ House Wren
_____ Ruby-crowned Kinglet

_____ **California Gnatcatcher**
_____ Blue-gray Gnatcatcher
_____ Western Bluebird
_____ Swainson's Thrush
_____ Hermit Thrush
_____ American Robin
(2) __ II Wrentit
_____ Northern Mockingbird
(8) IIII IIII California Thrasher
_____ American Pipit
_____ Cedar Waxwing
(1) _____ Phainopepla
_____ Loggerhead Shrike
(7) I 16 European Starling
_____ **Bell's Vireo**
_____ Solitary Vireo
_____ Warbling Vireo
_____ Orange-crowned Warbler
_____ Yellow Warbler
_____ Yellow-rumped Warbler
_____ Common Yellowthroat
_____ Wilson's Warbler
_____ Yellow-breasted Chat
_____ Western Tanager
(19) 6 IIII 3 IIII Black-headed Grosbeak
(2) __ II Blue Grosbeak
_____ Lazuli Bunting
(21) I IIII IIII 12 III Rufous-sided Towhee
(18) 123 IIII 3 III California Towhee
_____ Lark Sparrow
_____ Savannah Sparrow
(6) I IIII Song Sparrow
_____ Lincoln's Sparrow
_____ White-crowned Sparrow
(1) _____ Red-winged Blackbird
_____ Western Meadowlark
_____ Brewer's Blackbird
(4) __ IIII Brown-headed Cowbird
_____ Hooded Oriole
(2) __ II Northern Oriole
(27) IIII 6 5 22 II House Finch
_____ Pine Siskin
(5) __ II 2 Lesser Goldfinch
_____ Lawrence's Goldfinch
(1) _____ American Goldfinch
(2) __ II House Sparrow

2001 Upper River - Area 6

BIRDS OF Santa Clara River System

Locality SAN FRANCISQUITO Date 5-15 Time 6:50 - 8 AM

- ____ Great Blue Heron
- ____ Green Heron
- ____ Mallard
- ____ Turkey Vulture
- ____ White-tailed Kite
- ____ Sharp-shinned Hawk
- ____ Cooper's Hawk
- ____ Red-shouldered Hawk
- ____ Red-tailed Hawk
- ____ American Kestrel
- 6 22 California Quail
- ____ American Coot
- 2 Killdeer
- ____ Spotted Sandpiper
- ____ Least Sandpiper
- ____ Common Snipe
- ____ Rock Dove
- 2 5 3 Mourning Dove
- ____ Greater Roadrunner
- ____ Barn Owl
- ____ Great Horned Owl
- ____ White-throated Swift
- ____ Black-ch. Hummingbird
- 11 Anna's Hummingbird
- ____ Costa's Hummingbird
- ____ Belted Kingfisher
- ____ Acorn Woodpecker
- 1 Nuttall's Woodpecker
- ____ Downy Woodpecker
- ____ Hairy Woodpecker
- ____ Northern Flicker
- ____ Western Wood-Pewee
- ____ **Willow Flycatcher**
- ____ Pacific Slope Flycatcher
- 2 Black Phoebe
- 1 Say's Phoebe
- 1 Ash-throated Flycatcher
- ____ Cassin's Kingbird
- 2 2 Western Kingbird
- ____ Horned Lark
- ____ Tree Swallow
- ____ Violet-green Swallow
- ____ N. Rough-winged Swallow
- ____ Cliff Swallow
- ____ Barn Swallow
- 4 11 Scrub Jay
- ____ American Crow
- 3 11 Common Raven
- 111 Plain Titmouse
- 2 Bushtit
- 2 = 2 1 - 2 11 Bewick's Wren
- 1 1 House Wren
- ____ Ruby-crowned Kinglet
- ____ **California Gnatcatcher**
- ____ Blue-gray Gnatcatcher
- 2 Western Bluebird
- ____ Swainson's Thrush
- ____ Hermit Thrush
- ____ American Robin
- 3 Wrentit
- 111 Northern Mockingbird
- 11 California Thrasher
- ____ American Pipit
- ____ Cedar Waxwing
- ____ Phainopepla
- ____ Loggerhead Shrike
- 2 European Starling
- ____ **Bell's Vireo**
- ____ Solitary Vireo
- ____ Warbling Vireo
- ____ Orange-crowned Warbler
- ____ Yellow Warbler
- ____ Yellow-rumped Warbler
- ____ Common Yellowthroat
- ____ Wilson's Warbler
- ____ Yellow-breasted Chat
- ____ Western Tanager
- 111 Black-headed Grosbeak
- ____ Blue Grosbeak
- ____ Lazuli Bunting
- 1 1 1 2 1 2 12 Rufous-sided Towhee
- 2 2 2 2 2 California Towhee
- ____ Lark Sparrow
- ____ Savannah Sparrow
- 111 Song Sparrow
- ____ Lincoln's Sparrow
- ____ White-crowned Sparrow
- ____ Red-winged Blackbird
- ____ Western Meadowlark
- ____ Brewer's Blackbird
- ____ Brown-headed Cowbird
- ____ Hooded Oriole
- 1 Northern Oriole
- 4 2 4 House Finch
- ____ Pine Siskin
- 4 4 3 4 Lesser Goldfinch
- ____ Lawrence's Goldfinch
- ____ American Goldfinch
- ____ House Sparrow

TOTALS Any Upper

BIRDS OF Santa Clara River System

Locality San Francisco Cr. Lower wet Date 5/19/01 Time 6:45

- Great Blue Heron
- Green Heron
- Mallard
- Turkey Vulture
- White-tailed Kite
- Sharp-shinned Hawk
- Cooper's Hawk
- Red-shouldered Hawk
- || Red-tailed Hawk
- American Kestrel
- 122 California Quail
- American Coot
- Killdeer
- Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- Rock Dove
- 212 Mourning Dove
- Greater Roadrunner
- | Barn Owl
- Great Horned Owl
- White-throated Swift
- | Black-ch. Hummingbird
- || Anna's Hummingbird
- | Costa's Hummingbird
- Belted Kingfisher
- | Acorn Woodpecker
- Nuttall's Woodpecker
- Downy Woodpecker
- | Hairy Woodpecker
- Northern Flicker
- Western Wood-Pewee
- **Willow Flycatcher**
- Pacific Slope Flycatcher
- Black Phoebe
- Say's Phoebe
- || Ash-throated Flycatcher
- Cassin's Kingbird
- Western Kingbird
- Horned Lark
- Tree Swallow
- Violet-green Swallow
- N. Rough-winged Swallow
- 60 Cliff Swallow
- Barn Swallow
- ||| Scrub Jay
- | American Crow
- || Common Raven
- Plain Titmouse
- 22 Bushtit
- ||| Bewick's Wren
- 10 House Wren
- Ruby-crowned Kinglet
- **California Gnatcatcher**
- Blue-gray Gnatcatcher
- Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- American Robin
- Wrentit
- Northern Mockingbird
- | California Thrasher
- American Pipit
- Cedar Waxwing
- Phainopepla
- Loggerhead Shrike
- | European Starling
- **Bell's Vireo**
- Solitary Vireo
- Warbling Vireo
- Orange-crowned Warbler
- | Yellow Warbler
- Yellow-rumped Warbler
- 1 |||| Common Yellowthroat
- Wilson's Warbler
- Yellow-breasted Chat
- Western Tanager
- ||| Black-headed Grosbeak
- Blue Grosbeak
- Lazuli Bunting
- 624 |||| Rufous-sided Towhee
- 489 ||| California Towhee
- Lark Sparrow
- Savannah Sparrow
- 466 |||| Song Sparrow
- Lincoln's Sparrow
- White-crowned Sparrow
- Red-winged Blackbird
- Western Meadowlark
- 5 Brewer's Blackbird
- ||| Brown-headed Cowbird
- Hooded Oriole
- Northern Oriole
- 224 House Finch
- Pine Siskin
- ||2 Lesser Goldfinch
- Lawrence's Goldfinch
- American Goldfinch
- House Sparrow
- 1 Barn Owl under Bridge

Sunny, hot, dry

BIRDS OF Santa Clara River System

Locality San Francisquito **Date** 6/14/01 **Time** 6:45 – 9:45

- Great Blue Heron from Copper canyon down
- Green Heron
- Mallard
- Turkey Vulture
- White-tailed Kite
- Sharp-shinned Hawk
- Cooper's Hawk
- Red-shouldered Hawk
- 1 Red-tailed Hawk
- American Kestrel
- 10, 20, 20, 2, 2 California Quail
- American Coot
- 3 Killdeer
- Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- 3 Rock Dove
- 4, 10, 20, 10, 2, 2 Mourning Dove
- Greater Roadrunner
- 2 Barn Owl (one young) under Newhall Ranch Bridge
- Great Horned Owl
- White-throated Swift
- 1 Black-ch. Hummingbird
- 1 Anna's Hummingbird
- Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- 1 Nuttall's Woodpecker
- Downy Woodpecker
- Hairy Woodpecker
- Northern Flicker
- Western Wood-Pewee
- **Willow Flycatcher**
- Pacific Slope Flycatcher
- 3 Black Phoebe
- Say's Phoebe
- 2 Ash-throated Flycatcher
- Cassin's Kingbird
- 2 Western Kingbird
- Horned Lark
- Tree Swallow
- Violet-green Swallow
- 6 N. Rough-winged Swallow
- 4 Cliff Swallow
- 2 Barn Swallow
- 1 Scrub Jay
- American Crow
- 3 Common Raven
- 1 Plain Titmouse
- 2 Bushtit
- 1 Bewick's Wren
- House Wren
- Ruby-crowned Kinglet
- **California Gnatcatcher**
- Blue-gray Gnatcatcher
- 2 Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- American Robin
- Wrentit
- 3 Northern Mockingbird
- 13 California Thrasher
- American Pipit
- Cedar Waxwing
- Phainopepla
- Loggerhead Shrike
- 2 European Starling
- **Bell's Vireo**
- Solitary Vireo
- Warbling Vireo
- Orange-crowned Warbler
- 1 Yellow Warbler
- Yellow-rumped Warbler
- Common Yellowthrat
- Wilson's Warbler
- Yellow-breasted Chat
- Western Tanager
- 2 Black-headed Grosbeak
- Blue Grosbeak
- Lazuli Bunting
- 2 Rufous-sided Towhee
- California Towhee
- Lark Sparrow
- Savannah Sparrow
- Song Sparrow
- Lincoln's Sparrow
- White-crowned Sparrow
- 2 Red-winged Blackbird
- Western Meadowlark
- Brewer's Blackbird
- Brown-headed Cowbird
- 1 Hooded Oriole
- 2 Northern Oriole
- House Finch
- Pine Siskin
- Lesser Goldfinch
- Lawrence's Goldfinch
- American Goldfinch
- House Sparrow

BIRDS OF Santa Clara River System

Monday

Locality San Francisquito Date 6/25/01 Time 6:30 - 9:45

- ____ Great Blue Heron (copperhill to around curve)
- ____ Green Heron
- ____ Mallard
- ____ Turkey Vulture
- ____ White-tailed Kite
- ____ Sharp-shinned Hawk
- ____ Cooper's Hawk
- 1 Red-shouldered Hawk
- 2 Red-tailed Hawk
- ____ American Kestrel
- 22 12 11 12 California Quail
- ____ American Coot
- 111 Killdeer
- ____ Spotted Sandpiper
- ____ Least Sandpiper
- ____ Common Snipe
- 1 Rock Dove
- 48 23 4 2 111 Mourning Dove
- ____ Greater Roadrunner
- 1 Barn Owl (pellets under Copperhill bridge)
- ____ Great Horned Owl (under Newhall)
- ____ White-throated Swift
- 1 Black-ch. Hummingbird
- 1 111 111 111 Anna's Hummingbird
- 111 Costa's Hummingbird
- ____ Belted Kingfisher
- ____ Acorn Woodpecker
- 12 111 111 Nuttall's Woodpecker
- 111 Downy Woodpecker
- ____ Hairy Woodpecker
- ____ Northern Flicker
- ____ Western Wood-Pewee
- ____ **Willow Flycatcher**
- ____ Pacific Slope Flycatcher
- 11 Black Phoebe
- 1 Say's Phoebe
- 2 11 2 2 22 11 Ash-throated Flycatcher
- ____ Cassin's Kingbird
- ____ Western Kingbird
- ____ Horned Lark
- ____ Tree Swallow
- ____ Violet-green Swallow
- 111 N. Rough-winged Swallow
- 8 4 11 6 11 Cliff Swallow (still nesting under Scott)
- ____ Barn Swallow
- 1 12 5 11 12 Scrub Jay
- 22 11 20 American Crow
- 111 2 Common Raven
- 1 111 111 Plain Titmouse
- 20 24 Bushtit
- 8 111 111 111 Bewick's Wren
- ____ House Wren
- ____ Ruby-crowned Kinglet
- ____ **California Gnatcatcher**
- ____ Blue-gray Gnatcatcher
- 4 Western Bluebird
- ____ Swainson's Thrush
- ____ Hermit Thrush
- ____ American Robin
- ____ Wrentit
- 12 1 Northern Mockingbird
- 1111 California Thrasher
- ____ American Pipit
- ____ Cedar Waxwing
- 111 111 Phainopepla
- ____ Loggerhead Shrike
- 1111 2 European Starling
- ____ **Bell's Vireo**
- ____ Solitary Vireo
- ____ Warbling Vireo
- ____ Orange-crowned Warbler
- ____ Yellow Warbler
- ____ Yellow-rumped Warbler
- 4 111 Common Yellowthroat
- ____ Wilson's Warbler
- ____ Yellow-breasted Chat
- ____ Western Tanager
- ____ Black-headed Grosbeak
- ____ Blue Grosbeak
- ____ Lazuli Bunting
- 8 111 88 8 46 111 Rufous-sided Towhee
- 11 2 11 88 8 4 22 California Towhee
- ____ Lark Sparrow
- ____ Savannah Sparrow
- 1 8 8 4 Song Sparrow
- ____ Lincoln's Sparrow
- ____ White-crowned Sparrow
- ____ Red-winged Blackbird
- ____ Western Meadowlark
- ____ Brewer's Blackbird
- 11 Brown-headed Cowbird
- ____ Hooded Oriole
- 11 111 20 Northern Oriole
- 6 8 8 6 2 6 4 8 4 House Finch
- ____ Pine Siskin
- 26 22 12 4 Lesser Goldfinch
- ____ Lawrence's Goldfinch
- ____ American Goldfinch
- ____ House Sparrow

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_____

BIRDS OF Santa Clara River System

Locality Santa Francisquito Ck Date 7/7/05 Time 6:40 Saturday

- ____ Great Blue Heron
- ____ Green Heron
- ____ Mallard
- ____ Turkey Vulture
- ____ White-tailed Kite
- ____ Sharp-shinned Hawk
- ____ Cooper's Hawk
- ____ Red-shouldered Hawk
- ____ Red-tailed Hawk
- ____ American Kestrel
- (17) 8 \|\|\| 5 \|\| California Quail
- ____ American Coot
- (2) \|\| Killdeer
- ____ Spotted Sandpiper
- ____ Least Sandpiper
- ____ Common Snipe
- ____ Rock Dove
- (17) \|\|\| 2 \|\| 4 \|\| 3 \|\| Mourning Dove
- ____ Greater Roadrunner
- ____ Barn Owl
- ____ Great Horned Owl
- ____ White-throated Swift
- (3) \|\| Black-ch. Hummingbird
- (15) \|\|\| \|\|\| \|\|\| \|\| Anna's Hummingbird
- ____ Costa's Hummingbird
- ____ Belted Kingfisher
- ____ Acorn Woodpecker
- (9) \|\|\| \|\|\| \|\|\| Nuttall's Woodpecker
- ____ Downy Woodpecker
- ____ Hairy Woodpecker
- ____ Northern Flicker
- ____ Western Wood-Pewee
- ____ **Willow Flycatcher**
- ____ Pacific Slope Flycatcher
- (1) Black Phoebe
- ____ Say's Phoebe
- (9) 3 \|\| 2 \|\| Ash-throated Flycatcher
- ____ Cassin's Kingbird
- (9) 5 2 \|\| Western Kingbird
- ____ Horned Lark
- ____ Tree Swallow
- ____ Violet-green Swallow
- (18) 4 2 6 N. Rough-winged Swallow
- (39) 12 15 \|\| Cliff Swallow
- (3) \|\| Barn Swallow
- (11) \|\| 2 \|\| 4 2 Scrub Jay
- (8) 35 American Crow
- (11) \|\|\| 3 2 \|\| Common Raven
- ____ Plain Titmouse
- (7) 6 Bushtit
- (12) \|\|\| 2 2 Bewick's Wren
- ____ House Wren
- ____ Ruby-crowned Kinglet
- ____ **California Gnatcatcher**
- ____ Blue-gray Gnatcatcher
- (6) Western Bluebird
- ____ Swainson's Thrush
- ____ Hermit Thrush
- ____ American Robin
- ____ Wrentit
- (1) Northern Mockingbird
- (3) \|\| California Thrasher
- ____ American Pipit
- ____ Cedar Waxwing
- (4) \|\|\| Phainopepla
- ____ Loggerhead Shrike
- ____ European Starling
- ____ **Bell's Vireo**
- ____ Solitary Vireo
- ____ Warbling Vireo
- ____ Orange-crowned Warbler
- ____ Yellow Warbler
- ____ Yellow-rumped Warbler
- ____ Common Yellowthroat
- ____ Wilson's Warbler
- ____ Yellow-breasted Chat
- ____ Western Tanager
- (4) 1 3 Black-headed Grosbeak
- ____ Blue Grosbeak
- ____ Lazuli Bunting
- (14) \| \|\| 2 2 \|\| Rufous-sided Towhee
- (9) 2 \|\| 2 2 California Towhee
- ____ Lark Sparrow
- ____ Savannah Sparrow
- (2) \|\| Song Sparrow
- ____ Lincoln's Sparrow
- ____ White-crowned Sparrow
- ____ Red-winged Blackbird
- ____ Western Meadowlark
- ____ Brewer's Blackbird
- ____ Brown-headed Cowbird
- ____ Hooded Oriole
- (6) 1 3 2 Northern Oriole
- 21 9 8 6 2 6 6 0 3 \|\| House Finch
- (72) ____ Pine Siskin
- (9) \|\| 2 \|\| 2 Lesser Goldfinch
- ____ Lawrence's Goldfinch
- ____ American Goldfinch
- ____ House Sparrow

BIRDS OF Santa Clara River System

Locality SAN FRANCISQ Date 7-17 Time 615 - 815

- Great Blue Heron
- Green Heron
- Mallard
- Turkey Vulture
- White-tailed Kite
- Sharp-shinned Hawk
- Cooper's Hawk
- Red-shouldered Hawk
- Red-tailed Hawk
- American Kestrel
- 2 California Quail
- American Coot
- 1 Killdeer
- Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- Rock Dove
- 2 Mourning Dove
- 1 Greater Roadrunner
- Great Horned Owl
- White-throated Swift
- 11 Black-ch. Hummingbird
- 111 Anna's Hummingbird
- Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- 1111 Nuttall's Woodpecker
- Downy Woodpecker
- Hairy Woodpecker
- Northern Flicker
- Western Wood-Pewee
- **Willow Flycatcher**
- Pacific Slope Flycatcher
- Black Phoebe
- Say's Phoebe
- 11 Ash-throated Flycatcher
- Cassin's Kingbird
- 11 Western Kingbird
- Horned Lark
- Tree Swallow
- Violet-green Swallow
- 1 N. Rough-winged Swallow
- Cliff Swallow
- Barn Swallow
- 21 1112 Scrub Jay
- American Crow
- 11 Common Raven
- 21 Plain Titmouse
- Bushtit
- 111 Bewick's Wren
- House Wren
- Ruby-crowned Kinglet
- **California Gnatcatcher**
- Blue-gray Gnatcatcher
- Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- American Robin
- 11 Wrentit
- Northern Mockingbird
- 111 California Thrasher
- American Pipit
- Cedar Waxwing
- 1 Phainopepla
- Loggerhead Shrike
- European Starling
- **Bell's Vireo**
- Solitary Vireo
- Warbling Vireo
- Orange-crowned Warbler
- Yellow Warbler
- Yellow-rumped Warbler
- Common Yellowthroat
- Wilson's Warbler
- Yellow-breasted Chat
- Western Tanager
- Black-headed Grosbeak
- 1 Blue Grosbeak
- 2 Lazuli Bunting
- 1111 Rufous-sided Towhee
- 2 2 2 California Towhee
- Lark Sparrow
- Savannah Sparrow
- 4 Song Sparrow
- Lincoln's Sparrow
- White-crowned Sparrow
- Red-winged Blackbird
- Western Meadowlark
- Brewer's Blackbird
- Brown-headed Cowbird
- Hooded Oriole
- Northern Oriole
- 6 8 5 6 6 3 3 House Finch
- Pine Siskin
- 2 2 3 2 Lesser Goldfinch
- 1 Lawrence's Goldfinch
- American Goldfinch
- House Sparrow

clear 60°F

coyote

Copper Mill

2001 Upper River - Area 7

BIRDS OF Santa Clara River System

Locality South Fork - lower Date 2/15/01 Tues Time

- Great Blue Heron
- Green Heron
- Mallard
- Turkey Vulture
- White-tailed Kite
- Sharp-shinned Hawk
- Cooper's Hawk
- Red-shouldered Hawk
- Red-tailed Hawk
- American Kestrel
- California Quail
- American Coot
- Killdeer
- Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- Rock Dove
- Mourning Dove
- Greater Roadrunner
- Barn Owl
- Great Horned Owl
- White-throated Swift
- Black-ch. Hummingbird
- Anna's Hummingbird
- Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- Nuttall's Woodpecker
- Downy Woodpecker
- Hairy Woodpecker
- Northern Flicker
- Western Wood-Pewee
- **Willow Flycatcher**
- Pacific Slope Flycatcher
- Black Phoebe
- Say's Phoebe
- Ash-throated Flycatcher
- Cassin's Kingbird
- Western Kingbird
- Horned Lark
- Tree Swallow
- Violet-green Swallow
- N. Rough-winged Swallow
- Cliff Swallow
- Barn Swallow
- Scrub Jay
- American Crow
- Common Raven
- Plain Titmouse
- Bushtit
- Bewick's Wren
- House Wren
- Ruby-crowned Kinglet
- **California Gnatcatcher**
- Blue-gray Gnatcatcher
- Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- American Robin
- Wrentit
- Northern Mockingbird
- California Thrasher
- American Pipit
- Cedar Waxwing
- Phainopepla
- Loggerhead Shrike
- European Starling
- **Bell's Vireo**
- Solitary Vireo
- Warbling Vireo
- Orange-crowned Warbler
- Yellow Warbler
- Yellow-rumped Warbler
- Common Yellowthroat
- Wilson's Warbler
- Yellow-breasted Chat
- Western Tanager
- Black-headed Grosbeak
- Blue Grosbeak
- Lazuli Bunting
- Rufous-sided Towhee
- California Towhee
- Lark Sparrow
- Savannah Sparrow
- Song Sparrow
- Lincoln's Sparrow
- White-crowned Sparrow
- Red-winged Blackbird
- Western Meadowlark
- Brewer's Blackbird
- Brown-headed Cowbird
- Hooded Oriole
- Northern Oriole
- House Finch
- Pine Siskin
- Lesser Goldfinch
- Lawrence's Goldfinch
- American Goldfinch
- House Sparrow

1 coyote
3 rabbits
112 ground squirrels

BIRDS OF Santa Clara River System

Locality Lower South Fork Date 5/14/04 Time

_____ Great Blue Heron
_____ Green Heron
_____ Mallard
_____ Turkey Vulture
_____ White-tailed Kite
_____ Sharp-shinned Hawk
_____ Cooper's Hawk
_____ Red-shouldered Hawk
(2) || Red-tailed Hawk
(1) American Kestrel
(11) 2 || 22 California Quail
_____ American Coot
(1) Killdeer
_____ Spotted Sandpiper
_____ Least Sandpiper
_____ Common Snipe
_____ Rock Dove
(22) (60) 1 42 Mourning Dove
_____ Greater Roadrunner
_____ Barn Owl
_____ Great Horned Owl
_____ White-throated Swift
(1) Black-ch. Hummingbird
(3) ||| Anna's Hummingbird
(1) Costa's Hummingbird
_____ Belted Kingfisher
_____ Acorn Woodpecker
_____ Nuttall's Woodpecker
(1) Downy Woodpecker
_____ Hairy Woodpecker
_____ Northern Flicker
_____ Western Wood-Pewee
_____ **Willow Flycatcher**
_____ Pacific Slope Flycatcher
(2) Black Phoebe
(2) Say's Phoebe (adults & fledged young)
(1) Ash-throated Flycatcher
_____ Cassin's Kingbird
(1) Western Kingbird
_____ Horned Lark
_____ Tree Swallow
_____ Violet-green Swallow
(6) 2 || 2 N. Rough-winged Swallow
(5) 2 || Cliff Swallow
_____ Barn Swallow
(5) ||| Scrub Jay
(4) ||| American Crow
(16) 14 || Common Raven
(2) || Plain Titmouse
(2) Bushtit
(7) || ||| Bewick's Wren
_____ House Wren
_____ Ruby-crowned Kinglet
_____ California Gnatcatcher
_____ Blue-gray Gnatcatcher
(2) Western Bluebird
_____ Swainson's Thrush
_____ Hermit Thrush
_____ American Robin
(1) Wrentit
(5) ||| Northern Mockingbird
(2) || California Thrasher
_____ American Pipit
_____ Cedar Waxwing
(3) 12 Phainopepla
_____ Loggerhead Shrike
(6) 20 || European Starling
_____ **Bell's Vireo**
_____ Solitary Vireo
_____ Warbling Vireo
_____ Orange-crowned Warbler
(4) |||| Yellow Warbler
_____ Yellow-rumped Warbler
_____ Common Yellowthroat
_____ Wilson's Warbler
_____ Yellow-breasted Chat
_____ Western Tanager
_____ Black-headed Grosbeak
_____ Blue Grosbeak
_____ Lazuli Bunting
(3) ||| Rufous-sided Towhee
(8) ||| ||| California Towhee
_____ Lark Sparrow
_____ Savannah Sparrow
(4) |||| Song Sparrow
_____ Lincoln's Sparrow
_____ White-crowned Sparrow
_____ Red-winged Blackbird
_____ Western Meadowlark
(5) 32 Brewer's Blackbird
(3) ||| Brown-headed Cowbird
_____ Hooded Oriole
_____ Northern Oriole
(28) 20 4 8 House Finch
_____ Pine Siskin
(2) Lesser Goldfinch
_____ Lawrence's Goldfinch
_____ American Goldfinch
(10) 6 || 2 House Sparrow
(1) Gulls fly over
(3) Tricolored blackbirds at baseball complex
_____
_____
_____
_____
_____

BIRDS OF Santa Clara River System

Locality South Fork, Lower Date 6/16/01 Time ____

- ____ Great Blue Heron
- ____ Green Heron
- 1 Mallard
- ____ Turkey Vulture
- ____ White-tailed Kite
- ____ Sharp-shinned Hawk
- ____ Cooper's Hawk
- ____ Red-shouldered Hawk
- ____ Red-tailed Hawk
- 1 American Kestrel
- ____ California Quail
- ____ American Coot
- ____ Killdeer
- ____ Spotted Sandpiper
- ____ Least Sandpiper
- ____ Common Snipe
- ____ Rock Dove
- 29 Mourning Dove
- ____ Greater Roadrunner
- ____ Barn Owl
- ____ Great Horned Owl
- ____ White-throated Swift
- ____ Black-ch. Hummingbird
- 1 Anna's Hummingbird
- ____ Costa's Hummingbird
- ____ Belted Kingfisher
- ____ Acorn Woodpecker
- 1 Nuttall's Woodpecker
- ____ Downy Woodpecker
- ____ Hairy Woodpecker
- ____ Northern Flicker
- ____ Western Wood-Pewee
- ____ **Willow Flycatcher**
- ____ Pacific Slope Flycatcher
- 11 Black Phoebe
- ____ Say's Phoebe
- ____ Ash-throated Flycatcher
- ____ Cassin's Kingbird
- ____ Western Kingbird
- ____ Horned Lark
- ____ Tree Swallow
- ____ Violet-green Swallow
- 5 N. Rough-winged Swallow
- 113 Cliff Swallow
- ____ Barn Swallow
- 11 Scrub Jay
- ____ American Crow
- 12 Common Raven
- ____ Plain Titmouse
- ____ Bushtit
- 111 Bewick's Wren
- ____ House Wren
- ____ Ruby-crowned Kinglet
- ____ **California Gnatcatcher**
- ____ Blue-gray Gnatcatcher
- ____ Western Bluebird
- ____ Swainson's Thrush
- ____ Hermit Thrush
- ____ American Robin
- ____ Wrentit
- ____ Northern Mockingbird
- 11 California Thrasher
- ____ American Pipit
- ____ Cedar Waxwing
- 1 Phainopepla
- ____ Loggerhead Shrike
- 111 European Starling
- ____ **Bell's Vireo**
- ____ Solitary Vireo
- ____ Warbling Vireo
- ____ Orange-crowned Warbler
- ____ Yellow Warbler
- ____ Yellow-rumped Warbler
- 11 Common Yellowthroat
- ____ Wilson's Warbler
- ____ Yellow-breasted Chat
- ____ Western Tanager
- ____ Black-headed Grosbeak
- ____ Blue Grosbeak
- ____ Lazuli Bunting
- 1 Rufous-sided Towhee
- 112 California Towhee
- ____ Lark Sparrow
- ____ Savannah Sparrow
- 2 Song Sparrow
- ____ Lincoln's Sparrow
- ____ White-crowned Sparrow
- ____ Red-winged Blackbird
- ____ Western Meadowlark
- 1 Brewer's Blackbird
- ____ Brown-headed Cowbird
- ____ Hooded Oriole
- ____ Northern Oriole
- 6 House Finch
- ____ Pine Siskin
- ____ Lesser Goldfinch
- ____ Lawrence's Goldfinch
- ____ American Goldfinch
- ____ House Sparrow

BIRDS OF Santa Clara River System

Locality Lower South Fork Date 6/22/01 Wed Time 9:45 - 10:30

- ____ Great Blue Heron
- ____ Green Heron
- ____ Mallard
- ____ Turkey Vulture
- ____ White-tailed Kite
- ____ Sharp-shinned Hawk
- ____ Cooper's Hawk
- ____ Red-shouldered Hawk
- ||__ Red-tailed Hawk
- ____ American Kestrel
- |__ California Quail
- ____ American Coot
- |__ Killdeer
- ____ Spotted Sandpiper
- ____ Least Sandpiper
- ____ Common Snipe
- |__ Rock Dove
- ||| 22|24 Mourning Dove
- ____ Greater Roadrunner
- ____ Barn Owl
- ____ Great Horned Owl
- ____ White-throated Swift
- ____ Black-ch. Hummingbird
- |__ Anna's Hummingbird
- ____ Costa's Hummingbird
- ____ Belted Kingfisher
- ____ Acorn Woodpecker
- ||__ Nuttall's Woodpecker
- ____ Downy Woodpecker
- ____ Hairy Woodpecker
- ____ Northern Flicker
- ____ Western Wood-Pewee
- ____ **Willow Flycatcher**
- ____ Pacific Slope Flycatcher
- ____ Black Phoebe
- ____ Say's Phoebe
- 3| Ash-throated Flycatcher
- ____ Cassin's Kingbird
- |||| Western Kingbird
- ____ Horned Lark
- ____ Tree Swallow
- ____ Violet-green Swallow
- |__ N. Rough-winged Swallow
- ||__ Cliff Swallow
- ____ Barn Swallow
- |||__ Scrub Jay
- ____ American Crow
- 2 |||| 9 Common Raven
- |__ Plain Titmouse
- ____ Bushtit
- ||| Bewick's Wren
- ____ House Wren
- ____ Ruby-crowned Kinglet
- ____ **California Gnatcatcher**
- ____ Blue-gray Gnatcatcher
- ____ Western Bluebird
- ____ Swainson's Thrush
- ____ Hermit Thrush
- ____ American Robin
- ____ Wrentit
- ||__ Northern Mockingbird
- ____ California Thrasher
- ____ American Pipit
- ____ Cedar Waxwing
- ____ Phainopepla
- ____ Loggerhead Shrike
- 4|| European Starling
- ____ **Bell's Vireo**
- ____ Solitary Vireo
- ____ Warbling Vireo
- ____ Orange-crowned Warbler
- ____ Yellow Warbler
- ____ Yellow-rumped Warbler
- ____ Common Yellowthroat
- ____ Wilson's Warbler
- ____ Yellow-breasted Chat
- ____ Western Tanager
- ____ Black-headed Grosbeak
- ____ Blue Grosbeak
- ____ Lazuli Bunting
- |__ Rufous-sided Towhee
- |-|||| California Towhee
- ____ Lark Sparrow
- ____ Savannah Sparrow
- |||| Song Sparrow
- ____ Lincoln's Sparrow
- ____ White-crowned Sparrow
- ____ Red-winged Blackbird
- ____ Western Meadowlark
- ||| Brewer's Blackbird
- |__ Brown-headed Cowbird
- ||__ Hooded Oriole *fading*
- ____ Northern Oriole
- 6 2 3234 House Finch
- ____ Pine Siskin
- 3 Lesser Goldfinch
- ____ Lawrence's Goldfinch
- ____ American Goldfinch
- 2 House Sparrow

BIRDS OF Santa Clara River System

Locality S Fork McGr 126 (lower) Date 7-7 Time 6:45 - 7:45

- (1) Great Blue Heron
- Green Heron
- Mallard
- Turkey Vulture
- White-tailed Kite
- Sharp-shinned Hawk
- Cooper's Hawk
- Red-shouldered Hawk
- (2) Red-tailed Hawk
- American Kestrel
- (2) California Quail
- American Coot
- (5) 1112 Killdeer
- Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- Rock Dove
- (8) 4 22 Mourning Dove
- Greater Roadrunner
- Barn Owl
- Great Horned Owl
- White-throated Swift
- Black-ch. Hummingbird
- Anna's Hummingbird
- Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- (1) Nuttall's Woodpecker
- (1) Downy Woodpecker
- Hairy Woodpecker
- Northern Flicker
- Western Wood-Pewee
- **Willow Flycatcher**
- Pacific Slope Flycatcher
- (7) 2111 Black Phoebe
- Say's Phoebe
- (1) Ash-throated Flycatcher
- Cassin's Kingbird
- (4) 2 Western Kingbird
- Horned Lark
- Tree Swallow
- Violet-green Swallow
- (8) N. Rough-winged Swallow
- Cliff Swallow
- Barn Swallow
- (6) 1 1111 Scrub Jay
- (4) 3 1 American Crow
- (1) Common Raven
- (1) Plain Titmouse
- Bushtit
- (3) 111 Bewick's Wren
- House Wren
- Ruby-crowned Kinglet
- **California Gnatcatcher**
- Blue-gray Gnatcatcher
- Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- American Robin
- Wrentit
- (4) 1111 Northern Mockingbird
- California Thrasher
- American Pipit
- Cedar Waxwing
- Phainopepla
- Loggerhead Shrike
- (6) 2 22 European Starling
- **Bell's Vireo**
- Solitary Vireo
- Warbling Vireo
- Orange-crowned Warbler
- Yellow Warbler
- Yellow-rumped Warbler
- Common Yellowthroat
- Wilson's Warbler
- Yellow-breasted Chat
- Western Tanager
- Black-headed Grosbeak
- Blue Grosbeak
- Lazuli Bunting
- (1) Rufous-sided Towhee
- (8) 2 222 California Towhee
- Lark Sparrow
- Savannah Sparrow
- (3) 12 Song Sparrow
- Lincoln's Sparrow
- White-crowned Sparrow
- (33) 2 12 4 5 Red-winged Blackbird
- Western Meadowlark
- Brewer's Blackbird
- Brown-headed Cowbird
- Hooded Oriole
- (5) 111 Northern Oriole
- (11) 4 2 3 2 House Finch
- Pine Siskin
- Lesser Goldfinch
- Lawrence's Goldfinch
- American Goldfinch
- House Sparrow

1 coyote
1 deer
8 rabbits
4 g. squirrels

~~1999~~ 2001 Upper River Area 8

BIRDS OF Santa Clara River System

Locality Upper South Fork Date 5/14/01 Time 6:45

- Great Blue Heron
- Green Heron
- Mallard
- Turkey Vulture
- White-tailed Kite
- Sharp-shinned Hawk
- Cooper's Hawk
- Red-shouldered Hawk
- Red-tailed Hawk
- (1) American Kestrel
- (9) 2 California Quail
- American Coot
- (3) 4 Killdeer
- Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- Rock Dove
- (21) Mourning Dove
- Greater Roadrunner
- Barn Owl
- Great Horned Owl
- White-throated Swift
- (1) Black-ch. Hummingbird
- (10) Anna's Hummingbird
- Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- (4) Nuttall's Woodpecker
- Downy Woodpecker
- Hairy Woodpecker
- Northern Flicker
- Western Wood-Pewee
- **Willow Flycatcher**
- Pacific Slope Flycatcher
- (1) Black Phoebe
- Say's Phoebe
- (3) Ash-throated Flycatcher
- Cassin's Kingbird
- (2) Western Kingbird
- Horned Lark
- Tree Swallow
- Violet-green Swallow
- (6) N. Rough-winged Swallow
- (1) Cliff Swallow
- Barn Swallow
- (4) Scrub Jay
- (3) American Crow
- (2) Common Raven
- (2) Plain Titmouse
- (10) Bushtit
- (12) Bewick's Wren
- (3) House Wren
- Ruby-crowned Kinglet
- **California Gnatcatcher**
- Blue-gray Gnatcatcher
- Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- American Robin
- (1) Wrentit
- (8) Northern Mockingbird
- (4) California Thrasher
- American Pipit
- Cedar Waxwing
- (3) Phainopepla
- Loggerhead Shrike
- (4) European Starling
- **Bell's Vireo**
- Solitary Vireo
- Warbling Vireo
- Orange-crowned Warbler
- (6) Yellow Warbler
- Yellow-rumped Warbler
- (1) Common Yellowthroat
- (1) Wilson's Warbler
- Yellow-breasted Chat
- (1) Western Tanager
- Black-headed Grosbeak
- Blue Grosbeak
- Lazuli Bunting
- (3) Rufous-sided Towhee
- (19) California Towhee
- Lark Sparrow
- Savannah Sparrow
- (7) Song Sparrow
- Lincoln's Sparrow
- White-crowned Sparrow
- Red-winged Blackbird
- Western Meadowlark
- Brewer's Blackbird
- (6) Brown-headed Cowbird
- Hooded Oriole
- (3) Northern Oriole
- (61) House Finch
- Pine Siskin
- (18) Lesser Goldfinch
- Lawrence's Goldfinch
- (3) American Goldfinch
- (23) House Sparrow

1 Coyote

BIRDS OF Santa Clara River System

Locality South Fork - Upper Date 6/16/04 Time 8:30 – 10:05

- Great Blue Heron
- Green Heron
- Mallard
- Turkey Vulture
- White-tailed Kite
- Sharp-shinned Hawk
- Cooper's Hawk
- Red-shouldered Hawk
- 2 Red-tailed Hawk
- American Kestrel
- 12 California Quail
- American Coot
- 1 Killdeer
- Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- Rock Dove
- 8 Mourning Dove
- Greater Roadrunner
- Barn Owl
- Great Horned Owl
- White-throated Swift
- Black-ch. Hummingbird
- 1 Anna's Hummingbird
- 1 Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- 1 Nuttall's Woodpecker
- Downy Woodpecker
- Hairy Woodpecker
- Northern Flicker
- Western Wood-Pewee
- **Willow Flycatcher**
- Pacific Slope Flycatcher
- 12 Black Phoebe
- Say's Phoebe
- Ash-throated Flycatcher
- Cassin's Kingbird
- 1 Western Kingbird
- Horned Lark
- Tree Swallow
- Violet-green Swallow
- 3 N. Rough-winged Swallow
- 12 Cliff Swallow
- Barn Swallow
- 1 Scrub Jay
- 2 American Crow
- 5 Common Raven
- 1 Plain Titmouse
- 8 Bushtit
- 11 Bewick's Wren
- House Wren
- Ruby-crowned Kinglet
- **California Gnatcatcher**
- Blue-gray Gnatcatcher
- Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- American Robin
- Wrentit
- 1 Northern Mockingbird
- 3 California Thrasher
- American Pipit
- Cedar Waxwing
- Phainopepla
- Loggerhead Shrike
- 1 European Starling
- **Bell's Vireo**
- Solitary Vireo
- Warbling Vireo
- Orange-crowned Warbler
- Yellow Warbler
- Yellow-rumped Warbler
- 1 Common Yellowthroat
- Wilson's Warbler
- Yellow-breasted Chat
- Western Tanager
- Black-headed Grosbeak
- Blue Grosbeak
- Lazuli Bunting
- 3 Rufous-sided Towhee
- 12 California Towhee
- Lark Sparrow
- Savannah Sparrow
- Song Sparrow
- Lincoln's Sparrow
- White-crowned Sparrow
- Red-winged Blackbird
- Western Meadowlark
- Brewer's Blackbird
- Brown-headed Cowbird
- 2 Hooded Oriole
- 3 Northern Oriole
- 14 House Finch
- Pine Siskin
- 12 Lesser Goldfinch
- Lawrence's Goldfinch
- American Goldfinch
- 40, 2 House Sparrow

BIRDS OF Santa Clara River System

Locality Upper South Fork Date 6/27/01 Time 9:00 - 9:45

- Great Blue Heron
- Green Heron
- Mallard
- Turkey Vulture
- White-tailed Kite
- Sharp-shinned Hawk
- Cooper's Hawk
- Red-shouldered Hawk
- || Red-tailed Hawk
- American Kestrel
- 123 California Quail
- American Coot
- || Killdeer
- Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- Rock Dove
- 2|2|| 4212 Mourning Dove
- Greater Roadrunner
- Barn Owl
- Great Horned Owl
- White-throated Swift
- | Black-ch. Hummingbird
- |||| Anna's Hummingbird
- || Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- || Nuttall's Woodpecker
- Downy Woodpecker
- Hairy Woodpecker
- Northern Flicker
- Western Wood-Pewee
- **Willow Flycatcher**
- Pacific Slope Flycatcher
- 12 Black Phoebe
- Say's Phoebe
- | Ash-throated Flycatcher
- Cassin's Kingbird
- Western Kingbird
- Horned Lark
- Tree Swallow
- Violet-green Swallow
- N. Rough-winged Swallow
- Cliff Swallow
- Barn Swallow
- 12 Scrub Jay
- American Crow
- 5112 Common Raven
- ||| Plain Titmouse
- Bushtit
- |||| Bewick's Wren
- House Wren
- Ruby-crowned Kinglet
- California Gnatcatcher
- Blue-gray Gnatcatcher
- | Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- American Robin
- Wrentit
- || Northern Mockingbird
- || California Thrasher
- American Pipit
- Cedar Waxwing
- | Phainopepla
- Loggerhead Shrike
- || European Starling
- **Bell's Vireo**
- Solitary Vireo
- Warbling Vireo
- Orange-crowned Warbler
- Yellow Warbler
- Yellow-rumped Warbler
- || Common Yellowthroat
- Wilson's Warbler
- Yellow-breasted Chat
- Western Tanager
- Black-headed Grosbeak
- || Blue Grosbeak
- Lazuli Bunting
- || Rufous-sided Towhee
- 5 52||| |||| California Towhee
- Lark Sparrow
- Savannah Sparrow
- || Song Sparrow
- Lincoln's Sparrow
- White-crowned Sparrow
- Red-winged Blackbird
- Western Meadowlark
- Brewer's Blackbird
- Brown-headed Cowbird
- Hooded Oriole
- | Northern Oriole
- 20, || 5555 House Finch
- Pine Siskin
- 52 Lesser Goldfinch
- Lawrence's Goldfinch
- American Goldfinch
- 2 House Sparrow

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BIRDS OF Santa Clara River System

Locality S Fork Upper 126 → Coyote Date 7-7 Time 745 – 830

- ____ Great Blue Heron
- ____ Green Heron
- ____ Mallard
- ____ Turkey Vulture
- ____ White-tailed Kite
- ____ Sharp-shinned Hawk
- ____ Cooper's Hawk
- ____ Red-shouldered Hawk
- ____ Red-tailed Hawk
- ____ American Kestrel
- (3) California Quail
- ____ American Coot
- ____ Killdeer
- ____ Spotted Sandpiper
- ____ Least Sandpiper
- ____ Common Snipe
- ____ Rock Dove
- (5) 11 2 2 Mourning Dove
- ____ Greater Roadrunner
- ____ Barn Owl
- ____ Great Horned Owl
- ____ White-throated Swift
- ____ Black-ch. Hummingbird
- ____ Anna's Hummingbird
- ____ Costa's Hummingbird
- ____ Belted Kingfisher
- ____ Acorn Woodpecker
- (1) Nuttall's Woodpecker
- ____ Downy Woodpecker
- ____ Hairy Woodpecker
- ____ Northern Flicker
- ____ Western Wood-Pewee
- ____ **Willow Flycatcher**
- ____ Pacific Slope Flycatcher
- ____ Black Phoebe
- ____ Say's Phoebe
- ____ Ash-throated Flycatcher
- ____ Cassin's Kingbird
- ____ Western Kingbird
- ____ Horned Lark
- ____ Tree Swallow
- ____ Violet-green Swallow
- ____ N. Rough-winged Swallow
- ____ Cliff Swallow
- ____ Barn Swallow
- (7) 2 HH Scrub Jay
- ____ American Crow
- ____ Common Raven
- ____ Plain Titmouse
- (4) Bushtit
- (2) 11 Bewick's Wren
- ____ House Wren
- ____ Ruby-crowned Kinglet
- ____ **California Gnatcatcher**
- ____ Blue-gray Gnatcatcher
- ____ Western Bluebird
- ____ Swainson's Thrush
- ____ Hermit Thrush
- ____ American Robin
- ____ Wrentit
- (5) 11 2 Northern Mockingbird
- ____ California Thrasher
- ____ American Pipit
- ____ Cedar Waxwing
- ____ Phainopepla
- ____ Loggerhead Shrike
- ____ European Starling
- ____ **Bell's Vireo**
- ____ Solitary Vireo
- ____ Warbling Vireo
- ____ Orange-crowned Warbler
- ____ Yellow Warbler
- ____ Yellow-rumped Warbler
- ____ Common Yellowthroat
- ____ Wilson's Warbler
- ____ Yellow-breasted Chat
- ____ Western Tanager
- ____ Black-headed Grosbeak
- ____ Blue Grosbeak
- ____ Lazuli Bunting
- 2 Rufous-sided Towhee
- (1) California Towhee
- ____ Lark Sparrow
- ____ Savannah Sparrow
- (4) 2 11 Song Sparrow
- ____ Lincoln's Sparrow
- ____ White-crowned Sparrow
- ____ Red-winged Blackbird
- ____ Western Meadowlark
- ____ Brewer's Blackbird
- ____ Brown-headed Cowbird
- ____ Hooded Oriole
- (3) 1 2 Northern Oriole
- (14) 4 4 4 2 House Finch
- ____ Pine Siskin
- (4) Lesser Goldfinch
- ____ Lawrence's Goldfinch
- ____ American Goldfinch
- (3) House Sparrow

BIRDS OF Santa Clara River System

Locality South Fork - Upper Date 7/15/01 Time Trans.

_____ Great Blue Heron
_____ Green Heron
_____ Mallard
_____ Turkey Vulture
_____ White-tailed Kite
_____ Sharp-shinned Hawk
_____ Cooper's Hawk
_____ Red-shouldered Hawk
_____ Red-tailed Hawk
_____ American Kestrel
6 California Quail
_____ American Coot
_____ Killdeer
_____ Spotted Sandpiper
_____ Least Sandpiper
_____ Common Snipe
_____ Rock Dove
12 Mourning Dove
_____ Greater Roadrunner
_____ Barn Owl
_____ Great Horned Owl
_____ White-throated Swift
_____ Black-ch. Hummingbird
IIII Anna's Hummingbird
_____ Costa's Hummingbird
_____ Belted Kingfisher
_____ Acorn Woodpecker
II Nuttall's Woodpecker
I Downy Woodpecker
_____ Hairy Woodpecker
_____ Northern Flicker
_____ Western Wood-Pewee
_____ **Willow Flycatcher**
_____ Pacific Slope Flycatcher
2 Black Phoebe
_____ Say's Phoebe
_____ Ash-throated Flycatcher
_____ Cassin's Kingbird
_____ Western Kingbird
_____ Horned Lark
_____ Tree Swallow
_____ Violet-green Swallow
I N. Rough-winged Swallow
3 Cliff Swallow
_____ Barn Swallow
IIII 5 Scrub Jay
2 American Crow
4 Common Raven
I Plain Titmouse
5 Bushtit
IIII Bewick's Wren
_____ House Wren
_____ Ruby-crowned Kinglet

_____ **California Gnatcatcher**
_____ Blue-gray Gnatcatcher
_____ Western Bluebird
_____ Swainson's Thrush
_____ Hermit Thrush
_____ American Robin
_____ Wrentit
3 Northern Mockingbird
_____ California Thrasher
_____ American Pipit
_____ Cedar Waxwing
_____ Phainopepla
_____ Loggerhead Shrike
I European Starling
_____ **Bell's Vireo**
_____ Solitary Vireo
_____ Warbling Vireo
_____ Orange-crowned Warbler
_____ Yellow Warbler
_____ Yellow-rumped Warbler
_____ Common Yellowthroat
_____ Wilson's Warbler
_____ Yellow-breasted Chat
_____ Western Tanager
_____ Black-headed Grosbeak
_____ Blue Grosbeak
_____ Lazuli Bunting
I Rufous-sided Towhee
IIII 22 California Towhee
_____ Lark Sparrow
_____ Savannah Sparrow
_____ Song Sparrow
_____ Lincoln's Sparrow
_____ White-crowned Sparrow
_____ Red-winged Blackbird
_____ Western Meadowlark
_____ Brewer's Blackbird
_____ Brown-headed Cowbird
_____ Hooded Oriole
_____ Northern Oriole
8 8 6 House Finch
_____ Pine Siskin
4 IIII 2 Lesser Goldfinch
_____ Lawrence's Goldfinch
_____ American Goldfinch
_____ House Sparrow

BIRD SURVEYS ALONG A PORTION OF THE SANTA CLARA RIVER AND ITS TRIBUTARIES UPSTREAM FROM THE CASTAIC CREEK CONFLUENCE, NEAR VALENCIA, CALIFORNIA, 2000

Prepared for:

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August 2, 2000

Bird Surveys along a Portion of the Santa Clara River Upstream from the Castaic Creek Confluence, near Valencia, California, 2000

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Nature and Scope of Surveys

During the spring and early summer of 2000 surveys were conducted along a section of the Santa Clara River and its tributaries near Valencia, California (Figure 1). Surveys were focused on determining presence or absence of , yellow-billed cuckoo, least Bell's vireo and southwestern willow flycatcher, and followed U.S. Fish and Wildlife Service Guidelines for the latter two species. Numbers of all species observed were noted, and, in addition to the three species noted above, special attention was placed on locating species considered rare and endangered or of Special Concern, and on determining numbers of brown-headed cowbirds.

Each survey was conducted on foot by observers well acquainted with visual, auditory and behavioral characteristics of southern California birds. Survey routes were designed to cover all areas of each section of the river, with emphasis placed on wetter habitats where least Bell's vireos and other sensitive riparian species are most likely to occur. All surveys occurred between 5:30 and 10:00 a.m. If focus species (yellow-billed cuckoo, least Bell's vireo, and southwestern willow flycatcher), were not visually observed, tapes of their calls were played in an attempt to elicit a response. Personnel for all surveys were Daniel A. Guthrie and Judith A. Sugden, both working under Federal Fish and Wildlife Service Permit number TE810394-1, issued under section 10(a)(1)(A) of the Endangered Species Act.

To facilitate surveys and observe the coverage guidelines for focus species , the area was divided into eight sections (Figure 1). Delineation of the eight areas and comments on each follow. Surveys of the normally dry sections of the river system (Areas 4,6-8) were conducted twice during the nesting season. Although the habitat in these sections, due to dryness, was not considered suitable for focus species, the two surveys were conducted in June to insure that late arriving species such as yellow-billed cuckoo and willow flycatcher, if present, would not be missed. Surveys of the remaining sections of the Santa Clara River (Areas 1-3,5) were conducted according to the least Bell's vireo protocol outlined by the Fish and Wildlife Service, and consisted of 8 surveys between April 10 and July 31st, approximately 2 weeks apart, except when interrupted by periods of poor weather. Surveys in late May and during June also followed Fish and Wildlife Service protocol for southwestern willow flycatcher.

Habitat Condition and Bird Observations.

The riparian zone of the Santa Clara River, as described here, consists of two major habitat types, a wet riparian zone and a dry riparian woodland. The wet riparian zone consists of obligatory wet plants such as cattail and watercress found in continually moist soils along the active river channel and some willow, tamarisk and Baccharis shrubs also found in this zone. This zone is usually flooded during winter rains with the removal of much of the annual vegetation. Although this results in bare areas in April and early May, by June and July, most of this wet riparian vegetation has been reestablished. The dry riparian woodland consists of larger willow and cottonwood forests along the margins of the wet riparian zone and occurring on soils above the flood plain that are normally not damaged in winter floods. The winter of 1999-2000 was fairly mild, with the result that there was little scouring of the river channel and little removal of vegetation. The result was continued development of streamside wet riparian vegetation that was also not damaged during the mild winter of 1998-1999. Except for one cold spell in April, there was little spring rain, with the result that in the dry riparian woodlands smaller trees died and there was little development of annual plants.

Observations of all birds are shown in Tables 1-8. The numbers shown are of birds seen and heard, with heard individuals forming the majority of the observations. Numbers vary between censuses for several reasons. First, there was fog on some censuses which decreased bird activity. Secondly, some censuses were not complete but, rather, were focused on particular places or areas. Thirdly, bird activity varies with season. Different species breed at different times of the year. In general, species are most easily observed when they are actively defending territories by song during the establishment of breeding pairs. Once pairs are established and nesting begins song often decreases and the numbers of birds observed, therefore, also decreases. After young leave the nest, numbers observed may increase. Thus, for most resident species, numbers of adult birds are most accurately censused in April and May, when territorial activity is at a maximum. A few species such as Anna's hummingbird that nest early in the season may be underestimated. Numbers of some nesting species, such as yellow warbler may be higher than normal in May due to migratory birds passing through the area. Numbers may also increase in late June and July when young birds leave the nest.

The following sections contain specific comments on the habitat and bird observations in each area.

Area 1 (Table 1). Santa Clara River; Old Highway to the mouth of Castaic Creek and Castaic Creek from this confluence upstream to State Route 126.

Length of section, 3.5 miles. The Santa Clara River flows continuously in this section and is augmented by the Valencia waste water outfall near the upstream end of this section and by some irrigation runoff from Magic Mountain and agricultural fields along the north side. Extensive dry

riparian forests occur near the Valencia Waste water outfall, near Magic mountain, and near the

Valencia Travel Village. Cooper's hawk and white-tailed kite nested in these areas as did many wrens and towhees.

Along most of this section, wet riparian vegetation forms a narrow strip along the main channel of the Santa Clara River. This vegetation was unaffected by flooding this year. In order to prevent damage to the Old road, the main channel of the river was moved south at Castaic Junction during the spring of 1998 by the creation of a new channel by bulldozer. This new channel has moved the active river channel away from the road edge and has created a zone of low lying land along the north side of the riparian zone at Castaic Junction that is protected from erosion and scouring by spring floods. This protected section is wet from seepage from the main channel and from agricultural and urban runoff, with the result that a dense stand of willows has developed along the north edge of the riparian zone. These willows are now three years old and are prime habitat for both willow flycatchers and least Bell's vireo. Willow flycatchers were observed in migration (Figure 2) and at least two pair of least Bell's vireo nested (Figure 3).

The section of Castaic Creek between the Santa Clara River and Route 126, which is included in this section consists of a wide dry wash. This section was dry throughout the survey period and contains almost exclusively dry riparian vegetation plus some remnants of coastal sage scrub habitat.

The river between the Old Road and Castaic Creek is bounded on the nouth side by agricultural fields and developed land. On the north side, the river is bounded by coastal sage, which contributes such species as wrentit and Lawrence's goldfinch to the avifauna. A red-tailed hawk, ravens, and cliff swallows nested on cliffs along the south side of the river near the mouth of Castaic Creek.

The surveys on this section of the river includes the proposed river crossing area formed by the extension of Commerce Center Drive. This area was carefully searched for focus species and other species of concern. None of the focus species were found in this section. Yellow-breasted chat and yellow warbler, two species of concern, were heard in this section.

Area 2 (Table 2). Santa Clara River; McBean Parkway downstream to the Old Road.

Length of section, 1.4 miles. The Santa Clara River flows continuously in this section and additional water is provided by irrigation runoff from industrial parks along the north side. The channel was received little scouring during the winter of 1999-2000 with the result that wet riparian vegetation was well developed. Noisemakers along the both sides of the river just west of McBean were active during April and May censuses. A small area of coastal sage scrub borders the river just east of Interstate 5, but along the rest of this section the river is now bordered by commercial development.

The wet willow forest near the mouth of San Francisquito Creek was carefully surveyed for focus species as migrating willow flycatcher have been seen here in previous years. None were

found this year. White-tailed kite, Cooper's hawk and many woodpeckers nested in dry riparian woodlands along this section of the river while other species of concern, yellow warbler, yellow-breasted chat, were rarely encountered. Horned larks were observed in dirt fields along the sides of the river.

Area 3 (Table 3). Santa Clara River; Bouquet Canyon Road downstream to McBean Parkway

Length of section, 1.2 miles. Water, supplied by the Saugus wastewater outfall at the Bouquet Canyon Bridge, is continuous in this section of the Santa Clara River. A small amount of additional water is provided from irrigation runoff coming from Bouquet Canyon. Flooding in 1997-98 removed all wet riparian vegetation from this section of the river. Today dry riparian vegetation is restricted to a narrow zone on the north side of the river near McBean Parkway, to some islands of vegetation within the river channel, and a more extensive forest near the athletic park on the south side. Wet riparian vegetation consists of a narrow zone along the outflow from the Saugus outfall, a willow forest in the mouth of Bouquet Canyon Creek, and an extensive flat of cattail, baccharis and willow just upstream from the McBean Bridge.

Cowbird traps were operated in the section just above the McBean Bridge throughout the census period, The cattail flat just east of the McBean Bridge attracted a colony of red-winged blackbirds and other wet riparian species. Tricolored redwing, a California Species of Concern, has nested in this area in previous years but was only observed during migration this year. Barn owls, cliff swallows and a black phoebe nested under the McBean Bridge.

Area 4 (Table 4). Santa Clara River; Bouquet Canyon Road upstream to DWP transmission lines.

Length of section, 2.3 miles. The river channel in this section consists of a broad, flat, dry wash with narrow margins of dry riparian woodland. Within the channel are areas of coastal sage scrub habitat. This section of the Santa Clara River in past years has been wet only briefly during spring rains and due to water release from pumps one mile upstream from Bouquet Canyon Road. This year water flowed only in early April. By the time of the two census dates, water was completely absent. This resulted in very small numbers of riparian species such as song sparrow and yellowthroat. Most birds observed in this section are characteristic of coastal sage and dry riparian woodlands.

Area 5 (Table 5). Castaic Creek; Route 126 to Old Road next to Interstate 5.

Length of section, 1.8 miles. Water was released from upstream dams during April through June but not continuously. Except for pockets of wet vegetation formed near irrigation runoff channels, and remnant puddles near the middle of this section, the creek was dry much of this

spring. Despite this lack of permanent water flow, many wet riparian species (song sparrow, yellowthroat, nested successfully. Construction along both sides of the upper portion of this section has removed most of the coastal sage and ruderal vegetation that once bordered both sides of the riparian zone, eliminating some coastal sage species that visited this area in earlier years. Swallows nested again under the bridge across Route 126 and began nesting under the new bridge during July. The extensive willow forest on this section where least Bell's vireo once nested has matured and was dry much of this year. No vireos have been seen here the last four years and the area no longer seems suitable habitat due to its age and lack of permanent water. Two willow flycatchers were observed in this section on May 24th (Figure 2) but could not be relocated on subsequent visits and are, therefore, considered migrant birds passing through the area.

Area 6 (Table 6). San Francisquito Creek; Santa Clara River upstream 2.5 miles.

Length of section, 2.5 miles. Along most of this section the riparian zone consists of a broad sandy channel. Once bordered by coastal sage scrub habitat, the channel is now bordered by developed areas. In the upper part of this section, however, coastal sage scrub plants still occur within the channel as do sections of dry riparian woodland consisting mostly of cottonwoods. *Arundo* and tamarisk are common along this section along the stream channel. A single wet area exists near power transmission lines in the upper section of this stream, which was dry during surveys, but showed some effects of flow earlier in the spring. The lower ½ mile of San Francisquito Creek is wet due to runoff from adjacent development. Construction activity and noisemakers were present along the lower section downstream from Newhall Ranch Road during April and May.

Area 7 (Table 7). South Fork of the Santa Clara River; McBean Parkway to Magic Mountain Parkway (Route 126).

Length of section, 1.0 miles. The channel along this section of the South Fork is narrow and very sandy. Along most of this section vegetation is restricted to a narrow band of dry woodland and at each side of the channel and a few pockets of wet vegetation supported by runoff from adjacent development. Near the confluence with the main channel of the Santa Clara River a more extensive area of woodland exists on the north side of this section.

Area 8 (Table 8). South Fork of the Santa Clara River, Route 126 upstream to Newhall Creek.

Length of section, 1.4 miles. This section of the river consists of a wide sandy channel intersected by several concrete sills designed to restrict sand movement and flood damage. The river is entirely bordered by developed areas but contains small islands of dry riparian vegetation and some wet riparian areas formed by runoff from culverts along the sides of the creek. No flooding has occurred on this section of the river in recent years and riparian vegetation around these culverts continues to develop the well develop into areas of cottonwood and willow

woodland, resulting in the continued increase in riparian species along this section of the river.

Comments on Threatened and Endangered Species

Yellow-billed Cuckoo

The Yellow-billed Cuckoo is listed as a State Endangered Species. Despite playing taped calls of this species during June and July surveys, no individuals of this species were observed in 2000.

Southwestern Willow Flycatcher

This subspecies is listed under the Federal Endangered Species Act. Willow Flycatchers were once widespread in wet riparian woodland in southern California but now only a few individuals exist. The main California breeding populations of this species are along the Kern River and north of Santa Barbara.

Following the Protocol outlined by Sogge (Technical Report NPS/NAUCPRS/NRTR-97/12) four surveys were conducted specifically for Southwestern Willow Flycatcher in Areas 1-3 and 5 (see dates on tables 1-3, 5). All surveys occurred between 5:30 and 10:00 am. and used taped calls to elicit a response if flycatchers were not first observed. Other sections of the river (Areas 4 and 6-8)were dry during the nesting season for this species, and, therefore, were not considered suitable habitat. However, the two surveys that were conducted of these areas were timed so as to be within the time frame recommended for Southwestern Willow Flycatcher.

Four willow flycatchers were observed at locations shown on Figure 2. Two were observed along Castaic Creek on May 24th, and two others were observed along the Santa Clara River at Castaic Junction, one on May 18th and one on June 6th. Although these birds were in suitable nesting habitat for this species, none could be relocated on subsequent visits. Also, all observations were of single birds that call sporadically, not actively as is expected of territorial birds. For these reasons all four observed birds are considered migrants passing through the area. The report forms required by the U.S. Fish and Wildlife Service Protocol for this species are attached to this report.

Least Bell's Vireo

Surveys of the wet riparian areas (Areas 1-3,5) followed U.S. Fish and Wildlife Service Guidelines for least Bell's vireo. Eight surveys were conducted between April 10 and July 31 (see Tables 1-3,5 for dates). All surveys occurred between 5:30 and 10:00 am. and taped vireo calls were played if no vireos were heard or seen. The only vireos observed were on the Santa Clara River at Castaic Junction in an extensive stand of willows. Vireos were heard in four

places, but at two locations were present for only a limited time period (Figure 3, loc 1,3). These two observations were probably of unpaired birds. At two other locations (Figure 3, loc. 2,4), birds were present throughout most of the study period and nested.

The willow forest in which all four vireo sightings occurred is along the north side of the Santa Clara River in an area cut off from the main channel of the river by a dike created during the spring of 1998. The dike was designed to redirect the river away from the Old Road along the northeastern edge of the river channel, thus protecting it from further erosion. The willows that have developed in this section are now three years old and form an ideal habitat for least Bell's vireo. However, the dike protects this area from flooding and the result is that these willows will continue to mature, eventually forming a forest of older age than preferred by vireos.

Comments on Sensitive Species

Great Blue Heron

Great Blue Herons are listed on the California Natural Diversity Data Base as a species that warrants monitoring. Individuals of this species was observed sparingly along the river after the breeding season and along other sections of the river during migration. No nesting was observed and herons were absent during the nesting season.

Great Egret

The Great egret is listed on the California Natural Diversity Data Base as a species that warrents monitoring. A few individuals were observed along the river during migration and after the breeding season.

White-tailed Kite

This species, formerly the Black-shouldered Kite, is considered a Species of Special Concern by the State of California. A pair of kites nested successfully at Castaic Junction. A second attempted nesting in the area apparently failed due to harassment by the large number of ravens.

Cooper's Hawk

Cooper's Hawk is considered a Species of Special Concern by the State of California. Cooper's Hawks were observed rarely along the main river in 2000, with several observations just east of Interstate 5.

California Horned Lark

This is a California Special Concern species. Although none were observed nesting on the study site, horned larks are ground nesters that prefer bare hillsides and abandoned fields. A few were observed in late summer feeding on bare fields and construction areas along Castaic Creek, along the north side of the Santa Clara River both between Boquet Canyon crossing and McBean Parkway and at Castaic Junction.

Yellow Warbler

The Yellow Warbler is considered a Species of Special Concern by the State of California. Yellow Warblers prefer wet riparian habitat but are also found in large cottonwoods in drier riparian areas. Singing yellow warblers were observed along the continuously wet sections of the survey area during nesting season, but were observed in other dry sections of the river only during migration.

Yellow-breasted Chat

The Yellow-breasted Chat is considered a Species of Special Concern by the State of California. A few chats nested along the wet sections of the Santa Clara River.

Tricolored Blackbird

The Tricolored Blackbird is a California Special Concern species and a Bird of Management Concern for the U.S. Fish and Wildlife Service. A few individuals, probably wintering birds, were observed in early April.

Lawrence's Goldfinch

This species is a highest priority species on the Audubon Birds to Watch list for 1996 and is a Bird of Management Concern for the U.S. Fish and Wildlife Service. This species nests in chaparral vegetation and small flocks of this species were observed drinking along the Santa Clara River and its tributaries both before and after the breeding season.

Comments of Brown-headed Cowbirds

Although not a Species of Concern, comments about this species are warranted due to its influence on several endangered species. Cowbirds were regularly observed along all sections of the Santa Clara River, usually flying along the riparian corridor searching for either mates or potential nests to parasitize. Cowbird females often responded to taped calls of Least Bell's Vireo. Cowbird numbers showed a marked decrease after mid July between Bouquet Canyon and McBean Bridges, probably due to the operation of cowbird traps just upstream from the McBean Bridge during late May and June. These traps also caught large numbers of red-winged

blackbirds, which may have affected the breeding of this species.

Summary

No yellow-billed cuckoos were observed in 2000. Four individuals of Southwestern willow flycatcher were observed but could not be relocated on subsequent surveys. This failure, and their behavior suggests that these were migrant birds passing through the area. Least Bell's vireos nested at Castaic Junction. Although this nesting occurred in a newly created habitat, this general area has been the site of nesting by small numbers of this species in previous years. Other riparian species, including yellow warbler, yellow-breasted chat and white-tailed kite nested in small numbers along wet sections of the river while coastal sage species, namely Lawrence's goldfinch and grassland species, namely horned lark, visited the river sporadically from nearby areas of habitat suitable for these species. Cowbirds were numerous along the river and probably contributed to the small numbers of yellow warblers and least Bell's vireos observed.

Table 1. Bird Observations along the Santa Clara River System, 2000; Santa Clara River from Old Highway along I-5 to the mouth of Castaic Creek and Castaic Creek from this confluence to State Route 126.

Species	date: 4/12	4/28	5/10	5/23	6/16	6/28	7/17	7/26	Status
Great Blue Heron	2	1	-	-	1	-	-	-	W,M
Great Egret	2	2	-	1	-	-	-	-	W
Snowy Egret	3	2	-	1	-	-	-	-	W
Green Heron	2	1	1	2	3	2	2	2	R*
Bl-cr.NightHeron	-	-	-	1	-	-	1	-	R*?
Mallard	8	2	-	4	-	-	-	-	R*
White-tailed Kite	-	-	1	-	2	-	-	-	R*
Cooper's Hawk	-	1	-	-	-	-	-	-	R*
Red-sh. Hawk	1	-	2	1	3	1	1	2	R*
Red-tailed Hawk	3	1	-	1	1	-	1	1	R*
California Quail	8	8	32	6	12	10	4	2	R*
Virginia Rail	-	-	2	-	-	-	-	-	M
Killdeer	9	11	8	11	14	8	5	-	R*
Spotted Sandpiper	-	-	2	3	6	4	1	2	S*
Western Sandpiper	-	1	-	-	-	-	-	-	M
Common Snipe	3	-	-	-	-	-	-	-	M
Domestic Pigeon	-	-	3	-	-	-	-	-	R*
Mourning Dove	6	13	12	7	9	11	8	10	R*
Gr. Roadrunner	1	-	-	-	-	-	-	-	R*
White-thr. Swift	-	-	6	-	-	-	-	-	R*
Vaux Swift	-	10	-	-	-	-	-	-	R*
Anna's Humm-bird	3	1	3	1	1	3	3	8	R*
Costa's Humm-bird	-	-	-	-	-	-	1	1	S*
Belted Kingfisher	1	1	-	-	-	-	-	-	W,M
Nutt. Woodpecker	4	4	5	6	7	4	5	4	R*
Downy Woodpecker	1	-	-	2	3	-	1	1	R*
Hairy Woodpecker	-	1	-	-	-	-	-	-	R*
Northern Flicker	2	1	1	1	1	-	-	-	R*
Pac-sl.Flycatcher	-	-	-	-	1	-	-	-	M
Willow Flycatcher	-	-	-	2#	-	-	-	-	M
Black Phoebe	-	-	-	5	3	-	4	6	R*
Ash-th.Flycatcher	6	3	7	6	5	3	8	13	S*
Western Kingbird	1	2	-	-	1	2	-	3	S*
Horned Lark	-	-	-	-	-	15	-	-	R*
Violet-gr.Swallow	1	3	-	-	-	-	-	-	S*
N.Ro.-w. Swallow	16	22	10	8	24	8	4	1	S*
Cliff Swallow	-	110	30	40	16	40	2	11	S*
Barn Swallow	-	-	-	3	1	-	1	2	S*
Scrub Jay	15	6	1	6	8	1	11	4	R*
American Crow	6	6	6	4	6	2	2	2	R*
Common Raven	5	4	4	6	12	6	2	3	R*
Oak Titmouse	4	-	-	1	2	-	2	1	R*
Bushtit	2	2	-	18	10	-	-	4	R*
Bewick's Wren	26	17	18	23	3	11	10	9	R*

Table 1.(cont.) Bird Observations along the Santa Clara River System,2000; Santa Clara River from Old Highway along I-5 to the mouth of Castaic Creek and Castaic Creek from this confluence to State Route 126.

Species	date: 4/12	4/28	5/10	5/23	6/16	6/28	7/17	7/26	Status
House Wren	7	6	6	3	1	-	-	-	R*
B.-gr.Gnatcatcher	-	-	-	-	-	-	-	1	R*
Western Bluebird	8	2	4	-	2	4	-	2	R*
American Robin	-	-	-	-	-	1	1	-	R*
Wrentit	4	1	3	3	5	3	3	2	R*
Calif. Thrasher	3	1	-	1	4	-	2	-	R*
Phainopepla	-	-	-	2	2	-	1	-	S*
European Starling	5	-	8	5	1	16	2	-	R*
Bell's Vireo	**-**	**-**	**3**	**1**	**-**	**2**	**1**	**3**	**S***
Yellow Warbler	-	1	1	2	2	1	1	-	S*
Yellow-r.Warbler	9	-	-	-	-	-	-	-	W,M
Com.Yellowthroat	23	3	33	17	28	18	9	6	R*
Wilson's Warbler	-	4	2	-	-	-	-	-	M
Yellow-br. Chat	-	-	2	1	6	9	-	-	S*
Western Tanager	-	-	1	-	-	-	-	-	M
Bl.-h.Grosbeak	4	3	7	1	10	4	2	2	S*
Blue Grosbeak	-	1	6	2	2	-	7	8	S*
Lazuli Bunting	-	-	-	-	-	-	9	24	S*
Spotted Towhee	10	6	5	5	5	4	-	4	R*
Calif. Towhee	6	6	10	8	4	2	6	8	R*
Lark Sparrow	-	-	-	-	-	-	1	3	S*
Song Sparrow	52	31	54	50	45	38	54	30	R*
Lincoln's Sparrow	1	-	-	-	-	-	-	-	W,M
White-cr.Sparrow	6	-	-	-	-	-	-	-	W,M
Red-w.Blackbird	6	-	50	2	3	37	-	22	S*
Tricol. Redwing	-	-	-	-	-	-	-	1	M
Yel.-h. Blackbird	-	-	1	-	-	-	-	-	M
Brewer's Blkbird	-	-	-	20	-	6	-	-	R*
Brown-h. Cowbird	23	12	22	12	13	6	12	3	S*
Bullock's Oriole	-	4	1	2	1	3	2	-	S*
House Finch	12	8	22	6	2	22	8	16	R*
Lesser Goldfinch	16	8	6	12	3	10	10	2	R*
Lawr. Goldfinch	5	-	-	-	-	-	-	-	R*
Amer. Goldfinch	-	-	18	-	-	3	6	1	W,R*
Total Species:	45	43	42	46	45	36	41	41	

Total Species on all visits: 77

Total Potential Breeding species: 62 (marked with *)

Status: M- Migrant; R- Resident; S- Summer Only; W- Winter only

- birds observed on May 18th and June 6th (one each date)

Table 2. Bird Observations along the Santa Clara River System, 2000; Santa Clara River from McBean Parkway to Old Highway along I-5.

Species	date: 4/12	4/28	5/10	5/23	6/15	6/29	7/19	7/26	Status
Great Blue Heron	1	-	1	1	-	-	-	1	WM
Great Egret	-	-	-	1	-	-	-	-	W
Green Heron	-	2	-	-	1	-	-	2	R*
Bl-cr.Night Heron	-	-	-	-	-	1	-	-	M
Mallard	2	-	-	2	-	-	-	-	R*
Turkey Vulture	-	-	3	1	-	-	-	-	R*
White-tailed Kite	-	-	-	-	-	1	-	-	R*
Cooper's Hawk	-	-	-	-	-	-	1	-	R*
Red-sh. Hawk	1	-	1	2	-	-	-	-	R*
Red-tailed Hawk	3	3	1	1	1	1	1	1	R*
California Quail	12	6	8	9	6	8	9	65	R*
Killdeer	9	14	4	15	7	10	-	1	R*
Spotted Sandpiper	1	-	-	-	-	-	-	-	S*
Domestic Pigeon	160	-	2	-	-	-	-	-	R*
Mourning Dove	14	21	16	34	9	6	22	42	R*
White-thr. Swift	-	-	-	-	2	2	-	-	R*
Bl.-ch.Humm-bird	-	-	-	-	-	1	-	-	S*
Anna's Humm-bird	3	4	7	3	3	3	4	7	R*
Costa's Humm-bird	-	-	1	2	-	1	1	1	S*
Nutt. Woodpecker	7	6	5	5	2	3	7	5	R*
Downy Woodpecker	3	2	2	4	-	3	5	2	R*
Hairy Woodpecker	-	-	-	-	2	-	-	-	R*
Northern Flicker	1	-	-	-	1	-	1	-	R*
West. Wood Pewee	-	1	-	-	-	-	-	-	M
Black Phoebe	4	1	-	7	3	5	2	4	R*
Ash-th.Flycatcher	3	5	6	10	5	5	3	5	S*
Western Kingbird	-	-	2	-	-	-	-	5	S*
N.Ro.-w Swallow	30	33	4	6	41	17	14	3	S*
Cliff Swallow	40	80	4	100	10	40	4	6	S*
Barn Swallow	-	-	-	-	-	2	-	-	S*
Scrub Jay	6	8	1	11	8	5	7	7	R*
American Crow	2	-	3	2	6	-	-	2	R*
Common Raven	8	8	7	17	9	5	4	5	R*
Oak Titmouse	4	4	2	3	1	-	3	1	R*
Bushtit	4	10	6	14	5	5	-	6	R*
White-br.Nuthatch	-	-	1	-	-	1	-	-	R*
Bewick's Wren	44	19	23	21	25	11	10	10	R*
House Wren	6	6	3	-	13	5	-	3	R*
Western Bluebird	2	-	-	3	15	6	3	-	R*
N. Mockingbird	-	-	-	-	1	-	1	-	R*
Wrentit	-	2	1	-	5	-	1	-	R*
Calif. Thrasher	6	-	3	4	3	-	1	9	R*
Phainopepla	-	-	3	1	4	6	4	2	S*
Europ. Starling	15	4	48	24	104	6	1	3	R*
Warbling Vireo	1	3	2	-	-	-	-	-	M

Table 2(cont.). Bird Observations along the Santa Clara River System, 2000; Santa Clara River from McBean Parkway to Old Highway along I-5.

Species	date: 4/12	4/28	5/10	5/23	6/15	6/29	7/19	7/26	Status
Orange-cr.Warbler	8	5	-	-	1	-	-	-	M
Yellow Warbler	4	-	3	2	1	-	-	-	M,S*
Yellow-r.Warbler	15	-	-	-	-	-	-	-	W,M
Com.Yellowthroat	-	2	11	11	10	4	4	12	R*
Wilson's Warbler	3	7	5	-	-	-	-	-	M
Yellow-br. Chat	-	-	-	3	-	-	1	1	S*
Western Tanager	-	-	1	-	-	-	-	-	M
Bl.-h. Grosbeak	-	3	4	3	2	1	1	12	S*
Blue Grosbeak	-	-	-	-	1	-	2	11	S*
Lazuli Bunting	-	-	-	-	-	-	-	50	S*
Spotted Towhee	5	3	12	4	11	1	3	3	R*
California Towhee	5	10	16	14	33	7	4	5	R*
Lark Sparrow	-	-	-	-	-	-	-	-	R*
Song Sparrow	49	22	30	36	25	14	30	36	R*
White-cr.Sparrow	18	-	-	-	-	-	-	-	W,M
Red-w. Blackbird	-	6	-	2	3	-	-	20	S*
Brown-h. Cowbird	29	18	6	15	12	4	5	20	S*
Bullock's Oriole	2	2	1	-	2	2	1	-	S*
House Finch	9	5	-	39	112	59	54	160	R*
Lesser Goldfinch	6	7	-	6	2	6	14	6	R*
Lawr-ce's G-finch	-	1	-	-	-	-	-	-	R*
Amer. Goldfinch	310	2	-	-	-	-	-	-	W,R*
House Sparrow	2	-	-	-	-	-	-	-	R*
Total Species:	42	36	39	38	40	35	34	38	

Total Species on all visits: 68

Total Potential Breeding species: 58 (marked with *)

Status: M- Migrant; R- Resident; S- Summer Only; W- Winter only

Table 3. Bird Observations along the Santa Clara River System, 2000; Santa Clara River from Boquet Canyon Rd. to McBean Parkway.

Species	date: 4/12	4/28	5/10	5/23	6/15	6/28	7/18	7/26	Status
Green Heron	-	1	-	-	-	-	-	-	R*
Mallard	9	-	3	4	2	1	-	-	R*
Blue-w. Teal	-	-	-	-	1	-	-	-	R
Cinnamon Teal	-	-	-	2	-	-	-	-	R
Cooper's Hawk	-	-	-	-	-	1	-	-	R*
Red-sh. Hawk	1	-	-	-	-	-	2	-	R*
Red-tailed Hawk	3	-	2	1	-	2	1	3	R*
California Quail	10	9	-	14	8	2	6	3	R*
Killdeer	4	6	10	9	16	8	7	13	R*
Spotted Sandpiper	-	-	1	1	-	1	1	2	S*
Domestic Pigeon	2	2	-	-	-	-	-	2	R*
Spotted Dove	-	-	-	-	-	2	-	-	R*
Mourning Dove	21	24	24	57	30	34	39	50	R*
Gr. Roadrunner	-	-	-	-	-	-	-	1	R*
Barn Owl	-	-	-	-	1	-	-	-	R*
Bl.-ch.Humm-bird	-	1	-	-	-	-	1	-	S*
Anna's Humm-bird	4	3	1	3	1	2	9	25	R*
Costa's Humm-bird	-	-	-	-	-	-	1	1	S*
Nutt. Woodpecker	7	2	2	2	2	3	4	6	R*
Downy Woodpecker	2	1	2	-	2	1	1	4	R*
Hairy Woodpecker	-	-	2	-	-	-	-	-	R*
Northern Flicker	-	1	1	-	2	-	-	-	R*
West. Wood Pewee	-	-	-	-	2	-	-	-	M
Pa.-sl.Flycatcher	-	-	2	-	-	-	-	-	M
Black Phoebe	-	4	2	2	9	1	1	10	R*
Ash-th.Flycatcher	-	2	6	3	8	1	1	5	S*
Western Kingbird	-	-	5	4	1	-	-	-	S*
Horned Lark	-	-	4	2	13	-	-	-	R*
N.Ro.-w. Swallow	-	2	6	6	11	4	4	4	S*
Cliff Swallow	-	-	10	7	70	60	11	18	S*
Barn Swallow	-	-	-	-	-	1	-	-	S*
Scrub Jay	8	2	4	5	7	7	3	4	R*
American Crow	-	-	3	-	5	4	-	-	R*
Common Raven	28	13	12	57	36	25	40	9	R*
Oak Titmouse	2	3	3	2	1	-	-	5	R*
Bushtit	4	6	10	10	5	-	4	6	R*
Bewick's Wren	27	13	14	14	16	9	3	5	R*
House Wren	1	-	1	-	-	-	-	-	R*
Western Bluebird	-	-	-	-	-	1	-	-	R*
Swainson's Thrush	-	-	1	-	1	-	-	-	M
Wrentit	1	-	4	3	1	-	-	-	R*
N. Mockingbird	-	-	-	-	-	-	-	1	R*
Calif. Thrasher	5	3	-	4	3	2	5	5	R*
Europ. Starling	11	7	4	43	2	-	86	6	R*
Warbling Vireo	-	2	2	-	-	-	-	-	M

Table 3 (cont.). Bird Observations along the Santa Clara River System, 2000; Santa Clara River from Boquet Canyon Rd. to McBean Parkway.

Species	date: 4/12	4/28	5/10	5/23	6/15	6/28	7/18	7/26	Status
Orange-cr.Warbler	-	3	-	-	2	-	-	-	M
Yellow Warbler	1	1	7	2	1	2	-	-	MS*
Yellow-r.Warbler	4	1	-	-	-	-	-	-	W,M
Com.Yellowthroat	5	8	2	13	8	11	5	12	R*
Wilson's Warbler	-	5	5	1	-	-	-	-	M
Yellow-br. Chat	-	-	-	1	-	-	-	-	S*
Western Tanager	-	3	2	-	-	-	-	-	M
Bl.-h. Grosbeak	-	12	3	5	1	1	1	2	S*
Blue Grosbeak	-	3	3	-	-	3	5	-	S*
Lazuli Bunting	-	-	-	-	-	-	-	5	S*
Spotted Towhee	3	7	5	11	-	1	1	1	R*
Calif. Towhee	10	8	12	22	13	8	4	2	R*
Chipping Sparrow	-	-	1	-	-	-	-	-	M
Lark Sparrow	-	-	-	2	-	-	-	-	R*
Song Sparrow	40	22	28	20	25	9	9	45	R*
White-cr.Sparrow	42	-	-	-	-	-	-	-	W,M
Red-w. Blackbird	4	4	15	50	6	87	40	233	S*
Tricol. Redwing	2	-	-	-	-	-	-	-	W
Yell.-h.Blackbird	-	-	-	-	-	-	-	-	M
Brewer's Blkbird	6	6	-	2	-	-	-	3	R*
Br.-head.Cowbird	28	4	10	20	11	5	34	21	S*
Bullock's Oriole	-	5	-	-	4	-	-	-	S*
House Finch	6	10	10	18	56	85	16	57	R*
Lesser Goldfinch	2	14	5	17	2	-	2	4	R*
Lawrenc. G-finch	2	-	-	-	-	-	-	-	R*
Amer. Goldfinch	25	2	-	2	-	-	-	-	W,R*
House Sparrow	-	-	-	-	-	-	1	-	R*
Total Species:	34	39	42	38	38	32	31	34	

Total Species on all visits: 72

Total Potential Breeding species: 58 (marked with *)

Status: M- Migrant; R- Resident; S- Summer Only; W- Winter only

Table 4. Bird Observations along the Santa Clara River System, 2000; Santa Clara River from Power Line 2.5 miles upstream from Boquet Canyon Rd. to Boquet Canyon Road Crossing.

Species date:	5/31	7/10	Status
Cooper's Hawk	1	-	R*
Red-shouldered Hawk	-	1	R*
Red-tailed Hawk	3	4	R*
California Quail	42	26	R*
Killdeer	5	8	R*
Domestic Pigeon	-	2	R*
Mourning Dove	55	49	R*
Bl.-ch.Hummingbird	5	1	S*
Anna's Hummingbird	10	14	R*
Costa's Hummingbird	1	1	S*
Nuttall's Woodpecker	5	9	R*
Northern Flicker	2	2	R*
Black Phoebe	-	4	R*
Say's Phoebe	3	-	R*
Ash-thr.Flycatcher	8	6	S*
Western Kingbird	8	-	S*
N.Rough-w. Swallow	28	1	S*
Cliff Swallow	18	2	S*
Barn Swallow	1	-	S*
Scrub Jay	32	27	R*
American Crow	6	1	R*
Common Raven	32	18	R*
Oak Titmouse	3	12	R*
Bushtit	28	26	R*
Bewick's Wren	37	15	R*
House Wren	8	-	R*
Western Bluebird	9	13	R*
N. Mockingbird	7	10	R*
Wrentit	11	5	R*
California Thrasher	11	11	R*
Phainopepla	33	9	S*
European Starling	19	1	R*
Com. Yellowthroat	2	-	R*
Bl.-headed Grosbeak	-	5	S*
Blue Grosbeak	2	-	S*
Lazuli Bunting	1	1	S*
Spotted Towhee	36	27	R*
California Towhee	41	24	R*
Rufous-cr.Sparrow	6	1	R*
Lark Sparrow	5	-	S*
Song Sparrow	6	-	R*
Red-winged Blackbird	8	-	S*
Brown-headed Cowbird	6	1	S*
Hooded Oriole	5	-	S*
Bullock's Oriole	14	3	S*

Table 4 (cont.). Bird Observations along the Santa Clara River System, 2000; Santa Clara River from Power Line 2.5 miles upstream from Boquet Canyon Rd. to Boquet Canyon Road Crossing.

Species	date: 5/31	7/10	Status
House Finch	68	53	R*
Lesser Goldfinch	22	2	R*
American Goldfinch	2	-	R*
House Sparrow	5	-	R*
Total Species:	45	36	

Total Species on all visits: 49

Total Potential Breeding species: 49 (marked with *)

Status: M- Migrant; R- Resident; S- Summer Only; W- Winter only

Table 5. Bird Observations along the Santa Clara River System, 2000; Castaic Creek from I-5 west to Rte. 126.

Species	date:4/14	4/26	5/12	5/24	6/10	6/30	7/15	7/28	Status
Great Blue Heron	1	1	1	1	-	-	-	-	WM
Great Egret	1	-	-	-	-	-	-	-	W
Green Heron	-	-	2	1	-	-	-	-	R*
Bl-cr.Night Heron	-	-	-	1	-	-	-	-	R*
Mallard	-	-	2	2	-	-	-	-	R*
Red-should. Hawk	-	-	1	-	-	-	-	1	R*
Red-tailed Hawk	2	-	1	-	3	2	1	1	R*
American Kestrel	-	-	1	1	1	-	-	-	R*
California Quail	98	49	18	14	29	13	60	112	R*
Killdeer	-	-	-	7	1	2	-	-	R*
Domestic Pigeon	40	40	6	-	-	-	26	1	R*
Spotted Dove	-	1	-	-	-	-	-	-	R*
Mourning Dove	19	13	30	24	11	8	13	12	R*
Barn Owl	-	-	-	-	-	-	-	1	R*
Great horned Owl	-	-	-	-	1	-	-	-	R*
Bl.-ch.Humm-bird	-	-	-	2	2	4	3	2	S*
Anna's Humm-bird	4	5	6	3	3	12	30	25	R*
Costa's Humm-bird	-	-	-	-	-	1	6	3	S*
Belted Kingfisher	1	-	-	-	-	-	-	-	WM
Nutt. Woodpecker	-	4	3	5	4	9	3	3	R*
Downy Woodpecker	2	1	2	4	1	7	3	3	R*
Hairy Woodpecker	-	-	-	-	-	2	-	-	R*
Northern Flicker	-	1	-	1	2	2	2	1	R*
West. Wood Pewee	-	-	4	-	1	-	-	-	M
Willow Flycatcher	**-**	**-**	**2**	**-**	**-**	**-**	**-**	**-**	**M**
Black Phoebe	1	1	-	1	6	2	2	2	R*
Say's Phoebe	-	-	-	-	2	-	-	-	R*
Ash-th.Flycatcher	2	-	8	6	7	8	4	1	S*
Cassin's Kingbird	-	-	-	-	1	1	-	-	S*
Western Kingbird	-	1	-	1	2	-	2	-	S*
Horned Lark	2	-	-	-	9	-	-	-	R*
N.Ro.-w.Swallow	14	64	32	32	29	37	6	3	S*
Cliff Swallow	6	100	22	28	54	49	8	31	S*
Barn Swallow	1	-	-	-	-	3	-	1	S*
Scrub Jay	8	9	11	6	18	9	13	10	R*
American Crow	2	-	-	-	-	-	-	-	R*
Common Raven	22	14	-	32	4	5	53	9	R*
Oak Titmouse	11	4	1	25	8	2	10	8	R*
Bushtit	18	8	14	40	96	15	24	-	R*
Bewick's Wren	37	15	26	29	16	20	18	11	R*
House Wren	2	-	1	4	4	-	-	-	R*
Western Bluebird	-	-	-	1	-	3	-	-	R*
Swainson's Thrush	-	-	1	-	-	-	-	-	M
Wrentit	6	-	10	1	5	7	5	-	R*
Calif. Thrasher	9	6	8	7	13	2	2	3	R*
Phainopepla	-	-	3	5	1	3	2	1	S*

Table 5 (cont.). Bird Observations along the Santa Clara River System, 2000; Castaic Creek from I-5 west to Rte. 126.

Species	date: 4/14	4/26	5/12	5/24	6/10	6/30	7/15	7/28	Status
Europ. Starling	12	7	2	22	6	6	1	-	R*
Cassin's Vireo	-	-	1	-	-	-	-	-	M
Warbling Vireo	-	-	5	-	-	-	1	-	M
Orange-cr.Warbler	4	5	-	-	1	-	-	-	M
Yellow Warbler	3	2	10	1	2	5	-	-	S*
Yellow-r.Warbler	15	7	-	-	-	-	-	-	W,M
Com.Yellowthroat	26	8	7	6	17	15	12	2	R*
Wilson's Warbler	7	10	22	-	-	-	-	-	M
Yellow-br. Chat	-	-	-	1	2	-	-	-	S*
Western Tanager	-	1	-	-	-	-	-	-	M
Black-h. Grosbeak	5	21	15	3	6	6	8	2	S*
Blue Grosbeak	-	-	2	-	4	1	11	3	S*
Lazuli Bunting	-	-	1	-	5	3	1	1	S*
Spotted Towhee	20	8	12	4	31	18	9	5	R*
Calif. Towhee	20	12	14	22	51	29	12	12	R*
Lark Sparrow	-	2	-	-	-	1	-	-	R*
Song Sparrow	37	8	22	21	46	23	5	4	R*
White-cr.Sparrow	17	-	-	-	-	-	-	-	W,M
Red-w. Blackbird	24	4	31	38	36	4	12	10	S*
Brewer's Bl-bird	-	-	-	-	-	-	-	2	R*
Brown-h.Cowbird	33	8	6	12	8	16	5	-	S*
Bullock's Oriole	3	2	3	10	5	11	2	1	S*
House Finch	40	4	8	64	12	16	30	59	R*
Lesser Goldfinch	9	10	8	3	3	24	8	22	R*
Lawr. Goldfinch	-	2	-	-	-	4	2	-	R*
Amer. Goldfinch	-	-	-	-	-	-	3	4	W,R*
House Sparrow	-	4	-	6	-	-	-	1	R*
Total Species:	40	38	43	42	45	42	39	37	

Total Species on all visits: 73

Total Potential Breeding species: 60 (marked with *)

Status: M- Migrant; R- Resident; S- Summer Only; W- Winter only

Table 6. Bird Observations along the Santa Clara River System, 2000; San Francisquito Creek for 2 Miles above Main Channel.

Species	date: 6/16	7/1	Status
Cooper's Hawk	-	1	R*
Red-tailed Hawk	1	1	R*
California Quail	23	10	R*
Killdeer	6	2	R*
Domestic Pigeon	18	-	R*
Mourning Dove	35	13	R*
Black-ch.Hummingbird	1	1	S*
Anna's Hummingbird	1	4	R*
Nuttall's Woodpecker	6	6	R*
Say's Phoebe	-	1	R*
Ash-thr.Flycatcher	7	8	S*
Cassin's Kingbird	1	-	S*
N.Rough-w. Swallow	10	-	S*
Cliff Swallow	-	5	S*
Scrub Jay	7	9	R*
American Crow	2	2	R*
Common Raven	13	5	R*
Oak Titmouse	2	2	R*
Bushtit	-	17	R*
Bewick's Wren	9	8	R*
House Wren	-	1	R*
Western Bluebird	4	2	R*
N. Mockingbird	-	1	R*
Wrentit	2	1	R*
California Thrasher	2	1	R*
Phainopepla	4	-	S*
European Starling	1	-	R*
Common Yellowthroat	2	1	R*
Bl.-headed Grosbeak	2	3	S*
Blue Grosbeak	-	1	S*
Spotted Towhee	37	9	R*
California Towhee	15	16	R*
Song Sparrow	1	2	R*
Bullock's Oriole	1	1	S*
House Finch	52	62	R*
Lesser Goldfinch	12	13	R*
Total Species:	29	31	

Total Species on all visits: 36

Total Potential Breeding species: 36 (marked with *)

Status: M- Migrant; R- Resident; S- Summer Only; W- Winter only

Table 7. Bird Observations along the Santa Clara River System, 2000; South Fork from Rte. 126 to McBean Parkway.

Species	date: 6/7	7/1	Status
Red-tailed Hawk	1	-	R*
California Quail	-	3	R*
Killdeer	3	1	R*
Mourning Dove	28	12	R*
Black-ch.Hummingbird	1	3	S*
Anna's Hummingbird	2	3	R*
Costa's Hummingbird	-	2	S*
Nuttall's Woodpecker	2	6	R*
Downy Woodpecker	4	-	R*
Black Phoebe	1	1	R*
Say's Phoebe	-	1	R*
Ash-thr.Flycatcher	2	-	S*
Western Kingbird	2	5	S*
N.Rough-w. Swallow	18	6	S*
Cliff Swallow	9	-	S*
Scrub Jay	6	7	R*
Common Raven	10	5	R*
Oak Titmouse	6	4	R*
Bushtit	5	8	R*
Bewick's Wren	10	7	R*
N. Mockingbird	5	3	R*
California Thrasher	-	2	R*
Loggerhead Shrike	1	1	R*
European Starling	46	41	R*
Spotted Towhee	2	1	R*
California Towhee	5	5	R*
Song Sparrow	5	-	R*
Red-winged Blackbird	-	6	S*
Brewer's Blackbird	-	8	R*
Brown-headed Cowbird	2	2	S*
Bullock's Oriole	2	4	S*
House Finch	34	12	R*
Lesser Goldfinch	9	-	R*
House Sparrow	-	5	R*
Total Species:	27	28	

Total Species on all visits: 34

Total Potential Breeding species: 34 (marked with *)

Status: M- Migrant; R- Resident; S- Summer Only; W- Winter only

Table 8. Bird Observations along the Santa Clara River System, 2000: South Fork from Newhall Creek to Rte. 126.

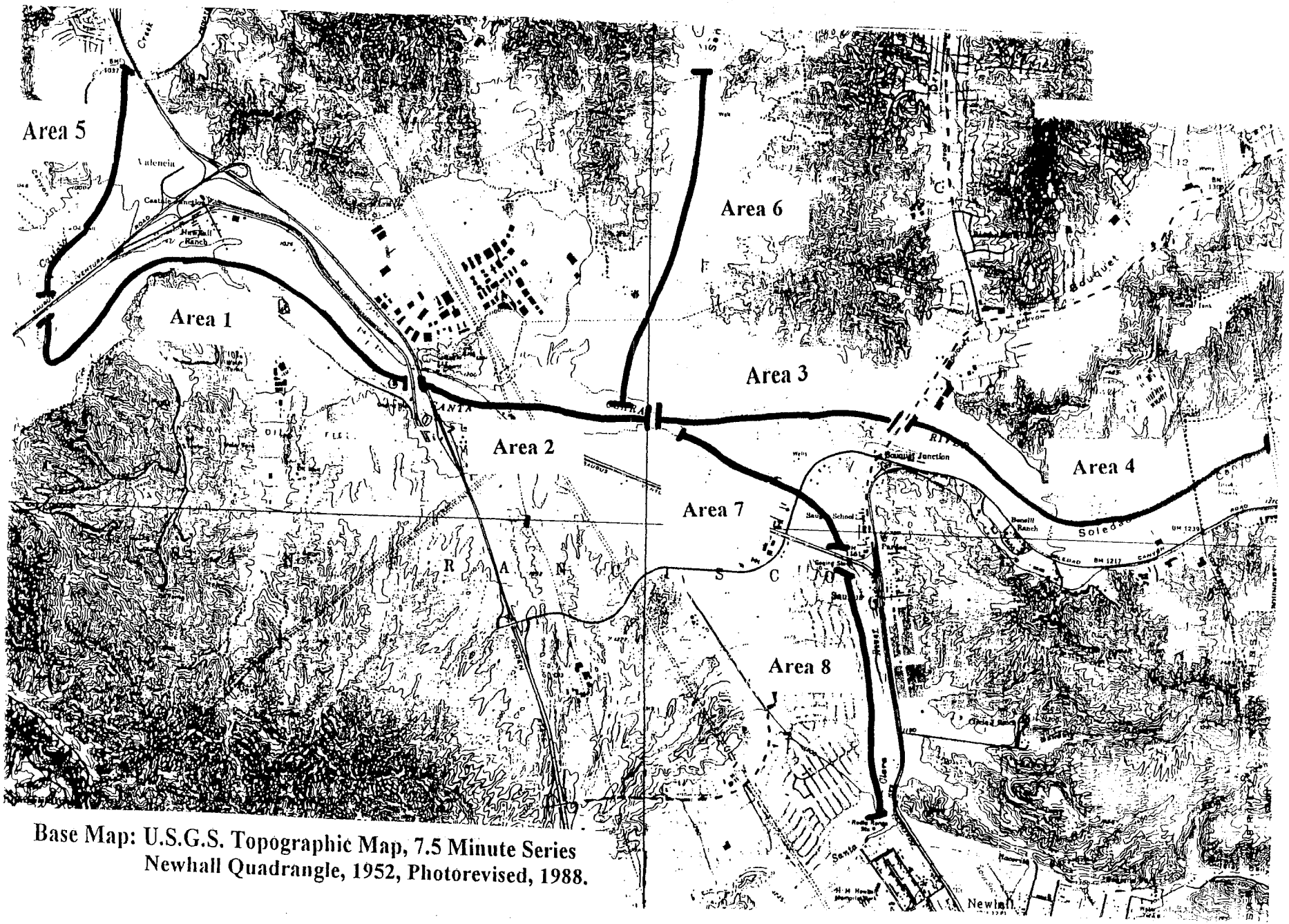
Species	date 6/7	7/1	Status
Red-tailed Hawk	1	-	R*
California Quail	14	5	R*
Killdeer	3	7	R*
Mourning Dove	20	37	R*
Black-ch.Hummingbird	1	1	S*
Anna's Hummingbird	3	6	R*
Costa's Hummingbird	-	2	S*
Nuttall's Woodpecker	3	1	R*
Downy Woodpecker	2	-	R*
Black Phoebe	-	3	R*
Ash-thr.Flycatcher	1	-	S*
Western Kingbird	2	-	S*
Barn Swallow	1	-	S*
Scrub Jay	7	4	R*
Common Raven	4	40	R*
Oak Titmouse	6	3	R*
Bushtit	13	22	R*
White-br. Nuthatch	1	-	R*
Bewick's Wren	8	12	R*
N. Mockingbird	2	7	R*
California Thrasher	7	8	R*
Phainopepla	2	1	S*
European Starling	11	10	R*
Summer Tanager	1	-	SM
Spotted Towhee	-	7	R*
California Towhee	14	18	R*
Song Sparrow	2	5	R*
Brewer's Blackbird	6	-	R*
Brown-headed Cowbird	4	10	S*
Bullock's Oriole	14	3	S*
House Finch	27	31	R*
Lesser Goldfinch	6	25	R*
House Sparrow	20	10	R*
Total Species:	30	25	

Total Species on all visits: 33

Total Potential Breeding species: 32 (marked with *)

Status: M- Migrant; R- Resident; S- Summer Only; W- Winter only

Figure 1. Survey Areas along the Santa Clara River and Tributaries.



Base Map: U.S.G.S. Topographic Map, 7.5 Minute Series
Newhall Quadrangle, 1952, Photorevised, 1988.

2000 - Upper River Area 1

BIRDS OF Santa Clara River System

Locality Old Rd → Custom Br Mouth Date 4-12 Time 6:35-9:35

(2) 11 Great Blue Heron
(2) 11 Green Heron
(8) 2 3 2 1 Mallard
_____ Turkey Vulture
_____ White-tailed Kite
_____ Sharp-shinned Hawk
_____ Cooper's Hawk
(1) Red-shouldered Hawk
(3) 11 Red-tailed Hawk
_____ American Kestrel
(8) 2 2 2 California Quail
_____ American Coot
(9) 2 1 1 2 2 Killdeer
_____ Spotted Sandpiper
_____ Least Sandpiper
(3) Common Snipe
_____ Rock Dove
(6) 2 2 1 1 Mourning Dove
(1) Greater Roadrunner
_____ Barn Owl
_____ Great Horned Owl
_____ White-throated Swift
_____ Black-ch. Hummingbird
(3) 111 Anna's Hummingbird
_____ Costa's Hummingbird
(1) Belted Kingfisher
_____ Acorn Woodpecker
(4) 1 1 2 Nuttall's Woodpecker
(1) Downy Woodpecker
_____ Hairy Woodpecker
(2) 11 Northern Flicker
_____ Western Wood-Pewee
_____ **Willow Flycatcher**
_____ Pacific Slope Flycatcher
_____ Black Phoebe
_____ Say's Phoebe
(6) 2 1 1 2 Ash-throated Flycatcher
_____ Cassin's Kingbird
(1) Western Kingbird
_____ Horned Lark
_____ Tree Swallow
(1) Violet-green Swallow
(16) 2 2 4 4 2 11 N. Rough-winged Swallow 2
_____ Cliff Swallow
_____ Barn Swallow
(13) 2 2 2 1 1111 Scrub Jay
(6) 2 2 2 American Crow
(5) 2 1 Common Raven
(11) 2 2 Plain Titmouse
(2) Bushtit
(26) 2 2 2 2 2 1 2 1 2 Bewick's Wren 2
(7) 1 1 1 House Wren
_____ Ruby-crowned Kinglet

_____ **California Gnatcatcher**
_____ Blue-gray Gnatcatcher
(8) 2 2 1 1 Western Bluebird
_____ Swainson's Thrush
_____ Hermit Thrush
_____ American Robin
(4) 111 Wrentit
_____ Northern Mockingbird
(3) 111 California Thrasher
_____ American Pipit
_____ Cedar Waxwing
_____ Phainopepla
_____ Loggerhead Shrike
(5) 4 1 European Starling
_____ **Bell's Vireo**
_____ Solitary Vireo
_____ Warbling Vireo
_____ Orange-crowned Warbler
_____ Yellow Warbler
(9) 4 2 1 2 Yellow-rumped Warbler
4 2 2 1 2 4 2 1 1111 Common Yellowthroat 1
(23) Wilson's Warbler
_____ Yellow-breasted Chat
_____ Western Tanager
(4) 1111 Black-headed Grosbeak
_____ Blue Grosbeak
_____ Lazuli Bunting
(10) 2 1 111 11 Rufous-sided Towhee
(6) 4 2 California Towhee
_____ Lark Sparrow 8
_____ Savannah Sparrow
52
4 4 4 4 4 4 4 2 2 2 2 2 2 2 2 2 11 Song Sparrow 2
(1) Lincoln's Sparrow
(6) 4 2 White-crowned Sparrow
(6) Red-winged Blackbird
_____ Western Meadowlark
_____ Brewer's Blackbird
(23) 4 3 4 2 4 2 3 1 Brown-headed Cowbird
_____ Hooded Oriole
_____ Northern Oriole
(12) 4 2 4 2 House Finch
_____ Pine Siskin
(16) 2 2 2 Lesser Goldfinch
(5) 3 11 Lawrence's Goldfinch
_____ American Goldfinch
_____ House Sparrow
(2) 11 CT Ecrit
(3) 21 SNOWY Ecret

Lots of Boot PRINTS.

BIRDS OF Santa Clara River System

Locality: Pearl Rd → CASTAIC   Date: 4/28   Time: 7 –

(1) Great Blue Heron
(1) Green Heron
(2) 11 Mallard
Turkey Vulture
White-tailed Kite
Sharp-shinned Hawk
(1) Cooper's Hawk
Red-shouldered Hawk
(1) Red-tailed Hawk
American Kestrel
(8) 2 2 2 2 California Quail
American Coot
(13) 2 11 2 2 Killdeer
Spotted Sandpiper
4 Least Sandpiper
Common Snipe
Rock Dove
(13) 6 1 2 2 11 Mourning Dove
Greater Roadrunner
Barn Owl
Great Horned Owl
White-throated Swift
Black-ch. Hummingbird
(1) Anna's Hummingbird
Costa's Hummingbird
(1) Belted Kingfisher ♀
Acorn Woodpecker
(4) 2 2 Nuttall's Woodpecker
Downy Woodpecker
(1) Hairy Woodpecker
(1) Northern Flicker
Western Wood-Pewee
Willow Flycatcher
Pacific Slope Flycatcher
Black Phoebe
Say's Phoebe
(3) 111 Ash-throated Flycatcher
Cassin's Kingbird
(2) Western Kingbird
Horned Lark
Tree Swallow
(3) Violet-green Swallow
(22) 4 6 4 4 4 N. Rough-winged Swallow
(110) 100 4 Cliff Swallow
Barn Swallow
(6) 1 ~~1111~~ Scrub Jay
(6) 2 2 11 American Crow
(4) 2 2 Common Raven
Plain Titmouse
(2) 2 Bushtit
(17) 2 2 1 2 ~~1111~~ ~~1111~~ Bewick's Wren
(6) ~~1111~~ House Wren
Ruby-crowned Kinglet

California Gnatcatcher
Blue-gray Gnatcatcher
(2) 11 Western Bluebird
Swainson's Thrush
Hermit Thrush
American Robin
(1) Wrentit
Northern Mockingbird
(1) California Thrasher
American Pipit
Cedar Waxwing
Phainopepla
Loggerhead Shrike
European Starling
Bell's Vireo
Solitary Vireo
Warbling Vireo
Orange-crowned Warbler
(1) Yellow Warbler
Yellow-rumped Warbler
(3) 111 Common Yellowthroat
(4) 11 Wilson's Warbler
3 Yellow-breasted Chat
Western Tanager
(3) 111 Black-headed Grosbeak
(1) Blue Grosbeak
Lazuli Bunting
(6) 1 ~~1111~~ Rufous-sided Towhee
(6) 2 2 California Towhee
Lark Sparrow
Savannah Sparrow
(31) 2 2 2 2 2 2 2 2 2 2 2 2 2 2 1 ~~1111~~ Song Sparrow
Lincoln's Sparrow
White-crowned Sparrow
Red-winged Blackbird
Western Meadowlark
Brewer's Blackbird
(12) 2 1 2 2 2 2 1 Brown-headed Cowbird
Hooded Oriole
(4) 1 2 1 Northern Oriole
(8) House Finch
Pine Siskin
(8) 4 4 Lesser Goldfinch
Lawrence's Goldfinch
American Goldfinch
House Sparrow
(2) 11 Snowy Egret
(1) Western SP
(2) 11 Gt Egret
(10) Vaux Swift

Walked River
TAPE LBV
overcast foggy
cool
good BIRDING

BIRDS OF Santa Clara River System

Locality OLD Rd & CASTAIC **Date** 5-10 **Time** 615—9 00

- Great Blue Heron
- 1 Green Heron
- Mallard
- Turkey Vulture
- 1 White-tailed Kite
- Sharp-shinned Hawk
- Cooper's Hawk
- 2 Red-shouldered Hawk
- Red-tailed Hawk
- American Kestrel
- 32 California Quail
- American Coot
- 8 Killdeer
- 2 Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- 3 Rock Dove
- 12 Mourning Dove
- Greater Roadrunner
- Barn Owl
- Great Horned Owl
- 6 White-throated Swift
- Black-ch. Hummingbird
- 3 Anna's Hummingbird
- Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- 5 Nuttall's Woodpecker
- Downy Woodpecker
- Hairy Woodpecker
- 1 Northern Flicker
- Western Wood-Pewee
- **Willow Flycatcher**
- Pacific Slope Flycatcher
- Black Phoebe
- Say's Phoebe
- 7 Ash-throated Flycatcher
- Cassin's Kingbird
- Western Kingbird
- Horned Lark
- Tree Swallow
- Violet-green Swallow
- 10 N. Rough-winged Swallow
- 30 Cliff Swallow
- Barn Swallow
- 1 Scrub Jay
- 6 American Crow
- 4 Common Raven
- Plain Titmouse
- 18 Bushtit
- Bewick's Wren
- House Wren
- 6 Ruby-crowned Kinglet

- **California Gnatcatcher**
- Blue-gray Gnatcatcher
- 4 Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- American Robin
- 3 Wrentit
- Northern Mockingbird
- California Thrasher
- American Pipit
- Cedar Waxwing
- Phainopepla
- Loggerhead Shrike
- 8 European Starling
- 2 **Bell's Vireo**
- Solitary Vireo
- Warbling Vireo
- Orange-crowned Warbler
- 1 Yellow Warbler
- Yellow-rumped Warbler
- 33 Common Yellowthroat
- 2 Wilson's Warbler
- 2 Yellow-breasted Chat
- 1 Western Tanager
- 7 Black-headed Grosbeak
- 6 Blue Grosbeak
- Lazuli Bunting
- 5 Rufous-sided Towhee
- 10 California Towhee
- Lark Sparrow
- 54 Savannah Sparrow
- Song Sparrow
- Lincoln's Sparrow
- White-crowned Sparrow
- 50 Red-winged Blackbird
- Western Meadowlark
- Brewer's Blackbird
- 22 Brown-headed Cowbird
- Hooded Oriole
- 1 Northern Oriole
- 22 House Finch
- Pine Siskin
- 6 Lesser Goldfinch
- Lawrence's Goldfinch
- 18 American Goldfinch
- House Sparrow
- 2 VIRG RAIL
- 1 YH BLKBRD

WIND N E 0-2

BIRDS OF Santa Clara River System

Locality OLD RD → CASTAIC Date 5-23 Time 7AM

- Great Blue Heron
- 11 Green Heron
- 12 Mallard
- Turkey Vulture
- White-tailed Kite
- Sharp-shinned Hawk
- Cooper's Hawk
- 1 Red-shouldered Hawk
- 1 Red-tailed Hawk
- American Kestrel
- 2 California Quail (4)
- American Coot
- 22 11 12 Killdeer (1)
- 1 10 Spotted Sandpiper (2)
- Least Sandpiper
- Common Snipe
- Rock Dove
- 2 1 2 Mourning Dove (2)
- Greater Roadrunner
- Barn Owl
- Great Horned Owl
- White-throated Swift
- Black-ch. Hummingbird
- 1 Anna's Hummingbird
- Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- 1111 Nuttall's Woodpecker (2)
- 11 Downy Woodpecker
- Hairy Woodpecker
- 1 Northern Flicker
- Western Wood-Pewee 44 44 44 44 44 44 2
- **Willow Flycatcher**
- Pacific Slope Flycatcher
- 1111 Black Phoebe
- Say's Phoebe
- 1 1111 Ash-throated Flycatcher
- Cassin's Kingbird
- Western Kingbird
- Horned Lark
- Tree Swallow
- Violet-green Swallow
- 4 4 N. Rough-winged Swallow
- 30 10 Cliff Swallow
- 3 Barn Swallow
- 1 1111 Scrub Jay
- 22 American Crow
- 2 4 Common Raven
- 1 Plain Titmouse
- 6, 12 Bushtit
- 22 1 1111 11 1 Bewick's Wren (1)
- 11 House Wren
- Ruby-crowned Kinglet

- **California Gnatcatcher**
- Blue-gray Gnatcatcher
- Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- American Robin
- 11 Wrentit
- Northern Mockingbird
- California Thrasher (1)
- American Pipit
- Cedar Waxwing
- 2 Phainopepla
- Loggerhead Shrike
- 3 European Starling (2)
- 1 **Bell's Vireo**
- Solitary Vireo
- Warbling Vireo
- Orange-crowned Warbler
- 11 Yellow Warbler
- Yellow-rumped Warbler
- 2 11 1111 111 Common Yellowthroat
- Wilson's Warbler
- 1 Yellow-breasted Chat
- Western Tanager
- 1 Black-headed Grosbeak
- 11 Blue Grosbeak
- Lazuli Bunting
- 2 11 Rufous-sided Towhee (1)
- 2 2 2 California Towhee (2)
- Lark Sparrow
- Savannah Sparrow
- 4 4 4 2 Song Sparrow (4)
- Lincoln's Sparrow
- White-crowned Sparrow
- 2 Red-winged Blackbird
- Western Meadowlark
- 20 Brewer's Blackbird
- 2 2 2 2 Brown-headed Cowbird (3)
- Hooded Oriole
- 1 Northern Oriole
- 2 House Finch (4)
- Pine Siskin
- 2 2 2 4 Lesser Goldfinch (2)
- Lawrence's Goldfinch
- American Goldfinch
- House Sparrow
- 1 CT EGRET
- 1 BC NIGHT HERON YOUNG,
- 1 SNOWY EG

FOGGY cool Overhead

(3) = CROSSING

BIRDS OF Santa Clara River System

Locality Old Rd → CASTAIC Date 6-16 Time 600-9

- 1 Great Blue Heron
- III Green Heron
- Mallard
- Turkey Vulture
- I White-tailed Kite (1)
- Sharp-shinned Hawk
- Cooper's Hawk
- III Red-shouldered Hawk
- 1 Red-tailed Hawk
- American Kestrel
- 4 2 2 2 California Quail (2)
- American Coot
- 3 3 I 2 I 2 Killdeer (2)
- 2 II Spotted Sandpiper (2)
- Least Sandpiper
- Common Snipe
- Rock Dove
- 4 2 2 I Mourning Dove
- Greater Roadrunner 2 II
- Barn Owl
- Great Horned Owl
- White-throated Swift
- Black-ch. Hummingbird
- I Anna's Hummingbird
- Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- II IIII Nuttall's Woodpecker
- III Downy Woodpecker
- Hairy Woodpecker
- 1 Northern Flicker
- Western Wood-Pewee 4 4 4 4 4 4 4
- **Willow Flycatcher**
- I Pacific Slope Flycatcher
- II Black Phoebe
- Say's Phoebe
- II Ash-throated Flycatcher (2)
- Cassin's Kingbird
- 1 Western Kingbird
- Horned Lark
- Tree Swallow
- Violet-green Swallow
- 4 8 2 4 4 N. Rough-winged Swallow (9)
- 10 Cliff Swallow (6)
- 1 Barn Swallow
- 2 IIII Scrub Jay (1)
- 4 II 2 2 American Crow
- 2 6 2 2 Common Raven
- 2 Plain Titmouse
- 4 2 2 2 Bushtit
- III Bewick's Wren
- I House Wren
- Ruby-crowned Kinglet

- **California Gnatcatcher**
- Blue-gray Gnatcatcher
- 2 Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- American Robin
- IIII Wrentit (1)
- Northern Mockingbird (1)
- II 2 California Thrasher
- American Pipit
- Cedar Waxwing
- I Phainopepla (1)
- Loggerhead Shrike
- I European Starling
- **Bell's Vireo**
- Solitary Vireo
- Warbling Vireo
- Orange-crowned Warbler
- II Yellow Warbler
- Yellow-rumped Warbler
- IIII IIII IIII Common Yellowthroat (11)
- Wilson's Warbler
- IIII Yellow-breasted Chat (1)
- Western Tanager
- 1 1 I IIII Black-headed Grosbeak (1)
- 1 1 Blue Grosbeak
- Lazuli Bunting
- IIII Rufous-sided Towhee
- IIII California Towhee
- Lark Sparrow
- Savannah Sparrow
- 4 4 4 Song Sparrow (12)
- Lincoln's Sparrow
- White-crowned Sparrow
- 3 Red-winged Blackbird
- Western Meadowlark
- Brewer's Blackbird
- 12 2 I IIII Brown-headed Cowbird (1)
- Hooded Oriole
- I Northern Oriole
- 2 House Finch
- Pine Siskin
- 3 Lesser Goldfinch
- Lawrence's Goldfinch
- American Goldfinch
- House Sparrow

COAST OVERCAST

WALKED RIVER

FLS 10? = CNNTS, RIGHT COMMENCE C CROSS ~400 YDS

BIRDS OF Santa Clara River System

Locality Old Rd → Creek Rd Date 6-28 Time 6:30 — 9:30

- Great Blue Heron
- (2) Green Heron
- Mallard
- Turkey Vulture
- White-tailed Kite
- Sharp-shinned Hawk
- Cooper's Hawk
- (1) Red-shouldered Hawk
- Red-tailed Hawk
- American Kestrel
- (10) California Quail
- American Coot
- (8) Killdeer
- (4) Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- Rock Dove
- (11) Mourning Dove
- Greater Roadrunner
- Barn Owl
- Great Horned Owl
- White-throated Swift
- Black-ch. Hummingbird
- (3) Anna's Hummingbird
- Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- (4) Nuttall's Woodpecker
- Downy Woodpecker
- Hairy Woodpecker
- Northern Flicker
- Western Wood-Pewee
- **Willow Flycatcher**
- Pacific Slope Flycatcher
- Black Phoebe
- Say's Phoebe
- (3) Ash-throated Flycatcher
- Cassin's Kingbird
- (2) Western Kingbird
- (15) Horned Lark
- Tree Swallow
- Violet-green Swallow
- (8) N. Rough-winged Swallow
- (44) Cliff Swallow
- Barn Swallow
- Scrub Jay
- American Crow
- (6) Common Raven
- Plain Titmouse
- Bushtit
- (11) Bewick's Wren
- House Wren
- Ruby-crowned Kinglet
- **California Gnatcatcher**
- Blue-gray Gnatcatcher
- (4) Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- (17) American Robin
- (3) Wrentit
- Northern Mockingbird
- California Thrasher
- American Pipit
- Cedar Waxwing
- Phainopepla
- Loggerhead Shrike
- (16) European Starling
- (2) **Bell's Vireo**
- Solitary Vireo
- Warbling Vireo
- Orange-crowned Warbler
- Yellow Warbler
- Yellow-rumped Warbler
- (18) Common Yellowthroat
- Wilson's Warbler
- (9) Yellow-breasted Chat
- Western Tanager
- (4) Black-headed Grosbeak
- Blue Grosbeak
- Lazuli Bunting
- (4) Rufous-sided Towhee
- (2) California Towhee
- Lark Sparrow
- Savannah Sparrow
- Song Sparrow
- (38) Lincoln's Sparrow
- White-crowned Sparrow
- (37) Red-winged Blackbird
- Western Meadowlark
- (6) Brewer's Blackbird
- (6) Brown-headed Cowbird
- (3) Hooded Oriole
- Northern Oriole
- (22) House Finch
- Pine Siskin
- (10) Lesser Goldfinch
- Lawrence's Goldfinch
- (3) American Goldfinch
- House Sparrow

1 Deer

BIRDS OF Santa Clara River System

Locality CASTAIC Creek 3rd inlet Date 7-17 Time 6:— 9AM

- Great Blue Heron
- 11 Green Heron
- Mallard
- Turkey Vulture
- White-tailed Kite
- Sharp-shinned Hawk
- Cooper's Hawk
- 1 Red-shouldered Hawk
- 1 Red-tailed Hawk
- 1 American Kestrel
- 2 11 California Quail
- American Coot
- 11 2 Killdeer
- 1 Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- Rock Dove
- 2 2 2 2 Mourning Dove
- Greater Roadrunner
- Barn Owl
- Great Horned Owl
- White-throated Swift
- Black-ch. Hummingbird
- 111 Anna's Hummingbird
- 1 Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- 1111 Nuttall's Woodpecker
- 1 Downy Woodpecker
- Hairy Woodpecker
- Northern Flicker
- Western Wood-Pewee 4 4 8 4 4 4 4 4 84
- **Willow Flycatcher**
- Pacific Slope Flycatcher
- 11 2 Black Phoebe
- Say's Phoebe
- 1 1 1111 Ash-throated Flycatcher
- Cassin's Kingbird
- Western Kingbird
- Horned Lark
- Tree Swallow
- Violet-green Swallow
- 4 N. Rough-winged Swallow
- 2 Cliff Swallow
- 1 Barn Swallow
- 2 2 1 111 2 Scrub Jay
- 2 American Crow
- 1 Common Raven
- 11 Plain Titmouse
- Bushtit
- 2 1 111 Bewick's Wren
- House Wren
- Ruby-crowned Kinglet
- **California Gnatcatcher**
- Blue-gray Gnatcatcher
- Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- 1 American Robin
- 11 Wrentit
- Northern Mockingbird
- 11 California Thrasher
- American Pipit
- Cedar Waxwing
- 1 Phainopepla
- Loggerhead Shrike
- 2 European Starling
- 1 **Bell's Vireo**
- Solitary Vireo
- Warbling Vireo
- Orange-crowned Warbler
- 1 Yellow Warbler
- Yellow-rumped Warbler
- 11 2 2 2 1 Common Yellowthroat
- Wilson's Warbler
- Yellow-breasted Chat
- Western Tanager
- 11 Black-headed Grosbeak
- 11 1111 Blue Grosbeak
- 3 3 3 Lazuli Bunting
- Rufous-sided Towhee
- 3 3 California Towhee
- 1 Lark Sparrow
- Savannah Sparrow
- 2 4 Song Sparrow
- Lincoln's Sparrow
- White-crowned Sparrow
- Red-winged Blackbird
- Western Meadowlark
- Brewer's Blackbird
- 2 2 6 2 Brown-headed Cowbird
- Hooded Oriole
- 2 Northern Oriole
- 2 2 2 2 House Finch
- Pine Siskin
- 2 4 4 Lesser Goldfinch
- Lawrence's Goldfinch
- 6 American Goldfinch
- House Sparrow
- 1 BCN Hum IMM
  prem Warbler?

BIRDS OF Santa Clara River System

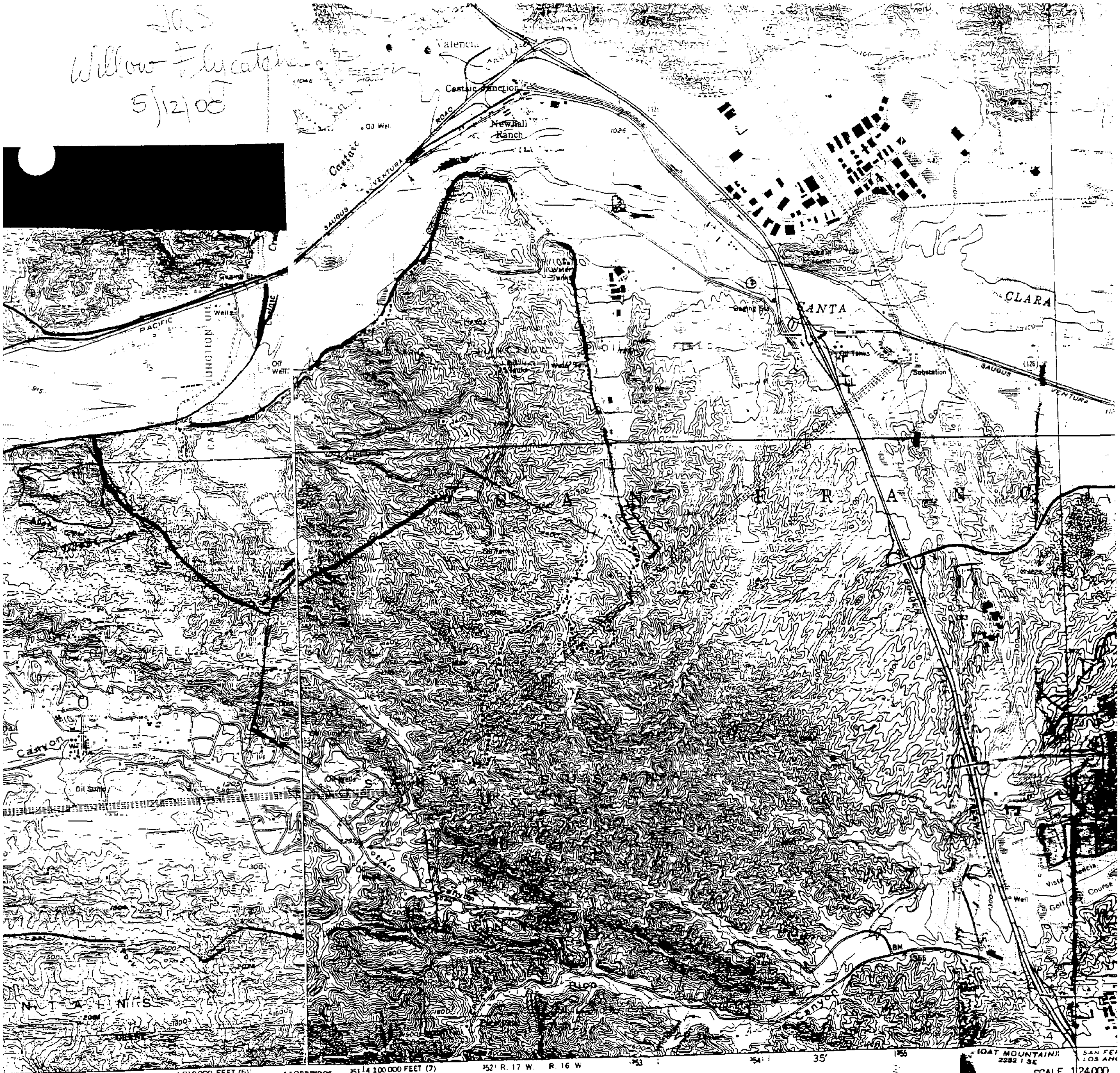
Locality Old Rd → CASTAIC Date 7-26 Time 645—9

- Great Blue Heron
- (2) II Green Heron 1 IMM
- Mallard 1♀
- Turkey Vulture
- White-tailed Kite
- Sharp-shinned Hawk
- Cooper's Hawk
- (2) II Red-shouldered Hawk
- 1 Red-tailed Hawk
- American Kestrel
- (2) 2 California Quail
- American Coot
- Killdeer
- (2) Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- Rock Dove
- (10) 24 2 II Mourning Dove
- Greater Roadrunner
- Barn Owl
- Great Horned Owl
- White-throated Swift
- 1 Black-ch. Hummingbird
- (8) 2 I I II Anna's Hummingbird
- 1 Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- (3) III Nuttall's Woodpecker
- 1 Downy Woodpecker
- Hairy Woodpecker
- Northern Flicker
- Western Wood-Pewee
- **Willow Flycatcher**
- Pacific Slope Flycatcher
- (6) 1 IIII Black Phoebe
- Say's Phoebe
- (13) 12 III 1 2 2 III Ash-throated Flycatcher
- Cassin's Kingbird
- (3) III Western Kingbird
- Horned Lark
- Tree Swallow
- Violet-green Swallow
- 1 N. Rough-winged Swallow
- (11) 3 6 2 Cliff Swallow
- (2) II Barn Swallow
- (4) IIII Scrub Jay
- (2) II American Crow
- (3) 2 1 Common Raven
- 1 Plain Titmouse
- 4 Bushtit
- (9) III 2 2 I Bewick's Wren
- House Wren
- Ruby-crowned Kinglet
- **California Gnatcatcher**
- 1 Blue-gray Gnatcatcher
- 1 Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- **American Robin**
- (2) II Wrentit
- Northern Mockingbird
- California Thrasher
- American Pipit
- Cedar Waxwing
- Phainopepla
- Loggerhead Shrike
- European Starling
- (3) 1♀ I **Bell's Vireo** 1 - N of Pines line; 2 near gym-don fut.
- Solitary Vireo
- Warbling Vireo
- Orange-crowned Warbler
- Yellow Warbler
- Yellow-rumped Warbler
- (6) 2 2 I Common Yellowthroat
- Wilson's Warbler
- Yellow-breasted Chat
- Western Tanager
- (2) II Black-headed Grosbeak
- (8) 3 IIII Blue Grosbeak
- (24) 4 4 2 3 4 2 2 III Lazuli Bunting
- (4) I I II Rufous-sided Towhee
- (8) 2 2 2 2 California Towhee
- (3) 2 I Lark Sparrow
- Savannah Sparrow
- (30) 4 4 2 4 2 4 2 2 2 Song Sparrow
- Lincoln's Sparrow
- White-crowned Sparrow
- (22) 20 2 Red-winged Blackbird
- Western Meadowlark
- Brewer's Blackbird
- (3) 2 1 Brown-headed Cowbird
- Hooded Oriole
- Northern Oriole
- (16) 4 4 6 2 House Finch
- Pine Siskin
- 2 Lesser Goldfinch
- Lawrence's Goldfinch
- 1 American Goldfinch
- House Sparrow
- (1) TRIC RW

1 deer

Willow Flycatcher
5/12/00

[redacted]



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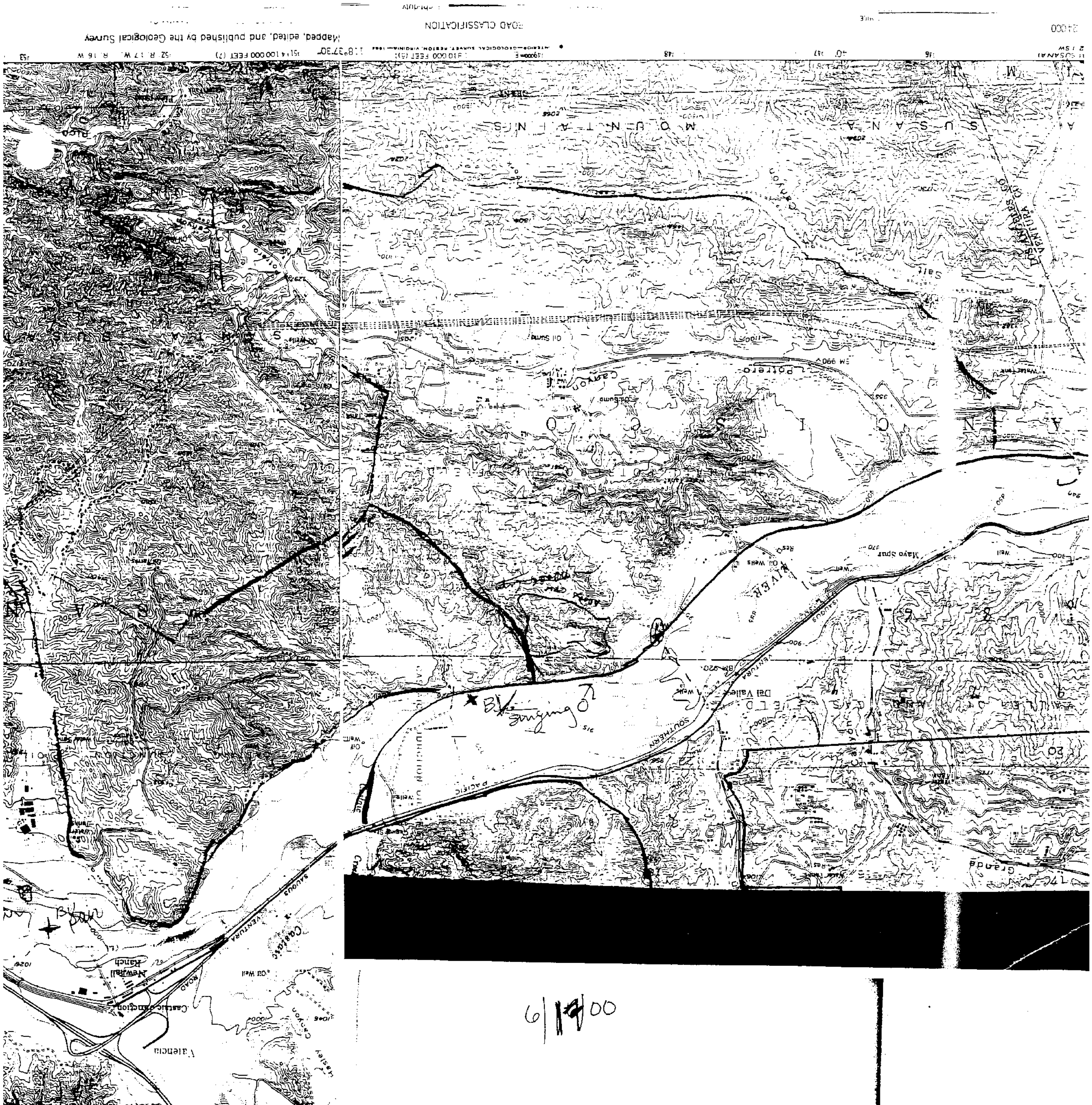
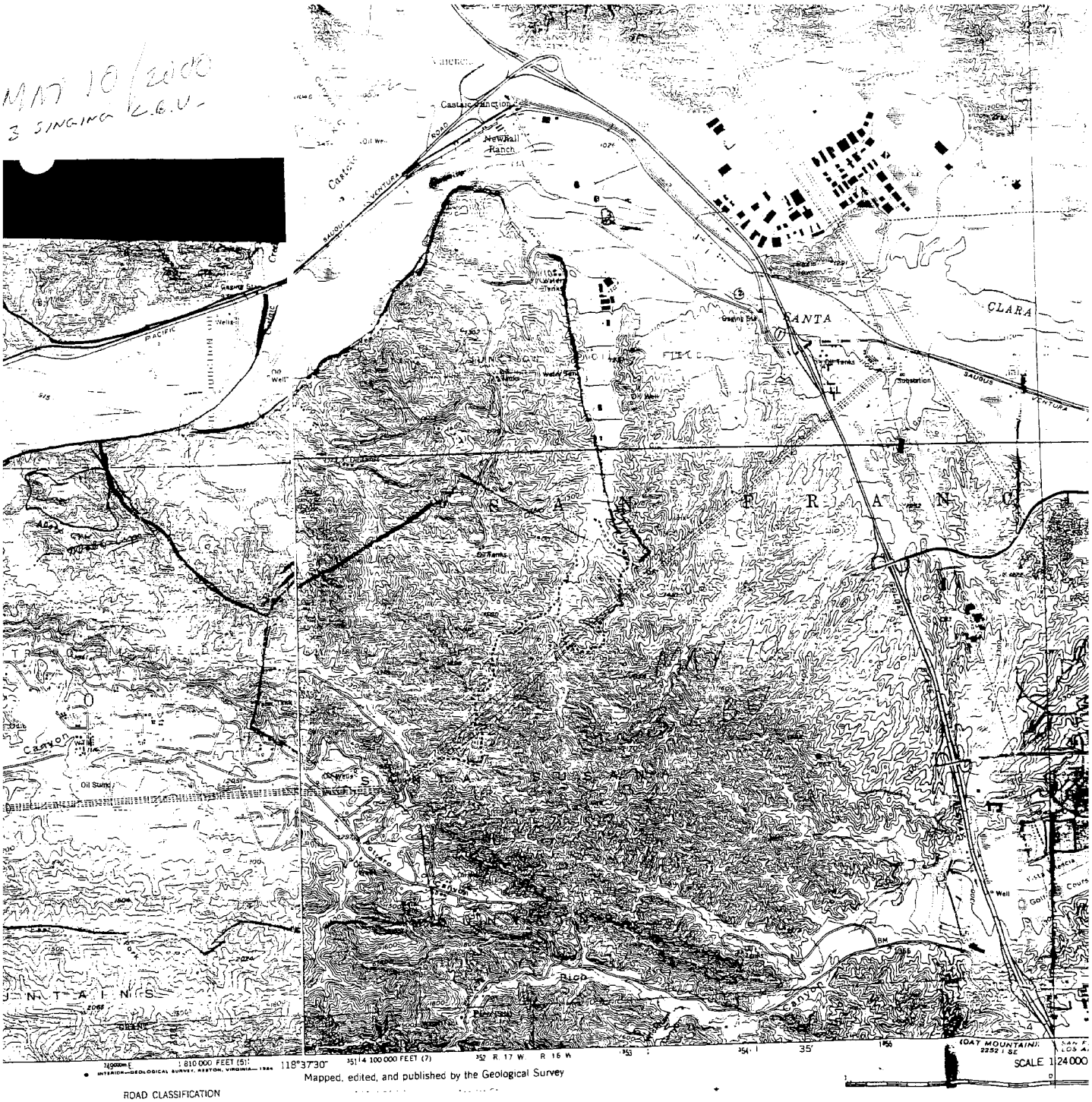
ROAD CLASSIFICATION

Light-duty


Mapped, edited, and published by the Geological Survey
ROAD CLASSIFICATION
SUSANA MOUNTAINS
Potrero
Canyon
Mayo Spur
RIVER
SOUTHERN PACIFIC
Del Valle
Newhall
Ranch
Castaic Junction
Valencia

6/14/00

MAP 10 (2008
3 SINGING C.G.U.-



2000 Spring Count 2

HR Dry — 1 3'x9" of water in river

BIRDS OF Santa Clara River System — Sugar

Locality McBean to Old Hyway Date 4/12/00 Time 730-930

- (1) Great Blue Heron
- Green Heron
- (2) Mallard
- Turkey Vulture
- White-tailed Kite
- Sharp-shinned Hawk
- Cooper's Hawk
- (1) Red-shouldered Hawk
- (3) III Red-tailed Hawk
- American Kestrel
- (12) 264 California Quail
- American Coot
- (9) 2 1 2 II 2 Killdeer
- (1) Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- (160) 20, 40, 100, Rock Dove
- (14) 2264 Mourning Dove
- Greater Roadrunner
- Barn Owl
- Great Horned Owl
- White-throated Swift
- Black-ch. Hummingbird
- (3) Anna's Hummingbird
- Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- (7) II 2 2 Nuttall's Woodpecker
- (3) I 2 Downy Woodpecker
- Hairy Woodpecker
- (1) Northern Flicker
- Western Wood-Pewee
- **Willow Flycatcher**
- Pacific Slope Flycatcher
- (4) 2 Black Phoebe
- Say's Phoebe
- (3) I 2 Ash-throated Flycatcher
- Cassin's Kingbird
- Western Kingbird
- Horned Lark
- Tree Swallow
- Violet-green Swallow
- (30) 4 4 2 2 N. Rough-winged Swallow
- (40) about 25 nests in McBean Cliff Swallow
- Barn Swallow
- (6) II 2 2 Scrub Jay
- (2) 2 American Crow
- (8) 2 4 2 Common Raven
- (4) 2 II Plain Titmouse
- (4) 2 2 Bushtit
- (44) 8 6 4 6 II 2 6 4 Bewick's Wren
- (6) House Wren
- Ruby-crowned Kinglet
- **California Gnatcatcher**
- Blue-gray Gnatcatcher
- (2) Western Bluebird
- (2) Swainson's Thrush
- Hermit Thrush
- American Robin
- Wrentit
- Northern Mockingbird
- (6) I 2 I 2 California Thrasher
- American Pipit
- Cedar Waxwing
- Phainopepla
- Loggerhead Shrike
- (15) 4 4 2 European Starling
- **Bell's Vireo**
- Solitary Vireo
- (1) Warbling Vireo
- (8) 3 III Orange-crowned Warbler
- (4) 2 2 Yellow Warbler
- (16) I 8 6 Yellow-rumped Warbler
- Common Yellowthroat
- (3) III Wilson's Warbler
- Yellow-breasted Chat
- Western Tanager
- Black-headed Grosbeak
- Blue Grosbeak
- Lazuli Bunting
- (5) 2 2 I Rufous-sided Towhee
- (5) 2 I 2 California Towhee
- Lark Sparrow
- Savannah Sparrow
- (49) 2 8 8 8 I 8 6 8 Song Sparrow
- Lincoln's Sparrow
- (18) I I 6 White-crowned Sparrow
- Red-winged Blackbird
- Western Meadowlark
- Brewer's Blackbird
- (29) 6 II I 8 5 5 2 3 Brown-headed Cowbird
- Hooded Oriole
- (2) II Northern Oriole
- (9) 2 4 I 2 House Finch
- Pine Siskin
- (6) 4 2 Lesser Goldfinch
- Lawrence's Goldfinch
- (310) 20, 40, 60, 8 5 8 5 American Goldfinch
- (21) House Sparrow

BIRDS OF Santa Clara River System

Locality McBean to Old Highway Date 4/25/10 Time

- Great Blue Heron
- || Green Heron possibly same indiv. but don't think so.
- Mallard
- Turkey Vulture
- White-tailed Kite
- Sharp-shinned Hawk
- Cooper's Hawk
- Red-shouldered Hawk
- 2 Red-tailed Hawk
- American Kestrel
- 14 California Quail
- American Coot
- 284 Killdeer
- Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- Rock Dove
- 4 18 22 Mourning Dove
- Greater Roadrunner
- Barn Owl
- Great Horned Owl
- White-throated Swift
- Black-ch. Hummingbird
- VII Anna's Hummingbird
- Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- |||| Nuttall's Woodpecker
- || Downy Woodpecker
- Hairy Woodpecker
- Northern Flicker
- | Western Wood-Pewee
- **Willow Flycatcher**
- Pacific Slope Flycatcher
- | Black Phoebe
- Say's Phoebe
- ||| Ash-throated Flycatcher
- Cassin's Kingbird
- Western Kingbird
- Horned Lark
- Tree Swallow
- Violet-green Swallow
- 20, 8 2 2 N. Rough-winged Swallow
- under freeway 30, 50 Cliff Swallow under McBean
- Barn Swallow
- 2221 Scrub Jay
- American Crow
- 44 Common Raven
- 22 Plain Titmouse
- 2 | 24 Bushtit
- 6 22 22 Bewick's Wren
- 6 House Wren
- Ruby-crowned Kinglet

- California Gnatcatcher
- Blue-gray Gnatcatcher
- Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- American Robin
- 2 Wrentit
- Northern Mockingbird
- California Thrasher
- American Pipit
- Cedar Waxwing
- Phainopepla
- Loggerhead Shrike
- 4 European Starling
- **Bell's Vireo**
- Solitary Vireo
- || Warbling Vireo
- || Orange-crowned Warbler
- Yellow Warbler
- Yellow-rumped Warbler
- || Common Yellowthroat
- ||| Wilson's Warbler
- Yellow-breasted Chat
- Western Tanager
- || Black-headed Grosbeak
- Blue Grosbeak
- Lazuli Bunting
- 12 Rufous-sided Towhee
- 24 22 California Towhee
- Lark Sparrow &
- Savannah Sparrow
- 8 22 22 Song Sparrow
- Lincoln's Sparrow
- White-crowned Sparrow
- 24 Red-winged Blackbird
- Western Meadowlark
- Brewer's Blackbird
- 6 24 || 22 Brown-headed Cowbird
- Hooded Oriole
- || Northern Oriole
- 14 House Finch
- Pine Siskin
- 4 | 2 Lesser Goldfinch
- | Lawrence's Goldfinch
- 2 American Goldfinch
- House Sparrow

Cowbird traps are Peter Bloom 714-544-6171

BIRDS OF Santa Clara River System

Locality McBean to old Highway Date 5/10/00 Time ____

- ____ Great Blue Heron
- ____ Green Heron
- ____ Mallard
- 3 Turkey Vulture
- ____ White-tailed Kite
- ____ Sharp-shinned Hawk
- ____ Cooper's Hawk
- 1 Red-shouldered Hawk
- 1 Red-tailed Hawk
- ____ American Kestrel
- 11 California Quail
- ____ American Coot
- 4 Killdeer
- ____ Spotted Sandpiper
- ____ Least Sandpiper
- ____ Common Snipe
- 3 Rock Dove
- 6 Mourning Dove
- ____ Greater Roadrunner
- ____ Barn Owl
- ____ Great Horned Owl
- ____ White-throated Swift
- ____ Black-ch. Hummingbird
- 6 Anna's Hummingbird
- 1 Costa's Hummingbird
- ____ Belted Kingfisher
- ____ Acorn Woodpecker
- 2 Nuttall's Woodpecker
- 2 Downy Woodpecker
- ____ Hairy Woodpecker
- ____ Northern Flicker
- ____ Western Wood-Pewee
- ____ **Willow Flycatcher**
- ____ Pacific Slope Flycatcher
- ____ Black Phoebe
- ____ Say's Phoebe
- 2 Ash-throated Flycatcher
- ____ Cassin's Kingbird
- 2 Western Kingbird
- ____ Horned Lark
- ____ Tree Swallow
- ____ Violet-green Swallow
- 2 N. Rough-winged Swallow
- 4 Cliff Swallow
- ____ Barn Swallow
- 1 Scrub Jay
- 2 American Crow
- 2 Common Raven
- 2 Plain Titmouse
- 2 Bushtit
- 9 Bewick's Wren
- 3 House Wren
- ____ Ruby-crowned Kinglet
- ____ **California Gnatcatcher**
- ____ Blue-gray Gnatcatcher
- ____ Western Bluebird
- ____ Swainson's Thrush
- ____ Hermit Thrush
- ____ American Robin
- 1 Wrentit
- ____ Northern Mockingbird
- 2 California Thrasher
- ____ American Pipit
- ____ Cedar Waxwing
- 2 Phainopepla
- ____ Loggerhead Shrike
- 26 European Starling
- ____ **Bell's Vireo**
- ____ Solitary Vireo
- 2 Warbling Vireo (2 Yellowish.
- ____ Orange-crowned Warbler
- 2 Yellow Warbler
- ____ Yellow-rumped Warbler
- 6 Common Yellowthroat
- 5 Wilson's Warbler
- ____ Yellow-breasted Chat
- 1 Western Tanager
- 3 Black-headed Grosbeak
- ____ Blue Grosbeak
- ____ Lazuli Bunting
- 6 Rufous-sided Towhee
- 12 California Towhee
- ____ Lark Sparrow
- ____ Savannah Sparrow
- 26 Song Sparrow
- ____ Lincoln's Sparrow
- ____ White-crowned Sparrow
- ____ Red-winged Blackbird
- ____ Western Meadowlark
- ____ Brewer's Blackbird
- 4 Brown-headed Cowbird (4 in trap)
- ____ Hooded Oriole
- 1 Northern Oriole
- ____ House Finch
- ____ Pine Siskin
- 2 Lesser Goldfinch
- ____ Lawrence's Goldfinch
- ____ American Goldfinch
- ____ House Sparrow
- 1 Yellow Billed cocoo — ? ?
- 1 white breasted nuthatch

BIRDS OF Santa Clara River System

Locality McBean To Old Hwy Date 5/23/00 Time _____

- 1 Great Blue Heron
- Green Heron
- 2 Mallard
- 1 Turkey Vulture
- White-tailed Kite
- Sharp-shinned Hawk
- Cooper's Hawk
- 2 Red-shouldered Hawk
- 1 Red-tailed Hawk
- American Kestrel
- 2142 California Quail
- American Coot
- 4128 Killdeer
- Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- Rock Dove
- $46 4264 Mourning Dove
- Greater Roadrunner
- Barn Owl
- Great Horned Owl
- White-throated Swift
- Black-ch. Hummingbird
- 11 Anna's Hummingbird
- 1 Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- 7 Nuttall's Woodpecker
- 121 Downy Woodpecker
- Hairy Woodpecker
- Northern Flicker
- Western Wood-Pewee
- **Willow Flycatcher**
- Pacific Slope Flycatcher
- 1212 Black Phoebe
- Say's Phoebe
- 1 2122 Ash-throated Flycatcher
- Cassin's Kingbird
- Western Kingbird
- Horned Lark
- Tree Swallow
- Violet-green Swallow
- 6 N. Rough-winged Swallow
- 100 Cliff Swallow
- Barn Swallow
- 22122 Scrub Jay
- 2 American Crow
- 8126 Common Raven
- 111 Plain Titmouse
- 262222 Bushtit
- 126 42113 Bewick's Wren
- House Wren
- Ruby-crowned Kinglet
- **California Gnatcatcher**
- Blue-gray Gnatcatcher
- 12 Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- American Robin
- Wrentit
- Northern Mockingbird
- 12 California Thrasher
- American Pipit
- Cedar Waxwing
- 1 Phainopepla
- Loggerhead Shrike
- 9,11034 European Starling
- **Bell's Vireo**
- Solitary Vireo
- Warbling Vireo
- Orange-crowned Warbler
- 2 Yellow Warbler
- Yellow-rumped Warbler
- 4114 Common Yellowthroat
- Wilson's Warbler
- 111 Yellow-breasted Chat
- Western Tanager
- 12 Black-headed Grosbeak
- Blue Grosbeak
- Lazuli Bunting
- 12 Rufous-sided Towhee
- 464 California Towhee
- Lark Sparrow
- Savannah Sparrow
- 68 6484 Song Sparrow
- Lincoln's Sparrow
- White-crowned Sparrow
- 2 Red-winged Blackbird
- Western Meadowlark
- Brewer's Blackbird
- 3416 Brown-headed Cowbird
- Hooded Oriole
- Northern Oriole
- 29 649 House Finch
- Pine Siskin
- 212 Lesser Goldfinch
- Lawrence's Goldfinch
- American Goldfinch
- House Sparrow
- 1 CT Egret

BIRDS OF Santa Clara River System

Locality McBean to Old Bridge Date 6/15/00 Time ______

Great Blue Heron
| Green Heron
Mallard
Turkey Vulture
White-tailed Kite
Sharp-shinned Hawk
Cooper's Hawk
Red-shouldered Hawk
| Red-tailed Hawk
American Kestrel
42 California Quail
American Coot
|| ||||| Killdeer
Spotted Sandpiper
Least Sandpiper
Common Snipe
Rock Dove
||| 24 Mourning Dove
Greater Roadrunner
Barn Owl
Great Horned Owl
2 White-throated Swift
Black-ch. Hummingbird
||| Anna's Hummingbird
Costa's Hummingbird
Belted Kingfisher
Acorn Woodpecker
|| Nuttall's Woodpecker
Downy Woodpecker
|| Hairy Woodpecker
| Northern Flicker
Western Wood-Pewee
Willow Flycatcher
Pacific Slope Flycatcher
||| Black Phoebe
Say's Phoebe
||||| Ash-throated Flycatcher
Cassin's Kingbird
Western Kingbird
Horned Lark
Tree Swallow
Violet-green Swallow
20, 20, | N. Rough-winged Swallow
64 Cliff Swallow
Barn Swallow
|||| 2 || Scrub Jay
4 2 American Crow
|||| 4 Common Raven
| Plain Titmouse
5 Bushtit
6 || ||||| 20 | 12 Bewick's Wren
3 5 House Wren
Ruby-crowned Kinglet

California Gnatcatcher
Blue-gray Gnatcatcher
| 2 5 7 Western Bluebird
Swainson's Thrush
Hermit Thrush
American Robin
|| 2 Wrentit
| Northern Mockingbird
||| California Thrasher
American Pipit
Cedar Waxwing
4 Phainopepla
Loggerhead Shrike
20, 20, 12, 35 juv. 15 juv. 2 European Starling
Bell's Vireo
Solitary Vireo
Warbling Vireo
| Orange-crowned Warbler
| Yellow Warbler
Yellow-rumped Warbler
||||| ||||| Common Yellowthroat
Wilson's Warbler
Yellow-breasted Chat
Western Tanager
|| Black-headed Grosbeak
| Blue Grosbeak
Lazuli Bunting
| 2 2 4 | | 2 Rufous-sided Towhee
1 2 6 6 4 2 5 1 2 2 California Towhee
Lark Sparrow
Savannah Sparrow
6 6 ||| 2 6 2 Song Sparrow
Lincoln's Sparrow
White-crowned Sparrow
3 Red-winged Blackbird
Western Meadowlark
Brewer's Blackbird
|| ||||| ||||| Brown-headed Cowbird in traps 2, 4
Hooded Oriole
|| Northern Oriole
20 20, 20, 20, 20, 10, 48 House Finch
Pine Siskin
2 Lesser Goldfinch
Lawrence's Goldfinch
American Goldfinch
House Sparrow

Lots of 1" small fry fish between 5 and 6 o

BIRDS OF Santa Clara River System

Locality McBean to Old Highway Date 6/23/10 Time

- Great Blue Heron
- Green Heron
- Mallard
- Turkey Vulture
- 1 White-tailed Kite
- Sharp-shinned Hawk
- Cooper's Hawk
- Red-shouldered Hawk
- 1 Red-tailed Hawk
- American Kestrel
- 8 California Quail
- American Coot
- 13 Killdeer
- Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- Rock Dove
- 22 Mourning Dove
- Greater Roadrunner
- Barn Owl
- Great Horned Owl
- 2 White-throated Swift
- 1 Black-ch. Hummingbird
- 2 Anna's Hummingbird
- 1 Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- 2 Nuttall's Woodpecker
- 2 Downy Woodpecker
- Hairy Woodpecker
- Northern Flicker
- Western Wood-Pewee
- **Willow Flycatcher**
- Pacific Slope Flycatcher
- 6 Black Phoebe
- Say's Phoebe
- 5 Ash-throated Flycatcher
- Cassin's Kingbird
- Western Kingbird
- Horned Lark
- Tree Swallow
- Violet-green Swallow
- 12 N. Rough-winged Swallow
- 20 on other side 10 10 Cliff Swallow
- 2 Barn Swallow
- 2 1 Scrub Jay
- American Crow
- 3 2 Common Raven
- Plain Titmouse
- 5 Bushtit
- 2 4 2 Bewick's Wren
- 3 1 House Wren
- Ruby-crowned Kinglet
- **California Gnatcatcher**
- Blue-gray Gnatcatcher
- 5 Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- **American Robin**
- Wrentit
- Northern Mockingbird
- California Thrasher
- American Pipit
- Cedar Waxwing
- 1 5 Phainopepla
- Loggerhead Shrike
- 1 4 European Starling
- **Bell's Vireo**
- Solitary Vireo
- Warbling Vireo
- Orange-crowned Warbler
- Yellow Warbler
- 2 Yellow-rumped Warbler
- 4 Common Yellowthroat
- Wilson's Warbler
- Yellow-breasted Chat
- Western Tanager
- 1 Black-headed Grosbeak
- Blue Grosbeak
- Lazuli Bunting
- 1 Rufous-sided Towhee
- 3 2 2 California Towhee
- Lark Sparrow
- Savannah Sparrow
- 5 2 4 Song Sparrow
- Lincoln's Sparrow
- White-crowned Sparrow
- Red-winged Blackbird
- Western Meadowlark
- Brewer's Blackbird
- 3 Brown-headed Cowbird
- Hooded Oriole
- 2 Northern Oriole
- 8 8 6 8 8 8 6 House Finch
- Pine Siskin
- 5 Lesser Goldfinch
- Lawrence's Goldfinch
- American Goldfinch
- 1 House Sparrow
- 1 B.C. Night Heron (adult)
- 1 White-breasted nuthatch (between old bridge & 5)

BIRDS OF Santa Clara River System

Locality McBean to Old 99 Date 7/19/00 Time _____ Monday

_____ Great Blue Heron
_____ Green Heron
_____ Mallard
_____ Turkey Vulture
_____ White-tailed Kite
_____ Sharp-shinned Hawk
_____ Cooper's Hawk
_____ Red-shouldered Hawk
_____ Red-tailed Hawk
_____ American Kestrel
224 California Quail
_____ American Coot
_____ Killdeer
_____ Spotted Sandpiper
_____ Least Sandpiper
_____ Common Snipe
_____ Rock Dove
8 3 4 2 Mourning Dove
_____ Greater Roadrunner
_____ Barn Owl
_____ Great Horned Owl
_____ White-throated Swift
_____ Black-ch. Hummingbird
_____ Anna's Hummingbird
_____ Costa's Hummingbird
_____ Belted Kingfisher
_____ Acorn Woodpecker
_____ Nuttall's Woodpecker
_____ Downy Woodpecker
_____ Hairy Woodpecker
_____ Northern Flicker
_____ Western Wood-Pewee
_____ **Willow Flycatcher**
_____ Pacific Slope Flycatcher
_____ Black Phoebe
_____ Say's Phoebe
_____ Ash-throated Flycatcher
_____ Cassin's Kingbird
_____ Western Kingbird
_____ Horned Lark
_____ Tree Swallow
_____ Violet-green Swallow
8 4 2 N. Rough-winged Swallow
4 Cliff Swallow
_____ Barn Swallow
_____ Scrub Jay
_____ American Crow
4 Common Raven
_____ Plain Titmouse
_____ Bushtit
2 3 Bewick's Wren
_____ House Wren
_____ Ruby-crowned Kinglet

_____ **California Gnatcatcher**
_____ Blue-gray Gnatcatcher
5 Western Bluebird
_____ Swainson's Thrush
_____ Hermit Thrush
_____ American Robin
_____ Wrentit
_____ Northern Mockingbird
_____ California Thrasher
_____ American Pipit
_____ Cedar Waxwing
4 Phainopepla
_____ Loggerhead Shrike
_____ European Starling
_____ **Bell's Vireo**
_____ Solitary Vireo
_____ Warbling Vireo
_____ Orange-crowned Warbler
_____ Yellow Warbler
_____ Yellow-rumped Warbler
4 Common Yellowthroat
_____ Wilson's Warbler
_____ Yellow-breasted Chat
_____ Western Tanager
_____ Black-headed Grosbeak
_____ Blue Grosbeak
_____ Lazuli Bunting
_____ Rufous-sided Towhee
2 California Towhee
_____ Lark Sparrow
_____ Savannah Sparrow
8 6 4 8 2 Song Sparrow
_____ Lincoln's Sparrow
_____ White-crowned Sparrow
_____ Red-winged Blackbird
_____ Western Meadowlark
_____ Brewer's Blackbird
_____ Brown-headed Cowbird
_____ Hooded Oriole
_____ Northern Oriole
20 6 8 8 2 House Finch
_____ Pine Siskin
8 1 2 2 Lesser Goldfinch
_____ Lawrence's Goldfinch
_____ American Goldfinch
_____ House Sparrow

1 Deer

BIRDS OF Santa Clara River System

Locality McBean to Old 5 Date 7/26/05 Time

- Great Blue Heron
- Green Heron
- Mallard
- Turkey Vulture
- White-tailed Kite
- Sharp-shinned Hawk
- Cooper's Hawk
- Red-shouldered Hawk
- Red-tailed Hawk
- American Kestrel
- California Quail
- American Coot
- Killdeer
- Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- Rock Dove
- Mourning Dove
- Greater Roadrunner
- Barn Owl
- Great Horned Owl
- White-throated Swift
- Black-ch. Hummingbird
- Anna's Hummingbird
- Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- Nuttall's Woodpecker
- Downy Woodpecker
- Hairy Woodpecker
- Northern Flicker
- Western Wood-Pewee
- **Willow Flycatcher**
- Pacific Slope Flycatcher
- Black Phoebe
- Say's Phoebe
- Ash-throated Flycatcher
- Cassin's Kingbird
- Western Kingbird
- Horned Lark
- Tree Swallow
- Violet-green Swallow
- N. Rough-winged Swallow
- Cliff Swallow
- Barn Swallow
- Scrub Jay
- American Crow
- Common Raven
- Plain Titmouse
- Bushtit
- Bewick's Wren
- House Wren
- Ruby-crowned Kinglet
- **California Gnatcatcher**
- Blue-gray Gnatcatcher
- Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- American Robin
- Wrentit
- Northern Mockingbird
- California Thrasher
- American Pipit
- Cedar Waxwing
- Phainopepla
- Loggerhead Shrike
- European Starling
- **Bell's Vireo**
- Solitary Vireo
- Warbling Vireo
- Orange-crowned Warbler
- Yellow Warbler
- Yellow-rumped Warbler
- Common Yellowthroat
- Wilson's Warbler
- Yellow-breasted Chat
- Western Tanager
- Black-headed Grosbeak
- Blue Grosbeak families
- Lazuli Bunting
- Rufous-sided Towhee
- California Towhee
- Lark Sparrow babies
- Savannah Sparrow
- Song Sparrow
- Lincoln's Sparrow
- White-crowned Sparrow
- Red-winged Blackbird
- Western Meadowlark
- Brewer's Blackbird
- Brown-headed Cowbird
- Hooded Oriole
- Northern Oriole
- House Finch
- Pine Siskin
- Lesser Goldfinch
- Lawrence's Goldfinch
- American Goldfinch
- House Sparrow

Upper Santa Clara River Snyder South side

BIRDS OF Santa Clara River System

Locality Bouquet to McBean Date 4/12/0 Time

	Great Blue Heron		California Gnatcatcher
	Green Heron		Blue-gray Gnatcatcher
(9)	522 Mallard		Western Bluebird
	Turkey Vulture		Swainson's Thrush
	White-tailed Kite		Hermit Thrush
	Sharp-shinned Hawk		American Robin
(1)	Cooper's Hawk	(1)	Wrentit
(1)	Red-shouldered Hawk		Northern Mockingbird
(3)	12 Red-tailed Hawk	(5)	5 3 1 1 California Thrasher
	American Kestrel		American Pipit
(10)	2226 California Quail		Cedar Waxwing
	American Coot		Phainopepla
(7)	12 Killdeer		Loggerhead Shrike
	Spotted Sandpiper	(11)	3 8 12 European Starling
	Least Sandpiper		**Bell's Vireo**
	Common Snipe		Solitary Vireo
(2)	2 Rock Dove		Warbling Vireo
(21)	63 22222 Mourning Dove		Orange-crowned Warbler
	Greater Roadrunner	(1)	Yellow Warbler
	Barn Owl	(4)	2 1 1 Yellow-rumped Warbler
	Great Horned Owl	(5)	1 1 1 2 Common Yellowthroat
	White-throated Swift		Wilson's Warbler
	Black-ch. Hummingbird		Yellow-breasted Chat
(4)	1111 Anna's Hummingbird		Western Tanager
	Costa's Hummingbird		Black-headed Grosbeak
	Belted Kingfisher		Blue Grosbeak
	Acorn Woodpecker		Lazuli Bunting
(7)	1222 Nuttall's Woodpecker	(8)	1 1 1 Rufous-sided Towhee
(2)	2 Downy Woodpecker	(10)	2 2 2 2 2 California Towhee
	Hairy Woodpecker		Lark Sparrow &
	Northern Flicker		Savannah Sparrow
	Western Wood-Pewee	(40)	8 8 2 1 2 1 1 2 2 2 4 4 Song Sparrow
	Willow Flycatcher		Lincoln's Sparrow
	Pacific Slope Flycatcher	(42)	8, 10, 20, 4 White-crowned Sparrow
	Black Phoebe	(4)	Red-winged Blackbird
	Say's Phoebe		Western Meadowlark
	Ash-throated Flycatcher	(6)	Brewer's Blackbird
	Cassin's Kingbird	(28)	4 6 8 6 2 2 Brown-headed Cowbird (+3 +6 in their corral trap.
	Western Kingbird		Hooded Oriole
	Horned Lark		Northern Oriole
	Tree Swallow	(6)	2 2 2 House Finch
	Violet-green Swallow		Pine Siskin
	N. Rough-winged Swallow	(2)	Lesser Goldfinch
	✓ Cliff Swallow (all under bridge on next section)	(2)	Lawrence's Goldfinch
	Barn Swallow	(25)	2, 3, 20 American Goldfinch
(8)	1 1 2 2 1 1 Scrub Jay		House Sparrow
	American Crow		11 Gull on baseball fields
(28)	8, 8, 4 1 1 2 4 Common Raven nest under McBean	(2)	TRICOLOR BBird (+more ? in flock ± 20.
(2)	Plain Titmouse		
(4)	22 Bushtit		
(27)	6 4 2 4 2 3 Bewick's Wren		
(1)	House Wren		
	Ruby-crowned Kinglet		

BIRDS OF Santa Clara River System

Locality Bryant to McBean Date 4/22/00 Time

- Great Blue Heron
- 1 Green Heron
- Mallard
- Turkey Vulture
- White-tailed Kite
- Sharp-shinned Hawk
- Cooper's Hawk
- Red-shouldered Hawk
- Red-tailed Hawk
- American Kestrel
- 1224 California Quail
- American Coot
- 6 Killdeer
- Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- 2 Rock Dove
- 4 2684 Mourning Dove
- 1 Greater Roadrunner
- Barn Owl
- Great Horned Owl
- White-throated Swift
- 1 Black-ch. Hummingbird
- III Anna's Hummingbird
- Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- 2 Nuttall's Woodpecker
- 1 Downy Woodpecker
- Hairy Woodpecker
- 1 Northern Flicker
- Western Wood-Pewee
- **Willow Flycatcher**
- Pacific Slope Flycatcher
- 22 Black Phoebe + young in nests
- Say's Phoebe
- II Ash-throated Flycatcher
- Cassin's Kingbird
- Western Kingbird
- Horned Lark
- Tree Swallow
- Violet-green Swallow
- 2 N. Rough-winged Swallow
- Cliff Swallow
- Barn Swallow
- II Scrub Jay
- American Crow
- 1228 Common Raven
- 12 Plain Titmouse + young in nests
- 222 Bushtit
- 2222212 Bewick's Wren
- House Wren
- Ruby-crowned Kinglet
- **California Gnatcatcher**
- Blue-gray Gnatcatcher
- Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- American Robin
- Wrentit
- Northern Mockingbird
- III California Thrasher
- American Pipit
- Cedar Waxwing
- Phainopepla
- Loggerhead Shrike
- 142 European Starling
- **Bell's Vireo**
- Solitary Vireo
- 2 Warbling Vireo nesting
- III Orange-crowned Warbler
- 1 Yellow Warbler
- 1 Yellow-rumped Warbler
- 13212 Common Yellowthroat
- III Wilson's Warbler
- Yellow-breasted Chat
- II Western Tanager
- 11162 Black-headed Grosbeak
- 12 Blue Grosbeak
- Lazuli Bunting
- 222 Rufous-sided Towhee
- 2222 California Towhee
- Lark Sparrow
- Savannah Sparrow
- 2226222222 Song Sparrow
- Lincoln's Sparrow
- White-crowned Sparrow
- 4 Red-winged Blackbird
- Western Meadowlark
- 6 Brewer's Blackbird
- 4 Brown-headed Cowbird
- Hooded Oriole
- II 2 Northern Oriole
- 64 House Finch
- Pine Siskin
- 2,10,2 Lesser Goldfinch
- Lawrence's Goldfinch
- 2 American Goldfinch
- House Sparrow

3 cowbird traps set from McBean with 2-5 cowbirds each not included above

BIRDS OF Santa Clara River System

Locality Bouquet to McBean Date 5/10/00 Time

- Great Blue Heron
- Green Heron
- 3 Mallard
- Turkey Vulture
- White-tailed Kite
- Sharp-shinned Hawk
- Cooper's Hawk
- Red-shouldered Hawk
- 2 Red-tailed Hawk
- American Kestrel
- California Quail
- American Coot
- 12123 Killdeer
- 1 Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- Rock Dove
- +6+22 Mourning Dove
- Greater Roadrunner
- Barn Owl
- Great Horned Owl
- White-throated Swift
- Black-ch. Hummingbird
- 1 Anna's Hummingbird
- Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- 11 Nuttall's Woodpecker
- 2 Downy Woodpecker
- 2 Hairy Woodpecker
- 1 Northern Flicker
- Western Wood-Pewee
- **Willow Flycatcher**
- 11 Pacific Slope Flycatcher
- 2 Black Phoebe
- Say's Phoebe
- 221 Ash-throated Flycatcher
- Cassin's Kingbird
- 221 Western Kingbird
- 22 Horned Lark
- Tree Swallow
- Violet-green Swallow
- 2112 N. Rough-winged Swallow
- 10 Cliff Swallow Don't Nothing under McBean
- Barn Swallow
- 12 Scrub Jay
- 3 American Crow
- 4152 Common Raven
- 21 Plain Titmouse
- 22222 Bushtit
- 22423 Bewick's Wren
- 1 House Wren
- Ruby-crowned Kinglet
- **California Gnatcatcher**
- Blue-gray Gnatcatcher
- Western Bluebird
- 1 Swainson's Thrush
- Hermit Thrush
- American Robin
- 22 Wrentit
- Northern Mockingbird
- California Thrasher
- American Pipit
- Cedar Waxwing
- Phainopepla
- Loggerhead Shrike
- 4 European Starling
- **Bell's Vireo**
- Solitary Vireo
- 11 Warbling Vireo
- Orange-crowned Warbler
- 1121 Yellow Warbler
- Yellow-rumped Warbler
- 11 Common Yellowthroat
- 111 Wilson's Warbler
- Yellow-breasted Chat
- 11 Western Tanager
- 111 Black-headed Grosbeak
- 12 Blue Grosbeak
- Lazuli Bunting
- 122 Rufous-sided Towhee
- 2811 California Towhee
- Lark Sparrow
- Savannah Sparrow
- +8+2+64 Song Sparrow
- Lincoln's Sparrow
- White-crowned Sparrow
- 5+46 Red-winged Blackbird
- Western Meadowlark
- Brewer's Blackbird
- 2251 Brown-headed Cowbird
- Hooded Oriole
- Northern Oriole
- 1144 House Finch
- Pine Siskin
- 212 Lesser Goldfinch
- Lawrence's Goldfinch
- American Goldfinch
- House Sparrow
- 1 Call I've never heard before
- 1 chipping sparrow

BIRDS OF Santa Clara River System

Locality Bouquet to McBean Date 5/23/00 Time

- Great Blue Heron
- Green Heron
- 12 Mallard
- Turkey Vulture
- White-tailed Kite
- Sharp-shinned Hawk
- Cooper's Hawk
- Red-shouldered Hawk
- 1 Red-tailed Hawk
- American Kestrel
- 6422 California Quail
- American Coot
- 2211 Killdeer
- 1 Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- Rock Dove
- 30, 20, 34 Mourning Dove
- Greater Roadrunner
- Barn Owl
- Great Horned Owl
- White-throated Swift
- Black-ch. Hummingbird
- 11 Anna's Hummingbird
- Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- 1 Nuttall's Woodpecker
- Downy Woodpecker
- Hairy Woodpecker
- Northern Flicker
- Western Wood-Pewee
- **Willow Flycatcher**
- Pacific Slope Flycatcher
- 11 Black Phoebe
- Say's Phoebe
- 21 Ash-throated Flycatcher
- Cassin's Kingbird
- 22 Western Kingbird
- 2 Horned Lark
- Tree Swallow
- Violet-green Swallow
- 42 N. Rough-winged Swallow
- 1123 Cliff Swallow
- Barn Swallow
- 211 Scrub Jay
- American Crow
- 25, 20, 102 Common Raven
- 11 Plain Titmouse
- 622 Bushtit
- 1164 Bewick's Wren
- House Wren
- Ruby-crowned Kinglet
- **California Gnatcatcher**
- Blue-gray Gnatcatcher
- Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- American Robin
- 12 Wrentit
- Northern Mockingbird
- 12 California Thrasher
- American Pipit
- Cedar Waxwing
- Phainopepla
- Loggerhead Shrike
- 15, 9, 8, 19, 6 European Starling
- **Bell's Vireo**
- Solitary Vireo
- Warbling Vireo
- Orange-crowned Warbler
- 2 Yellow Warbler
- Yellow-rumped Warbler
- 66 Common Yellowthroat
- 1 Wilson's Warbler
- 1 Yellow-breasted Chat
- Western Tanager
- 21 Black-headed Grosbeak
- Blue Grosbeak
- Lazuli Bunting
- 2134 Rufous-sided Towhee
- 224636 California Towhee
- 2 Lark Sparrow
- Savannah Sparrow
- 2648 Song Sparrow
- Lincoln's Sparrow
- White-crowned Sparrow
- 10, 20, 32, 118, 4 Red-winged Blackbird
- Western Meadowlark
- 11 Brewer's Blackbird
- 26, 14, 3 Brown-headed Cowbird
- Hooded Oriole
- Northern Oriole
- 4824 House Finch
- Pine Siskin
- 2, 11, 4, 6 Lesser Goldfinch
- Lawrence's Goldfinch
- 2 American Goldfinch
- House Sparrow
- 2 Common Teal

BIRDS OF Santa Clara River System

Locality Bouquet to McBean Date 6/15/00 Time 6:00

Thursday

_____ Great Blue Heron
_____ Green Heron
2 Mallard
_____ Turkey Vulture
_____ White-tailed Kite
_____ Sharp-shinned Hawk
_____ Cooper's Hawk
_____ Red-shouldered Hawk
_____ Red-tailed Hawk
_____ American Kestrel
2,6 California Quail
_____ American Coot
3,9,4 Killdeer
_____ Spotted Sandpiper
_____ Least Sandpiper
_____ Common Snipe
_____ Rock Dove
20, 24,3 Mourning Dove
_____ Greater Roadrunner
Heard now X Barn Owl
_____ Great Horned Owl
_____ White-throated Swift
_____ Black-ch. Hummingbird
1 Anna's Hummingbird
_____ Costa's Hummingbird
_____ Belted Kingfisher
_____ Acorn Woodpecker
11 Nuttall's Woodpecker
2 Downy Woodpecker
_____ Hairy Woodpecker
11 Northern Flicker
2 Western Wood-Pewee
_____ **Willow Flycatcher**
_____ Pacific Slope Flycatcher
1,2,3 Black Phoebe
_____ Say's Phoebe
12 Ash-throated Flycatcher
_____ Cassin's Kingbird
1 Western Kingbird
9,2 Horned Lark
_____ Tree Swallow
_____ Violet-green Swallow
6,5 N. Rough-winged Swallow
30,30,10 Cliff Swallow 5 nests under Bouquet Canyon Bridge, 15 nests under Hardluck Bridge, 10 nests still occupied under McBean
_____ Barn Swallow
3,1,2 Scrub Jay
_____ American Crow
25, 16,4 Common Raven
1 Plain Titmouse
5 Bushtit
1,2,4,2,6 Bewick's Wren
_____ House Wren
_____ Ruby-crowned Kinglet

_____ **California Gnatcatcher**
_____ Blue-gray Gnatcatcher
_____ Western Bluebird
1 Swainson's Thrush
_____ Hermit Thrush
_____ American Robin
1 Wrentit
_____ Northern Mockingbird
111 California Thrasher
_____ American Pipit
_____ Cedar Waxwing
_____ Phainopepla
_____ Loggerhead Shrike
11 European Starling
_____ **Bell's Vireo**
_____ Solitary Vireo
_____ Warbling Vireo
2 Orange-crowned Warbler pr.
1 Yellow Warbler
_____ Yellow-rumped Warbler
12 Common Yellowthroat
_____ Wilson's Warbler
_____ Yellow-breasted Chat
_____ Western Tanager
1 Black-headed Grosbeak
_____ Blue Grosbeak
_____ Lazuli Bunting
_____ Rufous-sided Towhee
1,2,4,2,7 California Towhee
_____ Lark Sparrow
_____ Savannah Sparrow
64,1,3,0,4 Song Sparrow
_____ Lincoln's Sparrow
_____ White-crowned Sparrow
5 Red-winged Blackbird
_____ Western Meadowlark
_____ Brewer's Blackbird
14 Brown-headed Cowbird + in trap 3 4
_____ Hooded Oriole
2 Northern Oriole
20,20,8 House Finch
_____ Pine Siskin
2 Lesser Goldfinch
_____ Lawrence's Goldfinch
_____ American Goldfinch
_____ House Sparrow
New Barn Owl Pellets = Roost under Nelson Bridge
1 Blue-winged Teal on

Additional pellets under McBean

BIRDS OF Santa Clara River System

Locality Bouquet to McBean Date 6/28/00 Time 6:15

- Great Blue Heron
- Green Heron
- 1 Mallard
- Turkey Vulture
- White-tailed Kite
- Sharp-shinned Hawk
- 1 Cooper's Hawk
- Red-shouldered Hawk
- 2 Red-tailed Hawk
- American Kestrel
- 2 California Quail
- American Coot
- 3 1 3 Killdeer
- 1 Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- Rock Dove
- 8 8 4 4 2 Mourning Dove
- Greater Roadrunner
- Barn Owl
- Great Horned Owl
- White-throated Swift
- Black-cn. Hummingbird
- 2 Anna's Hummingbird
- Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- 3 Nuttall's Woodpecker
- 1 Downy Woodpecker
- Hairy Woodpecker
- Northern Flicker
- Western Wood-Pewee
- **Willow Flycatcher**
- Pacific Slope Flycatcher
- 1 Black Phoebe
- Say's Phoebe
- 1 Ash-throated Flycatcher
- Cassin's Kingbird
- Western Kingbird
- Horned Lark
- Tree Swallow
- Violet-green Swallow
- 2 2 N. Rough-winged Swallow
- 20, 20, 20 Cliff Swallow 3 new nests under New Hall Bridge still in nests under main bridge
- 1 Barn Swallow
- 1 2 2 Scrub Jay
- 4 American Crow
- 2 6 2 6 2 3 Common Raven
- Plain Titmouse
- Bushtit
- 1 5 2 Bewick's Wren
- House Wren
- Ruby-crowned Kinglet
- **California Gnatcatcher**
- Blue-gray Gnatcatcher
- 1 Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- American Robin
- Wrentit
- Northern Mockingbird
- 2 California Thrasher
- American Pipit
- Cedar Waxwing
- Phainopepla
- Loggerhead Shrike
- European Starling
- **Bell's Vireo**
- Solitary Vireo
- Warbling Vireo
- Orange-crowned Warbler
- 2 Yellow Warbler
- Yellow-rumped Warbler
- 1 1 2 2 1 2 2 Common Yellowthroat
- Wilson's Warbler
- Yellow-breasted Chat
- Western Tanager
- 1 Black-headed Grosbeak
- 1 2 Blue Grosbeak
- Lazuli Bunting
- 1 Rufous-sided Towhee
- 1 2 1 1 2 California Towhee
- Lark Sparrow
- Savannah Sparrow
- 1 3 2 Song Sparrow
- Lincoln's Sparrow
- White-crowned Sparrow
- 20, 40, 8 8 3 1 1 Red-winged Blackbird
- Western Meadowlark
- Brewer's Blackbird
- 3 Brown-headed Cowbird
- Hooded Oriole
- Northern Oriole
- 20, 20, 8 8 6 8 9 6 House Finch
- 1 Pine Siskin
- Lesser Goldfinch
- Lawrence's Goldfinch
- American Goldfinch
- House Sparrow
- 2 Spotted Doves

BIRDS OF Santa Clara River System

Locality Borrow Pit & M. Barn Date 7/17/00 Monday Time

_____ Great Blue Heron
_____ Green Heron
_____ Mallard
_____ Turkey Vulture
_____ White-tailed Kite
_____ Sharp-shinned Hawk
_____ Cooper's Hawk
2 Red-shouldered Hawk
1 Red-tailed Hawk
_____ American Kestrel
6 California Quail
_____ American Coot
25, 1 Killdeer
1 Spotted Sandpiper
_____ Least Sandpiper
_____ Common Snipe
_____ Rock Dove
25, 36 Mourning Dove
_____ Greater Roadrunner
_____ Barn Owl
_____ Great Horned Owl
_____ White-throated Swift
1 Black-ch. Hummingbird
IIII IIII Anna's Hummingbird
1 Costa's Hummingbird
_____ Belted Kingfisher
_____ Acorn Woodpecker
IIII Nuttall's Woodpecker
1 Downy Woodpecker
_____ Hairy Woodpecker
_____ Northern Flicker
_____ Western Wood-Pewee
_____ **Willow Flycatcher**
_____ Pacific Slope Flycatcher
1 Black Phoebe
_____ Say's Phoebe
1 Ash-throated Flycatcher
_____ Cassin's Kingbird
_____ Western Kingbird
_____ Horned Lark
_____ Tree Swallow
_____ Violet-green Swallow
4 N. Rough-winged Swallow
6 III 2 Cliff Swallow
_____ Barn Swallow
III Scrub Jay
_____ American Crow
8, 12, 25 Common Raven
_____ Plain Titmouse
II 2 Bushtit
II Bewick's Wren
_____ House Wren
_____ Ruby-crowned Kinglet

_____ **California Gnatcatcher**
_____ Blue-gray Gnatcatcher
_____ Western Bluebird
_____ Swainson's Thrush
_____ Hermit Thrush
_____ American Robin
_____ Wrentit
_____ Northern Mockingbird
II 3 California Thrasher
_____ American Pipit
_____ Cedar Waxwing
_____ Phainopepla
_____ Loggerhead Shrike
85, 1 European Starling
_____ **Bell's Vireo**
_____ Solitary Vireo
_____ Warbling Vireo
_____ Orange-crowned Warbler
_____ Yellow Warbler
_____ Yellow-rumped Warbler
14 Common Yellowthroat
_____ Wilson's Warbler
_____ Yellow-breasted Chat
_____ Western Tanager
1 Black-headed Grosbeak
II 2 Blue Grosbeak
_____ Lazuli Bunting
1 Rufous-sided Towhee
12 California Towhee
_____ Lark Sparrow
_____ Savannah Sparrow
4 23 Song Sparrow
_____ Lincoln's Sparrow
_____ White-crowned Sparrow
25, 15 Red-winged Blackbird
_____ Western Meadowlark
_____ Brewer's Blackbird
6, 8, 6, 4, 6 Brown-headed Cowbird
_____ Hooded Oriole
_____ Northern Oriole
8 8 House Finch
_____ Pine Siskin
2 Lesser Goldfinch
_____ Lawrence's Goldfinch
_____ American Goldfinch
1 House Sparrow
1 yellow headed blackbird

BIRDS OF Santa Clara River System

Locality Bouquet to McBean Date 7/26/00 Time _____

_____ Great Blue Heron
_____ Green Heron
_____ Mallard
_____ Turkey Vulture
_____ White-tailed Kite
_____ Sharp-shinned Hawk
_____ Cooper's Hawk
_____ Red-shouldered Hawk
(3) 2 Red-tailed Hawk
_____ American Kestrel
(3) 2 California Quail
_____ American Coot
(13, 14) 6 Killdeer
(11) _____ Spotted Sandpiper
_____ Least Sandpiper
(2) _____ Common Snipe
1 Rock Dove
(88, 88, 82, 46) Mourning Dove
(1) _____ Greater Roadrunner
_____ Barn Owl
_____ Great Horned Owl
_____ White-throated Swift
(25) 18 Black-ch. Hummingbird
_____ Anna's Hummingbird
(1) _____ Costa's Hummingbird
_____ Belted Kingfisher
_____ Acorn Woodpecker
(6) 17 Nuttall's Woodpecker
(7) 12 Downy Woodpecker
_____ Hairy Woodpecker
_____ Northern Flicker
_____ Western Wood-Pewee
_____ **Willow Flycatcher**
_____ Pacific Slope Flycatcher
(10) 23 Black Phoebe
_____ Say's Phoebe
(5) 2 Ash-throated Flycatcher
_____ Cassin's Kingbird
_____ Western Kingbird
_____ Horned Lark
_____ Tree Swallow
(1) _____ Violet-green Swallow
_____ N. Rough-winged Swallow
(18) 12, 24 Cliff Swallow (nests under McBean)
_____ Barn Swallow
(4) 3 Scrub Jay
_____ American Crow
(9) 10 Common Raven
(5) 5 Plain Titmouse
(6) 6 Bushtit
(5) 2 Bewick's Wren
_____ House Wren
_____ Ruby-crowned Kinglet

_____ **California Gnatcatcher**
_____ Blue-gray Gnatcatcher
_____ Western Bluebird
_____ Swainson's Thrush
_____ Hermit Thrush
_____ **American Robin**
(1) _____ Wrentit
_____ Northern Mockingbird
(5) 3 California Thrasher
_____ American Pipit
_____ Cedar Waxwing
_____ Phainopepla
_____ Loggerhead Shrike
(16) _____ European Starling
_____ **Bell's Vireo**
_____ Solitary Vireo
_____ Warbling Vireo
_____ Orange-crowned Warbler
_____ Yellow Warbler
_____ Yellow-rumped Warbler
(12) 13 Common Yellowthroat
_____ Wilson's Warbler
_____ Yellow-breasted Chat
(2) _____ Western Tanager
_____ Black-headed Grosbeak
_____ Blue Grosbeak
(5) 2 Lazuli Bunting
(1) _____ Rufous-sided Towhee
(2) _____ California Towhee
_____ Lark Sparrow
_____ Savannah Sparrow
(43, 48) 38 Song Sparrow
_____ Lincoln's Sparrow
_____ White-crowned Sparrow
(233) 63 Red-winged Blackbird
(20, 30, 30, 20, 20, 20) _____ Western Meadowlark
3 Brewer's Blackbird
(21) 13 Brown-headed Cowbird
_____ Hooded Oriole
_____ Northern Oriole
(57) (68, 48, 48) 46 House Finch
_____ Pine Siskin
(4) _____ Lesser Goldfinch
_____ Lawrence's Goldfinch
_____ American Goldfinch
_____ House Sparrow

Sugden   2000 Upper Area   Area 4   + 5/31/00 5:00am to 6:00am Dawn Willow + Brine, Lowest Castaic + Pan section

Upper, Upper
BIRDS OF Santa Clara River System

Locality Pipeline to Bouquet Bridge   Date 5/31/00 Time 6:00 – 10:00

Count	Species
	Great Blue Heron
	Green Heron
	Mallard
	Turkey Vulture
	White-tailed Kite
	Sharp-shinned Hawk
1	Cooper's Hawk
	Red-shouldered Hawk
2	Red-tailed Hawk
	American Kestrel
2 1 4 4 8 2 6 2 1 1 2 2	California Quail
	American Coot
5	Killdeer
	Spotted Sandpiper
	Least Sandpiper
	Common Snipe
	Rock Dove
2 4 4 8 3 6 4 2 2 4 2 3	Mourning Dove
	Greater Roadrunner
	Barn Owl
	Great Horned Owl
	White-throated Swift
	Black-ch. Hummingbird
2 2 1 2 1	Anna's Hummingbird
1	Costa's Hummingbird
	Belted Kingfisher
	Acorn Woodpecker
1 1 2	Nuttall's Woodpecker
	Downy Woodpecker
	Hairy Woodpecker
1	Northern Flicker
	Western Wood-Pewee
	Willow Flycatcher
	Pacific Slope Flycatcher
	Black Phoebe
1 1	Say's Phoebe
1 2 2 2	Ash-throated Flycatcher
	Cassin's Kingbird
2 2 1 1 2	Western Kingbird
	Horned Lark
	Tree Swallow
	Violet-green Swallow
6 4 6 8 4	N. Rough-winged Swallow
8 2 8	Cliff Swallow
1	Barn Swallow
6 4 1 1 2 4 2 6 2 2	Scrub Jay
4 2	American Crow
6 8, 12, 6	Common Raven
1 2	Plain Titmouse
4 2 4 1 2 8 5 2	Bushtit
1 2 4 2 6 6 4 1 6 2 2	Bewick's Wren
8	House Wren
	Ruby-crowned Kinglet
	California Gnatcatcher
	Blue-gray Gnatcatcher
5 1 2	Western Bluebird
	Swainson's Thrush
	Hermit Thrush
	American Robin
2 2 4 1 2	Wrentit
1 1 2 1	Northern Mockingbird
1 1 1 1 2 2 1	California Thrasher
	American Pipit
	Cedar Waxwing
2 4 6 8 1 2 6 2	Phainopepla
	Loggerhead Shrike
8 4 1 2 4	European Starling
	Bell's Vireo
	Solitary Vireo
	Warbling Vireo
	Orange-crowned Warbler
	Yellow Warbler
	Yellow-rumped Warbler
1	Common Yellowthroat
	Wilson's Warbler
	Yellow-breasted Chat
	Western Tanager
	Black-headed Grosbeak
2	Blue Grosbeak
1	Lazuli Bunting
2 1 4 4 6 4 1 2 2 2 2	Rufous-sided Towhee
1 4 4 4 6 8 1 6 2	California Towhee
1 1 2	Lark Sparrow
	Savannah Sparrow
2 1 2	Song Sparrow
	Lincoln's Sparrow
	White-crowned Sparrow
8	Red-winged Blackbird
	Western Meadowlark
	Brewer's Blackbird
1 1 3	Brown-headed Cowbird
2 2 1	Hooded Oriole
1 1 1 1 2 2 2 1 1	Northern Oriole
20, 20, 8 8 4 2 4 2	House Finch
	Pine Siskin
6 8 2 2 2 2	Lesser Goldfinch
	Lawrence's Goldfinch
2	American Goldfinch
4 1	House Sparrow
1 4 2	Rufous Crowned Sparrows (hillside, vegetation)

BIRDS OF Santa Clara River System

Locality Upper Upper River Date 7/10/00 Time Monday

- Great Blue Heron
- Green Heron
- Mallard
- Turkey Vulture
- White-tailed Kite
- Sharp-shinned Hawk
- Cooper's Hawk
- 1 Red-shouldered Hawk
- 1 Red-tailed Hawk
- American Kestrel
- 1 ||| 26512 California Quail
- American Coot
- 16 Killdeer
- Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- 2 Rock Dove
- 6 4666 ||| Mourning Dove
- Greater Roadrunner
- Barn Owl
- Great Horned Owl
- White-throated Swift
- 1 Black-ch. Hummingbird
- 11 |||| Anna's Hummingbird
- Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- ||| 2 Nuttall's Woodpecker
- Downy Woodpecker
- Hairy Woodpecker
- 1 Northern Flicker
- Western Wood-Pewee
- **Willow Flycatcher**
- Pacific Slope Flycatcher
- || Black Phoebe
- Say's Phoebe
- ||| Ash-throated Flycatcher
- Cassin's Kingbird
- Western Kingbird
- Horned Lark
- Tree Swallow
- Violet-green Swallow
- 1 N. Rough-winged Swallow
- || Cliff Swallow
- Barn Swallow
- 1 |||| 3 |||| Scrub Jay
- American Crow
- 4 Common Raven
- 272 Plain Titmouse
- 20 Bushtit
- |||| Bewick's Wren
- House Wren
- Ruby-crowned Kinglet
- California Gnatcatcher
- Blue-gray Gnatcatcher
- 7 2 Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- American Robin
- 1 22 Wrentit
- ||| |||| Northern Mockingbird
- ||| 3121 California Thrasher
- American Pipit
- Cedar Waxwing
- |||| Phainopepla
- Loggerhead Shrike
- 1 European Starling
- **Bell's Vireo**
- Solitary Vireo
- Warbling Vireo
- Orange-crowned Warbler
- Yellow Warbler
- Yellow-rumped Warbler
- Common Yellowthroat
- Wilson's Warbler
- Yellow-breasted Chat
- Western Tanager
- 1 Black-headed Grosbeak
- Blue Grosbeak
- 1 Lazuli Bunting
- 4 122 |||| 2222 Rufous-sided Towhee
- 11 12 |||| 2 |||| California Towhee
- Lark Sparrow
- Savannah Sparrow
- Song Sparrow
- Lincoln's Sparrow
- White-crowned Sparrow
- Red-winged Blackbird
- Western Meadowlark
- Brewer's Blackbird
- 1 Brown-headed Cowbird
- Hooded Oriole
- || Northern Oriole
- 8 4 5 62 7 6662 House Finch
- Pine Siskin
- Lesser Goldfinch
- Lawrence's Goldfinch
- American Goldfinch
- House Sparrow
- 1 R.C. Sparrow

BIRDS OF Santa Clara River System

Locality Upper Santa Clara Reach Date 7-10 Time 630—8

_____ Great Blue Heron
_____ Green Heron
_____ Mallard
_____ Turkey Vulture
_____ White-tailed Kite
_____ Sharp-shinned Hawk
_____ Cooper's Hawk
_____ Red-shouldered Hawk
III Red-tailed Hawk
_____ American Kestrel
4 California Quail
_____ American Coot
_____ Killdeer
_____ Spotted Sandpiper
_____ Least Sandpiper
_____ Common Snipe
_____ Rock Dove
44 44 Mourning Dove
_____ Greater Roadrunner
_____ Barn Owl
_____ Great Horned Owl
_____ White-throated Swift
_____ Black-ch. Hummingbird
II Anna's Hummingbird
I Costa's Hummingbird
_____ Belted Kingfisher
_____ Acorn Woodpecker
II Nuttall's Woodpecker
_____ Downy Woodpecker
_____ Hairy Woodpecker
I Northern Flicker
_____ Western Wood-Pewee
_____ **Willow Flycatcher**
_____ Pacific Slope Flycatcher
II Black Phoebe
_____ Say's Phoebe
II Ash-throated Flycatcher
_____ Cassin's Kingbird
_____ Western Kingbird
_____ Horned Lark
_____ Tree Swallow
_____ Violet-green Swallow
_____ N. Rough-winged Swallow
_____ Cliff Swallow
_____ Barn Swallow
2 2 12 Scrub Jay
I American Crow
10 4 Common Raven
_____ Plain Titmouse
6 Bushtit
11 IIII Bewick's Wren
_____ House Wren
_____ Ruby-crowned Kinglet

_____ **California Gnatcatcher**
_____ Blue-gray Gnatcatcher
_____ Western Bluebird
_____ Swainson's Thrush
_____ Hermit Thrush
_____ American Robin
_____ Wrentit
_____ Northern Mockingbird
_____ California Thrasher
_____ American Pipit
_____ Cedar Waxwing
4 Phainopepla
_____ Loggerhead Shrike
_____ European Starling
_____ **Bell's Vireo**
_____ Solitary Vireo
_____ Warbling Vireo
_____ Orange-crowned Warbler
_____ Yellow Warbler
_____ Yellow-rumped Warbler
_____ Common Yellowthroat
_____ Wilson's Warbler
_____ Yellow-breasted Chat
_____ Western Tanager
3 Black-headed Grosbeak
_____ Blue Grosbeak
_____ Lazuli Bunting
11 IIII Rufous-sided Towhee
2 2 California Towhee
_____ Lark Sparrow
_____ Savannah Sparrow
_____ Song Sparrow
_____ Lincoln's Sparrow
_____ White-crowned Sparrow
_____ Red-winged Blackbird
_____ Western Meadowlark
_____ Brewer's Blackbird
_____ Brown-headed Cowbird
_____ Hooded Oriole
I Northern Oriole
34 House Finch
_____ Pine Siskin
2 Lesser Goldfinch
_____ Lawrence's Goldfinch
_____ American Goldfinch
_____ House Sparrow

NO N2O

2000 Upper River Area 5

BIRDS OF Santa Clara River System

Locality Castaic Creek Date 4/19/00 Time

2 Great Egret
1 Great Blue Heron
Green Heron
Mallard
Turkey Vulture
White-tailed Kite
Sharp-shinned Hawk
Cooper's Hawk
Red-shouldered Hawk
2 Red-tailed Hawk
American Kestrel
98 30,30,25, 48 22 California Quail
American Coot
Killdeer
Spotted Sandpiper
Least Sandpiper
Common Snipe
40 40 Rock Dove
19 48 222 Mourning Dove
Greater Roadrunner
Barn Owl
Great Horned Owl
White-throated Swift
Black-ch. Hummingbird
42 VII Anna's Hummingbird
Costa's Hummingbird
1 Belted Kingfisher
Acorn Woodpecker
Nuttall's Woodpecker
2 Downy Woodpecker
Hairy Woodpecker
Northern Flicker
Western Wood-Pewee
Willow Flycatcher
Pacific Slope Flycatcher
1 Black Phoebe
Say's Phoebe
2 Ash-throated Flycatcher
Cassin's Kingbird
Western Kingbird
2 II Horned Lark
Tree Swallow
Violet-green Swallow
54 86 N. Rough-winged Swallow
60 Cliff Swallow
1 Barn Swallow
8 III Scrub Jay
2 II American Crow
22 868 Common Raven
11 22 221 Plain Titmouse
18 112 2222 2 Bushtit
21 24 628 21 22 12 Bewick's Wren
2 House Wren
37 Ruby-crowned Kinglet

California Gnatcatcher
Blue-gray Gnatcatcher
Western Bluebird
Swainson's Thrush
Hermit Thrush
American Robin
6 II 22 Wrentit
Northern Mockingbird
9 21 211 California Thrasher
American Pipit
Cedar Waxwing
Phainopepla
Loggerhead Shrike
12 43 European Starling
Bell's Vireo
Solitary Vireo
Warbling Vireo
42 VII Orange-crowned Warbler
3 III Yellow Warbler
15 4623 Yellow-rumped Warbler
26 IIII IIII Common Yellowthroat
IIII IIII Wilson's Warbler
7 Yellow-breasted Chat
Western Tanager
5 IIII Black-headed Grosbeak
Blue Grosbeak
Lazuli Bunting
20 2 III 22 2221 22 Rufous-sided Towhee
20 2 222 2 222 2 California Towhee
Lark Sparrow &
Savannah Sparrow
37 68 22 III 22 Song Sparrow
1 Lincoln's Sparrow
17 8441 White-crowned Sparrow
24 638 2 Red-winged Blackbird
Western Meadowlark
Brewer's Blackbird
43 153 III 7 Brown-headed Cowbird
Hooded Oriole
3 III Northern Oriole
48 262 House Finch
Pine Siskin
9 124 Lesser Goldfinch
Lawrence's Goldfinch
American Goldfinch
House Sparrow
40 Gulls flyover

BIRDS OF Santa Clara River System

Locality Castaic Creek Date 4/26/02 Time

1	Great Blue Heron
	Green Heron
	Mallard
	Turkey Vulture
	White-tailed Kite
	Sharp-shinned Hawk
	Cooper's Hawk
	Red-shouldered Hawk
	Red-tailed Hawk
	American Kestrel
10,15,20,9	California Quail
	American Coot
2	Killdeer
	Spotted Sandpiper
	Least Sandpiper
	Common Snipe
40,	Rock Dove
3,2,10	Mourning Dove
	Greater Roadrunner
	Barn Owl
	Great Horned Owl
	White-throated Swift
	Black-ch. Hummingbird
5	Anna's Hummingbird
	Costa's Hummingbird
	Belted Kingfisher
	Acorn Woodpecker
1,2	Nuttall's Woodpecker
1	Downy Woodpecker
	Hairy Woodpecker
1	Northern Flicker
	Western Wood-Pewee
	Willow Flycatcher
	Pacific Slope Flycatcher
1	Black Phoebe
	Say's Phoebe
	Ash-throated Flycatcher
	Cassin's Kingbird
1	Western Kingbird
	Horned Lark
	Tree Swallow
	Violet-green Swallow
26, 68 (would 50 under water release=100)	N. Rough-winged Swallow
	Cliff Swallow under new bridge
	Barn Swallow
2,2,1,2	Scrub Jay
	American Crow
4,6,4	Common Raven
2,2	Plain Titmouse
2,2,2	Bushtit
1,1,2,2,2,1,2,2	Bewick's Wren
	House Wren
	Ruby-crowned Kinglet
	California Gnatcatcher
	Blue-gray Gnatcatcher
	Western Bluebird
	Swainson's Thrush
	Hermit Thrush
	American Robin
	Wrentit
	Northern Mockingbird
2,1,2	California Thrasher
	American Pipit
	Cedar Waxwing
	Phainopepla
	Loggerhead Shrike
1,2,4	European Starling
	Bell's Vireo
	Solitary Vireo
	Warbling Vireo
5	Orange-crowned Warbler
1,1	Yellow Warbler
1,5,4	Yellow-rumped Warbler
1,1,2,2,1	Common Yellowthroat
5,4,5	Wilson's Warbler
	Yellow-breasted Chat
1	Western Tanager
2,1,8,6,1	Black-headed Grosbeak
	Blue Grosbeak
	Lazuli Bunting
2,2,2,2	Rufous-sided Towhee
2,2,2,2,2	California Towhee
2	Lark Sparrow &
	Savannah Sparrow
2,2,1,2	Song Sparrow
	Lincoln's Sparrow
	White-crowned Sparrow
4	Red-winged Blackbird
	Western Meadowlark
	Brewer's Blackbird
1,5,2	Brown-headed Cowbird
	Hooded Oriole
1	Northern Oriole
4	House Finch
	Pine Siskin
12	Lesser Goldfinch
2	Lawrence's Goldfinch bathing by house
	American Goldfinch
4	House Sparrow
	1 Spotted Dove

BIRDS OF Santa Clara River System

Locality Castaic Creek Date 5/12/ Time

- 1 Great Blue Heron
- 11 Green Heron
- 2 Mallard
- Turkey Vulture
- White-tailed Kite
- Sharp-shinned Hawk
- Cooper's Hawk
- 1 Red-shouldered Hawk
- 1 Red-tailed Hawk
- 1 American Kestrel
- 44 2224 California Quail
- American Coot
- Killdeer
- Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- 6 Rock Dove
- 88 22224 Mourning Dove
- Greater Roadrunner
- Barn Owl
- Great Horned Owl
- White-throated Swift
- Black-ch. Hummingbird
- 1 Anna's Hummingbird
- Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- 111 Nuttall's Woodpecker
- 11 Downy Woodpecker
- Hairy Woodpecker
- Northern Flicker
- 1111 Western Wood-Pewee
- 11 **Willow Flycatcher**
- Pacific Slope Flycatcher
- Black Phoebe
- Say's Phoebe
- 2221 Ash-throated Flycatcher
- Cassin's Kingbird
- Western Kingbird
- Horned Lark
- Tree Swallow
- Violet-green Swallow
- 30,2 N. Rough-winged Swallow
- 10,48 Cliff Swallow
- Barn Swallow
- 4322 Scrub Jay
- American Crow
- Common Raven
- 1 Plain Titmouse
- 21222222 Bushtit
- 88224 2 Bewick's Wren
- 1 House Wren
- Ruby-crowned Kinglet

- **California Gnatcatcher**
- Blue-gray Gnatcatcher
- Western Bluebird
- 1 Swainson's Thrush
- Hermit Thrush
- American Robin
- 12222 Wrentit
- Northern Mockingbird
- 11112 11 California Thrasher
- American Pipit
- Cedar Waxwing
- 12 Phainopepla
- Loggerhead Shrike
- 2 European Starling
- **Bell's Vireo**
- 1 Solitary Vireo — Cassin's Vireo
- 121 Warbling Vireo
- Orange-crowned Warbler
- 121 223 Yellow Warbler
- 44 Yellow-rumped Warbler
- 1114 Common Yellowthroat
- 44 Wilson's Warbler
- Yellow-breasted Chat
- Western Tanager
- 44 Black-headed Grosbeak
- 11 Blue Grosbeak
- 1 Lazuli Bunting
- 22247 Rufous-sided Towhee
- 22224 California Towhee
- Lark Sparrow
- Savannah Sparrow
- 8824 Song Sparrow
- Lincoln's Sparrow
- White-crowned Sparrow
- 8,10,13 Red-winged Blackbird
- Western Meadowlark
- Brewer's Blackbird
- 131 Brown-headed Cowbird
- Hooded Oriole
- 12 Northern Oriole
- 44 House Finch
- Pine Siskin
- 62 Lesser Goldfinch
- Lawrence's Goldfinch
- American Goldfinch
- House Sparrow

Full of water, dry last time

Snyder

BIRDS OF Santa Clara River System

Locality Castaic Creek Date 5/29/00 Time ______

Count	Species
|	Great Blue Heron
|	Green Heron
2	Mallard
	Turkey Vulture
	White-tailed Kite
	Sharp-shinned Hawk
	Cooper's Hawk
	Red-shouldered Hawk
	Red-tailed Hawk
|	American Kestrel
2822	California Quail
	American Coot
|||4	Killdeer
	Spotted Sandpiper
	Least Sandpiper
	Common Snipe
	Rock Dove
82482	Mourning Dove
	Greater Roadrunner
	Barn Owl
	Great Horned Owl
	White-throated Swift
||	Black-ch. Hummingbird
||	Anna's Hummingbird
	Costa's Hummingbird
	Belted Kingfisher
	Acorn Woodpecker
12||	Nuttall's Woodpecker
22	Downy Woodpecker
	Hairy Woodpecker
|	Northern Flicker
	Western Wood-Pewee
	Willow Flycatcher
	Pacific Slope Flycatcher
|	Black Phoebe
	Say's Phoebe
12||	Ash-throated Flycatcher
	Cassin's Kingbird
|	Western Kingbird
	Horned Lark
	Tree Swallow
	Violet-green Swallow
,20,12	N. Rough-winged Swallow
,20,6	Cliff Swallow none under 126
	Barn Swallow
24	Scrub Jay
	American Crow
,16,2,8,1,3	Common Raven
5686	Plain Titmouse
,20,846	Bushtit
4624|0||||2	Bewick's Wren
4	House Wren
	Ruby-crowned Kinglet

Count	Species
	California Gnatcatcher
	Blue-gray Gnatcatcher
|	Western Bluebird
	Swainson's Thrush
	Hermit Thrush
	American Robin
|	Wrentit
	Northern Mockingbird
||22	California Thrasher
	American Pipit
	Cedar Waxwing
|||2	Phainopepla
	Loggerhead Shrike
8446	European Starling
	Bell's Vireo
	Solitary Vireo
	Warbling Vireo
	Orange-crowned Warbler
|	Yellow Warbler
	Yellow-rumped Warbler
| 卌	Common Yellowthroat
	Wilson's Warbler
|	Yellow-breasted Chat
	Western Tanager
|||	Black-headed Grosbeak
	Blue Grosbeak
	Lazuli Bunting
||2	Rufous-sided Towhee
24826	California Towhee
	Lark Sparrow
	Savannah Sparrow
4814222	Song Sparrow
	Lincoln's Sparrow
	White-crowned Sparrow
10,20,8	Red-winged Blackbird
	Western Meadowlark
	Brewer's Blackbird
326	Brown-headed Cowbird
	Hooded Oriole
||224	Northern Oriole 7 nesting in trailer park but foraging river
10,30,20,4	House Finch
	Pine Siskin
|2	Lesser Goldfinch
	Lawrence's Goldfinch
	American Goldfinch
42	House Sparrow
1	Black crowned night heron

Full of water

BIRDS OF Santa Clara River System

Locality Castaic Creek Date 6/10/00 Time 6:00 – 10:00

- Great Blue Heron
- Green Heron
- Mallard
- Turkey Vulture
- White-tailed Kite
- Sharp-shinned Hawk
- Cooper's Hawk
- Red-shouldered Hawk
- 3 Red-tailed Hawk flying right over
- | American Kestrel
- 10, 14 26 California Quail
- American Coot
- 1 Killdeer
- Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- Rock Dove
- 2 2 4 2 Mourning Dove
- Greater Roadrunner
- Barn Owl
- Great Horned Owl
- White-throated Swift
- 11 Black-ch. Hummingbird
- 11 Anna's Hummingbird
- Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- 11 2 Nuttall's Woodpecker
- | Downy Woodpecker
- Hairy Woodpecker
- 11 Northern Flicker
- | Western Wood-Pewee smooth medium chest only heard
- (1 possibly) — **Willow Flycatcher**
- Pacific Slope Flycatcher
- 2 3 | Black Phoebe
- 2 Say's Phoebe
- 2 1 2 2 Ash-throated Flycatcher
- | Cassin's Kingbird
- 2 Western Kingbird
- 3 3 4 Horned Lark
- Tree Swallow
- Violet-green Swallow
- 1, 25, 11 2 N. Rough-winged Swallow
- 1, 50, 4 Cliff Swallow
- Barn Swallow
- 4 2 2 6 4 Scrub Jay
- American Crow
- 3 Common Raven
- 6 2 Plain Titmouse
- 10, 40, 20, 6 2 8, 10 Bushtit
- 2 4 5 2 Bewick's Wren
- House Wren
- Ruby-crowned Kinglet
- **California Gnatcatcher**
- Blue-gray Gnatcatcher
- Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- American Robin
- | 2 Wrentit
- Northern Mockingbird
- 1 1 2 2 2 2 2 California Thrasher
- American Pipit
- Cedar Waxwing
- | Phainopepla
- Loggerhead Shrike
- 2 4 European Starling
- **Bell's Vireo**
- Solitary Vireo
- Warbling Vireo
- | Orange-crowned Warbler
- 2 Yellow Warbler
- Yellow-rumped Warbler
- 6 2 2 2 2 1 Common Yellowthroat
- Wilson's Warbler
- 1 | Yellow-breasted Chat
- Western Tanager
- 1 1 1 Black-headed Grosbeak
- 1 1 2 Blue Grosbeak
- 2 1 2 Lazuli Bunting
- 6 5 8 8 2 2 Rufous-sided Towhee
- 8 5 4 6 4 8 8 8 California Towhee
- Lark Sparrow
- Savannah Sparrow
- 6 4 & 8 8 4 4 8 Song Sparrow
- Lincoln's Sparrow
- White-crowned Sparrow
- 10, 8 Red-winged Blackbird
- Western Meadowlark
- Brewer's Blackbird
- 3 4 Brown-headed Cowbird
- | Hooded Oriole
- 5 Northern Oriole
- 4 6 2 House Finch
- Pine Siskin
- | 2 Lesser Goldfinch
- Lawrence's Goldfinch
- American Goldfinch
- House Sparrow
- 1 Great Horned Owl

BIRDS OF Santa Clara River Systen

Locality Castaic Creek Date 6/30/08 Time 6:15 - 9:00

- Great Blue Heron
- Green Heron
- Mallard
- Turkey Vulture
- White-tailed Kite
- Sharp-shinned Hawk
- Cooper's Hawk
- Red-shouldered Hawk
- (2) Red-tailed Hawk
- American Kestrel
- (13) 33 | 4 11 California Quail
- American Coot
- (2) || Killdeer
- Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- Rock Dove
- (8) 12 | 2 Mourning Dove
- Greater Roadrunner
- Barn Owl
- Great Horned Owl
- White-throated Swift
- (4) 12 | Black-ch. Hummingbird
- (12) || Anna's Hummingbird
- Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- (9) Nuttall's Woodpecker
- (7) 222 | Downy Woodpecker
- (2) || Hairy Woodpecker
- (2) || Northern Flicker juv
- Western Wood-Pewee
- **Willow Flycatcher**
- Pacific Slope Flycatcher
- (2) || Black Phoebe
- Say's Phoebe
- (8) Ash-throated Flycatcher
- (1) | Cassin's Kingbird carrying bugs
- Western Kingbird
- Horned Lark
- Tree Swallow
- Violet-green Swallow
- (37) 8 6596 N. Rough-winged Swallow
- 49 20 6868 | Cliff Swallow
- (3) 12 Barn Swallow
- (9) 12 | 22 Scrub Jay
- American Crow
- (5) Common Raven
- (2) Plain Titmouse
- (15) 16 Bushtit
- (22) 24 | 25 | 2 Bewick's Wren
- House Wren
- Ruby-crowned Kinglet
- **California Gnatcatcher**
- Blue-gray Gnatcatcher
- (3) || Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- American Robin
- (7) 2 | 22 Wrentit
- Northern Mockingbird
- (2) || California Thrasher
- American Pipit
- Cedar Waxwing
- (3) Phainopepla
- Loggerhead Shrike
- (6) 24 European Starling
- **Bell's Vireo**
- Solitary Vireo
- Warbling Vireo
- Orange-crowned Warbler
- (5) X ~~Yellow Warbler~~
- 3 ~~Yellow-rumped Warbler~~
- (15) 22 | 12 Common Yellowthroat
- Wilson's Warbler
- Yellow-breasted Chat
- Western Tanager
- (6) Black-headed Grosbeak
- (3) Blue Grosbeak
- (3) Lazuli Bunting
- (18) 22 | 2 | 22 Rufous-sided Towhee
- California Towhee
- (29) 22 Dark Sparrow
- Savannah Sparrow
- Song Sparrow
- (23) Lincoln's Sparrow
- White-crowned Sparrow
- (4) Red-winged Blackbird
- Western Meadowlark
- Brewer's Blackbird
- (18) Brown-headed Cowbird
- Hooded Oriole
- Northern Oriole
- (16) 4 | 6 House Finch
- Pine Siskin
- (24) 10, 10, 13 Lesser Goldfinch
- (4) 2 Lawrence's Goldfinch
- American Goldfinch
- House Sparrow

| Deer

dry. cream rust/ vireo.
small
New water release trickle about 1/5
way down

Saturday

BIRDS OF Santa Clara River Syste

Locality Castaic Creek Date 7/15/00 Time 6:00

Count	Species
3	Great Blue Heron
	Green Heron
	Mallard
	Turkey Vulture
	White-tailed Kite
	Sharp-shinned Hawk
	Cooper's Hawk
	Red-shouldered Hawk
|	Red-tailed Hawk
	American Kestrel
21 68 8 16,20	California Quail
	American Coot
	Killdeer
	Spotted Sandpiper
	Least Sandpiper
	Common Snipe
26	Rock Dove
卌 3 卌	Mourning Dove
	Greater Roadrunner
	Barn Owl
	Great Horned Owl
	White-throated Swift
2 |	Black-ch. Hummingbird
卌卌卌 5 卌	Anna's Hummingbird
1 卌	Costa's Hummingbird
	Belted Kingfisher
	Acorn Woodpecker
||	Nuttall's Woodpecker
2	Downy Woodpecker
	Hairy Woodpecker
||	Northern Flicker
	Western Wood-Pewee
	Willow Flycatcher
	Pacific Slope Flycatcher
||	Black Phoebe
	Say's Phoebe
2 ||	Ash-throated Flycatcher
	Cassin's Kingbird
||	Western Kingbird
	Horned Lark
	Tree Swallow
	Violet-green Swallow
6	N. Rough-winged Swallow
62	Cliff Swallow after nest still active under commercial
	Barn Swallow
1 12 卌	Scrub Jay
	American Crow
53	Common Raven
卌	Plain Titmouse
|| 2 20	Bushtit
||| 卌卌卌	Bewick's Wren
	House Wren
	Ruby-crowned Kinglet
	California Gnatcatcher
	Blue-gray Gnatcatcher
	Western Bluebird
	Swainson's Thrush
	Hermit Thrush
	American Robin
2 ||	Wrentit
	Northern Mockingbird
||	California Thrasher
	American Pipit
	Cedar Waxwing
||	Phainopepla
	Loggerhead Shrike
|	European Starling
	Bell's Vireo
	Solitary Vireo
|	Warbling Vireo
	Orange-crowned Warbler
	Yellow Warbler
	Yellow-rumped Warbler
|| 卌卌	Common Yellowthroat
	Wilson's Warbler
	Yellow-breasted Chat
	Western Tanager
3 卌	Black-headed Grosbeak
1 2 卌	Blue Grosbeak singing ♂
|	Lazuli Bunting singing ♂
3 卌	Rufous-sided Towhee
||| 卌 卌	California Towhee
	Lark Sparrow
	Savannah Sparrow
卌	Song Sparrow carrying food
	Lincoln's Sparrow
	White-crowned Sparrow
12	Red-winged Blackbird
	Western Meadowlark
	Brewer's Blackbird
3 ||	Brown-headed Cowbird
	Hooded Oriole
||	Northern Oriole
40 in field 8 2 6 28 4	House Finch
	Pine Siskin
|| 卌	Lesser Goldfinch
||	Lawrence's Goldfinch drink ♂ calls
12	American Goldfinch
	House Sparrow

1 Deer
6 Rabbits (cotton)

Dry except suburban

BIRDS OF Santa Clara River System

Locality Castaic Creek Date 7/28/00 Time 6:00

- Great Blue Heron
- Green Heron
- Mallard
- Turkey Vulture
- White-tailed Kite
- Sharp-shinned Hawk
- Cooper's Hawk
- (1) Red-shouldered Hawk
- (1) Red-tailed Hawk
- (112) American Kestrel
- 12, 6, 6, 8, 4, 1, 25, 20 California Quail some very small
- American Coot
- Killdeer
- Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- (1) Rock Dove
- (12) Mourning Dove
- Greater Roadrunner
- (1) Barn Owl
- Great Horned Owl
- White-throated Swift
- (2) Black-ch. Hummingbird
- (5) Anna's Hummingbird
- (3) Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- (3) Nuttall's Woodpecker
- (3) Downy Woodpecker
- Hairy Woodpecker
- (1) Northern Flicker
- Western Wood-Pewee
- **Willow Flycatcher**
- Pacific Slope Flycatcher
- (2) Black Phoebe
- Say's Phoebe
- (1) Ash-throated Flycatcher
- Cassin's Kingbird
- Western Kingbird
- Horned Lark
- Tree Swallow
- Violet-green Swallow
- (3) N. Rough-winged Swallow
- (31) 8, 8, 8, 6 Cliff Swallow
- (1) Barn Swallow
- (10) Scrub Jay
- American Crow
- (9) 18 Common Raven
- (8) Plain Titmouse
- Bushtit
- (11) Bewick's Wren
- House Wren
- Ruby-crowned Kinglet
- **California Gnatcatcher**
- Blue-gray Gnatcatcher
- Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- American Robin
- Wrentit
- Northern Mockingbird
- (3) California Thrasher
- American Pipit
- Cedar Waxwing
- (1) Phainopepla
- Loggerhead Shrike
- European Starling
- **Bell's Vireo**
- Solitary Vireo
- Warbling Vireo
- Orange-crowned Warbler
- Yellow Warbler
- Yellow-rumped Warbler
- (2) Common Yellowthroat
- Wilson's Warbler
- Yellow-breasted Chat
- Western Tanager
- (4) Black-headed Grosbeak
- (3) Blue Grosbeak
- (1) Lazuli Bunting
- (5) 12 Rufous-sided Towhee
- (12) California Towhee
- Lark Sparrow
- Savannah Sparrow
- (4) Song Sparrow
- Lincoln's Sparrow
- White-crowned Sparrow
- (10) Red-winged Blackbird
- Western Meadowlark
- (2) Brewer's Blackbird
- Brown-headed Cowbird
- Hooded Oriole
- (1) Northern Oriole
- (59) 8, 8, 8, 3, 8, 6, 4 House Finch
- Pine Siskin
- (22) 8, 8, 8, 8, 8, 8, 8, 8, 8, 8, 8, 8, 8, 8, 8, 8, 8, 8, 8, 8, 8, 8 Lesser Goldfinch
- Lawrence's Goldfinch
- (4) American Goldfinch
- (1) House Sparrow

2005 Upper Area 6

BIRDS OF Santa Clara River System

Locality SAN FERNANDO RD Date 6/9 Time 6:30 — 8:15

- ____ Great Blue Heron
- ____ Green Heron
- ____ Mallard
- ____ Turkey Vulture
- ____ White-tailed Kite
- ____ Sharp-shinned Hawk
- ____ Cooper's Hawk
- ____ Red-shouldered Hawk
- I Red-tailed Hawk
- ____ American Kestrel
- 4,14 IIII California Quail
- ____ American Coot
- 4 2 Killdeer
- ____ Spotted Sandpiper
- ____ Least Sandpiper
- ____ Common Snipe
- 6 Rock Dove
- 10 6 55 IIII Mourning Dove
- ____ Greater Roadrunner
- ____ Barn Owl
- ____ Great Horned Owl
- ____ White-throated Swift
- ____ Black-ch. Hummingbird
- I Anna's Hummingbird
- ____ Costa's Hummingbird
- ____ Belted Kingfisher
- ____ Acorn Woodpecker
- IIII Nuttall's Woodpecker
- ____ Downy Woodpecker
- ____ Hairy Woodpecker
- ____ Northern Flicker
- ____ Western Wood-Pewee
- ____ **Willow Flycatcher**
- ____ Pacific Slope Flycatcher
- ____ Black Phoebe
- ____ Say's Phoebe
- IIII Ash-throated Flycatcher
- I Cassin's Kingbird
- ____ Western Kingbird
- ____ Horned Lark
- ____ Tree Swallow
- ____ Violet-green Swallow
- 6 N. Rough-winged Swallow
- ____ Cliff Swallow
- ____ Barn Swallow
- 2 II Scrub Jay
- 2 6 American Crow
- 6 5 Common Raven
- 2 Plain Titmouse
- ____ Bushtit
- I 2 Bewick's Wren
- ____ House Wren
- ____ Ruby-crowned Kinglet

- ____ **California Gnatcatcher**
- ____ Blue-gray Gnatcatcher
- 2 2 Western Bluebird
- ____ Swainson's Thrush
- ____ Hermit Thrush
- ____ American Robin
- II Wrentit
- ____ Northern Mockingbird
- ____ California Thrasher
- ____ American Pipit
- ____ Cedar Waxwing
- I 2 Phainopepla
- ____ Loggerhead Shrike
- ____ European Starling
- ____ **Bell's Vireo**
- ____ Solitary Vireo
- ____ Warbling Vireo
- ____ Orange-crowned Warbler
- ____ Yellow Warbler
- ____ Yellow-rumped Warbler
- II Common Yellowthroat
- ____ Wilson's Warbler
- ____ Yellow-breasted Chat
- ____ Western Tanager
- II Black-headed Grosbeak
- ____ Blue Grosbeak
- 4 4 5 IIII Lazuli Bunting
- IIII IIII Rufous-sided Towhee
- 4 4 California Towhee
- ____ Lark Sparrow
- ____ Savannah Sparrow
- ____ Song Sparrow
- ____ Lincoln's Sparrow
- ____ White-crowned Sparrow
- ____ Red-winged Blackbird
- ____ Western Meadowlark
- ____ Brewer's Blackbird
- ____ Brown-headed Cowbird
- ____ Hooded Oriole
- I Northern Oriole
- 10 6 6 6 10 6 House Finch
- ____ Pine Siskin
- 4 2 10 4 Lesser Goldfinch
- ____ Lawrence's Goldfinch
- ____ American Goldfinch
- ____ House Sparrow

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BIRDS OF Santa Clara River System

Locality San Fernando Town Date 6/19 Time 6:30-8:00

- ____ Great Blue Heron
- ____ Green Heron
- ____ Mallard
- ____ Turkey Vulture
- ____ White-tailed Kite
- ____ Sharp-shinned Hawk
- ____ Cooper's Hawk
- ____ Red-shouldered Hawk
- ____ Red-tailed Hawk
- ____ American Kestrel
- 5 California Quail
- ____ American Coot
- ____ Killdeer
- ____ Spotted Sandpiper
- ____ Least Sandpiper
- ____ Common Snipe
- 12 Rock Dove
- ____ Mourning Dove
- ____ Greater Roadrunner
- ____ Barn Owl
- ____ Great Horned Owl
- ____ White-throated Swift
- 1 Black-ch. Hummingbird
- ____ Anna's Hummingbird
- ____ Costa's Hummingbird
- ____ Belted Kingfisher
- ____ Acorn Woodpecker
- 2 Nuttall's Woodpecker
- ____ Downy Woodpecker
- ____ Hairy Woodpecker
- ____ Northern Flicker
- ____ Western Wood-Pewee
- ____ **Willow Flycatcher**
- ____ Pacific Slope Flycatcher
- ____ Black Phoebe
- ____ Say's Phoebe
- 2 Ash-throated Flycatcher
- ____ Cassin's Kingbird
- ____ Western Kingbird
- ____ Horned Lark
- ____ Tree Swallow
- ____ Violet-green Swallow
- 12 N. Rough-winged Swallow
- ____ Cliff Swallow
- ____ Barn Swallow
- 12 Scrub Jay
- ____ American Crow
- 2 Common Raven
- ____ Plain Titmouse
- ____ Bushtit
- 123 Bewick's Wren
- ____ House Wren
- ____ Ruby-crowned Kinglet
- ____ **California Gnatcatcher**
- ____ Blue-gray Gnatcatcher
- ____ Western Bluebird
- ____ Swainson's Thrush
- ____ Hermit Thrush
- ____ American Robin
- ____ Wrentit
- ____ Northern Mockingbird
- 11 California Thrasher
- ____ American Pipit
- ____ Cedar Waxwing
- 1 Phainopepla
- ____ Loggerhead Shrike
- 1 European Starling
- ____ **Bell's Vireo**
- ____ Solitary Vireo
- ____ Warbling Vireo
- ____ Orange-crowned Warbler
- ____ Yellow Warbler
- ____ Yellow-rumped Warbler
- ____ Common Yellowthroat
- ____ Wilson's Warbler
- ____ Yellow-breasted Chat
- ____ Western Tanager
- ____ Black-headed Grosbeak
- ____ Blue Grosbeak
- ____ Lazuli Bunting
- 2 1122 Rufous-sided Towhee
- 123 California Towhee
- ____ Lark Sparrow
- ____ Savannah Sparrow
- 1 Song Sparrow
- ____ Lincoln's Sparrow
- ____ White-crowned Sparrow
- ____ Red-winged Blackbird
- ____ Western Meadowlark
- ____ Brewer's Blackbird
- ____ Brown-headed Cowbird
- ____ Hooded Oriole
- ____ Northern Oriole
- 8 House Finch
- ____ Pine Siskin
- 2 Lesser Goldfinch
- ____ Lawrence's Goldfinch
- ____ American Goldfinch
- ____ House Sparrow

_____

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2000 Upper Run

BIRDS OF Santa Clara River System

Locality SAN FRANCISQUITO Date 7-1 Time 6-8

- Great Blue Heron
- Green Heron
- Mallard
- Turkey Vulture
- White-tailed Kite
- Sharp-shinned Hawk
- (1) Cooper's Hawk
- Red-shouldered Hawk
- 1 Red-tailed Hawk
- American Kestrel
- (10) 4 2 4 California Quail
- American Coot
- (2) Killdeer
- Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- Rock Dove
- (13) 3 4 5 3 Mourning Dove
- Greater Roadrunner
- Barn Owl
- Great Horned Owl
- White-throated Swift
- 1 Black-ch. Hummingbird
- (4) 1 2 1 Anna's Hummingbird
- Costa's Hummingbird
- Belted Kingfisher
- (6) Acorn Woodpecker
- 1 IIII Nuttall's Woodpecker
- Downy Woodpecker
- Hairy Woodpecker
- Northern Flicker
- Western Wood-Pewee
- **Willow Flycatcher**
- Pacific Slope Flycatcher
- (1) Black Phoebe
- 1 Say's Phoebe
- (8) 11 IIII Ash-throated Flycatcher
- Cassin's Kingbird
- Western Kingbird
- Horned Lark
- Tree Swallow
- Violet-green Swallow
- N. Rough-winged Swallow
- (5) Cliff Swallow
- Barn Swallow
- (9) 1 2 2 2 11 Scrub Jay
- (2) 2 American Crow
- (5) 1 11 2 Common Raven
- (2) 2 Plain Titmouse
- (17) 9 8 Bushtit
- (8) 11 IIII Bewick's Wren
- 1 House Wren
- Ruby-crowned Kinglet
- **California Gnatcatcher**
- Blue-gray Gnatcatcher
- (2) Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- American Robin
- 1 Wrentit
- (1) Northern Mockingbird
- (4) California Thrasher
- American Pipit
- Cedar Waxwing
- Phainopepla
- Loggerhead Shrike
- European Starling
- **Bell's Vireo**
- Solitary Vireo
- Warbling Vireo
- Orange-crowned Warbler
- Yellow Warbler
- (2) Yellow-rumped Warbler
- (1) Common Yellowthroat
- Wilson's Warbler
- Yellow-breasted Chat
- Western Tanager
- (3) 11 Black-headed Grosbeak
- 1 Blue Grosbeak
- (2) Lazuli Bunting
- (9) 111 IIII Rufous-sided Towhee
- 4 2 22 4 2 California Towhee
- (16) Lark Sparrow
- Savannah Sparrow
- (2) Song Sparrow
- Lincoln's Sparrow
- White-crowned Sparrow
- Red-winged Blackbird
- Western Meadowlark
- Brewer's Blackbird
- Brown-headed Cowbird
- Hooded Oriole
- 1 Northern Oriole
- 6 (62) 20 20 4 4 4 4 House Finch
- Pine Siskin
- (13) 4 4 2 3 Lesser Goldfinch
- Lawrence's Goldfinch
- American Goldfinch
- House Sparrow

2000 Upper River Area 7

BIRDS OF Santa Clara River System

Locality South Fork (~~mouth~~ northern corner) Date 6/7/00 Time → 12:00

- Great Blue Heron
- Green Heron
- Mallard
- Turkey Vulture
- White-tailed Kite
- Sharp-shinned Hawk
- Cooper's Hawk
- Red-shouldered Hawk
- | Red-tailed Hawk
- American Kestrel
- California Quail
- American Coot
- 3 Killdeer
- Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- Rock Dove
- 24 68 || 124 Mourning Dove
- Greater Roadrunner
- Barn Owl
- Great Horned Owl
- White-throated Swift
- | Black-ch. Hummingbird
- || Anna's Hummingbird
- Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- 2 Nuttall's Woodpecker
- 22 Downy Woodpecker
- Hairy Woodpecker
- Northern Flicker
- Western Wood-Pewee
- **Willow Flycatcher**
- Pacific Slope Flycatcher
- | Black Phoebe juv.
- Say's Phoebe
- 2 Ash-throated Flycatcher
- Cassin's Kingbird
- 2 Western Kingbird
- Horned Lark
- Tree Swallow
- Violet-green Swallow
- 8 8 2 N. Rough-winged Swallow
- 9 Cliff Swallow
- Barn Swallow
- 2 || 2 Scrub Jay
- American Crow
- 8 2 Common Raven
- 3 4 Plain Titmouse
- 2 | 2 Bushtit
- | 22 | 22 Bewick's Wren
- House Wren
- Ruby-crowned Kinglet
- **California Gnatcatcher**
- Blue-gray Gnatcatcher
- Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- American Robin
- Wrentit
- 2 | 2 Northern Mockingbird
- California Thrasher
- American Pipit
- Cedar Waxwing
- Phainopepla
- | Loggerhead Shrike on ball fields
- 40, VF European Starling
- **Bell's Vireo**
- Solitary Vireo
- Warbling Vireo
- Orange-crowned Warbler
- Yellow Warbler
- Yellow-rumped Warbler
- Common Yellowthroat
- Wilson's Warbler
- Yellow-breasted Chat
- Western Tanager
- Black-headed Grosbeak
- Blue Grosbeak
- Lazuli Bunting
- 2 Rufous-sided Towhee
- || 2 California Towhee
- Lark Sparrow
- Savannah Sparrow
- | 22 Song Sparrow
- Lincoln's Sparrow
- White-crowned Sparrow
- Red-winged Blackbird
- Western Meadowlark
- Brewer's Blackbird
- 2 Brown-headed Cowbird
- Hooded Oriole
- || Northern Oriole
- 20, 6 4 House Finch
- Pine Siskin
- 6 | 2 Lesser Goldfinch
- Lawrence's Goldfinch
- American Goldfinch
- House Sparrow

BIRDS OF Santa Clara River System

Locality Lower South Fork Date 7/1/0 Time _____

_____ Great Blue Heron
_____ Green Heron
_____ Mallard
_____ Turkey Vulture
_____ White-tailed Kite
_____ Sharp-shinned Hawk
_____ Cooper's Hawk
_____ Red-shouldered Hawk
_____ Red-tailed Hawk
_____ American Kestrel
III California Quail
_____ American Coot
I Killdeer
_____ Spotted Sandpiper
_____ Least Sandpiper
_____ Common Snipe
_____ Rock Dove
2 ~~3~~ 2 Mourning Dove
_____ Greater Roadrunner
_____ Barn Owl
_____ Great Horned Owl
_____ White-throated Swift
II Black-ch. Hummingbird
III Anna's Hummingbird
II Costa's Hummingbird
_____ Belted Kingfisher
_____ Acorn Woodpecker
IIII Nuttall's Woodpecker family
_____ Downy Woodpecker
_____ Hairy Woodpecker
_____ Northern Flicker
_____ Western Wood-Pewee
_____ **Willow Flycatcher**
_____ Pacific Slope Flycatcher
I Black Phoebe
I Say's Phoebe juv.
_____ Ash-throated Flycatcher
_____ Cassin's Kingbird
32 Western Kingbird family
_____ Horned Lark
_____ Tree Swallow
_____ Violet-green Swallow
6 N. Rough-winged Swallow
_____ Cliff Swallow
_____ Barn Swallow
2 III Scrub Jay
_____ American Crow
23 Common Raven
13 Plain Titmouse
9 Bushtit
2 II 2 Bewick's Wren
_____ House Wren
_____ Ruby-crowned Kinglet

_____ **California Gnatcatcher**
_____ Blue-gray Gnatcatcher
_____ Western Bluebird
_____ Swainson's Thrush
_____ Hermit Thrush
_____ American Robin
_____ Wrentit
III Northern Mockingbird
II California Thrasher
_____ American Pipit
_____ Cedar Waxwing
_____ Phainopepla
I Loggerhead Shrike on Ba. Airport
32 8 31 European Starling
_____ **Bell's Vireo**
_____ Solitary Vireo
_____ Warbling Vireo
_____ Orange-crowned Warbler
_____ Yellow Warbler
_____ Yellow-rumped Warbler
_____ Common Yellowthroat
_____ Wilson's Warbler
_____ Yellow-breasted Chat
_____ Western Tanager
_____ Black-headed Grosbeak
_____ Blue Grosbeak
_____ Lazuli Bunting
I Rufous-sided Towhee
III 2 California Towhee
_____ Lark Sparrow
_____ Savannah Sparrow
_____ Song Sparrow
_____ Lincoln's Sparrow
_____ White-crowned Sparrow
6 Red-winged Blackbird
_____ Western Meadowlark
8 Brewer's Blackbird on ballpark
II Brown-headed Cowbird
_____ Hooded Oriole
III Northern Oriole
624 House Finch
_____ Pine Siskin
_____ Lesser Goldfinch
_____ Lawrence's Goldfinch
_____ American Goldfinch
5 House Sparrow

2000 Upper River Data 8

BIRDS OF Santa Clara River System

Locality South Fork - Upper **Date** 6/7/00 **Time** 6:00 → see cover

	Great Blue Heron
	Green Heron
	Mallard
	Turkey Vulture
	White-tailed Kite
	Sharp-shinned Hawk
	Cooper's Hawk
	Red-shouldered Hawk
I	Red-tailed Hawk
	American Kestrel
222222	California Quail
	American Coot
3	Killdeer
	Spotted Sandpiper
	Least Sandpiper
	Common Snipe
	Rock Dove
84422	Mourning Dove
	Greater Roadrunner
	Barn Owl
	Great Horned Owl
	White-throated Swift
I	Black-ch. Hummingbird
III	Anna's Hummingbird
	Costa's Hummingbird
	Belted Kingfisher
	Acorn Woodpecker
12	Nuttall's Woodpecker
II	Downy Woodpecker
	Hairy Woodpecker
	Northern Flicker
	Western Wood-Pewee
	Willow Flycatcher
	Pacific Slope Flycatcher
	Black Phoebe
	Say's Phoebe
I	Ash-throated Flycatcher
	Cassin's Kingbird
2	Western Kingbird
	Horned Lark
	Tree Swallow
	Violet-green Swallow
	N. Rough-winged Swallow
	Cliff Swallow
I	Barn Swallow
231	Scrub Jay
	American Crow
22	Common Raven
112	Plain Titmouse
912	Bushtit
2222	Bewick's Wren
	House Wren
	Ruby-crowned Kinglet
	California Gnatcatcher
	Blue-gray Gnatcatcher
	Western Bluebird
	Swainson's Thrush
	Hermit Thrush
	American Robin
	Wrentit
2	Northern Mockingbird
1212	California Thrasher
	American Pipit
	Cedar Waxwing
II	Phainopepla
	Loggerhead Shrike
526	European Starling
	Bell's Vireo
	Solitary Vireo
	Warbling Vireo
	Orange-crowned Warbler
	Yellow Warbler
	Yellow-rumped Warbler
	Common Yellowthroat
	Wilson's Warbler
	Yellow-breasted Chat
	Western Tanager
	Black-headed Grosbeak
	Blue Grosbeak
	Lazuli Bunting
	Rufous-sided Towhee
222242	California Towhee
	Lark Sparrow
	Savannah Sparrow
2	Song Sparrow
	Lincoln's Sparrow
	White-crowned Sparrow
	Red-winged Blackbird
	Western Meadowlark
6	Brewer's Blackbird
21	Brown-headed Cowbird
	Hooded Oriole
13611	Northern Oriole
4896	House Finch
	Pine Siskin
122	Lesser Goldfinch
	Lawrence's Goldfinch
	American Goldfinch
10	House Sparrow
1	White Breasted Nuthatch
1	Summer Tanager
1	Empidonax — Hammond even with willow Tape

BIRDS OF Santa Clara River System

Locality Upper South Fork Date 7/1/00 Time 530-

- Great Blue Heron
- Green Heron
- Mallard
- Turkey Vulture
- White-tailed Kite
- Sharp-shinned Hawk
- Cooper's Hawk
- Red-shouldered Hawk
- Red-tailed Hawk
- American Kestrel
- 5 California Quail
- American Coot
- 11 Killdeer
- Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- Rock Dove
- 6 4 2 2 8 Mourning Dove
- Greater Roadrunner
- Barn Owl
- Great Horned Owl
- White-throated Swift
- 1 Black-ch. Hummingbird
- 1 Anna's Hummingbird
- 2 Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- 1 Nuttall's Woodpecker
- Downy Woodpecker
- Hairy Woodpecker
- Northern Flicker
- Western Wood-Pewee
- **Willow Flycatcher**
- Pacific Slope Flycatcher
- 3 Black Phoebe
- Say's Phoebe
- Ash-throated Flycatcher
- Cassin's Kingbird
- Western Kingbird
- Horned Lark
- Tree Swallow
- Violet-green Swallow
- N. Rough-winged Swallow
- Cliff Swallow
- Barn Swallow
- 4 Scrub Jay
- American Crow
- 2, 22, 3, 5 2 3 Common Raven all flying up channel
- 3 Plain Titmouse
- 2, 20 Bushtit
- 11 Bewick's Wren
- House Wren
- Ruby-crowned Kinglet
- **California Gnatcatcher**
- Blue-gray Gnatcatcher
- Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- American Robin
- Wrentit
- 11 Northern Mockingbird
- 11 12 California Thrasher
- American Pipit
- Cedar Waxwing
- 1 Phainopepla
- Loggerhead Shrike
- 4 10 European Starling
- **Bell's Vireo**
- Solitary Vireo
- Warbling Vireo
- Orange-crowned Warbler
- Yellow Warbler
- Yellow-rumped Warbler
- Common Yellowthroat
- Wilson's Warbler
- Yellow-breasted Chat
- Western Tanager
- Black-headed Grosbeak
- Blue Grosbeak
- Lazuli Bunting
- 4 2 Rufous-sided Towhee
- 11 12 2 11 12 2 22 California Towhee
- Lark Sparrow
- Savannah Sparrow
- 11 24 Song Sparrow
- Lincoln's Sparrow
- White-crowned Sparrow
- Red-winged Blackbird
- Western Meadowlark
- Brewer's Blackbird
- 15 4 Brown-headed Cowbird
- Hooded Oriole
- 3 Northern Oriole
- 3 8 8 4 5 3 House Finch
- Pine Siskin
- 8 12 11 Lesser Goldfinch
- Lawrence's Goldfinch
- American Goldfinch
- 10 House Sparrow

Guthrie, Daniel. *Bird Surveys Along a Portion of the Santa Clara River and Its Tributaries Upstream from the Castaic Creek Confluence.* August 1999.

BIRD SURVEYS ALONG A PORTION OF THE SANTA CLARA RIVER AND ITS TRIBUTARIES UPSTREAM FROM THE CASTAIC CREEK CONFLUENCE, NEAR VALENCIA, CALIFORNIA, 1999

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August 26, 1999

Bird Surveys along a Portion of the Santa Clara River Upstream from the Castaic Creek Confluence, near Valencia, California, 1999

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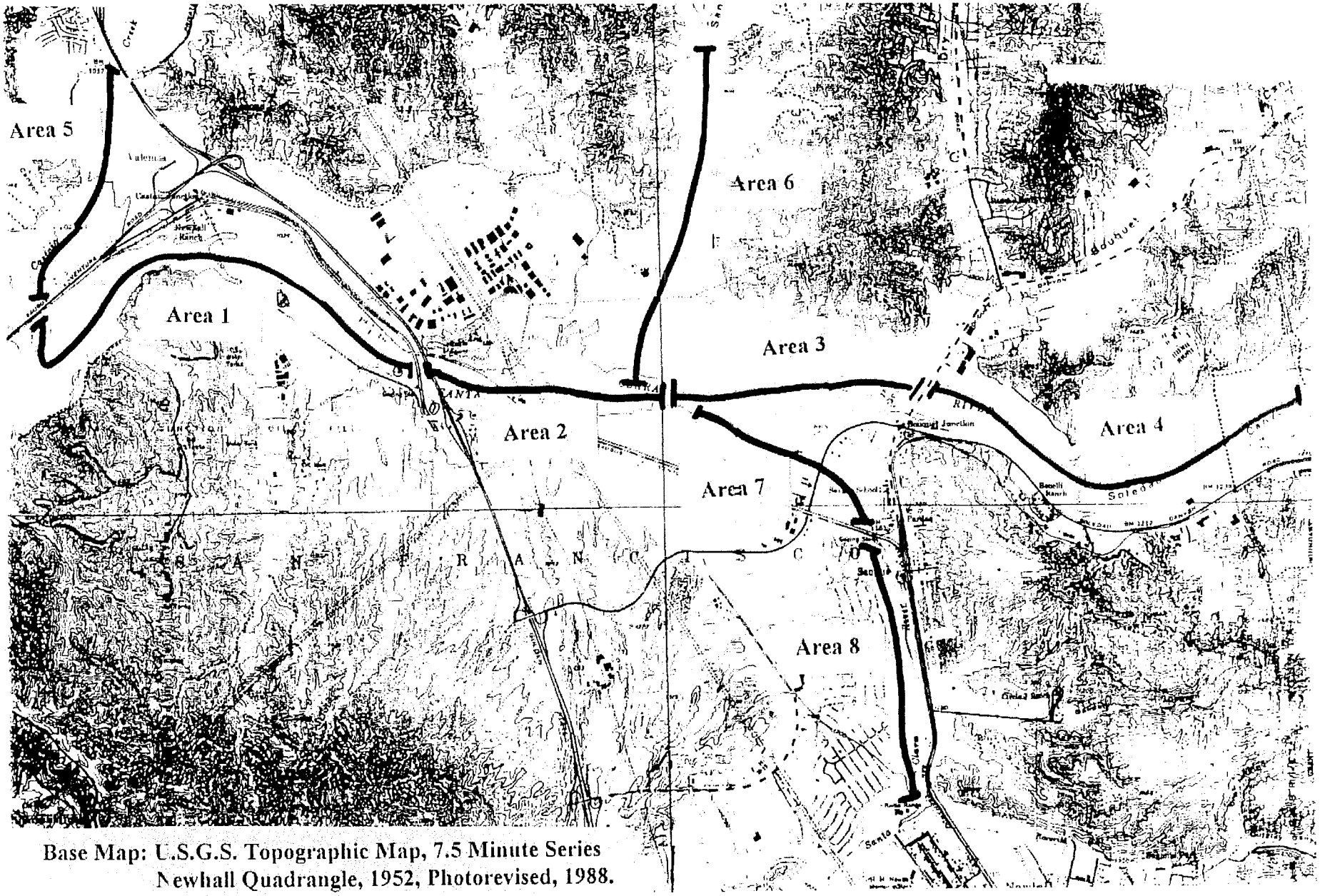
Nature and Scope of Surveys

During the spring and early summer of 1999 surveys were conducted along a section of the Santa Clara River and its tributaries near Valencia, California (Figure 1). Surveys were focused on determining presence or absence of ,Yellow-billed Cuckoo, Least Bell's Vireo and Southwestern Willow Flycatcher, and followed U.S. Fish and Wildlife Service Guidelines for the latter two species. Numbers of all species observed were noted, and, in addition to the three species noted above, special attention was placed on locating species considered rare and endangered or of Special Concern, and on determining numbers of Brown-headed Cowbirds.

Each survey was conducted on foot by observers well acquainted with visual, auditory and behavioral characteristics of southern California birds. Survey routes were designed to cover all areas of each section of the river, with emphasis placed on wetter habitats where Least Bell's Vireos and other sensitive riparian species are most likely to occur. All surveys occurred between 5:30 and 10:00 a.m. If focus species (Yellow-billed Cuckoo, Least Bell's Vireo, and Southwestern Willow Flycatcher), were not visually observed, tapes of their calls were played in an attempt to elicit a response. Personnel for all surveys were Daniel A. Guthrie and Judith A. Sugden, both working under Federal Fish and Wildlife Service Permit number TE810394-1, issued under section 10(a)(1)(A) of the Endangered Species Act.

To facilitate surveys and observe the coverage guidelines for focus species , the area was divided into eight sections (Figure 1). Delineation of the eight areas and comments on each follow. Surveys of the normally dry sections of the river system (Areas 4,6-8) were conducted twice during the nesting season. Both surveys was conducted in June to insure that late arriving species such as Yellow-billed Cuckoo and Willow Flycatcher would not be missed. Surveys of the remaining sections of the Santa Clara River (Areas 1-3,5) were conducted according to the Least Bell's Vireo protocol outlined by the Fish and Wildlife Service (Appendix 1), and consisted of 8 surveys, two each in April, May, June and July. Surveys in late May and during June also followed Fish and Wildlife Service protocol for Southwestern Willow Flycatcher.

Figure 1. Survey Areas along the Santa Clara River and Tributaries.



Base Map: U.S.G.S. Topographic Map, 7.5 Minute Series
Newhall Quadrangle, 1952, Photorevised, 1988.

Habitat Condition and Bird Observations.

The riparian zone of the Santa Clara River, as described here, consists of two major habitat types, a wet riparian zone and a dry riparian woodland. The wet riparian zone consists of obligatory wet plants such as cattail and watercress found in continually moist soils along the active river channel and some willow, tamarisk and baccharis shrubs also found in this zone. This zone is usually flooded during winter rains with the removal of much of the annual vegetation. The dry riparian woodland consists of larger willow and cottonwood forests along the margins of the wet riparian zone and occurring on soils above the flood plain that are normally not damaged in winter floods. Due to El Nino, the winter of 1997-98 was very wet, with several heavy rains causing severe flooding along most sections of the river. Except for Castaic Creek, where flooding was controlled by upstream dams, flooding removed all wet riparian vegetation along the river as well as many areas of dry riparian woodland. During 1999 there was less rain than usual with the result that wet riparian vegetation that began to grow in 1998 continued development, gaining in density and height. However, in many areas the river channel was cut into old flood deposits, leaving areas of bare sand and dead and dying vegetation along many areas of the river.

Different species breed at different times of the year. In general, species are most easily observed when they are actively defending territories by song during the establishment of breeding pairs. Once pairs are established and nesting begins song often decreases and the numbers of birds observed, therefore, also decreases. After young leave the nest, numbers observed increase. Thus, for most resident species, numbers of adult birds are most accurately censused in April and May, when territorial activity is at a maximum. A few species such as Anna's Hummingbird that nest early in the season may be underestimated. Numbers observed may decrease slightly in June and early July when birds are less active during nesting, and increase in late June and July when young birds leave the nest.

Several species that are not considered riparian species but are common in adjacent coastal sage and chaparral habitats come into the riparian zone in late summer when other vegetational areas are dry. The increase in numbers of House Finch, and Mourning Dove in late July follow this trend.

The lack of flooding in 1999 and the continued growth of wet riparian vegetation caused an increase in number of many wet riparian species. However, construction activities along several sections of the river and associated noisemakers caused a noticeable reduction in numbers of riparian species and reduced numbers of coastal sage species visiting the riparian zone from neighboring habitats. Following are specific comments on the habitat and bird observations in each area.

Area 1. Santa Clara River; Old Highway to the mouth of Castaic Creek and Castaic Creek from this confluence upstream to State Route 126.

Length of section, 3.5 miles. The Santa Clara River flows continuously in this section and is augmented by the Valencia waste water outfall near the upstream end of this section and by some

irrigation runoff from Magic Mountain and agricultural fields along the north side. Extensive dry riparian forests occur near the Valencia Waste water outfall, near Magic mountain, and near the Valencia Travel Village. Cooper's Hawk and White-tailed Kite nested in these areas as did many wrens and towhees. Wet riparian vegetation in this section forms a narrow strip near the Old Road but widens out further downstream. This wet vegetation was unaffected by spring floods. However, some areas that were wet before the floods of 1997-98 were dry due to channel deepening and vegetation in these areas was dying. A wet riparian area along the south side near Magic Mountain where Least Bell's Vireos have nested in past years was becoming more mature and drier. Perhaps due to these habitat changes, no vireos were found here this year. A section of the river bypassed by a channel cut to prevent flood damage to the Old Road in 1997-98 showed continued development of wet riparian vegetation, including a willow thicket and cattail marsh. This section was attractive to many Red-winged Blackbirds and other wet riparian species and should be suitable habitat for vireos in another year.

The section of Castaic Creek between the Santa Clara River and Route 126, which is included in this section consists of a wide dry wash. This section was dry throughout the survey period and contains almost exclusively dry riparian vegetation plus some remnants of coastal sage scrub habitat.

The river along this section is bordered by agricultural fields, Magic Mountain development but on the south side in the lower section is still bordered by extensive coastal sage scrub habitat. This accounts for the many observations of wrentit and other species from this habitat.

Area 2. Santa Clara River; Old Highway to McBean Parkway.

Length of section, 1.4 miles. The Santa Clara River flows continuously in this section and additional water is provided by irrigation runoff from industrial parks along the north side. The channel was heavily scoured by spring flooding in 1997-98 which eliminated all wet riparian vegetation along the main channel of the river and destroyed a large area of dry riparian forest along the south side. However, a large stand of dry riparian forest and some wet riparian areas along the north side near the mouth of San Francisquito creek were unaffected. As in previous years, this section of the river was impacted by off road vehicles during the study period. Noisemakers along the both sides of the river just west of McBean were active during most censuses to scare birds away from construction sites along the sides of the river and caused a reduction in sightings of many dry riparian species. A small area of coastal sage scrub borders the river just east of Interstate 5, but along the rest of this section the river is now bordered by commercial development.

The wet willow forest near the mouth of San Francisquito Creek attracted a migrating Willow Flycatcher and seems suitable for Least Bell's Vireo, although none were seen here. White-tailed Kite, Cooper's Hawk and many woodpeckers nested in dry riparian woodlands along this section of the river.

Area 3. Santa Clara River; McBean Parkway to Bouquet Canyon Road.

Length of section, 1.2 miles. Water, supplied by the Saugus wastewater outfall at the Bouquet Canyon Bridge, is continuous in this section of the Santa Clara River. A small amount of additional water is provided from irrigation runoff coming from Bouquet Canyon Flooding in 1997-98 removed all wet riparian vegetation from this section of the river and also removed large sections of cottonwoods planted as mitigation for development. Today dry riparian vegetation is restricted to a narrow zone on the north side of the river near McBean Parkway, to some islands of vegetation within the river channel, and a more extensive forest near the athletic park on the south side. Wet riparian vegetation consists of a narrow zone along the outflow from the Saugus outfall, a willow forest in the mouth of Bouquet Canyon Creek, and an extensive flat of cattail, baccharis and willow just upstream from the McBean Bridge.

Noisemakers along the north side of the entire length of this section were active during most censuses to scare birds away from construction sites. This resulted in a reduction in the number of birds seen and heard. Cowbird traps were operated in the section just above the McBean Bridge during May and June. The cattail flat just east of the McBean Bridge attracted a colony of Red-winged Blackbirds and other wet riparian species. Barn Owls, Cliff Swallows and a Black Phoebe nested under the McBean Bridge.

Area 4. Santa Clara River; Bouquet Canyon Road upstream to DWP transmission lines.

Length of section, 2.3 miles. The river channel in this section consists of a broad, flat, dry wash with narrow margins of dry riparian woodland. Within the channel are areas of coastal sage scrub habitat. This section of the Santa Clara River in past years has been wet only briefly during spring rains and due to water release from pumps one mile upstream from Bouquet Canyon Road. This year there was water flowing continuously in this section of the river only during the early Spring. By the time of this census, water was present only in the small section of continuous flow about 1 mile upstream from the Bouquet Canyon Bridge. However, remnant cattails from earlier spring flow provided habitat for some wet riparian species such as Red-winged Blackbirds and Song Sparrows. A White-tailed Kite nested in the large cottonwoods on the north side of the river just upstream from Bouquet Canyon Bridge.

Area 5. Castaic Creek; Route 126 to Old Road next to Interstate 5.

Length of section, 1.8 miles. Water was released from upstream dams during most of the study period but not continuously. Except for pockets of wet vegetation formed near irrigation runoff channels, and a section of continuous flow near the middle of this section, the creek was dry much of this spring. Construction occurred on a new road crossing and bridge on this section of Castaic Creek and development during 1998 removed most of the coastal sage and ruderal vegetation that once bordered both sides of the riparian zone, eliminating some coastal sage species that visited this area in earlier years. Swallows nested again under the bridge across Route 126 and began nesting under the new bridge during July. The extensive willow forest on

this section where Least Bell's Vireo once nested has matured and was dry much of this year. No vireos have been seen here the last three years and the area no longer seems suitable habitat due to its age and lack of permanent water.

Area 6. San Francisquito Creek; Santa Clara River upstream 2.5 miles.

Length of section, 2.5 miles. Along most of this section the riparian zone consists of a broad sandy channel. Once bordered by coastal sage scrub habitat, the channel is now bordered by developed areas. In the upper part of this section, however, coastal sage scrub plants still occur within the channel as do sections of dry riparian woodland consisting mostly of cottonwoods. Arundo and tamarisk are common along this section along the stream channel. A single wet area exists near power transmission lines in the upper section of this stream, which was dry during surveys, but showed some effects of flow earlier in the spring. The lower ½ mile of San Francisquito Creek is wet due to runoff from adjacent development. Construction activity and noisemakers to scare away birds were present along this section throughout the survey period and resulted in lower observations of wet riparian species..

Area 7. South Fork of the Santa Clara River; McBean Parkway to Magic Mountain Parkway (Route 126).

Length of section, 1.0 miles. The channel along this section of the South Fork is narrow and very sandy. Along most of this section vegetation is restricted to a narrow band of dry woodland and at each side of the channel and a few pockets of wet vegetation supported by runoff from adjacent development. Near the confluence with the main channel of the Santa Clara River a more extensive area of woodland exists on the north side of this section.

Area 8. South Fork of the Santa Clara River, Route 126 upstream to Newhall Creek.

Length of section, 1.4 miles. This section of the river consists of a wide sandy channel intersected by several concrete sills designed to restrict sand movement and flood damage. The river is entirely bordered by developed areas but contains small islands of dry riparian vegetation and some wet riparian areas formed by runoff from culverts along the sides of the creek. No flooding has occurred on this section of the river in recent years and riparian vegetation around this culverts continues to develop the well develop into areas of cottonwood and willow woodland. The result was the continued increase in riparian species along this section of the river.

Comments on Threatened and Endangered Species

Yellow-billed Cuckoo

The Yellow-billed Cuckoo is listed as a State Endangered Species. Despite playing taped calls

of this species during June and July surveys, no individuals of this species were observed in 1999. Two migrating cuckoos were observed about ½ mile above McBean Bridge in 1998.

Southwestern Willow Flycatcher

This subspecies is listed under the Federal Endangered Species Act. Willow Flycatchers were once widespread in wet riparian woodland in southern California but now only a few individuals exist. The main California breeding populations of this species are along the Kern River and north of Santa Barbara.

Following the Protocol outlined by Sogge (Technical Report NPS/NAUCPRS/NRTR-97/12) four surveys were conducted specifically for Southwestern Willow Flycatcher in Areas 1-3 and 5 (see dates on tables 1-3, 5). All surveys occurred between 5:30 and 10:00 am. and used taped calls to elicit a response if flycatchers were not first observed. Other sections of the river (Areas 4 and 6-8)were dry during the nesting season for this species, and, therefore, were not considered suitable habitat. However, the two surveys that were conducted of these areas were timed so as to be within the time frame recommended for Southwestern Willow Flycatcher.

Three Willow Flycatchers were observed at locations shown on Figure 2. All three observations were of single birds that did not call except in response to a tape. The two sightings on June 9th could not be refound on subsequent surveys on June 22 and July 6th. Both these birds were in suitable nesting habitat for this species. The bird found on June 17 was not refound on a visit to the site on June 22 and was found in an area of riparian habitat probably not suitable for nesting due to its small extent and isolation from other suitable habitat. All three birds are considered migrants passing through the area..

Least Bell's Vireo

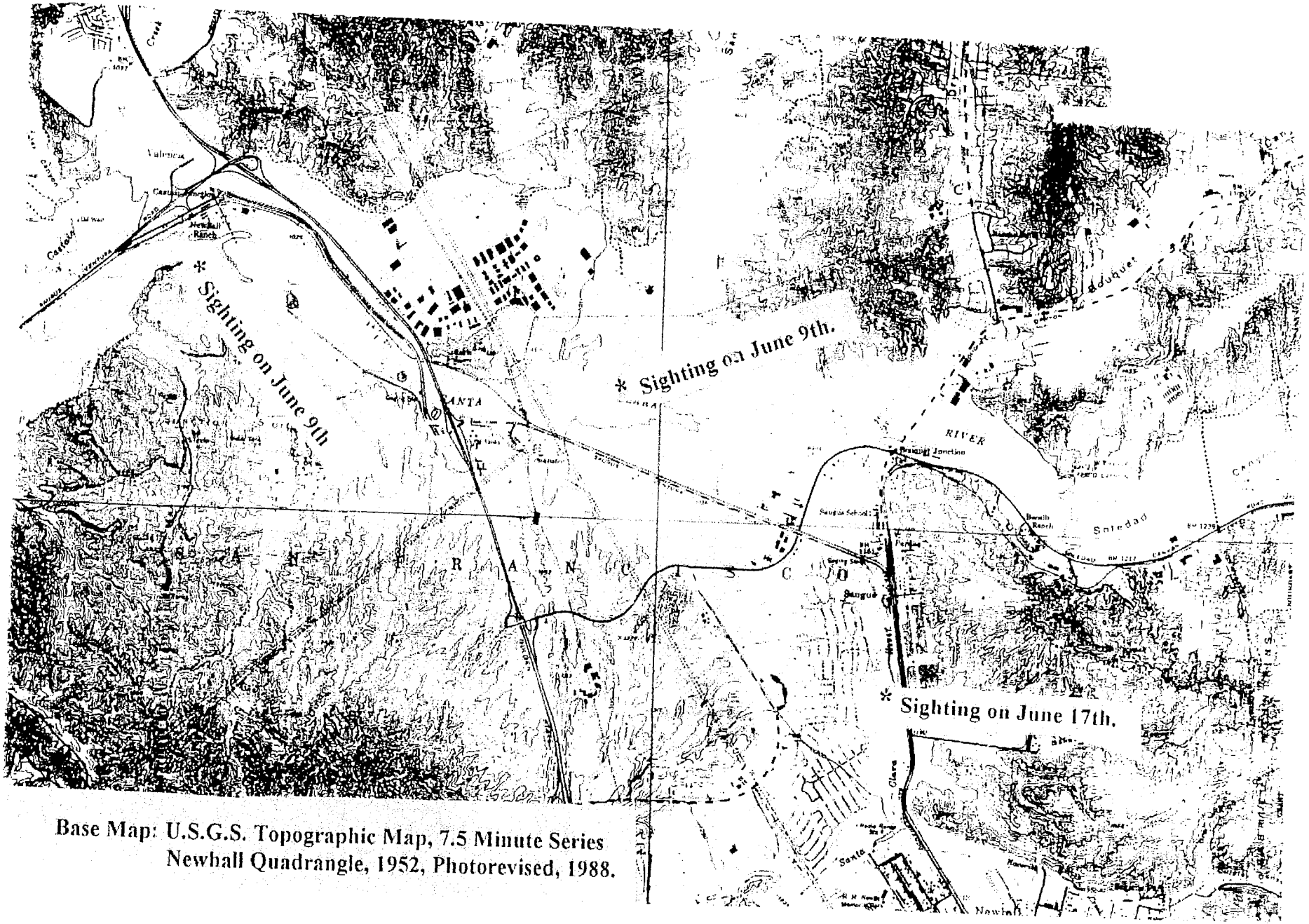
Surveys of the wet riparian areas (Areas 1-3,5) followed U.S. Fish and Wildlife Service Guidelines for Least Bell's Vireo. Eight surveys were conducted between April 10 and July 31 (see Tables 1-3,5 for dates). All surveys occurred between 5:30 and 10:00 am. and taped vireo calls were played if no vireos were heard or seen. No vireos were observed during 1999 surveys. In past years vireos have been present along Castaic Creek and along the Santa Clara River near Magic Mountain. In both areas vegetation has become perhaps too mature to be prime habitat for this species. However, at Magic Mountain new habitat is developing nearby and may be suitable for vireos in another year.

Comments on Sensitive Species

Great Blue Heron

Great Blue Herons are listed on the California Natural Diversity Data Base as a species that

Figure 2. Southwestern Willow Flycatcher Sightings during 1999.



Base Map: U.S.G.S. Topographic Map, 7.5 Minute Series
Newhall Quadrangle, 1952, Photorevised, 1988.

warrants monitoring. Individuals of this species was observed sparingly along the river after the breeding season and along other sections of the river during migration. No nesting was observed and herons were absent during the nesting season.

Great Egret

The Great egret is listed on the California Natural Diversity Data Base as a species that warrents monitoring. A few individuals were observed along the river during migration and after the breeding season.

White-tailed Kite

This species, formerly the Black-shouldered Kite, is considered a Species of Special Concern by the State of California. Three pair of kites nested successfully in the survey area. One pair of kites nested in the dry riparian woodland near Castaic Junction. A second pair nested near the mouth of San Francisquito Creek and a third pair nested approximately 1/4th mile east of the Bouquet Canyon Bridge.

Cooper's Hawk

Cooper's Hawk is considered a Species of Special Concern by the State of California. Cooper's Hawks were observed rarely along the main river in 1999 and may have nested just east of Interstate 5.

California Horned Lark

This species is a candidate for listing under the Federal Endangered Species Act. Although none were observed nesting on the study site, Horned Larks do nest on dry hillsides and agricultural areas in adjacent areas and were observed in late summer feeding on a bare construction area north of the Santa Clara River just west of the Bouquet Canyon Bridge.

Yellow Warbler

The Yellow Warbler is considered a Species of Special Concern by the State of California. Yellow Warblers prefer wet riparian habitat but are also found in large cottonwoods in drier riparian areas. Singing yellow warblers were observed along the continuously wet sections of the survey area during nesting season, but were observed in other dry sections of the river only during migration.

Yellow-breasted Chat

The Yellow-breasted Chat is considered a Species of Special Concern by the State of California. A few chats nested along the wet sections of the Santa Clara River.

Tricolored Blackbird

The Tricolored Blackbird is a Candidate for listing under the Federal Endangered Species Act. A small group of male Blackbirds were present throughout the survey period in irrigated areas of the baseball park on the south side of the Santa Clara River between McBean Bridge and Bouquet Canyon crossing. No evidence of nesting was observed.

Lawrence's Goldfinch

This species is a highest priority species on the Audubon Birds to Watch list for 1996. This species nests in chaparral vegetation and small flocks of this species were observed drinking along the Santa Clara River and its tributaries where native vegetation is still present next to the river.

Comments of Brown-headed Cowbirds

Although not a Species of Concern, comments about this species are warranted due to its influence on several endangered species. Cowbirds were regularly observed along all sections of the Santa Clara River, usually flying along the riparian corridor searching for either mates or potential nests to parasitize. Cowbird females often responded to taped calls of Least Bell's Vireo. Cowbird numbers showed a marked decrease after mid July between Bouquet Canyon and McBean Bridges, probably due to the operation of cowbird traps just upstream from the McBean Bridge during late May and June. These traps also caught large numbers of red-winged blackbirds. Although released each day, this trapping may have affected the breeding of this species.

Table 1. Bird Observations along the Santa Clara River System, 1999; Santa Clara River from Old Highway along I-5 to the mouth of Castaic Creek and Castaic Creek from this confluence to State Route 126.

Species	date: 4/10	4/20	5/13	5/24	6/9	6/22	7/6	7/27	status
Great Blue Heron	-	-	-	-	-	-	1	-	M
Great Egret	1	2	1	1	-	-	-	-	M
Green Heron	2	-	-	-	-	-	1	2	R*
Bl.-cr. Night Heron	1	-	-	-	-	-	-	-	M
Mallard	5	2	3	5	3	3	-	-	R*
Turkey Vulture	2	-	-	-	-	-	-	-	M
White-tailed Kite	2	-	1	3	2	1	-	3	R*
Cooper's Hawk	-	-	-	-	-	1	-	1	R*
Red-shouldered Hawk	1	1	2	2	2	3	2	2	R*
Red-tailed Hawk	-	-	3	2	3	2	1	2	R*
American Kestrel	-	-	1	-	-	2	-	-	R*
California Quail	5	8	31	26	10	21	22	8	R*
Virginia Rail	2	1	-	-	-	-	-	-	M
Sora	3	-	-	-	-	-	-	-	M
Killdeer	3	5	7	12	8	7	5	-	R*
Spotted Sandpiper	-	-	-	2	1	1	-	-	S*
Domestic Pigeon	-	-	8	-	-	-	-	-	R*
Mourning Dove	6	7	23	14	14	10	9	12	R*
Greater Roadrunner	-	-	-	1	-	-	-	-	R*
White-th. Swift	-	-	-	-	2	-	-	-	R*
Black-ch. Hummingbird	-	-	4	-	-	-	-	2	S*
Anna's Hummingbird	5	6	4	3	1	3	5	6	R*
Belted Kingfisher	1	-	-	-	-	-	-	-	M
Nuttall's Woodpecker	1	1	11	4	4	7	2	5	R*
Downy Woodpecker	-	1	6	1	1	1	1	2	R*
Hairy Woodpecker	1	2	1	-	-	-	-	2	R*
Northern Flicker	3	1	-	-	1	3	1	1	R*
Western Wood Pewee	-	-	-	1	-	-	-	-	M
Willow Flycatcher	**-**	**-**	**-**	**-**	**1**	**-**	**-**	**-**	**M**
Black Phoebe	3	1	4	2	4	6	1	10	R*
Say's Phoebe	-	-	-	1	-	-	-	-	R*
Ash-thr. Flycatcher	-	8	12	7	5	7	4	6	S*
Western Kingbird	-	2	2	-	3	3	2	1	S*
Tree Swallow	4	-	-	-	-	-	-	-	S*
Violet-green Swallow	4	-	3	-	4	2	4	-	S*
N. Rough-w. Swallow	48	30	58	36	10	14	30	4	S*
Cliff Swallow	100	80	120	20	12	30	25	50	S*
Barn Swallow	1	-	4	4	8	1	-	1	S*
Scrub Jay	6	7	13	12	6	10	6	7	R*
American Crow	29	5	16	8	5	6	8	3	R*
Common Raven	6	4	12	4	8	12	12	6	R*
Plain Titmouse	1	4	7	-	1	3	4	3	R*
Bushtit	4	-	18	3	4	6	13	12	R*
Bewick's Wren	13	13	63	21	14	12	18	11	R*
House Wren	2	8	54	14	3	2	5	1	R*

Table 1 (cont.). Bird Observations along the Santa Clara River System, 1999; Santa Clara River from Old Highway along I-5 to the mouth of Castaic Creek and Castaic Creek from this confluence to State Route 126.

Species	date: 4/10	4/20	5/13	5/24	6/9	6/22	7/6	7/27	status
Western Bluebird	4	3	2	2	2	-	-	-	R*
Swainson's Thrush	-	-	2	-	-	-	-	-	M
American Robin	-	-	2	-	-	-	1	-	R*
Wrentit	-	5	9	10	1	5	2	11	R*
Calif. Thrasher	-	-	3	2	1	-	2	-	R*
Phainopepla	-	-	4	8	18	15	6	11	S*
European Starling	1	6	11	9	16	5	4	2	R*
Warbling Vireo	-	2	-	-	-	-	-	-	M
Orange-cr. Warbler	4	1	-	-	-	-	-	-	M
Yellow Warbler	2	2	8	6	6	3	-	-	S*
Yellow- r. Warbler	26	5	-	-	-	-	-	-	W,M
Common Yellowthroat	13	14	20	16	37	24	44	36	R*
Wilson's Warbler	-	-	9	-	-	-	-	-	M
Yellow-br. Chat	-	-	7	14	4	4	6	-	S*
Western Tanager	-	-	2	-	-	-	-	-	M
Bl.-headed Grosbeak	-	4	14	7	4	3	2	-	S*
Blue Grosbeak	-	-	4	6	2	6	18	10	S*
Lazuli Bunting	-	1	-	-	-	1	6	-	S*
Spotted Towhee	3	5	9	16	7	3	2	4	R*
California Towhee	-	2	34	10	5	6	8	6	R*
Chipping Sparrow	-	6	-	-	-	-	-	-	M
Lark Sparrow	3	-	-	1	-	-	-	-	S*
Song Sparrow	74	78	74	84	68	60	52	66	R*
Lincoln's Sparrow	-	2	-	-	-	-	-	-	W,M
White-cr. Sparrow	88	-	-	-	-	-	-	-	W,M
Red-w. Blackbird	70	40	68	79	46	10	50	1	S*
Brown-headed Cowbird	-	-	35	27	25	12	9	12	S*
Bullock's Oriole	1	4	7	-	2	-	-	-	S*
House Finch	6	6	12	6	8	7	8	8	R*
Lesser Goldfinch	12	8	24	18	6	8	16	20	R*
Lawrence's Goldfinch	-	-	-	2	-	-	-	-	R*
American Goldfinch	36	-	-	-	-	-	-	4	W,R*
Total Species:	45	43	51	45	46	44	41	39	

Total Species on all visits: 77
Total Potential Breeding species: 59 (marked with *)

Status: M- Migrant; R- Resident; S- Summer Only; W- Winter Only

Table 2. Bird Observations along the Santa Clara River System, 1999; Santa Clara River from McBean Parkway to Old Highway along I-5.

Species	date: 4/10	4/20	5/13	5/24	6/9	6/22	7/6	7/20	status
Great Blue Heron	-	-	-	-	-	-	1	-	M
Great Egret	-	-	-	1	-	-	-	1	M
Snowy Egret	-	-	-	-	-	-	-	1	M
Green Heron	-	-	3	3	1	-	1	-	R*
Mallard	-	-	7	-	2	-	-	-	R*
White-tailed Kite	3	2	1	3	1	2	2	4	R*
Cooper's Hawk	-	1	-	-	-	-	-	-	R*
Red-shouldered Hawk	2	-	-	1	-	1	-	3	R*
Red-tailed Hawk	4	-	-	1	-	-	4	2	R*
American Kestrel	-	2	-	-	-	-	-	-	R*
California Quail	4	13	14	14	10	4	15	4	R*
Killdeer	2	6	6	3	5	2	1	4	R*
Least Sandpiper	-	-	1	-	-	-	-	-	M
Domestic Pigeon	12	-	-	-	-	1	-	-	R*
Mourning Dove	6	8	10	6	8	15	7	3	R*
Barn Owl	1	-	-	-	-	-	-	-	R*
Great Horned Owl	-	-	-	-	-	1	-	-	R*
Bl.-ch. Hummingbird	-	-	-	-	2	-	1	-	S*
Anna's Hummingbird	4	5	1	6	4	3	6	-	R*
Costa's Hummingbird	-	-	-	-	2	-	-	-	S*
Nuttall's W-pecker	3	4	4	6	8	5	9	7	R*
Downy Woodpecker	2	4	1	7	7	1	7	2	R*
Hairy Woodpecker	1	-	-	1	-	-	1	-	R*
Northern Flicker	-	2	-	-	-	-	-	-	R*
Olive-s. Flycatcher	-	-	-	1	-	-	-	-	M
Western Wood Pewee	-	-	-	7	2	-	-	-	M
Pac. sl. Flycatcher	-	-	-	1	-	-	-	-	M
Willow Flycatcher	-	-	-	-	**1**	-	-	-	**M**
Hammond's Flycatch.	-	-	-	1	-	-	-	-	M
Black Phoebe	1	3	2	2	6	2	5	16	R*
Ash-thr. Flycatcher	-	2	2	4	4	4	5	2	S*
Western Kingbird	-	-	2	-	-	-	1	-	S*
Violet-gr. Swallow	3	4	2	-	-	-	-	-	S*
N. Ro.-w. Swallow	15	4	10	6	25	18	8	-	S*
Cliff Swallow	8	6	-	-	65	50	9	100	S*
Barn Swallow	1	-	-	-	-	-	-	5	M
Scrub Jay	5	11	6	8	6	9	3	3	R*
American Crow	8	-	10	12	-	4	14	3	R*
Common Raven	4	18	2	12	2	11	6	2	R*
Plain Titmouse	2	2	2	2	6	7	3	3	R*
Bushtit	8	8	2	12	2	-	25	9	R*
White-br. Nuthatch	-	-	-	-	1	-	-	-	R*
Bewick's Wren	6	21	8	14	17	14	11	10	R*
House Wren	12	28	3	3	6	12	-	-	R*
Ruby-cr. Kinglet	3	-	-	-	-	-	-	-	W,M
Western Bluebird	1	2	4	-	2	3	10	-	R*
Swainson's Thrush	-	-	1	-	-	-	-	-	M
Hermit Thrush	1	-	-	-	-	-	-	-	W,M

Table 2 (cont.). Bird Observations along the Santa Clara River System, 1999; Santa Clara River from McBean Parkway to Old Highway along I-5.

Species	date: 4/10	4/20	5/13	5/24	6/9	6/22	7/6	7/20	status
American Robin	-	-	-	-	-	-	-	1	R*
Wrentit	-	-	-	-	2	3	2	2	R*
Calif. Thrasher	1	2	1	1	5	2	4	2	R*
Phainopepla	-	-	1	1	12	7	10	15	S*
European Starling	6	22	10	18	18	5	1	2	R*
Warbling Vireo	-	1	-	2	-	-	-	-	M
Orange-cr. Warbler	1	-	-	-	-	-	-	-	M
Yellow Warbler	-	1	2	2	-	2	2	-	S*
Yellow- r. Warbler	35	3	-	-	-	-	-	-	W,M
Bl.th Grey Warbler	-	-	-	1	-	-	-	-	M
Common Yellowthroat	6	27	2	13	18	26	18	3	R*
Wilson's Warbler	2	-	2	5	-	-	-	-	M
Yellow-br. Chat	-	-	3	-	-	-	2	-	S*
Western Tanager	-	-	2	4	-	-	-	-	M
Bl.-headed Grosbeak	-	2	3	9	5	8	3	1	S*
Blue Grosbeak	-	-	1	-	3	1	-	2	S*
Spotted Towhee	2	8	1	10	12	17	8	4	R*
California Towhee	14	22	6	16	15	24	16	6	R*
Chipping Sparrow	-	3	-	-	-	-	-	-	M
Song Sparrow	35	35	32	68	23	27	19	9	R*
Lincoln's Sparrow	-	2	-	-	-	-	-	-	W,M
White-cr. Sparrow	50	5	-	-	-	-	-	-	W,M
Red-w. Blackbird	4	5	16	17	15	-	-	2	S*
Brewer's Blackbird	8	-	-	-	2	-	-	-	R*
Br.-headed Cowbird	-	9	15	19	16	13	24	14	S*
Hooded Oriole	-	-	-	-	-	-	1	-	S*
Bullock's Oriole	-	-	-	-	-	-	3	-	S*
House Finch	60	6	2	6	14	31	41	46	R*
Lesser Goldfinch	30	7	2	5	5	20	15	10	R*
Lawrence's G.finch	-	8	-	-	-	-	-	-	R*
American Goldfinch	-	2	-	-	-	-	2	-	W,R*
Total Species:	41	41	41	43	40	35	41	35	

Total Species on all visits: 79
Total Potential Breeding species: 57 (marked with *)

Status: M- Migrant; R- Resident; S- Summer Only; W- Winter Only

Table 3. Bird Observations along the Santa Clara River System, 1999; Santa Clara River from Boquet Canyon Rd. to McBean Parkway.

Species	date: 4/10	4/20	5/13	5/24	6/9	6/22	7/6	7/20	status
Great Egret	-	3	-	-	-	-	-	-	M
Green Heron	-	-	-	1	-	-	-	-	R*
Mallard	3	5	1	-	-	1	-	-	R*
Red-shouldered Hawk	1	-	-	-	-	-	1	-	R*
Red-tailed Hawk	-	3	1	-	1	2	2	1	R*
California Quail	8	10	7	19	8	6	20	4	R*
Killdeer	3	9	8	9	-	3	2	6	R*
Domestic Pigeon	35	-	8	-	-	-	9	-	R*
Mourning Dove	6	22	8	28	9	25	6	14	R*
Barn Owl	3	3	2	4	1	1	2	2	R*
Bl.-ch. Hummingbird	-	2	-	-	1	-	-	-	S*
Anna's Hummingbird	6	3	1	9	2	3	5	2	R*
Costa's Hummingbird	-	-	-	1	1	-	-	-	M
Nutt. Woodpecker	1	-	-	2	5	-	3	4	R*
Downy Woodpecker	3	3	-	-	2	-	5	-	R*
Northern Flicker	3	2	-	-	-	-	1	-	R*
Western Wood Pewee	-	-	-	4	-	-	-	-	M
Black Phoebe	4	4	-	3	2	5	-	4	R*
Say's Phoebe	-	-	-	-	-	1	-	-	R*
Ash-thr. Flycatcher	-	3	-	7	1	1	-	1	S*
Western Kingbird	-	-	2	-	-	-	-	-	S*
Horned Lark	-	-	-	1	-	40	-	-	R*
Violet-gr.Swallow	8	-	-	-	-	-	-	-	S*
N.Rough-w.Swallow	40	15	4	1	1	17	-	4	S*
Cliff Swallow	8	60	86	106	80	33	200	100	S*
Barn Swallow	2	-	-	1	-	2	2	6	S*
Scrub Jay	3	10	2	10	2	6	4	4	R*
American Crow	6	1	-	-	-	-	3	2	R*
Common Raven	45	38	24	44	12	24	24	4	R*
Plain Titmouse	-	4	1	-	3	-	1	-	R*
Bushtit	8	4	-	2	4	-	24	-	R*
Bewick's Wren	14	20	3	16	8	6	6	2	R*
House Wren	2	-	-	6	1	-	-	-	R*
Ruby-cr. Kinglet	4	-	-	-	-	-	-	-	W,M
Western Bluebird	-	-	-	2	2	1	-	-	R*
Swainson's Thrush	-	-	-	1	-	-	-	-	M
Hermit Thrush	3	-	-	-	-	-	-	-	M
N. Mockingbird	-	1	-	-	-	-	-	-	R*
Wrentit	1	4	-	-	1	2	-	1	R*
Calif. Thrasher	4	3	-	2	3	2	6	-	R*
American Pipit	9	-	-	-	-	-	-	-	W,M
Phainopepla	-	-	-	-	-	-	1	-	S*
European Starling	1	18	2	13	2	8	-	-	R*
Warbling Vireo	-	2	-	4	-	-	-	-	M
Orange-cr. Warbler	3	3	-	-	-	-	-	-	M
Yellow Warbler	1	-	4	11	1	-	-	-	S*

Table 3 (cont.). Bird Observations along the Santa Clara River System, 1999; Santa Clara River from Boquet Canyon Rd. to McBean Parkway.

Species	date: 4/10	4/20	5/13	5/24	6/9	6/22	7/6	7/20	status
Yellow-r.Warbler	30	8	-	-	-	-	-	-	W,M
Com.Yellowthroat	4	20	3	7	18	32	10	1	R*
Wilson's Warbler	3	-	2	6	-	-	-	-	M
Yellow-br. Chat	-	-	-	1	-	-	-	-	S*
Western Tanager	-	-	-	6	-	-	-	-	M
Bl.-headed Grosbeak	-	2	2	6	2	-	-	-	S*
Blue Grosbeak	-	-	1	2	-	-	-	2	S*
Lazuli Bunting	-	-	-	-	-	2	-	-	S*
Spotted Towhee	3	14	1	7	7	7	-	2	R*
California Towhee	8	24	6	14	15	11	6	5	R*
Song Sparrow	25	67	16	22	20	31	18	4	R*
Lincoln's Sparrow	1	2	-	-	-	-	-	-	W,M
White-cr. Sparrow	40	8	-	-	-	-	-	-	W,M
Red-w. Blackbird	25	20	12	36	24	144	188	24	S*
Tricol. Blackbird	-	2	-	9	-	5	-	-	W,M
Brewer's Blackbird	-	10	-	-	20	-	2	-	R*
Brown-h. Cowbird	-	35	3	6	4	10	25	4	S*
Hooded Oriole	-	-	-	3	-	-	-	-	S*
Bullock's Oriole	-	-	-	-	3	-	-	-	S*
House Finch	14	15	2	14	4	89	14	4	R*
Lesser Goldfinch	22	17	2	2	10	42	8	2	R*
American Goldfinch	-	-	-	-	-	-	-	2	W,R*
House Sparrow	-	-	-	-	-	1	-	-	
Total Species:	40	41	28	41	35	32	29	27	

Total Species on all visits: 69
Total Potential Breeding species: 54 (marked with *)

Status: M- Migrant; R- Resident; S- Summer Only; W- Winter Only

Table 4. Bird Observations along the Santa Clara River System, 1999; Santa Clara River from Power Line 2.5 miles upstream from Boquet Canyon Rd. to Boquet Canyon Road Crossing.

Species	date: 6/7	6/15	status
White-tailed Kite	2	4	R*
Red-shouldered Hawk	-	1	R*
Red-tailed Hawk	4	3	R*
California Quail	14	22	R*
Killdeer	4	3	R*
Mourning Dove	18	12	R*
Greater Roadrunner	1	-	R*
Anna's Hummingbird	1	-	R*
Nuttall's Woodpecker	1	5	R*
Northern Flicker	3	1	R*
Black Phoebe	1	1	R*
Ash-thr. Flycatcher	3	3	S*
Western Kingbird	2	-	S*
N. Rough-w. Swallow	-	1	S*
Scrub Jay	22	11	R*
American Crow	2	2	R*
Common Raven	19	10	R*
Plain Titmouse	-	1	R*
Bushtit	14	-	R*
Bewick's Wren	24	15	R*
House Wren	1	-	R*
N. Mockingbird	5	4	R*
Wrentit	6	2	R*
Calif. Thrasher	4	-	R*
Phainopepla	8	8	S*
European Starling	2	5	R*
Common Yellowthroat	1	5	R*
Western Tanager	1	-	M
Bl.-headed Grosbeak	3	-	S*
Blue Grosbeak	3	3	S*
Spotted Towhee	12	16	R*
California Towhee	20	12	R*
Song Sparrow	17	20	R*
Red-w. Blackbird	30	18	S*
Brown-headed Cowbird	6	5	S*
Bullock's Oriole	2	2	S*
House Finch	12	8	R*
Lesser Goldfinch	8	4	R*
Total Species:	35	30	

Total Species on all visits: 38
Total Potential Breeding species: 37 (marked with *)

Status: M- Migrant; R- Resident; S- Summer Only; W- Winter Only

Table 5. Bird Observations along the Santa Clara River System, 1999; Castaic Creek from Old Road west to Rte. 126.

Species	date: 4/13	4/22	5/12	5/25	6/10	6/23	7/7	7/28	status
Great Blue Heron	-	-	1	-	-	1	2	1	M
Great Egret	-	-	2	-	-	-	-	-	M
Green Heron	-	-	-	-	-	1	1	1	R*
Bl.cr.Night Heron	1	-	-	-	2	2	1	1	M
Mallard	4	1	-	-	-	-	-	-	R*
Cinnamon Teal	1	-	-	-	-	-	-	-	M
White-tailed Kite	2	-	-	-	2	-	2	-	R*
Cooper's Hawk	-	1	-	-	-	-	-	-	R*
Red-sh. Hawk	1	-	-	2	-	1	-	-	R*
Red-tailed Hawk	1	1	-	3	2	-	3	1	R*
American Kestrel	3	-	-	-	-	-	1	-	R*
California Quail	18	23	24	20	4	66	63	42	R*
Killdeer	10	12	12	7	9	5	4	4	R*
Spotted Sandpiper	-	1	1	-	-	-	-	-	S*
Common Snipe	1	-	-	-	-	-	-	-	M
Domestic Pigeon	10	20	12	8	-	10	35	15	R*
Mourning Dove	17	16	25	22	12	24	8	12	R*
Barn Owl	1	-	-	1	-	-	-	-	R*
Bl.-ch.Hummingbird	1	-	1	2	-	-	2	-	S*
Anna's Hummingbird	6	10	8	10	2	4	15	9	R*
Costa's Hummbird	-	-	-	1	1	-	-	-	S*
Belted Kingfisher	1	1	-	-	-	-	-	-	M
Nutt. Woodpecker	2	4	5	6	4	5	3	3	R*
Downy Woodpecker	2	-	2	5	1	3	1	1	R*
Hairy Woodpecker	-	-	-	1	-	-	-	-	R*
Northern Flicker	3	2	1	1	-	-	-	-	R*
Black Phoebe	3	-	2	3	2	5	3	3	R*
Ash-thr.Flycatcher	2	-	7	4	7	6	4	3	S*
Western Kingbird	-	-	-	-	2	2	-	1	S*
Violet-gr.Swallow	-	-	-	-	1	-	-	-	S*
N.Ro.-w.Swallow	9	20	25	20	24	8	8	-	S*
Cliff Swallow	100	100	100	100	128	206	164	150	S*
Barn Swallow	-	-	-	-	2	-	-	1	S*
Scrub Jay	13	9	10	20	9	8	11	9	R*
American Crow	2	3	3	4	7	6	16	8	R*
Common Raven	12	9	1	4	6	2	14	12	R*
Plain Titmouse	3	1	-	3	7	-	1	2	R*
Bushtit	22	7	23	18	32	8	50	18	R*
Bewick's Wren	37	36	40	32	31	15	10	6	R*
House Wren	2	23	6	4	3	-	-	-	R*
Ruby cr. Kinglet	8	-	-	-	-	-	-	-	W
Western Bluebird	-	-	-	-	-	-	2	3	R*
Swainson's Thrush	-	-	-	2	-	-	-	-	M
Hermit Thrush	3	-	-	-	-	-	-	-	M
American Robin	6	2	-	1	-	-	-	-	R*
N. Mockingbird	-	-	-	1	-	-	1	-	R*
Wrentit	4	4	2	2	-	2	2	2	R*
Calif. Thrasher	1	8	7	2	4	3	1	-	R*

Table 5 (cont.). Bird Observations along the Santa Clara River System,1999; Castaic Creek from Old Road west to Rte. 126.

Species	date: 4/13	4/22	5/12	5/25	6/10	6/23	7/7	7/28	status
Phainopepla	-	-	-	-	5	1	2	3	S*
European Starling	8	16	5	20	3	8	-	4	R*
Warbling Vireo	-	-	-	2	-	-	-	-	M
Orange-cr. Warbler	7	-	2	-	-	-	-	-	M
Yellow Warbler	1	1	11	4	9	2	1	-	S*
Yellow-r.Warbler	95	-	-	-	-	-	-	-	W,M
Bl-th.Grey Warbler	3	-	-	-	-	-	-	-	M
Com. Yellowthroat	28	32	9	6	9	13	5	6	R*
Wilson's Warbler	2	1	4	1	-	-	-	-	M
Yellow-br. Chat	-	-	-	1	-	-	1	-	S*
Western Tanager	-	-	4	-	-	-	-	-	M
Bl.-head.Grosbeak	2	3	18	9	11	7	7	2	S*
Blue Grosbeak	-	-	2	-	-	-	-	-	S*
Spotted Towhee	32	2	22	16	22	11	9	4	R*
California Towhee	18	33	33	26	18	16	21	18	R*
Song Sparrow	97	53	43	30	36	31	15	7	R*
White-cr. Sparrow	61	5	-	-	-	-	-	-	W,M
Red-w. Blackbird	33	27	30	55	15	6	17	5	S*
Tricol.Blackbird	2	-	-	-	-	-	-	-	W
Brewer's Blackb.	-	2	3	2	-	-	-	-	R*
Brown-h. Cowbird	10	40	8	23	8	4	2	3	S*
Hooded Oriole	1	1	-	-	1	-	-	-	S*
Bullock's Oriole	2	6	7	1	6	3	2	-	S*
House Finch	28	14	8	10	4	6	12	18	R*
Lesser Goldfinch	18	7	2	7	4	2	1	2	R*
House Sparrow	-	2	-	2	2	-	-	3	R*
Total Species:	54	41	41	47	40	36	41	36	

Total Species on all visits: 74
Total Potential Breeding species: 57 (marked with *)

Status: M- Migrant; R- Resident; S- Summer Only; W- Winter Only

Table 6. Bird Observations along the Santa Clara River System, 1999; San Francisquito Creek for 2 Miles above Main Channel.

Species	date: 5/27	6/17	Status
Red-tailed Hawk	3	3	R*
California Quail	38	28	R*
Killdeer	4	2	R*
Mourning Dove	14	10	R*
Greater Roadrunner	1	-	R*
Barn Owl	1	-	R*
Anna's Hummingbird	1	2	R*
Costa's Hummingbird	1	-	S*
Nuttall's Woodpecker	6	8	R*
Black Phoebe	4	2	R*
Say's Phoebe	1	-	R*
Ash-thr. Flycatcher	2	3	S*
Western Kingbird	3	2	S*
N. Rough-w. Swallow	-	2	S*
Cliff Swallow	8	6	S*
Scrub Jay	8	9	R*
American Crow	-	4	R*
Common Raven	12	6	R*
Plain Titmouse	-	2	R*
Bushtit	2	2	R*
Bewick's Wren	12	13	R*
House Wren	-	1	R*
N. Mockingbird	-	1	R*
Calif. Thrasher	1	1	R*
Phainopepla	8	16	S*
European Starling	5	8	R*
Yellow Warbler	2	-	S*
Common Yellowthroat	2	5	R*
Yellow-br. Chat	1	-	S*
Bl.-headed Grosbeak	11	3	S*
Blue Grosbeak	1	5	S*
Spotted Towhee	5	12	R*
California Towhee	14	10	R*
Song Sparrow	11	6	R*
Red-w. Blackbird	3	2	S*
Brown-headed Cowbird	13	6	S*
Bullock's Oriole	7	8	S*
House Finch	16	18	R*
Lesser Goldfinch	20	10	R*
Lawrence's Goldfinch	1	-	R*
Total Species:	35	33	

Total Species on all visits: 40
Total Potential Breeding species: 40 (marked with *)

Status: M- Migrant; R- Resident; S- Summer Only; W- Winter Only

Table 7. Bird Observations along the Santa Clara River System, 1999; South Fork from Rte. 126 to McBean Parkway.

Species	date: 5/27	6/17	status
Red-shouldered Hawk	-	1	R*
Red-tailed Hawk	1	-	R*
California Quail	4	5	R*
Killdeer	1	-	R*
Mourning Dove	24	10	R*
Black-ch. Hummingbird	-	1	S*
Anna's Hummingbird	2	7	R*
Costa's Hummingbird	1	-	S*
Nuttall's Woodpecker	1	-	R*
Hairy Woodpecker	-	1	R*
Northern Flicker	1	-	R*
Western Wood Pewee	1	-	M
Black Phoebe	-	1	R*
Ash-thr. Flycatcher	5	2	S*
Western Kingbird	6	-	S*
N. Rough-w. Swallow	5	6	S*
Cliff Swallow	4	28	S*
Barn Swallow	1	2	S*
Scrub Jay	2	7	R*
American Crow	4	-	R*
Common Raven	17	13	R*
Plain Titmouse	-	7	R*
Bushtit	-	11	R*
Bewick's Wren	12	15	R*
Western Bluebird	1	-	R*
N. Mockingbird	2	1	R*
Wrentit	-	1	R*
Calif. Thrasher	2	6	R*
European Starling	8	-	R*
Yellow Warbler	2	2	S*
Common Yellowthroat	-	5	R*
Wilson's Warbler	2	-	M
Spotted Towhee	1	3	R*
California Towhee	10	8	R*
Song Sparrow	4	14	R*
Red-w. Blackbird	-	60	S*
Brewer's Blackbird	-	1	R*
Brown-headed Cowbird	2	4	S*
Bullock's Oriole	2	-	S*
House Finch	17	23	R*
Lesser Goldfinch	3	4	R*
House Sparrow	-	6	R*
Total Species:	31	30	

Total Species on all visits: 42
Total Potential Breeding species: 40 (marked with *)

Status: M- Migrant; R- Resident; S- Summer Only; W- Winter Only

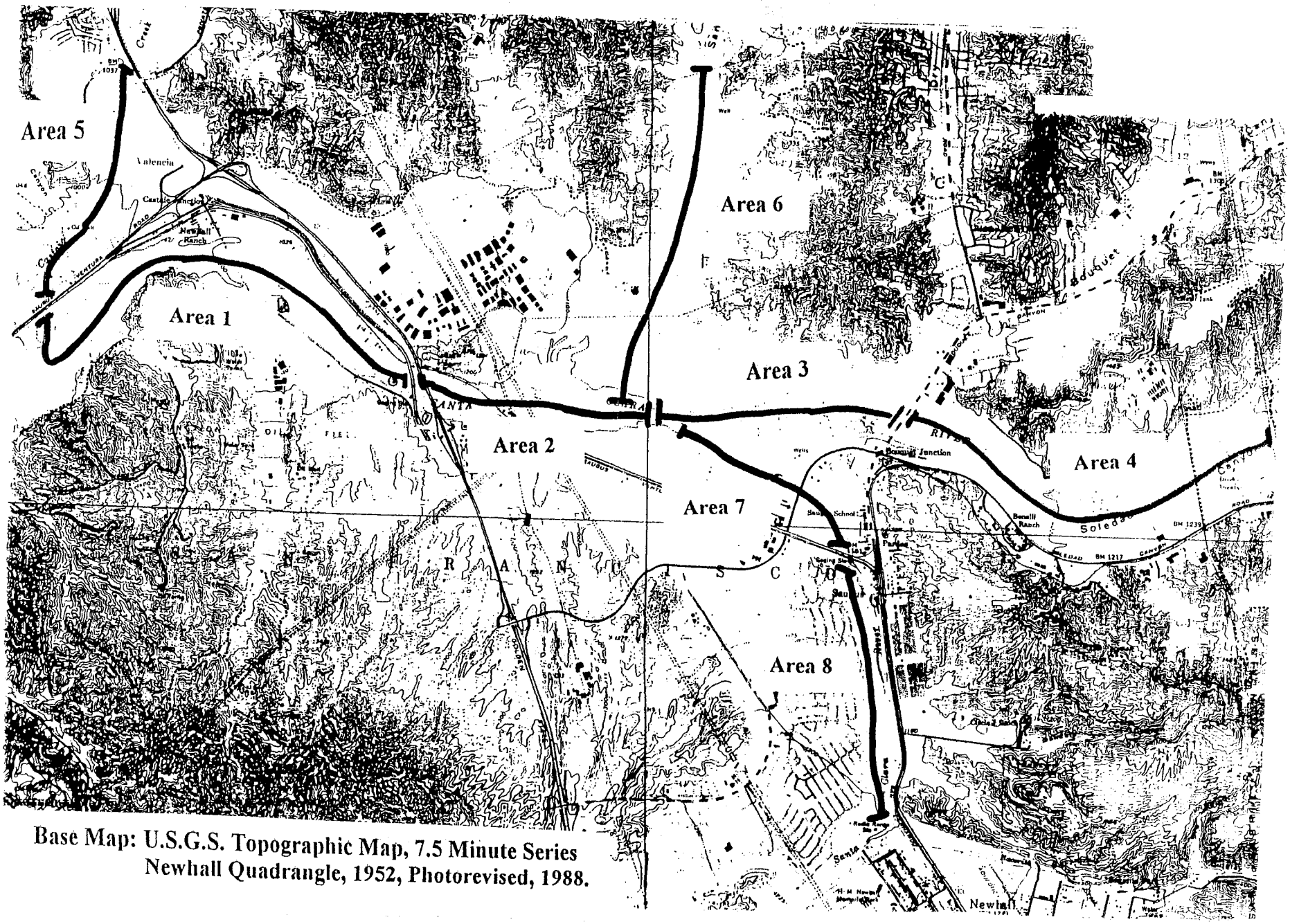
Table 8. Bird Observations along the Santa Clara River System, 1999: South Fork from Newhall Creek to Rte. 126.

Species	date: 5/27	6/17	status
Red-tailed Hawk	1	-	R*
American Kestrel	-	4	R*
California Quail	14	12	R*
Killdeer	4	2	R*
Domestic Pigeon	-	5	R*
Mourning Dove	18	33	R*
Black-ch. Hummingbird	5	2	S*
Anna's Hummingbird	7	9	R*
Nuttall's Woodpecker	2	4	R*
Downy Woodpecker	-	1	R*
Willow Flycatcher	-	1	M
Black Phoebe	2	-	R*
Ash-thr. Flycatcher	4	-	S*
Western Kingbird	8	10	S*
N. Rough-w. Swallow	4	3	S*
Scrub Jay	10	3	R*
American Crow	10	-	R*
Common Raven	5	6	R*
Bushtit	23	27	R*
Bewick's Wren	18	11	R*
N. Mockingbird	2	4	R*
Cal. Thrasher	2	6	R*
Phainopepla	1	-	S*
European Starling	46	-	R*
Warbling Vireo	-	1	M
Yellow Warbler	6	-	S*
Wilson's Warbler	4	-	M
Western Tanager	7	-	M
Bl.-headed Grosbeak	1	-	S*
Blue Grosbeak	1	2	S*
Spotted Towhee	6	1	R*
California Towhee	11	11	R*
Song Sparrow	13	4	R*
Red-w. Blackbird	1	-	S*
Brewer's Blackbird	17	6	R*
Brown-headed Cowbird	3	5	S*
Bullock's Oriole	7	7	S*
House Finch	41	38	R*
Lesser Goldfinch	13	3	R*
House Sparrow	16	8	R*
Total Species:	35	29	

Total Species on all visits: 40
Total Potential Breeding species: 36 (marked with *)

Status: M- Migrant; R- Resident; S- Summer Only; W- Winter Only

Figure 1. Survey Areas along the Santa Clara River and Tributaries.



Base Map: U.S.G.S. Topographic Map, 7.5 Minute Series
Newhall Quadrangle, 1952, Photorevised, 1988.

UPPER RIVER 1999 AREA 1

BIRDS OF Santa Clara River System

Locality OCD RR → CAST Ch. **Date** 4-10 **Time** 7:45 - 9:00 → 10:15 N SIDE

- Great Blue Heron
- (2) 11 Green Heron
- (5) 22 1 Mallard
- (2) 11 Turkey Vulture
- (2) 11 White-tailed Kite P
- Sharp-shinned Hawk
- Cooper's Hawk
- (1) 1 Red-shouldered Hawk
- Red-tailed Hawk
- American Kestrel
- (5) 2 21 California Quail
- American Coot
- (3) 111 Killdeer
- Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- Rock Dove
- (6) 2 22 Mourning Dove
- Greater Roadrunner
- Barn Owl
- Great Horned Owl
- White-throated Swift
- Black-ch. Hummingbird
- (5) 1 2 Anna's Hummingbird
- Costa's Hummingbird
- (1) 1 Belted Kingfisher
- Acorn Woodpecker
- (1) 1 Nuttall's Woodpecker
- Downy Woodpecker
- (1) 1 Hairy Woodpecker
- (3) 111 Northern Flicker
- Western Wood-Pewee
- **Willow Flycatcher**
- Pacific Slope Flycatcher
- (3) 111 Black Phoebe
- Say's Phoebe
- Ash-throated Flycatcher
- Cassin's Kingbird
- Western Kingbird
- Horned Lark
- (4) Tree Swallow
- (7) Violet-green Swallow
- (48) 40 6,1 N. Rough-winged Swallow
- (100) 60 Cliff Swallow
- (6) 1 Barn Swallow
- (6) 1 11 Scrub Jay
- (25) (20) 4 2 2 1 American Crow
- 4 2 Common Raven
- (1) Plain Titmouse
- (4) 2 2 Bushtit
- (13) 11 11 2 1 Bewick's Wren
- (2) 11 House Wren
- Ruby-crowned Kinglet

- **California Gnatcatcher**
- Blue-gray Gnatcatcher
- (4) 112 Western Bluebird P
- Swainson's Thrush
- Hermit Thrush
- American Robin
- Wrentit
- Northern Mockingbird
- California Thrasher
- American Pipit
- Cedar Waxwing
- Phainopepla
- Loggerhead Shrike
- (1) European Starling
- **Bell's Vireo**
- Solitary Vireo
- Warbling Vireo
- (4) 2 11 Orange-crowned Warbler
- (2) 11 Yellow Warbler
- (26) 6 6 6 2 4 2 Yellow-rumped Warbler
- (13) 1 4 2 1 2 1 2 Common Yellowthroat
- Wilson's Warbler
- Yellow-breasted Chat
- Western Tanager
- Black-headed Grosbeak
- Blue Grosbeak
- Lazuli Bunting
- (3) 21 Rufous-sided Towhee
- (3) California Towhee
- 21 Lark Sparrow
- Savannah Sparrow
- (74) 4 4 4 4 4 4 4 4 2 2 2 1 1 Song Sparrow
- Lincoln's Sparrow
- 6 6 6 6 4 White-crowned Sparrow
- (138) 40 10 20 20 30 40 Red-winged Blackbird
- (10) Western Meadowlark
- Brewer's Blackbird
- Brown-headed Cowbird
- Hooded Oriole
- (1) Northern Oriole
- (6) House Finch
- Pine Siskin
- (12) 66 Lesser Goldfinch
- Lawrence's Goldfinch
- (36) 10 6,20 American Goldfinch
- House Sparrow
- (1) OC Exot
- (3) 21 SORA
- (2) 2 VIRG RAIL
- (1) 1 BCN HUM NOVET

BIRDS OF Santa Clara River System

Locality _oel Rd → Castaic on Mann_ **Date** _4/20/95_ **Time** _640-910_

640 Sand 910

(2) 11 Great Blue Heron... Mallard	
Great Blue Heron	California Gnatcatcher
Green Heron	Blue-gray Gnatcatcher
(2) 11 Mallard	(3) 111 Western Bluebird
Turkey Vulture	Swainson's Thrush
(1) 1 White-tailed Kite	Hermit Thrush
Sharp-shinned Hawk	American Robin
Cooper's Hawk	(3) 111 Wrentit
(1) Red-shouldered Hawk	Northern Mockingbird
Red-tailed Hawk	California Thrasher
American Kestrel	American Pipit
(8) 2 4 2 California Quail	Cedar Waxwing
American Coot	Phainopepla
(5) 1 1 1 2 Killdeer	Loggerhead Shrike
Spotted Sandpiper	(6) 2 4 European Starling
Least Sandpiper	(1) Bell's Vireo — SINGING - but scared w/the moving UPRIVER
Common Snipe	Solitary Vireo
Rock Dove	(2) Warbling Vireo
(7) 2 2 1 2 Mourning Dove	(1) 1 Orange-crowned Warbler
Greater Roadrunner	(2) 11 Yellow Warbler
Barn Owl	(5) 2 1 2 Yellow-rumped Warbler
Great Horned Owl	(24) 2 2 2 11112 Common Yellowthroat
White-throated Swift	Wilson's Warbler
Black-ch. Hummingbird	Yellow-breasted Chat
(6) 1111 Anna's Hummingbird	Western Tanager
Costa's Hummingbird	(4) 1111 Black-headed Grosbeak
Belted Kingfisher	Blue Grosbeak
Acorn Woodpecker	(1) Lazuli Bunting
(1) Nuttall's Woodpecker	(5) 𝍸 Rufous-sided Towhee
(1) Downy Woodpecker	(2) California Towhee
(2) 11 Hairy Woodpecker	Lark Sparrow
(1) Northern Flicker	(78) 4 4 8 4 4 Savannah Sparrow
Western Wood-Pewee	8484 4 4 4 4 4 2 2 2 Song Sparrow
Willow Flycatcher	(2) Lincoln's Sparrow
Pacific Slope Flycatcher	White-crowned Sparrow
(1) Black Phoebe	(40) 20 10 10 Red-winged Blackbird
Say's Phoebe	Western Meadowlark
(8) 11 𝍸 Ash-throated Flycatcher	Brewer's Blackbird
Cassin's Kingbird	(8) 2 2 2 2 Brown-headed Cowbird
(2) Western Kingbird	Hooded Oriole
Horned Lark	(4) Northern Oriole
Tree Swallow	(6) House Finch
Violet-green Swallow	Pine Siskin
(30) 12 8 6 2 11 N. Rough-winged Swallow	(8) 4 2 1 1 Lesser Goldfinch
Cliff Swallow	Lawrence's Goldfinch
Barn Swallow	American Goldfinch
(7) 2 1 2 11 Scrub Jay	House Sparrow
(5) 4 1 American Crow	(2) Gt Egret
(2) 2 Common Raven	(6) CHIPPING SP
(4) 1 1 2 Plain Titmouse	
Bushtit	
(13) 111 𝍸 𝍸 Bewick's Wren	
(8) 111 𝍸 House Wren	
Ruby-crowned Kinglet	

BIRDS OF Santa Clara River System

Locality Old Highway to Blue Moon **Date** 5/13/99 **Time** _____

_____ Great Blue Heron
_____ Green Heron
2 Mallard
_____ Turkey Vulture
_____ White-tailed Kite
_____ Sharp-shinned Hawk
_____ Cooper's Hawk
1 nest w/ 2 young visible Red-shouldered Hawk
|| Red-tailed Hawk
| American Kestrel
4 2 2 2 4 California Quail
_____ American Coot
1 1 2 1 Killdeer
_____ Spotted Sandpiper
_____ Least Sandpiper
_____ Common Snipe
8 Rock Dove
8 2 2 4 1 2 Mourning Dove
_____ Greater Roadrunner
_____ Barn Owl
_____ Great Horned Owl
_____ White-throated Swift
||| Black-ch. Hummingbird
||| Anna's Hummingbird
_____ Costa's Hummingbird
_____ Belted Kingfisher
_____ Acorn Woodpecker
|||| 2 || Nuttall's Woodpecker
||| Downy Woodpecker
| Hairy Woodpecker
_____ Northern Flicker
_____ Western Wood-Pewee
_____ **Willow Flycatcher**
_____ Pacific Slope Flycatcher
2 Black Phoebe
_____ Say's Phoebe
|| 2 |||| Ash-throated Flycatcher
_____ Cassin's Kingbird
2 Western Kingbird
_____ Horned Lark
_____ Tree Swallow
2 Violet-green Swallow
12 6 N. Rough-winged Swallow
25, 8, 6 Cliff Swallow
4 Barn Swallow
|| 2 2 | Scrub Jay
6 6 4 American Crow
8 Common Raven
1 ||| Plain Titmouse
1 2 2 4 2 1 Bushtit
8 4 4 4 8 6 4 Bewick's Wren
4 6 1 8 4 5 1 4 2 House Wren
_____ Ruby-crowned Kinglet

_____ **California Gnatcatcher**
_____ Blue-gray Gnatcatcher
2 Western Bluebird
_____ Swainson's Thrush
_____ Hermit Thrush
2 American Robin
1 2 Wrentit
_____ Northern Mockingbird
|| California Thrasher
_____ American Pipit
_____ Cedar Waxwing
|| Phainopepla
_____ Loggerhead Shrike
1 4 2 European Starling
_____ **Bell's Vireo**
_____ Solitary Vireo
_____ Warbling Vireo
_____ Orange-crowned Warbler
1 2 |||| Yellow Warbler
_____ Yellow-rumped Warbler
4 2 4 2 Common Yellowthroat
||| Wilson's Warbler
|| Yellow-breasted Chat
_____ Western Tanager
1 1 2 Black-headed Grosbeak
|| Blue Grosbeak
_____ Lazuli Bunting
|| |||| Rufous-sided Towhee
8 2 6 4 2 2 California Towhee
_____ Lark Sparrow
_____ Savannah Sparrow
6 4 8 2 6 8 4 6 4 Song Sparrow
_____ Lincoln's Sparrow
_____ White-crowned Sparrow
6 2 Red-winged Blackbird
_____ Western Meadowlark
_____ Brewer's Blackbird
2 4 6 2 3 4 4 1 Brown-headed Cowbird
_____ Hooded Oriole
1 1 4 Northern Oriole
1 3 2 House Finch
_____ Pine Siskin
2 2 2 Lesser Goldfinch
_____ Lawrence's Goldfinch
_____ American Goldfinch
_____ House Sparrow
1 Rail
1 Great Egret

Surgeon

BIRDS OF Santa Clara River System

Locality Blue Moon to Castaic **Date** 5/13/99 **Time** _____

_____ Great Blue Heron
_____ Green Heron
_____ Mallard
_____ Turkey Vulture
_____ White-tailed Kite
_____ Sharp-shinned Hawk
_____ Cooper's Hawk
_____ Red-shouldered Hawk
_____ Red-tailed Hawk
_____ American Kestrel
12 4 California Quail
_____ American Coot
2 Killdeer
_____ Spotted Sandpiper
_____ Least Sandpiper
_____ Common Snipe
_____ Rock Dove
11 2 Mourning Dove
_____ Greater Roadrunner
_____ Barn Owl
_____ Great Horned Owl
_____ White-throated Swift
_____ Black-ch. Hummingbird
_____ Anna's Hummingbird
_____ Costa's Hummingbird
_____ Belted Kingfisher
_____ Acorn Woodpecker
111 Nuttall's Woodpecker
12 Downy Woodpecker
_____ Hairy Woodpecker
_____ Northern Flicker
_____ Western Wood-Pewee
_____ **Willow Flycatcher**
_____ Pacific Slope Flycatcher
_____ Black Phoebe
_____ Say's Phoebe
11 Ash-throated Flycatcher
_____ Cassin's Kingbird
_____ Western Kingbird
_____ Horned Lark
_____ Tree Swallow
_____ Violet-green Swallow
40 N. Rough-winged Swallow
80 Cliff Swallow
_____ Barn Swallow
1112 Scrub Jay
_____ American Crow
4 Common Raven
1 Plain Titmouse
122 Bushtit
4 8 3 11 4 Bewick's Wren
4 46 House Wren
_____ Ruby-crowned Kinglet

_____ **California Gnatcatcher**
_____ Blue-gray Gnatcatcher
_____ Western Bluebird
1 Swainson's Thrush
_____ Hermit Thrush
_____ American Robin
132 Wrentit
_____ Northern Mockingbird
1 California Thrasher
_____ American Pipit
_____ Cedar Waxwing
_____ Phainopepla
_____ Loggerhead Shrike
4 European Starling
_____ **Bell's Vireo**
_____ Solitary Vireo
_____ Warbling Vireo
_____ Orange-crowned Warbler
_____ Yellow Warbler
_____ Yellow-rumped Warbler
42 Common Yellowthroat
1 Wilson's Warbler
11 Yellow-breasted Chat
2 Western Tanager
3 11 2 11 Black-headed Grosbeak
11 Blue Grosbeak
_____ Lazuli Bunting
11 Rufous-sided Towhee
224 California Towhee
_____ Lark Sparrow
_____ Savannah Sparrow
8 7 6 8 Song Sparrow
_____ Lincoln's Sparrow
_____ White-crowned Sparrow
60 Red-winged Blackbird
_____ Western Meadowlark
_____ Brewer's Blackbird
11 2 Brown-headed Cowbird
_____ Hooded Oriole
11 Northern Oriole
4 House Finch
_____ Pine Siskin
8 2 4 12 Lesser Goldfinch
_____ Lawrence's Goldfinch
_____ American Goldfinch
_____ House Sparrow
1 VIRG RAIL

BIRDS OF Santa Clara River System

Locality [illegible] Date [illegible] Time [illegible] 950

- Great Blue Heron
- Green Heron
- (5) 122 Mallard
- Turkey Vulture
- (3) 21 White-tailed Kite
- Sharp-shinned Hawk
- Cooper's Hawk
- (2) 11 Red-shouldered Hawk
- (2) 11 Red-tailed Hawk
- American Kestrel
- (26) 10 622 California Quail
- American Coot
- (12) 26 [redacted] Killdeer
- (2) Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- Rock Dove
- (14) 4 45 Mourni[redacted]ve
- (1) Greate[redacted]irunner
- Barn O[redacted]
- Great [redacted]d Owl
- White-throated Swift
- Black-ch. Hummingbird
- (3) 12 Anna's Hummingbird
- Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- (4) 211 Nuttall's Woodpecker
- (1) Downy Woodpecker
- Hairy Woodpecker
- Northern Flicker
- (1) Western Wood-Pewee
- **Willow Flycatcher**
- Pacific Slope Flycatcher
- (2) 1 Black Phoebe
- (1) Say's Phoebe
- (7) 111 Ash-throated Flycatcher
- Cassin's Kingbird
- Western Kingbird
- Horned Lark
- Tree Swallow
- Violet-green Swallow
- (36) 10 88 N. Rough-winged Swallow
- (20) Cliff Swallow
- (4) Barn Swallow
- (12) 2 712 Scrub Jay
- (8) 4 31 American Crow
- (4) 31 Common Raven
- Plain Titmouse
- (21) Bushtit
- 4 11 2 3 111 Bewick's Wren
- (14) 11 111 House Wren
- Ruby-crowned Kinglet

- **California Gnatcatcher**
- Blue-gray Gnatcatcher
- (2) 11 Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- American Robin
- (10) 21 111 Wrentit
- Northern Mockingbird
- (2) 11 California Thrasher
- American Pipit
- Cedar Waxwing
- (8) 4 22 Phainopepla
- Loggerhead Shrike
- (97) 4 22 1 European Starling
- **Bell's Vireo**
- Solitary Vireo
- Warbling Vireo
- Orange-crowned Warbler
- (6) 111 Yellow Warbler
- Yellow-rumped Warbler
- (16) 2 11 23 111 Common Yellowthroat
- Wilson's Warbler
- 1111 2 113 1 (14) Yellow-breasted Chat
- Western Tanager
- (7) 2 111 Black-headed Grosbeak
- (6) 1 211 Blue Grosbeak
- Lazuli Bunting
- (16) 22 22 1 Rufous-sided Towhee
- (10) 2 22 California Towhee
- (1) Lark Sparrow
- (84) Savannah Sparrow
- 10 10 10 90 [redacted] 44444 Song Sparrow
- Lincoln's Sparrow
- White-crowned Sparrow
- (79) 30 90 19 Red-winged Blackbird
- Western Meadowlark
- Brewer's Blackbird
- 44 44 223 Brown-headed Cowbird
- (27) Hooded Oriole
- Northern Oriole
- (6) House Finch
- Pine Siskin
- (18) 4 4 Lesser Goldfinch
- (2) Lawrence's Goldfinch
- American Goldfinch
- House Sparrow
- (1) CT Exit

BIRDS OF Santa Clara River System

Locality [illegible] CYSTAIC Date 6-9 Time 7 – 10

- Great Blue Heron
- Green Heron
- 12 Mallard
- Turkey Vulture
- 11 White-tailed Kite
- Sharp-shinned Hawk
- Cooper's Hawk
- 11 Red-shouldered Hawk
- 111 Red-tailed Hawk
- American Kestrel
- 4 2222 California Quail
- American Coot
- 11 2222 Killdeer
- 1 Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- Rock Dove
- 3 2222 1 Mourning Dove
- Greater Roadrunner
- Barn Owl
- Great Horned Owl
- 2 White-throated Swift
- Black-ch. Hummingbird
- 1 Anna's Hummingbird
- Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- 1111 Nuttall's Woodpecker
- 1 Downy Woodpecker
- Hairy Woodpecker
- 1 Northern Flicker
- Western Wood-Pewee
- 1 Willow Flycatcher
- Pacific Slope Flycatcher
- 12 Black Phoebe
- Say's Phoebe
- 112 Ash-throated Flycatcher
- Cassin's Kingbird
- 111 Western Kingbird
- Horned Lark
- Tree Swallow
- 4 Violet-green Swallow
- 64 N. Rough-winged Swallow
- 66 Cliff Swallow
- 44 Barn Swallow
- 1111 Scrub Jay
- 41 American Crow
- 2222 Common Raven
- 1 Plain Titmouse
- 4 Bushtit
- 11111111 Bewick's Wren
- 111 House Wren
- Ruby-crowned Kinglet
- California Gnatcatcher
- Blue-gray Gnatcatcher
- 2 Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- American Robin
- 1 Wrentit
- Northern Mockingbird
- 1 California Thrasher
- American Pipit
- Cedar Waxwing
- 44442 Phainopepla
- Loggerhead Shrike
- 1 44422 European Starling
- Bell's Vireo
- Solitary Vireo
- Warbling Vireo
- Orange-crowned Warbler
- 1111 Yellow Warbler
- Yellow-rumped Warbler
- 4 4 2444 5 1111 111 Common Yellowthroat
- Wilson's Warbler
- 111 Yellow-breasted Chat
- Western Tanager
- 1111 Black-headed Grosbeak
- 11 Blue Grosbeak
- Lazuli Bunting
- 1111 Rufous-sided Towhee
- California Towhee
- Lark Sparrow
- Savannah Sparrow
- 4444888444444444 Song Sparrow
- Lincoln's Sparrow
- White-crowned Sparrow
- 30 844 Red-winged Blackbird
- Western Meadowlark
- Brewer's Blackbird
- 44 23 4222 Brown-headed Cowbird
- Hooded Oriole
- 2 Northern Oriole
- 44 House Finch
- Pine Siskin
- 42 Lesser Goldfinch
- Lawrence's Goldfinch
- American Goldfinch
- House Sparrow

BIRDS OF Santa Clara River System

Locality Oxnard → CASTAIC Date 6/22 Time 6:30 - 9:30

- Great Blue Heron
- Green Heron
- (3) 1 2 Mallard
- Turkey Vulture
- (1) White-tailed Kite
- Sharp-shinned Hawk
- (1) Cooper's Hawk
- (3) 2 1 Red-shouldered Hawk
- (2) 1 1 Red-tailed Hawk
- (2) American Kestrel
- (21) 3 4 3 4 3 4 California Quail
- American Coot
- (7) 2 1 1 2 Killdeer
- (1) Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- Rock Dove
- (10) 2 2 2 2 1 1 Mourning Dove
- Greater Roadrunner
- Barn Owl
- Great Horned Owl
- White-throated Swift
- Black-ch. Hummingbird
- (3) 2 1 1 Anna's Hummingbird
- Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- (7) 1 1 1 1 Nuttall's Woodpecker
- (1) Downy Woodpecker
- Hairy Woodpecker
- (3) 1 1 1 Northern Flicker
- Western Wood-Pewee
- **Willow Flycatcher**
- Pacific Slope Flycatcher
- (6) 1 1 1 1 Black Phoebe
- Say's Phoebe
- (7) 1 1 1 1 1 Ash-throated Flycatcher
- Cassin's Kingbird
- (3) 1 1 1 Western Kingbird
- Horned Lark
- Tree Swallow
- (2) Violet-green Swallow
- (14) 8 4 2 N. Rough-winged Swallow
- (30) 20 10 Cliff Swallow
- (1) Barn Swallow
- (10) 2 1 1 2 1 1 Scrub Jay
- (6) American Crow
- (12) 2 2 6 2 Common Raven
- (3) 2 1 Plain Titmouse
- (6) 4 2 Bushtit
- (12) 2 1 1 2 1 1 Bewick's Wren
- (2) 1 1 House Wren
- Ruby-crowned Kinglet
- **California Gnatcatcher**
- Blue-gray Gnatcatcher
- Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- American Robin
- (5) 1 1 1 1 1 Wrentit
- Northern Mockingbird
- California Thrasher
- American Pipit
- Cedar Waxwing
- (15) 4 8 3 Phainopepla
- Loggerhead Shrike
- (5) 1 2 2 European Starling
- **Bell's Vireo**
- Solitary Vireo
- Warbling Vireo
- Orange-crowned Warbler
- (3) 1 1 1 Yellow Warbler
- Yellow-rumped Warbler
- (29) 2 2 2 4 2 2 1 1 1 1 1 Common Yellowthrat
- Wilson's Warbler
- (4) 1 1 1 1 Yellow-breasted Chat
- Western Tanager
- (3) 1 1 1 Black-headed Grosbeak
- (6) 4 1 1 Blue Grosbeak
- (1) Lazuli Bunting
- (3) 1 1 1 Rufous-sided Towhee
- (6) 4 2 California Towhee
- Lark Sparrow
- (60) 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 Savannah Sparrow
- Song Sparrow
- Lincoln's Sparrow
- White-crowned Sparrow
- (10) 6 4 Red-winged Blackbird
- Western Meadowlark
- Brewer's Blackbird
- (12) 3 2 2 1 1 1 Brown-headed Cowbird
- Hooded Oriole
- Northern Oriole
- (7) 1 2 3 House Finch
- Pine Siskin
- (8) 4 2 Lesser Goldfinch
- Lawrence's Goldfinch
- American Goldfinch
- House Sparrow

OVERCAST

COYOTE

BIRDS OF Santa Clara River System

Locality Old Rd - CASTAIC Date 7-6 Time 6-9

- (1) Great Blue Heron
- (1) Green Heron
- Mallard
- Turkey Vulture
- White-tailed Kite
- Sharp-shinned Hawk
- Cooper's Hawk
- (11) Red-shouldered Hawk
- (1) Red-tailed Hawk
- American Kestrel
- (22) 6 6 8 2 California Quail
- American Coot
- (5) 2 1 2 Killdeer
- Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- Rock Dove
- (9) 6 1 Mourning Dove
- Greater Roadrunner
- Barn Owl
- Great Horned Owl
- White-throated Swift
- Black-ch. Hummingbird
- (5) 2 1 1 Anna's Hummingbird
- Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- (6) 2 1 1 Nuttall's Woodpecker
- (1) Downy Woodpecker
- Hairy Woodpecker
- (1) Northern Flicker
- Western Wood-Pewee
- **Willow Flycatcher**
- Pacific Slope Flycatcher
- (1) Black Phoebe
- Say's Phoebe
- (4) 1 1 2 Ash-throated Flycatcher
- Cassin's Kingbird
- (2) 1 Western Kingbird
- Horned Lark
- (4) Tree Swallow
- (30) 15 15 Violet-green Swallow
- (25) 15 5 N. Rough-winged Swallow
- Cliff Swallow
- Barn Swallow
- (6) 1 2 Scrub Jay
- (8) 4 2 American Crow
- (12) 6 2 1 1 Common Raven
- (4) 2 2 Plain Titmouse
- (13) 4 6 3 Bushtit
- (18) 11 2 1 4 1 1 1 Bewick's Wren
- (5) 2 3 House Wren
- Ruby-crowned Kinglet
- **California Gnatcatcher**
- Blue-gray Gnatcatcher
- Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- (1) American Robin
- (2) 1 Wrentit
- Northern Mockingbird
- (2) California Thrasher
- American Pipit
- Cedar Waxwing
- (6) Phainopepla
- Loggerhead Shrike
- (4) European Starling
- **Bell's Vireo**
- Solitary Vireo
- Warbling Vireo
- Orange-crowned Warbler
- Yellow Warbler
- (47) Yellow-rumped Warbler
- 20 4 4 2 2 2 2 2 1 2 1 1 Common Yellowthroat
- Wilson's Warbler
- (6) 1 1 Yellow-breasted Chat
- Western Tanager
- (2) 1 Black-headed Grosbeak
- (18) 8 2 2 2 2 1 1 Blue Grosbeak
- (6) Lazuli Bunting
- (2) 2 Rufous-sided Towhee
- (8) 6 2 California Towhee
- Lark Sparrow
- (52) 20 8 8 4 4 2 2 4 Savannah Sparrow
- Song Sparrow
- Lincoln's Sparrow
- White-crowned Sparrow
- (50) 20 4 2 4 10 Red-winged Blackbird
- Western Meadowlark
- Brewer's Blackbird
- (9) 3 2 1 Brown-headed Cowbird
- Hooded Oriole
- Northern Oriole
- (8) 4 4 House Finch
- Pine Siskin
- (16) 4 4 4 2 2 Lesser Goldfinch
- Lawrence's Goldfinch
- 11 American Goldfinch
- House Sparrow

N Ridge outlook

1 deer

BIRDS OF Santa Clara River System

Locality _____ Date _____ Time _____

_____ Great Blue Heron
_____ Green Heron
_____ Mallard
_____ Turkey Vulture
_____ White-tailed Kite
_____ Sharp-shinned Hawk
_____ Cooper's Hawk
_____ Red-shouldered Hawk
_____ Red-tailed Hawk
_____ American Kestrel
_____ California Quail
_____ American Coot
_____ Killdeer
_____ Spotted Sandpiper
_____ Least Sandpiper
_____ Common Snipe
_____ Rock Dove
_____ Mourning Dove
_____ Greater Roadrunner
_____ Barn Owl
_____ Great Horned Owl
_____ White-throated Swift
_____ Black-ch. Hummingbird
_____ Anna's Hummingbird
_____ Costa's Hummingbird
_____ Belted Kingfisher
_____ Acorn Woodpecker
_____ Nuttall's Woodpecker
_____ Downy Woodpecker
_____ Hairy Woodpecker
_____ Northern Flicker
_____ Western Wood-Pewee
_____ **Willow Flycatcher**
_____ Pacific Slope Flycatcher
_____ Black Phoebe
_____ Say's Phoebe
_____ Ash-throated Flycatcher
_____ Cassin's Kingbird
_____ Western Kingbird
_____ Horned Lark
_____ Tree Swallow
_____ Violet-green Swallow
_____ N. Rough-winged Swallow
_____ Cliff Swallow
_____ Barn Swallow
_____ Scrub Jay
_____ American Crow
_____ Common Raven
_____ Plain Titmouse
_____ Bushtit
_____ Bewick's Wren
_____ House Wren
_____ Ruby-crowned Kinglet

_____ **California Gnatcatcher**
_____ Blue-gray Gnatcatcher
_____ Western Bluebird
_____ Swainson's Thrush
_____ Hermit Thrush
_____ American Robin
_____ Wrentit
_____ Northern Mockingbird
_____ California Thrasher
_____ American Pipit
_____ Cedar Waxwing
_____ Phainopepla
_____ Loggerhead Shrike
_____ European Starling
_____ **Bell's Vireo**
_____ Solitary Vireo
_____ Warbling Vireo
_____ Orange-crowned Warbler
_____ Yellow Warbler
_____ Yellow-rumped Warbler
_____ Common Yellowthroat
_____ Wilson's Warbler
_____ Yellow-breasted Chat
_____ Western Tanager
_____ Black-headed Grosbeak
_____ Blue Grosbeak
_____ Lazuli Bunting
_____ Rufous-sided Towhee
_____ California Towhee
_____ Lark Sparrow
_____ Savannah Sparrow
_____ Song Sparrow
_____ Lincoln's Sparrow
_____ White-crowned Sparrow
_____ Red-winged Blackbird
_____ Western Meadowlark
_____ Brewer's Blackbird
_____ Brown-headed Cowbird
_____ Hooded Oriole
_____ Northern Oriole
_____ House Finch
_____ Pine Siskin
_____ Lesser Goldfinch
_____ Lawrence's Goldfinch
_____ American Goldfinch
_____ House Sparrow

Upper River 1999 Order 2

Cold & stormy last night Sand Sat 4-10

BIRDS OF Santa Clara River System

Locality McBean To Old Road **Date** 4/3/99 **Time** _____

	Great Blue Heron		**California Gnatcatcher**
	Green Heron		Blue-gray Gnatcatcher
	Mallard	1	Western Bluebird
	Turkey Vulture	1	Swainson's Thrush
(3)	1,2 White-tailed Kite		Hermit Thrush
	Sharp-shinned Hawk		American Robin
	Cooper's Hawk		Wrentit
2	Red-shouldered Hawk building nest		Northern Mockingbird
4	Red-tailed Hawk	1	California Thrasher
	American Kestrel		American Pipit
4	California Quail		Cedar Waxwing
	American Coot		Phainopepla
2	Killdeer		Loggerhead Shrike
	Spotted Sandpiper	(6) 4,2	European Starling
	Least Sandpiper		**Bell's Vireo**
	Common Snipe		Solitary Vireo
(12) 4,8	Rock Dove		Warbling Vireo
6	Mourning Dove	1	Orange-crowned Warbler
	Greater Roadrunner		Yellow Warbler
1	Barn Owl	36	Yellow-rumped Warbler
	Great Horned Owl	16	Common Yellowthroat
	White-throated Swift	2	Wilson's Warbler
	Black-ch. Hummingbird		Yellow-breasted Chat
4	Anna's Hummingbird		Western Tanager
	Costa's Hummingbird		Black-headed Grosbeak
	Belted Kingfisher		Blue Grosbeak
	Acorn Woodpecker		Lazuli Bunting
(3) 1,1	Nuttall's Woodpecker	2	Rufous-sided Towhee
2	Downy Woodpecker	(14) 8,6	California Towhee
	Hairy Woodpecker		Lark Sparrow
1	Northern Flicker		Savannah Sparrow
	Western Wood-Pewee	35	Song Sparrow
	Willow Flycatcher		Lincoln's Sparrow
	Pacific Slope Flycatcher	50	White-crowned Sparrow
1	Black Phoebe	4	Red-winged Blackbird
	Say's Phoebe		Western Meadowlark
	Ash-throated Flycatcher	8	Brewer's Blackbird
	Cassin's Kingbird		Brown-headed Cowbird
	Western Kingbird		Hooded Oriole
	Horned Lark		Northern Oriole
	Tree Swallow	(60) 20,40	House Finch
3	Violet-green Swallow		Pine Siskin
15,	N. Rough-winged Swallow	30	Lesser Goldfinch
8	Cliff Swallow		Lawrence's Goldfinch
1	Barn Swallow		American Goldfinch
(5) 2,3	Scrub Jay		House Sparrow
8	American Crow		
4	Common Raven		
2	Plain Titmouse		
(8) 2,4,2	Bushtit		
6	Bewick's Wren		
(12) 4,8	House Wren		
3	Ruby-crowned Kinglet		

BIRDS OF Santa Clara River System

Locality McBean to old highway **Date** 4/20/99 **Time** _____

_____ Great Blue Heron
_____ Green Heron
_____ Mallard
_____ Turkey Vulture
(2) II White-tailed Kite
_____ Sharp-shinned Hawk
(1) Cooper's Hawk
_____ Red-shouldered Hawk
_____ Red-tailed Hawk
(2) II American Kestrel
(13) 4 | 4 2 2 California Quail
_____ American Coot
(6) 123 Killdeer
_____ Spotted Sandpiper
_____ Least Sandpiper
_____ Common Snipe
_____ Rock Dove
(8) 1 2 1 2 Mourning Dove
_____ Greater Roadrunner
_____ Barn Owl
_____ Great Horned Owl
_____ White-throated Swift
_____ Black-ch. Hummingbird
(5) 12 | Anna's Hummingbird
_____ Costa's Hummingbird
_____ Belted Kingfisher
_____ Acorn Woodpecker
(4) 12 | Nuttall's Woodpecker
(9) 2 | | Downy Woodpecker
_____ Hairy Woodpecker
(1) Northern Flicker
_____ Western Wood-Pewee
_____ **Willow Flycatcher**
_____ Pacific Slope Flycatcher
(3) III Black Phoebe
_____ Say's Phoebe
(2) II Ash-throated Flycatcher
_____ Cassin's Kingbird
_____ Western Kingbird
_____ Horned Lark
_____ Tree Swallow
2pr. to nest holes _____ Violet-green Swallow
(4) N. Rough-winged Swallow
20? Cliff Swallow see other side of McBean bridge count.
_____ Barn Swallow
(11) 1 1 1 4 2 2 Scrub Jay
_____ American Crow
(18) 8 6 4 Common Raven
(1) Plain Titmouse
(8) 1 2 2 1 2 Bushtit
(27) 6 1 1 2 4 1 4 2 Bewick's Wren
(28) 2 4 6 4 1 2 House Wren
_____ Ruby-crowned Kinglet

_____ **California Gnatcatcher**
_____ Blue-gray Gnatcatcher
(17) Western Bluebird
_____ Swainson's Thrush
_____ Hermit Thrush
_____ American Robin
_____ Wrentit
_____ Northern Mockingbird
(2) II California Thrasher
_____ American Pipit
_____ Cedar Waxwing
_____ Phainopepla
_____ Loggerhead Shrike
(22) 2 8 8 4 European Starling
_____ **Bell's Vireo**
_____ Solitary Vireo
(1) Warbling Vireo
_____ Orange-crowned Warbler
(1) Yellow Warbler
(3) Yellow-rumped Warbler
(27) 4 6 8 9 Common Yellowthroat
_____ Wilson's Warbler
_____ Yellow-breasted Chat
_____ Western Tanager
(2) II Black-headed Grosbeak
_____ Blue Grosbeak
_____ Lazuli Bunting
(8) 2 3 1 2 Rufous-sided Towhee
(23) 4 8 4 2 4 California Towhee
_____ Lark Sparrow
_____ Savannah Sparrow
(35) 6 2 6 4 4 8 Song Sparrow
(2) Lincoln's Sparrow
(5) 14 White-crowned Sparrow
(5) 23 Red-winged Blackbird
_____ Western Meadowlark
_____ Brewer's Blackbird
(9) 2 1 4 Brown-headed Cowbird
_____ Hooded Oriole
_____ Northern Oriole
(6) 42 House Finch
_____ Pine Siskin
(7) 1 2 4 Lesser Goldfinch
(8) Lawrence's Goldfinch
(28) American Goldfinch
_____ House Sparrow
(1) great egret
(3) CHIPPING SP

BIRDS OF Santa Clara River System

Locality McB → Old Rd   Date 5-13   Time 740 → 840

- Great Blue Heron
- (3) ||| Green Heron
- (7) 2 3 2 Mallard
- Turkey Vulture
- (1) White-tailed Kite
- Sharp-shinned Hawk
- Cooper's Hawk
- Red-shouldered Hawk
- Red-tailed Hawk
- American Kestrel
- (14) 4 2 2 2 2 2 California Quail
- American Coot
- (6) 2 2 2 Killdeer
- Spotted Sandpiper
- (1) Least Sandpiper
- Common Snipe
- Rock Dove
- (10) 2 2 2 2 2 Mourning Dove
- Greater Roadrunner
- Barn Owl
- Great Horned Owl
- White-throated Swift
- Black-ch. Hummingbird
- (1) Anna's Hummingbird
- Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- (4) 2 1 1 Nuttall's Woodpecker
- (1) Downy Woodpecker
- Hairy Woodpecker
- Northern Flicker
- Western Wood-Pewee
- **Willow Flycatcher**
- Pacific Slope Flycatcher
- (2) || Black Phoebe
- Say's Phoebe
- (2) || Ash-throated Flycatcher
- Cassin's Kingbird
- (2) || Western Kingbird
- Horned Lark
- Tree Swallow
- (2) Violet-green Swallow
- (10) 6 4 N. Rough-winged Swallow
- Cliff Swallow
- Barn Swallow
- (6) 2 2 2 Scrub Jay
- (10) 4 4 2 American Crow
- (2) 2 Common Raven
- Plain Titmouse
- (2) 2 Bushtit
- (8) ||| ||||| Bewick's Wren
- (3) ||| House Wren
- Ruby-crowned Kinglet
- **California Gnatcatcher**
- Blue-gray Gnatcatcher
- (4) 2 2 Western Bluebird
- (1) Swainson's Thrush
- Hermit Thrush
- American Robin
- Wrentit
- Northern Mockingbird
- (1) California Thrasher
- American Pipit
- Cedar Waxwing
- (1) Phainopepla
- Loggerhead Shrike
- (20) 6 4 4 4 2 European Starling
- **Bell's Vireo**
- Solitary Vireo
- Warbling Vireo
- Orange-crowned Warbler
- (2) || Yellow Warbler
- Yellow-rumped Warbler
- (2) || Common Yellowthroat
- (2) || Wilson's Warbler
- (3) ||| Yellow-breasted Chat
- (2) || Western Tanager
- (3) ||| Black-headed Grosbeak
- (1) Blue Grosbeak
- Lazuli Bunting
- (1) Rufous-sided Towhee
- (6) 4 2 California Towhee
- Lark Sparrow
- Savannah Sparrow
- (32) 4 4 4 4 4 4 4 4 Song Sparrow
- Lincoln's Sparrow
- White-crowned Sparrow
- (16) 8 4 4 Red-winged Blackbird
- Western Meadowlark
- Brewer's Blackbird
- (15) 4 4 2 2 2 1 Brown-headed Cowbird
- Hooded Oriole
- Northern Oriole
- (2) House Finch
- Pine Siskin
- (2) Lesser Goldfinch
- Lawrence's Goldfinch
- American Goldfinch
- House Sparrow
- (1) Spotted Dove

None [illegible]
N male × S Sub
1 1000 yds
1 200 yds.

BIRDS OF Santa Clara River System

Locality McBean to Old Hyway Date 5/24/97 Time ______

(2) 1 2 Green Heron together

Great Blue Heron

Mallard

Turkey Vulture

(3) ||| White-tailed Kite on nest!

Sharp-shinned Hawk

Cooper's Hawk

(1) Red-shouldered Hawk nest looking good!

(1) Red-tailed Hawk

American Kestrel

(14) 24 California Quail [224]

American Coot

(3) Killdeer [21]

Spotted Sandpiper

Least Sandpiper

Common Snipe

Rock Dove

(6) 2112 Mourning Dove

Greater Roadrunner

Barn Owl

Great Horned Owl

White-throated Swift

Black-ch. Hummingbird

(6) |~~||||~~ Anna's Hummingbird

Costa's Hummingbird

Belted Kingfisher

Acorn Woodpecker

(6) 1112 Nuttall's Woodpecker

(7) 2221 Downy Woodpecker

(1) Hairy Woodpecker

Northern Flicker

(7) ||~~||||~~ Western Wood-Pewee

Willow Flycatcher

(1) ~~Pacific Slope Flycatcher~~

(2) Black Phoebe w/ nest on McBean 2

Say's Phoebe

(4) 21 Ash-throated Flycatcher

Cassin's Kingbird

Western Kingbird

Horned Lark

Tree Swallow

Violet-green Swallow

N. Rough-winged Swallow other count

Cliff Swallow

Barn Swallow

(8) 1112 Scrub Jay [11]

(12) 264 American Crow

(12) 426 Common Raven

5 Plain Titmouse (2) feeding young

(12) 282 Bushtit

(14) 252 ~~|||~~ Bewick's Wren

(3) ||| House Wren

Ruby-crowned Kinglet

California Gnatcatcher

Blue-gray Gnatcatcher

Western Bluebird

Swainson's Thrush

Hermit Thrush

American Robin

Wrentit

Northern Mockingbird

(1) California Thrasher [1]

American Pipit

Cedar Waxwing

(1) Phainopepla

Loggerhead Shrike

(18) 68 European Starling [22]

Bell's Vireo

Solitary Vireo

(2) 1 Warbling Vireo [1]

Orange-crowned Warbler

(2) 11 Yellow Warbler

Yellow-rumped Warbler

(13) 116 Common Yellowthroat [2|||]

(5) 113 Wilson's Warbler

Yellow-breasted Chat

(4) ||| Western Tanager

(9) ~~||||~~|||| Black-headed Grosbeak [2]

Blue Grosbeak

Lazuli Bunting

(10) 222 Rufous-sided Towhee [2|]

(16) 421122 California Towhee [6]

Lark Sparrow

Savannah Sparrow

(68) 6848 8·6 8264 Song Sparrow [86]

Lincoln's Sparrow

White-crowned Sparrow

(17) || Red-winged Blackbird [15]

Western Meadowlark

Brewer's Blackbird

(19) 12 2112 Brown-headed Cowbird [3,2||]

Hooded Oriole

Northern Oriole

(6) House Finch [6]

Pine Siskin

(5) 12 Lesser Goldfinch [2]

Lawrence's Goldfinch

American Goldfinch

House Sparrow

Great Egret (1)

(1) DIAMMONDS

(1) Black Throat Grey

(1) OLIVE SIDED Fly.

BIRDS OF Santa Clara River System

Locality Mc Bean to Old Nyeing Date 6/9/19 Time _____

_____ Great Blue Heron
_____ Green Heron
2 Mallard
_____ Turkey Vulture
_____ White-tailed Kite
_____ Sharp-shinned Hawk
_____ Cooper's Hawk
_____ Red-shouldered Hawk
_____ Red-tailed Hawk
_____ American Kestrel
4 2 California Quail
_____ American Coot
IIII Killdeer
_____ Spotted Sandpiper
_____ Least Sandpiper
_____ Common Snipe
_____ Rock Dove
4 2 Mourning Dove
_____ Greater Roadrunner
_____ Barn Owl
_____ Great Horned Owl
_____ White-throated Swift
II Black-ch. Hummingbird
III Anna's Hummingbird
II Costa's Hummingbird
_____ Belted Kingfisher
_____ Acorn Woodpecker
2 2 Nuttall's Woodpecker
1 2 2 Downy Woodpecker
_____ Hairy Woodpecker
_____ Northern Flicker
II Western Wood-Pewee North side
I **Willow Flycatcher** 75 yds above tow pipes above power
_____ Pacific Slope Flycatcher
I IIII Black Phoebe
_____ Say's Phoebe
2 2 Ash-throated Flycatcher
_____ Cassin's Kingbird
_____ Western Kingbird
_____ Horned Lark
_____ Tree Swallow
_____ Violet-green Swallow
25 _____ N. Rough-winged Swallow
30, 15, 20 Cliff Swallow
_____ Barn Swallow
2 2 Scrub Jay
_____ American Crow
2 Common Raven
2 4 Plain Titmouse
2 Bushtit
II IIII IIII IIII Bewick's Wren
II 2 2 House Wren
_____ Ruby-crowned Kinglet

California Gnatcatcher
_____ Blue-gray Gnatcatcher
2 Western Bluebird
_____ Swainson's Thrush
_____ Hermit Thrush
_____ American Robin
2 Wrentit
_____ Northern Mockingbird
IIII California Thrasher
_____ American Pipit
_____ Cedar Waxwing
2 III 2 2 Phainopepla
_____ Loggerhead Shrike
8 II 2 2 2 European Starling
_____ **Bell's Vireo**
_____ Solitary Vireo
_____ Warbling Vireo
_____ Orange-crowned Warbler
_____ Yellow Warbler
_____ Yellow-rumped Warbler
6 4 4 2 II Common Yellowthroat
_____ Wilson's Warbler
_____ Yellow-breasted Chat
_____ Western Tanager
II 2 Black-headed Grosbeak
2 Blue Grosbeak
_____ Lazuli Bunting
2 2 IIII 2 Rufous-sided Towhee
2 2 2 2 2 2 California Towhee
_____ Lark Sparrow
_____ Savannah Sparrow
4 2 3 4 2 3 Song Sparrow
_____ Lincoln's Sparrow
_____ White-crowned Sparrow
8 6 Red-winged Blackbird
_____ Western Meadowlark
II Brewer's Blackbird
II 3 4 2 3 Brown-headed Cowbird
_____ Hooded Oriole
_____ Northern Oriole
1 4 2 2 II 2 House Finch
_____ Pine Siskin
2 2 Lesser Goldfinch
_____ Lawrence's Goldfinch
_____ American Goldfinch
_____ House Sparrow
1 White breasted Nuthatch

BIRDS OF Santa Clara River System

Locality McBean to Old Hwy **Date** 6 2 7 **Time** _____

_____ Great Blue Heron
_____ Green Heron
_____ Mallard
_____ Turkey Vulture
(2) || White-tailed Kite
_____ Sharp-shinned Hawk
_____ Cooper's Hawk
(1) | Red-shouldered Hawk
_____ Red-tailed Hawk
_____ American Kestrel
(9) 12 California Quail
_____ American Coot
(2) || Killdeer
_____ Spotted Sandpiper
_____ Least Sandpiper
_____ Common Snipe
| Rock Dove
(15) 61242 Mourning Dove
_____ Greater Roadrunner
_____ Barn Owl
_____ Great Horned Owl
_____ White-throated Swift
_____ Black-ch. Hummingbird
(3) ||| Anna's Hummingbird
_____ Costa's Hummingbird
_____ Belted Kingfisher
_____ Acorn Woodpecker
(5) ||| 2 Nuttall's Woodpecker
| Downy Woodpecker
_____ Hairy Woodpecker
_____ Northern Flicker
_____ Western Wood-Pewee
_____ **Willow Flycatcher**
_____ Pacific Slope Flycatcher
(2) || Black Phoebe
_____ Say's Phoebe
(4) || 2 Ash-throated Flycatcher
_____ Cassin's Kingbird
_____ Western Kingbird
_____ Horned Lark
_____ Tree Swallow
_____ Violet-green Swallow
(18) 684 N. Rough-winged Swallow
(50) 30, 20, 20 Cliff Swallow
_____ Barn Swallow
(9) ||| ||| Scrub Jay
(4) 4 American Crow
(11) 4124 Common Raven
(7) 172 Plain Titmouse
_____ Bushtit
(14) 4612 Bewick's Wren
(12) 246 House Wren
_____ Ruby-crowned Kinglet

_____ **California Gnatcatcher**
_____ Blue-gray Gnatcatcher
(3) | 2 Western Bluebird
_____ Swainson's Thrush
_____ Hermit Thrush
_____ American Robin
(3) 21 Wrentit
_____ Northern Mockingbird
(2) 4 || California Thrasher
_____ American Pipit
_____ Cedar Waxwing
(7) 412 Phainopepla
_____ Loggerhead Shrike
(5) 2 ||| European Starling
_____ **Bell's Vireo**
_____ Solitary Vireo
_____ Warbling Vireo
_____ Orange-crowned Warbler
(3) || Yellow Warbler
_____ Yellow-rumped Warbler
(28) 48842 Common Yellowthroat
_____ Wilson's Warbler
_____ Yellow-breasted Chat
_____ Western Tanager
(8) 31 Black-headed Grosbeak
(1) | Blue Grosbeak
_____ Lazuli Bunting
(17) 42 |||| 42 Rufous-sided Towhee
(24) 6442422 California Towhee
_____ Lark Sparrow
_____ Savannah Sparrow
(27) 2836021 Song Sparrow
_____ Lincoln's Sparrow
_____ White-crowned Sparrow
_____ Red-winged Blackbird
_____ Western Meadowlark
_____ Brewer's Blackbird
(13) ||| 421 Brown-headed Cowbird
_____ Hooded Oriole
_____ Northern Oriole
(31) 6988 House Finch
_____ Pine Siskin
(20) 48242 Lesser Goldfinch
_____ Lawrence's Goldfinch
_____ American Goldfinch
_____ House Sparrow
(1) Great Horned Owl
(2) Brown Crested Flycatchers (where willows was last time)
_____
_____
_____
_____

BIRDS OF Santa Clara River System

Locality McBean to Old Hyway Date 7/6/99 Time _____

(1) Great Blue Heron
(1) Green Heron acting mating/protective
_____ Mallard
_____ Turkey Vulture
(2) II White-tailed Kite
_____ Sharp-shinned Hawk
_____ Cooper's Hawk
_____ Red-shouldered Hawk
(4) 2II Red-tailed Hawk
_____ American Kestrel
(15) III,12 California Quail
_____ American Coot
(1) Killdeer
_____ Spotted Sandpiper
_____ Least Sandpiper
_____ Common Snipe
_____ Rock Dove
(7) IIII2 Mourning Dove
_____ Greater Roadrunner
_____ Barn Owl
_____ Great Horned Owl
_____ White-throated Swift
(1) Black-ch. Hummingbird
(6) I IIII Anna's Hummingbird
_____ Costa's Hummingbird
_____ Belted Kingfisher
_____ Acorn Woodpecker
(9) IIII IIII Nuttall's Woodpecker
(7) III2II Downy Woodpecker
(1) Hairy Woodpecker
_____ Northern Flicker
_____ Western Wood-Pewee
_____ **Willow Flycatcher**
_____ Pacific Slope Flycatcher
(5) 3II Black Phoebe
_____ Say's Phoebe
(4) 2 III Ash-throated Flycatcher
_____ Cassin's Kingbird
(1) Western Kingbird
_____ Horned Lark
_____ Tree Swallow
_____ Violet-green Swallow
(8) 62 N. Rough-winged Swallow (see McBean)
(9) Cliff Swallow
_____ Barn Swallow
(3) 21 Scrub Jay
(14) 3623 American Crow
(6) Common Raven
(3) III Plain Titmouse
(25) 12,5 8 Bushtit
(14) 2II2I2 Bewick's Wren
_____ House Wren
_____ Ruby-crowned Kinglet

_____ **California Gnatcatcher**
_____ Blue-gray Gnatcatcher
(19) 325 Western Bluebird
_____ Swainson's Thrush
_____ Hermit Thrush
_____ American Robin
(2) II Wrentit
_____ Northern Mockingbird
(11) 13 California Thrasher
_____ American Pipit
_____ Cedar Waxwing
(10) 6II2 Phainopepla
_____ Loggerhead Shrike
(1) European Starling
_____ **Bell's Vireo**
_____ Solitary Vireo
_____ Warbling Vireo
_____ Orange-crowned Warbler
(2) Yellow Warbler
_____ Yellow-rumped Warbler
(18) 64II Common Yellowthroat
_____ Wilson's Warbler
(2) Yellow-breasted Chat
_____ Western Tanager
(3) III Black-headed Grosbeak
_____ Blue Grosbeak
_____ Lazuli Bunting
(8) 2222 Rufous-sided Towhee
(16) IIII2 2221 2 California Towhee
_____ Lark Sparrow
_____ Savannah Sparrow
(19) III2II4 2211 Song Sparrow
_____ Lincoln's Sparrow
_____ White-crowned Sparrow
_____ Red-winged Blackbird
_____ Western Meadowlark
_____ Brewer's Blackbird
(24) 91 6341 Brown-headed Cowbird
(1) Hooded Oriole
(3) II Northern Oriole
(47) 8 4 8 6861 House Finch
_____ Pine Siskin
_____ 4041 Lesser Goldfinch
_____ Lawrence's Goldfinch
(15) 2 American Goldfinch Female gathering spiders
_____ House Sparrow
_____
_____
_____
_____
_____
_____

BIRDS OF Santa Clara River System TUE 7/28

Locality McBean Rd Date ______ Time 630-730

- ______ Great Blue Heron
- ______ Green Heron
- ______ Mallard
- ______ Turkey Vulture
- (4) White-tailed Kite 3 YOUNG
- ______ Sharp-shinned Hawk
- ______ Cooper's Hawk
- (3) 111 Red-shouldered Hawk
- (2) 11 Red-tailed Hawk
- ______ American Kestrel
- (4) California Quail
- ______ American Coot
- (4) 2 2 Killdeer
- ______ Spotted Sandpiper
- ______ Least Sandpiper
- ______ Common Snipe
- ______ Rock Dove
- (3) 1 2 Mourning Dove
- ______ Greater Roadrunner
- ______ Barn Owl
- ______ Great Horned Owl
- ______ White-throated Swift
- ______ Black-ch. Hummingbird
- ______ Anna's Hummingbird
- ______ Costa's Hummingbird
- ______ Belted Kingfisher
- ______ Acorn Woodpecker
- (7) 11 ||||| Nuttall's Woodpecker
- (2) Downy Woodpecker
- ______ Hairy Woodpecker
- ______ Northern Flicker
- ______ Western Wood-Pewee
- ______ **Willow Flycatcher**
- (16) Pacific Slope Flycatcher
- 2 1) 2 / 2 ||||| Black Phoebe
- ______ Say's Phoebe
- (2) 11 Ash-throated Flycatcher
- ______ Cassin's Kingbird
- ______ Western Kingbird
- ______ Horned Lark
- ______ Tree Swallow
- ______ Violet-green Swallow
- ______ N. Rough-winged Swallow
- (50) Cliff Swallow
- (5) Barn Swallow
- (3) 111 Scrub Jay
- (3) 1 2 American Crow
- (2) Common Raven
- (3) 1 2 Plain Titmouse
- (9) 3 6 Bushtit
- (10) 1111 ||||| Bewick's Wren
- ______ House Wren
- ______ Ruby-crowned Kinglet

- ______ **California Gnatcatcher**
- ______ Blue-gray Gnatcatcher
- ______ Western Bluebird
- ______ Swainson's Thrush
- ______ Hermit Thrush
- (1) American Robin
- (2) 11 Wrentit
- ______ Northern Mockingbird
- (2) 11 California Thrasher
- ______ American Pipit
- ______ Cedar Waxwing
- (15) 3 10 2 Phainopepla
- ______ Loggerhead Shrike ORV
- (2) 11 European Starling
- ______ **Bell's Vireo**
- ______ Solitary Vireo
- ______ Warbling Vireo
- ______ Orange-crowned Warbler
- ______ Yellow Warbler
- ______ Yellow-rumped Warbler
- (3) Common Yellowthroat
- ______ Wilson's Warbler
- ______ Yellow-breasted Chat
- ______ Western Tanager
- ______ Black-headed Grosbeak
- (2) 11 Blue Grosbeak
- ______ Lazuli Bunting NO NOISE
- (4) 1 1 2 Rufous-sided Towhee
- (6) 2 2 2 California Towhee
- ______ Lark Sparrow
- ______ Savannah Sparrow
- (9) 5 2 2 Song Sparrow
- ______ Lincoln's Sparrow
- ______ White-crowned Sparrow
- (2) Red-winged Blackbird
- ______ Western Meadowlark
- ______ Brewer's Blackbird
- (14) 4 2 5 11 Brown-headed Cowbird
- ______ Hooded Oriole
- ______ Northern Oriole
- XX 20 (26) 4 2 House Finch
- ______ Pine Siskin
- (10) 6 4 Lesser Goldfinch
- ______ Lawrence's Goldfinch
- ______ American Goldfinch
- ______ House Sparrow
- (1) SNOWY EGRET
- (1) GT EGRET

1999 UPPER river Area 3

Sept

BIRDS OF Santa Clara River System

Locality Bouquet Canyon + McBean **Date** Sept 4/10/99 **Time** _____

- _____ Great Blue Heron
- _____ Green Heron
- 3 Mallard
- _____ Turkey Vulture
- _____ White-tailed Kite
- _____ Sharp-shinned Hawk
- _____ Cooper's Hawk
- 1 Red-shouldered Hawk
- _____ Red-tailed Hawk
- _____ American Kestrel
- 8 California Quail
- _____ American Coot
- (3) 1,2 Killdeer
- _____ Spotted Sandpiper
- _____ Least Sandpiper
- 1 Common Snipe
- 35 Rock Dove
- 6 Mourning Dove
- _____ Greater Roadrunner
- (3) 1,2 Barn Owl
- _____ Great Horned Owl
- _____ White-throated Swift
- _____ Black-ch. Hummingbird
- 6 Anna's Hummingbird
- _____ Costa's Hummingbird
- _____ Belted Kingfisher
- _____ Acorn Woodpecker
- 1 Nuttall's Woodpecker
- (3) 1,2 Downy Woodpecker
- _____ Hairy Woodpecker
- 3 Northern Flicker
- _____ Western Wood-Pewee
- _____ **Willow Flycatcher**
- _____ Pacific Slope Flycatcher
- (4) 1,1,2 Black Phoebe
- _____ Say's Phoebe
- _____ Ash-throated Flycatcher
- _____ Cassin's Kingbird
- _____ Western Kingbird
- _____ Horned Lark
- _____ Tree Swallow
- 8 Violet-green Swallow
- (40) 15, 25, N. Rough-winged Swallow
- 6 Cliff Swallow
- (2) 1 1 Barn Swallow
- (3) 2,1 Scrub Jay
- 6 American Crow
- (3) 15, 10, 20 Common Raven
- _____ Plain Titmouse
- (8) 6,2 Bushtit
- (14) 4, 6, 4 Bewick's Wren
- 2 House Wren
- (4) 12 Ruby-crowned Kinglet

- _____ **California Gnatcatcher**
- _____ Blue-gray Gnatcatcher
- _____ Western Bluebird
- 3 Swainson's Thrush
- _____ Hermit Thrush
- _____ American Robin
- 1 Wrentit
- _____ Northern Mockingbird
- 4 California Thrasher
- 9 American Pipit
- _____ Cedar Waxwing
- _____ Phainopepla
- _____ Loggerhead Shrike
- 1 European Starling
- _____ **Bell's Vireo**
- _____ Solitary Vireo
- _____ Warbling Vireo
- 3 Orange-crowned Warbler
- 1 Yellow Warbler
- 30 Yellow-rumped Warbler
- 4 Common Yellowthroat
- 3 Wilson's Warbler
- _____ Yellow-breasted Chat
- _____ Western Tanager
- _____ Black-headed Grosbeak
- _____ Blue Grosbeak
- _____ Lazuli Bunting
- 1,2 Rufous-sided Towhee
- 8 California Towhee
- _____ Lark Sparrow
- _____ Savannah Sparrow
- 25 Song Sparrow
- 1 Lincoln's Sparrow
- 40 White-crowned Sparrow
- 25 Red-winged Blackbird
- _____ Western Meadowlark
- _____ Brewer's Blackbird
- _____ Brown-headed Cowbird
- _____ Hooded Oriole
- _____ Northern Oriole
- 14 House Finch
- _____ Pine Siskin
- 22 Lesser Goldfinch
- _____ Lawrence's Goldfinch
- _____ American Goldfinch
- _____ House Sparrow

BIRDS OF Santa Clara River System

Locality Fagnant to McBean **Date** 4/20/97 **Time** _____

_____ Great Blue Heron
_____ Green Heron
(5) 2 1 2 Mallard
_____ Turkey Vulture
_____ White-tailed Kite
_____ Sharp-shinned Hawk
_____ Cooper's Hawk
_____ Red-shouldered Hawk
(3) 1 2 Red-tailed Hawk
_____ American Kestrel
(10) 8 2 California Quail
_____ American Coot
(7) [2] 1 2 2 1 1 Killdeer
_____ Spotted Sandpiper
_____ Least Sandpiper
_____ Common Snipe
_____ Rock Dove
(22) 4 6 4 6 2 Mourning Dove
(3) _____ Greater Roadrunner
_____ Barn Owl
_____ Great Horned Owl
_____ White-throated Swift
(3) _____ Black-ch. Hummingbird
[1] (3) 1 1 Anna's Hummingbird
_____ Costa's Hummingbird
_____ Belted Kingfisher
_____ Acorn Woodpecker
_____ Nuttall's Woodpecker
(3) 1 2 Downy Woodpecker
_____ Hairy Woodpecker
[2] _____ Northern Flicker
_____ Western Wood-Pewee
_____ **Willow Flycatcher**
_____ Pacific Slope Flycatcher
(2) [2] 1 1 Black Phoebe
_____ Say's Phoebe
(3) 1 1 Ash-throated Flycatcher
_____ Cassin's Kingbird
_____ Western Kingbird
_____ Horned Lark
_____ Tree Swallow
_____ Violet-green Swallow
_____ N. Rough-winged Swallow
2 building under McBean I-30 nest +5. _____ Cliff Swallow
_____ Barn Swallow
(10) [4] 1 2 1 Scrub Jay
(1) _____ American Crow
8]20, 4 6 2 Common Raven
(2) 1 1 2 Plain Titmouse
(4) 2 2 Bushtit
(3) [6] 2 2 4 6 Bewick's Wren
_____ House Wren
_____ Ruby-crowned Kinglet

_____ **California Gnatcatcher**
_____ Blue-gray Gnatcatcher
_____ Western Bluebird
_____ Swainson's Thrush
_____ Hermit Thrush
_____ American Robin
(4) 1 1 2 Wrentit
_____ Northern Mockingbird
(3) [1] 1 1 California Thrasher
_____ American Pipit
_____ Cedar Waxwing
_____ Phainopepla
_____ Loggerhead Shrike
(16) 5 6 4 European Starling
_____ **Bell's Vireo**
_____ Solitary Vireo
(2) _____ Warbling Vireo
(3) [1] 1 Orange-crowned Warbler
_____ Yellow Warbler
(8) 4 2 1 Yellow-rumped Warbler
(20) [6] 5 2 4 2 4 Common Yellowthroat
_____ Wilson's Warbler
_____ Yellow-breasted Chat
_____ Western Tanager
(2) 1 1 Black-headed Grosbeak
_____ Blue Grosbeak
_____ Lazuli Bunting
(14) [4] 2 4 2 2 Rufous-sided Towhee
(24) [8] 4 2 4 2 4 California Towhee
_____ Lark Sparrow
_____ Savannah Sparrow
87 [25] 8 2 2 4 8 9 Song Sparrow
(2) _____ Lincoln's Sparrow
(8) 1 4 2 White-crowned Sparrow
(20) [8 males] 1 1 2 3 Red-winged Blackbird
_____ Western Meadowlark
(10) 4 6 Brewer's Blackbird
(35) [6] 9,1 1 6 3 6 1 2 Brown-headed Cowbird
_____ Hooded Oriole
_____ Northern Oriole
(15) [6] 1 2 1 4 House Finch
_____ Pine Siskin
(17) [4] 2 2 3 3 4 Lesser Goldfinch
_____ Lawrence's Goldfinch
_____ American Goldfinch
_____ House Sparrow
(2) TRICOLORED BLACKBIRDS
(12) Great Egret

BOX = 200 yds E of McB.

BIRDS OF Santa Clara River System

Locality BOGUET → MC B. **Date** 5/13 **Time** 630 – 730

- Great Blue Heron
- Green Heron
- (1) Mallard
- Turkey Vulture
- White-tailed Kite
- Sharp-shinned Hawk
- Cooper's Hawk
- Red-shouldered Hawk
- (1) Red-tailed Hawk
- American Kestrel
- [1] (2) (7) 2 California Quail
- American Coot
- (8) 4 2 1 Killdeer
- Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- (8) Rock Dove
- [2] 2 2 2 Mourning Dove
- Greater Roadrunner
- (2) Barn Owl
- Great Horned Owl
- White-throated Swift
- Black-ch. Hummingbird
- (1) Anna's Hummingbird
- Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- Nuttall's Woodpecker
- Downy Woodpecker
- Hairy Woodpecker
- Northern Flicker
- Western Wood-Pewee
- **Willow Flycatcher**
- Pacific Slope Flycatcher
- Black Phoebe
- Say's Phoebe
- Ash-throated Flycatcher
- Cassin's Kingbird
- [2] Western Kingbird
- Horned Lark
- Tree Swallow
- Violet-green Swallow
- (4) N. Rough-winged Swallow
- (80) (86) 6 Cliff Swallow
- Barn Swallow
- [2] Scrub Jay
- American Crow
- (10) 8 2 2 2 Common Raven
- (1) Plain Titmouse
- Bushtit
- (3) [2] 1 Bewick's Wren
- House Wren
- Ruby-crowned Kinglet

- **California Gnatcatcher**
- Blue-gray Gnatcatcher
- Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- American Robin
- Wrentit
- Northern Mockingbird
- California Thrasher
- American Pipit
- Cedar Waxwing
- Phainopepla
- Loggerhead Shrike
- (2) 11 European Starling
- **Bell's Vireo**
- Solitary Vireo
- Warbling Vireo
- Orange-crowned Warbler
- (4) 11 111 Yellow Warbler
- Yellow-rumped Warbler
- (2) (3) 1 Common Yellowthroat
- [2] Wilson's Warbler
- Yellow-breasted Chat
- Western Tanager
- (2) 11 Black-headed Grosbeak
- (11) Blue Grosbeak
- Lazuli Bunting
- (1) Rufous-sided Towhee
- (6) 2 2 2 California Towhee
- Lark Sparrow
- Savannah Sparrow
- (16) [4] 4 4 4 Song Sparrow
- Lincoln's Sparrow
- White-crowned Sparrow
- (12) [8] 4 Red-winged Blackbird
- Western Meadowlark
- Brewer's Blackbird
- (3) [2] 1 Brown-headed Cowbird
- Hooded Oriole
- Northern Oriole
- (2) House Finch
- Pine Siskin
- (2) Lesser Goldfinch
- Lawrence's Goldfinch
- American Goldfinch
- House Sparrow

red = Total in study

[ ] = LAST 1000 FT.

NEST EGGS

STARTING SCALE ON N MC.

1 UNDER CONSTRUCTION

(3 COWB TRAPS

-1 OWLET

1

1,000' North of McBean

BIRDS OF Santa Clara River System

Locality Bonquet to McBean **Date** 5/29/99 **Time** _____

- _____ Great Blue Heron
- 1 Green Heron
- _____ Mallard
- _____ Turkey Vulture
- _____ White-tailed Kite
- _____ Sharp-shinned Hawk
- _____ Cooper's Hawk
- _____ Red-shouldered Hawk
- _____ Red-tailed Hawk
- _____ American Kestrel
- 19 | 42 | 2 | 8 California Quail
- _____ American Coot
- 9 | 22 | 8 | III Killdeer
- _____ Spotted Sandpiper
- _____ Least Sandpiper
- _____ Common Snipe
- _____ Rock Dove
- 38 | 22 | 6 | 6 | 2 Mourning Dove
- _____ Greater Roadrunner
- _____ Barn Owl
- _____ Great Horned Owl
- _____ White-throated Swift
- 17 _____ Black-ch. Hummingbird
- 1 | | III Anna's Hummingbird
- 1 Costa's Hummingbird
- _____ Belted Kingfisher
- _____ Acorn Woodpecker
- 2 | 2 | II Nuttall's Woodpecker
- _____ Downy Woodpecker
- _____ Hairy Woodpecker
- _____ Northern Flicker
- 7 | III Western Wood-Pewee
- _____ **Willow Flycatcher**
- _____ Pacific Slope Flycatcher
- 3 | III Black Phoebe
- _____ Say's Phoebe
- 1 | 22 | III Ash-throated Flycatcher
- _____ Cassin's Kingbird
- _____ Western Kingbird
- 1 Horned Lark
- _____ Tree Swallow
- _____ Violet-green Swallow
- 106 | 1 N. Rough-winged Swallow
- 100 | 6 Cliff Swallow
- 1 Barn Swallow
- 10 | 12 | III | 3 | II Scrub Jay
- _____ American Crow
- 125, 863 Common Raven
- _____ Plain Titmouse
- 2 Bushtit
- 12 | 12 | 16 | 2 | 2 Bewick's Wren
- 4 | 6 | II House Wren
- _____ Ruby-crowned Kinglet

- _____ **California Gnatcatcher**
- _____ Blue-gray Gnatcatcher
- 2 Western Bluebird
- 1 Swainson's Thrush
- _____ Hermit Thrush
- _____ American Robin
- _____ Wrentit
- _____ Northern Mockingbird
- 2 | II California Thrasher
- _____ American Pipit
- _____ Cedar Waxwing
- _____ Phainopepla
- _____ Loggerhead Shrike
- 18 | 24 | 8 | 1 European Starling
- **Bell's Vireo**
- _____ Solitary Vireo
- 4 | | | I Warbling Vireo
- _____ Orange-crowned Warbler
- 11 | 2 | III | 2 | 2 Yellow Warbler
- _____ Yellow-rumped Warbler
- 1 | II Common Yellowthroat
- 6 | I | III Wilson's Warbler
- 4 Yellow-breasted Chat
- 6 | 2 | 2 Western Tanager
- 6 | 2 | II | 2 Black-headed Grosbeak
- 2 Blue Grosbeak
- _____ Lazuli Bunting
- 7 | 2 | III Rufous-sided Towhee
- 10 | 2 | II | 2 | II | 22 California Towhee
- _____ Lark Sparrow
- _____ Savannah Sparrow
- 2 | 22 | II | 24 | 26 Song Sparrow
- _____ Lincoln's Sparrow
- _____ White-crowned Sparrow
- 36, 30 _____ 24 Red-winged Blackbird
- _____ Western Meadowlark
- _____ Brewer's Blackbird
- 6 | 4 | I Brown-headed Cowbird
- 3 Hooded Oriole
- 2 Northern Oriole 2 more ♂s singing
- 14 | 32 | 4 | I House Finch
- _____ Pine Siskin
- 2 Lesser Goldfinch
- _____ Lawrence's Goldfinch
- _____ American Goldfinch
- _____ House Sparrow
- under McBean 1 | 2 | II Barn owl w/ young under side bridge
- 1 ? Bishop?
- 9 | 5, 6 tri colored BB ♂s

_____

_____

_____

_____

BIRDS OF Santa Clara River System

Locality Bouquet to McBean **Date** 6/9/99 **Time** _____

_____ Great Blue Heron
_____ Green Heron
_____ Mallard
_____ Turkey Vulture
_____ White-tailed Kite
_____ Sharp-shinned Hawk
_____ Cooper's Hawk
_____ Red-shouldered Hawk
| Red-tailed Hawk
_____ American Kestrel
[2] 232 California Quail
_____ American Coot
_____ Killdeer
_____ Spotted Sandpiper
_____ Least Sandpiper
_____ Common Snipe
_____ Rock Dove
[41] 22 Mourning Dove
_____ Greater Roadrunner
_____ Barn Owl
_____ Great Horned Owl
_____ White-throated Swift
| Black-ch. Hummingbird
|| Anna's Hummingbird
| Costa's Hummingbird
_____ Belted Kingfisher
_____ Acorn Woodpecker
[2] || Nuttall's Woodpecker
2 Downy Woodpecker
_____ Hairy Woodpecker
_____ Northern Flicker
_____ Western Wood-Pewee
_____ **Willow Flycatcher**
_____ Pacific Slope Flycatcher
|| Black Phoebe
_____ Say's Phoebe
| Ash-throated Flycatcher
_____ Cassin's Kingbird
_____ Western Kingbird
_____ Horned Lark
_____ Tree Swallow
_____ Violet-green Swallow
| N. Rough-winged Swallow
Slightly over mtn McB 46 Cliff Swallow
_____ Barn Swallow
[2] || Scrub Jay
_____ American Crow
[4] 3 Common Raven
[2] _____ Plain Titmouse
4 _____ Bushtit
6 || Bewick's Wren
| House Wren
_____ Ruby-crowned Kinglet

_____ **California Gnatcatcher**
_____ Blue-gray Gnatcatcher
2 Western Bluebird
_____ Swainson's Thrush
_____ Hermit Thrush
_____ American Robin
| Wrentit
_____ Northern Mockingbird
2| California Thrasher
_____ American Pipit
_____ Cedar Waxwing
_____ Phainopepla
_____ Loggerhead Shrike
2 European Starling
_____ **Bell's Vireo**
_____ Solitary Vireo
_____ Warbling Vireo
_____ Orange-crowned Warbler
| Yellow Warbler
_____ Yellow-rumped Warbler
[43] Ca Common Yellowthroat
_____ Wilson's Warbler
_____ Yellow-breasted Chat
_____ Western Tanager
[2] _____ Black-headed Grosbeak
_____ Blue Grosbeak
_____ Lazuli Bunting
[3] | 2 Rufous-sided Towhee
[24] ||| 24 California Towhee
_____ Lark Sparrow
_____ Savannah Sparrow
[80] || 14 Song Sparrow
_____ Lincoln's Sparrow
_____ White-crowned Sparrow
[68] 46 Red-winged Blackbird
_____ Western Meadowlark
20 _____ Brewer's Blackbird
[2] 1 || Brown-headed Cowbird
_____ Hooded Oriole
[2] _____ Northern Oriole
[1] | 2 House Finch
_____ Pine Siskin
[4] 27 Lesser Goldfinch
_____ Lawrence's Goldfinch
_____ American Goldfinch
_____ House Sparrow
| Barn Owl (McBean Bridge)
_____
_____
_____
_____
_____

BIRDS OF Santa Clara River System

Locality Bonquet to McBean **Date** 6/22/99 **Time** Tues.

- Great Blue Heron
- Green Heron
- (1) Mallard
- (1) Turkey Vulture
- White-tailed Kite
- Sharp-shinned Hawk
- Cooper's Hawk
- Red-shouldered Hawk
- (2) II Red-tailed Hawk
- American Kestrel
- (6) (2) 4 California Quail
- American Coot
- (3) 2 Killdeer
- Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- Rock Dove
- (25) (6) 8 8 12 Mourning Dove
- Greater Roadrunner
- Barn Owl
- Great Horned Owl
- White-throated Swift
- Black-ch. Hummingbird
- (3) (1) II Anna's Hummingbird
- Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- Nuttall's Woodpecker
- Downy Woodpecker
- Hairy Woodpecker
- Northern Flicker
- Western Wood-Pewee
- **Willow Flycatcher**
- Pacific Slope Flycatcher
- (5) (1) IIII Black Phoebe
- (1) Say's Phoebe
- Ash-throated Flycatcher
- Cassin's Kingbird
- Western Kingbird
- (40) Horned Lark
- Tree Swallow
- Violet-green Swallow
- (17) (2) 8, 4, 3 N. Rough-winged Swallow
- (33) (15) 8, 6, 2 Cliff Swallow
- (2) Barn Swallow
- (6) (3) III Scrub Jay
- 8 American Crow
- (2) 8, 8, 6 Common Raven
- Plain Titmouse
- Bushtit
- (6) (2) 2 1 Bewick's Wren
- House Wren
- Ruby-crowned Kinglet

- **California Gnatcatcher**
- Blue-gray Gnatcatcher
- [1] (1) Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- American Robin
- (2) Wrentit
- Northern Mockingbird
- [1] (2) California Thrasher
- American Pipit
- Cedar Waxwing
- Phainopepla
- Loggerhead Shrike
- (8) 6 2 European Starling
- **Bell's Vireo**
- Solitary Vireo
- Warbling Vireo
- Orange-crowned Warbler
- Yellow Warbler
- Yellow-rumped Warbler
- [32] (17) 7 125 Common Yellowthroat
- Wilson's Warbler
- Yellow-breasted Chat
- Western Tanager
- Black-headed Grosbeak
- Blue Grosbeak
- (2) Lazuli Bunting
- [1] (7) 2 2 II Rufous-sided Towhee
- (17) [3] 6 2 California Towhee
- Lark Sparrow
- Savannah Sparrow
- [4, 6] (31) 2 1 4 6 8 Song Sparrow
- Lincoln's Sparrow
- White-crowned Sparrow
- [8, 50] [1, 80] 14 Red-winged Blackbird
- Western Meadowlark
- Brewer's Blackbird
- [4] (10) 4 2 Brown-headed Cowbird
- Hooded Oriole
- Northern Oriole
- (89) 8 [1, 10, 20, 21] House Finch
- Pine Siskin
- [2] 4, 20, 8, 8, Lesser Goldfinch
- (42) Lawrence's Goldfinch
- American Goldfinch
- House Sparrow
- (5) TRI COLORED BB (males)
- [1] Barn Owl

BIRDS OF Santa Clara River System

Locality Bouquet to McBean Date July 6/99 Time _____

_____ Great Blue Heron
_____ Green Heron
_____ Mallard
_____ Turkey Vulture
_____ White-tailed Kite
_____ Sharp-shinned Hawk
_____ Cooper's Hawk
(1) | I Red-shouldered Hawk
(2) | II Red-tailed Hawk
_____ American Kestrel
(4) [20] 20, 86 California Quail
_____ American Coot
(2) | II Killdeer
_____ Spotted Sandpiper
_____ Least Sandpiper
_____ Common Snipe
(9) Rock Dove
(6) [2] II2 Mourning Dove
_____ Greater Roadrunner
_____ Barn Owl
_____ Great Horned Owl
_____ White-throated Swift
(5) _____ Black-ch. Hummingbird
_____ Anna's Hummingbird
_____ Costa's Hummingbird
_____ Belted Kingfisher
(3) _____ Acorn Woodpecker
III Nuttall's Woodpecker
(5) III III Downy Woodpecker
_____ Hairy Woodpecker
(1) [1] _____ Northern Flicker
_____ Western Wood-Pewee
Willow Flycatcher
_____ Pacific Slope Flycatcher
_____ Black Phoebe
_____ Say's Phoebe
_____ Ash-throated Flycatcher
_____ Cassin's Kingbird
_____ Western Kingbird
_____ Horned Lark
_____ Tree Swallow
_____ Violet-green Swallow
_____ N. Rough-winged Swallow
(200) [200] _____ Cliff Swallow nesting under McBean
(2) [2] _____ Barn Swallow
(4) [2] II Scrub Jay
_____ American Crow
(24) [2], 14, 8 Common Raven
(1) Plain Titmouse
(14) [12] _____, 12, Bushtit
(6) [3] _____, 2 Bewick's Wren
_____ House Wren
_____ Ruby-crowned Kinglet

California Gnatcatcher
_____ Blue-gray Gnatcatcher
_____ Western Bluebird
_____ Swainson's Thrush
_____ Hermit Thrush
_____ American Robin
_____ Wrentit
_____ Northern Mockingbird
(6) [3] III California Thrasher
_____ American Pipit
_____ Cedar Waxwing
(1) [1] _____ Phainopepla
_____ Loggerhead Shrike
_____ European Starling
Bell's Vireo
_____ Solitary Vireo
_____ Warbling Vireo
_____ Orange-crowned Warbler
_____ Yellow Warbler
_____ Yellow-rumped Warbler
(18) [IIII] 4 Common Yellowthroat
_____ Wilson's Warbler
_____ Yellow-breasted Chat
_____ Western Tanager
_____ Black-headed Grosbeak
_____ Blue Grosbeak
_____ Lazuli Bunting
_____ Rufous-sided Towhee
(6) [2] 112 California Towhee
_____ Lark Sparrow
_____ Savannah Sparrow
(18) [6] 4 16 Song Sparrow
_____ Lincoln's Sparrow
(188) _____ White-crowned Sparrow
[8], 60, 40, 80, Red-winged Blackbird
_____ Western Meadowlark
(2) _____ Brewer's Blackbird
(25), 20, 1, 4 Brown-headed Cowbird
_____ Hooded Oriole
_____ Northern Oriole
(14) [8] _____ 6 House Finch
_____ Pine Siskin
(8) [4] _____ 112 Lesser Goldfinch
_____ Lawrence's Goldfinch
_____ American Goldfinch
_____ House Sparrow
(2) [2] Barn Owl under McBean (1 is fledged fuzzy young)
_____
_____
_____
_____
_____
_____

BIRDS OF Santa Clara River System

Locality BOG VET → McBean Date 7/10 TUGS Time 545–630

- Great Blue Heron
- Green Heron
- Mallard
- Turkey Vulture
- White-tailed Kite
- Sharp-shinned Hawk
- Cooper's Hawk
- Red-shouldered Hawk
- (1) Red-tailed Hawk
- American Kestrel
- [4] (4) California Quail
- American Coot
- (6) 22 Killdeer
- Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- Rock Dove
- [4] (14) 42 Mourning Dove
- Greater Roadrunner
- (2) (2) Barn Owl (DOWN)
- Great Horned Owl
- White-throated Swift
- Black-ch. Hummingbird
- (2) 2 Anna's Hummingbird
- Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- (1) (4) III Nuttall's Woodpecker
- Downy Woodpecker
- Hairy Woodpecker
- Northern Flicker
- Western Wood-Pewee
- **Willow Flycatcher**
- Pacific Slope Flycatcher
- (4) IIII Black Phoebe
- Say's Phoebe
- (1) Ash-throated Flycatcher
- Cassin's Kingbird
- Western Kingbird
- Horned Lark
- Tree Swallow
- (4) Violet-green Swallow
- N. Rough-winged Swallow
- 100 W Swlw (120) 40 Cliff Swallow
- (6) Barn Swallow
- (4) III Scrub Jay
- (2) American Crow
- (4) 2 II Common Raven
- Plain Titmouse
- Bushtit
- [11] (2) (1) Bewick's Wren
- House Wren
- Ruby-crowned Kinglet
- **California Gnatcatcher**
- Blue-gray Gnatcatcher
- Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- (1) American Robin
- Wrentit
- Northern Mockingbird
- California Thrasher
- American Pipit
- Cedar Waxwing
- Phainopepla
- Loggerhead Shrike
- European Starling
- **Bell's Vireo**
- Solitary Vireo
- Warbling Vireo
- Orange-crowned Warbler
- Yellow Warbler
- (1) Yellow-rumped Warbler
- Common Yellowthroat
- Wilson's Warbler
- Yellow-breasted Chat
- Western Tanager
- Black-headed Grosbeak
- (2) II Blue Grosbeak
- Lazuli Bunting
- Rufous-sided Towhee
- (5) 221 California Towhee
- Lark Sparrow
- Savannah Sparrow
- [11] (4) II Song Sparrow
- Lincoln's Sparrow
- White-crowned Sparrow
- (20) (24) 4 Red-winged Blackbird
- Western Meadowlark
- Brewer's Blackbird
- Brown-headed Cowbird
- Hooded Oriole
- Northern Oriole
- (4) 22 House Finch
- Pine Siskin
- (2) Lesser Goldfinch
- Lawrence's Goldfinch
- [2] American Goldfinch
- House Sparrow

NO NOISEMAKERS

Nuttall's, Nuttall's, Nuttall's

Cactus Wren 1998 Sand

Lots of ORV

1999 Upper River AREA 4

BIRDS OF Santa Clara River System

Locality Upper R 2 MI up bs Blood Rd **Date** 6-7 **Time** 545-730 PM

- ____ Great Blue Heron
- ____ Green Heron
- ____ Mallard
- ____ Turkey Vulture
- 1 White-tailed Kite ON FT
- ____ Sharp-shinned Hawk
- ____ Cooper's Hawk
- ____ Red-shouldered Hawk
- 4 Red-tailed Hawk
- ____ American Kestrel
- 44 222 California Quail
- ____ American Coot
- 22 Killdeer
- ____ Spotted Sandpiper
- ____ Least Sandpiper
- ____ Common Snipe
- ____ Rock Dove
- 44 222 Mourning Dove
- 1 Greater Roadrunner
- ____ Barn Owl
- ____ Great Horned Owl
- ____ White-throated Swift
- ____ Black-ch. Hummingbird
- 1 Anna's Hummingbird
- ____ Costa's Hummingbird
- ____ Belted Kingfisher
- ____ Acorn Woodpecker
- 1 Nuttall's Woodpecker
- ____ Downy Woodpecker
- ____ Hairy Woodpecker
- 11 Northern Flicker
- ____ Western Wood-Pewee
- ____ **Willow Flycatcher**
- ____ Pacific Slope Flycatcher
- 1 Black Phoebe
- 1 Say's Phoebe
- 111 Ash-throated Flycatcher
- ____ Cassin's Kingbird
- 2 Western Kingbird
- ____ Horned Lark
- ____ Tree Swallow
- ____ Violet-green Swallow
- ____ N. Rough-winged Swallow
- ____ Cliff Swallow
- ____ Barn Swallow
- 12 2222112 Scrub Jay
- 2 American Crow
- 10 621 Common Raven
- 2 Plain Titmouse
- 842 Bushtit
- 4 HH HH HH 111 Bewick's Wren
- 2 House Wren
- ____ Ruby-crowned Kinglet
- ____ **California Gnatcatcher**
- ____ Blue-gray Gnatcatcher
- ____ Western Bluebird
- ____ Swainson's Thrush
- ____ Hermit Thrush
- ____ American Robin
- 1 HH Wrentit
- HH Northern Mockingbird
- 111 California Thrasher
- ____ American Pipit
- ____ Cedar Waxwing
- 3 HH Phainopepla
- ____ Loggerhead Shrike
- 2 European Starling
- ____ **Bell's Vireo**
- ____ Solitary Vireo
- ____ Warbling Vireo
- ____ Orange-crowned Warbler
- ____ Yellow Warbler
- ____ Yellow-rumped Warbler
- 1 Common Yellowthroat
- ____ Wilson's Warbler
- ____ Yellow-breasted Chat
- 1 Western Tanager
- 11 Black-headed Grosbeak
- 11 Blue Grosbeak
- ____ Lazuli Bunting
- 2 HH HH Rufous-sided Towhee
- 44 22 44 California Towhee
- ____ Lark Sparrow
- ____ Savannah Sparrow
- 9 44 HH Song Sparrow
- ____ Lincoln's Sparrow
- ____ White-crowned Sparrow
- 30 Red-winged Blackbird
- ____ Western Meadowlark
- ____ Brewer's Blackbird
- 22 Brown-headed Cowbird
- ____ Hooded Oriole
- 2 Northern Oriole
- 4 944 House Finch
- ____ Pine Siskin
- 4 2 2 Lesser Goldfinch
- ____ Lawrence's Goldfinch
- ____ American Goldfinch
- ____ House Sparrow

water 4 mi above Bridge

BIRDS OF Santa Clara River System

Locality Upper R- Date 6-15 Time 530-733

Great Blue Heron
Green Heron
Mallard
Turkey Vulture
||2 White-tailed Kite
Sharp-shinned Hawk
Cooper's Hawk
| Red-shouldered Hawk
||| Red-tailed Hawk
American Kestrel
642342 California Quail
American Coot
|2 Killdeer
Spotted Sandpiper
Least Sandpiper
Common Snipe
Rock Dove
442222 Mourning Dove
Greater Roadrunner
Barn Owl
Great Horned Owl
White-throated Swift
Black-ch. Hummingbird
Anna's Hummingbird
Costa's Hummingbird
Belted Kingfisher
Acorn Woodpecker
𝍸 Nuttall's Woodpecker
Downy Woodpecker
Hairy Woodpecker
| Northern Flicker
Western Wood-Pewee
Willow Flycatcher
Pacific Slope Flycatcher
| Black Phoebe
Say's Phoebe
||| Ash-throated Flycatcher
Cassin's Kingbird
Western Kingbird
Horned Lark
Tree Swallow
Violet-green Swallow
| N. Rough-winged Swallow
Cliff Swallow
Barn Swallow
||2|||22 Scrub Jay
2 American Crow
42222 Common Raven
| Plain Titmouse
Bushtit
𝍸 𝍸 𝍸 | Bewick's Wren
| House Wren
Ruby-crowned Kinglet

California Gnatcatcher
Blue-gray Gnatcatcher
Western Bluebird
Swainson's Thrush
Hermit Thrush
American Robin
|| Wrentit
|||| Northern Mockingbird
| California Thrasher
American Pipit
Cedar Waxwing
222 Phainopepla
Loggerhead Shrike
4 1 European Starling
Bell's Vireo
Solitary Vireo
Warbling Vireo
Orange-crowned Warbler
Yellow Warbler
Yellow-rumped Warbler
𝍸 Common Yellowthroat
Wilson's Warbler
Yellow-breasted Chat
Western Tanager
Black-headed Grosbeak
||| Blue Grosbeak
Lazuli Bunting
| 𝍸 𝍸 𝍸 Rufous-sided Towhee
447 California Towhee
Lark Sparrow
Savannah Sparrow
24444|| Song Sparrow
Lincoln's Sparrow
White-crowned Sparrow
6642 Red-winged Blackbird
Western Meadowlark
Brewer's Blackbird
32 Brown-headed Cowbird
Hooded Oriole
2 Northern Oriole
44 House Finch
Pine Siskin
4 Lesser Goldfinch
Lawrence's Goldfinch
American Goldfinch
House Sparrow

Smoke (?) Hwy

N mls 2nd Pash.

No scow

Flw in midpts N mls - Fish.

1999 Upper River Count 5

JAS

BIRDS OF Santa Clara River System

Locality Castaic Creek **Date** 4/13/99 **Time** 7-10 AM

- Great Blue Heron
- Green Heron
- (4) Mallard
- Turkey Vulture
- (2) White-tailed Kite
- Sharp-shinned Hawk
- Cooper's Hawk
- (1) Red-shouldered Hawk
- (1) Red-tailed Hawk
- (3) 1 2 American Kestrel
- (18)(16) 7 2 3 2 1 2 California Quail
- American Coot
- (10) 2 1 2 1 2 2 Killdeer
- Spotted Sandpiper
- Least Sandpiper
- (1) Common Snipe
- (10) 4 6 Rock Dove
- (17) 2 6 5 4 Mourning Dove
- Greater Roadrunner
- (1) Barn Owl
- Great Horned Owl
- White-throated Swift
- (1) Black-ch. Hummingbird
- (6) 1 1 1 1 Anna's Hummingbird
- Costa's Hummingbird
- (1) Belted Kingfisher
- Acorn Woodpecker
- (2) 1 1 Nuttall's Woodpecker
- (2) 1 1 Downy Woodpecker
- Hairy Woodpecker
- (3) 1 2 Northern Flicker
- Western Wood-Pewee
- **Willow Flycatcher**
- Pacific Slope Flycatcher
- (3) 1 1 1 Black Phoebe
- Say's Phoebe
- (2) 1 1 Ash-throated Flycatcher
- Cassin's Kingbird
- Western Kingbird
- Horned Lark
- Tree Swallow
- Violet-green Swallow
- (9) N. Rough-winged Swallow
- (30) 100 nests under bridge, 20 Cliff Swallow
- Barn Swallow
- (13) 6 2 2 2 Scrub Jay
- (2) 2 American Crow
- (3) 6 2 4 Common Raven
- (3) 2 1 Plain Titmouse
- (22) 4 2 4 2 2 4 2 2 Bushtit
- 2 2 9 5 4 1 2 Bewick's Wren
- (2) House Wren
- (8) 2 2 Ruby-crowned Kinglet
- **California Gnatcatcher**
- Blue-gray Gnatcatcher
- Western Bluebird
- (8) Swainson's Thrush
- (3) Hermit Thrush
- (6) American Robin
- (12) 2 2 Wrentit
- Northern Mockingbird
- (1) California Thrasher
- American Pipit
- Cedar Waxwing
- Phainopepla
- Loggerhead Shrike
- (8) 4 2 2 European Starling
- **Bell's Vireo**
- Solitary Vireo
- Warbling Vireo
- (7) (9) 1 2 Orange-crowned Warbler
- (1) Yellow Warbler
- (95) 20, 20, 12, 4 6 8 Yellow-rumped Warbler
- (28) 4, 10 11, 2 Common Yellowthroat
- (2) 1 1 Wilson's Warbler
- Yellow-breasted Chat
- Western Tanager
- (2) 1 1 Black-headed Grosbeak
- Blue Grosbeak
- Lazuli Bunting
- (32) 4 6 6, 8 Rufous-sided Towhee
- (18) 4 2 4 1 1 California Towhee
- Lark Sparrow
- Savannah Sparrow
- (97) 8 4 8 8, 25, 9 1 4 2 6 Song Sparrow
- Lincoln's Sparrow
- (61) 8, 20, 13 White-crowned Sparrow
- (33) 8, 16, 6 3 Red-winged Blackbird
- Western Meadowlark
- Brewer's Blackbird
- (10) (2) 1 1 Brown-headed Cowbird
- (1) Hooded Oriole
- (2) 1 1 Northern Oriole
- (28) 8 4 4 2 House Finch
- Pine Siskin
- (18) 2 6 Lesser Goldfinch
- Lawrence's Goldfinch
- American Goldfinch
- House Sparrow
- (2) Tricolor BB overhead
- (3) black throat grey warb
- (1) blk crowned Nightheron
- (1) cinamon teal

Singles
Thursday

BIRDS OF Santa Clara River System

Locality Castaic Creek **Date** 4/22/99 **Time** _____

_____ Great Blue Heron
_____ Green Heron
(1) Mallard
_____ Turkey Vulture
_____ White-tailed Kite
_____ Sharp-shinned Hawk
(1) Cooper's Hawk
_____ Red-shouldered Hawk
(1) Red-tailed Hawk
_____ American Kestrel
(23) 8 4 8 | 2 California Quail
_____ American Coot
(12) 2 | 2 2 | 2 Killdeer
(1) Spotted Sandpiper
_____ Least Sandpiper
_____ Common Snipe
(20) 4 2 6 8 Rock Dove
(16) 2 4 2 | | 3 Mourning Dove
_____ Greater Roadrunner
_____ Barn Owl
_____ Great Horned Owl
_____ White-throated Swift
_____ Black-ch. Hummingbird
(10) | | 2 | | | Anna's Hummingbird
_____ Costa's Hummingbird
(1) Belted Kingfisher
_____ Acorn Woodpecker
(4) | | 2 Nuttall's Woodpecker
_____ Downy Woodpecker
_____ Hairy Woodpecker
(2) | | Northern Flicker
_____ Western Wood-Pewee
_____ **Willow Flycatcher**
_____ Pacific Slope Flycatcher
_____ Black Phoebe
_____ Say's Phoebe
_____ Ash-throated Flycatcher
_____ Cassin's Kingbird
_____ Western Kingbird
_____ Horned Lark
_____ Tree Swallow
_____ Violet-green Swallow
(20) 4 2 6 8 N. Rough-winged Swallow
bridge lot rain 4 Cliff Swallow
_____ Barn Swallow
(9) | | 2 | 2 2 Scrub Jay
(3) 2 | American Crow
(9) 4 | | 2 Common Raven
(1) Plain Titmouse
(7) 2 | 2 2 Bushtit
(36) 8 6 8 4 | 2 2 | Bewick's Wren
(23) 2 8 8 2 | 2 House Wren
_____ Ruby-crowned Kinglet

_____ **California Gnatcatcher**
_____ Blue-gray Gnatcatcher
_____ Western Bluebird
_____ Swainson's Thrush
_____ Hermit Thrush
(2) American Robin
(4) | | 2 Wrentit
_____ Northern Mockingbird
(8) | | | | | California Thrasher
_____ American Pipit
_____ Cedar Waxwing
_____ Phainopepla
_____ Loggerhead Shrike
(16) 2 6 | | | 2 European Starling
_____ **Bell's Vireo**
_____ Solitary Vireo
_____ Warbling Vireo
_____ Orange-crowned Warbler
(1) Yellow Warbler
_____ Yellow-rumped Warbler
(32) 2 6 8 8 4 | 2 Common Yellowthroat
(1) Wilson's Warbler
_____ Yellow-breasted Chat
_____ Western Tanager
(3) Black-headed Grosbeak
_____ Blue Grosbeak
_____ Lazuli Bunting
(2) | | Rufous-sided Towhee
(33) 2 8 8 4 2 2 California Towhee
_____ Lark Sparrow
_____ Savannah Sparrow
(53) 8, 20, 2 4 2 4 Song Sparrow
_____ Lincoln's Sparrow
(5) 4 | White-crowned Sparrow
(27) 8, 10, 36 Red-winged Blackbird
_____ Western Meadowlark
(2) Brewer's Blackbird
(40) 2 6 3, 31, 6 | | | Brown-headed Cowbird
(1) Hooded Oriole
(6) | | | Northern Oriole
(14) 8 2 4 House Finch
_____ Pine Siskin
(7) 2 2 2 | Lesser Goldfinch
_____ Lawrence's Goldfinch
_____ American Goldfinch
(2) House Sparrow

BIRDS OF Santa Clara River System

Locality Castaic Creek Date 5/12/99 Time 620 - 9AM

1	Great Blue Heron
	Green Heron
	Mallard
	Turkey Vulture
	White-tailed Kite
	Sharp-shinned Hawk
	Cooper's Hawk
	Red-shouldered Hawk
	Red-tailed Hawk
	American Kestrel
24	4682 California Quail
	American Coot
12	12 Killdeer
1	Spotted Sandpiper
	Least Sandpiper
	Common Snipe
17	6 Rock Dove
25	685 Mourning Dove
	Greater Roadrunner
	Barn Owl
	Great Horned Owl
	White-throated Swift
1	Black-ch. Hummingbird
8	111 Anna's Hummingbird
	Costa's Hummingbird
	Belted Kingfisher
	Acorn Woodpecker
6	111 Nuttall's Woodpecker
2	Downy Woodpecker
	Hairy Woodpecker
1	Northern Flicker
	Western Wood-Pewee
	Willow Flycatcher
	Pacific Slope Flycatcher
2	Black Phoebe
	Say's Phoebe
7	1 111 Ash-throated Flycatcher
	Cassin's Kingbird
	Western Kingbird
	Horned Lark
	Tree Swallow
	Violet-green Swallow
25	4 N. Rough-winged Swallow
100	8 Cliff Swallow
	Barn Swallow
10	1221 Scrub Jay
3	12 American Crow
1	Common Raven
	Plain Titmouse
23	2 2 7 16 2 Bushtit
40	20,8 6 4 Bewick's Wren
6	41 House Wren
	Ruby-crowned Kinglet
	California Gnatcatcher
	Blue-gray Gnatcatcher
	Western Bluebird
	Swainson's Thrush
	Hermit Thrush
	American Robin
2	Wrentit
	Northern Mockingbird
7	11 111 California Thrasher
	American Pipit
	Cedar Waxwing
	Phainopepla
	Loggerhead Shrike
5	112 European Starling
	Bell's Vireo
	Solitary Vireo
	Warbling Vireo
2	11 Orange-crowned Warbler
11	121 111 Yellow Warbler
	Yellow-rumped Warbler
9	3 Common Yellowthroat
4	111 Wilson's Warbler
	Yellow-breasted Chat
4	13 Western Tanager
18	3 2 8 11 Black-headed Grosbeak
2	Blue Grosbeak
	Lazuli Bunting
22	2 111 111 62 Rufous-sided Towhee
33	8 8 4 8 4 California Towhee
	Lark Sparrow
	Savannah Sparrow
43	4 6 4 8 4 4 Song Sparrow
	Lincoln's Sparrow
	White-crowned Sparrow
20	30, Red-winged Blackbird
	Western Meadowlark
3	3 Brewer's Blackbird
8	125 Brown-headed Cowbird
	Hooded Oriole
7	1 111 Northern Oriole
8	2 House Finch
	Pine Siskin
2	Lesser Goldfinch
	Lawrence's Goldfinch
	American Goldfinch
	House Sparrow
2	11 Great Egret

BIRDS OF Santa Clara River System

Locality Castaic Date 5/25 Time 1630 -911-10

- Great Blue Heron
- Green Heron
- Mallard
- Turkey Vulture
- White-tailed Kite
- Sharp-shinned Hawk
- Cooper's Hawk
- (2) II Red-shouldered Hawk
- (3) II Red-tailed Hawk
- American Kestrel
- (20) II 2 4 2 II 2 California Quail
- American Coot
- (7) 2 2 Killdeer
- Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- (8) Rock Dove
- (22) 4 I 2 2 4 2 Mourning Dove
- Greater Roadrunner
- (1) Barn Owl
- Great Horned Owl
- White-throated Swift
- (2) II Black-ch. Hummingbird
- (10) II II II Anna's Hummingbird
- (1) Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- (6) 2 III Nuttall's Woodpecker
- (5) 2 II Downy Woodpecker
- (1) Hairy Woodpecker
- (1) Northern Flicker
- Western Wood-Pewee
- **Willow Flycatcher**
- Pacific Slope Flycatcher
- (3) II Black Phoebe
- Say's Phoebe
- (4) II Ash-throated Flycatcher
- Cassin's Kingbird
- Western Kingbird
- Horned Lark
- Tree Swallow
- Violet-green Swallow
- (20) (8) N. Rough-winged Swallow
- (100) 4 Cliff Swallow
- Barn Swallow
- (20) II 4 2 6 2 Scrub Jay
- (4) I American Crow
- (4) 2 2 Common Raven
- (3) 1 2 Plain Titmouse
- (18) 6 2 II 4 2 2 Bushtit
- (32) II 8 6 5 III Bewick's Wren
- (4) 2 1 House Wren
- Ruby-crowned Kinglet

- **California Gnatcatcher**
- Blue-gray Gnatcatcher
- Western Bluebird
- (2) Swainson's Thrush
- Hermit Thrush
- (1) American Robin
- (2) Wrentit
- Northern Mockingbird
- (2) II California Thrasher
- American Pipit
- Cedar Waxwing
- Phainopepla
- Loggerhead Shrike
- (20) 6 7 8 European Starling
- **Bell's Vireo**
- Solitary Vireo
- (2) II Warbling Vireo
- Orange-crowned Warbler
- (9) III Yellow Warbler
- Yellow-rumped Warbler
- (6) II 2 II Common Yellowthroat
- (1) Wilson's Warbler
- (1) Yellow-breasted Chat
- Western Tanager
- (9) II III Black-headed Grosbeak
- Blue Grosbeak
- Lazuli Bunting
- (16) 2 6 2 2 1 Rufous-sided Towhee
- (26) II 2 2 4 2 2 2 II California Towhee
- Lark Sparrow
- Savannah Sparrow
- (30) 4 6 + 2 2 I III Song Sparrow
- Lincoln's Sparrow
- White-crowned Sparrow
- (55) 30, 20, 1 Red-winged Blackbird
- Western Meadowlark
- (2) II Brewer's Blackbird
- (33) 4 2 4 III 3 4 Brown-headed Cowbird
- Hooded Oriole
- (1) Northern Oriole
- (10) 4 6 House Finch
- Pine Siskin
- (7) 1 2 2 Lesser Goldfinch
- Lawrence's Goldfinch
- American Goldfinch
- (2) 2 House Sparrow

1 Barn Owl

15 ~~5~~ 4-7 inch mottled fish
some in pictures

3 types Bagrid Tadpole
black, mottled brown & clear

low = small water flow
high = no water except small trickel of street runoff.

BIRDS OF Santa Clara River System

Locality Castaic **Date** 6/10/99 **Time** _____

_____ Great Blue Heron
_____ Green Heron
_____ Mallard
_____ Turkey Vulture
(1) White-tailed Kite
_____ Sharp-shinned Hawk
_____ Cooper's Hawk
_____ Red-shouldered Hawk
(2) II Red-tailed Hawk
_____ American Kestrel
(4) California Quail
_____ American Coot
(9) 117 Killdeer
_____ Spotted Sandpiper
_____ Least Sandpiper
_____ Common Snipe
_____ Rock Dove
(12) 2 2412 Mourning Dove
_____ Greater Roadrunner
_____ Barn Owl
_____ Great Horned Owl
_____ White-throated Swift
_____ Black-ch. Hummingbird
(2) II Anna's Hummingbird
(1) Costa's Hummingbird
_____ Belted Kingfisher
_____ Acorn Woodpecker
(4) 21 Nuttall's Woodpecker
(1) Downy Woodpecker
_____ Hairy Woodpecker
_____ Northern Flicker
_____ Western Wood-Pewee
_____ **Willow Flycatcher**
_____ Pacific Slope Flycatcher
(2) II Black Phoebe
_____ Say's Phoebe
(7) 2112 Ash-throated Flycatcher
_____ Cassin's Kingbird
(2) Western Kingbird
_____ Horned Lark
_____ Tree Swallow
(1) Violet-green Swallow
(34) ,34 N. Rough-winged Swallow
(128) 125, 3 Cliff Swallow Collecting new bridge — none left under Hwy
(2) 2 Barn Swallow
(2) (9) 11213 Scrub Jay
(9) 421 American Crow
_____ Common Raven
(7) 1222 Plain Titmouse
(32) 34698 Bushtit
(31) 42112 4612 Bewick's Wren
(5) House Wren
_____ Ruby-crowned Kinglet

_____ **California Gnatcatcher**
_____ Blue-gray Gnatcatcher
_____ Western Bluebird
_____ Swainson's Thrush
_____ Hermit Thrush
_____ American Robin
_____ Wrentit
_____ Northern Mockingbird
(4) 112 California Thrasher
_____ American Pipit
_____ Cedar Waxwing
(5) Phainopepla
_____ Loggerhead Shrike
(3) European Starling
_____ **Bell's Vireo**
_____ Solitary Vireo
_____ Warbling Vireo
_____ Orange-crowned Warbler
(9) 12122 Yellow Warbler
_____ Yellow-rumped Warbler
(9) 4121 Common Yellowthroat
_____ Wilson's Warbler
_____ Yellow-breasted Chat
_____ Western Tanager
(11) 11412 Black-headed Grosbeak
_____ Blue Grosbeak
_____ Lazuli Bunting
(22) 2414 3232 Rufous-sided Towhee
(18) 42142214 California Towhee
_____ Lark Sparrow
_____ Savannah Sparrow
11424264 2415 Song Sparrow
(36) _____ Lincoln's Sparrow
_____ White-crowned Sparrow
(15) Red-winged Blackbird
_____ Western Meadowlark
_____ Brewer's Blackbird
(8) 36 Brown-headed Cowbird
1 Hooded Oriole
(6) 1 1111 Northern Oriole
(4) House Finch
_____ Pine Siskin
(4) 2121 Lesser Goldfinch
_____ Lawrence's Goldfinch
_____ American Goldfinch
(2) House Sparrow
(2) Blk Crn Night Heron

Mother Coyote + 5 pups
no water – only deep holes with upto 7" fish –

BIRDS OF Santa Clara River System

Locality Santa Clarita Canyon Dr. **Date** 6/23/99 **Time** _____

- 1 Great Blue Heron
- 1 Green Heron acting very maternal
- _____ Mallard
- _____ Turkey Vulture
- _____ White-tailed Kite
- _____ Sharp-shinned Hawk
- _____ Cooper's Hawk
- 1 Red-shouldered Hawk
- _____ Red-tailed Hawk
- _____ American Kestrel
- 5, 8 4 6 8, 6 9 California Quail
- _____ American Coot
- 14 Killdeer
- 1 Spotted Sandpiper
- _____ Least Sandpiper
- _____ Common Snipe
- 46 Rock Dove
- 8 6 6 9 Mourning Dove
- _____ Greater Roadrunner
- _____ Barn Owl
- _____ Great Horned Owl
- _____ White-throated Swift
- _____ Black-ch. Hummingbird
- 1111 Anna's Hummingbird
- _____ Costa's Hummingbird
- _____ Belted Kingfisher
- _____ Acorn Woodpecker
- 7HH Nuttall's Woodpecker
- 111 Downy Woodpecker
- _____ Hairy Woodpecker
- _____ Northern Flicker
- _____ Western Wood-Pewee
- _____ **Willow Flycatcher**
- _____ Pacific Slope Flycatcher
- 14 Black Phoebe
- _____ Say's Phoebe
- 1122 Ash-throated Flycatcher
- 2 Cassin's Kingbird
- _____ Western Kingbird
- _____ Horned Lark
- _____ Tree Swallow
- _____ Violet-green Swallow
- 8 N. Rough-winged Swallow
- ,200, 6 Cliff Swallow
- _____ Barn Swallow
- 7HH3 Scrub Jay
- 23 American Crow
- 2 Common Raven
- _____ Plain Titmouse
- 1124 Bushtit
- 1116211 Bewick's Wren
- _____ House Wren
- _____ Ruby-crowned Kinglet
- _____ **California Gnatcatcher**
- _____ Blue-gray Gnatcatcher
- _____ Western Bluebird
- _____ Swainson's Thrush
- _____ Hermit Thrush
- _____ American Robin
- 2 Wrentit
- _____ Northern Mockingbird
- 21 California Thrasher
- _____ American Pipit
- _____ Cedar Waxwing
- 1 Phainopepla
- _____ Loggerhead Shrike
- 124 European Starling
- _____ **Bell's Vireo**
- _____ Solitary Vireo
- _____ Warbling Vireo
- _____ Orange-crowned Warbler
- 11 Yellow Warbler
- _____ Yellow-rumped Warbler
- 111 6 4 4 Common Yellowthroat
- _____ Wilson's Warbler
- _____ Yellow-breasted Chat
- _____ Western Tanager
- 1123 Black-headed Grosbeak
- _____ Blue Grosbeak
- _____ Lazuli Bunting
- 7 4 2 2 Rufous-sided Towhee
- 2 4 6 2 California Towhee
- _____ Lark Sparrow
- _____ Savannah Sparrow
- 16 4 2 4 4 8 2 Song Sparrow
- _____ Lincoln's Sparrow
- _____ White-crowned Sparrow
- 6 Red-winged Blackbird all gone from main mars
- 2 Western Meadowlark
- _____ Brewer's Blackbird
- 1114 Brown-headed Cowbird
- _____ Hooded Oriole
- 111 Northern Oriole
- 411 House Finch
- _____ Pine Siskin
- 2 Lesser Goldfinch
- _____ Lawrence's Goldfinch
- _____ American Goldfinch
- _____ House Sparrow
- 11 Night Heron – (in jury)

1 Coyote

BIRDS OF Santa Clara River System

Locality Castaic Date 7/7/99 Time 530-800

(2) || Great Blue Heron
(1) Green Heron
___ Mallard
___ Turkey Vulture
(2) || White-tailed Kite
___ Sharp-shinned Hawk
___ Cooper's Hawk
___ Red-shouldered Hawk
(3) ||| Red-tailed Hawk
(1) American Kestrel
(63) 11, 20, 2, 10, 20 California Quail
___ American Coot
(4) Killdeer
___ Spotted Sandpiper
___ Least Sandpiper
___ Common Snipe
(35) Rock Dove
(8) 4 || 2 Mourning Dove
___ Greater Roadrunner
___ Barn Owl
___ Great Horned Owl
___ White-throated Swift
(2) || Black-ch. Hummingbird
(15) |||| |||| || Anna's Hummingbird
___ Costa's Hummingbird
___ Belted Kingfisher
___ Acorn Woodpecker
(3) ||| Nuttall's Woodpecker
(1) Downy Woodpecker
___ Hairy Woodpecker
___ Northern Flicker
___ Western Wood-Pewee
___ **Willow Flycatcher**
___ Pacific Slope Flycatcher
(3) ||| Black Phoebe
___ Say's Phoebe
(4) |||| Ash-throated Flycatcher
___ Cassin's Kingbird
___ Western Kingbird
___ Horned Lark
___ Tree Swallow
___ Violet-green Swallow
(8) 6, 2 N. Rough-winged Swallow
(104) 20, 40, 40, 24 Cliff Swallow
___ Barn Swallow
(11) || 2 || 2 | 4 Scrub Jay
(16) 13, 3 American Crow
(14) 4 4 4 2 Common Raven
(1) Plain Titmouse
(50) 9, 8, 6, 9, 12 Bushtit
(10) ||| 2 |||| Bewick's Wren
___ House Wren
___ Ruby-crowned Kinglet
___ **California Gnatcatcher**
___ Blue-gray Gnatcatcher
(2) Western Bluebird
___ Swainson's Thrush
___ Hermit Thrush
___ American Robin
(2) Wrentit
(1) Northern Mockingbird
(1) California Thrasher
(1) American Pipit
___ Cedar Waxwing
(2) || Phainopepla
___ Loggerhead Shrike
___ European Starling
___ **Bell's Vireo**
___ Solitary Vireo
___ Warbling Vireo
___ Orange-crowned Warbler
(1) Yellow Warbler
___ Yellow-rumped Warbler
(5) |||| Common Yellowthroat
___ Wilson's Warbler
(1) Yellow-breasted Chat
___ Western Tanager
(7) || |||| Black-headed Grosbeak
___ Blue Grosbeak
___ Lazuli Bunting
(9) || |||| 2 Rufous-sided Towhee
(21) || 2 || |||| 2 |||| California Towhee
___ Lark Sparrow
___ Savannah Sparrow
(15) || |||| |||| Song Sparrow (still doing Robin wing)
___ Lincoln's Sparrow
___ White-crowned Sparrow
(17) 9, 8 Red-winged Blackbird all flyovers
___ Western Meadowlark
___ Brewer's Blackbird
(2) || Brown-headed Cowbird
___ Hooded Oriole
(2) || Northern Oriole
(12) | 2 6 | 2 House Finch
___ Pine Siskin
(1) Lesser Goldfinch
___ Lawrence's Goldfinch
___ American Goldfinch
___ House Sparrow
(1) BC Nightheron
(25) Glossy Ibis flyover

1999 Upper River Area 5

BIRDS OF Santa Clara River System

Locality San Francisquito **Date** THURS 5-27 **Time** ~~6:45~~ 7:10 –

- ______ Great Blue Heron
- ______ Green Heron
- ______ Mallard
- ______ Turkey Vulture
- ______ White-tailed Kite
- ______ Sharp-shinned Hawk
- ______ Cooper's Hawk
- ______ Red-shouldered Hawk
- (3) 2 1 Red-tailed Hawk
- ______ American Kestrel
- 4 4 2 2 6 6 California Quail
- ______ American Coot
- (4) 2 2 Killdeer
- ______ Spotted Sandpiper
- ______ Least Sandpiper
- ______ Common Snipe
- ______ Rock Dove
- 2 4 2 2 2 Mourning Dove
- (1) Greater Roadrunner
- (1) Barn Owl
- ______ Great Horned Owl
- ______ White-throated Swift
- ______ Black-ch. Hummingbird
- (1) Anna's Hummingbird
- (1) Costa's Hummingbird
- ______ Belted Kingfisher
- ______ Acorn Woodpecker
- (6) 𝍸 1 Nuttall's Woodpecker
- ______ Downy Woodpecker
- ______ Hairy Woodpecker
- ______ Northern Flicker
- ______ Western Wood-Pewee
- ______ **Willow Flycatcher**
- ______ Pacific Slope Flycatcher
- (4) 2 2 Black Phoebe
- (1) Say's Phoebe
- (2) 1 1 Ash-throated Flycatcher
- ______ Cassin's Kingbird
- (3) 2 1 Western Kingbird
- ______ Horned Lark
- ______ Tree Swallow
- ______ Violet-green Swallow
- ______ N. Rough-winged Swallow
- (8) 4 Cliff Swallow
- ______ Barn Swallow
- (8) 1 2 1 1 1 Scrub Jay
- 2 American Crow
- (1) 2 2 2 2 Common Raven ON
- ______ Plain Titmouse
- (2) Bushtit
- (12) 1 𝍸 𝍸 1 Bewick's Wren
- ______ House Wren
- ______ Ruby-crowned Kinglet

- ______ **California Gnatcatcher**
- ______ Blue-gray Gnatcatcher
- ______ Western Bluebird
- ______ Swainson's Thrush
- ______ Hermit Thrush
- ______ American Robin
- ______ Wrentit
- ______ Northern Mockingbird
- (1) California Thrasher
- ______ American Pipit
- ______ Cedar Waxwing
- (8) 2 4 2 Phainopepla
- ______ Loggerhead Shrike
- (5) 4 1 European Starling
- ______ **Bell's Vireo**
- ______ Solitary Vireo
- ______ Warbling Vireo
- ______ Orange-crowned Warbler
- (2) 1 1 Yellow Warbler
- ______ Yellow-rumped Warbler
- (2) 1 1 Common Yellowthroat
- ______ Wilson's Warbler
- (1) Yellow-breasted Chat
- ______ Western Tanager
- (11) 1 𝍸 𝍸 Black-headed Grosbeak
- (1) Blue Grosbeak
- ______ Lazuli Bunting
- (5) 𝍸 Rufous-sided Towhee
- (14) 2 4 2 2 2 California Towhee
- ______ Lark Sparrow
- ______ Savannah Sparrow
- (11) 1 1 𝍸 4 1 Song Sparrow
- ______ Lincoln's Sparrow
- ______ White-crowned Sparrow
- (3) Red-winged Blackbird
- ______ Western Meadowlark
- ______ Brewer's Blackbird
- (13) 2 2 2 2 1111 Brown-headed Cowbird
- ______ Hooded Oriole
- (7) 2 2 2 1 Northern Oriole
- (16) 4 6 6 House Finch
- ______ Pine Siskin
- (20) 4 4 4 4 2 2 Lesser Goldfinch
- ______ Lawrence's Goldfinch
- (1) American Goldfinch
- ______ House Sparrow

Noise rubber from SC → road

River dry

No Swallows NEW SF ~~Road~~ Rd Blue & Bolsa Birds

Red Sh Hawk: No Swallows

Coyote

BIRDS OF Santa Clara River System

Locality SAN CHECKOUT Date 6/7 Time 6:40 - 9 AM

- Great Blue Heron
- Green Heron
- Mallard
- Turkey Vulture
- White-tailed Kite
- Sharp-shinned Hawk
- Cooper's Hawk
- Red-shouldered Hawk
- (3) III Red-tailed Hawk
- American Kestrel
- LV 8 4 4 2 California Quail
- American Coot
- (28) (2) Killdeer
- Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- Rock Dove
- (10) 4 2 2 2 Mourning Dove
- Greater Roadrunner
- Barn Owl
- Great Horned Owl
- White-throated Swift
- Black-ch. Hummingbird
- (2) II Anna's Hummingbird
- Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- (8) 2 1 IIII Nuttall's Woodpecker
- Downy Woodpecker
- Hairy Woodpecker
- Northern Flicker
- Western Wood-Pewee
- **Willow Flycatcher**
- Pacific Slope Flycatcher
- (2) II Black Phoebe
- Say's Phoebe
- (3) III Ash-throated Flycatcher
- Cassin's Kingbird
- (2) Western Kingbird
- Horned Lark
- Tree Swallow
- Violet-green Swallow
- (2) N. Rough-winged Swallow
- (6) Cliff Swallow
- Barn Swallow
- (9) 1 2 2 II II Scrub Jay
- (4) 2 2 American Crow
- (6) 2 1 Common Raven
- (2) Plain Titmouse
- Bushtit
- (13) III - IIII Bewick's Wren
- (1) House Wren
- Ruby-crowned Kinglet
- **California Gnatcatcher**
- Blue-gray Gnatcatcher
- Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- American Robin
- Wrentit
- (1) Northern Mockingbird
- (1) California Thrasher
- American Pipit
- Cedar Waxwing
- (16) 4 4 2 2 Phainopepla
- Loggerhead Shrike
- (8) 4 2 2 European Starling
- **Bell's Vireo**
- Solitary Vireo
- Warbling Vireo
- Orange-crowned Warbler
- Yellow Warbler
- Yellow-rumped Warbler
- (5) IIII Common Yellowthroat
- Wilson's Warbler
- Yellow-breasted Chat
- Western Tanager
- (3) II Black-headed Grosbeak
- (5) IIII Blue Grosbeak
- Lazuli Bunting
- (12) II IIII Rufous-sided Towhee
- (10) 1 2 2 2 California Towhee
- Lark Sparrow
- Savannah Sparrow
- (6) 2 2 2 Song Sparrow
- Lincoln's Sparrow
- White-crowned Sparrow
- (2) Red-winged Blackbird
- Western Meadowlark
- Brewer's Blackbird
- (6) 2 II 2 2 Brown-headed Cowbird
- Hooded Oriole
- (8) 2 2 2 2 Northern Oriole
- (18) 4 4 4 2 House Finch
- Pine Siskin
- (10) 4 4 2 2 Lesser Goldfinch
- Lawrence's Goldfinch
- American Goldfinch
- House Sparrow

bd = NB new bird

1999 Upper Santa Ana River Area 7

Surgd

BIRDS OF Santa Clara River System

Locality South Fork Lower **Date** 5/22/99 **Time** _____

_____ Great Blue Heron
_____ Green Heron
_____ Mallard
_____ Turkey Vulture
_____ White-tailed Kite
_____ Sharp-shinned Hawk
_____ Cooper's Hawk
_____ Red-shouldered Hawk
1 Red-tailed Hawk
_____ American Kestrel
4) 22 California Quail
_____ American Coot
1 Killdeer
_____ Spotted Sandpiper
_____ Least Sandpiper
_____ Common Snipe
_____ Rock Dove
14) 6 8 2 6 2 Mourning Dove
_____ Greater Roadrunner
_____ Barn Owl
_____ Great Horned Owl
_____ White-throated Swift
_____ Black-ch. Hummingbird
2 Anna's Hummingbird
1 Costa's Hummingbird
_____ Belted Kingfisher
_____ Acorn Woodpecker
1 Nuttall's Woodpecker 1
_____ Downy Woodpecker
_____ Hairy Woodpecker
1 Northern Flicker
1 Western Wood-Pewee
_____ **Willow Flycatcher**
_____ Pacific Slope Flycatcher
_____ Black Phoebe
_____ Say's Phoebe
5) 1 2 Ash-throated Flycatcher
_____ Cassin's Kingbird
6) 2 2 7 Western Kingbird
_____ Horned Lark
_____ Tree Swallow
_____ Violet-green Swallow
5) 2 2 N. Rough-winged Swallow
4) 1 1 2 Cliff Swallow
1 Barn Swallow 2
2) 1 1 Scrub Jay 1
7) 4 4 American Crow
17) 10, 6 1 Common Raven
_____ Plain Titmouse
_____ Bushtit
12) 6 2 2 Bewick's Wren
_____ House Wren
_____ Ruby-crowned Kinglet

_____ **California Gnatcatcher**
_____ Blue-gray Gnatcatcher
1 Western Bluebird
_____ Swainson's Thrush
_____ Hermit Thrush
_____ American Robin
_____ Wrentit
2) 1 1 Northern Mockingbird
2) 1 1 California Thrasher
_____ American Pipit
_____ Cedar Waxwing
_____ Phainopepla
_____ Loggerhead Shrike
8) 6 2 European Starling
_____ **Bell's Vireo**
_____ Solitary Vireo
_____ Warbling Vireo
_____ Orange-crowned Warbler
2) 1 1 Yellow Warbler
_____ Yellow-rumped Warbler
_____ Common Yellowthroat 12
2) 1 1 Wilson's Warbler
_____ Yellow-breasted Chat
_____ Western Tanager
_____ Black-headed Grosbeak
_____ Blue Grosbeak
_____ Lazuli Bunting
1 Rufous-sided Towhee
10) 2 2 2 2 California Towhee
_____ Lark Sparrow
_____ Savannah Sparrow
9) 4 Song Sparrow 20
_____ Lincoln's Sparrow
_____ White-crowned Sparrow
_____ Red-winged Blackbird 30
_____ Western Meadowlark
_____ Brewer's Blackbird
2) 2 Brown-headed Cowbird
_____ Hooded Oriole
2) 1 1 Northern Oriole
17) 6 5 6 4 House Finch
_____ Pine Siskin
3) 1 2 Lesser Goldfinch
_____ Lawrence's Goldfinch
_____ American Goldfinch
_____ House Sparrow

BIRDS OF Santa Clara River Syster

Locality Lower South Fork to McBean Date 6/17/99 Time

- Great Blue Heron
- Green Heron
- Mallard
- Turkey Vulture
- White-tailed Kite
- Sharp-shinned Hawk
- Cooper's Hawk
- 1 Red-shouldered Hawk carrying food
- Red-tailed Hawk
- American Kestrel - family under bridge on Upper
- 32 California Quail
- American Coot
- Killdeer
- Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- Rock Dove
- 82 Mourning Dove
- Greater Roadrunner
- Barn Owl
- Great Horned Owl
- White-throated Swift
- 1 Black-ch. Hummingbird
- 12 Anna's Hummingbird
- Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- Nuttall's Woodpecker
- Downy Woodpecker
- 1 Hairy Woodpecker
- Northern Flicker
- Western Wood-Pewee
- **Willow Flycatcher**
- Pacific Slope Flycatcher
- 1 Black Phoebe
- Say's Phoebe
- 2 Ash-throated Flycatcher
- Cassin's Kingbird
- Western Kingbird
- Horned Lark
- Tree Swallow
- Violet-green Swallow
- 2 4 N. Rough-winged Swallow
- 10 8 Cliff Swallow 4 nests under bridge
- 2 Barn Swallow
- 11 Scrub Jay
- American Crow
- 5 3 Common Raven
- 14 Plain Titmouse
- 56 Bushtit
- 44 Bewick's Wren
- House Wren
- Ruby-crowned Kinglet
- California Gnatcatcher
- Blue-gray Gnatcatcher
- Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- American Robin
- 1 Wrentit
- 1 Northern Mockingbird
- 32 California Thrasher
- American Pipit
- Cedar Waxwing
- Phainopepla
- Loggerhead Shrike
- European Starling
- **Bell's Vireo**
- Solitary Vireo
- Warbling Vireo
- Orange-crowned Warbler
- 2 Yellow Warbler
- Yellow-rumped Warbler
- 4 Common Yellowthroat
- Wilson's Warbler
- Yellow-breasted Chat
- Western Tanager
- Black-headed Grosbeak
- Blue Grosbeak
- Lazuli Bunting
- 11 Rufous-sided Towhee
- 1212 California Towhee
- Lark Sparrow
- Savannah Sparrow
- 36 22 Song Sparrow
- Lincoln's Sparrow
- White-crowned Sparrow
- 60 Red-winged Blackbird
- Western Meadowlark
- 1 Brewer's Blackbird
- 1 3 Brown-headed Cowbird
- Hooded Oriole
- Northern Oriole
- 8 654 House Finch
- Pine Siskin
- 111 Lesser Goldfinch
- Lawrence's Goldfinch
- American Goldfinch
- 6 House Sparrow

1999 Upper River Count 8

Singh

THOMS

BIRDS OF Santa Clara River System

Locality South Fork Upper **Date** 5/27/99 **Time** _____

_____ Great Blue Heron
_____ Green Heron
_____ Mallard
_____ Turkey Vulture
_____ White-tailed Kite
_____ Sharp-shinned Hawk
_____ Cooper's Hawk
_____ Red-shouldered Hawk
(1) Red-tailed Hawk
_____ American Kestrel
(14) 2,2,4,2,2 California Quail
_____ American Coot
(4) |||| Killdeer
3 Spotted Sandpiper
_____ Least Sandpiper
_____ Common Snipe
_____ Rock Dove
(18) 2,2,1,2,2,2,4,1,2 Mourning Dove
_____ Greater Roadrunner
_____ Barn Owl
_____ Great Horned Owl
_____ White-throated Swift
(5) |||| Black-ch. Hummingbird
(7) ||||| Anna's Hummingbird
_____ Costa's Hummingbird
_____ Belted Kingfisher
_____ Acorn Woodpecker
(2) Nuttall's Woodpecker
_____ Downy Woodpecker
_____ Hairy Woodpecker
_____ Northern Flicker
_____ Western Wood-Pewee
_____ **Willow Flycatcher**
_____ Pacific Slope Flycatcher
(2) Black Phoebe
_____ Say's Phoebe
(4) 2,2 Ash-throated Flycatcher
_____ Cassin's Kingbird
(8) 2,2,2,2 Western Kingbird
_____ Horned Lark
_____ Tree Swallow
_____ Violet-green Swallow
(4) 2,1 N. Rough-winged Swallow
_____ Cliff Swallow
_____ Barn Swallow
(10) 2,1,1,3 Scrub Jay
(10) 3,4,2 American Crow
(5) 1,3 Common Raven
_____ Plain Titmouse
(23) 2,2,2,5,4,8 Bushtit
(18) 2,2,2,4,1,4 Bewick's Wren
_____ House Wren
_____ Ruby-crowned Kinglet

_____ **California Gnatcatcher**
_____ Blue-gray Gnatcatcher
_____ Western Bluebird
_____ Swainson's Thrush
_____ Hermit Thrush
_____ American Robin
_____ Wrentit
(2) || Northern Mockingbird
(2) || California Thrasher
_____ American Pipit
_____ Cedar Waxwing
(1) Phainopepla
_____ Loggerhead Shrike
(96) 8,6,4,8,10, European Starling
_____ **Bell's Vireo**
_____ Solitary Vireo
_____ Warbling Vireo
_____ Orange-crowned Warbler
(6) |||| Yellow Warbler
_____ Yellow-rumped Warbler
_____ Common Yellowthroat
(4) |||| Wilson's Warbler
_____ Yellow-breasted Chat
(7) ||||| Western Tanager
(1) Black-headed Grosbeak
(1) Blue Grosbeak
_____ Lazuli Bunting
(6) |||| Rufous-sided Towhee
(11) 2,1,2,2,2 California Towhee
_____ Lark Sparrow
_____ Savannah Sparrow
(13) 2,1,1,2,5,1 Song Sparrow
_____ Lincoln's Sparrow
_____ White-crowned Sparrow
(1) Red-winged Blackbird
_____ Western Meadowlark
(17) 8,2,1,6 Brewer's Blackbird
(3) 1,2 Brown-headed Cowbird
_____ Hooded Oriole
(7) ||,3,2 Northern Oriole
(41) 6,4,3,8,1,6,2,2,4,6 House Finch
_____ Pine Siskin
(13) 1,2,2,2,2,1 Lesser Goldfinch
_____ Lawrence's Goldfinch
_____ American Goldfinch
(18) 6,2,8 House Sparrow

BIRDS OF Santa Clara River System

Locality Upper South Fork Date 6/17/99 Time

- Great Blue Heron
- Green Heron
- Mallard
- Turkey Vulture
- White-tailed Kite
- Sharp-shinned Hawk
- Cooper's Hawk
- Red-shouldered Hawk
- Red-tailed Hawk
- family (III) American Kestrel
- 2 2 California Quail
- American Coot
- II Killdeer
- Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- 4 Rock Dove
- $5462232 Mourning Dove
- Greater Roadrunner
- Barn Owl
- Great Horned Owl
- White-throated Swift
- II Black-ch. Hummingbird
- IIII IIII Anna's Hummingbird
- Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- 12 Nuttall's Woodpecker
- I Downy Woodpecker
- Hairy Woodpecker
- Northern Flicker
- Western Wood-Pewee
- I **Willow Flycatcher**
- Pacific Slope Flycatcher
- Black Phoebe
- Say's Phoebe
- Ash-throated Flycatcher
- Cassin's Kingbird
- 226 Western Kingbird
- Horned Lark
- Tree Swallow
- Violet-green Swallow
- II N. Rough-winged Swallow
- I Cliff Swallow
- Barn Swallow
- III Scrub Jay
- American Crow
- 6 Common Raven
- Plain Titmouse
- 86 II 50 Bushtit
- 6 IIII Bewick's Wren
- House Wren
- Ruby-crowned Kinglet
- **California Gnatcatcher**
- Blue-gray Gnatcatcher
- Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- American Robin
- Wrentit
- 2 II Northern Mockingbird
- 3 III **California Thrasher**
- American Pipit
- Cedar Waxwing
- Phainopepla
- Loggerhead Shrike
- European Starling
- **Bell's Vireo**
- Solitary Vireo
- I Warbling Vireo
- Orange-crowned Warbler
- Yellow Warbler
- Yellow-rumped Warbler
- Common Yellowthroat
- Wilson's Warbler
- Yellow-breasted Chat
- Western Tanager
- Black-headed Grosbeak
- II Blue Grosbeak
- Lazuli Bunting
- I Rufous-sided Towhee
- 6 IIII **California Towhee**
- Lark Sparrow
- Savannah Sparrow
- 2 II Song Sparrow
- Lincoln's Sparrow
- White-crowned Sparrow
- Red-winged Blackbird
- Western Meadowlark
- 22 Brewer's Blackbird
- 23 Brown-headed Cowbird
- Hooded Oriole
- 14 I Northern Oriole
- 6,00, 42 II House Finch
- Pine Siskin
- 2 I Lesser Goldfinch
- Lawrence's Goldfinch
- American Goldfinch
- 62 House Sparrow

Guthrie, Daniel. ***Bird Surveys Along a Portion of the Santa Clara River and Its Tributaries Near Valencia, California.*** **July 1998.**

BIRD SURVEYS ALONG THE SANTA CLARA RIVER AND ITS TRIBUTARIES

NEAR VALENCIA, CALIFORNIA, 1998

Prepared for:

Mark Subbotin
Valencia Corporation
23823 Valencia Blvd.
Valencia, Ca. 91355

Prepared by:

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July 28, 1998

Bird Surveys along the Santa Clara River and its Tributaries near Valencia, California, 1998

Prepared by: Daniel A. Guthrie
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Nature and Scope of Surveys

During the spring and early summer of 1998 surveys were conducted along a section of the Santa Clara River and its tributaries in the vicinity of Valencia, California to determine presence or absence of Least Bell's Vireo and other Species of Concern. Numbers of all species observed were noted, and special attention was placed on locating species considered rare and endangered.

Each survey was conducted on foot by observers well acquainted with both visual and auditory patterns of southern California birds. All surveys occurred between 6 and 10 a.m. If no vireos were found during the first two surveys, calls of Least Bell's Vireo were played during subsequent censuses to elicit response from territorial males. Survey routes were designed to cover all areas of each section of the river, with emphasis placed on wetter habitats where Least Bell's Vireos and other sensitive riparian species are most likely to occur. Personnel for all surveys were Daniel A. Guthrie, Richard F. Clements, and Judith A. Sugden.

To facilitate surveys, the area was divided into eight sections (Figure 1). Delineation of the eight areas and comments on each follow. Surveys of the normally dry sections of the river system (Areas 4,6-8) and sections where Least Bell's Vireos have not been observed in the past (Area 3) were conducted twice during the nesting season. The second survey was delayed until June to insure that late arriving species such as Yellow-billed Cuckoo and Willow Flycatcher would not be missed. Surveys of the remaining sections of the Santa Clara River (Areas 1-3,5) were conducted according to the protocol outlined by the Fish and Wildlife Service (Appendix 1), and consisted of 8 surveys, two each in April, May, June and July. The first survey in July was restricted to areas where vireos had been seen in the past. Thus, while the species seen were noted, numbers of individuals were not recorded.

Habitat Condition and Bird Observations.

Due to El Nino, the winter of 1998 was very wet, with several heavy rains which caused severe flooding along most sections of the river. Except for Castaic Creek, where flooding was controlled by upstread dams, flooding removed all wet riparian vegetation along the river as well as many sections of large trees. Wet riparian vegetation was only beginning to appear during the July censuses.

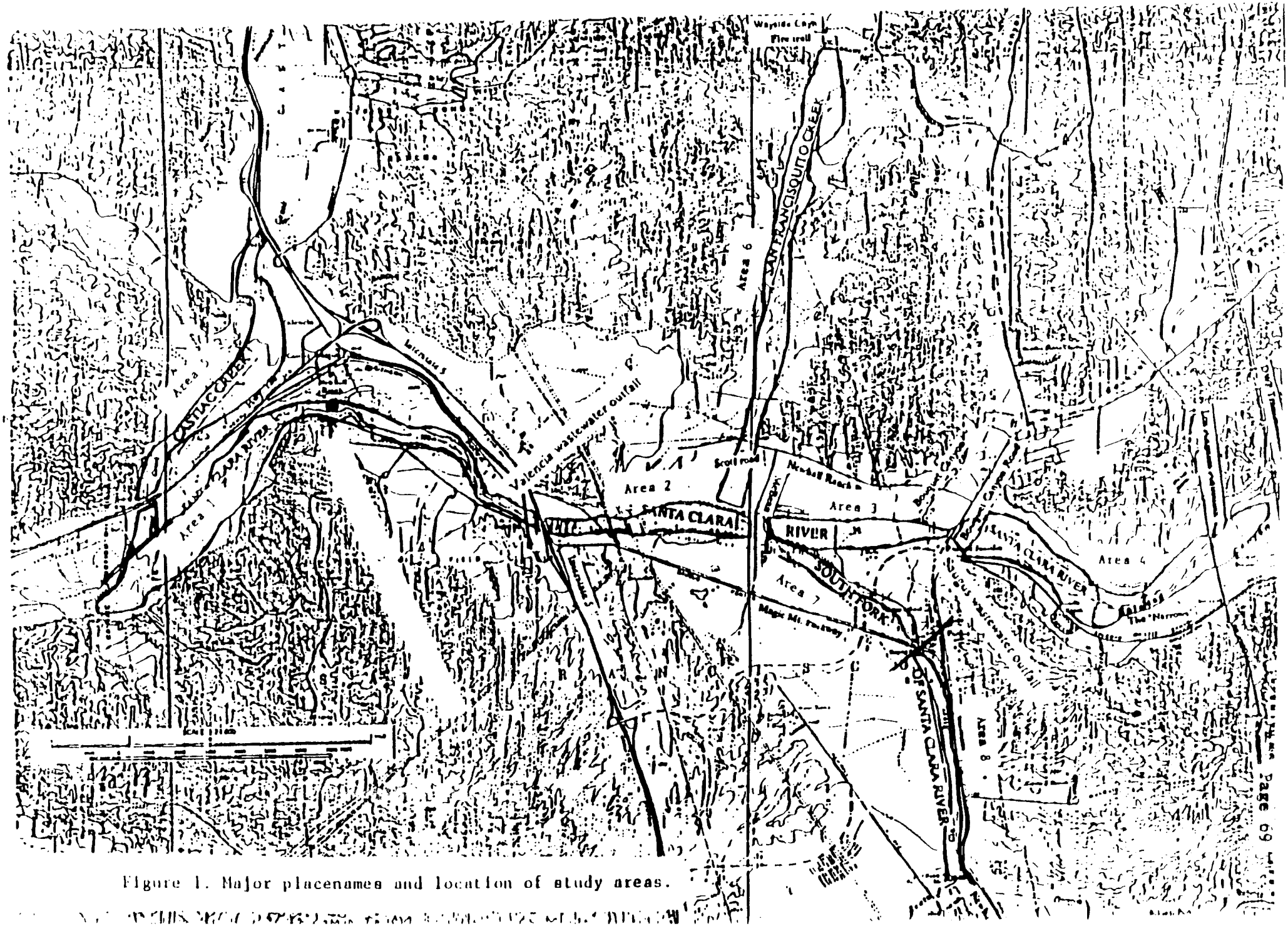


Figure 1. Major placenames and location of study areas.

Water continued to flow in all sections of the river throughout the census period.

Tables 1 through 8 present bird observations in each of the specific study areas for 1998. Different species breed at different times of the year. In general, species are most easily observed when they are actively defending territories by song during the establishment of breeding pairs. Once pairs are established and nesting begins song often decreases and the numbers of birds observed, therefore, also decreases. After young leave the nest, numbers observed increase. Thus, for most resident species, numbers of adult birds are most accurately censused in April and May, when territorial activity is at a maximum. A few species such as Anna's Hummingbird that nest early in the season may be underestimated. Numbers observed may decrease slightly in June and early July when birds are less active during nesting, and increase in late June and July when young birds leave the nest.

Several species that are not considered riparian species but are common in adjacent coastal sage and chaparral habitats come into the riparian zone in late summer when other vegetational areas are dry. The increase in numbers of Lazuli Bunting, Lark Sparrow, House Finch, Phainopepla and Mourning Dove in late July follow this trend.

The general effect of flooding in 1998 was to reduce the numbers of obligate wet riparian species. Thus red-winged blackbirds, which are usually found in cattail marshes, were fewer in number. Some species that nest on gravel bars, such as killdeer and spotted sandpiper were also reduced in numbers as their habitat was flooded in April and May during the nesting season. The lack of change in numbers of most other species between 1997 and 1998 indicates that they accomodated to flooding. For instance, song sparrows, usually common along the wet riparian vegetation, moved into weedy fields and wooded habitat at the sides of the river as did some red-winged blackbirds and blue grosbeaks.

Following are specific comments on the habitat and bird observations in each area.

Area 1. Santa Clara River; Old Highway to the mouth of Castaic Creek and Castaic Creek from this confluence to State Route 126.

Length of section, 3.5 miles. The Santa Clara River flows continuously in this section and is augmented by the Valencia waste water outfall near the upstream end of this section. Severe flooding and the threat of bank erosion led to the construction of a new river channel to divert water away from the Old Highway (fig. 2). Although this new channel bisected an area where Least Bell's Vireos were found in 1997, it apparently did not affect the vireos as they were regularly observed along the sides of this channel during 1998 (see additional comments in section on Least

Bell's Vireo). The section of river channel bypassed by this diversion was one of the few remaining wet riparian areas along the river and provided nest sites for Spotted Sandpiper and killdeer.

Area 2. Santa Clara River; Old Highway to McBean Parkway.

Length of section, 1.4 miles. The Santa Clara River flows continuously in this section. The channel was heavily scoured by spring flooding which eliminated all wet riparian vegetation along the main channel of the river. A small area of wet riparian vegetation remained at the mouth of San Francisquito Creek. As in previous years, this area was impacted by off road vehicles during the study period. However, vehicles remained for the most part in the main channel of the river.

Area 3. Santa Clara River; McBean Parkway to Boquet Canyon Road.

Length of section, 1.2 miles. Water, supplied by the Saugus wastewater outfall at the Boquet Canyon Bridge, is continuous in this section of the Santa Clara River. This area was almost completely scoured by spring flooding, leaving only a narrow strip of vegetation along the sides of the river. Species number and the number of individuals seen in this area were reduced from previous years.

Area 4. Santa Clara River; Boquet Canyon Road upstream to DWP transmission lines.

Length of section, 2.3 miles. This section of the Santa Clara River in past years has been wet only briefly during spring rains. and due to water release from the DWP aqueduct 2.0 miles upstream from Boquet Canyon Road. This year there was water flowing continuously in this section of the river. However, flood scouring reduced the overall amount of vegetation and deepened the river channel, leaving much vegetation along the sides of the wide channel out of contact with ground water with the result that much of last years new vegetation was dead and wet riparian species were very reduced.

Area 5. Castaic Creek; Route 125 to Old Road next to Interstate 5.

Length of section, 1.8 miles. Water was released from upstream dams during most of the study period but not continuously so that at times the river was dry. Noise makers and scarecrows were placed along the upper portion of this section to scare birds away from the vicinity of construction to the east. The result was that nesting by red-winged blackbirds and other wet riparian species near the wet pond in this area was greatly reduced as were the overall numbers of individuals and species.

Area 6. San Francisquito Creek; Santa Clara River upstream 2.5 miles.

Length of section, 2.5 miles. This section was wet throughout the study period and showed some effects of flooding, especially in the lower portion where a heavy mud deposit covered most wet riparian vegetation.

Area 7. South Fork of the Santa Clara River; McBean Parkway to Magic Mountain Parkway (Route 126).

Length of section, 1.0 miles. The channel along this section of the South Fork is narrow and very sandy. Flooding removed all vegetation except for a narrow band at each side of the channel.

Area 8. South Fork of the Santa Clara River, Route 126 upstream to Newhall Creek.

Length of section, 1.4 miles. This section of the river was dry except for damp areas formed by runoff from culverts along the west side of the creek. Flooding was restricted to the central channel of the river and did not affect the well developed cattail and willow areas near these culverts. The result was the continued increase in riparian species along this section of the river.

Comments on Sensitive Species

Cooper's Hawk

Cooper's Hawk is considered a Species of Special Concern by the State of California. Coopers hawks were observed rarely on most sections of the main river in 1998 and also along San Francisquito and Castaic Creek. This species is a resident that nests and hunts in riparian woodland habitat.

White-tailed Kite

This species, formerly the Black-shouldered Kite, is considered "Special" by the State of California. Two pair of kites nested along the river in 1998, both in areas where the have been noted in previous years. One pair of kites nested in the dry woodland on the north side of the Santa Clara River near the confluence with Castaic Creek and a second pair of kites nested on the south side of the Santa Clara River about 1/2 mile west of the McBean Bridge.

Yellow-billed Cuckoo

The Yellow-billed Cuckoo is listed as a State Endangered Species. Although no individuals of this species were observed by us in 1998, there was a report of an observation along the Santa Clara River above the McBean crossing in July. As these birds could not be found subsequently and as the referred food of this species

(tent caterpillers and tree frogs) is lacking in this area, this sighting was probably of post-breeding birds on their way south during migration. In the past, cuckoos have been rarely observed as migrants passing through the area in June.

Willow Flycatcher

This species is listed as an Endangered Species under the Federal Endangered Species Act. Willow Flycatchers were once widespread in wet riparian woodland in southern California but now only a few individuals exist. The main California breeding populations of this species are along the Kern River and in northern California. Although migrating individuals of this species have been observed in the past in early June, none were observed this year.

California Horned Lark

This species is a candidate for listing under the Federal Endangered Species Act. Horned Larks nest on dry hillsides and agricultural areas and were observed in late summer on plowed fields adjacent to the Castaic Creek and near the main river at Castaic Junction.

Loggerhead Shrike

This is a California Species of Special Concern. Shrikes are resident in the coastal sage scrub areas adjacent to the Santa Clara River System. This habitat has been nearly completely eliminated along the sides of the upper river. Although shrikes have been observed in the past to enter the riparian area in late summer seeking water, none were observed this year.

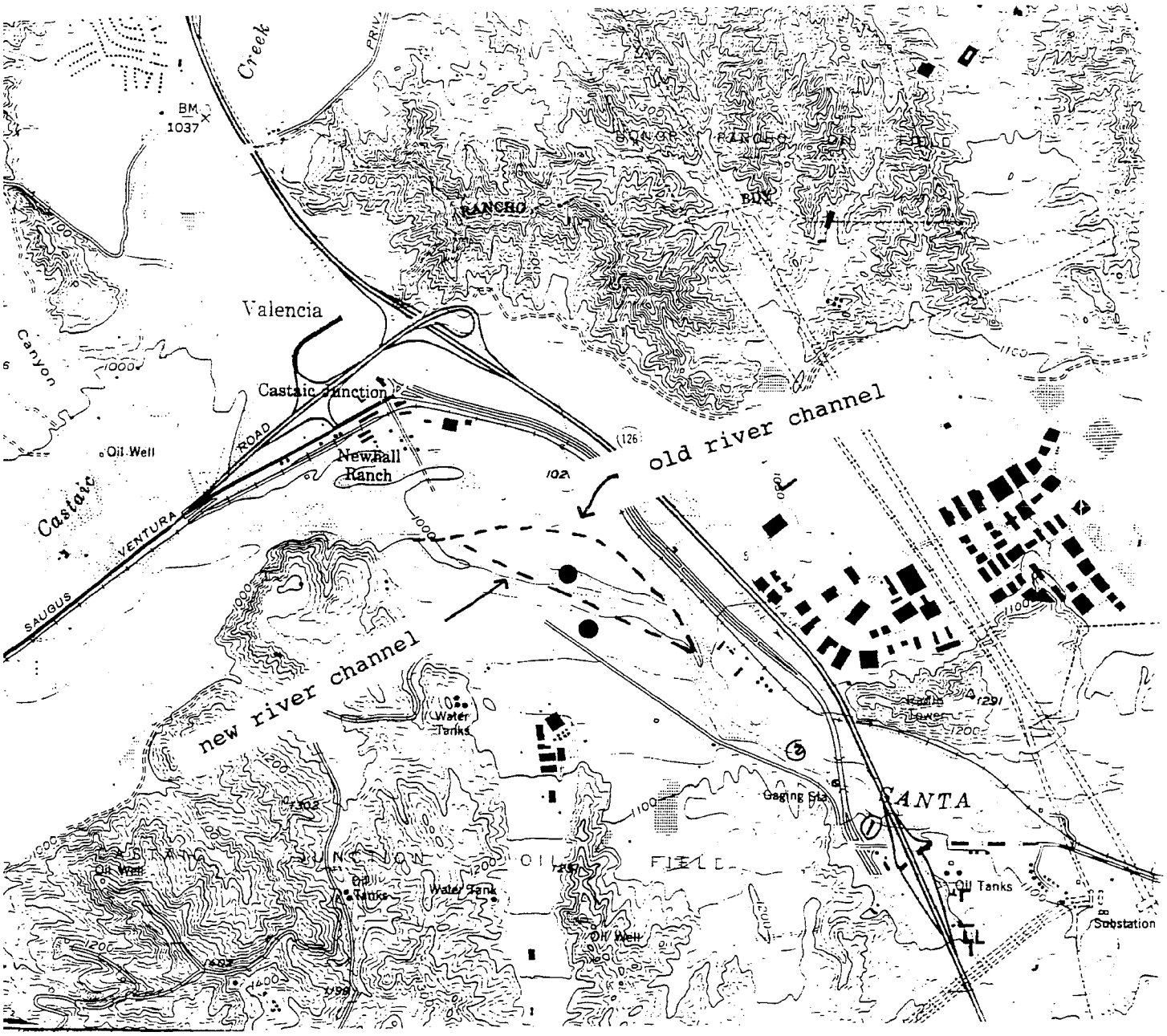
Least Bell's Vireo

Two singing Least Bell's Vireos were observed near Castaic Junction, one on each side of the newly created channel (Figure 2) and both appeared paired and nesting. Although these birds were in dense willow, the berms along the new channel prevented water from reaching this vegetation and much of it was dying by July. Also, the creation of the new channel created edges through the vireo habitat, thus openning the area to increased cowbird predation. There were two cowbird traps in this area in 1997 but no cowbird traps this year and the number of cowbirds observed was higher than in 1997, when two birds were also observed in this area.

Yellow Warbler

The Yellow Warbler is considered a Species of Special Concern by the State of California. Yellow Warblers prefer wet riparian habitat but are also found in large cottonwoods in drier riparian areas. Singing yellow warblers were observed along nearly every section of the Santa Clara River and Castaic Creek. The drop in

Figure 2. Location of Least Bell's Vireo sightings in 1998



● - Singing Least Bell's Vireo

numbers observed between May and June indicate that most of the earlier birds observed were migrants passing through the area. The Yellow Warblers that remained in June along wet sections of the Santa Clara river presumably were breeding birds.

Yellow-breasted Chat

The yellow-breasted chat is considered a Species of Special Concern by the State of California. Chats were observed sparingly along the wet sections of the Santa Clara River.

Lawrence's Goldfinch

This species is a highest priority species on the Audubon Birds to Watch list for 1996. A few birds were observed drinking along The Santa Clara River. This species nests in coastal sage and chaparral habitat and visits the river during the dry late summer.

Table 1. Bird Observations along the Santa Clara River System, 1998: Santa Clara River from Old Highway along I-5 to the mouth of Castaic Creek and Castaic Creek from this confluence to State Route 126.

Species	date: 4/11	4/23	5/8	5/21	6/3	6/13	7/2	7/21	status
Great Blue Heron	-	-	-	-	-	-	-	1	M
Great Egret	-	-	-	-	1	-	-	-	M
Snowy Egret	2	-	-	-	-	-	-	-	M
Green Heron	-	3	-	-	-	2	-	1	R*
Bl.cr. Night Heron	2	1	-	-	-	-	-	-	M
Mallard	1	-	2	-	1	-	x	3	R*
Turkey Vulture	1	-	1	-	1	-	-	-	S
White-tailed Kite	-	2	-	2	1	3	-	2	R*
Cooper's Hawk	1	-	-	-	-	1	-	1	R*
Red-shouldered Hawk	4	2	2	1	-	2	x	1	R*
Red-tailed Hawk	2	1	3	-	2	4	x	3	R*
American Kestrel	1	-	2	1	-	-	-	-	R*
Sora Rail	-	1	-	-	-	-	-	-	M
Ring-n. Pheasant	1	-	-	-	-	-	-	-	R
California Quail	-	6	18	17	12	19	x	22	R*
Killdeer	8	5	8	1	13	16	x	10	R*
Spotted Sandpiper	2	-	5	4	-	2	1(1)	-	S*
California Gull	-	-	200	-	-	-	-	-	M
Domestic Pigeon	2	3	3	13	7	25	x	6	R*
Mourning Dove	6	6	8	2	6	9	x	69	R*
Greater Roadrunner	-	1	-	-	-	-	-	-	R*
Great Horned Owl	-	-	-	1	-	-	-	-	R*
Vaux's Swift	4	10	-	-	-	-	-	-	M
White-th. Swift	-	2	1	-	-	-	-	-	R
Black-ch. Hummingbird	1	3	-	2	-	2	-	-	S*
Anna's Hummingbird	9	19	6	18	6	8	x	4	R*
Belted Kingfisher	1	-	-	-	-	-	-	-	M
Nuttall's Woodpecker	8	6	6	10	11	6	x	8	R*
Downy Woodpecker	2	3	4	3	-	3	x	3	R*
Hairy Woodpecker	-	3	4	3	3	1	-	-	R*
Northern Flicker	1	1	1	-	-	2(1)	-	1	R*
Black Phoebe	-	1	4	2	7	8	x	7	R*
Ash-thr. Flycatcher	7	13	10	8	12	12	x	9	S*
Western Kingbird	-	-	1	3	-	2	x	2	S*
Violet-green Swallow	8	4	-	-	2	-	-	1	S*
N. Rough-w. Swallow	79	63	33	21	18	79	x	3	S*
Barn Swallow	4	2	1	5	1	-	-	-	S
Cliff Swallow	22	34	9	21	56	47	x	-	S*
Scrub Jay	10	17	5	22	7	17	x	15	R*
American Crow	14	4	16	2	8	14	x	5	R*
Common Raven	15	1	7	11	34	17	x	8	R*
Plain Titmouse	13	8	6	4	4	1	x	-	R*
Bushtit	6	7	7	22	12	18	x	2	R*
White-br. Nuthatch	-	-	-	-	-	-	-	1	R?
Bewick's Wren	28	34	33	48	27	23	x	26	R*

Table 1 (cont.). Bird Observations along the Santa Clara River System,1998: Santa Clara River from Old Highway along I-5 to the mouth of Castaic Creek and Castaic Creek from this confluence to State Route 126.

Species	date: 4/11	4/23	5/8	5/21	6/3	6/13	7/2	7/21	status
House Wren	22	15	43	9	12	4	x	4	R*
Western Bluebird	-	2	2	3	1	3	x	6	R*
Mockingbird	-	-	-	2	-	-	-	-	R*
Wrentit	5	6	4	1	3	4	x	3	R*
Calif. Thrasher	2	2	1	3	1	6	x	2	R*
American Pipit	2	-	-	-	-	-	-	-	M
Cedar Waxwing	-	-	-	8	-	-	-	-	W,M
Phainopepla	-	-	-	1	1	-	x	8	S*
European Starling	11	26	23	26	59	11	x	8	R*
Bell's Vireo	**-**	**2**	**1**	**1**	**3**	**1**	**3**	**-**	**S***
Warbling Vireo	-	-	1	-	-	-	-	-	M
Yellow Warbler	3	6	4	13	6	2	x	1	S*
Yellow- r. Warbler	34	-	-	-	-	-	-	-	W,M
Townsend's Warbler	-	-	2	-	-	-	-	-	M
Common Yellowthroat	13	12	6	11	23	15	x	18	R*
Wilson's Warbler	5	2	2	-	-	-	-	-	M
Yellow-br. Chat	-	-	-	2	2	2	x	1	S*
Western Tanager	5	-	1	1	-	-	-	-	M
Bl.-headed Grosbeak	2	13	9	9	7	10	x	17	S*
Blue Grosbeak	-	4	4	3	1	-	-	-	S*
Lazuli Bunting	-	-	-	-	1	2	-	-	S*
Spotted Towhee	4	18	10	7	16	9	x	21	R*
California Towhee	11	25	4	19	18	7	x	15	R*
Lark Sparrow	-	-	-	-	-	-	x	3	S*
Song Sparrow	42	90	48	51	67	51	x	76	R*
Red-w. Blackbird	6	2	-	-	-	-	-	-	S*
Brewer's Blackbird	-	4	4	-	-	-	x	-	R*
Brown-headed Cowbird	5	5	6	20	9	18	x	5	S*
Hooded Oriole	-	1	-	-	-	-	-	5	S*
Bullock's Oriole	4	3	1	-	1	2	x	3	S*
House Finch	9	29	16	8	4	26	x	125	R*
Lesser Goldfinch	4	6	-	2	3	5	x	16	R*
Lawrence's Goldfinch	-	2	-	-	-	-	-	-	R*
American Goldfinch	-	-	-	-	-	-	-	1	W,R*
Total Species:	50	53	50	47	45	45	42	46	

Total Species on all visits: 79
Total Probable Breeding species: 59 (marked with *)

Status: M - Migrant; R - Resident; S - Summer Only; W - Winter Only

() = dependent young birds

Censuses of 4/11, 5/8, 6/3, 7/2 on the north side of river,
Censuses of 4/23, 5/21, 6/13, 7/21 on south side of river.

Table 2. Bird Observations along the Santa Clara River System, 1998: Santa Clara River from McBean Parkway to Old Highway along I-5.

Species	date: 4/11	4/23	5/8	5/21	6/3	6/13	7/2	7/21	status
Snowy Egret	-	7	-	-	-	-	-	-	M
Mallard	2	4	-	-	7	-	x	-	R*
Turkey Vulture	-	-	-	-	-	-	-	1	S
White-tailed Kite	-	1	-	-	1	1	x	1(3)	R*
Cooper's Hawk	-	1	-	1	-	-	-	-	R*
Red-shouldered Hawk	-	-	2	2	2	3	x	2	R*
Red-tailed Hawk	1	-	1	1	1	-	-	-	R*
American Kestrel	1	-	-	-	1	-	x	1	R*
California Quail	-	4	2	4	6	13	x	6	R*
Killdeer	2	5	4	2	4	5	x	4	R*
Least Sandpiper	1	-	-	-	-	-	-	-	M
Domestic Pigeon	-	2	-	-	7	1	x	3	R*
Mourning Dove	1	-	2	-	-	4	x	2	R*
Barn Owl	-	-	-	-	-	2	-	-	R*
Black-ch. Hummingbird	-	-	-	-	1	4	x	-	S*
Anna's Hummingbird	2	8	5	3	3	2	x	1	R*
Nuttall's Woodpecker	2	1	3	-	3	7	x	5	R*
Downy Woodpecker	-	2	3	2	2	4	x	2	R*
Hairy Woodpecker	-	-	-	-	2	4	x	-	R*
Black Phoebe	3	-	-	-	1	3	x	3	R*
Ash-thr. Flycatcher	3	7	5	5	2	9	x	4	S*
Western Kingbird	1	-	-	-	-	-	-	-	S*
Horned Lark	-	-	-	-	-	9	-	-	R*
Tree Swallow	1	1	2	-	1	-	-	-	S*
N. Rough-w. Swallow	16	16	16	9	20	-	-	1	S*
Barn Swallow	-	-	-	2	-	-	-	-	S
Cliff Swallow	-	-	2	-	20	19	x	7	S*
Scrub Jay	11	2	4	8	7	6	x	7	R*
American Crow	3	2	3	8	4	21	x	4	R*
Common Raven	2	1	2	1	4	-	x	4	R*
Plain Titmouse	14	4	2	-	-	5	x	1	R*
Bushtit	-	4	-	8	8	3	x	2	R*
White-br. Nuthatch	-	-	-	-	-	1	-	-	R*
Bewick's Wren	21	20	19	20	15	38	x	7	R*
House Wren	13	10	18	9	15	4	x	3	R*
Western Bluebird	3	-	3	1	2	-	x	4	R*
American Robin	-	-	1	1	-	-	-	-	R*
Wrentit	-	1	-	1	-	-	-	-	R*
Calif. Thrasher	2	3	2	4	4	3	x	1	R*
Phainopepla	-	-	1	2	-	7	x	-	S*
European Starling	21	16	26	13	17	4	x	13	R*
Warbling Vireo	1	-	-	-	-	-	-	-	M
Orange-cr. Warbler	1	-	-	-	-	-	-	-	M
Yellow Warbler	-	6	3	7	2	1	x	-	S*
Yellow- r. Warbler	9	1	-	-	-	-	-	-	W,M

Table 2 (cont.). Bird Observations along the Santa Clara River System,1998: Santa Clara River from McBean Parkway to Old Highway along I-5.

Species	date: 4/11	4/23	5/8	5/21	6/3	6/13	7/2	7/21	status
Blck-th. Grey Warbler	-	1	-	-	-	-	-	-	M
Common Yellowthroat	-	-	-	3	1	7	x	1	R*
Wilson's Warbler	2	-	-	-	-	-	-	-	M
Yellow-br. Chat	-	1	-	-	-	-	-	-	S*
Bl.-headed Grosbeak	5	3	8	8	5	3	x	1	S*
Blue Grosbeak	-	-	1	1	-	-	-	-	S*
Spotted Towhee	1	4	3	5	4	19	x	2	R*
California Towhee	8	6	2	4	8	9	x	2	R*
Song Sparrow	26	38	12	15	11	41	x	4	R*
White-cr. Sparrow	4	-	-	-	-	-	-	-	W,M
Brown-headed Cowbird	9	1	2	7	-	7	x	2	S*
Bullock's Oriole	2	1	1	1	-	-	x	-	S*
House Finch	13	10	6	8	8	26	x	38	R*
Lesser Goldfinch	-	10	4	4	6	9	x	5	R*
American Goldfinch	14	40	-	-	2	2	-	-	W,R*
Total Species:	35	36	33	33	36	36	37	33	

Total Species on all visits: 60
Total Probable Breeding species: 50 (marked with *)

Status: M - Migrant; R - Resident; S - Summer Only; W - Winter Only

() = dependent young birds

Censuses of 4/11, 5/8, 6/3, 7/2 on the north side of river,
Censuses of 4/23, 5/2, 6/13, 7/21 on south side of river.

Table 3. Bird Observations along the Santa Clara River System, 1998: Santa Clara River from Boquet Canyon Rd. to McBean Parkway.

Species	date: 5/14	6/5	status
Mallard	3	1	R*
Red-tailed Hawk	2	1	R*
California Quail	5	2	R*
Killdeer	4	4	R*
Spotted Sandpiper	2	-	S*
Domestic Pigeon	2	-	R*
Mourning Dove	5	8	R*
Greater Roadrunner	-	1	R*
Barn Owl	-	1	R*
Anna's Hummingbird	2	3	R*
Nuttall's Woodpecker	1	3	R*
Northern Flicker	2	-	R*
Black Phoebe	3	5	R*
Ash-thr. Flycatcher	2	4	S*
N. Rough-w. Swallow	7	11	S*
Barn Swallow	2	-	S
Cliff Swallow	11	25	S*
Scrub Jay	7	9	R*
American Crow	15	33	R*
Common Raven	45	15	R*
Plain Titmouse	2	1	R*
Bushtit	-	2	R*
Bewick's Wren	5	9	R*
Western Bluebird	-	2	R*
Wrentit	2	-	R*
Calif. Thrasher	-	1	R*
European Starling	5	6	R*
Common Yellowthroat	2	1	R*
Bl.-headed Grosbeak	5	1	S*
Spotted Towhee	4	2	R*
California Towhee	3	2	R*
Song Sparrow	5	7	R*
Red-w. Blackbird	-	2	S*
Brown-headed Cowbird	3	6	S*
Bullock's Oriole	2	-	S*
House Finch	7	5	R*
Lesser Goldfinch	2	2	R*
House Sparrow	-	2	R*
Total Species:	31	32	

Total Species on all visits: 38
Total Probable Breeding species: 37 (marked with *)

Status: M - Migrant; R - Resident; S - Summer Only; W - Winter Only

Table 4. Bird Observations along the Santa Clara River System, 1998: Santa Clara River from Power Line 2.5 miles upstream from Boquet Canyon Rd. to Boquet Canyon Road Crossing.

Species	date: 5/14	6/5	status
Mallard	-	2	R*
Cooper's Hawk	1	-	R*
Red-shouldered Hawk	-	1	R*
Red-tailed Hawk	4	2	R*
California Quail	42	23	R*
Killdeer	12	9	R*
Domestic Pigeon	1	-	R*
Mourning Dove	13	9	R*
Anna's Hummingbird	5	1	R*
Nuttall's Woodpecker	2	4	R*
Northern Flicker	4	-	R*
Pac. slope Flycatcher	1	-	M
Black Phoebe	2	2	R*
Say's Phoebe	-	1	R*
Ash-thr. Flycatcher	2	4	S*
N. Rough-w. Swallow	7	2	S*
Cliff Swallow	6	1	S*
Scrub Jay	19	12	R*
American Crow	9	-	R*
Common Raven	8	25	R*
Plain Titmouse	2	-	R*
Bushtit	14	-	R*
Bewick's Wren	18	19	R*
House Wren	-	3	R*
Mockingbird	3	6	R*
Wrentit	2	2	R*
Calif. Thrasher	8	1	R*
Cedar Waxwing	6	-	W,M
Phainopepla	11	2	S*
European Starling	23	2	R*
Yellow Warbler	1	-	S*
Common Yellowthroat	-	2	R*
Western Tanager	1	-	M
Bl.-headed Grosbeak	10	-	S*
Blue Grosbeak	-	1	S*
Spotted Towhee	15	12	R*
California Towhee	21	13	R*

Table 4 (cont.) Bird Observations along the Santa Clara River System, 1998: Santa Clara River from Power Line 2.5 miles upstream from Boquet Canyon Rd. to Boquet Canyon Road Crossing.

Species	date: 5/14	6/5	status
Song Sparrow	18	10	R*
Red-w. Blackbird	-	2	S*
Brown-headed Cowbird	8	3	S*
Hooded Oriole	2	-	S*
Bullock's Oriole	4	1	S*
House Finch	13	32	R*
Lesser Goldfinch	2	4	R*
Total Species:	38	31	

Total Species on all visits: 44
Total Probable Breeding species: 41 (marked with *)

Status: M - Migrant; R - Resident; S - Summer Only; W - Winter Only

Table 5. Bird Observations along the Santa Clara River System, 1998: Castaic Creek from Old Road west to Rte. 126.

Species	date: 4/11	4/23	5/8	5/25	6/3	6/15	7/3	7/21	status
Great Blue Heron	1	2	-	-	-	-	-	-	M
Great Egret	2	-	2	-	-	-	-	-	M
Green Heron	-	1	3	-	-	2	x	1	R*
Bl. cr. Night Heron	-	-	-	-	2	-	-	-	M
Canada Goose	7	-	-	-	-	-	-	-	W,M
Mallard	3	3	2	-	-	-	-	-	R*
Cooper's Hawk	-	-	-	-	1	-	-	-	R*
Red-shouldered Hawk	2	-	-	-	-	-	-	2	R*
Red-tailed Hawk	2	2	2	3	3	2	x	2	R*
American Kestrel	-	-	1	-	2	1	x	-	R*
California Quail	11	11	7	19	9	11	x	12	R*
Killdeer	-	-	2	7	2	4	x	4	R*
Domestic Pigeon	9	2	200	8	2	2	x	2	R*
Mourning Dove	4	7	5	10	5	11	x	5	R*
Black-ch. Hummingbird	-	-	-	1	-	-	-	-	S*
Anna's Hummingbird	4	4	5	6	3	2	x	4	R*
Belted Kingfisher	-	1	-	-	-	-	-	-	M
Nuttall's Woodpecker	3	2	1	2	2	5	x	3	R*
Downy Woodpecker	1	-	-	2	-	-	-	-	R*
Hairy Woodpecker	-	-	-	2	-	-	-	-	R*
Northern Flicker	2	1	-	-	-	-	x	4	R*
Black Phoebe	2	2	2	2	1	2	x	7	R*
Ash-thr. Flycatcher	1	2	1	2	2	4	x	2	S*
Cassin's Kingbird	-	2	-	-	-	-	-	-	R
Western Kingbird	-	4	3	1	2	3	-	2	S*
N. Rough-w. Swallow	20	65	120	8	75	90	x	-	S*
Barn Swallow	2	-	1	-	-	-	-	-	S
Cliff Swallow	6	90	200	200	150	190	x	-	S*
Scrub Jay	9	11	5	14	11	17	x	15	R*
American Crow	4	2	15	1	2	9	x	5	R*
Common Raven	2	6	5	2	5	5	x	2	R*
Plain Titmouse	2	-	1	-	-	-	-	2	R*
Bushtit	7	-	-	16	-	16	x	10	R*
Bewick's Wren	8	8	5	17	6	9	x	12	R*
House Wren	2	-	-	-	-	-	-	-	R*
American Robin	2	-	2	-	2	-	-	-	R*
N. Mockingbird	-	-	-	-	-	2	-	-	R*
Wrentit	3	1	2	-	1	3	-	2	R*
Calif. Thrasher	6	3	2	9	2	5	x	2	R*
European Starling	-	2	50	-	4	3	x	3	R*
Yellow Warbler	-	-	2	-	-	1	-	-	S*
Yellow- r. Warbler	7	-	-	-	-	-	-	-	W,M

Table 5 (cont.). Bird Observations along the Santa Clara River System, 1998: Castaic Creek from Old Road west to Rte.126.

Species	date: 4/11	4/23	5/8	5/25	6/3	6/15	7/3	7/21	status
Common Yellowthroat	1	2	3	9	2	3	x	-	R*
Wilson's Warbler	2	-	-	2	-	-	-	-	M
Yellow-br. Chat	-	-	-	-	-	1	-	-	S*
Bl.-headed Grosbeak	3	9	7	10	7	12	x	2	S*
Blue Grosbeak	-	1	1	1	2	2	-	-	S*
Spotted Towhee	4	7	2	17	3	6	x	5	R*
California Towhee	2	5	4	10	2	4	x	5	R*
Savannah Sparrow	50	-	-	-	-	-	-	-	W
Song Sparrow	13	5	7	44	9	6	x	15	R*
White-cr. Sparrow	34	-	-	-	-	-	-	-	W,M
Red-w. Blackbird	49	5	50	-	2	15	-	-	S*
Brewer's Blackbird	-	13	5	1	4	-	x	-	R*
Brown-headed Cowbird	-	3	3	10	3	4	x	5	S*
Hooded Oriole	-	-	-	-	2	-	-	-	S*
Bullock's Oriole	3	6	8	2	5	5	x	7	S*
House Finch	7	9	6	4	3	13	x	16	R*
Lesser Goldfinch	4	7	3	5	2	2	-	2	R*
American Goldfinch	-	-	-	1	-	-	-	-	W,R*
Total Species:	41	36	39	34	36	36	30	30	

Total Species on all visits: 60
Total Probable Breeding species: 49 (marked with *)

Status: M - Migrant; R - Resident; S - Summer Only; W - Winter Only

Table 6. Bird Observations along the Santa Clara River System, 1998: San Francisquito Creek for 2 Miles above Main Channel.

Species	date: 5/18	6/2	status
Mallard	8	-	R*
Cooper's Hawk	1	1	R*
Red-tailed Hawk	1	2	R*
California Quail	15	7	R*
Killdeer	6	16	R*
Mourning Dove	16	32	R*
Black-ch. Hummingbird	1	-	S*
Anna's Hummingbird	3	5	R*
Nuttall's Woodpecker	4	3	R*
Northern Flicker	1	-	R*
Black Phoebe	1	4	R*
Say's Phoebe	1	-	R*
Ash-thr. Flycatcher	4	5	S*
Western Kingbird	4	4	S*
Horned Lark	12	1	R*
N. Rough-w. Swallow	4	6	S*
Cliff Swallow	16	2	S*
Scrub Jay	3	4	R*
American Crow	-	2	R*
Common Raven	3	4	R*
Plain Titmouse	-	2	R*
Bushtit	2	-	R*
Bewick's Wren	8	5	R*
House Wren	-	1	R*
Western Bluebird	1	2	R*
Wrentit	1	-	R*
Calif. Thrasher	2	2	R*
European Starling	4	16	R*
Plumbeous Vireo	1	-	M
Yellow Warbler	2	-	S*
Common Yellowthroat	4	2	R*
Wilson's Warbler	4	-	M
Bl.-headed Grosbeak	3	1	S*
Blue Grosbeak	-	2	S*
Lazuli Bunting	2	-	S*
Spotted Towhee	2	2	R*
California Towhee	10	4	R*
Lark Sparrow	-	2	S*
Song Sparrow	21	10	R*

Table 6 (cont.). Bird Observations along the Santa Clara River System, 1998: San Francisquito Creek for 2 Miles above Main Channel.

Species	date: 5/18	6/2	status
Red-w. Blackbird	-	28	S*
Brown-headed Cowbird	4	11	S*
Bullock's Oriole	3	2	S*
House Finch	10	12	R*
Lesser Goldfinch	8	4	R*
American Goldfinch	4	-	W,R*
Total Species:	39	34	

Total Species on all visits: 45
Total Probable Breeding species: 43 (marked with *)

Status: M - Migrant; R - Resident; S - Summer Only; W - Winter Only

Table 7. Bird Observations along the Santa Clara River System, 1998: South Fork from Rte. 126 to McBean Parkway.

Species	date: 5/18	6/2	status
Mallard	-	7	R*
Red-shouldered Hawk	-	1	R*
Prairie Falcon	1	-	M
California Quail	6	6	R*
Killdeer	-	4	R*
Domestic Pigeon	-	4	R*
Mourning Dove	6	6	R*
Anna's Hummingbird	3	6	R*
Nuttall's Woodpecker	-	1	R*
Black Phoebe	1	2	R*
Ash-thr. Flycatcher	3	1	S*
Western Kingbird	2	2	S*
N. Rough-w. Swallow	14	4	S*
Cliff Swallow	8	6	S*
Scrub Jay	13	7	R*
American Crow	2	-	R*
Common Raven	32	80	R*
Plain Titmouse	2	-	R*
Bushtit	8	10	R*
Bewick's Wren	12	7	R*
Western Bluebird	-	2	R*
Mockingbird	4	4	R*
Calif. Thrasher	2	3	R*
Phainopepla	-	2	S*
European Starling	14	100	R*
Yellow Warbler	8	1	S*
Wilson's Warbler	1	-	M
Bl.-headed Grosbeak	1	-	S*
Spotted Towhee	3	2	R*
California Towhee	7	8	R*
Song Sparrow	9	2	R*
Brewer's Blackbird	7	6	R*
Brown-headed Cowbird	-	2	S*
Bullock's Oriole	1	3	S*
House Finch	22	15	R*
Lesser Goldfinch	2	3	R*
House Sparrow	-	4	R*
Total Species:	28	32	

Total Species on all visits: 36
Total Probable Breeding species: 34 (marked with *)

Status: M - Migrant; R - Resident; S - Summer Only; W - Winter Only

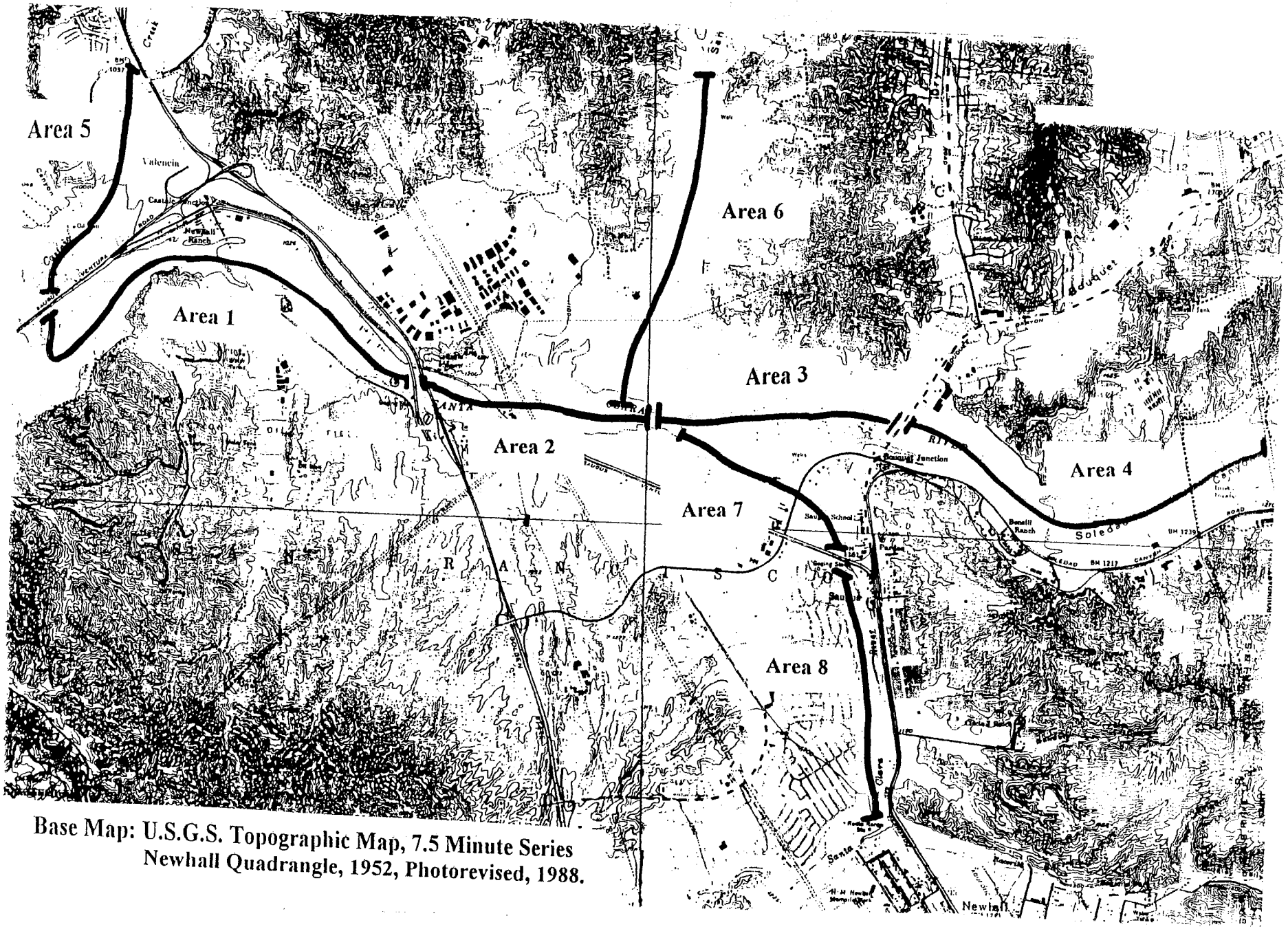
Table 8. Bird Observations along the Santa Clara River System, 1998: South Fork from Newhall Creek to Rte. 126.

Species	date: 5/18	6/2	status
Red-tailed Hawk	-	1	R*
American Kestrel	-	2	R*
California Quail	-	12	R*
Killdeer	3	3	R*
Domestic Pigeon	12	40	R*
Mourning Dove	10	3	R*
Black-ch. Hummingbird	-	2	S*
Anna's Hummingbird	10	8	R*
Black Phoebe	1	1	R*
Ash-thr. Flycatcher	4	2	S*
Western Kingbird	2	2	S*
N. Rough-w. Swallow	5	7	S*
Cliff Swallow	6	2	S*
Scrub Jay	2	1	R*
American Crow	5	2	R*
Common Raven	12	3	R*
Bushtit	6	16	R*
Bewick's Wren	3	10	R*
Western Bluebird	-	2	R*
N. Mockingbird	5	4	R*
Wrentit	1	-	R*
Calif. Thrasher	7	3	R*
European Starling	18	2	R*
Orange-cr. Warbler	1	-	M
Yellow Warbler	10	1	S*
Common Yellowthroat	1	-	R*
Wilson's Warbler	3	-	M
Western Tanager	3	-	M
Bl.-headed Grosbeak	2	-	S*
Blue Grosbeak	1	-	S*
Spotted Towhee	3	-	R*
California Towhee	7	10	R*
Song Sparrow	8	3	R*
Brown-headed Cowbird	1	-	S*
Bullock's Oriole	4	2	S*
House Finch	52	16	R*
Lesser Goldfinch	6	8	R*
House Sparrow	2	4	R*
Total Species:	33	29	

Total Species on all visits: 38
Total Probable Breeding species: 35 (marked with *)

Status: M - Migrant; R - Resident; S - Summer Only; W - Winter Only

Figure 1. Survey Areas along the Santa Clara River and Tributaries.



Base Map: U.S.G.S. Topographic Map, 7.5 Minute Series
Newhall Quadrangle, 1952, Photorevised, 1988.

S S106 Open Area 1998

BIRDS OF Santa Clara River System

Locality OLD RD @ CASTAIC **Date** 4/11 **Time** 8-

- Great Blue Heron
- Green Heron
- (1) Mallard
- (1) Turkey Vulture
- White-tailed Kite
- Sharp-shinned Hawk
- Cooper's Hawk
- (2) 11 Red-shouldered Hawk
- Red-tailed Hawk
- (1) American Kestrel
- (2) 2 California Quail
- American Coot
- (1) Killdeer
- Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- Rock Dove
- (1) Mourning Dove
- Greater Roadrunner
- Barn Owl
- Great Horned Owl
- White-throated Swift
- Black-ch. Hummingbird
- (3) 21 Anna's Hummingbird
- Costa's Hummingbird
- (1) Belted Kingfisher
- Acorn Woodpecker
- (3) 21 Nuttall's Woodpecker
- (2) 11 Downy Woodpecker
- Hairy Woodpecker
- Northern Flicker
- Western Wood-Pewee
- Willow Flycatcher
- Pacific Slope Flycatcher
- Black Phoebe
- Say's Phoebe
- (12) 1 Ash-throated Flycatcher
- Cassin's Kingbird
- Western Kingbird
- Horned Lark
- Tree Swallow
- (8) 8 Violet-green Swallow
- (46) (20) (20) 24 N. Rough-winged Swallow
- Cliff Swallow
- (4) 4 Barn Swallow
- (5) 21 2 Scrub Jay
- (3) 12 American Crow
- (6) 221 Common Raven
- (6) 222 Plain Titmouse
- Bushtit
- (14) 11 111 Bewick's Wren
- (3) 21 House Wren
- Ruby-crowned Kinglet
- Blue-gray Gnatcatcher
- Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- American Robin
- (1) Wrentit
- Northern Mockingbird
- California Thrasher
- American Pipit
- Cedar Waxwing
- Phainopepla
- Loggerhead Shrike
- (3) European Starling
- **Bell's Vireo**
- Solitary Vireo
- Warbling Vireo
- Orange-crowned Warbler
- Yellow Warbler
- (5) 211 Yellow-rumped Warbler
- (1) Common Yellowthroat
- Wilson's Warbler
- Yellow-breasted Chat
- Western Tanager
- Black-headed Grosbeak
- Blue Grosbeak
- Lazuli Bunting
- Rufous-sided Towhee
- (2) California Towhee
- Lark Sparrow
- Savannah Sparrow
- (15) 6 111 1111 Song Sparrow
- Lincoln's Sparrow
- White-crowned Sparrow
- Red-winged Blackbird
- Western Meadowlark
- Brewer's Blackbird
- Brown-headed Cowbird
- Hooded Oriole
- Northern Oriole
- (3) House Finch
- Pine Siskin
- Lesser Goldfinch
- Lawrence's Goldfinch
- American Goldfinch
- House Sparrow
- (1) BCN Heron (IMM)
- (4) YNUX SWPT
- (1) PHEASANT

BIRDS OF Santa Clara River System

Locality Blue Moon to Castaic **Date** 4/11/98 **Time** 6:45

_____ Great Blue Heron
_____ Green Heron
_____ Mallard
_____ Turkey Vulture
_____ White-tailed Kite
_____ Sharp-shinned Hawk
(1) | Cooper's Hawk
(2) || Red-shouldered Hawk
(2) || Red-tailed Hawk
_____ American Kestrel
(6) 222 California Quail
_____ American Coot
(7) 1222 Killdeer
(2) 2 Spotted Sandpiper
_____ Least Sandpiper
_____ Common Snipe
(2) 2 Rock Dove
(5) 122 Mourning Dove
_____ Greater Roadrunner
_____ Barn Owl
_____ Great Horned Owl
_____ White-throated Swift
(1) | Black-ch. Hummingbird
(6) 1 |||| Anna's Hummingbird
_____ Costa's Hummingbird
_____ Belted Kingfisher
_____ Acorn Woodpecker
(5) 1112 Nuttall's Woodpecker
_____ Downy Woodpecker
_____ Hairy Woodpecker
(1) Northern Flicker
_____ Western Wood-Pewee
_____ Willow Flycatcher
_____ Pacific Slope Flycatcher
_____ Black Phoebe
_____ Say's Phoebe
(6) 1 |||| Ash-throated Flycatcher
_____ Cassin's Kingbird
_____ Western Kingbird
_____ Horned Lark
_____ Tree Swallow
_____ Violet-green Swallow
(33) 9 4 8 12 N. Rough-winged Swallow
(17) 8 9 Cliff Swallow
_____ Barn Swallow
(5) 1112 Scrub Jay
(11) 443 American Crow
(9) 432 Common Raven
(7) 2221 Plain Titmouse
(6) 222 Bushtit
(14) 22221 4 Bewick's Wren
(19) 2 1 2 2 4 4 22 House Wren
_____ Ruby-crowned Kinglet
_____ Blue-gray Gnatcatcher
_____ Western Bluebird
_____ Swainson's Thrush
_____ Hermit Thrush
_____ American Robin
(9) 12 Wrentit
_____ Northern Mockingbird
(2) California Thrasher
_____ American Pipit
_____ Cedar Waxwing
_____ Phainopepla
_____ Loggerhead Shrike
(8) 1 21 2 European Starling
_____ **Bell's Vireo**
_____ Solitary Vireo
_____ Warbling Vireo
_____ Orange-crowned Warbler
(3) 111 Yellow Warbler
(29) 25 4 Yellow-rumped Warbler
(12) 3 2 4 3 Common Yellowthroat
(5) 1112 Wilson's Warbler
_____ Yellow-breasted Chat
(5) 1 3 Western Tanager
(2) 11 Black-headed Grosbeak
_____ Blue Grosbeak
_____ Lazuli Bunting
(4) 13 Rufous-sided Towhee
(9) 1114 California Towhee
_____ Lark Sparrow
_____ Savannah Sparrow
(27) 9 2 4 1 8 2 4 Song Sparrow
_____ Lincoln's Sparrow
_____ White-crowned Sparrow
(6) Red-winged Blackbird
_____ Western Meadowlark
_____ Brewer's Blackbird
(5) 123 Brown-headed Cowbird
_____ Hooded Oriole
(4) 111 Northern Oriole
(6) 42 House Finch
_____ Pine Siskin
(4) 22 Lesser Goldfinch
_____ Lawrence's Goldfinch
_____ American Goldfinch
_____ House Sparrow
(2) Snowy egrets
(1) Blk.-crown Night Heron imm
(2) Pipits

BIRDS OF Santa Clara River System

Locality Blue Heron To Castaic **Date** ~ 23rd **Time** _____

_____ Great Blue Heron
_____ Green Heron
(1) Mallard
_____ Turkey Vulture
(1) White-tailed Kite nest
_____ Sharp-shinned Hawk
_____ Cooper's Hawk
(2) Red-shouldered Hawk
(1) Red-tailed Hawk
_____ American Kestrel
(6) California Quail
_____ American Coot
(3) Killdeer
_____ Spotted Sandpiper
_____ Least Sandpiper
_____ Common Snipe
(3) Rock Dove
(6) Mourning Dove
(1) Greater Roadrunner
_____ Barn Owl
_____ Great Horned Owl
_____ White-throated Swift
(3) Black-ch. Hummingbird
(4) Anna's Hummingbird
_____ Costa's Hummingbird
_____ Belted Kingfisher
_____ Acorn Woodpecker
(4) Nuttall's Woodpecker
(2) Downy Woodpecker
(3) Hairy Woodpecker pounding in hole
(1) Northern Flicker
_____ Western Wood-Pewee
_____ Willow Flycatcher
_____ Pacific Slope Flycatcher
(1) Black Phoebe
_____ Say's Phoebe
(8) Ash-throated Flycatcher
_____ Cassin's Kingbird
_____ Western Kingbird
_____ Horned Lark
_____ Tree Swallow
(4) Violet-green Swallow
(50) 20, 30, N. Rough-winged Swallow
(34), 30, Cliff Swallow
(2) Barn Swallow
(15) Scrub Jay
(3) American Crow
(1) Common Raven
(8) Plain Titmouse
(5) Bushtit
(19) Bewick's Wren
(13) House Wren
_____ Ruby-crowned Kinglet

_____ Blue-gray Gnatcatcher
_____ Western Bluebird
_____ Swainson's Thrush
_____ Hermit Thrush
_____ American Robin
(6) Wrentit
_____ Northern Mockingbird
(2) California Thrasher
_____ American Pipit
_____ Cedar Waxwing
_____ Phainopepla
_____ Loggerhead Shrike
(42) European Starling
_____ **Bell's Vireo**
_____ Solitary Vireo
_____ Warbling Vireo
_____ Orange-crowned Warbler
(5) Yellow Warbler
_____ Yellow-rumped Warbler
(7) Common Yellowthroat
(2) Wilson's Warbler
_____ Yellow-breasted Chat
_____ Western Tanager
(7) Black-headed Grosbeak
(1) Blue Grosbeak
_____ Lazuli Bunting
(16) Rufous-sided Towhee
(21) California Towhee
_____ Lark Sparrow
_____ Savannah Sparrow
Song Sparrow
_____ Lincoln's Sparrow
(67) White-crowned Sparrow
(2) Red-winged Blackbird
_____ Western Meadowlark
(4) Brewer's Blackbird in Tules pond
(1) Brown-headed Cowbird
(1) Hooded Oriole
(2) Northern Oriole
(27), 10, House Finch
_____ Pine Siskin
(7) Lesser Goldfinch
(2) Lawrence's Goldfinch pr.
_____ American Goldfinch
_____ House Sparrow
(1) RAIL ~~Sora~~
(10) VAUX'S SWIFT
(2) Bigger Swift (Co White)

BIRDS OF Santa Clara River System

Locality OLD M → CASTAIC JNCT. **Date** 4/23 **Time** 8—

5 SIDE

- Great Blue Heron
- (3) 2 Green Heron
- Mallard
- Turkey Vulture
- (1) White-tailed Kite
- Sharp-shinned Hawk
- Cooper's Hawk
- Red-shouldered Hawk
- Red-tailed Hawk
- American Kestrel
- California Quail
- American Coot
- (2) 2 Killdeer
- Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- Rock Dove
- Mourning Dove
- Greater Roadrunner
- Barn Owl
- Great Horned Owl
- White-throated Swift
- Black-ch. Hummingbird
- (2) II Anna's Hummingbird
- Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- (2) II Nuttall's Woodpecker
- (1) Downy Woodpecker
- Hairy Woodpecker
- Northern Flicker
- Western Wood-Pewee
- Willow Flycatcher
- Pacific Slope Flycatcher
- Black Phoebe
- Say's Phoebe
- (5) III Ash-throated Flycatcher
- Cassin's Kingbird
- Western Kingbird
- Horned Lark
- Tree Swallow
- Violet-green Swallow
- (13) 6 34 N. Rough-winged Swallow (NB)
- Cliff Swallow
- Barn Swallow
- (2) Scrub Jay
- (1) American Crow
- Common Raven
- (2) Plain Titmouse
- 2 Bushtit
- (15) (6) 1 IIII Bewick's Wren IIII 4
- (2) II House Wren
- Ruby-crowned Kinglet
- Blue-gray Gnatcatcher
- (2) Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- American Robin
- Wrentit
- Northern Mockingbird
- California Thrasher
- American Pipit
- Cedar Waxwing
- Phainopepla
- Loggerhead Shrike
- (4) European Starling
- (2) 4 III **Bell's Vireo**
- Solitary Vireo
- Warbling Vireo
- Orange-crowned Warbler
- (1) I Yellow Warbler
- Yellow-rumped Warbler
- (5) 2 2 I Common Yellowthroat
- Wilson's Warbler
- Yellow-breasted Chat
- Western Tanager
- (6) 2 2 I Black-headed Grosbeak
- (3) 1 2 Blue Grosbeak
- Lazuli Bunting
- (2) 1 II Rufous-sided Towhee
- (4) 3 I California Towhee
- Lark Sparrow
- (23) Savannah Sparrow
- 4 4 2 III IIII Song Sparrow
- Lincoln's Sparrow
- White-crowned Sparrow
- Red-winged Blackbird
- Western Meadowlark
- Brewer's Blackbird
- (4) 2 2 Brown-headed Cowbird
- Hooded Oriole
- (1) Northern Oriole
- (2) House Finch
- Pine Siskin
- (2) Lesser Goldfinch
- Lawrence's Goldfinch
- American Goldfinch
- House Sparrow
- (1) BCNH (IMM)

5 pairs
1 N pair with fledglings.

BIRDS OF Santa Clara River System

Locality Blue Moon to Canstair SUGDEN Date 5/9/98

Time

_____ Great Blue Heron
_____ Green Heron
_____ Mallard
_____ Cinnamon Teal
1 Turkey Vulture
_____ White-tailed Kite
_____ Sharp-shinned Hawk
_____ Cooper's Hawk
1 Red-shouldered Hawk
3 III Red-tailed Hawk
2 II Golden Eagle
_____ American Kestrel
16 26 II 22 24 II 22 California Quail
_____ American Coot
5 IIII Killdeer
3 III Spotted Sandpiper
_____ Least Sandpiper
_____ Common Snipe
3 2 Rock Dove
8 II 2 I 2 I Mourning Dove
_____ **Yellow-billed Cuckoo**
_____ Greater Roadrunner
_____ Barn Owl
_____ Great Horned Owl
1 White-throated Swift
_____ Black-ch. Hummingbird
9 IIII Anna's Hummingbird
_____ Costa's Hummingbird
_____ Belted Kingfisher
_____ Acorn Woodpecker
6 I IIII Nuttall's Woodpecker
3 I III Downy Woodpecker
4 II 2 Hairy Woodpecker
2 I Northern Flicker
_____ Western Wood-Pewee
_____ Willow Flycatcher
_____ Hammond's Flycatcher
_____ Pacific Slope Flycatcher
1 Black Phoebe
_____ Say's Phoebe
7 II IIII Ash-throated Flycatcher
_____ **Brown-crested Flycatcher**
_____ Cassin's Kingbird
1 Western Kingbird
_____ Horned Lark
_____ Tree Swallow
_____ Violet-green Swallow
10 35 II N. Rough-winged Swallow
_____ Bank Swallow
9 Cliff Swallow
1 Barn Swallow
3 2 Scrub Jay
19 4 22 IIII American Crow
7 I 22 II Common Raven
4 III Plain Titmouse
7 2 I 22 Bushtit
_____ Rock Wren
26 3 I 25 4 4 II II 3 I Bewick's Wren
_____ House Wren

_____ Ruby-crowned Kinglet
_____ Blue-gray Gnatcatcher
2 Western Bluebird
_____ Swainson's Thrush
_____ Hermit Thrush
_____ American Robin
3 21 Wrentit
_____ Northern Mockingbird
1 California Thrasher
_____ American Pipit
_____ Cedar Waxwing
_____ Phainopepla
_____ Loggerhead Shrike
97 64 I 24 European Starling
_____ **Bell's Vireo**
_____ Solitary Vireo
1 Warbling Vireo
_____ Orange-crowned Warbler
2 II Yellow Warbler
_____ Yellow-rumped Warbler
_____ Black-th. Gray Warbler
2 Townsend's Warbler
_____ MacGillivray's Warbler
1 Common Yellowthrate
2 II Wilson's Warbler
_____ Yellow-breasted Chat
_____ **Summer Tananger**
_____ Western Tanager
5 IIII Black-headed Grosbeak
_____ Blue Grosbeak
103 Lazuli Bunting
IIII IIII Rufous-sided Towhee
7 IIII California Towhee
_____ Lark Sparrow
_____ Savannah Sparrow
_____ Fox Sparrow
35 I 88 2 I 9 Song Sparrow
_____ Lincoln's Sparrow
_____ White-crowned Sparrow
_____ Red-winged Blackbird
_____ Western Meadowlark
_____ Brewer's Blackbird
6 19 Brown-headed Cowbird
_____ Hooded Oriole
1 Northern Oriole
7 4 House Finch
_____ Pine Siskin
_____ Lesser Goldfinch
_____ Lawrence's Goldfinch
_____ American Goldfinch
_____ House Sparrow

Additional Species
202 ~~Ring-billed~~ California Gulls flyover

BIRDS OF Santa Clara River System

Locality Oxnard East Date 5-8

Time

_____ Great Blue Heron
_____ Green Heron
(2) Mallard
_____ Cinnamon Teal
_____ Turkey Vulture
_____ White-tailed Kite
_____ Sharp-shinned Hawk
_____ Cooper's Hawk
1 Red-shouldered Hawk
_____ Red-tailed Hawk
_____ Golden Eagle
_____ American Kestrel
(2) California Quail
_____ American Coot
(3) Killdeer
(2) Spotted Sandpiper
_____ Least Sandpiper
_____ Common Snipe
_____ Rock Dove
_____ Mourning Dove
_____ **Yellow-billed Cuckoo**
_____ Greater Roadrunner
_____ Barn Owl
_____ Great Horned Owl
_____ White-throated Swift
_____ Black-ch. Hummingbird
(2) Anna's Hummingbird
_____ Costa's Hummingbird
_____ Belted Kingfisher
_____ Acorn Woodpecker
_____ Nuttall's Woodpecker
(1) Downy Woodpecker
_____ Hairy Woodpecker
_____ Northern Flicker
_____ Western Wood-Pewee
_____ Willow Flycatcher
_____ Hammond's Flycatcher
_____ Pacific Slope Flycatcher
(3) 2 1 Black Phoebe
_____ Say's Phoebe
(3) II Ash-throated Flycatcher
_____ **Brown-crested Flycatcher**
_____ Cassin's Kingbird
_____ Western Kingbird
_____ Horned Lark
_____ Tree Swallow
_____ Violet-green Swallow
(23) 8 15 N. Rough-winged Swallow
_____ Bank Swallow
_____ Cliff Swallow
_____ Barn Swallow
(2) II Scrub Jay
(2) American Crow
_____ Common Raven
(2) Plain Titmouse
_____ Bushtit
_____ Rock Wren
(7) II IIII Bewick's Wren
_____ House Wren

N side only

N SIDE
OUTSIDE

_____ Ruby-crowned Kinglet
_____ Blue-gray Gnatcatcher
_____ Western Bluebird
_____ Swainson's Thrush
_____ Hermit Thrush
_____ American Robin
(1) Wrentit
_____ Northern Mockingbird
_____ California Thrasher
_____ American Pipit
_____ Cedar Waxwing
_____ Phainopepla
(1) Loggerhead Shrike
(8) European Starling
(1) **Bell's Vireo**
_____ Solitary Vireo
_____ Warbling Vireo
_____ Orange-crowned Warbler
(2) II Yellow Warbler
_____ Yellow-rumped Warbler
_____ Black-th. Gray Warbler
_____ Townsend's Warbler
_____ MacGillivray's Warbler
(5) IIII Common Yellowthroat
_____ Wilson's Warbler
_____ Yellow-breasted Chat
_____ **Summer Tananger**
(1) Western Tanager
(4) IIII Black-headed Grosbeak
(4) 2 2 Blue Grosbeak
_____ Lazuli Bunting
_____ Rufous-sided Towhee
_____ California Towhee
_____ Lark Sparrow
_____ Savannah Sparrow
2 Fox Sparrow
(13) 5 II IIII Song Sparrow
_____ Lincoln's Sparrow
_____ White-crowned Sparrow
_____ Red-winged Blackbird
_____ Western Meadowlark
(4) Brewer's Blackbird
_____ Brown-headed Cowbird
_____ Hooded Oriole
_____ Northern Oriole
(12) 6 6 House Finch
_____ Pine Siskin
_____ Lesser Goldfinch
_____ Lawrence's Goldfinch
_____ American Goldfinch
_____ House Sparrow

Additional Species

(100) CAL Gull

BIRDS OF Santa Clara River System

Locality ____________ Date 5-21

Time ____________

Count	Species
	Great Blue Heron
	Green Heron
	Mallard
	Cinnamon Teal
	Turkey Vulture
	White-tailed Kite
	Sharp-shinned Hawk
	Cooper's Hawk
(1)	Red-shouldered Hawk
	Red-tailed Hawk
	Golden Eagle
	American Kestrel
	California Quail
	American Coot
(5) 32	Killdeer
	Spotted Sandpiper
	Least Sandpiper
	Common Snipe
	Rock Dove
	Mourning Dove
	Yellow-billed Cuckoo
	Greater Roadrunner
	Barn Owl
	Great Horned Owl
	White-throated Swift
	Black-ch. Hummingbird
(3) III	Anna's Hummingbird
	Costa's Hummingbird
	Belted Kingfisher
	Acorn Woodpecker
(4) IIII	Nuttall's Woodpecker
(1)	Downy Woodpecker
(1)	Hairy Woodpecker
	Northern Flicker
	Western Wood-Pewee
	Willow Flycatcher
	Hammond's Flycatcher
	Pacific Slope Flycatcher
(2)	Black Phoebe
	Say's Phoebe
(5) IIII	Ash-throated Flycatcher FY
	Brown-crested Flycatcher
	Cassin's Kingbird
	Western Kingbird
	Horned Lark
	Tree Swallow
	Violet-green Swallow
(10) 8 2	N. Rough-winged Swallow
	Bank Swallow
(1)	Cliff Swallow
(3) 2 1	Barn Swallow
(8) III IIII	Scrub Jay
	American Crow
(4) 3 1	Common Raven
(4) 22	Plain Titmouse
(4)	Bushtit
	Rock Wren
(14) IIII IIII IIII	Bewick's Wren
	House Wren

Count	Species
	Ruby-crowned Kinglet
	Blue-gray Gnatcatcher
	Western Bluebird
	Swainson's Thrush
	Hermit Thrush
	American Robin
(1)	Wrentit
	Northern Mockingbird
	California Thrasher
	American Pipit
	Cedar Waxwing
	Phainopepla
	Loggerhead Shrike
(6)	European Starling
(1)	**Bell's Vireo**
	Solitary Vireo
	Warbling Vireo
	Orange-crowned Warbler
(1)	Yellow Warbler
	Yellow-rumped Warbler
	Black-th. Gray Warbler
	Townsend's Warbler
	MacGillivray's Warbler
(7) II IIII	Common Yellowthroat
	Wilson's Warbler
	Yellow-breasted Chat
	Summer Tananger
	Western Tanager
(3) III	Black-headed Grosbeak
(3) 2 1	Blue Grosbeak
	Lazuli Bunting
(2) II	Rufous-sided Towhee
(4)	California Towhee
	Lark Sparrow
	Savannah Sparrow
	Fox Sparrow
(19) IIII IIII IIII IIII	Song Sparrow
	Lincoln's Sparrow
	White-crowned Sparrow
	Red-winged Blackbird
	Western Meadowlark
	Brewer's Blackbird
(14) 4 2 2 2 2 2	Brown-headed Cowbird
	Hooded Oriole
	Northern Oriole
(8) 4 4	House Finch
	Pine Siskin
	Lesser Goldfinch
	Lawrence's Goldfinch
	American Goldfinch
	House Sparrow

Additional Species

S Slope
S Slope mmchnd

Bushel cluster 50 yds from fan palm in scrub.

BIRDS OF Santa Clara River System

Locality Blue Moon to Castaic Suzi Thurs. Date 5/21/98

Time ~~6:30–9:30 sunny~~

- Great Blue Heron
- Green Heron
- Mallard
- Cinnamon Teal
- Turkey Vulture
- (1) White-tailed Kite / carrying snake
- Sharp-shinned Hawk
- Cooper's Hawk
- Red-shouldered Hawk
- Red-tailed Hawk
- Golden Eagle
- (1) American Kestrel
- (17) 2 4 4 2 4 2 California Quail
- American Coot
- (6) 2 4 Killdeer
- (4) Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- (13) 6 3 4 Rock Dove
- (2) Mourning Dove
- **Yellow-billed Cuckoo**
- Greater Roadrunner
- Barn Owl
- (1) Great Horned Owl
- White-throated Swift
- (2) II Black-ch. Hummingbird
- (15) IIII/ 5 1 IIII/ Anna's Hummingbird
- Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- (6) I IIII/ Nuttall's Woodpecker
- (2) II Downy Woodpecker
- (2) II Hairy Woodpecker
- Northern Flicker
- Western Wood-Pewee
- Willow Flycatcher
- Hammond's Flycatcher
- Pacific Slope Flycatcher
- Black Phoebe
- Say's Phoebe
- (3) III Ash-throated Flycatcher
- **Brown-crested Flycatcher**
- Cassin's Kingbird
- (3) 2 1 Western Kingbird
- Horned Lark
- Tree Swallow
- Violet-green Swallow
- (11) 8 1 2 N. Rough-winged Swallow
- Bank Swallow
- (20) Cliff Swallow
- (2) II Barn Swallow
- (14) 4 2 4 1 2 Scrub Jay
- (2) II American Crow
- (7) 2 1 4 Common Raven
- Plain Titmouse
- (18) 2 2 6 2 6 Bushtit
- Rock Wren
- (34) 4 4 1 8 4 4 4 2 Bewick's Wren
- House Wren
- Ruby-crowned Kinglet
- Blue-gray Gnatcatcher
- (3) 2 1 Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- American Robin
- Wrentit
- (2) II Northern Mockingbird
- (3) III California Thrasher
- American Pipit
- (4) Cedar Waxwing
- (1) Phainopepla
- Loggerhead Shrike
- (20) 6 4 2 8 European Starling
- **Bell's Vireo**
- Solitary Vireo
- Warbling Vireo
- Orange-crowned Warbler
- (12) II 2 2 II 2 Yellow Warbler
- Yellow-rumped Warbler
- Black-th. Gray Warbler
- Townsend's Warbler
- MacGillivray's Warbler
- (4) 1 2 1 Common Yellowthroat
- Wilson's Warbler
- (2) II Yellow-breasted Chat
- **Summer Tanager**
- (1) Western Tanager
- (6) 1 IIII/ Black-headed Grosbeak
- Blue Grosbeak
- Lazuli Bunting
- (5) IIII/ Rufous-sided Towhee
- (15) IIII/ IIII/ IIII/ California Towhee
- Lark Sparrow
- Savannah Sparrow
- Fox Sparrow
- (32) 8 6 4 1 6 3 4 Song Sparrow
- Lincoln's Sparrow
- White-crowned Sparrow
- Red-winged Blackbird
- Western Meadowlark
- Brewer's Blackbird
- (6) 2 II 2 Brown-headed Cowbird
- Hooded Oriole
- Northern Oriole
- House Finch
- Pine Siskin
- (2) Lesser Goldfinch
- Lawrence's Goldfinch
- American Goldfinch
- House Sparrow

Additional Species

- 1 ~~Great Horned Owl~~
- 1 pond turtle

BIRDS OF Santa Clara River System

Locality OXNARD → CONSTANC **Date** 6-3 **Time** _____

_____ Great Blue Heron
_____ Green Heron
| Mallard
| Turkey Vulture
/ White-tailed Kite
_____ Sharp-shinned Hawk
_____ Cooper's Hawk
_____ Red-shouldered Hawk
_____ Red-tailed Hawk
_____ American Kestrel
|| California Quail
_____ American Coot
2 22 Killdeer
_____ Spotted Sandpiper
_____ Least Sandpiper
_____ Common Snipe
_____ Rock Dove
2 Mourning Dove
_____ Greater Roadrunner
_____ Barn Owl
_____ Great Horned Owl
_____ White-throated Swift
_____ Black-ch. Hummingbird
|| Anna's Hummingbird
_____ Costa's Hummingbird
_____ Belted Kingfisher
_____ Acorn Woodpecker
|| Nuttall's Woodpecker
_____ Downy Woodpecker
_____ Hairy Woodpecker
_____ Northern Flicker
_____ Western Wood-Pewee
_____ Willow Flycatcher
_____ Pacific Slope Flycatcher
IIII Black Phoebe
_____ Say's Phoebe
|| Ash-throated Flycatcher
_____ Cassin's Kingbird
_____ Western Kingbird
_____ Horned Lark
_____ Tree Swallow
_____ Violet-green Swallow
16 N. Rough-winged Swallow
4 Cliff Swallow
| Barn Swallow
III Scrub Jay
4 2 2 American Crow
15 28 Common Raven
2 Plain Titmouse
4 Bushtit
11 4 Bewick's Wren
|| House Wren
_____ Ruby-crowned Kinglet

_____ Blue-gray Gnatcatcher
| Western Bluebird
_____ Swainson's Thrush
_____ Hermit Thrush
_____ American Robin
| Wrentit
_____ Northern Mockingbird
| California Thrasher
_____ American Pipit
_____ Cedar Waxwing
_____ Phainopepla
_____ Loggerhead Shrike
3 European Starling
||| **Bell's Vireo** N Side
_____ Solitary Vireo
_____ Warbling Vireo 1 Nest 100 yds downstream from Palm
_____ Orange-crowned Warbler
|| Yellow Warbler
_____ Yellow-rumped Warbler
11 IIII Common Yellowthroat
_____ Wilson's Warbler
_____ Yellow-breasted Chat 1 South
_____ Western Tanager
IIII Black-headed Grosbeak 100 yds downstream
| Blue Grosbeak
_____ Lazuli Bunting
| IIII Rufous-sided Towhee
| California Towhee
_____ Lark Sparrow
_____ Savannah Sparrow all 3 together in willows
11 IIII IIII Song Sparrow
_____ Lincoln's Sparrow
_____ White-crowned Sparrow
_____ Red-winged Blackbird
_____ Western Meadowlark
_____ Brewer's Blackbird
2 || Brown-headed Cowbird
_____ Hooded Oriole
_____ Northern Oriole
_____ House Finch
_____ Pine Siskin
_____ Lesser Goldfinch
_____ Lawrence's Goldfinch
_____ American Goldfinch
_____ House Sparrow

BIRDS OF Santa Clara River System

SUGDEN

Locality Blue Moon 1/18 Castaic Date 6/3/98

Time

- Great Blue Heron
- Green Heron
- Mallard
- Cinnamon Teal
- Turkey Vulture
- White-tailed Kite
- Sharp-shinned Hawk
- Cooper's Hawk
- Red-shouldered Hawk
- 2 Red-tailed Hawk
- Golden Eagle
- American Kestrel
- 26 California Quail
- American Coot
- 16 Killdeer
- Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- 34 Rock Dove
- 4 Mourning Dove
- **Yellow-billed Cuckoo**
- Greater Roadrunner
- Barn Owl
- Great Horned Owl
- White-throated Swift
- Black-ch. Hummingbird
- IIII Anna's Hummingbird
- Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- 2222 Nuttall's Woodpecker
- Downy Woodpecker
- III Hairy Woodpecker
- Northern Flicker
- Western Wood-Pewee
- Willow Flycatcher
- Hammond's Flycatcher
- Pacific Slope Flycatcher
- II Black Phoebe
- Say's Phoebe
- 11 Ash-throated Flycatcher
- **Brown-crested Flycatcher**
- Cassin's Kingbird
- Western Kingbird
- Horned Lark
- Tree Swallow mating
- 2 Violet-green Swallow
- 8 N. Rough-winged Swallow
- Bank Swallow
- 50, 2 Cliff Swallow
- Barn Swallow
- IIII Scrub Jay
- American Crow
- III 4224 Common Raven
- II Plain Titmouse
- 8 Bushtit
- Rock Wren
- 62 44 Bewick's Wren
- House Wren
- Ruby-crowned Kinglet
- Blue-gray Gnatcatcher
- Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- American Robin
- 2 Wrentit
- Northern Mockingbird
- I California Thrasher
- American Pipit
- Cedar Waxwing
- I Phainopepla
- Loggerhead Shrike
- 8, 8, 40 European Starling
- **Bell's Vireo**
- Solitary Vireo
- Warbling Vireo
- Orange-crowned Warbler
- III Yellow Warbler
- Yellow-rumped Warbler
- Black-th. Gray Warbler
- Townsend's Warbler
- MacGillivray's Warbler
- 8 III Common Yellowthroat
- Wilson's Warbler
- 4 Yellow-breasted Chat
- **Summer Tananger**
- Western Tanager
- III Black-headed Grosbeak
- Blue Grosbeak
- 1 Lazuli Bunting
- 4 III Rufous-sided Towhee
- III 11 California Towhee
- Lark Sparrow
- Savannah Sparrow
- Fox Sparrow
- 888 48 68 Song Sparrow
- Lincoln's Sparrow
- White-crowned Sparrow
- Red-winged Blackbird
- Western Meadowlark
- Brewer's Blackbird
- 2 2 Brown-headed Cowbird
- Hooded Oriole
- I Northern Oriole
- 4 House Finch
- Pine Siskin
- 3 Lesser Goldfinch
- Lawrence's Goldfinch
- American Goldfinch
- House Sparrow

Additional Species

1 6" Tan Rock fish

1 Great Egret

BIRDS OF Santa Clara River System Saturday

Locality Bluebloom to Castaic (mostly southside) **Date** 6/15/13 **Time** 7

	Great Blue Heron		Blue-gray Gnatcatcher
	Green Heron	3	Western Bluebird 1 juv.
	Mallard		Swainson's Thrush
	Turkey Vulture		Hermit Thrush
3	White-tailed Kite		American Robin
	Sharp-shinned Hawk	4	Wrentit
1	Cooper's Hawk		Northern Mockingbird
2	Red-shouldered Hawk	3	California Thrasher
2	Red-tailed Hawk		American Pipit
	American Kestrel		Cedar Waxwing
19	California Quail		Phainopepla
	American Coot		Loggerhead Shrike
11	Killdeer	3	European Starling
	Spotted Sandpiper		**Bell's Vireo**
	Least Sandpiper		Solitary Vireo
	Common Snipe		Warbling Vireo
25	Rock Dove		Orange-crowned Warbler
9	Mourning Dove	1	Yellow Warbler
	Greater Roadrunner		Yellow-rumped Warbler
	Barn Owl	7	Common Yellowthroat
	Great Horned Owl		Wilson's Warbler
	White-throated Swift	2	Yellow-breasted Chat
	Black-ch. Hummingbird		Western Tanager
2	Anna's Hummingbird	4	Black-headed Grosbeak
	Costa's Hummingbird		Blue Grosbeak
	Belted Kingfisher	2	Lazuli Bunting
	Acorn Woodpecker	5	Rufous-sided Towhee
1	Nuttall's Woodpecker	5	California Towhee
	Downy Woodpecker		Lark Sparrow
	Hairy Woodpecker		Savannah Sparrow
cl. 1 juvenile 3	Northern Flicker	25	Song Sparrow
	Western Wood-Pewee		Lincoln's Sparrow
	Willow Flycatcher		White-crowned Sparrow
	Pacific Slope Flycatcher		Red-winged Blackbird
2	Black Phoebe		Western Meadowlark
	Say's Phoebe		Brewer's Blackbird
8	Ash-throated Flycatcher	2	Brown-headed Cowbird
	Cassin's Kingbird		Hooded Oriole
2	Western Kingbird	2	Northern Oriole
	Horned Lark	18	House Finch
	Tree Swallow		Pine Siskin
	Violet-green Swallow	2	Lesser Goldfinch
34	N. Rough-winged Swallow		Lawrence's Goldfinch
47	Cliff Swallow		American Goldfinch
	Barn Swallow		House Sparrow
14	Scrub Jay		
8	American Crow		
5	Common Raven		
1	Plain Titmouse		
12	Bushtit		
17	Bewick's Wren		
2	House Wren		
	Ruby-crowned Kinglet		

Single

BIRDS OF Santa Clara River System

Locality Fwy to Blue Moon **Date** 6/13/98 **Time** _____

- _____ Great Blue Heron
- 1 Green Heron
- _____ Mallard
- _____ Turkey Vulture
- _____ White-tailed Kite
- _____ Sharp-shinned Hawk
- _____ Cooper's Hawk
- _____ Red-shouldered Hawk
- 2 Red-tailed Hawk
- _____ American Kestrel
- _____ California Quail
- _____ American Coot
- 12 Killdeer
- 2 Spotted Sandpiper
- _____ Least Sandpiper
- _____ Common Snipe
- _____ Rock Dove
- _____ Mourning Dove
- _____ Greater Roadrunner
- _____ Barn Owl
- _____ Great Horned Owl
- _____ White-throated Swift
- 1 Black-ch. Hummingbird
- 4 Anna's Hummingbird
- _____ Costa's Hummingbird
- _____ Belted Kingfisher
- _____ Acorn Woodpecker
- 1 Nuttall's Woodpecker
- 2 Downy Woodpecker
- 1 Hairy Woodpecker
- _____ Northern Flicker
- _____ Western Wood-Pewee
- _____ Willow Flycatcher
- _____ Pacific Slope Flycatcher
- 2 Black Phoebe
- _____ Say's Phoebe
- 3 Ash-throated Flycatcher
- _____ Cassin's Kingbird
- _____ Western Kingbird
- _____ Horned Lark
- _____ Tree Swallow
- _____ Violet-green Swallow
- 25 N. Rough-winged Swallow
- _____ Cliff Swallow
- _____ Barn Swallow
- 2 Scrub Jay
- 6 American Crow
- 12 Common Raven
- _____ Plain Titmouse
- 10 Bushtit
- 12 Bewick's Wren
- 1 House Wren
- _____ Ruby-crowned Kinglet
- _____ Blue-gray Gnatcatcher
- _____ Western Bluebird
- _____ Swainson's Thrush
- _____ Hermit Thrush
- _____ American Robin
- _____ Wrentit
- _____ Northern Mockingbird
- 2 California Thrasher
- _____ American Pipit
- _____ Cedar Waxwing
- _____ Phainopepla
- _____ Loggerhead Shrike
- 8 European Starling
- 1 **Bell's Vireo**
- _____ Solitary Vireo
- _____ Warbling Vireo
- _____ Orange-crowned Warbler
- 1 Yellow Warbler
- _____ Yellow-rumped Warbler
- 12 Common Yellowthroat
- _____ Wilson's Warbler
- _____ Yellow-breasted Chat
- _____ Western Tanager
- 1 Black-headed Grosbeak
- _____ Blue Grosbeak
- _____ Lazuli Bunting
- 2 Rufous-sided Towhee
- 1 California Towhee
- _____ Lark Sparrow
- _____ Savannah Sparrow
- 14 Song Sparrow
- _____ Lincoln's Sparrow
- _____ White-crowned Sparrow
- _____ Red-winged Blackbird
- _____ Western Meadowlark
- _____ Brewer's Blackbird
- 4 Brown-headed Cowbird
- _____ Hooded Oriole
- _____ Northern Oriole
- 8 House Finch
- _____ Pine Siskin
- 2 Lesser Goldfinch
- _____ Lawrence's Goldfinch
- _____ American Goldfinch
- _____ House Sparrow

- 1 white breasted nuthatch (sewer pond stream)

BIRDS OF Santa Clara River System

Locality old Mtn Blue Mtn Date 7/21 Time _____

1	Great Blue Heron
	Green Heron
2 1	Mallard
	Turkey Vulture
	White-tailed Kite
	Sharp-shinned Hawk
	Cooper's Hawk
1	Red-shouldered Hawk
1	Red-tailed Hawk
	American Kestrel
	California Quail
	American Coot
2	Killdeer
	Spotted Sandpiper
	Least Sandpiper
	Common Snipe
	Rock Dove
	Mourning Dove
	Greater Roadrunner
	Barn Owl
	Great Horned Owl
	White-throated Swift
	Black-ch. Hummingbird
	Anna's Hummingbird
	Costa's Hummingbird
	Belted Kingfisher
	Acorn Woodpecker
4 1	Nuttall's Woodpecker
1	Downy Woodpecker
	Hairy Woodpecker
	Northern Flicker
	Western Wood-Pewee
	Willow Flycatcher
	Pacific Slope Flycatcher
1 1	Black Phoebe
	Say's Phoebe
1 1 1	Ash-throated Flycatcher
	Cassin's Kingbird
	Western Kingbird
	Horned Lark
	Tree Swallow
	Violet-green Swallow
1	N. Rough-winged Swallow
	Cliff Swallow
	Barn Swallow
1 1	Scrub Jay
1	American Crow
2 1	Common Raven
	Plain Titmouse
2	Bushtit
1 1	Bewick's Wren
	House Wren
	Ruby-crowned Kinglet

	Blue-gray Gnatcatcher
	Western Bluebird
	Swainson's Thrush
	Hermit Thrush
	American Robin
	Wrentit
	Northern Mockingbird
1	California Thrasher
	American Pipit
	Cedar Waxwing
	Phainopepla
	Loggerhead Shrike
	European Starling
	Bell's Vireo
	Solitary Vireo
	Warbling Vireo
	Orange-crowned Warbler
	Yellow Warbler
	Yellow-rumped Warbler
2	Common Yellowthroat
	Wilson's Warbler
1	Yellow-breasted Chat
	Western Tanager
1 1	Black-headed Grosbeak
	Blue Grosbeak
	Lazuli Bunting
1 1	Rufous-sided Towhee
3 1 1	California Towhee
2	Lark Sparrow
	Savannah Sparrow
1 1 1 1	Song Sparrow
	Lincoln's Sparrow
	White-crowned Sparrow
	Red-winged Blackbird
	Western Meadowlark
	Brewer's Blackbird
	Brown-headed Cowbird
	Hooded Oriole
	Northern Oriole
6 3 1	House Finch
	Pine Siskin
2	Lesser Goldfinch
	Lawrence's Goldfinch
	American Goldfinch
	House Sparrow
	_____
	_____
	_____
	_____
	_____
	_____

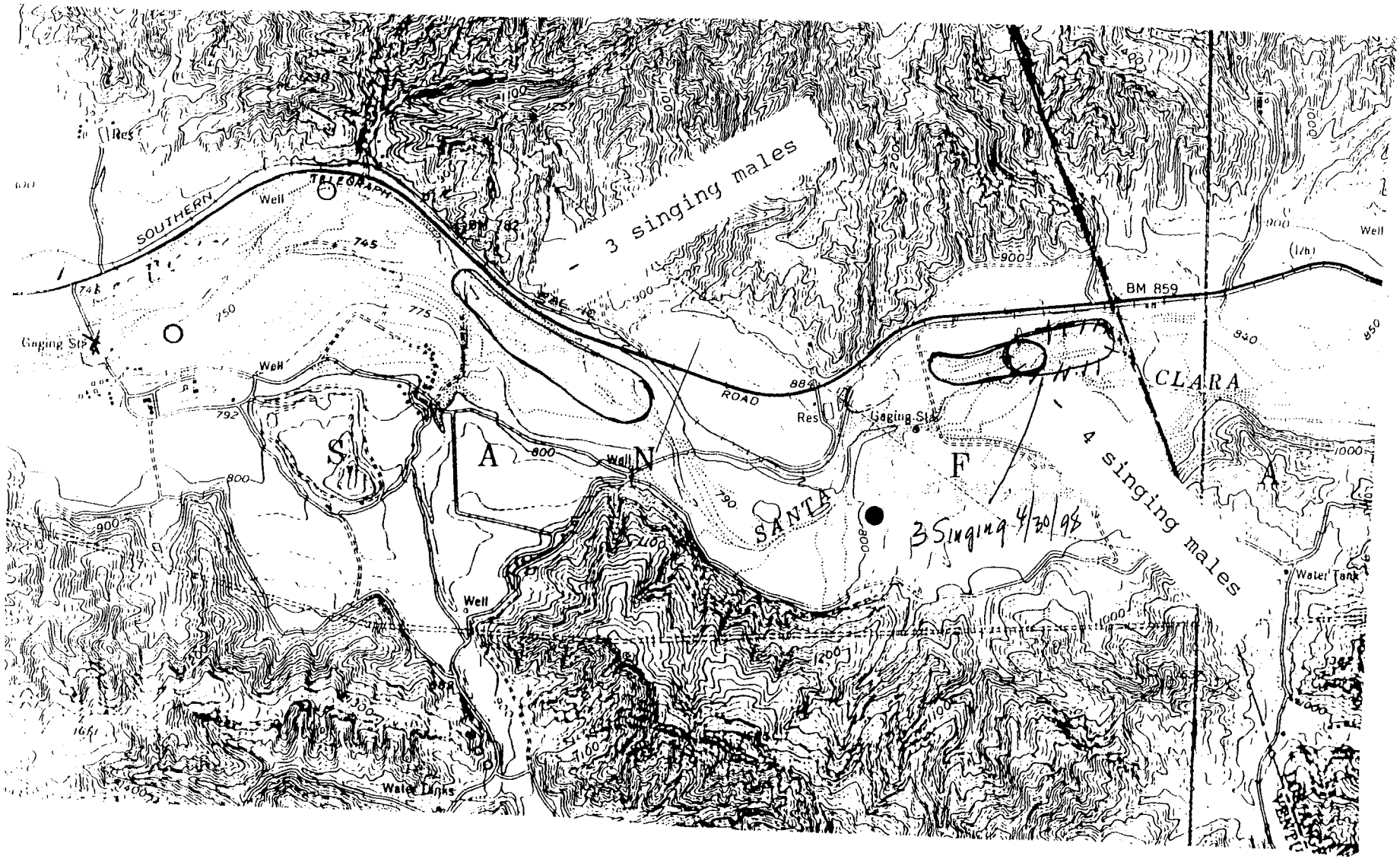
Sugden

BIRDS OF Santa Clara River System

Locality Blue Moon to Castaic **Date** 7/20/98 **Time** _____

- 1 Great Blue Heron
- 1 Green Heron
- Mallard
- Turkey Vulture
- 2 White-tailed Kite
- Sharp-shinned Hawk
- 1 Cooper's Hawk
- Red-shouldered Hawk
- 2 Red-tailed Hawk
- American Kestrel
- 4, 2, 2, 8, 24 California Quail
- American Coot
- 3, 2 Killdeer
- Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- Rock Dove
- 30, 25, 42, 12 Mourning Dove
- Greater Roadrunner
- Barn Owl
- Great Horned Owl
- White-throated Swift
- Black-ch. Hummingbird
- 2 Anna's Hummingbird
- Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- 2 Nuttall's Woodpecker
- 1 Downy Woodpecker
- Hairy Woodpecker
- 1 Northern Flicker
- Western Wood-Pewee
- Willow Flycatcher
- Pacific Slope Flycatcher
- 3 Black Phoebe
- Say's Phoebe
- 2, 2 Ash-throated Flycatcher
- Cassin's Kingbird
- 2 Western Kingbird
- Horned Lark
- 1 Tree Swallow
- Violet-green Swallow
- 2 N. Rough-winged Swallow
- Cliff Swallow
- Barn Swallow
- 4, 1, 3, 2, 4 Scrub Jay
- 2 American Crow
- 1, 1, 2 Common Raven
- Plain Titmouse
- Bushtit
- 4, 4, 4, 1, 2 Bewick's Wren
- 1, 2 House Wren
- Ruby-crowned Kinglet
- Blue-gray Gnatcatcher
- 4, 2 Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- American Robin
- 2 Wrentit
- Northern Mockingbird
- 1 California Thrasher
- American Pipit
- Cedar Waxwing
- 1, 1, 7 Phainopepla
- Loggerhead Shrike
- 26 European Starling
- **Bell's Vireo**
- Solitary Vireo
- Warbling Vireo
- Orange-crowned Warbler
- 1 Yellow Warbler
- Yellow-rumped Warbler
- 6, 7 Common Yellowthrat
- Wilson's Warbler
- Yellow-breasted Chat
- Western Tanager
- 1, 2, 6, 2 Black-headed Grosbeak
- Blue Grosbeak
- Lazuli Bunting
- 14, 4, 5, 7 Rufous-sided Towhee
- 5, 2, 1, 4 California Towhee
- 1 Lark Sparrow
- Savannah Sparrow
- 20, 15, 8, 6, 10, 5, 2 Song Sparrow
- Lincoln's Sparrow
- White-crowned Sparrow
- Red-winged Blackbird
- Western Meadowlark
- Brewer's Blackbird
- 2, 2 Brown-headed Cowbird
- 1, 1, 2 Hooded Oriole
- 2 Northern Oriole
- 10, 50, 8, 6, 8, 6 House Finch
- Pine Siskin
- 4, 6, 4 Lesser Goldfinch
- Lawrence's Goldfinch
- 1 American Goldfinch
- House Sparrow

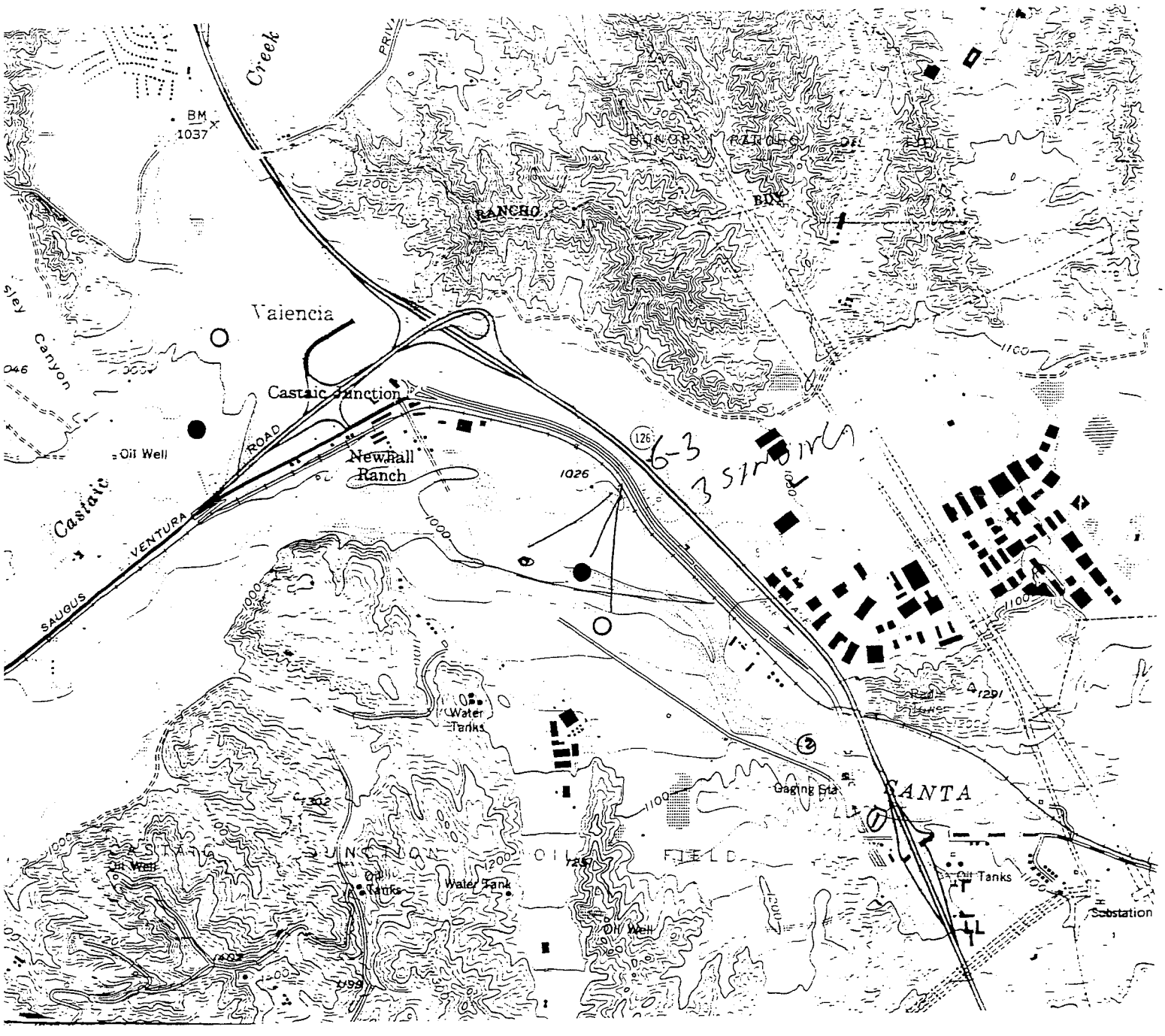
Figure 1. Location of Least Bell's Vireos and Yellow-billed Cuckoo sightings in 1997



● - Yellow-billed Cuckoo

○ - Least Bell's Vireo

Figure 2. Location of Least Bell's Vireo Sightings in 1996 and 1997



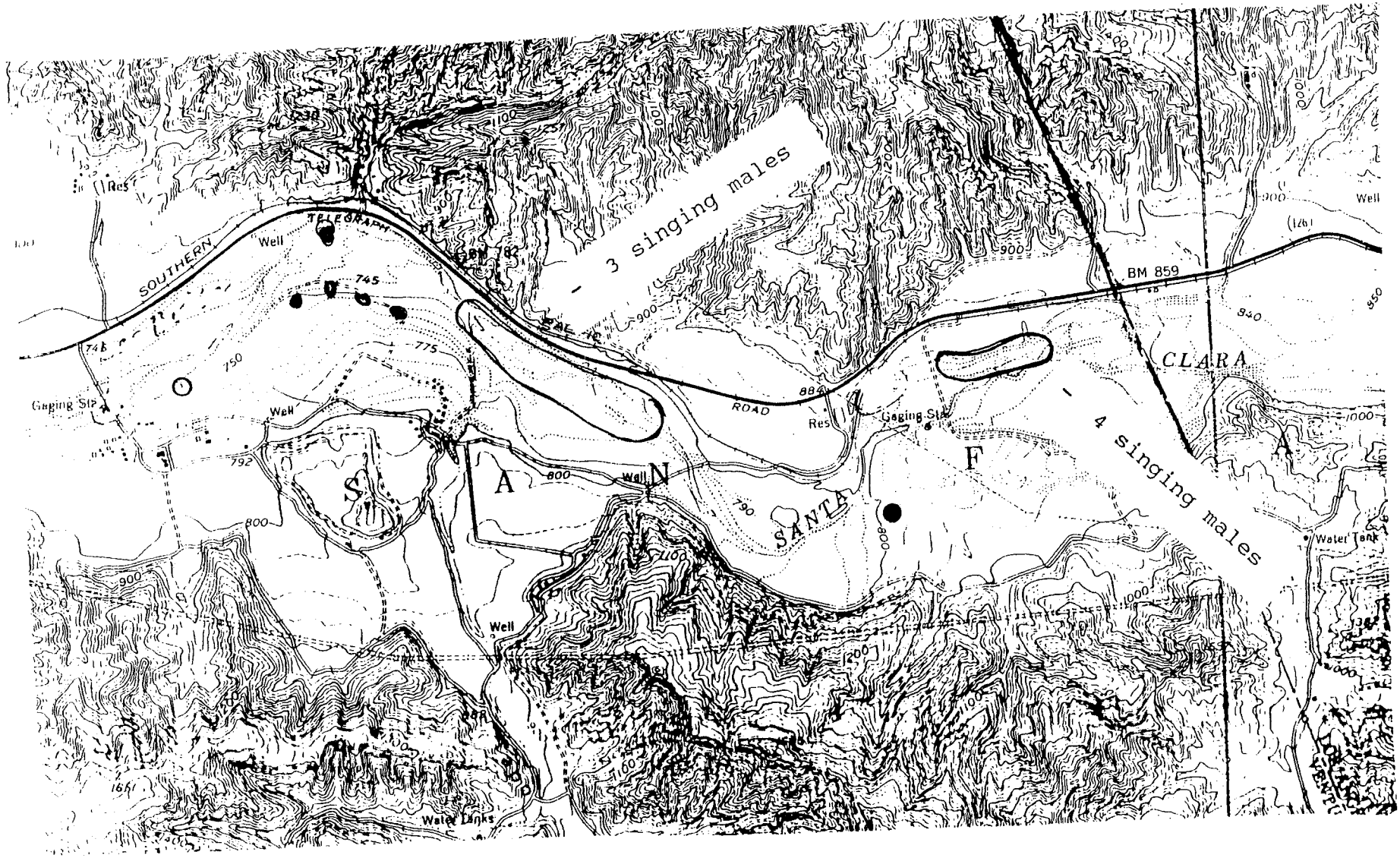
● Location of 1997 sightings

○ Location of 1996 sightings

6/3
3 singing

Judy 6/16/98

Figure 1. Location of Least Bell's Vireos and Yellow-billed Cuckoo sightings in 1997



● - Yellow-billed Cuckoo

○ - Least Bell's Vireo

SANTA CLARA RIVER – LEAST BELL'S VIREO SURVEY

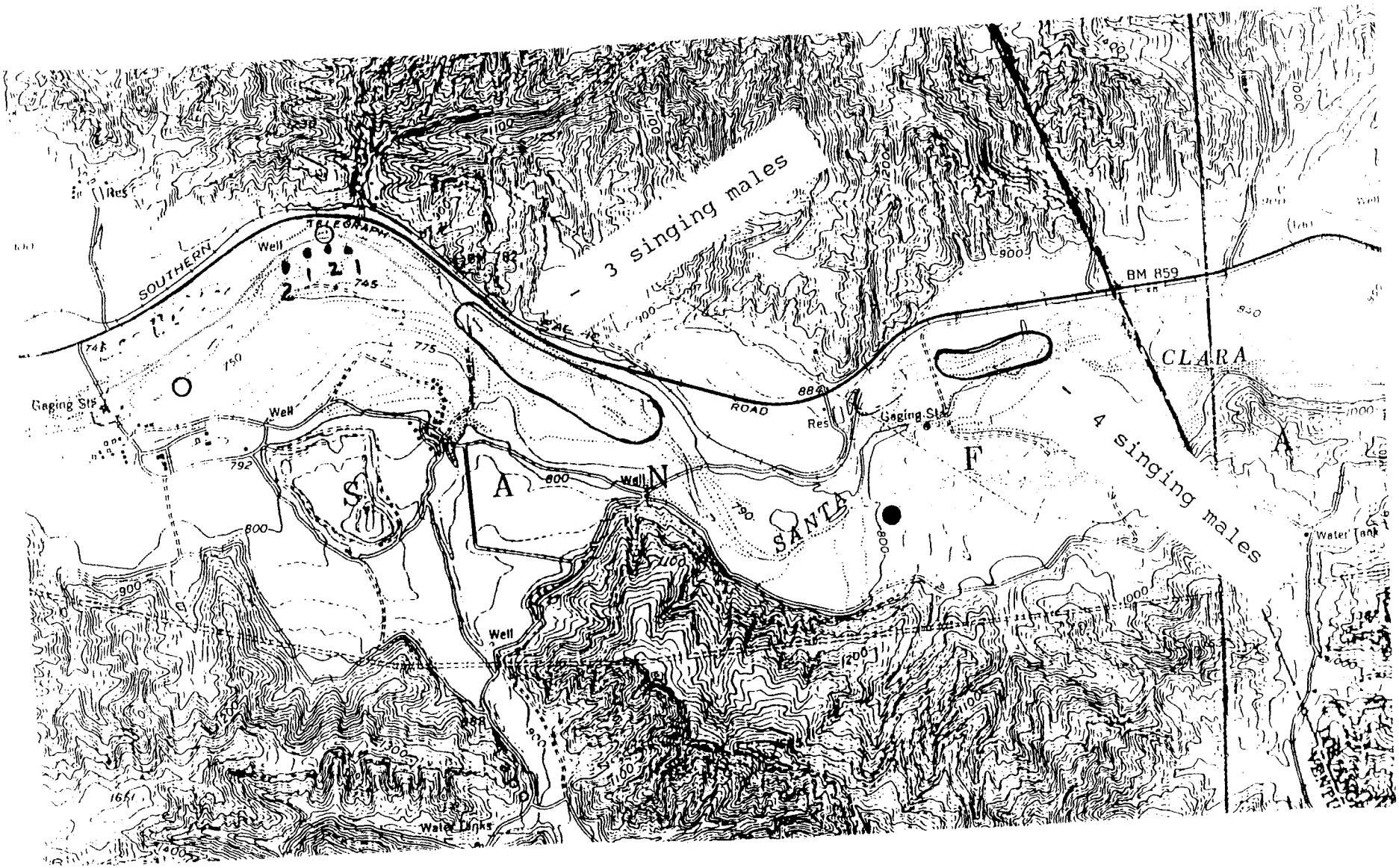
6 July 1998 Lower Santa Clara River, Ventura County

Marcy and I walked the river between the Los Brisos Bridge and slightly beyond the the bend opposite the canyon that comes in from the north. We found four singing birds along the south side of the river as shown on the attached map. Two of these were paired so there was a total of six vireos. The vireo near the bridge (aka the "ranch house vireo") was not in evidence.

We did not keep track of birds but did make note of the following:

1. One white-tailed kite.
2. Three to four common ground-doves slightly downstream from the vireos.
3. One ring-necked pheasant in the same area as the ground-doves.

I ure 1. Location of Least Bell's Vireos a Yellow-billed Cuckoo
sightings in 1997

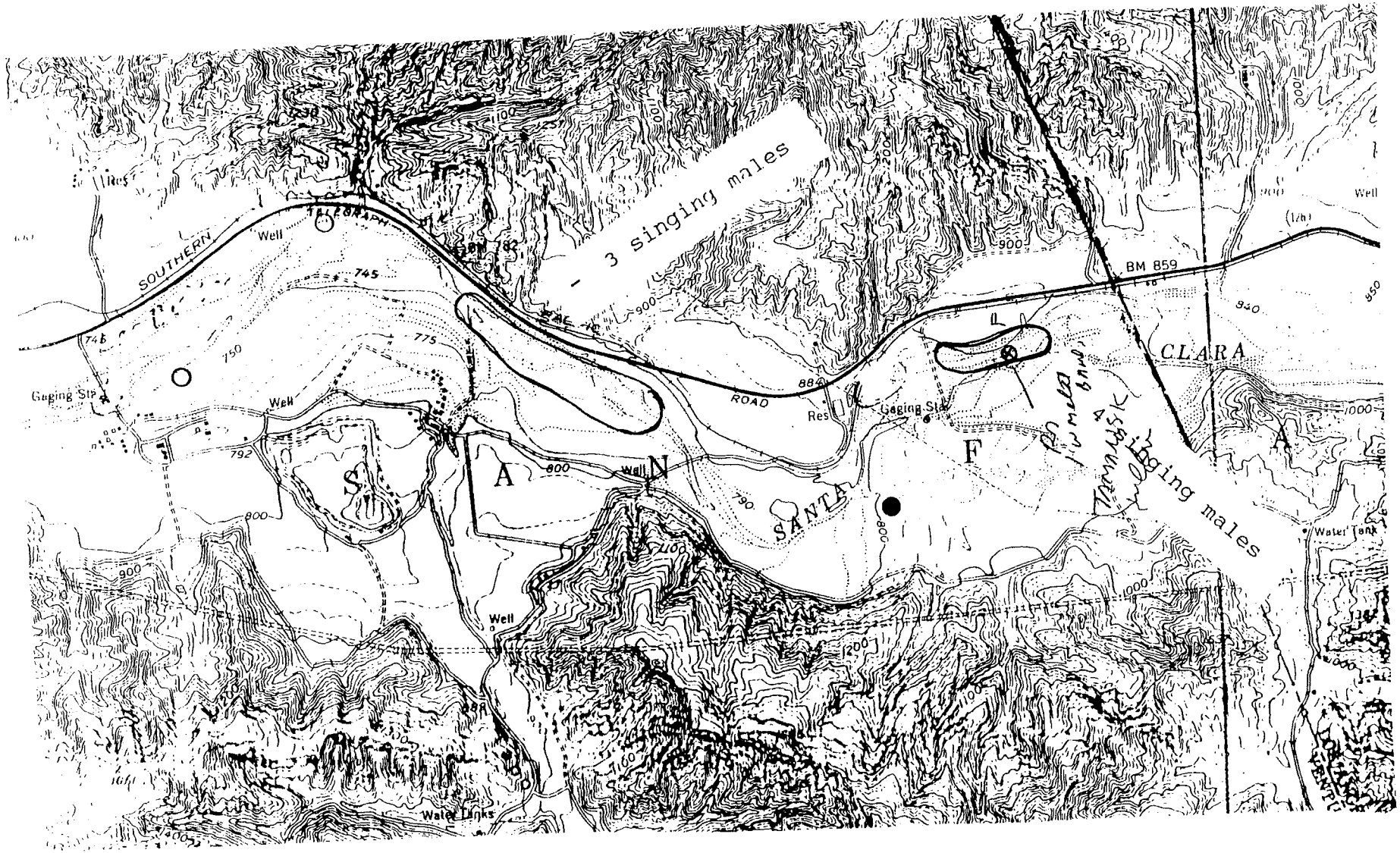


● - Yellow-billed Cuckoo

○ - Least Bell's Vireo

● - Location & number of vireos 7/6/98

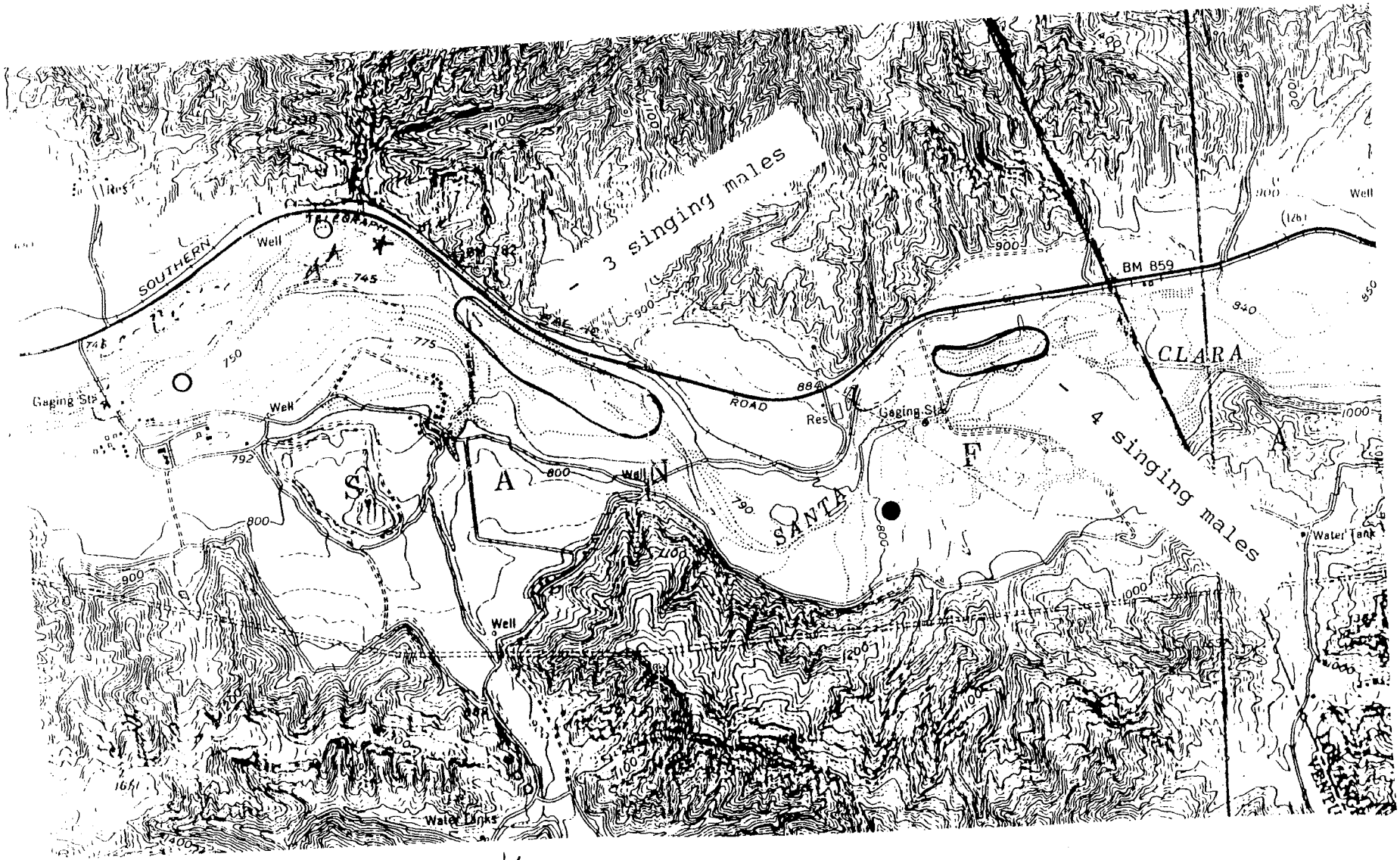
Figure 1. Location of Least Bell's Vireos and Yellow-billed Cuckoo sightings in 1997



● - Yellow-billed Cuckoo

○ - Least Bell's Vireo

Figure 1. Location of Least Bell's Vireos and Yellow-billed Cuckoo sightings in 1997

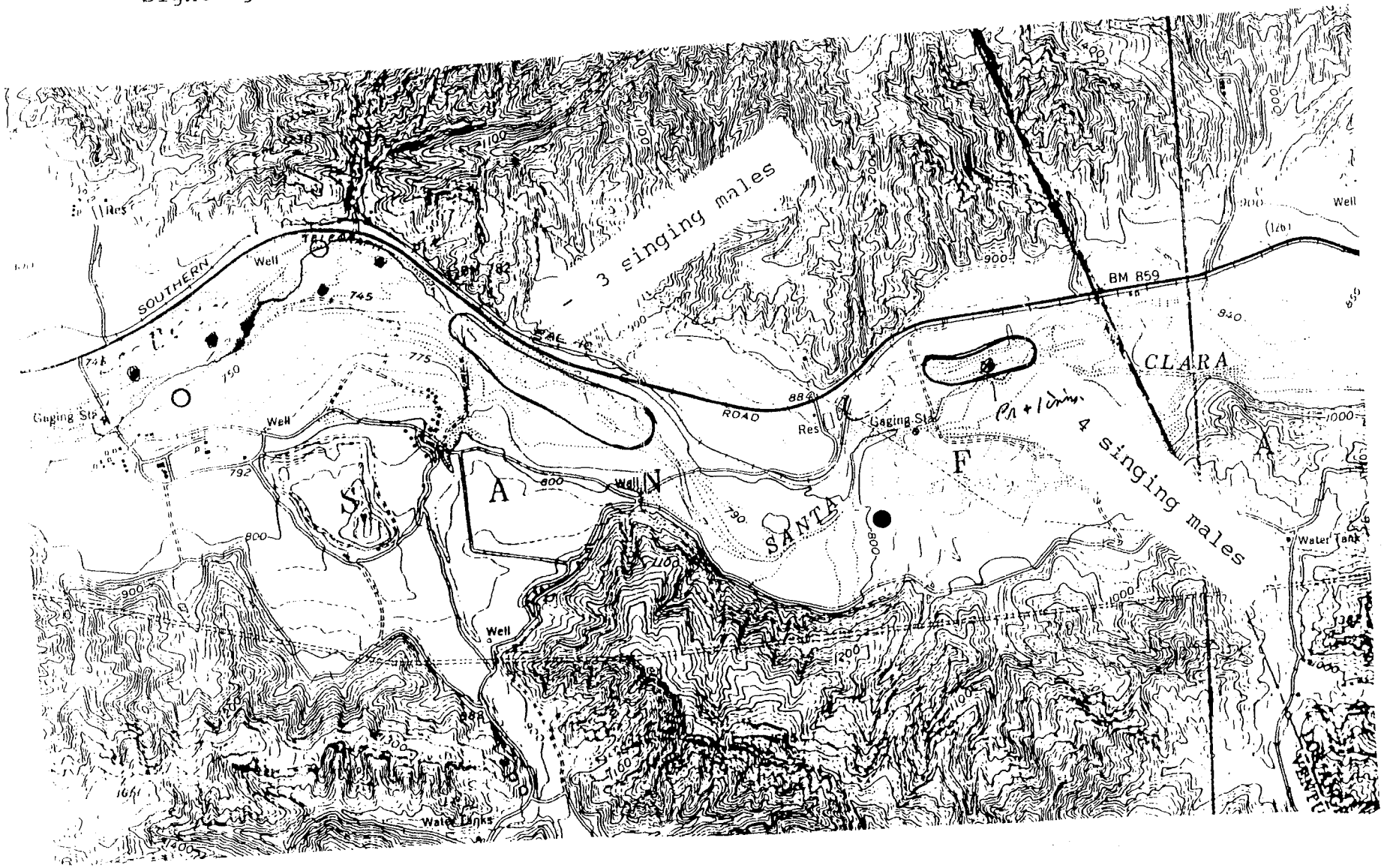


● - Yellow-billed Cuckoo

○ - Least Bell's Vireo

✱ - 5/15/98 - high water

Figure 1. Location of Least Bell's Vireos and Yellow-billed Cuckoo sightings in 1997

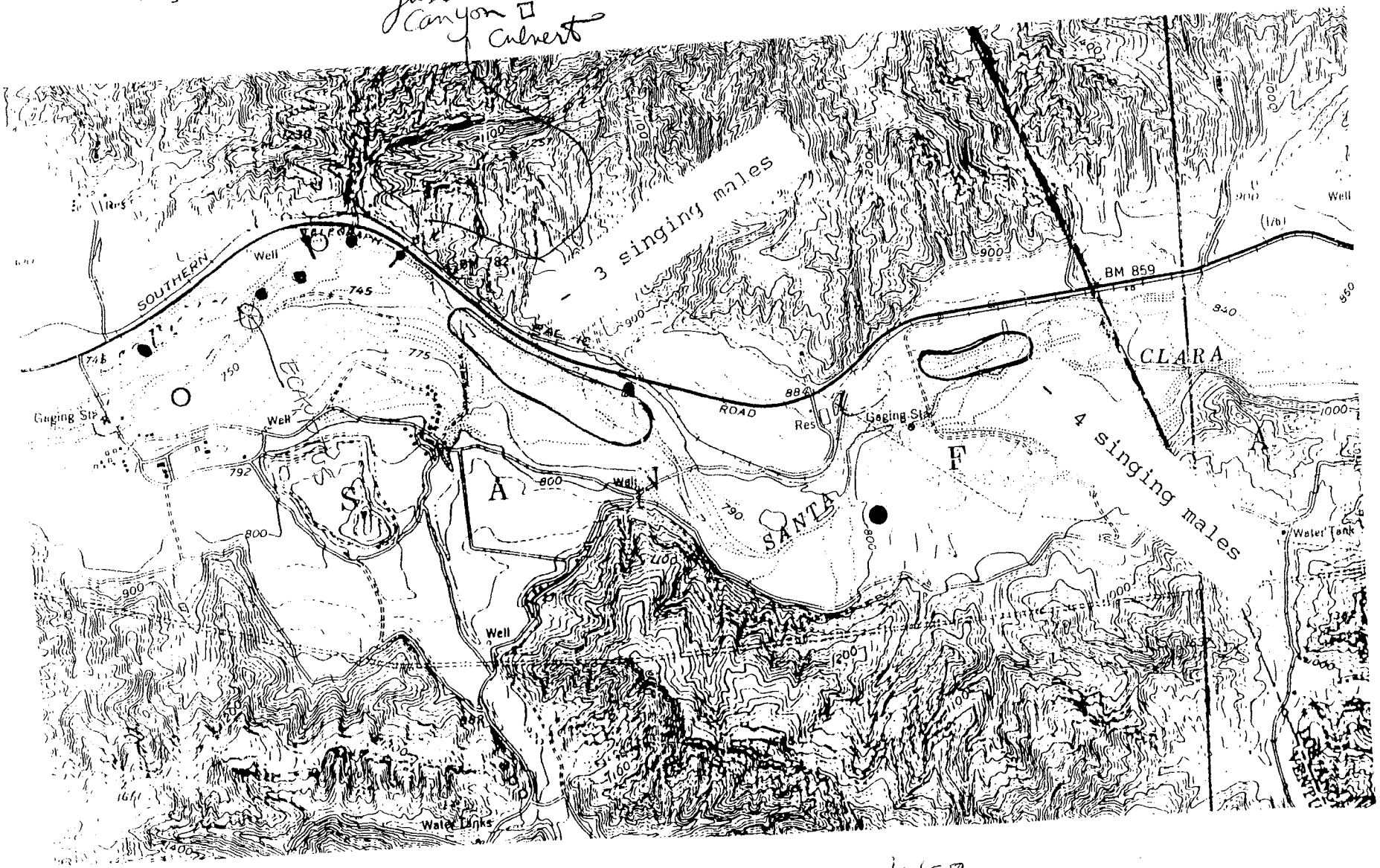


● - Yellow-billed Cuckoo

○ - Least Bell's Vireo

5/27/96

Figure 1. Location of Least Bell's Vireos and Yellow-billed Cuckoo sightings in 1997



7-2-98

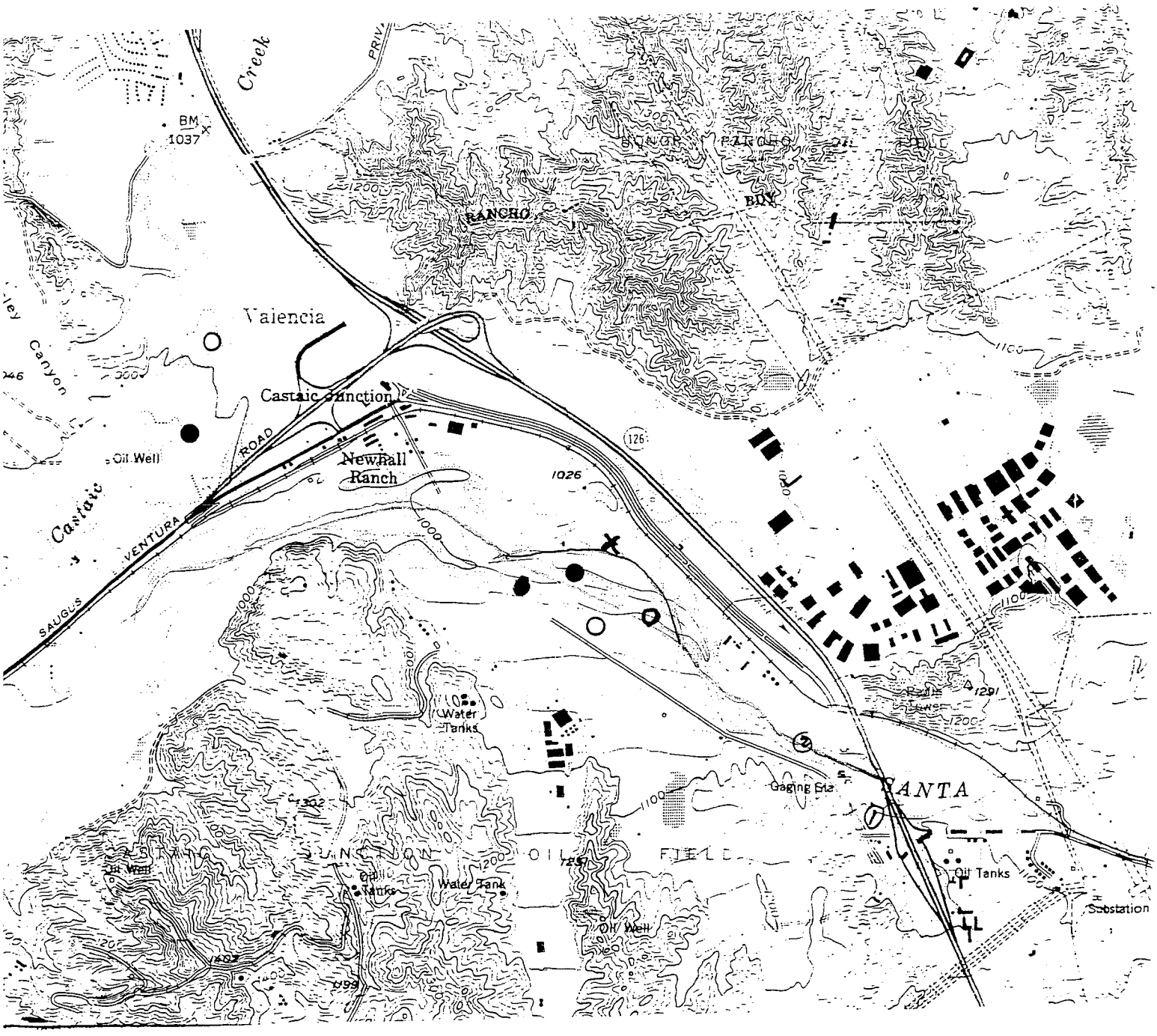
SANTA CLARA RIVER – LEAST BELL'S VIREO SURVEY

2 July 1998 Blue Moon Saloon vicinity
Marcy and I walked the main channel, the new berm and the old channel. Three vireos were found as shown on the attached map. The single vireo was heard singing twice. The pair were actively feeding in the willows; the male singing.

We did not keep track of birds but did make note of the following:
1. Juvenile white-tailed kite
2. A few Lazuli buntings feeding in the water cress and clover along the old channel
3. MOST IMPORTANT: Spotted sandpiper adult calling repeatedly and a downy chick trying to hide in the weeds along the old channel. First definite evidence of breeding.

2 July 1998 County Line vicinity
Marcy and I searched diligently for an hour in the area at the county line where vireos have occurred in past years and were seen on early 1998 surveys. We found no evidence of vireos.

Figure 2. Location of Least Bell's Vireo Sightings in 1996 and 1997



● Location of 1997 sightings

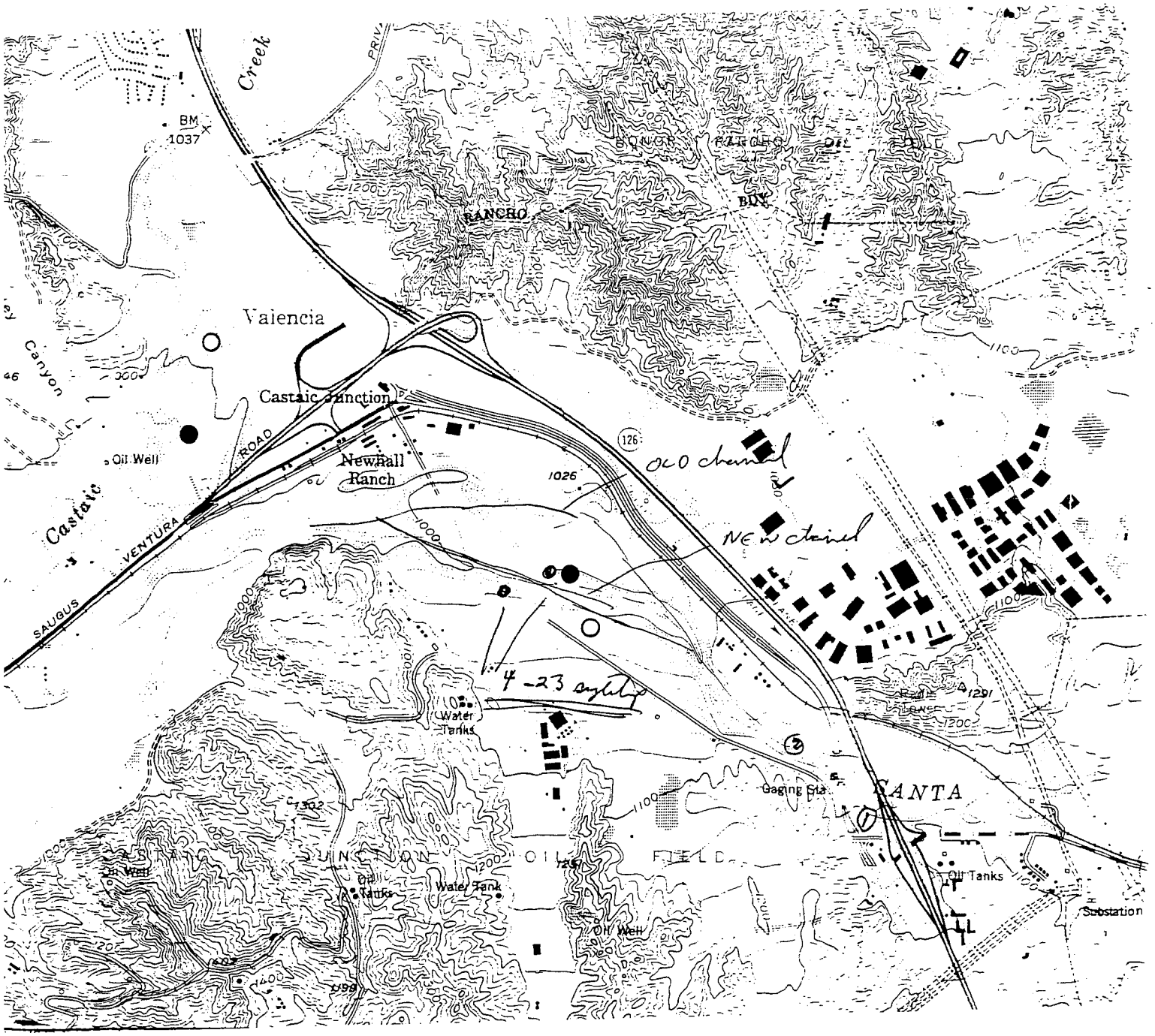
○ Location of 1996 sightings

◐ 2 July 1998 Least Bell's Vireo ♂

◉ 2 July 1998 Least Bell's Vireo ♂ & ♀

× 2 July 1998 Adult and downy chick Spotted Sandpiper

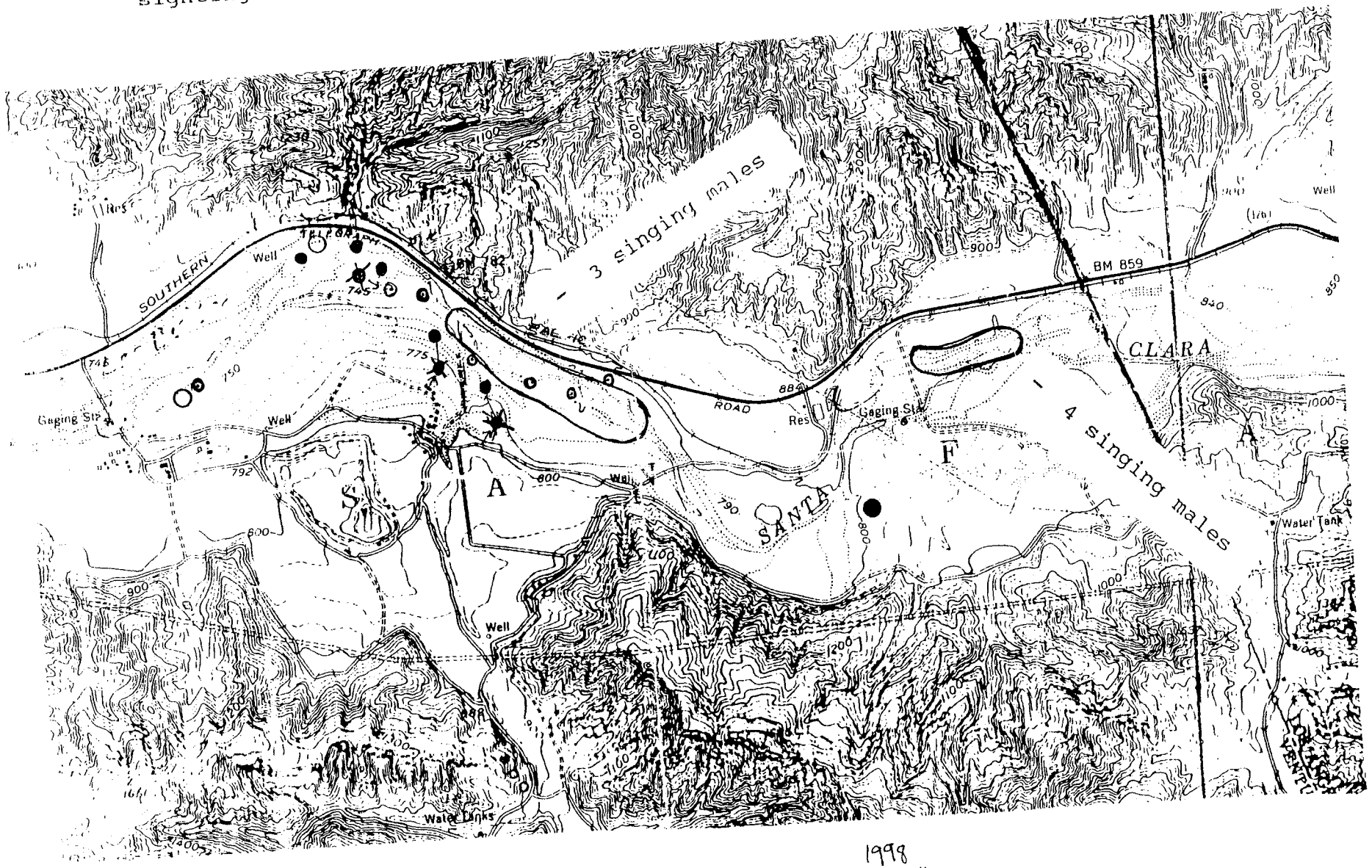
Figure 2. Location of Least Bell's Vireo Sightings in 1996 and 1997



● Location of 1997 sightings

○ Location of 1996 sightings

Figure 1. Location of Least Bell's Vireos and Yellow-billed Cuckoo sightings in 1997



S SIDE.

BIRDS OF Santa Clara River System

Locality McBean → Old Rd Date 4/11 Time 630 –

- ______ Great Blue Heron
- ______ Green Heron
- (2) Mallard P
- ______ Turkey Vulture
- ______ White-tailed Kite
- ______ Sharp-shinned Hawk
- ______ Cooper's Hawk
- ______ Red-shouldered Hawk
- (1) Red-tailed Hawk
- (1) American Kestrel
- ______ California Quail
- ______ American Coot
- (2) Killdeer
- ______ Spotted Sandpiper
- (1) Least Sandpiper
- ______ Common Snipe
- ______ Rock Dove
- (1) Mourning Dove
- ______ Greater Roadrunner
- ______ Barn Owl
- ______ Great Horned Owl
- ______ White-throated Swift
- ______ Black-ch. Hummingbird
- (2) 11 Anna's Hummingbird
- ______ Costa's Hummingbird
- ______ Belted Kingfisher
- ______ Acorn Woodpecker
- (2) 11 Nuttall's Woodpecker
- ______ Downy Woodpecker
- ______ Hairy Woodpecker
- ______ Northern Flicker
- ______ Western Wood-Pewee
- ______ Willow Flycatcher
- ______ Pacific Slope Flycatcher
- (3) 111 Black Phoebe
- ______ Say's Phoebe
- (3) 111 Ash-throated Flycatcher
- ______ Cassin's Kingbird
- (1) Western Kingbird
- ______ Horned Lark
- (1) Tree Swallow T
- ______ Violet-green Swallow
- (16) N. Rough-winged Swallow
- ______ Cliff Swallow
- ______ Barn Swallow
- (11) 2 11 2 2 111 Scrub Jay
- (3) 2 1 American Crow
- (2) 2 Common Raven
- (14) 2 2 1 2 1 2 2 Plain Titmouse
- ______ Bushtit
- 1111 1111 1111 1111 Bewick's Wren 1111 1111 1111
- (13) 111 1111 1111 House Wren
- ______ Ruby-crowned Kinglet
- ______ Blue-gray Gnatcatcher
- (3) 2 1 Western Bluebird
- ______ Swainson's Thrush
- ______ Hermit Thrush
- ______ American Robin
- ______ Wrentit
- ______ Northern Mockingbird
- (2) 11 California Thrasher
- ______ American Pipit
- ______ Cedar Waxwing
- ______ Phainopepla
- ______ Loggerhead Shrike
- (21) 6 6 3 2 1 1 2 European Starling
- ______ **Bell's Vireo**
- ______ Solitary Vireo
- (1) Warbling Vireo
- (1) Orange-crowned Warbler
- ______ Yellow Warbler
- (9) 2 1 2 3 Yellow-rumped Warbler
- ______ Common Yellowthroat
- (2) 11 Wilson's Warbler
- ______ Yellow-breasted Chat
- ______ Western Tanager
- (5) 1111 Black-headed Grosbeak
- ______ Blue Grosbeak
- ______ Lazuli Bunting
- (1) Rufous-sided Towhee
- (8) 2 2 2 2 California Towhee
- ______ Lark Sparrow
- ______ Savannah Sparrow
- (26) 1 1111 1111 1111 1111 1111 Song Sparrow
- ______ Lincoln's Sparrow
- (4) 2 2 White-crowned Sparrow
- ______ Red-winged Blackbird
- ______ Western Meadowlark
- ______ Brewer's Blackbird
- (9) 1 4 2 2 Brown-headed Cowbird
- ______ Hooded Oriole
- (2) 11 Northern Oriole
- (13) 3 3 3 4 House Finch
- ______ Pine Siskin
- ______ Lesser Goldfinch
- ______ Lawrence's Goldfinch
- (14) 6 9 American Goldfinch
- ______ House Sparrow

All Sheasville veg seen – Cottonwood + willow + Baccharis –

N SIDE.

BIRDS OF Santa Clara River System

Locality McBean → Cold Rd. **Date** 4/23 **Time** 630→

- ____ Great Blue Heron
- ____ Green Heron
- (4) 22 Mallard
- ____ Turkey Vulture
- (1) White-tailed Kite
- ____ Sharp-shinned Hawk
- (1) Cooper's Hawk
- ____ Red-shouldered Hawk
- ____ Red-tailed Hawk
- ____ American Kestrel
- (4) 2 11 California Quail
- ____ American Coot
- (5) 112 Killdeer
- ____ Spotted Sandpiper
- ____ Least Sandpiper
- ____ Common Snipe
- (2) Rock Dove
- ____ Mourning Dove
- ____ Greater Roadrunner
- ____ Barn Owl
- ____ Great Horned Owl
- ____ White-throated Swift
- ____ Black-ch. Hummingbird
- (8) 11 Anna's Hummingbird
- ____ Costa's Hummingbird
- ____ Belted Kingfisher
- ____ Acorn Woodpecker
- (1) Nuttall's Woodpecker
- (2) 11 Downy Woodpecker
- ____ Hairy Woodpecker
- ____ Northern Flicker
- ____ Western Wood-Pewee
- ____ Willow Flycatcher
- ____ Pacific Slope Flycatcher
- ____ Black Phoebe
- ____ Say's Phoebe
- (7) 11 Ash-throated Flycatcher
- ____ Cassin's Kingbird
- ____ Western Kingbird
- ____ Horned Lark
- (1) Tree Swallow NB
- ____ Violet-green Swallow
- (16) 664 N. Rough-winged Swallow
- ____ Cliff Swallow
- ____ Barn Swallow
- (2) 11 Scrub Jay
- (2) 11 American Crow
- (1) Common Raven
- (4) 1111 Plain Titmouse
- (4) 22 Bushtit
- HH 1 1111 HH 111 Bewick's Wren
- (20) 1111 111 House Wren
- (12) ____ Ruby-crowned Kinglet
- ____ Blue-gray Gnatcatcher
- ____ Western Bluebird
- ____ Swainson's Thrush
- ____ Hermit Thrush
- ____ American Robin
- (1) Wrentit
- ____ Northern Mockingbird
- (3) 111 California Thrasher
- ____ American Pipit
- ____ Cedar Waxwing
- ____ Phainopepla
- ____ Loggerhead Shrike
- (16) 4 42 212 European Starling
- ____ **Bell's Vireo**
- ____ Solitary Vireo
- ____ Warbling Vireo
- ____ Orange-crowned Warbler
- (6) 1 1111 Yellow Warbler
- (1) Yellow-rumped Warbler
- ____ Common Yellowthroat
- ____ Wilson's Warbler
- (1) Yellow-breasted Chat
- ____ Western Tanager
- (3) 111 Black-headed Grosbeak
- ____ Blue Grosbeak
- ____ Lazuli Bunting
- (4) 1111 Rufous-sided Towhee
- (6) 1 1111 California Towhee
- (38) 1111 1111 1111 1111 1111 1111 1111 1111 Song Sparrow
- ____ Lark Sparrow
- ____ Savannah Sparrow
- ____ Lincoln's Sparrow
- ____ White-crowned Sparrow
- ____ Red-winged Blackbird
- ____ Western Meadowlark
- ____ Brewer's Blackbird
- (1) Brown-headed Cowbird
- ____ Hooded Oriole
- (1) Northern Oriole
- (10) 64 House Finch
- ____ Pine Siskin
- (10) 622 Lesser Goldfinch
- ____ Lawrence's Goldfinch
- (40) American Goldfinch
- ____ House Sparrow

(7) SNOWY EGRET

(1) B-ch Grey U

BIRDS OF Santa Clara River System

Locality MCB → ~~East~~ Fifteen Oxnard **Date** 5-9 **Time** 630

- Great Blue Heron
- Green Heron
- Mallard
- Turkey Vulture
- White-tailed Kite
- Sharp-shinned Hawk
- Cooper's Hawk
- (2) Red-shouldered Hawk
- (1) Red-tailed Hawk
- American Kestrel
- (2) California Quail
- American Coot
- (4) (12) Killdeer
- Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- Rock Dove
- (2) Mourning Dove
- Greater Roadrunner
- Barn Owl
- Great Horned Owl
- White-throated Swift
- Black-ch. Hummingbird
- (5) Anna's Hummingbird
- Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- (3) Nuttall's Woodpecker
- (3) (2) Downy Woodpecker
- Hairy Woodpecker
- Northern Flicker
- Western Wood-Pewee
- Willow Flycatcher
- Pacific Slope Flycatcher
- Black Phoebe
- Say's Phoebe
- (5) Ash-throated Flycatcher
- Cassin's Kingbird
- Western Kingbird
- Horned Lark
- (2) Tree Swallow
- Violet-green Swallow
- (16) (10) 6 N. Rough-winged Swallow
- (2) Cliff Swallow
- Barn Swallow
- (4) Scrub Jay
- (3) (2) American Crow
- (2) Common Raven
- (2) Plain Titmouse
- Bushtit
- (19) Bewick's Wren
- (35) House Wren
- (18) Ruby-crowned Kinglet
- Blue-gray Gnatcatcher
- (3) (12) Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- (1) American Robin
- Wrentit
- Northern Mockingbird
- (2) California Thrasher
- American Pipit
- Cedar Waxwing
- (1) Phainopepla
- Loggerhead Shrike
- (26) (15) European Starling
- **Bell's Vireo**
- Solitary Vireo
- Warbling Vireo
- Orange-crowned Warbler
- (3) Yellow Warbler
- Yellow-rumped Warbler
- Common Yellowthroat
- Wilson's Warbler
- Yellow-breasted Chat
- Western Tanager
- (8) Black-headed Grosbeak
- (1) Blue Grosbeak
- Lazuli Bunting
- (3) Rufous-sided Towhee
- (2) California Towhee
- Lark Sparrow
- Savannah Sparrow
- (12) Song Sparrow
- Lincoln's Sparrow
- White-crowned Sparrow
- Red-winged Blackbird
- Western Meadowlark
- Brewer's Blackbird
- (2) Brown-headed Cowbird
- Hooded Oriole
- (1) Northern Oriole
- (6) House Finch
- Pine Siskin
- (4) Lesser Goldfinch
- Lawrence's Goldfinch
- American Goldfinch
- House Sparrow

cloudy, cool - 1

BIRDS OF Santa Clara River System

Locality Mcgr ~~Wagon Rd~~ Date 5-21-99

Time

_____ Great Blue Heron
_____ Green Heron
_____ Mallard
_____ Cinnamon Teal
_____ Turkey Vulture
_____ White-tailed Kite
_____ Sharp-shinned Hawk
(1) Cooper's Hawk
(2) II Red-shouldered Hawk
(1) Red-tailed Hawk
_____ Golden Eagle
_____ American Kestrel
(4) 2 2 California Quail
_____ American Coot
(2) Killdeer
_____ Spotted Sandpiper
_____ Least Sandpiper
_____ Common Snipe
_____ Rock Dove
_____ Mourning Dove
_____ **Yellow-billed Cuckoo**
_____ Greater Roadrunner
_____ Barn Owl
_____ Great Horned Owl
_____ White-throated Swift
_____ Black-ch. Hummingbird
(3) III Anna's Hummingbird
_____ Costa's Hummingbird
_____ Belted Kingfisher
_____ Acorn Woodpecker
(2) II Nuttall's Woodpecker
_____ Downy Woodpecker
_____ Hairy Woodpecker
_____ Northern Flicker
_____ Western Wood-Pewee
_____ Willow Flycatcher
_____ Hammond's Flycatcher
_____ Pacific Slope Flycatcher
_____ Black Phoebe
_____ Say's Phoebe
(5) IIII Ash-throated Flycatcher
_____ **Brown-crested Flycatcher**
_____ Cassin's Kingbird
_____ Western Kingbird
_____ Horned Lark
_____ Tree Swallow
_____ Violet-green Swallow
(9) 8 1 N. Rough-winged Swallow
_____ Bank Swallow
_____ Cliff Swallow
(2) Barn Swallow
(8) II IIII Scrub Jay
(8) 2 4 2 American Crow
(1) Common Raven
_____ Plain Titmouse
(8) 6 2 Bushtit
_____ Rock Wren
(20) IIII IIII IIII Bewick's Wren IIII
_____ House Wren

NSDO

_____ Ruby-crowned Kinglet
_____ Blue-gray Gnatcatcher
(1) Western Bluebird
_____ Swainson's Thrush
_____ Hermit Thrush
(1) American Robin
(1) Wrentit
_____ Northern Mockingbird
(4) IIII California Thrasher
_____ American Pipit
_____ Cedar Waxwing
(2) Phainopepla
_____ Loggerhead Shrike
(3) 6 2 2 1 2 European Starling
_____ **Bell's Vireo**
_____ Solitary Vireo
_____ Warbling Vireo
_____ Orange-crowned Warbler
(7) I IIII Yellow Warbler
_____ Yellow-rumped Warbler
_____ Black-th. Gray Warbler
_____ Townsend's Warbler
_____ MacGillivray's Warbler
(3) III Common Yellowthroat
_____ Wilson's Warbler
_____ Yellow-breasted Chat
_____ **Summer Tananger**
_____ Western Tanager
(8) II IIII Black-headed Grosbeak
(1) Blue Grosbeak
_____ Lazuli Bunting
(5) IIII Rufous-sided Towhee
(4) II 2 California Towhee
_____ Lark Sparrow
_____ Savannah Sparrow
_____ Fox Sparrow
(15) IIII IIII IIII Song Sparrow
_____ Lincoln's Sparrow
_____ White-crowned Sparrow
_____ Red-winged Blackbird
_____ Western Meadowlark
_____ Brewer's Blackbird
(7) 2 2 3 Brown-headed Cowbird
_____ Hooded Oriole
(1) Northern Oriole
(8) House Finch
_____ Pine Siskin
(4) 2 2 Lesser Goldfinch
_____ Lawrence's Goldfinch
_____ American Goldfinch
_____ House Sparrow

Additional Species

_____
_____
_____
_____
_____
_____

BIRDS OF Santa Clara River System

Locality MCB → Old Rd **Date** 6-3 **Time** 1:30

- ____ Great Blue Heron
- ____ Green Heron
- 43 Mallard
- ____ Turkey Vulture
- 1 White-tailed Kite
- ____ Sharp-shinned Hawk
- ____ Cooper's Hawk
- 11 Red-shouldered Hawk
- 1 Red-tailed Hawk
- 1 American Kestrel
- 22 California Quail
- ____ American Coot
- 22 Killdeer
- ____ Spotted Sandpiper
- ____ Least Sandpiper
- ____ Common Snipe
- 7 Rock Dove
- ____ Mourning Dove
- ____ Greater Roadrunner
- ____ Barn Owl
- ____ Great Horned Owl
- ____ White-throated Swift
- 1 Black-ch. Hummingbird
- 111 Anna's Hummingbird
- ____ Costa's Hummingbird
- ____ Belted Kingfisher
- ____ Acorn Woodpecker
- 111 Nuttall's Woodpecker
- 11 Downy Woodpecker
- 11 Hairy Woodpecker
- ____ Northern Flicker
- ____ Western Wood-Pewee
- ____ Willow Flycatcher
- ____ Pacific Slope Flycatcher
- 1 Black Phoebe
- ____ Say's Phoebe
- 11 Ash-throated Flycatcher
- ____ Cassin's Kingbird
- ____ Western Kingbird
- ____ Horned Lark
- 1 Tree Swallow ON
- ____ Violet-green Swallow
- 10 10 N. Rough-winged Swallow
- 20 Cliff Swallow
- ____ Barn Swallow
- 11 Scrub Jay
- 22 American Crow
- 22 Common Raven
- ____ Plain Titmouse
- 8 Bushtit
- Bewick's Wren
- House Wren 1
- ____ Ruby-crowned Kinglet
- ____ Blue-gray Gnatcatcher
- 2 Western Bluebird
- ____ Swainson's Thrush
- ____ Hermit Thrush
- ____ American Robin
- ____ Wrentit
- ____ Northern Mockingbird
- 211 California Thrasher
- ____ American Pipit
- ____ Cedar Waxwing
- ____ Phainopepla
- ____ Loggerhead Shrike
- 64421 European Starling
- ____ **Bell's Vireo**
- ____ Solitary Vireo
- ____ Warbling Vireo
- ____ Orange-crowned Warbler
- 11 Yellow Warbler
- ____ Yellow-rumped Warbler
- 1 Common Yellowthroat
- ____ Wilson's Warbler
- ____ Yellow-breasted Chat
- ____ Western Tanager
- 11 Black-headed Grosbeak
- ____ Blue Grosbeak
- ____ Lazuli Bunting
- 1111 Rufous-sided Towhee
- 2222 California Towhee
- ____ Lark Sparrow
- ____ Savannah Sparrow
- 1 Song Sparrow
- ____ Lincoln's Sparrow
- ____ White-crowned Sparrow
- ____ Red-winged Blackbird
- ____ Western Meadowlark
- ____ Brewer's Blackbird
- ____ Brown-headed Cowbird
- ____ Hooded Oriole
- ____ Northern Oriole
- 8 House Finch
- ____ Pine Siskin
- 24 Lesser Goldfinch
- ____ Lawrence's Goldfinch
- 2 American Goldfinch
- ____ House Sparrow

Coast Day-shed wren

5 Side

SUGDEN

BIRDS OF Santa Clara River System

Locality McBean To Fillmore North Side Date 6/13/98 Time _____

- _____ Great Blue Heron
- _____ Green Heron
- _____ Mallard
- _____ Turkey Vulture
- _____ White-tailed Kite
- _____ Sharp-shinned Hawk
- _____ Cooper's Hawk
- 2 Red-shouldered Hawk
- _____ Red-tailed Hawk
- _____ American Kestrel
- 22 California Quail
- _____ American Coot
- 12 Killdeer
- _____ Spotted Sandpiper
- _____ Least Sandpiper
- _____ Common Snipe
- _____ Rock Dove
- 12 Mourning Dove
- _____ Greater Roadrunner
- _____ Barn Owl
- _____ Great Horned Owl
- _____ White-throated Swift
- _____ Black-ch. Hummingbird
- _____ Anna's Hummingbird
- _____ Costa's Hummingbird
- _____ Belted Kingfisher
- _____ Acorn Woodpecker
- _____ Nuttall's Woodpecker
- 2 Downy Woodpecker
- 2 Hairy Woodpecker
- _____ Northern Flicker
- _____ Western Wood-Pewee
- _____ Willow Flycatcher
- _____ Pacific Slope Flycatcher
- 2 Black Phoebe
- _____ Say's Phoebe
- _____ Ash-throated Flycatcher
- _____ Cassin's Kingbird
- _____ Western Kingbird
- _____ Horned Lark
- _____ Tree Swallow
- _____ Violet-green Swallow
- _____ N. Rough-winged Swallow
- _____ Cliff Swallow (Barn 19 nests under)
- _____ Barn Swallow
- _____ Scrub Jay
- 6 American Crow
- _____ Common Raven
- 2 Plain Titmouse
- 2 Bushtit
- 6 Bewick's Wren
- _____ House Wren
- _____ Ruby-crowned Kinglet
- _____ Blue-gray Gnatcatcher
- _____ Western Bluebird
- _____ Swainson's Thrush
- _____ Hermit Thrush
- _____ American Robin
- _____ Wrentit
- _____ Northern Mockingbird
- 2 California Thrasher
- _____ American Pipit
- _____ Cedar Waxwing
- 3 Phainopepla
- _____ Loggerhead Shrike
- _____ European Starling
- _____ **Bell's Vireo**
- _____ Solitary Vireo
- _____ Warbling Vireo
- _____ Orange-crowned Warbler
- _____ Yellow Warbler
- _____ Yellow-rumped Warbler
- 2 Common Yellowthroat
- _____ Wilson's Warbler
- _____ Yellow-breasted Chat
- _____ Western Tanager
- _____ Black-headed Grosbeak
- _____ Blue Grosbeak
- _____ Lazuli Bunting
- 4 Rufous-sided Towhee
- _____ California Towhee
- _____ Lark Sparrow
- _____ Savannah Sparrow
- 2 Song Sparrow
- _____ Lincoln's Sparrow
- _____ White-crowned Sparrow
- _____ Red-winged Blackbird
- _____ Western Meadowlark
- _____ Brewer's Blackbird
- 2 Brown-headed Cowbird
- _____ Hooded Oriole
- _____ Northern Oriole
- 3 House Finch
- _____ Pine Siskin
- 4 Lesser Goldfinch
- _____ Lawrence's Goldfinch
- _____ American Goldfinch
- _____ House Sparrow

1 Barn Owl under McBean Bridge (Veg. dr.)
9 Horned Lark
1 white crested nuthatch

BIRDS OF Santa Clara River System

Locality RC B→ GT Date 7/2 Time

- Great Blue Heron
- Green Heron
- Mallard
- 1 Turkey Vulture
- 3 White-tailed Kite ? 1 MM
- Sharp-shinned Hawk
- Cooper's Hawk
- 1 Red-shouldered Hawk
- Red-tailed Hawk
- 1 American Kestrel
- 4-2 California Quail
- American Coot
- 1/2 Killdeer
- Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- 2 Rock Dove
- 1 Mourning Dove
- Greater Roadrunner
- Barn Owl
- Great Horned Owl
- White-throated Swift
- Black-ch. Hummingbird
- 1 Anna's Hummingbird
- Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- 4 Nuttall's Woodpecker
- 1 Downy Woodpecker
- Hairy Woodpecker
- Northern Flicker
- Western Wood-Pewee
- Willow Flycatcher
- Pacific Slope Flycatcher
- 1-2 Black Phoebe
- Say's Phoebe
- 1 Ash-throated Flycatcher
- Cassin's Kingbird
- Western Kingbird
- Horned Lark
- Tree Swallow
- Violet-green Swallow
- 1 N. Rough-winged Swallow
- 6 Cliff Swallow
- Barn Swallow
- 5 Scrub Jay
- 2 2 American Crow
- 4 Common Raven
- 1 Plain Titmouse
- ~ Bushtit
- 1 Bewick's Wren
- 1 House Wren
- Ruby-crowned Kinglet
- Blue-gray Gnatcatcher
- 1-2 Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- American Robin
- Wrentit
- Northern Mockingbird
- 1 California Thrasher
- American Pipit
- Cedar Waxwing
- Phainopepla
- Loggerhead Shrike
- 3 6 1 European Starling
- **Bell's Vireo**
- Solitary Vireo
- Warbling Vireo
- Orange-crowned Warbler
- Yellow Warbler
- Yellow-rumped Warbler
- 1 Common Yellowthroat
- Wilson's Warbler
- Yellow-breasted Chat
- Western Tanager
- 1 Black-headed Grosbeak
- Blue Grosbeak
- Lazuli Bunting
- 2 Rufous-sided Towhee
- 1 California Towhee
- Lark Sparrow
- Savannah Sparrow
- 4 Song Sparrow
- Lincoln's Sparrow
- White-crowned Sparrow
- Red-winged Blackbird
- Western Meadowlark
- Brewer's Blackbird
- 2 Brown-headed Cowbird
- Hooded Oriole
- Northern Oriole
- 8,8,2/20 House Finch
- Pine Siskin
- 3-2 Lesser Goldfinch
- Lawrence's Goldfinch
- American Goldfinch
- House Sparrow

N SIDE

Upper River Area 3 1998

BIRDS OF Santa Clara River System

Locality Bouquet to McBean **Date** 5-14 **Time** 7:20 - 9:00

- ___ Great Blue Heron
- ___ Green Heron
- 3 Mallard
- ___ Turkey Vulture
- ___ White-tailed Kite
- ___ Sharp-shinned Hawk
- ___ Cooper's Hawk
- ___ Red-shouldered Hawk
- 2 Red-tailed Hawk
- ___ American Kestrel
- 5 California Quail
- ___ American Coot
- 4 Killdeer
- 2 Spotted Sandpiper
- ___ Least Sandpiper
- ___ Common Snipe
- 2 Rock Dove
- 5 Mourning Dove
- ___ Greater Roadrunner
- ___ Barn Owl
- ___ Great Horned Owl
- ___ White-throated Swift
- ___ Black-ch. Hummingbird
- 2 Anna's Hummingbird
- ___ Costa's Hummingbird
- ___ Belted Kingfisher
- ___ Acorn Woodpecker
- 1 Nuttall's Woodpecker
- ___ Downy Woodpecker
- ___ Hairy Woodpecker
- 2 Northern Flicker
- ___ Western Wood-Pewee
- ___ Willow Flycatcher
- ___ Pacific Slope Flycatcher
- 3 Black Phoebe
- ___ Say's Phoebe
- 2 Ash-throated Flycatcher
- ___ Cassin's Kingbird
- ___ Western Kingbird
- ___ Horned Lark
- ___ Tree Swallow
- ___ Violet-green Swallow
- 7 N. Rough-winged Swallow
- 11 Cliff Swallow
- 2 Barn Swallow
- 7 Scrub Jay
- 15 American Crow
- 45 Common Raven
- 2 Plain Titmouse
- ___ Bushtit
- 5 Bewick's Wren
- ___ House Wren
- ___ Ruby-crowned Kinglet
- ___ Blue-gray Gnatcatcher
- ___ Western Bluebird
- ___ Swainson's Thrush
- ___ Hermit Thrush
- ___ American Robin
- 2 Wrentit
- ___ Northern Mockingbird
- ___ California Thrasher
- ___ American Pipit
- ___ Cedar Waxwing
- ___ Phainopepla
- ___ Loggerhead Shrike
- 5 European Starling
- ___ **Bell's Vireo**
- ___ Solitary Vireo
- ___ Warbling Vireo
- ___ Orange-crowned Warbler
- ___ Yellow Warbler
- ___ Yellow-rumped Warbler
- 2 Common Yellowthroat
- ___ Wilson's Warbler
- ___ Yellow-breasted Chat
- ___ Western Tanager
- 5 Black-headed Grosbeak
- ___ Blue Grosbeak
- ___ Lazuli Bunting
- 4 Rufous-sided Towhee
- 3 California Towhee
- ___ Lark Sparrow
- ___ Savannah Sparrow
- 5 Song Sparrow
- ___ Lincoln's Sparrow
- ___ White-crowned Sparrow
- ___ Red-winged Blackbird
- ___ Western Meadowlark
- ___ Brewer's Blackbird
- 3 Brown-headed Cowbird
- ___ Hooded Oriole
- 2 Northern Oriole
- 7 House Finch
- ___ Pine Siskin
- 2 Lesser Goldfinch
- ___ Lawrence's Goldfinch
- ___ American Goldfinch
- ___ House Sparrow

Much habitat gone

MORE WATER THAN EVER BEFORE

BIRDS OF Santa Clara River System

Locality Bogue → McBean **Date** 6/5 **Time** 7

- ___ Great Blue Heron
- ___ Green Heron
- 1 Mallard
- ___ Turkey Vulture
- ___ White-tailed Kite
- ___ Sharp-shinned Hawk
- ___ Cooper's Hawk
- ___ Red-shouldered Hawk
- 1 Red-tailed Hawk
- ___ American Kestrel
- 11 California Quail
- ___ American Coot
- 4 Killdeer
- ___ Spotted Sandpiper
- ___ Least Sandpiper
- ___ Common Snipe
- ___ Rock Dove
- 8 Mourning Dove
- 1 Greater Roadrunner
- 1 Barn Owl *Nesting Under McBean*
- ___ Great Horned Owl
- ___ White-throated Swift
- ___ Black-ch. Hummingbird
- 3 Anna's Hummingbird
- ___ Costa's Hummingbird
- ___ Belted Kingfisher
- ___ Acorn Woodpecker
- 3 Nuttall's Woodpecker
- ___ Downy Woodpecker
- ___ Hairy Woodpecker
- ___ Northern Flicker
- ___ Western Wood-Pewee
- ___ Willow Flycatcher
- ___ Pacific Slope Flycatcher
- 5 Black Phoebe
- ___ Say's Phoebe
- 4 Ash-throated Flycatcher
- ___ Cassin's Kingbird
- ___ Western Kingbird
- ___ Horned Lark
- ___ Tree Swallow
- ___ Violet-green Swallow
- 11 N. Rough-winged Swallow
- 25 Cliff Swallow *19 nests West Side McBean Bridge*
- ___ Barn Swallow
- 9 Scrub Jay
- 32 American Crow
- 15 Common Raven
- 1 Plain Titmouse
- 2 Bushtit
- 9 Bewick's Wren
- ___ House Wren
- ___ Ruby-crowned Kinglet
- ___ Blue-gray Gnatcatcher
- 2 Western Bluebird
- ___ Swainson's Thrush
- ___ Hermit Thrush
- ___ American Robin
- ___ Wrentit
- ___ Northern Mockingbird
- 1 California Thrasher
- ___ American Pipit
- ___ Cedar Waxwing
- ___ Phainopepla
- ___ Loggerhead Shrike
- 16 European Starling
- ___ **Bell's Vireo**
- ___ Solitary Vireo
- ___ Warbling Vireo
- ___ Orange-crowned Warbler
- ___ Yellow Warbler
- ___ Yellow-rumped Warbler
- 1 Common Yellowthroat
- ___ Wilson's Warbler
- ___ Yellow-breasted Chat
- ___ Western Tanager
- 1 Black-headed Grosbeak
- ___ Blue Grosbeak
- ___ Lazuli Bunting
- 2 Rufous-sided Towhee
- 2 California Towhee
- ___ Lark Sparrow
- ___ Savannah Sparrow
- 7 Song Sparrow
- ___ Lincoln's Sparrow
- ___ White-crowned Sparrow
- 2 Red-winged Blackbird
- ___ Western Meadowlark
- ___ Brewer's Blackbird
- 6 Brown-headed Cowbird
- ___ Hooded Oriole
- ___ Northern Oriole
- 5 House Finch
- ___ Pine Siskin
- 7 Lesser Goldfinch
- ___ Lawrence's Goldfinch
- ___ American Goldfinch
- 2 House Sparrow

Upper River Area 4

Syde- 1998

BIRDS OF Santa Clara River System

Locality Upper River - Pipeline to Bouquet **Date** 5/14/98 **Time** _____

- _____ Great Blue Heron
- _____ Green Heron
- _____ Mallard
- _____ Turkey Vulture
- _____ White-tailed Kite
- _____ Sharp-shinned Hawk
- _____ Cooper's Hawk
- _____ Red-shouldered Hawk
- 2 || Red-tailed Hawk
- _____ American Kestrel
- 29264 b 1111 2 California Quail
- _____ American Coot
- 2 1111 6 Killdeer
- _____ Spotted Sandpiper
- _____ Least Sandpiper
- _____ Common Snipe
- 1 Rock Dove
- 2 1111 2 2 11 Mourning Dove
- _____ Greater Roadrunner
- _____ Barn Owl
- _____ Great Horned Owl
- _____ White-throated Swift
- _____ Black-ch. Hummingbird
- 1 1111 Anna's Hummingbird
- _____ Costa's Hummingbird
- _____ Belted Kingfisher
- _____ Acorn Woodpecker
- 1 1 Nuttall's Woodpecker
- _____ Downy Woodpecker
- _____ Hairy Woodpecker
- 2 2 Northern Flicker
- _____ Western Wood-Pewee
- _____ Willow Flycatcher
- _____ Pacific Slope Flycatcher
- 2 Black Phoebe
- _____ Say's Phoebe
- _____ Ash-throated Flycatcher
- _____ Cassin's Kingbird
- _____ Western Kingbird
- _____ Horned Lark
- _____ Tree Swallow
- _____ Violet-green Swallow
- 5 2 N. Rough-winged Swallow
- 3 2 Cliff Swallow
- _____ Barn Swallow
- 8 11 2221 2 Scrub Jay
- 7 2 American Crow
- 6 2 Common Raven
- 2 Plain Titmouse
- 2 1111 2 Bushtit
- 6 11 1111 Bewick's Wren
- _____ House Wren
- _____ Ruby-crowned Kinglet
- _____ Blue-gray Gnatcatcher
- _____ Western Bluebird
- _____ Swainson's Thrush
- _____ Hermit Thrush
- _____ American Robin
- 2 Wrentit
- 11 Northern Mockingbird
- 1 11 1111 California Thrasher
- _____ American Pipit
- 6 Cedar Waxwing
- 362 Phainopepla
- _____ Loggerhead Shrike
- 4486 European Starling
- _____ **Bell's Vireo**
- _____ Solitary Vireo
- _____ Warbling Vireo
- _____ Orange-crowned Warbler
- _____ Yellow Warbler
- _____ Yellow-rumped Warbler
- _____ Common Yellowthroat
- _____ Wilson's Warbler
- _____ Yellow-breasted Chat
- _____ Western Tanager
- 3 2212 Black-headed Grosbeak
- _____ Blue Grosbeak
- _____ Lazuli Bunting
- 5 1111 Rufous-sided Towhee
- 3 111 1111 California Towhee
- _____ Lark Sparrow
- _____ Savannah Sparrow
- 4 111 1111 Song Sparrow
- _____ Lincoln's Sparrow
- _____ White-crowned Sparrow
- _____ Red-winged Blackbird
- _____ Western Meadowlark
- _____ Brewer's Blackbird
- 3 1 Brown-headed Cowbird
- 11 Hooded Oriole
- 2 11 Northern Oriole
- 7 114 House Finch
- _____ Pine Siskin
- 2 Lesser Goldfinch
- _____ Lawrence's Goldfinch
- _____ American Goldfinch
- _____ House Sparrow
- ~~Empid sp., Dyer~~

BIRDS OF Santa Clara River System

Locality UPPER R → BOQUET Date 6-5 Time ______

Count	Species	Count	Species
	Great Blue Heron		Blue-gray Gnatcatcher
	Green Heron		Western Bluebird
2	Mallard		Swainson's Thrush
	Turkey Vulture		Hermit Thrush
	White-tailed Kite		American Robin
	Sharp-shinned Hawk	||	Wrentit
	Cooper's Hawk	| 𝍸	Northern Mockingbird
|	Red-shouldered Hawk		California Thrasher
|	Red-tailed Hawk		American Pipit
	American Kestrel		Cedar Waxwing
7 4 2 4 2 2 2 2 |	California Quail	2	Phainopepla
	American Coot		Loggerhead Shrike
2 3 2 2	Killdeer	2	European Starling
	Spotted Sandpiper		**Bell's Vireo**
	Least Sandpiper		Solitary Vireo
	Common Snipe		Warbling Vireo
	Rock Dove		Orange-crowned Warbler
3 4 2	Mourning Dove		Yellow Warbler
	Greater Roadrunner		Yellow-rumped Warbler
	Barn Owl	||	Common Yellowthroat
	Great Horned Owl		Wilson's Warbler
	White-throated Swift		Yellow-breasted Chat
	Black-ch. Hummingbird		Western Tanager
|	Anna's Hummingbird		Black-headed Grosbeak
	Costa's Hummingbird	|	Blue Grosbeak
	Belted Kingfisher		Lazuli Bunting
	Acorn Woodpecker	|| 𝍸 𝍸 |	Rufous-sided Towhee
|||	Nuttall's Woodpecker	2 2 2 2 𝍸	California Towhee
	Downy Woodpecker		Lark Sparrow
	Hairy Woodpecker		Savannah Sparrow
	Northern Flicker	|||| 𝍸	Song Sparrow
	Western Wood-Pewee		Lincoln's Sparrow
	Willow Flycatcher		White-crowned Sparrow
	Pacific Slope Flycatcher	2	Red-winged Blackbird
||	Black Phoebe		Western Meadowlark
|	Say's Phoebe		Brewer's Blackbird
||||	Ash-throated Flycatcher	12	Brown-headed Cowbird
	Cassin's Kingbird		Hooded Oriole
	Western Kingbird	|	Northern Oriole
	Horned Lark	6 6 6 4 4 6	House Finch
	Tree Swallow		Pine Siskin
	Violet-green Swallow	4	Lesser Goldfinch
2	N. Rough-winged Swallow		Lawrence's Goldfinch
|	Cliff Swallow		American Goldfinch
	Barn Swallow		House Sparrow
| 𝍸 𝍸	Scrub Jay		
	American Crow		
10 10 2 ||	Common Raven		
	Plain Titmouse		
	Bushtit		
4 4 𝍸 𝍸	Bewick's Wren		
|||	House Wren		
	Ruby-crowned Kinglet		

N side

Upper Area 1998
Area 5

BIRDS OF Santa Clara River System

Locality Castaic **Date** 4-11 **Time** 6:30

1	Great Blue Heron
	Green Heron
3	Mallard
	Turkey Vulture
	White-tailed Kite
	Sharp-shinned Hawk
	Cooper's Hawk
2	Red-shouldered Hawk
2	Red-tailed Hawk
	American Kestrel
11	California Quail
	American Coot
	Killdeer
	Spotted Sandpiper
	Least Sandpiper
	Common Snipe
9	Rock Dove
4	Mourning Dove
	Greater Roadrunner
	Barn Owl
	Great Horned Owl
	White-throated Swift
	Black-ch. Hummingbird
4	Anna's Hummingbird
	Costa's Hummingbird
	Belted Kingfisher
	Acorn Woodpecker
3	Nuttall's Woodpecker
1	Downy Woodpecker
	Hairy Woodpecker
2	Northern Flicker
	Western Wood-Pewee
	Willow Flycatcher
	Pacific Slope Flycatcher
2	Black Phoebe
	Say's Phoebe
1	Ash-throated Flycatcher
	Cassin's Kingbird
	Western Kingbird
	Horned Lark
	Tree Swallow
	Violet-green Swallow
20	N. Rough-winged Swallow
6	Cliff Swallow
2	Barn Swallow
9	Scrub Jay
4	American Crow
2	Common Raven
2	Plain Titmouse
7	Bushtit
8	Bewick's Wren
2	House Wren
	Ruby-crowned Kinglet
	Blue-gray Gnatcatcher
	Western Bluebird
	Swainson's Thrush
	Hermit Thrush
2	American Robin
3	Wrentit
	Northern Mockingbird
6	California Thrasher
	American Pipit
	Cedar Waxwing
	Phainopepla
	Loggerhead Shrike
	European Starling
	Bell's Vireo
	Solitary Vireo
	Warbling Vireo
	Orange-crowned Warbler
	Yellow Warbler
7	Yellow-rumped Warbler
1	Common Yellowthroat
2	Wilson's Warbler
	Yellow-breasted Chat
	Western Tanager
3	Black-headed Grosbeak
	Blue Grosbeak
	Lazuli Bunting
4	Rufous-sided Towhee
2	California Towhee
	Lark Sparrow
50	Savannah Sparrow
13	Song Sparrow
	Lincoln's Sparrow
34	White-crowned Sparrow
49	Red-winged Blackbird
	Western Meadowlark
	Brewer's Blackbird
	Brown-headed Cowbird
	Hooded Oriole
3	Northern Oriole
7	House Finch
	Pine Siskin
4	Lesser Goldfinch
	Lawrence's Goldfinch
	American Goldfinch
	House Sparrow
7	Canada goose
2	Great egret

BIRDS OF Santa Clara River System

Locality Castaic (north side) **Date** 4-23-98 **Time** _____

2	Great Blue Heron		Blue-gray Gnatcatcher
1	Green Heron		Western Bluebird
3	Mallard		Swainson's Thrush
	Turkey Vulture		Hermit Thrush
	White-tailed Kite		American Robin
	Sharp-shinned Hawk	1	Wrentit
	Cooper's Hawk		Northern Mockingbird
	Red-shouldered Hawk	3	California Thrasher
2	Red-tailed Hawk		American Pipit
	American Kestrel		Cedar Waxwing
11	California Quail		Phainopepla
	American Coot		Loggerhead Shrike
	Killdeer	2	European Starling
	Spotted Sandpiper		**Bell's Vireo**
	Least Sandpiper		Solitary Vireo
	Common Snipe		Warbling Vireo
2	Rock Dove		Orange-crowned Warbler
7	Mourning Dove		Yellow Warbler
	Greater Roadrunner		Yellow-rumped Warbler
	Barn Owl	2	Common Yellowthroat
	Great Horned Owl		Wilson's Warbler
	White-throated Swift		Yellow-breasted Chat
	Black-ch. Hummingbird		Western Tanager
4	Anna's Hummingbird	9	Black-headed Grosbeak
	Costa's Hummingbird	1	Blue Grosbeak
1	Belted Kingfisher		Lazuli Bunting
	Acorn Woodpecker	7	Rufous-sided Towhee
2	Nuttall's Woodpecker	5	California Towhee
	Downy Woodpecker		Lark Sparrow
	Hairy Woodpecker		Savannah Sparrow
1	Northern Flicker	5	Song Sparrow
	Western Wood-Pewee		Lincoln's Sparrow
	Willow Flycatcher		White-crowned Sparrow
	Pacific Slope Flycatcher	5	Red-winged Blackbird
2	Black Phoebe		Western Meadowlark
	Say's Phoebe	13	Brewer's Blackbird
2	Ash-throated Flycatcher	3	Brown-headed Cowbird
2	Cassin's Kingbird		Hooded Oriole
4	Western Kingbird	6	Northern Oriole
	Horned Lark	9	House Finch
	Tree Swallow		Pine Siskin
	Violet-green Swallow	7	Lesser Goldfinch
65	N. Rough-winged Swallow		Lawrence's Goldfinch
90	Cliff Swallow		American Goldfinch
	Barn Swallow		House Sparrow
11	Scrub Jay		
2	American Crow		
6	Common Raven		
	Plain Titmouse		
	Bushtit		
8	Bewick's Wren		
	House Wren		
	Ruby-crowned Kinglet		

52 Cliff nests on north side of bridge

~50 rough wing nests under bridge

did NOT look at marsh

BIRDS OF Santa Clara River System

Locality Castaic south side **Date** 5-8-96 **Time** _____

___ Great Blue Heron	___ Blue-gray Gnatcatcher
3 Green Heron	___ Western Bluebird
2 Mallard	___ Swainson's Thrush
___ Turkey Vulture	___ Hermit Thrush
___ White-tailed Kite	2 American Robin
___ Sharp-shinned Hawk	2 Wrentit
___ Cooper's Hawk	___ Northern Mockingbird
___ Red-shouldered Hawk	2 California Thrasher
2 Red-tailed Hawk	___ American Pipit
1 American Kestrel	___ Cedar Waxwing
7 California Quail	___ Phainopepla
___ American Coot	___ Loggerhead Shrike
2 Killdeer	50 European Starling
___ Spotted Sandpiper	___ **Bell's Vireo**
___ Least Sandpiper	___ Solitary Vireo
___ Common Snipe	___ Warbling Vireo
200 Rock Dove flying upstream	___ Orange-crowned Warbler
15 Mourning Dove	1 Yellow Warbler
___ Greater Roadrunner	___ Yellow-rumped Warbler
___ Barn Owl	3 Common Yellowthroat
___ Great Horned Owl	___ Wilson's Warbler
___ White-throated Swift	___ Yellow-breasted Chat
___ Black-ch. Hummingbird	___ Western Tanager
5 Anna's Hummingbird	7 ♂ Black-headed Grosbeak
___ Costa's Hummingbird	1 Blue Grosbeak
___ Belted Kingfisher	___ Lazuli Bunting
___ Acorn Woodpecker	2 Rufous-sided Towhee
1 Nuttall's Woodpecker	4 California Towhee
___ Downy Woodpecker	___ Lark Sparrow
___ Hairy Woodpecker	___ Savannah Sparrow
___ Northern Flicker	7 Song Sparrow
___ Western Wood-Pewee	___ Lincoln's Sparrow
___ Willow Flycatcher	___ White-crowned Sparrow
___ Pacific Slope Flycatcher	50 Red-winged Blackbird
2 Black Phoebe	___ Western Meadowlark
___ Say's Phoebe	5 Brewer's Blackbird
1 Ash-throated Flycatcher	3 Brown-headed Cowbird
___ Cassin's Kingbird	___ Hooded Oriole
3 Western Kingbird	8 Northern Oriole
___ Horned Lark	6 House Finch
___ Tree Swallow	___ Pine Siskin
___ Violet-green Swallow	3 Lesser Goldfinch
120 N. Rough-winged Swallow	___ Lawrence's Goldfinch
200 Cliff Swallow	___ American Goldfinch
1 Barn Swallow	___ House Sparrow
5 Scrub Jay	
15 American Crow	2 Great Egret
5 Common Raven	
1 Plain Titmouse	
___ Bushtit	
5 Bewick's Wren	
___ House Wren	
___ Ruby-crowned Kinglet	

John Stoner said Tricolored blackbird are westmo List I saw none.

BIRDS OF Santa Clara River System

SVGDFG

Locality Castaic Date 5/25/98

Time

_____ Great Blue Heron
_____ Green Heron
_____ Mallard
_____ Cinnamon Teal
_____ Turkey Vulture
_____ White-tailed Kite
_____ Sharp-shinned Hawk
_____ Cooper's Hawk
_____ Red-shouldered Hawk
(3) ||| Red-tailed Hawk
_____ Golden Eagle
_____ American Kestrel
(19) 22224214 California Quail
_____ American Coot
(7) 2122 Killdeer
_____ Spotted Sandpiper
_____ Least Sandpiper
_____ Common Snipe
(8) 26 Rock Dove
(10) 2242 Mourning Dove
_____ **Yellow-billed Cuckoo**
_____ Greater Roadrunner
_____ Barn Owl
_____ Great Horned Owl
_____ White-throated Swift
(1) Black-ch. Hummingbird
(6) |||| Anna's Hummingbird
_____ Costa's Hummingbird
_____ Belted Kingfisher
_____ Acorn Woodpecker
(2) || Nuttall's Woodpecker
(2) || Downy Woodpecker
(2) || Hairy Woodpecker
_____ Northern Flicker
_____ Western Wood-Pewee
_____ Willow Flycatcher
_____ Hammond's Flycatcher
4 Pacific Slope Flycatcher
(2) || Black Phoebe
_____ Say's Phoebe
(2) || Ash-throated Flycatcher
_____ **Brown-crested Flycatcher**
_____ Cassin's Kingbird
(1) Western Kingbird
_____ Horned Lark
_____ Tree Swallow
_____ Violet-green Swallow
(8) N. Rough-winged Swallow
_____ Bank Swallow
(200) ,200 Cliff Swallow
_____ Barn Swallow
(14) |||| ||| Scrub Jay
(1) American Crow
(2) Common Raven
_____ Plain Titmouse
(16) 268 Bushtit
_____ Rock Wren
(3) |||| Bewick's Wren

_____ Ruby-crowned Kinglet
_____ Blue-gray Gnatcatcher
_____ Western Bluebird
_____ Swainson's Thrush
_____ Hermit Thrush
_____ American Robin
_____ Wrentit
_____ Northern Mockingbird
(9) |||| || California Thrasher
_____ American Pipit
_____ Cedar Waxwing
_____ Phainopepla
_____ Loggerhead Shrike
_____ European Starling
_____ **Bell's Vireo**
_____ Solitary Vireo
_____ Warbling Vireo
_____ Orange-crowned Warbler
_____ Yellow Warbler
_____ Yellow-rumped Warbler
_____ Black-th. Gray Warbler
_____ Townsend's Warbler
_____ MacGillivray's Warbler
(9) |||| || Common Yellowthrat
(2) || Wilson's Warbler
_____ Yellow-breasted Chat
_____ **Summer Tananger**
_____ Western Tanager
(10) |||| |||| Black-headed Grosbeak
(1) Blue Grosbeak
_____ Lazuli Bunting
(17) |||| |||| || Rufous-sided Towhee
(10) |||| |||| California Towhee
_____ Lark Sparrow
_____ Savannah Sparrow
_____ Fox Sparrow
16499463 || Song Sparrow
(44) _____ Lincoln's Sparrow
_____ White-crowned Sparrow
_____ Red-winged Blackbird
_____ Western Meadowlark
(1) Brewer's Blackbird
(10) 24 Brown-headed Cowbird
_____ Hooded Oriole
(2) || Northern Oriole
(4) House Finch
_____ Pine Siskin
(5) ||| Lesser Goldfinch
_____ Lawrence's Goldfinch
(1) American Goldfinch
_____ House Sparrow

Additional Species

_____

_____

_____

_____

_____

BIRDS OF Santa Clara River System

Locality Castaic **Date** 6.3.95 **Time** 7

____ Great Blue Heron
____ Green Heron
____ Mallard
____ Turkey Vulture
____ White-tailed Kite
____ Sharp-shinned Hawk
1 Cooper's Hawk
____ Red-shouldered Hawk
3 Red-tailed Hawk
2 American Kestrel
9 California Quail
____ American Coot
2 Killdeer
____ Spotted Sandpiper
____ Least Sandpiper
____ Common Snipe
2 Rock Dove
5 Mourning Dove
____ Greater Roadrunner
____ Barn Owl
____ Great Horned Owl
____ White-throated Swift
____ Black-ch. Hummingbird
3 Anna's Hummingbird
____ Costa's Hummingbird
____ Belted Kingfisher
____ Acorn Woodpecker
2 Nuttall's Woodpecker
____ Downy Woodpecker
____ Hairy Woodpecker
____ Northern Flicker
____ Western Wood-Pewee
____ Willow Flycatcher
____ Pacific Slope Flycatcher
1 Black Phoebe
____ Say's Phoebe
2 Ash-throated Flycatcher
____ Cassin's Kingbird
2 Western Kingbird
____ Horned Lark
____ Tree Swallow
____ Violet-green Swallow
75 N. Rough-winged Swallow
150 Cliff Swallow ~134/nests
____ Barn Swallow
11 Scrub Jay
2 American Crow
5 Common Raven
____ Plain Titmouse
____ Bushtit
6 Bewick's Wren
____ House Wren
____ Ruby-crowned Kinglet

____ Blue-gray Gnatcatcher
____ Western Bluebird
____ Swainson's Thrush
____ Hermit Thrush
2 American Robin
1 Wrentit
____ Northern Mockingbird
2 California Thrasher
____ American Pipit
____ Cedar Waxwing
____ Phainopepla
____ Loggerhead Shrike
4 European Starling
____ **Bell's Vireo**
____ Solitary Vireo
____ Warbling Vireo
____ Orange-crowned Warbler
____ Yellow Warbler
____ Yellow-rumped Warbler
2 Common Yellowthroat
____ Wilson's Warbler
____ Yellow-breasted Chat
____ Western Tanager
7 Black-headed Grosbeak
2 males Blue Grosbeak
____ Lazuli Bunting
3 Rufous-sided Towhee
2 California Towhee
____ Lark Sparrow
____ Savannah Sparrow
9 Song Sparrow
____ Lincoln's Sparrow
____ White-crowned Sparrow
2 Red-winged Blackbird
____ Western Meadowlark
4 Brewer's Blackbird
3 Brown-headed Cowbird
2 Hooded Oriole
5 Northern Oriole
8 House Finch
____ Pine Siskin
2 Lesser Goldfinch
____ Lawrence's Goldfinch
____ American Goldfinch
____ House Sparrow

no birds in marsh

2 Night heron imm.

BIRDS OF Santa Clara River System

Locality Castaic Cr Mid Channel **Date** 6-15 **Time** 6:30

___ Great Blue Heron	___ Blue-gray Gnatcatcher
2 Green Heron	___ Western Bluebird
___ Mallard	___ Swainson's Thrush
___ Turkey Vulture	___ Hermit Thrush
___ White-tailed Kite	___ American Robin
___ Sharp-shinned Hawk	3 Wrentit
___ Cooper's Hawk	2 Northern Mockingbird
___ Red-shouldered Hawk	5 California Thrasher
2 Red-tailed Hawk	___ American Pipit
1 American Kestrel	___ Cedar Waxwing
___ California Quail	___ Phainopepla
11 American Coot	___ Loggerhead Shrike
4 Killdeer	3 European Starling
___ Spotted Sandpiper	___ **Bell's Vireo**
___ Least Sandpiper	___ Solitary Vireo
___ Common Snipe	___ Warbling Vireo
2 Rock Dove	___ Orange-crowned Warbler
11 Mourning Dove	1 Yellow Warbler
___ Greater Roadrunner	___ Yellow-rumped Warbler
___ Barn Owl	3 Common Yellowthroat
___ Great Horned Owl	___ Wilson's Warbler
___ White-throated Swift	1 Yellow-breasted Chat
___ Black-ch. Hummingbird	___ Western Tanager
2 Anna's Hummingbird	12 Black-headed Grosbeak
___ Costa's Hummingbird	2 Blue Grosbeak
___ Belted Kingfisher	___ Lazuli Bunting
___ Acorn Woodpecker	6 Rufous-sided Towhee
5 Nuttall's Woodpecker	4 California Towhee
___ Downy Woodpecker	___ Lark Sparrow
___ Hairy Woodpecker	___ Savannah Sparrow
___ Northern Flicker	6 Song Sparrow
___ Western Wood-Pewee	___ Lincoln's Sparrow
___ Willow Flycatcher	___ White-crowned Sparrow
___ Pacific Slope Flycatcher	15 Red-winged Blackbird
2 Black Phoebe	___ Western Meadowlark
___ Say's Phoebe	___ Brewer's Blackbird
4 Ash-throated Flycatcher	4 Brown-headed Cowbird
___ Cassin's Kingbird	1 Hooded Oriole
3 Western Kingbird	5 Northern Oriole
___ Horned Lark	13 House Finch
___ Tree Swallow	___ Pine Siskin
___ Violet-green Swallow	2 Lesser Goldfinch
90 N. Rough-winged Swallow	___ Lawrence's Goldfinch
190 Cliff Swallow	___ American Goldfinch
___ Barn Swallow	___ House Sparrow
17 Scrub Jay	___
9 American Crow	___
5 Common Raven	___
___ Plain Titmouse	___
16 Bushtit	___
9 Bewick's Wren	___
___ House Wren	
___ Ruby-crowned Kinglet	

BIRDS OF Santa Clara River System

Locality Castaic Cr **Date** 10/21 **Time** 7

___ Great Blue Heron	___ Blue-gray Gnatcatcher
6 Green Heron	___ Western Bluebird
___ Mallard	___ Swainson's Thrush
___ Turkey Vulture	___ Hermit Thrush
___ White-tailed Kite	___ American Robin
___ Sharp-shinned Hawk	2 Wrentit
___ Cooper's Hawk	___ Northern Mockingbird
2 Red-shouldered Hawk	2 California Thrasher
2 Red-tailed Hawk	___ American Pipit
___ American Kestrel	___ Cedar Waxwing
12 California Quail	___ Phainopepla
___ American Coot	___ Loggerhead Shrike
4 Killdeer	3 European Starling
___ Spotted Sandpiper	___ **Bell's Vireo**
___ Least Sandpiper	___ Solitary Vireo
___ Common Snipe	___ Warbling Vireo
2 Rock Dove	___ Orange-crowned Warbler
5 Mourning Dove	___ Yellow Warbler
___ Greater Roadrunner	___ Yellow-rumped Warbler
___ Barn Owl	___ Common Yellowthroat
___ Great Horned Owl	___ Wilson's Warbler
___ White-throated Swift	___ Yellow-breasted Chat
___ Black-ch. Hummingbird	___ Western Tanager
4 Anna's Hummingbird	2 Black-headed Grosbeak
___ Costa's Hummingbird	___ Blue Grosbeak
___ Belted Kingfisher	___ Lazuli Bunting
___ Acorn Woodpecker	15 Rufous-sided Towhee
3 Nuttall's Woodpecker	5 California Towhee
___ Downy Woodpecker	___ Lark Sparrow
___ Hairy Woodpecker	___ Savannah Sparrow
4 Northern Flicker	15 Song Sparrow
___ Western Wood-Pewee	___ Lincoln's Sparrow
___ Willow Flycatcher	___ White-crowned Sparrow
___ Pacific Slope Flycatcher	___ Red-winged Blackbird
7 Black Phoebe	___ Western Meadowlark
___ Say's Phoebe	___ Brewer's Blackbird
2 Ash-throated Flycatcher	5 Brown-headed Cowbird
___ Cassin's Kingbird	___ Hooded Oriole
2 Western Kingbird	7 Northern Oriole
___ Horned Lark	16 House Finch
___ Tree Swallow	___ Pine Siskin
0 ___ Violet-green Swallow	2 Lesser Goldfinch
___ N. Rough-winged Swallow	___ Lawrence's Goldfinch
___ Cliff Swallow	___ American Goldfinch
___ Barn Swallow	___ House Sparrow
15 Scrub Jay	___
5 American Crow	___
2 Common Raven	___
2 Plain Titmouse	___
10 Bushtit	___
12 Bewick's Wren	___
___ House Wren	
___ Ruby-crowned Kinglet	

Upper Riv, 1998
Area 6

BIRDS OF Santa Clara River System

Locality SAN FRANCISQUITO **Date** 5-18 **Time** 6:30-

- Great Blue Heron
- Green Heron
- (8) 4 4 Mallard
- Turkey Vulture
- White-tailed Kite
- Sharp-shinned Hawk
- (1) Cooper's Hawk
- Red-shouldered Hawk
- (1) Red-tailed Hawk
- American Kestrel
- (15) 2 3 2 4 4 California Quail
- American Coot
- (6) 3 1 1 2 Killdeer
- Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- Rock Dove
- (16) 5 6 1 2 2 Mourning Dove
- Greater Roadrunner
- Barn Owl
- Great Horned Owl
- White-throated Swift
- (1) Black-ch. Hummingbird
- (3) 1 1 1 Anna's Hummingbird
- Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- (9) 1 1 1 Nuttall's Woodpecker
- Downy Woodpecker
- Hairy Woodpecker
- (1) Northern Flicker
- Western Wood-Pewee
- Willow Flycatcher
- Pacific Slope Flycatcher
- (1) Black Phoebe
- (1) Say's Phoebe
- (4) 1 1 1 Ash-throated Flycatcher
- Cassin's Kingbird
- (4) 2 2 Western Kingbird
- (12) 6 4 2 Horned Lark
- Tree Swallow
- (4) Violet-green Swallow
- N. Rough-winged Swallow
- (16) 9 6 Cliff Swallow
- Barn Swallow
- (3) 1 1 1 Scrub Jay
- American Crow
- (3) 1 1 1 Common Raven
- Plain Titmouse
- (2) Bushtit
- (8) 1 1 1 1 1 Bewick's Wren
- House Wren
- Ruby-crowned Kinglet
- Blue-gray Gnatcatcher
- (1) Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- American Robin
- (1) Wrentit
- Northern Mockingbird
- (2) 1 1 California Thrasher
- American Pipit
- Cedar Waxwing
- Phainopepla
- Loggerhead Shrike
- (4) 2 2 European Starling
- **Bell's Vireo**
- Solitary Vireo
- Warbling Vireo
- Orange-crowned Warbler
- (2) Yellow Warbler
- Yellow-rumped Warbler
- (4) 1 1 1 1 Common Yellowthroat
- (4) 1 1 1 1 Wilson's Warbler
- Yellow-breasted Chat
- Western Tanager
- (3) 1 1 1 Black-headed Grosbeak
- Blue Grosbeak
- (2) Lazuli Bunting
- (2) 1 1 Rufous-sided Towhee
- (10) 2 1 2 2 California Towhee
- Lark Sparrow
- Savannah Sparrow
- (21) 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 Song Sparrow
- Lincoln's Sparrow
- White-crowned Sparrow
- (21) 9 6 4 Red-winged Blackbird
- Western Meadowlark
- Brewer's Blackbird
- (4) 2 2 Brown-headed Cowbird
- Hooded Oriole
- (3) Northern Oriole
- (10) 4 6 House Finch
- Pine Siskin
- (8) 2 4 Lesser Goldfinch
- Lawrence's Goldfinch
- (1) American Goldfinch
- House Sparrow

(1) SOL VIREO

Good flow - all Buttes visited and But not Butte.

BIRDS OF Santa Clara River System

Locality SAN FRANCISQUITO **Date** 6-2 **Time** 630

- Great Blue Heron
- Green Heron
- Mallard
- Turkey Vulture
- White-tailed Kite
- Sharp-shinned Hawk
- (1) Cooper's Hawk
- Red-shouldered Hawk
- (2) II Red-tailed Hawk
- American Kestrel
- (7) ~ 1 2 2 California Quail
- American Coot
- (16) 4 44 ~ 2 Killdeer
- Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- Rock Dove
- (32) 10 6 6 6 22 Mourning Dove
- Greater Roadrunner
- Barn Owl
- Great Horned Owl
- White-throated Swift
- Black-ch. Hummingbird
- (5) IIII Anna's Hummingbird
- Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- (3) III Nuttall's Woodpecker
- Downy Woodpecker
- Hairy Woodpecker
- Northern Flicker
- Western Wood-Pewee
- Willow Flycatcher
- Pacific Slope Flycatcher
- (4) 2 1 Black Phoebe ON
- Say's Phoebe
- (5) IIII Ash-throated Flycatcher
- Cassin's Kingbird
- (11) ~ 2 2 Western Kingbird ON
- (1) Horned Lark
- Tree Swallow
- Violet-green Swallow
- (6) N. Rough-winged Swallow
- (2) Cliff Swallow
- Barn Swallow
- (4) II II Scrub Jay
- (2) American Crow ON
- (4) III Common Raven
- (2) Plain Titmouse
- Bushtit
- (5) IIII Bewick's Wren
- (1) House Wren
- Ruby-crowned Kinglet
- Blue-gray Gnatcatcher
- (2) Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- American Robin
- Wrentit
- Northern Mockingbird
- (2) II California Thrasher
- American Pipit
- Cedar Waxwing
- Phainopepla
- Loggerhead Shrike
- (16) 4 4 6 2 European Starling
- **Bell's Vireo**
- Solitary Vireo
- Warbling Vireo
- Orange-crowned Warbler
- Yellow Warbler
- Yellow-rumped Warbler
- (2) II Common Yellowthroat
- Wilson's Warbler
- Yellow-breasted Chat
- Western Tanager
- (1) Black-headed Grosbeak
- (2) II Blue Grosbeak
- Lazuli Bunting
- (2) II Rufous-sided Towhee
- (4) 2 ~ California Towhee
- (2) Lark Sparrow
- Savannah Sparrow
- (10) IIII IIII Song Sparrow
- Lincoln's Sparrow
- White-crowned Sparrow
- (28) 10 10 6 2 Red-winged Blackbird F Y
- Western Meadowlark
- Brewer's Blackbird
- (11) ~ 2 2 2 2 Brown-headed Cowbird
- Hooded Oriole
- (2) Northern Oriole ON
- (12) 6 4 2 House Finch
- Pine Siskin
- (4) Lesser Goldfinch
- Lawrence's Goldfinch
- American Goldfinch
- House Sparrow

W SIDE Lagoon

Upper Santa Clara 1996 Count

BIRDS OF Santa Clara River System

Locality South Fork (Bridge to McBean) **Date** 5/18/96 **Time** _____

_____ Great Blue Heron
_____ Green Heron
_____ Mallard
_____ Turkey Vulture
_____ White-tailed Kite
_____ Sharp-shinned Hawk
_____ Cooper's Hawk
_____ Red-shouldered Hawk
_____ Red-tailed Hawk
_____ American Kestrel
(6) 222 California Quail
_____ American Coot
_____ Killdeer
_____ Spotted Sandpiper
_____ Least Sandpiper
_____ Common Snipe
_____ Rock Dove
(6) 122 Mourning Dove
_____ Greater Roadrunner
_____ Barn Owl
_____ Great Horned Owl
_____ White-throated Swift
_____ Black-ch. Hummingbird
(2) 11 Anna's Hummingbird
_____ Costa's Hummingbird
_____ Belted Kingfisher
_____ Acorn Woodpecker
_____ Nuttall's Woodpecker
_____ Downy Woodpecker
_____ Hairy Woodpecker
_____ Northern Flicker
_____ Western Wood-Pewee
_____ Willow Flycatcher
(1) Pacific Slope Flycatcher
(1) Black Phoebe
_____ Say's Phoebe
(3) 111 Ash-throated Flycatcher
_____ Cassin's Kingbird
(2) Western Kingbird
_____ Horned Lark
_____ Tree Swallow
_____ Violet-green Swallow
(14) 68 N. Rough-winged Swallow
(8) Cliff Swallow
_____ Barn Swallow
(13) 222 212 Scrub Jay
(2) American Crow
(2) 6848 Common Raven
(2) Plain Titmouse
(8) 222 Bushtit
(12) 11 1111 1111 Bewick's Wren
_____ House Wren
_____ Ruby-crowned Kinglet
_____ Blue-gray Gnatcatcher
_____ Western Bluebird
_____ Swainson's Thrush
_____ Hermit Thrush
_____ American Robin
_____ Wrentit
(9) 1111 Northern Mockingbird
(2) 11 California Thrasher
(2) American Pipit
_____ Cedar Waxwing
_____ Phainopepla
_____ Loggerhead Shrike
(14) 86 European Starling
_____ **Bell's Vireo**
_____ Solitary Vireo
_____ Warbling Vireo
_____ Orange-crowned Warbler
(8) 1111 1111 Yellow Warbler
_____ Yellow-rumped Warbler
_____ Common Yellowthroat
(1) Wilson's Warbler
_____ Yellow-breasted Chat
_____ Western Tanager
(1) Black-headed Grosbeak
_____ Blue Grosbeak
_____ Lazuli Bunting
(3) 111 Rufous-sided Towhee
(7) 2 1111 California Towhee
_____ Lark Sparrow
_____ Savannah Sparrow
(9) 1111 1111 Song Sparrow
_____ Lincoln's Sparrow
_____ White-crowned Sparrow
_____ Red-winged Blackbird
_____ Western Meadowlark
(2) 16 Brewer's Blackbird
_____ Brown-headed Cowbird
_____ Hooded Oriole
(1) Northern Oriole
(22) 5168 House Finch
_____ Pine Siskin
(2) Lesser Goldfinch
_____ Lawrence's Goldfinch
_____ American Goldfinch
_____ House Sparrow
(1) Prairie Falcon

BIRDS OF Santa Clara River System

Locality Lower R SEMS **Date** 6-2 **Time** _____

___ Great Blue Heron	___ Blue-gray Gnatcatcher
___ Green Heron	2 Western Bluebird
(7) Mallard	___ Swainson's Thrush
___ Turkey Vulture	___ Hermit Thrush
___ White-tailed Kite	___ American Robin
___ Sharp-shinned Hawk	___ Wrentit
___ Cooper's Hawk	7 Northern Mockingbird
(1) Red-shouldered Hawk	3 California Thrasher
___ Red-tailed Hawk	___ American Pipit
___ American Kestrel	___ Cedar Waxwing
6 California Quail	2 Phainopepla
___ American Coot	___ Loggerhead Shrike
4 Killdeer	100 European Starling
___ Spotted Sandpiper	___ **Bell's Vireo**
___ Least Sandpiper	___ Solitary Vireo
___ Common Snipe	___ Warbling Vireo
4 Rock Dove	___ Orange-crowned Warbler
6 Mourning Dove	1 Yellow Warbler
___ Greater Roadrunner	___ Yellow-rumped Warbler
___ Barn Owl	___ Common Yellowthroat
___ Great Horned Owl	___ Wilson's Warbler
___ White-throated Swift	___ Yellow-breasted Chat
___ Black-ch. Hummingbird	___ Western Tanager
6 Anna's Hummingbird	___ Black-headed Grosbeak
___ Costa's Hummingbird	___ Blue Grosbeak
___ Belted Kingfisher	___ Lazuli Bunting
___ Acorn Woodpecker	2 Rufous-sided Towhee
1 Nuttall's Woodpecker	8 California Towhee
___ Downy Woodpecker	___ Lark Sparrow
___ Hairy Woodpecker	___ Savannah Sparrow
___ Northern Flicker	2 Song Sparrow
___ Western Wood-Pewee	___ Lincoln's Sparrow
___ Willow Flycatcher	___ White-crowned Sparrow
___ Pacific Slope Flycatcher	___ Red-winged Blackbird
2 Black Phoebe	___ Western Meadowlark
___ Say's Phoebe	6 Brewer's Blackbird
1 Ash-throated Flycatcher	2 Brown-headed Cowbird
___ Cassin's Kingbird	___ Hooded Oriole
2 Western Kingbird	3 Northern Oriole
___ Horned Lark	15 House Finch
___ Tree Swallow	___ Pine Siskin
___ Violet-green Swallow	3 Lesser Goldfinch
4 N. Rough-winged Swallow	___ Lawrence's Goldfinch
6 Cliff Swallow	___ American Goldfinch
___ Barn Swallow	4 House Sparrow
7 Scrub Jay	_____
___ American Crow	_____
80 Common Raven	_____
___ Plain Titmouse	_____
10 Bushtit	_____
7 Bewick's Wren	_____
___ House Wren	
___ Ruby-crowned Kinglet	

Upper Aug 8 1998

Water & Vegetation

BIRDS OF Santa Clara River System

Locality South Fork (Upper) **Date** 5/18/98 **Time** _____

_____ Great Blue Heron
_____ Green Heron
_____ Mallard
_____ Turkey Vulture
_____ White-tailed Kite
_____ Sharp-shinned Hawk
_____ Cooper's Hawk
_____ Red-shouldered Hawk
_____ Red-tailed Hawk
_____ American Kestrel
_____ California Quail
_____ American Coot
3 III Killdeer
_____ Spotted Sandpiper
_____ Least Sandpiper
_____ Common Snipe
12 240 Rock Dove
10 2 II 22 Mourning Dove
_____ Greater Roadrunner
_____ Barn Owl
_____ Great Horned Owl
_____ White-throated Swift
_____ Black-ch. Hummingbird
10 III IIII Anna's Hummingbird
_____ Costa's Hummingbird
_____ Belted Kingfisher
_____ Acorn Woodpecker
_____ Nuttall's Woodpecker
_____ Downy Woodpecker
_____ Hairy Woodpecker
_____ Northern Flicker
_____ Western Wood-Pewee
_____ Willow Flycatcher
1 Pacific Slope Flycatcher
1 Black Phoebe
_____ Say's Phoebe
4 IIII Ash-throated Flycatcher
_____ Cassin's Kingbird
2 Western Kingbird
_____ Horned Lark
_____ Tree Swallow
_____ Violet-green Swallow
5 32 N. Rough-winged Swallow
60 Cliff Swallow
_____ Barn Swallow
2 Scrub Jay
5 22 American Crow
12 240 Common Raven
_____ Plain Titmouse
6 222 Bushtit
3 Bewick's Wren
_____ House Wren
_____ Ruby-crowned Kinglet

_____ Blue-gray Gnatcatcher
_____ Western Bluebird
_____ Swainson's Thrush
_____ Hermit Thrush
_____ American Robin
1 Wrentit
2 III Northern Mockingbird
7 II III California Thrasher
_____ American Pipit
_____ Cedar Waxwing
_____ Phainopepla
_____ Loggerhead Shrike
18 3164 European Starling
_____ **Bell's Vireo**
_____ Solitary Vireo
_____ Warbling Vireo
1 Orange-crowned Warbler
18 II 2 2 2 Yellow Warbler
_____ Yellow-rumped Warbler
1 Common Yellowthroat
3 III Wilson's Warbler
_____ Yellow-breasted Chat
3 III Western Tanager
2 II Black-headed Grosbeak
1 Blue Grosbeak
_____ Lazuli Bunting
3 II Rufous-sided Towhee
7 II III California Towhee
_____ Lark Sparrow
_____ Savannah Sparrow
8 V 3 Song Sparrow
_____ Lincoln's Sparrow
_____ White-crowned Sparrow
_____ Red-winged Blackbird
_____ Western Meadowlark
_____ Brewer's Blackbird
1 Brown-headed Cowbird
_____ Hooded Oriole
4 2 Northern Oriole
52 69 8 48 9 House Finch
_____ Pine Siskin
6 22 2 Lesser Goldfinch
_____ Lawrence's Goldfinch
_____ American Goldfinch
2 II House Sparrow

SUGDEN

BIRDS OF Santa Clara River System

Locality South Fork (upper) **Date** 6/2/98 **Time** _____

_____ Great Blue Heron
_____ Green Heron
_____ Mallard
_____ Turkey Vulture
_____ White-tailed Kite
_____ Sharp-shinned Hawk
_____ Cooper's Hawk
_____ Red-shouldered Hawk
(1) _____ Red-tailed Hawk
(2) _____ American Kestrel
(12) 2226 California Quail
_____ American Coot
(3) 12 Killdeer
_____ Spotted Sandpiper
_____ Least Sandpiper
_____ Common Snipe
(40) _____ Rock Dove
(3) ||| Mourning Dove
_____ Greater Roadrunner
_____ Barn Owl
_____ Great Horned Owl
_____ White-throated Swift
(2) || Black-ch. Hummingbird
(8) ||| |||| Anna's Hummingbird
_____ Costa's Hummingbird
_____ Belted Kingfisher
_____ Acorn Woodpecker
_____ Nuttall's Woodpecker
_____ Downy Woodpecker
_____ Hairy Woodpecker
_____ Northern Flicker
_____ Western Wood-Pewee
_____ Willow Flycatcher
_____ Pacific Slope Flycatcher
(1) _____ Black Phoebe
_____ Say's Phoebe
(2) || Ash-throated Flycatcher
_____ Cassin's Kingbird
(2) _____ Western Kingbird
_____ Horned Lark
_____ Tree Swallow
_____ Violet-green Swallow
(7) 61 N. Rough-winged Swallow
(2) _____ Cliff Swallow
_____ Barn Swallow
(1) _____ Scrub Jay
(2) || American Crow
(3) 2 Common Raven roosting
_____ Plain Titmouse
(16) 8222 Bushtit
|||| |||| Bewick's Wren
(10) _____ House Wren
_____ Ruby-crowned Kinglet

_____ Blue-gray Gnatcatcher
(2) _____ Western Bluebird
_____ Swainson's Thrush
_____ Hermit Thrush
_____ American Robin
_____ Wrentit
(4) || 2 Northern Mockingbird
(3) ||| California Thrasher
_____ American Pipit
_____ Cedar Waxwing
_____ Phainopepla
1 Loggerhead Shrike
(2) || European Starling
_____ **Bell's Vireo**
_____ Solitary Vireo
_____ Warbling Vireo
_____ Orange-crowned Warbler
(1) _____ Yellow Warbler
_____ Yellow-rumped Warbler
_____ Common Yellowthroat
_____ Wilson's Warbler
_____ Yellow-breasted Chat
_____ Western Tanager
_____ Black-headed Grosbeak
_____ Blue Grosbeak
_____ Lazuli Bunting
_____ Rufous-sided Towhee
(10) |||| |||| 2 California Towhee
_____ Lark Sparrow
_____ Savannah Sparrow
(3) ||| Song Sparrow
_____ Lincoln's Sparrow
_____ White-crowned Sparrow
_____ Red-winged Blackbird
_____ Western Meadowlark
_____ Brewer's Blackbird
_____ Brown-headed Cowbird
_____ Hooded Oriole
(2) || Northern Oriole
(16) 1468 House Finch
_____ Pine Siskin
(8) 413 Lesser Goldfinch
_____ Lawrence's Goldfinch
_____ American Goldfinch
(4) _____ House Sparrow

Guthrie, Daniel. *Bird Surveys Along a Portion of the Santa Clara River and Its Tributaries Near Valencia, California.* June 1997.

BIRD SURVEYS ALONG THE SANTA CLARA RIVER AND ITS TRIBUTARIES

NEAR VALENCIA, CALIFORNIA, 1997

Prepared for:

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June 23, 1997

Bird Surveys along the Santa Clara River and its Tributaries near Valencia, California, 1997

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Nature and Scope of Surveys

During the spring and early summer of 1997 surveys were conducted along a section of the Santa Clara River and its tributaries in the vicinity of Valencia, California to determine presence or absence of Least Bell's Vireo and other Species of Concern. Numbers of all species observed were noted, and special attention was placed on locating species considered rare and endangered.

Each survey was conducted on foot by observers well acquainted with both visual and auditory patterns of southern California birds. All surveys occurred between 6 and 10 a.m. If no vireos were found during the first two surveys, calls of Least Bell's Vireo were played during subsequent censuses to elicit response from territorial males. Survey routes were designed to cover all areas of each section of the river, with emphasis placed on wetter habitats where Least Bell's Vireos and other sensitive riparian species are most likely to occur. Personnel for all surveys were Daniel A. Guthrie, Richard F. Clements, and Judith A. Sugden.

To facilitate surveys, the area was divided into eight sections (Figure 1). Delineation of the eight areas and comments on each follow. Surveys of the normally dry sections of the river system (Areas 6-8) where Least Bell's Vireos have not been observed in the past were conducted twice during the nesting season. The second survey was delayed until June to insure that late arriving species such as Yellow-billed Cuckoo and Willow Flycatcher would not be missed. Surveys of the remaining sections of the Santa Clara River (Areas 1-5) were conducted according to the protocol outlined by the Fish and Wildlife Service (Appendix 1), except that surveys were limited to 6 in number.

Habitat Condition and Bird Observations.

Rainfall during 1997 was good during the early winter, but there was little rainfall during the spring, resulting in fairly dry conditions away from the river and little runoff. The result was generally dry conditions in intermittent sections of streams, such as Castaic Creek and San Francisquito Creek. However, lack of spring flooding resulted in luxuriant growth along the main section of the Santa Clara river below Boquet Canyon Road. Above Boquet Canyon, the river was dry throughout the study period.

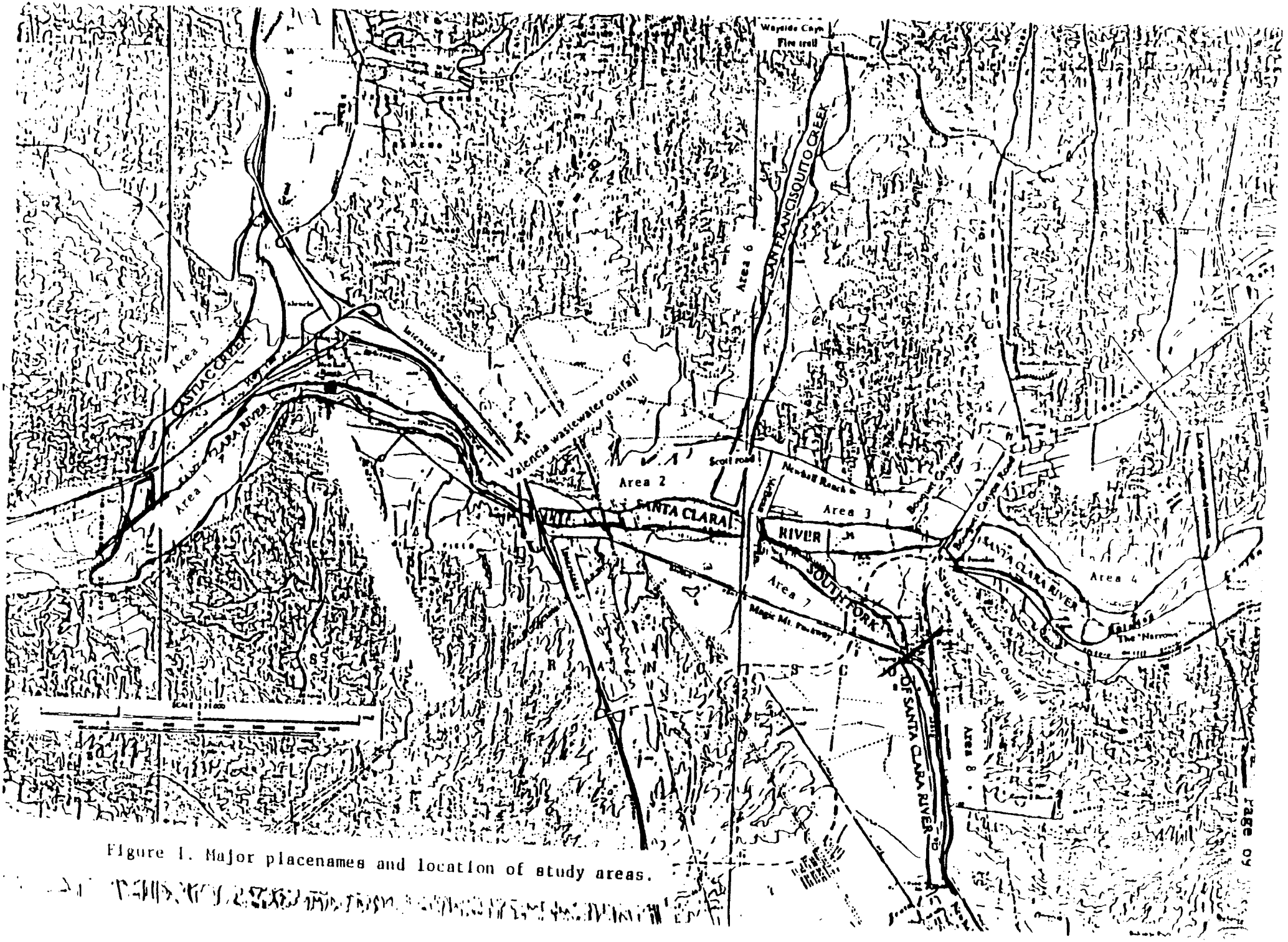


Figure 1. Major placenames and location of study areas.

Tables 1 through 8 present bird observations in each of the specific study areas for 1997. Different species breed at different times of the year. In general, species are most easily observed when they are actively defending territories by song during the establishment of breeding pairs. Once pairs are established and nesting begins song often decreases and the numbers of birds observed, therefore, also decreases. After young leave the nest, numbers observed increase. Thus, for most resident species, numbers of adult birds are most accurately censused in April and May, when territorial activity is at a maximum. A few species such as Anna's Hummingbird that nest early in the season may be underestimated. Numbers observed may decrease slightly in June and early July when birds are less active during nesting, and increase in late June and July when young birds leave the nest.

Several species that are not considered riparian species but are common in adjacent coastal sage and chaparral habitats come into the riparian zone in late summer when other vegetational areas are dry. The increase in numbers of Lazuli Bunting, Lark Sparrow, House Finch, Phainopepla and Mourning Dove in late June follow this trend.

Following are specific comments on the habitat and bird observations in each area.

Area 1. Santa Clara River; Old Highway to the mouth of Castaic Creek and Castaic Creek from this confluence to State Route 126.

Length of section, 3.5 miles. The Santa Clara River flows continuously in this section and is augmented by the Valencia waste water outfall near the upstream end of this section. Near Castaic Junction, a low area on the south side of the river is kept wet by runoff from Magic Mountain. Two Least Bell's Vireos were found along the river near Castaic Junction, not far from a locality where vireos were found in 1996 (Fig. 2; see additional comments in section on Least Bell's Vireo).

Area 2. Santa Clara River; Old Highway to McBean Parkway.

Length of section, 1.4 miles. The Santa Clara River flows continuously in this section. The channel is braided and wet riparian vegetation is well developed along this section of the river. As in previous years, this area was impacted by off road vehicles during the study period. However, vehicles remained for the most part in the main channel of the river.

Area 3. Santa Clara River; McBean Parkway to Boquet Canyon Road.

Length of section, 1.2 miles. Water, supplied by the Saugus wastewater outfall at the Boquet Canyon Bridge, is continuous in this section of the Santa Clara River. Riparian vegetation was

considerably improved over past years.

Area 4. Santa Clara River; Boquet Canyon Road upstream to DWP transmission lines.

Length of section, 2.3 miles. This section of the Santa Clara River in past years has been wet only briefly during spring rains. and due to water release from the DWP aqueduct 2.0 miles upstream from Boquet Canyon Road. This year there was no water flowing in this section of the river, with the result that much of last years new vegetation was dead and wet riparian species were very reduced.

Area 5. Castaic Creek; Route 125 to Old Road next to Interstate 5.

Length of section, 1.8 miles. Water was released from upstream dams for only a short duration during the study period. Only a short section receiving water from street runoff at the north end of the section, and a pond at the east side of the creek were continually wet. The result was many fewer riparian species compared to last year when water flowed continuously throughout the study. A single Least Bell's Vireo was observed but appeared to be an immature rather than a breeding bird. The dry conditions apparently were not suitable to vireos as no breeding birds were observed in areas where they have been found in previous years (Fig. 2; see additional comments on section on Least Bell's Vireo).

Area 6. San Francisquito Creek; Santa Clara River upstream 2.5 miles.

Length of section, 2.5 miles. This section was dry throughout the study period, except for a short section near a well at the middle of the section where water flowed during April and May. There were many fewer riparian species compared to last year when this section contained flowing water.

Area 7. South Fork of the Santa Clara River; McBean Parkway to Magic Mountain Parkway (Route 126).

Length of section, 1.0 miles. The channel along this section of the South Fork is narrow and very sandy. Almost all vegetation along the bottom of the channel was removed by spring floods. Some standing water was present near the McBean bridge.

Area 8. South Fork of the Santa Clara River, Route 126 upstream to Newhall Creek.

Length of section, 1.4 miles. This section of the river was dry except for damp areas formed by runoff from culverts along the west side of the creek. Cattails developed in these wet areas supported fewer Song Sparrows than in previous years and no Red-

winged Blackbirds, perhaps a sign of human disturbance near the wet areas.

Comments on Sensitive Species

Cooper's Hawk

Cooper's Hawk is considered a Species of Special Concern by the State of California. Coopers hawks were observed rarely on all sections of the main river in 1997 and also along San Francisquito Creek. This species is a resident that nests and hunts in riparian woodland habitat.

White-tailed Kite

This species, formerly the Black-shouldered Kite, is considered "Special" by the State of California. The pair of kites that nested in the dry woodland on the north side of the Santa Clara River near the confluence with Castaic Creek in 1995 was present this year, having been absent in 1996. A pair of kites also nested on the south side of the Santa Clara River about 1/2 mile west of the McBean Bridge.

Yellow-billed Cuckoo

The Yellow-billed Cuckoo is listed as a State Endangered Species. A single individual was observed on June 19th about 1 mile east of the Boquet River Bridge in a cottonwood tree next to the dry channel of the Santa Clara River. At this date cuckoos are migrating through southern California on their way to the nesting grounds along the Kern River. As the bird was silent and not in good breeding habitat, it is considered a migrant passing through the area.

Willow Flycatcher

This species is listed as an Endangered Species under the Federal Endangered Species Act. Willow Flycatchers were once widespread in wet riparian woodland in southern California but now only a few individuals exist. The main California breeding populations of this species are along the Kern River and in northern California. Individuals of this species wre observed on all sections of the river between May 26 and June 10. Despite a concerted search, none of these individuals could be refound on subsequent visits and are, therefore, considered to be migrants passing through the area.

California Horned Lark

This species is a candidate for listing under the Federal Endangered Species Act. Horned Larks nest on dry hillsides above

Castaic Creek and were observed in late summer on plowed fields adjacent to the Castaic Creek and near the main river at Castaic Junction.

Least Bell's Vireo

Two singing Least Bell's Vireos were observed near Castaic Junction in dense willow along the Santa Clara River. This locality is different from the one where vireos were found last year, but is not too distant (Figure 2). As only males sing, this was considered evidence of two territorial males. In order to avoid disturbance of possibly nesting birds, no search for nests or mates was conducted.

Least Bell's Vireos were not singing this year along Castaic Creek in the area where they nested in 1996. Castaic Creek was dry most of the spring and annual vegetation along the creek was not well developed. A single bird was observed in a different location along the creek on June 5th (Figure 2). This bird did not sing and is considered an immature of the year rather than a breeding bird.

Yellow Warbler

The Yellow Warbler is considered a Species of Special Concern by the State of California. Yellow Warblers prefer wet riparian habitat but are also found in large cottonwoods in drier riparian areas. Singing yellow warblers were observed along nearly every section of the Santa Clara River and Castaic Creek. The drop in numbers observed between May and June indicate that most of the earlier birds observed were migrants passing through the area. The Yellow Warblers that remained in June along wet sections of the Santa Clara river presumably were breeding birds.

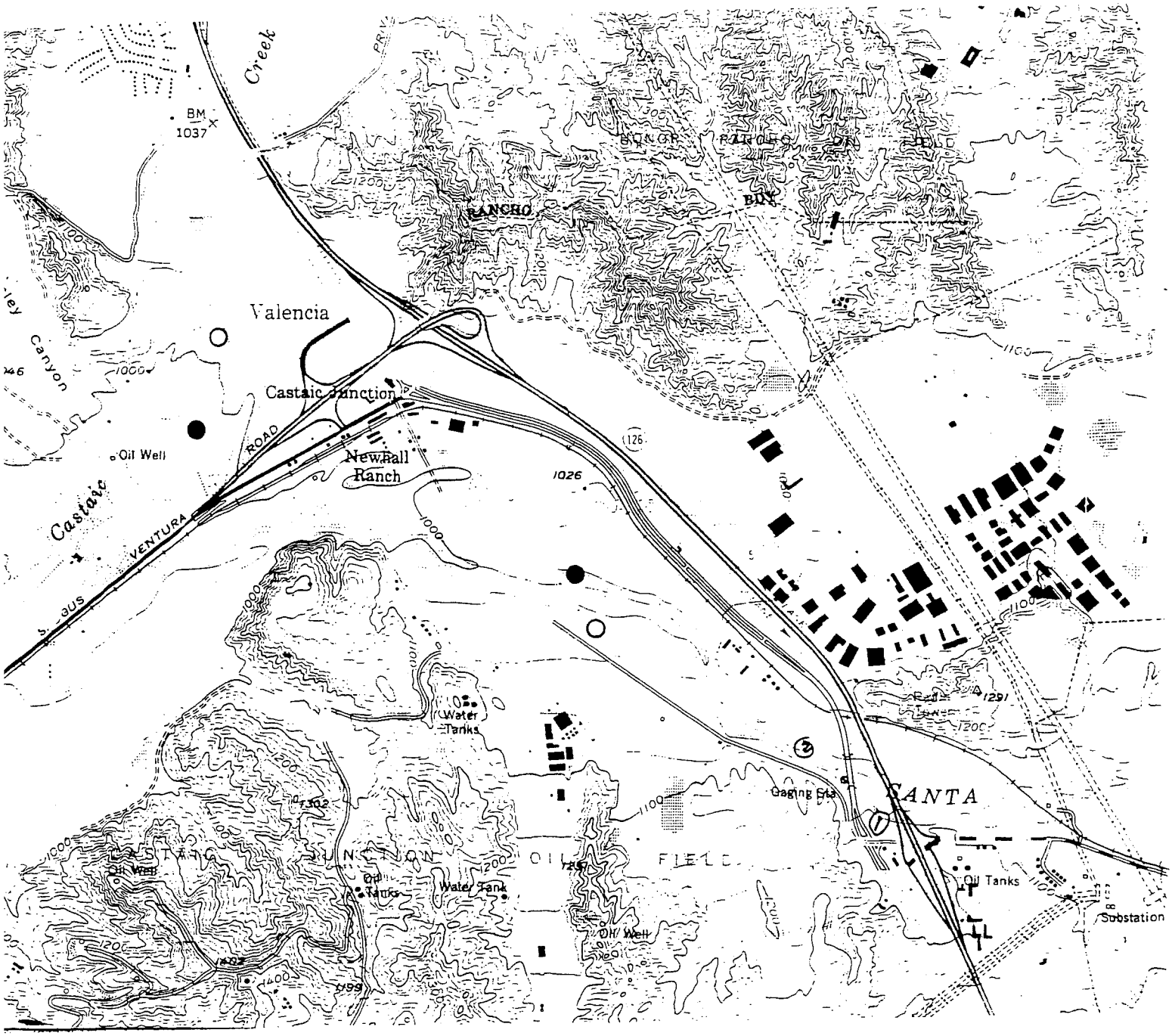
Yellow-breasted Chat

The yellow-breasted chat is considered a Species of Special Concern by the State of California. Chats were observed sparingly along the wet sections of the Santa Clara River. Numbers were lower along the upper river and Castic Creek, both of which were dry, but increased along the main river.

Lawrence's Goldfinch

This species is a highest priority species on the Audubon Birds to Watch list for 1996. A pair was observed drinking along Castiac Creek in June. This species nests in coastal sage and chaparral habitat and visits the river during the dry late summer.

Figure 2. Location of Least Bell's Vireo Sightings in 1996 and 1997



● Location of 1997 sightings

○ Location of 1996 sightings

Table 1. Bird Observations along the Santa Clara River System, 1997: Santa Clara River from Old Highway along I-5 to the mouth of Castaic Creek and Castaic Creek from this confluence to State Route 126.

Species	date: 4/5	4/22	5/8	5/26	6/5	6/20	status
American Bittern	-	1	-	-	-	-	M
Green Heron	1	2	2	1	1	3	R*
Bl. cr. Night Heron	1	1	-	1	-	-	M
Mallard	9	4	13(4)	3	-	1	R*
Turkey Vulture	1	-	-	-	2	1	S
White-tailed Kite	1	1	-	2(1)	2	1	R*
Cooper's Hawk	1	-	-	-	-	1	R*
Red-shouldered Hawk	1	1	2	2	2	2	R*
Red-tailed Hawk	3	4	3(1)	-	5	3	R*
American Kestrel	1	1	-	-	1	-	R*
Sora Rail	2	3	-	-	-	-	M
Virginia Rail	-	2	-	-	-	-	M
California Quail	57	3	14	34	8	23	R*
Killdeer	4	-	2	-	2	4	R*
Spotted Sandpiper	-	-	4	1	-	-	S*
Least Sandpiper	-	10	-	-	-	-	M
Domestic Pigeon	7	-	-	-	4	-	R*
Mourning Dove	12	-	15	6	3	12	R*
Greater Roadrunner	-	-	-	-	2	-	R*
Great Horned Owl	-	-	-	-	1	-	R*
Vaux's Swift	-	2	-	-	-	-	M
White-th. Swift	-	-	9	-	2	8	R
Black-ch. Hummingbird	-	-	1	-	5	1	S*
Anna's Hummingbird	13	5	9	7	9	12	R*
Costa's Hummingbird	-	-	-	-	1	-	S*
Belted Kingfisher	-	3	-	-	-	-	M
Nuttall's Woodpecker	6	6	9	9	11	13	R*
Downy Woodpecker	-	2	-	5	4	6	R*
Hairy Woodpecker	2	-	1	1	-	-	R*
Northern Flicker	-	3	2	-	-	2	R*
Pac. slope Flycatcher	-	-	2	1	-	-	M
Willow Flycatcher	-	-	-	1	-	-	M
Black Phoebe	-	-	3	-	4	7	R*
Ash-thr. Flycatcher	-	5	7	11	9	17	S*
Western Kingbird	2	10	3	4	1	5	S*
Violet-green Swallow	-	4	6	-	10	2	S*
N. Rough-w. Swallow	34	49	12	24	39	16	S*
Barn Swallow	-	1	-	-	-	5	S
Cliff Swallow	-	200	200	200	160	130	S*
Scrub Jay	11	5	14	16	16	22	R*
American Crow	20	3	5	5	6	7	R*
Common Raven	33	19	19	7	15	19	R*
Plain Titmouse	11	7	10	9	13	13	R*
Bushtit	8	7	4	6	18	71	R*
Bewick's Wren	24	27	27	48	22	28	R*

Table 1 (cont.). Bird Observations along the Santa Clara River System, 1997: Santa Clara River from Old Highway along I-5 to the mouth of Castaic Creek and Castaic Creek from this confluence to State Route 126.

Species	date: 4/5	4/22	5/8	5/26	6/5	6/20	status
House Wren	15	4	11	17	8	12	R*
Western Bluebird	2	1	2	4	1	12	R*
American Robin	-	-	-	-	-	2	R*
Mockingbird	1	-	-	-	-	-	R*
Wrentit	4	-	1	-	3	7	R*
Calif. Thrasher	2	4	2	5	5	13	R*
Cedar Waxwing	-	-	16	-	-	-	W,M
Phainopepla	-	-	-	-	3	1	S*
European Starling	5	5	22	6	15	18	R*
Bell's Vireo	**-**	**-**	**-**	**2**	**-**	**1**	**S***
Yellow Warbler	2	8	13	8	5	4	S*
Yellow- r. Warbler	40	-	-	-	-	-	W,M
Common Yellowthroat	25	21	58	71	44	35	R*
Wilson's Warbler	-	2	8	1	-	-	M
Yellow-br. Chat	4	4	11	6	13	5	S*
Bl.-headed Grosbeak	-	15	18	7	19	38	S*
Blue Grosbeak	-	5	5	5	7	6	S*
Lazuli Bunting	2	4	10	-	3	17	S*
Spotted Towhee	15	5	26	27	19	29	R*
California Towhee	15	18	19	24	15	7	R*
Lark Sparrow	-	-	-	-	1	2	S*
Song Sparrow	125	103	108	108	121	55	R*
Red-w. Blackbird	24	19	15	16	10	5	S*
Brewer's Blackbird	1	-	-	-	-	-	R*
Brown-headed Cowbird	20	23	12	23	7	11	S*
Hooded Oriole	-	-	-	-	3	1	S*
Bullock's Oriole	11	-	3	2	1	13	S*
House Finch	4	6	17	16	53	78	R*
Lesser Goldfinch	13	10	5	3	4	12	R*
American Goldfinch	41	-	-	3	-	-	W,R*
House Sparrow	-	-	1	1	-	-	R*
Total Species:	46	48	49	45	52	53	
Total Individuals:	636	648	782	760	738	819	

Total Species on all visits: 76
Total Probable Breeding species: 61 (marked with *)

Status: M - Migrant; R - Resident; S - Summer Only; W - Winter Only

() = dependent young birds

Censuses of 4/5, 5/26, 6/20 on the north side of river,
Censuses of 4/22, 4/8, 6/5 on south side of river.

Table 2. Bird Observations along the Santa Clara River System, 1997: Santa Clara River from McBean Parkway to Old Highway along I-5.

Species	date: 4/5	4/22	5/8	5/26	6/5	6/20	status
Great Blue Heron	-	1	-	-	-	-	M
Great Egret	-	1	-	-	-	-	W,M
Green Heron	-	-	1	-	1	-	R*
Bl. cr. Night Heron	1	-	-	-	-	-	M
Mallard	2	2	-	-	1	-	R*
Turkey Vulture	3	-	-	-	-	-	M,S
White-tailed Kite	2	1	-	-	1	-	R*
Cooper's Hawk	1	-	-	1	-	-	R*
Red-shouldered Hawk	1	1	2	2	1	3	R*
Swainson's Hawk	1	-	-	-	-	-	M
Red-tailed Hawk	-	1	1	2	2	-	R*
American Kestrel	-	-	-	1	-	-	R*
California Quail	21	8	9	9	13	-	R*
Killdeer	3	2	2	2	-	2	R*
Mourning Dove	1	-	2	5	7	4	R*
Roadrunner	1	-	1	-	-	-	R*
Barn Owl	1	-	-	-	-	-	R*
Great Horned Owl	-	-	-	1	-	-	R*
Bl. chin. Hummingbird	1	-	-	-	-	-	S*
Anna's Hummingbird	1	2	-	1	3	5	R*
Nuttall's Woodpecker	2	6	6	4	4	9	R*
Downy Woodpecker	1	1	4	3	2	4	R*
Hairy Woodpecker	-	-	-	1	-	-	R*
Northern Flicker	-	-	-	-	1	-	R*
Pac. slope Flycatcher	-	1	-	-	-	-	M
Willow Flycatcher	-	-	-	-	1	-	M
Black Phoebe	1	1	1	1	3	4	R*
Ash-thr. Flycatcher	-	4	4	2	6	3	S*
Western Kingbird	1	-	-	-	2	1	S*
Tree Swallow	-	-	2	-	-	-	S*
N. Rough-w. Swallow	25	44	16	18	22	22	S*
Cliff Swallow	-	20	30	50	50	70	S*
Barn Swallow	-	-	-	-	-	2	S*
Scrub Jay	2	4	3	5	5	6	R*
American Crow	6	3	2	10	9	2	R*
Common Raven	6	1	5	-	-	4	R*
Plain Titmouse	5	2	7	6	5	4	R*
Bushtit	4	8	4	22	2	-	R*
Bewick's Wren	8	9	17	21	13	6	R*
House Wren	4	2	5	4	1	-	R*
White-br. Nuthatch	-	-	-	1	-	-	R*?
Western Bluebird	4	3	2	1	3	-	R*
American Robin	1	-	-	-	-	-	R*
Wrentit	-	-	-	-	-	3	R*
Calif. Thrasher	4	3	4	2	-	2	R*

Table 2 (cont.). Bird Observations along the Santa Clara River System, 1997: Santa Clara River from McBean Parkway to Old Highway along I-5.

Species	date: 4/5	4/22	5/8	5/26	6/5	6/20	status
European Starling	7	16	33	7	6	8	R*
Warbling Vireo	-	-	1	-	-	-	M
Yellow Warbler	-	1	9	3	1	2	S*
Yellow- r. Warbler	11	5	-	-	-	-	W,M
Common Yellowthroat	4	15	4	6	11	10	R*
Wilson's Warbler	-	1	5	1	-	-	M
Yellow-br. Chat	-	-	6	6	4	5	S*
Western Tanager	-	-	2	1	-	-	M
Bl.-headed Grosbeak	2	4	5	4	6	3	S*
Blue Grosbeak	-	1	1	1	2	1	S*
Lazuli Bunting	-	-	-	-	-	3	S*
Spotted Towhee	2	4	4	7	5	6	R*
California Towhee	-	4	2	2	5	4	R*
Song Sparrow	26	40	31	25	37	37	R*
Red-winged Blackbird	10	20	28	8	2	-	S*
Brown-headed Cowbird	5	10	2	2	6	3	S*
Bullock's Oriole	3	2	-	-	-	-	S*
House Finch	8	12	15	6	15	16	R*
Lesser Goldfinch	-	-	-	2	15	7	R*
American Goldfinch	13	4	-	-	-	-	W,M
Total Species:	40	40	38	40	37	32	
Total Individuals:	196	270	278	256	275	261	

Total Species on all visits: 65
Total Probable Breeding species: 53 (marked with *)

Status: M - Migrant; R - Resident; S - Summer Only; W - Winter Only

Censuses of 4/22, 5/26, 6/20 on the north side of river,
Censuses of 4/5, 5/8, 6/5 on south side of river.

Table 3. Bird Observations along the Santa Clara River System, 1997: Santa Clara River from Boquet Canyon Rd. to McBean Parkway.

Species date:	4/8	4/19	5/11	5/27	6/6	6/19	status
Great Egret	-	-	1	-	-	-	W,M
Green Heron	1	-	1	-	-	-	R*
Mallard	2	-	-	-	-	-	R*
Cooper's Hawk	-	-	-	-	-	1	R*
Red-shouldered Hawk	-	-	-	-	2	-	R*
Red-tailed Hawk	1	4	2	3	2	1	R*
Golden Eagle	-	1	-	-	-	-	R
California Quail	15	6	11	6	-	6	R*
Killdeer	4	4	4	-	-	2	R*
California Gull	-	55	-	-	-	-	M
Domestic Pigeon	4	-	-	-	-	-	R*
Mourning Dove	5	5	6	5	2	9	R*
Bl. Ch. Hummingbird	-	-	-	-	1	-	S*
Anna's Hummingbird	3	2	2	4	5	7	R*
Nuttall's Woodpecker	3	2	3	2	5	3	R*
Downy Woodpecker	-	2	2	-	2	-	R*
Northern Flicker	4	-	-	-	-	-	R*
W. Wood Pewee	-	-	1	-	-	-	M
Willow Flycatcher	-	-	-	-	1	-	M
Black Phoebe	2	2	2	5	3	3	R*
Ash-thr. Flycatcher	-	1	6	2	2	5	S*
Western Kingbird	-	2	2	2	-	2	S*
N. Rough-w. Swallow	19	6	36	20	36	19	S*
Cliff Swallow	2	-	25	6	15	30	S*
Barn Swallow	-	-	-	-	2	6	S*
Scrub Jay	8	9	9	9	9	10	R*
American Crow	19	12	11	31	6	9	R*
Common Raven	38	31	35	55	61	14	R*
Plain Titmouse	2	-	-	-	-	-	R*
Bushtit	4	4	2	6	2	-	R*
Bewick's Wren	7	7	12	3	6	5	R*
House Wren	1	1	2	6	-	-	R*
Wrentit	1	2	1	1	-	1	R*
Calif. Thrasher	2	5	2	2	-	2	R*
European Starling	-	6	4	-	-	2	R*
Orange-cr. Warbler	1	1	-	-	-	-	M
Yellow Warbler	2	2	4	-	-	-	S*
Yellow- r. Warbler	13	3	-	-	-	-	W,M
Common Yellowthroat	7	6	5	10	9	14	R*
Yellow-br. Chat	-	1	1	-	-	-	S*
Bl.-headed Grosbeak	1	3	2	3	1	1	S*
Spotted Towhee	7	2	2	2	-	1	R*
California Towhee	4	3	3	4	2	4	R*
Song Sparrow	24	27	26	34	29	47	R*
White-cr. Sparrow	21	-	-	-	-	-	W

Table 3. (cont.) Bird Observations along the Santa Clara River System, 1997: Santa Clara River from Boquet Canyon Rd. to McBean Parkway.

Species date:	4/8	4/19	5/11	5/27	6/6	6/19	status
Red-w. Blackbird	35	35	45	18	59	116	S*
Brown-headed Cowbird	4	6	12	3	3	5	S*
Bullock's Oriole	1	1	4	2	3	-	S*
House Finch	11	6	12	12	16	28	R*
Lesser Goldfinch	5	2	2	4	5	5	R*
American Goldfinch	9	-	-	-	-	-	W,M
House Sparrow	-	2	-	2	-	-	R*
Total Species:	37	37	36	29	27	29	
Total Individuals:	291	269	300	262	289	358	

Total Species on all visits: 52
Total Probable Breeding species: 43 (marked with *)

Status: M - Migrant; R - Resident; S - Summer Only; W - Winter Only

Table 4. Bird Observations along the Santa Clara River System, 1997: Santa Clara River from Power Line 2.5 miles upstream from Boquet Canyon Rd. to Boquet Canyon Road Crossing.

Species	date: 4/8	4/19	5/11	5/29	6/6	6/19	status
Turkey Vulture	-	-	-	-	1	-	S
Cooper's Hawk	1	-	-	-	-	-	R*
Red-shouldered Hawk	1	-	1	-	-	-	R*
Red-tailed Hawk	1	2	2(1)	3	1	2	R*
American Kestrel	-	-	2	-	-	2	R*
California Quail	47	41	39	51	51	16	R*
Killdeer	4	-	2	2	5	-	R*
Domestic Pigeon	-	-	-	15	8	-	R*
Mourning Dove	14	20	30	16	24	14	R*
Common Ground Dove	-	-	-	1	-	-	R*?
Yellow-billed Cuckoo	**-**	**-**	**-**	**-**	**-**	**1**	**M**
Bl.-ch. Hummingbord	-	-	3	2	6	-	S*
Anna's Hummingbird	29	10	11	13	12	5	R*
Costa's Hummingbird	1	-	-	1	-	-	S*
Nuttall's Woodpecker	4	2	3	9	-	6	R*
Downy Woodpecker	2	-	-	1	-	-	R*
Northern Flicker	7	-	-	-	-	1	R*
Hammond's Flycatcher	-	-	2	-	-	-	M
Pac. slope Flycatcher	-	-	-	1	-	-	M
Willow Flycatcher	-	-	-	2	-	-	M
Ash-thr. Flycatcher	1	-	2	3	2	-	S*
Black Phoebe	-	-	-	-	-	1	R*
Western Kingbird	1	4	-	3	-	-	S*
N. Rough-w. Swallow	-	-	-	10	12	4	S*
Cliff Swallow	-	-	3	1	-	-	S*
Scrub Jay	18	6	22	30	21	18	R*
American Crow	7	2	1	6	5	-	R*
Common Raven	20	19	29	28	33	21	R*
Plain Titmouse	11	3	2	3	3	-	R*
Bushtit	10	6	8	13	22	3	R*
Bewick's Wren	27	24	34	34	9	9	R*
House Wren	5	-	3	-	-	-	R*
Ruby-cr. Kinglet	2	-	-	-	-	-	W
Swainson's Thrush	-	-	2	-	-	-	M
Hermit Thrush	1	-	-	-	-	-	W,M
Western Bluebird	-	-	-	2	-	-	R*
American Robin	5	-	-	-	-	-	R*
Wrentit	-	-	5	5	-	5	R*
N. Mockingbird	12	6	2	5	8	11	R*
Calif. Thrasher	10	10	9	17	8	4	R*
Cedar Waxwing	56	7	-	-	-	-	W
Phainopepla	-	5	6	8	5	1	R*
European Starling	9	19	4	7	7	3	R*
Warbling Vireo	1	2	-	-	-	-	M

Table 4 (cont.). Bird Observations along the Santa Clara River System, 1997: Santa Clara River from Power Line 2.5 miles upstream from Boquet Canyon Rd. to Boquet Canyon Road Crossing.

Species	date: 4/8	4/19	5/11	5/29	6/6	6/20	status
Orange-cr. Warbler	2	-	-	-	-	-	M
Yellow Warbler	3	-	3	1	-	-	S*
Yellow- r. Warbler	77	1	-	-	-	-	W,M
Common Yellowthroat	3	3	1	1	-	-	R*
Wilson's Warbler	-	-	5	-	-	-	M
Bl.-headed Grosbeak	2	2	11	6	-	4	S*
Blue Grosbeak	-	4	1	-	-	-	S*
Lazuli Bunting	-	-	-	3	-	-	S*
Spotted Towhee	37	33	30	34	20	12	R*
California Towhee	41	30	29	28	14	4	R*
Rufous-cr. Sparrow	-	5	2	1	-	-	R*
Lark Sparrow	-	-	-	2	-	-	R*
Brewer's Sparrow	-	-	1	-	-	-	M
Savannah Sparrow	4	-	-	3	-	-	R*
Song Sparrow	24	16	6	6	6	-	R*
White-cr. Sparrow	60	-	-	-	-	-	W
Red-winged Blackbird	1	1	-	-	-	-	S*
West. Meadowlark	2	1	2	-	-	-	R*
Brown-headed Cowbird	18	6	14	2	5	-	S*
Hooded Oriole	-	-	-	-	5	-	S*
Bullock's Oriole	6	6	6	25	3	3	S*
House Finch	25	11	34	104	61	25	R*
Lesser Goldfinch	19	3	5	7	22	-	R*
House Sparrow	2	4	-	-	3	-	R*
Total Species:	45	33	41	43	29	24	
Total Individuals:	633	314	378	515	382	175	

Total Species on all visits: 68
Total Probable Breeding species: 53 (marked with *)

Status: M - Migrant; R - Resident; S - Summer Only; W - Winter Only

() = dependent young birds

Table 5. Bird Observations along the Santa Clara River System, 1997: Castaic Creek from Old Road west to Rte. 126.

Species date:	4/5	4/26	5/8	5/26	6/5	6/20	status
Green Heron	-	1	-	-	2	-	R*
Bl-cr. Night Heron	-	2	-	-	-	-	M
White-faced Ibis	1	-	-	-	-	-	M
Cooper's Hawk	-	-	-	-	1	-	R*
Red-shouldered Hawk	-	-	1	-	1	1	R*
Red-tailed Hawk	-	2	1	2	3	2	R*
American Kestrel	1	-	-	1	-	1	R*
California Quail	15	16	28	15	13	9(7)	R*
Killdeer	2	4	4	2	-	2	R*
California Gull	-	-	30	-	-	-	M
Domestic Pigeon	25	-	6	2	6	2	R*
Mourning Dove	11	11	5	8	9	14	R*
Anna's Hummingbird	4	5	3	7	9	4	R*
Nuttall's Woodpecker	3	4	4	5	4	5	R*
Downy Woodpecker	-	-	-	1	1	-	R*
Northern Flicker	1	-	2	-	-	4	R*
Black Phoebe	-	-	2	2	2	2	R*
Say's Phoebe	-	-	-	-	-	2	R*
Ash-thr. Flycatcher	-	3	3	1	1	7	S*
Western Kingbird	4	4	6	2	1	3	S*
Horned Lark	2	-	2	-	-	-	R
N. Rough-w. Swallow	37	36	50	38	30	36	S*
Barn Swallow	-	-	-	4	-	-	S
Cliff Swallow	-	10	35	8	130	130	S*
Scrub Jay	5	11	13	7	13	15	R*
American Crow	8	6	5	3	2	-	R*
Common Raven	2	1	1	4	5	10	R*
Plain Titmouse	1	2	2	2	-	-	R*
Bushtit	-	4	6	8	4	8	R*
Bewick's Wren	6	5	10	8	11	7	R*
Western Bluebird	-	-	2	-	-	-	R*
American Robin	3	2	2	-	-	-	R*
Wrentit	-	3	2	2	2	2	R*
Calif. Thrasher	2	3	4	4	3	5	R*
Cedar Waxwing	-	-	18	-	-	-	W,M
Phainopepla	-	-	-	-	1	1	S*
European Starling	5	4	25	4	5	2	R*
Bell's Vireo	**-**	**-**	**-**	**-**	**1**	**-**	**S***
Orange-cr. Warbler	2	-	-	-	-	-	M
Yellow Warbler	-	2	-	-	-	-	S*
Common Yellowthroat	2	8	5	5	6	4	R*
Yellow-br. Chat	-	-	-	-	2	-	S*
Western Tanager	-	2	-	-	-	-	M
Bl.-headed Grosbeak	1	12	9	10	11	8	S*

Table 5 (cont.). Bird Observations along the Santa Clara River System, 1997: Castaic Creek from Old Road west to Rte. 126.

Species date:	4/5	4/26	5/8	5/26	6/5	6/20	status
Blue Grosbeak	-	5	11	2	3	6	S*
Spotted Towhee	2	3	4	6	6	5	R*
California Towhee	5	5	10	6	10	4	R*
Lark Sparrow	-	-	-	-	-	-	R*
Savannah Sparrow	11	1	-	3	-	-	R
Song Sparrow	15	20	18	22	11	7	R*
Red-wing. Blackbird	43	60	70	54	45	39	S*
Yellow-h. Blackbird	-	10	-	-	-	-	M
Brewer's Blackbird	5	4	-	-	-	-	R*
Brown-headed Cowbird	4	6	10	6	5	-	S*
Bullock's Oriole	6	6	5	5	8	2	S*
House Finch	15	12	8	6	14	28	R*
Lesser Goldfinch	-	-	-	-	4	2	R*
Lawrence's Goldfinch	-	2	-	-	-	-	R*
House Sparrow	-	2	-	-	-	-	R*
Total Species:	32	39	38	35	38	34	
Total Individuals:	249	299	422	265	415	386	

Total Species on all visits: 59
Total Probable Breeding species: 49 (marked with *)

Status: M - Migrant; R - Resident; S - Summer Only; W - Winter Only

() = dependent young birds

Table 6. Bird Observations along the Santa Clara River System, 1997: San Francisquito Creek for 2 Miles above Main Channel.

Species	date: 5/15	6/10	status
Cooper's Hawk	-	1	R*
Red-shouldered Hawk	-	1	R*
Red-tailed Hawk	3	1	R*
California Quail	18	44(8)	R*
Killdeer	4	3	R*
Domestic Pigeon	-	68	R*
Mourning Dove	30	28	R*
Roadrunner	-	1	R*
Bl.-ch. Hummingbird	-	5	S*
Anna's Hummingbird	6	12	R*
Nuttall's Woodpecker	12	16	R*
Downy Woodpecker	-	1	R*
Northern Flicker		-	R*
Willow Flycatcher	-	1	M
Black Phoebe	3	2	R*
Ash-thr. Flycatcher	9	9	S*
Western Kingbird	4	7	S*
N. Rough-w. Swallow	8	30	S*
Cliff Swallow	5	8	S*
Scrub Jay	15	28	R*
American Crow	3	5	R*
Common Raven	10	19	R*
Plain Titmouse	4	7	R*
Bushtit	2	15	R*
Bewick's Wren	12	12	R*
House Wren	3	1	R*
Western Bluebird	2	-	R*
N.Mockingbird	1	2	R*
Calif. Thrasher	8	9	R*
Cedar Waxwing	10	-	W,M
Phainopepla	2	4	R*
European Starling	11	8	R*
Yellow Warbler	2	-	S*
Common Yellowthroat	-	7	R*
Black-headed Grosbeak	4	7	S*
Blue Grosbeak	2	4	S*
Lazuli Bunting	-	1	S*
Spotted Towhee	10	13	R*
California Towhee	31	24	R*
Lark Sparrow	-	1	R*
Song Sparrow	11	12	R*
Brown-headed Cowbird	16	6	S*
Hooded Oriole	-	1	S*

Table 6 (cont.). Bird Observations along the Santa Clara River System, 1997: San Francisquito Creek for 2 Miles above Main Channel.

Species	date: 5/15	6/10	status
Bullock's Oriole	20	11	S*
House Finch	5	73	R*
Lesser Goldfinch	11	12	R*
Total Species:	34	42	
Total Individuals:	297	532	

Total Species on all visits: 46
Total Probable Breeding species: 44 (marked with *)

Status: M - Migrant; R - Resident; S - Summer Only; W - Winter Only

() = dependent young birds

Table 7. Bird Observations along the Santa Clara River System, 1997: South Fork from Rte. 126 to McBean Parkway.

Species	date: 5/15	6\10	status
California Quail	4	4	R*
Mourning Dove	1	1	R*
Anna's Hummingbird	1	1	R*
Nuttall's Woodpecker	1	1	R*
Black Phoebe	2	1	R*
Ash-thr. Flycatcher	1	2	S*
Western Kingbird	-	1	S*
N. Rough-w. Swallow	15	4	S*
Cliff Swalow	-	20	S*
Scrub Jay	3	2(2)	R*
American Crow	-	2	R*
Common Raven	1	2	R*
Bewick's Wren	2	3	R*
Western Bluebird	2	-	R*
Northern Mockingbird	-	2	R*
Calif. Thrasher	2	2	R*
Eur. Starling	-	1	R*
California Towhee	4	-	R*
Lark Sparrow	-	1	R*
Song Sparrow	2	1	R*
Red-winged Blackbird	6	1(2)	S*
Brown-headed Cowbird	1	-	S*
Bullock's Oriole		-	S*
House Finch	8	9	R*
Lesser Goldfinch	-	6	R*
Total Species:	17	21	
Total Individuals:	56	71	

Total Species on all visits: 25
Total Probable Breeding species: 25 (marked with *)

Status: M - Migrant; R - Resident; S - Summer Only; W - Winter Only

() = dependent young birds

Table 8. Bird Observations along the Santa Clara River System, 1997: South Fork from Newhall Creek to Rte. 126.

Species	date: 5/15	6/10	status
Mallard	2	-	R*
Red-tailed Hawk	1	1	R*
California Quail	6	4(6)	R*
Killdeer	4	4	R*
Mourning Dove	13	6	R*
Anna's Hummingbird	-	4	R*
Nuttall's Woodpecker	-	1	R*
Northern Flicker	1	1	R*
Black Phoebe	2	-	R*
Rough-winged Swallow	-	4	S*
Scrub Jay	3	3	R*
American Crow	-	1	R*
Common Raven	-	5	R*
Bushtit	28	5	R*
Bewick's Wren	4	5	R*
N. Mockingird	1	2	R*
Calif. Thrasher	1	2	R*
Cedar Waxwing	8	-	M,W
European Starling	2	-	R*
Yellow Warbler	1	-	S
Common Yellowthroat	-	1	R*
Blue Grosbeak	1	-	S*
Spotted Towhee	-	1	R*
California Towhee	10	4(1)	R*
Song Sparrow	10	4	R*
Brown-headed Cowbird	1	2	S*
Bullock's Oriole	5	3	S*
House Finch	14	17	R*
Lesser Goldfinch	2	1	R*
Total Species:	22	23	
Total Individuals:	120	83	

Total Species on all visits: 29
Total Probable Breeding species: 27 (marked with *)

Status: M - Migrant; R - Resident; S - Summer Only; W - Winter Only

() = dependent young birds

Appendix 1. Fish and Wildlife Rules for Least Bell's Vireo Censuses.

LEAST BELL'S VIREO SURVEY GUIDELINES

1. All riparian areas should be surveyed once a week from April 1 to July 31. These dates encompass the period during which most vireo nesting activity occurs. If additional information on vireo habitat utilization is needed, these surveys should be extended to August 31. Information typically collected after July 31 will reflect a broader extent of the riparian habitat and other adjacent habitat types that the vireo utilizes during the latter phase of the breeding season, especially when the young become independent of the adults.

2. Surveys must be conducted by qualified biologist(s) familiar with song and plumage characteristics of the vireo.

3. Surveys shall be conducted between dawn and 11:00 a.m. Surveys shall avoid periods of excessive heat, wind, and rain.

4. All vireo detections (e.g., vocalization points, areas used for foraging, etc.) should be used to define individual home range. These data need to be mapped on a large-scale aerial photograph.

5. Data on vireo breeding status (e.g., number and location of paired or unpaired territorial males, nest building efforts, feeding of nestlings, location of vireo nests, etc.) should be noted during each survey.

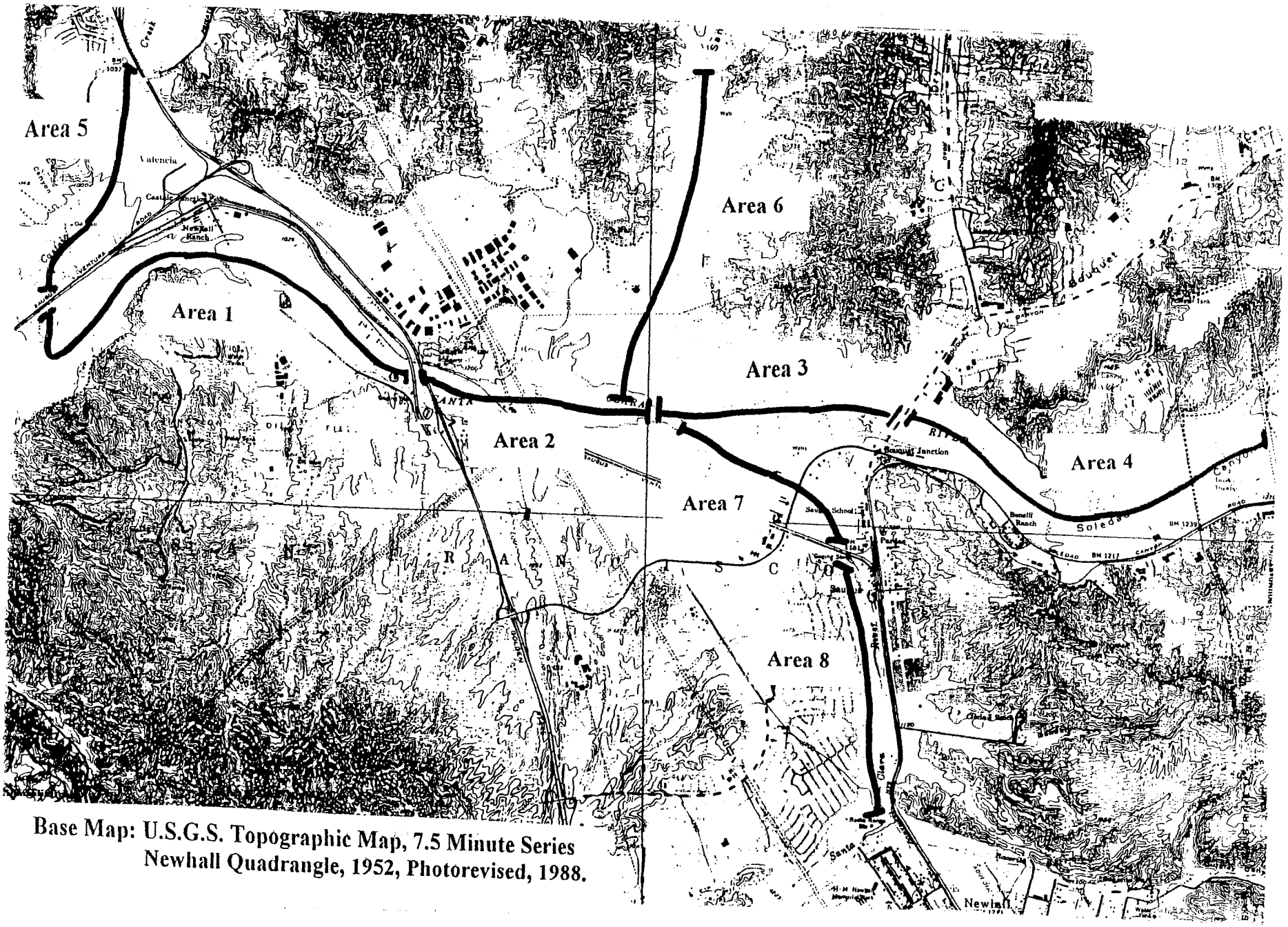
6. All sightings of cowbirds and their numbers in vireo territories should be noted during each survey.

7. No attempts should be made to locate or examine vireo nests unless authorized by permits issued by California Department of Fish and Game and the U.S. Fish and Wildlife Service.

8. A final report should be prepared which describes survey dates, methods, locations, and information identified in items 4, 5, and 6 above.

If you have any questions regarding these survey guidelines, please contact the U.S. Fish and Wildlife Service at (714) 643-4270.

Figure 1. Survey Areas along the Santa Clara River and Tributaries.



Base Map: U.S.G.S. Topographic Map, 7.5 Minute Series
Newhall Quadrangle, 1952, Photorevised, 1988.

BIRDS OF Santa Clara River System

Locality Oxnard → CAST JUNCT 7:45 → 8:45 Date 4-5-97

Time

1997 - Upper Reach 1

one 5 2

- Great Blue Heron
- Green Heron
- (3) 2 Mallard
- Cinnamon Teal
- (1) Turkey Vulture
- White-tailed Kite
- Sharp-shinned Hawk
- (1) Cooper's Hawk
- (1) Red-shouldered Hawk
- Red-tailed Hawk
- Golden Eagle
- American Kestrel
- California Quail
- American Coot
- (2) 11 Killdeer
- Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- Rock Dove
- Mourning Dove
- **Yellow-billed Cuckoo**
- Greater Roadrunner
- Barn Owl
- Great Horned Owl
- White-throated Swift
- Black-ch. Hummingbird
- Anna's Hummingbird
- Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- (1) Nuttall's Woodpecker
- Downy Woodpecker
- Hairy Woodpecker
- Northern Flicker
- Western Wood-Pewee
- Willow Flycatcher
- Hammond's Flycatcher
- Pacific Slope Flycatcher
- Black Phoebe
- Say's Phoebe
- Ash-throated Flycatcher
- **Brown-crested Flycatcher**
- Cassin's Kingbird
- (2) 11 Western Kingbird
- Horned Lark
- Tree Swallow
- Violet-green Swallow
- (17) (12) 23 N. Rough-winged Swallow ON
- Bank Swallow
- Cliff Swallow
- Barn Swallow
- (3) 111 Scrub Jay
- (2) 11 American Crow NB
- (11) 8 111 Common Raven
- (2) 11 Plain Titmouse
- (4) 4 Bushtit
- Rock Wren
- (9) 1111 HH Bewick's Wren
- House Wren
- Ruby-crowned Kinglet
- Blue-gray Gnatcatcher
- Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- American Robin
- Wrentit
- Northern Mockingbird
- California Thrasher
- American Pipit
- Cedar Waxwing
- Phainopepla
- Loggerhead Shrike
- European Starling
- **Bell's Vireo**
- Solitary Vireo
- Warbling Vireo
- Orange-crowned Warbler
- (1) Yellow Warbler
- (25) Yellow-rumped Warbler
- Black-th. Gray Warbler
- Townsend's Warbler
- MacGillivray's Warbler
- (4) 1111 Common Yellowthroat
- Wilson's Warbler
- Yellow-breasted Chat
- **Summer Tananger**
- Western Tanager
- Black-headed Grosbeak
- Blue Grosbeak
- Lazuli Bunting
- (4) 1111 Rufous-sided Towhee
- California Towhee
- Lark Sparrow
- Savannah Sparrow
- Fox Sparrow
- 5 1111 3 111 (27) 111 HH Song Sparrow
- Lincoln's Sparrow
- White-crowned Sparrow
- (10) Red-winged Blackbird
- Western Meadowlark
- Brewer's Blackbird
- (2) Brown-headed Cowbird
- Hooded Oriole
- (2) 11 Northern Oriole
- (2) House Finch
- Pine Siskin
- Lesser Goldfinch
- Lawrence's Goldfinch
- (35) American Goldfinch
- House Sparrow

Additional Species

(1) BCN Heron (IMM)

Birds of Santa Clara River System

OGDEN

Locality Blue Moon to Castaic -- West Side River Date 4/5/97

Time 6:45

2 DEER

- Great Blue Heron
- (1) Green Heron
- (6) 1 2 3 Mallard
- Cinnamon Teal
- Turkey Vulture
- (1) White-tailed Kite
- Sharp-shinned Hawk
- Cooper's Hawk
- Red-shouldered Hawk
- (3) 1 2 Red-tailed Hawk
- Golden Eagle
- (1) American Kestrel
- (57) 4 8 2 4 8 2 8 2 8 9 2 California Quail
- American Coot
- (2) Killdeer
- Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- (7) 6 1 Rock Dove
- (12) 1 2 1 2 2 1 1 2 Mourning Dove
- **Yellow-billed Cuckoo**
- Greater Roadrunner
- Barn Owl
- Great Horned Owl
- White-throated Swift
- Black-ch. Hummingbird
- (13) 1 1 2 1 2 3 1 1 Anna's Hummingbird
- Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- (5) 2 2 Nuttall's Woodpecker
- Downy Woodpecker
- (2) 1 1 Hairy Woodpecker
- Northern Flicker
- Western Wood-Pewee
- Willow Flycatcher
- Hammond's Flycatcher
- Pacific Slope Flycatcher
- Black Phoebe
- Say's Phoebe
- Ash-throated Flycatcher
- **Brown-crested Flycatcher**
- Cassin's Kingbird
- Western Kingbird
- Horned Lark
- Tree Swallow
- Violet-green Swallow
- (17) 8 6 2 1 N. Rough-winged Swallow
- Bank Swallow
- (2) Cliff Swallow
- Barn Swallow
- (8) 1 1 2 1 1 2 Scrub Jay
- (18) 8 4 2 1 2 1 American Crow
- (22) 1 1 4 8 6 2 Common Raven
- (9) 2 1 2 2 1 Plain Titmouse
- (4) 2 2 Bushtit
- Rock Wren
- (15) 2 1 2 4 1 2 2 1 2 Bewick's Wren
- (12) 4 1 2 1 2 2 House Wren
- Ruby-crowned Kinglet
- Blue-gray Gnatcatcher
- (2) 2 Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- American Robin
- (4) 2 2 Wrentit
- (1) 1 Northern Mockingbird
- (2) 2 California Thrasher
- (2) American Pipit
- Cedar Waxwing
- Phainopepla
- Loggerhead Shrike
- (5) 4 1 European Starling
- **Bell's Vireo**
- Solitary Vireo
- Warbling Vireo
- Orange-crowned Warbler
- (1) 1 Yellow Warbler
- (15) 1 6 8 Yellow-rumped Warbler
- Black-th. Gray Warbler
- Townsend's Warbler
- MacGillivray's Warbler
- (21) 2 2 4 2 2 3 4 2 Common Yellowthroat
- Wilson's Warbler
- (4) 4 2 2 1 1 Yellow-breasted Chat
- **Summer Tananger**
- Western Tanager
- Black-headed Grosbeak
- Blue Grosbeak
- (2) 1 1 Lazuli Bunting
- (11) 2 1 2 1 2 2 Rufous-sided Towhee
- (15) 1 2 2 2 2 2 1 2 California Towhee
- Lark Sparrow
- Savannah Sparrow
- Fox Sparrow
- $8 6 4 8 8 4 8 6 4 4 1 8 7 6 9$ Song Sparrow
- Lincoln's Sparrow
- (98) (3) White-crowned Sparrow
- (14) 6 1 4 3 Red-winged Blackbird
- Western Meadowlark
- (1) Brewer's Blackbird
- (18) 6 3 4 2 1 Brown-headed Cowbird
- Hooded Oriole
- (9) 2 1 1 2 2 Northern Oriole
- (2) House Finch
- Pine Siskin
- (13) 1 2 3 2 1 2 2 Lesser Goldfinch
- Lawrence's Goldfinch
- (6) American Goldfinch
- House Sparrow

Additional Species

(2) 1 Sora rail

BIRDS OF Santa Clara River System

Locality Blue Moon to Castaic Date 4/22/97

Time Breezy

_____ Great Blue Heron
11 Green Heron
2 Mallard
_____ Cinnamon Teal
_____ Turkey Vulture
_____ White-tailed Kite
_____ Sharp-shinned Hawk
_____ Cooper's Hawk
1 Red-shouldered Hawk
211 Red-tailed Hawk
_____ Golden Eagle
1 American Kestrel
111 California Quail
_____ American Coot
_____ Killdeer
_____ Spotted Sandpiper
_____ Least Sandpiper
_____ Common Snipe
_____ Rock Dove
121 Mourning Dove
_____ **Yellow-billed Cuckoo**
_____ Greater Roadrunner
_____ Barn Owl
_____ Great Horned Owl
_____ White-throated Swift
_____ Black-ch. Hummingbird
1111 Anna's Hummingbird
_____ Costa's Hummingbird
11 Belted Kingfisher
_____ Acorn Woodpecker
11 Nuttall's Woodpecker
11 Downy Woodpecker
_____ Hairy Woodpecker
3 Northern Flicker
_____ Western Wood-Pewee
_____ Willow Flycatcher
_____ Hammond's Flycatcher
_____ Pacific Slope Flycatcher
_____ Black Phoebe
_____ Say's Phoebe
1111 Ash-throated Flycatcher
_____ **Brown-crested Flycatcher**
_____ Cassin's Kingbird
242 Western Kingbird
1 Horned Lark
_____ Tree Swallow
4 Violet-green Swallow
4461 N. Rough-winged Swallow
_____ Bank Swallow
_____ Cliff Swallow
_____ Barn Swallow
1121 Scrub Jay
1 American Crow
5462 Common Raven 1 in nest
1121 Plain Titmouse
12 Bushtit
_____ Rock Wren
66 Bewick's Wren
House Wren

_____ Ruby-crowned Kinglet
_____ Blue-gray Gnatcatcher
1 Western Bluebird
_____ Swainson's Thrush
_____ Hermit Thrush
_____ American Robin
_____ Wrentit
_____ Northern Mockingbird
111 California Thrasher
_____ American Pipit
_____ Cedar Waxwing
_____ Phainopepla
_____ Loggerhead Shrike
1112 European Starling
_____ **Bell's Vireo**
_____ Solitary Vireo
_____ Warbling Vireo
_____ Orange-crowned Warbler
1111 Yellow Warbler
_____ Yellow-rumped Warbler
_____ Black-th. Gray Warbler
_____ Townsend's Warbler
_____ MacGillivray's Warbler
214 Common Yellowthroat
1 Wilson's Warbler
1 Yellow-breasted Chat
_____ **Summer Tananger**
_____ Western Tanager
22222 Black-headed Grosbeak
11 Blue Grosbeak
2 Lazuli Bunting
111 Rufous-sided Towhee
1112 California Towhee
_____ Lark Sparrow
_____ Savannah Sparrow
_____ Fox Sparrow
488648119 Song Sparrow
_____ Lincoln's Sparrow
_____ White-crowned Sparrow
12 Red-winged Blackbird
_____ Western Meadowlark
_____ Brewer's Blackbird
42242 Brown-headed Cowbird
_____ Hooded Oriole
_____ Northern Oriole
2211 House Finch
_____ Pine Siskin
111 Lesser Goldfinch
_____ Lawrence's Goldfinch
_____ American Goldfinch
_____ House Sparrow

Additional Species

11 Sora Rail one at car, one at pond marsh
11 Virginia Rail at pond/marsh
11 small brown swifts

* Least 5 133 nests or cliff

BIRDS OF Santa Clara River System

Locality OLD RD - EAST SURVEY Date 4-22

Time

_____ Great Blue Heron
_____ Green Heron
2 Mallard
_____ Cinnamon Teal
_____ Turkey Vulture
1 White-tailed Kite
_____ Sharp-shinned Hawk
_____ Cooper's Hawk
_____ Red-shouldered Hawk
_____ Red-tailed Hawk
_____ Golden Eagle
_____ American Kestrel
_____ California Quail
_____ American Coot
_____ Killdeer
_____ Spotted Sandpiper
8 2 Least Sandpiper
_____ Common Snipe
_____ Rock Dove
_____ Mourning Dove
_____ **Yellow-billed Cuckoo**
_____ Greater Roadrunner
_____ Barn Owl
_____ Great Horned Owl
_____ White-throated Swift
_____ Black-ch. Hummingbird
1 Anna's Hummingbird
_____ Costa's Hummingbird
1 Belted Kingfisher
_____ Acorn Woodpecker
III Nuttall's Woodpecker
_____ Downy Woodpecker
_____ Hairy Woodpecker
_____ Northern Flicker
_____ Western Wood-Pewee
10 _____ Willow Flycatcher
III ||| ||| ||| ||| Hammond's Flycatcher
_____ Pacific Slope Flycatcher
_____ Black Phoebe
_____ Say's Phoebe
1 Ash-throated Flycatcher
_____ **Brown-crested Flycatcher**
_____ Cassin's Kingbird
2 Western Kingbird
_____ Horned Lark
_____ Tree Swallow
_____ Violet-green Swallow
(30) 3 N. Rough-winged Swallow
_____ Bank Swallow
_____ Cliff Swallow
1 Barn Swallow
_____ Scrub Jay
2 American Crow
II Common Raven
2 Plain Titmouse
22 Bushtit
_____ Rock Wren
||| Bewick's Wren
_____ House Wren

_____ Ruby-crowned Kinglet
_____ Blue-gray Gnatcatcher
_____ Western Bluebird
_____ Swainson's Thrush
_____ Hermit Thrush
_____ American Robin
_____ Wrentit
_____ Northern Mockingbird
1 California Thrasher
_____ American Pipit
_____ Cedar Waxwing
_____ Phainopepla
_____ Loggerhead Shrike
_____ European Starling
_____ **Bell's Vireo**
_____ Solitary Vireo
_____ Warbling Vireo
_____ Orange-crowned Warbler
1 Yellow Warbler
_____ Yellow-rumped Warbler
_____ Black-th. Gray Warbler
_____ Townsend's Warbler
_____ MacGillivray's Warbler
113 ||| |||| Common Yellowthroat
1 Wilson's Warbler
111 Yellow-breasted Chat
_____ **Summer Tananger**
_____ Western Tanager
|| Black-headed Grosbeak
|| Blue Grosbeak
2 Lazuli Bunting
1 Rufous-sided Towhee
1 California Towhee
_____ Lark Sparrow
_____ Savannah Sparrow
_____ Fox Sparrow
|||| |||| |||| |||| Song Sparrow
_____ Lincoln's Sparrow
_____ White-crowned Sparrow
(10) 5 Red-winged Blackbird
_____ Western Meadowlark
_____ Brewer's Blackbird
224 Brown-headed Cowbird
_____ Hooded Oriole
_____ Northern Oriole
_____ House Finch
_____ Pine Siskin
322 Lesser Goldfinch
_____ Lawrence's Goldfinch
_____ American Goldfinch
_____ House Sparrow

Additional Species

1 BCNH imm
1 Cinnamon Teal
1 SORA

BIRDS OF Santa Clara River System

Locality Blue Moon to Castaic Date May 8

Time

- Great Blue Heron
- 1 Green Heron
- 1(4) 4 2 2 Mallard with babies
- Cinnamon Teal
- Turkey Vulture
- White-tailed Kite
- Sharp-shinned Hawk
- Cooper's Hawk
- 1 Red-shouldered Hawk
- 3(1) 1(1) 2 4 Red-tailed Hawk young
- Golden Eagle
- American Kestrel
- 8 || 24 California Quail
- American Coot
- 2 || Killdeer
- 4 13 Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- 6 1, 22 Rock Dove
- 13 22 || 22 Mourning Dove
- **Yellow-billed Cuckoo**
- Greater Roadrunner
- Barn Owl
- Great Horned Owl
- 9 6 || White-throated Swift ON Some at cliff/rock
- 1 Black-ch. Hummingbird
- 6 | || Anna's Hummingbird
- Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- 7 || || Nuttall's Woodpecker
- Downy Woodpecker
- 1 | Hairy Woodpecker
- 2 || Northern Flicker
- Western Wood-Pewee
- Willow Flycatcher
- Hammond's Flycatcher
- 2 Pacific Slope Flycatcher
- Black Phoebe
- Say's Phoebe
- 4 2 || Ash-throated Flycatcher
- **Brown-crested Flycatcher**
- Cassin's Kingbird
- 3 || Western Kingbird
- Horned Lark
- Tree Swallow
- 6 4 2 Violet-green Swallow
- 4 1 2 1 N. Rough-winged Swallow
- Bank Swallow
- 200 Cliff Swallow
- Barn Swallow
- 14 2 2 || 2 || 2 || Scrub Jay
- 3 | || American Crow
- 18 4 || 2 9 Common Raven
- 10 3 2 | 3 Plain Titmouse
- 3 2 Bushtit
- Rock Wren
- 16 | || 2 4 2 2 || Bewick's Wren

11 Turkeys 3" and 4"

3 deer (1 doe 2 buck)

- Ruby-crowned Kinglet
- Blue-gray Gnatcatcher
- 1 Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- American Robin
- 1 Wrentit
- Northern Mockingbird
- 1 California Thrasher
- American Pipit
- 16 Cedar Waxwing
- Phainopepla
- Loggerhead Shrike
- 22 3 6 4 | 2 2 2 || European Starling
- **Bell's Vireo**
- Solitary Vireo
- Warbling Vireo
- Orange-crowned Warbler
- 9 2 2 || 2 Yellow Warbler
- Yellow-rumped Warbler
- Black-th. Gray Warbler
- Townsend's Warbler
- MacGillivray's Warbler
- 50 6 2 4 6 2 6 6 2 6 4 Common Yellowthroat
- 7 || || Wilson's Warbler
- 6 | || Yellow-breasted Chat
- **Summer Tananger**
- Western Tanager
- 16 Black-headed Grosbeak
- 7 3 || 2 Blue Grosbeak Male carrying feather.
- 10 || || 2 || Lazuli Bunting
- 18 | || 4 | || Rufous-sided Towhee
- 19 | || 2 2 || 2 2 2 4 California Towhee
- Lark Sparrow
- Savannah Sparrow
- Fox Sparrow
- 73 54 68 2 || 4 4 4 6 6 2 4 6 5 Song Sparrow
- Lincoln's Sparrow
- White-crowned Sparrow
- 9 || || 6 Red-winged Blackbird
- Western Meadowlark
- Brewer's Blackbird
- 12 || || 24 Brown-headed Cowbird
- Hooded Oriole
- 3 || | Northern Oriole
- 15 2, 26 | || 2 House Finch
- Pine Siskin
- 5 2 2 Lesser Goldfinch
- Lawrence's Goldfinch
- American Goldfinch
- 1 House Sparrow

Additional Species

_____

_____

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_____

BIRDS OF Santa Clara River System

Locality Old Rd → Cast Junct Date 5-8-97 TWR

Time ______

1072

8 → 415

55%

Red S17 Camp Gr

Count	Tally	Species
		Great Blue Heron
		Green Heron
4		Mallard
		Cinnamon Teal
		Turkey Vulture
		White-tailed Kite
		Sharp-shinned Hawk
		Cooper's Hawk
1		Red-shouldered Hawk
		Red-tailed Hawk
		Golden Eagle
		American Kestrel
6		California Quail
		American Coot
		Killdeer
		Spotted Sandpiper
		Least Sandpiper
		Common Snipe
		Rock Dove
2		Mourning Dove
		Yellow-billed Cuckoo
		Greater Roadrunner
		Barn Owl
		Great Horned Owl
		White-throated Swift
		Black-ch. Hummingbird
3	III	Anna's Hummingbird
		Costa's Hummingbird
		Belted Kingfisher
		Acorn Woodpecker
2	II	Nuttall's Woodpecker
		Downy Woodpecker
		Hairy Woodpecker
		Northern Flicker
		Western Wood-Pewee
		Willow Flycatcher
		Hammond's Flycatcher
		Pacific Slope Flycatcher
3	III	Black Phoebe
		Say's Phoebe
3	III	Ash-throated Flycatcher
		Brown-crested Flycatcher
		Cassin's Kingbird
		Western Kingbird
		Horned Lark
		Tree Swallow
		Violet-green Swallow
8	4 II	N. Rough-winged Swallow
		Bank Swallow
		Cliff Swallow
		Barn Swallow
		Scrub Jay
2		American Crow
1		Common Raven
		Plain Titmouse
2		Bushtit #B
		Rock Wren
11	I HHT HHT	Bewick's Wren
	III	House Wren

Count	Tally	Species
		Ruby-crowned Kinglet
		Blue-gray Gnatcatcher
1		Western Bluebird
		Swainson's Thrush
		Hermit Thrush
		American Robin
		Wrentit
		Northern Mockingbird
1		California Thrasher
		American Pipit
		Cedar Waxwing
		Phainopepla
		Loggerhead Shrike
		European Starling
		Bell's Vireo
		Solitary Vireo
		Warbling Vireo
		Orange-crowned Warbler
4	IIII	Yellow Warbler
		Yellow-rumped Warbler
		Black-th. Gray Warbler
		Townsend's Warbler
		MacGillivray's Warbler
8	III HHT	Common Yellowthroat
		Wilson's Warbler
5	HHT	Yellow-breasted Chat
		Summer Tanager
		Western Tanager
2	I	Black-headed Grosbeak
1		Blue Grosbeak
		Lazuli Bunting
8	III HHT	Rufous-sided Towhee
		California Towhee
		Lark Sparrow
		Savannah Sparrow
		Fox Sparrow
33	HHT HHT III HHT	Song Sparrow
		Lincoln's Sparrow
		White-crowned Sparrow
6		Red-winged Blackbird
		Western Meadowlark
		Brewer's Blackbird
		Brown-headed Cowbird
		Hooded Oriole
		Northern Oriole
2		House Finch
		Pine Siskin
		Lesser Goldfinch
		Lawrence's Goldfinch
		American Goldfinch
		House Sparrow

Additional Species

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BIRDS OF Santa Clara River System

Locality ____OLD RD @ RIVERVIEW____ Date ____5-26____

Time __________

8 AM → 915

N Side

Count	Species
	Great Blue Heron
1	Green Heron
	Mallard
	Cinnamon Teal
	Turkey Vulture
	White-tailed Kite
	Sharp-shinned Hawk
	Cooper's Hawk
	Red-shouldered Hawk
	Red-tailed Hawk
	Golden Eagle
	American Kestrel
3	California Quail
	American Coot
	Killdeer
	Spotted Sandpiper
	Least Sandpiper
	Common Snipe
	Rock Dove
1 1	Mourning Dove
	Yellow-billed Cuckoo
	Greater Roadrunner
	Barn Owl
	Great Horned Owl
	White-throated Swift
	Black-ch. Hummingbird
1 2	Anna's Hummingbird
	Costa's Hummingbird
	Belted Kingfisher
	Acorn Woodpecker
1	Nuttall's Woodpecker
1	Downy Woodpecker
	Hairy Woodpecker
	Northern Flicker
	Western Wood-Pewee
1	Willow Flycatcher
	Hammond's Flycatcher
	Pacific Slope Flycatcher
	Black Phoebe
	Say's Phoebe
111	Ash-throated Flycatcher
	Brown-crested Flycatcher
	Cassin's Kingbird
	Western Kingbird
	Horned Lark
	Tree Swallow
	Violet-green Swallow
(15) 4	N. Rough-winged Swallow
	Bank Swallow
	Cliff Swallow
	Barn Swallow
1'1	Scrub Jay
111	American Crow
	Common Raven
1 2	Plain Titmouse
4	Bushtit
	Rock Wren
11 ~~1111~~	Bewick's Wren
	House Wren

Count	Species
	Ruby-crowned Kinglet
	Blue-gray Gnatcatcher
11	Western Bluebird
	Swainson's Thrush
	Hermit Thrush
	American Robin
	Wrentit
	Northern Mockingbird
11	California Thrasher
	American Pipit
	Cedar Waxwing
	Phainopepla
	Loggerhead Shrike
	European Starling
2 1	**Bell's Vireo**
	Solitary Vireo
	Warbling Vireo
	Orange-crowned Warbler
1	Yellow Warbler
	Yellow-rumped Warbler
	Black-th. Gray Warbler
	Townsend's Warbler
	MacGillivray's Warbler
1 ~~1111~~ 111 ~~1111~~ 1	Common Yellowthroat
	Wilson's Warbler
	Yellow-breasted Chat
	Summer Tananger
	Western Tanager
1 (5)	Black-headed Grosbeak
111 2	Blue Grosbeak
	Lazuli Bunting
1	Rufous-sided Towhee
2	California Towhee
	Lark Sparrow
	Savannah Sparrow
	Fox Sparrow
3 5 5 ~~1111~~ ~~1111~~ ~~1111~~ 11 ~~1111~~	Song Sparrow
	Lincoln's Sparrow
	White-crowned Sparrow
6 6	Red-winged Blackbird
	Western Meadowlark
	Brewer's Blackbird
2	Brown-headed Cowbird
	Hooded Oriole
	Northern Oriole
1 2	House Finch
	Pine Siskin
3	Lesser Goldfinch
	Lawrence's Goldfinch
3	American Goldfinch
	House Sparrow

owners Nord → Bell.

Additional Species

1 BCNH

BIRDS OF Santa Clara River System

Locality Blue Moon to Castaic Date 5/26/97

Time

- Great Blue Heron
- Green Heron
- 3 Mallard
- Cinnamon Teal
- Turkey Vulture
- 2 White-tailed Kite (1 young fledged)
- Sharp-shinned Hawk
- Cooper's Hawk
- 2 Red-shouldered Hawk
- Red-tailed Hawk
- Golden Eagle
- American Kestrel
- 31 ,20, 6 California Quail
- American Coot
- Killdeer
- 1 Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- Rock Dove
- 3 Mourning Dove
- **Yellow-billed Cuckoo**
- Greater Roadrunner
- Barn Owl
- Great Horned Owl
- White-throated Swift
- Black-ch. Hummingbird
- 14 32 2 Anna's Hummingbird
- Costa's Hummingbird
- Belted Kingfisher
- 8 Acorn Woodpecker
- Nuttall's Woodpecker
- 4 Downy Woodpecker
- 1 Hairy Woodpecker
- Northern Flicker
- Western Wood-Pewee
- Willow Flycatcher
- Hammond's Flycatcher
- 1 Pacific Slope Flycatcher
- Black Phoebe
- Say's Phoebe
- 8 Ash-throated Flycatcher
- **Brown-crested Flycatcher**
- Cassin's Kingbird
- 4 Western Kingbird
- Horned Lark
- Tree Swallow
- Violet-green Swallow
- 8 N. Rough-winged Swallow
- Bank Swallow
- 26 4,8,6,9 Cliff Swallow
- Barn Swallow
- 14 22 2 Scrub Jay
- 2 American Crow
- 7 Common Raven
- 6 Plain Titmouse
- 2 Bushtit
- Rock Wren
- 41 Bewick's Wren
- Ruby-crowned Kinglet
- Blue-gray Gnatcatcher
- 2 Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- American Robin
- Wrentit
- Northern Mockingbird
- 3 California Thrasher
- American Pipit
- Cedar Waxwing
- Phainopepla
- Loggerhead Shrike
- 6 European Starling
- **Bell's Vireo**
- Solitary Vireo
- Warbling Vireo
- Orange-crowned Warbler
- 7 Yellow Warbler
- Yellow-rumped Warbler
- Black-th. Gray Warbler
- Townsend's Warbler
- MacGillivray's Warbler
- 55 Common Yellowthroat
- 1 Wilson's Warbler
- 6 Yellow-breasted Chat
- **Summer Tananger**
- Western Tanager
- 3 Black-headed Grosbeak
- Blue Grosbeak
- Lazuli Bunting
- 26 Rufous-sided Towhee
- 22 California Towhee
- Lark Sparrow
- Savannah Sparrow
- Fox Sparrow
- Song Sparrow
- Lincoln's Sparrow
- White-crowned Sparrow
- 4 Red-winged Blackbird
- Western Meadowlark
- Brewer's Blackbird
- 21 Brown-headed Cowbird
- Hooded Oriole
- 2 Northern Oriole
- 12 House Finch
- Pine Siskin
- Lesser Goldfinch
- Lawrence's Goldfinch
- American Goldfinch
- House Sparrow

Additional Species

BIRDS OF Santa Clara River System

Locality OLD RD → BLUE MOON Date 65 6-5

Time ____________

S SINK

LOAM → 9

- ____ Great Blue Heron
- (1) Green Heron
- ____ Mallard
- ____ Cinnamon Teal
- (1) Turkey Vulture
- (1) White-tailed Kite
- ____ Sharp-shinned Hawk
- ____ Cooper's Hawk
- (1) Red-shouldered Hawk
- ____ Red-tailed Hawk
- ____ Golden Eagle
- ____ American Kestrel
- ____ California Quail
- ____ American Coot
- ____ Killdeer
- ____ Spotted Sandpiper
- ____ Least Sandpiper
- ____ Common Snipe
- ____ Rock Dove
- (1) Mourning Dove
- ____ **Yellow-billed Cuckoo**
- ____ Greater Roadrunner
- ____ Barn Owl
- ____ Great Horned Owl
- ____ White-throated Swift
- ____ Black-ch. Hummingbird
- (2) II Anna's Hummingbird
- ____ Costa's Hummingbird
- ____ Belted Kingfisher
- ____ Acorn Woodpecker
- (2) II Nuttall's Woodpecker
- (1) Downy Woodpecker
- ____ Hairy Woodpecker
- ____ Northern Flicker
- ____ Western Wood-Pewee
- ____ Willow Flycatcher
- ____ Hammond's Flycatcher
- ____ Pacific Slope Flycatcher
- (2) Black Phoebe ON
- ____ Say's Phoebe
- (5) ~~IIII~~ Ash-throated Flycatcher
- ____ **Brown-crested Flycatcher**
- ____ Cassin's Kingbird
- ____ Western Kingbird
- ____ Horned Lark
- ____ Tree Swallow
- (6) Violet-green Swallow ON Castro Junction.
- (16) (13) 6 N. Rough-winged Swallow
- ____ Bank Swallow
- ____ Cliff Swallow
- ____ Barn Swallow
- (4) IIII Scrub Jay
- ____ American Crow
- (2) Common Raven
- ____ Plain Titmouse
- ____ Bushtit
- ____ Rock Wren
- (8) II ~~IIII~~ Bewick's Wren
- ____ House Wren
- ____ Ruby-crowned Kinglet
- ____ Blue-gray Gnatcatcher
- ____ Western Bluebird
- ____ Swainson's Thrush
- ____ Hermit Thrush
- ____ American Robin
- ____ Wrentit
- ____ Northern Mockingbird
- ____ California Thrasher
- ____ American Pipit
- ____ Cedar Waxwing
- ____ Phainopepla
- ____ Loggerhead Shrike
- ____ European Starling
- ____ **Bell's Vireo**
- ____ Solitary Vireo
- ____ Warbling Vireo
- ____ Orange-crowned Warbler
- ____ Yellow Warbler
- ____ Yellow-rumped Warbler
- ____ Black-th. Gray Warbler
- ____ Townsend's Warbler
- ____ MacGillivray's Warbler
- (12) II ~~IIII~~ ~~IIII~~ Common Yellowthroat
- ____ Wilson's Warbler
- (8) III ~~IIII~~ Yellow-breasted Chat
- ____ **Summer Tananger**
- ____ Western Tanager
- (1) Black-headed Grosbeak
- (5) ~~IIII~~ Blue Grosbeak
- (2) II Lazuli Bunting
- (3) III Rufous-sided Towhee
- (2) California Towhee
- (1) Lark Sparrow
- ____ Savannah Sparrow
- ____ Fox Sparrow
- (27) // ~~IIII~~ ~~IIII~~ ~~IIII~~ 2 Song Sparrow
- ____ Lincoln's Sparrow
- ____ White-crowned Sparrow
- (9) 8 1 Red-winged Blackbird
- ____ Western Meadowlark
- ____ Brewer's Blackbird
- (3) 2 1 Brown-headed Cowbird
- ____ Hooded Oriole
- ____ Northern Oriole
- (5) 3 2 House Finch
- ____ Pine Siskin
- (2) Lesser Goldfinch
- ____ Lawrence's Goldfinch
- ____ American Goldfinch
- ____ House Sparrow

Additional Species

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____

BIRDS OF Santa Clara River System

Locality Blue Moon to Castaic — Date 6/7/97

Time _____

Great Blue Heron
Green Heron
Mallard
Cinnamon Teal
Turkey Vulture
White-tailed Kite
Sharp-shinned Hawk
Cooper's Hawk
Red-shouldered Hawk
Red-tailed Hawk
Golden Eagle
American Kestrel
California Quail
American Coot
Killdeer
Spotted Sandpiper
Least Sandpiper
Common Snipe
Rock Dove
Mourning Dove
Yellow-billed Cuckoo
Greater Roadrunner
Barn Owl
Great Horned Owl
White-throated Swift
Black-ch. Hummingbird
Anna's Hummingbird
Costa's Hummingbird
Belted Kingfisher
Acorn Woodpecker
Nuttall's Woodpecker
Downy Woodpecker
Hairy Woodpecker
Northern Flicker
Western Wood-Pewee
Willow Flycatcher
Hammond's Flycatcher
Pacific Slope Flycatcher
Black Phoebe
Say's Phoebe
Ash-throated Flycatcher
Brown-crested Flycatcher
Cassin's Kingbird
Western Kingbird
Horned Lark
Tree Swallow
Violet-green Swallow
N. Rough-winged Swallow
Bank Swallow
Cliff Swallow
Barn Swallow
Scrub Jay
American Crow
Common Raven
Plain Titmouse
Bushtit
Rock Wren
Bewick's Wren

Ruby-crowned Kinglet
Blue-gray Gnatcatcher
Western Bluebird
Swainson's Thrush
Hermit Thrush
American Robin
Wrentit
Northern Mockingbird
California Thrasher
American Pipit
Cedar Waxwing
Phainopepla
Loggerhead Shrike
European Starling
Bell's Vireo
Solitary Vireo
Warbling Vireo
Orange-crowned Warbler
Yellow Warbler
Yellow-rumped Warbler
Black-th. Gray Warbler
Townsend's Warbler
MacGillivray's Warbler
Common Yellowthroat
Wilson's Warbler
Yellow-breasted Chat
Summer Tananger
Western Tanager
Black-headed Grosbeak
Blue Grosbeak
Lazuli Bunting
Rufous-sided Towhee
California Towhee
Lark Sparrow
Savannah Sparrow
Fox Sparrow
Song Sparrow
Lincoln's Sparrow
White-crowned Sparrow
Red-winged Blackbird
Western Meadowlark
Brewer's Blackbird
Brown-headed Cowbird
Hooded Oriole
Northern Oriole
House Finch
Pine Siskin
Lesser Goldfinch
Lawrence's Goldfinch
American Goldfinch
House Sparrow

Additional Species

~~Great Horned Owl~~
1 Rufus/allens ♀

BIRDS OF Santa Clara River System

Locality Blue Moon to Castaic

Date 6/20/97 Friday

Time

Surgeon

- Great Blue Heron ! BIG RATTLESNAKE
- (1) Green Heron
- (1) Mallard with nest w eggs ± 10
- Cinnamon Teal
- (1) Turkey Vulture
- (1) White-tailed Kite
- (1) Sharp-shinned Hawk
- (1) Cooper's Hawk
- Red-shouldered Hawk
- (3) 12 Red-tailed Hawk
- Golden Eagle
- American Kestrel
- (19) 4861 California Quail w. young
- American Coot
- (4) 12 Killdeer
- Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- Rock Dove
- (10) 2 12 2 Mourning Dove
- **Yellow-billed Cuckoo**
- Greater Roadrunner
- Barn Owl
- Great Horned Owl
- (8) White-throated Swift
- (1) Black-ch. Hummingbird
- (11) 1 2 Anna's Hummingbird
- Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- (8) Nuttall's Woodpecker
- (3) Downy Woodpecker
- Hairy Woodpecker
- (2) Northern Flicker
- Western Wood-Pewee
- Willow Flycatcher
- Hammond's Flycatcher
- Pacific Slope Flycatcher
- (4) 12 Black Phoebe
- Say's Phoebe
- (14) 11 22 4 Ash-throated Flycatcher ON
- **Brown-crested Flycatcher**
- Cassin's Kingbird
- (3) Western Kingbird
- Horned Lark
- Tree Swallow
- (2) Violet-green Swallow
- (12) N. Rough-winged Swallow
- Bank Swallow
- (80) lots 63 Cliff Swallow
- Barn Swallow
- (19) 22 4 23 2 Scrub Jay
- American Crow
- (7) (8) 4 22 2 Common Raven
- (13) 4 2 4 3 Plain Titmouse
- (35) 12, 25, 8 2 6 9 Bushtit
- Rock Wren
- (22) 1 6 4 4 2 Bewick's Wren
- Ruby-crowned Kinglet
- Blue-gray Gnatcatcher
- (12) 345 Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- (2) American Robin
- (5) 4 Wrentit
- Northern Mockingbird
- (13) 1 2 3 4 California Thrasher
- American Pipit
- Cedar Waxwing
- (1) Phainopepla
- Loggerhead Shrike
- (18) European Starling
- **Bell's Vireo**
- Solitary Vireo
- Warbling Vireo
- Orange-crowned Warbler
- (3) Yellow Warbler
- Yellow-rumped Warbler
- Black-th. Gray Warbler
- Townsend's Warbler
- MacGillivray's Warbler
- (23) 4 1 4 4 32 Common Yellowthroat
- Wilson's Warbler
- (2) Yellow-breasted Chat
- **Summer Tanager**
- Western Tanager
- (29) 4 4 8 6 24 Black-headed Grosbeak
- Blue Grosbeak
- (11) +6 Lazuli Bunting
- (25) 2 23 2 Rufous-sided Towhee
- (7) 2 California Towhee
- (2) Clark Sparrow
- Savannah Sparrow
- Fox Sparrow
- (37) 5 6 8 4 56 Song Sparrow
- Lincoln's Sparrow
- White-crowned Sparrow
- Red-winged Blackbird
- Western Meadowlark
- Brewer's Blackbird
- (9) 2 Brown-headed Cowbird
- (1) Hooded Oriole
- (13) 2 12 4 Northern Oriole
- 48 68 House Finch
- (76) 25, 26, Pine Siskin
- (7) 2 2 2 Lesser Goldfinch
- Lawrence's Goldfinch
- American Goldfinch
- House Sparrow

Additional Species

1 MERLIN

1 Brown Crested Flycatcher

BIRDS OF Santa Clara River System

Locality GCR [illegible] → CKT JNCT Date 6-20-97

Time

8 - 9:15

N mile

Count	Species
	Great Blue Heron
(1)	Green Heron (P)
	Mallard
	Cinnamon Teal
	Turkey Vulture
	White-tailed Kite
	Sharp-shinned Hawk
	Cooper's Hawk
(2) II	Red-shouldered Hawk
	Red-tailed Hawk
	Golden Eagle
	American Kestrel
(4)	California Quail
	American Coot
	Killdeer
	Spotted Sandpiper
	Least Sandpiper
	Common Snipe
	Rock Dove
(2)	Mourning Dove
	Yellow-billed Cuckoo
	Greater Roadrunner
	Barn Owl
	Great Horned Owl
	White-throated Swift
	Black-ch. Hummingbird
(1)	Anna's Hummingbird
	Costa's Hummingbird
	Belted Kingfisher
	Acorn Woodpecker
(5) IIII	Nuttall's Woodpecker
(1)	Downy Woodpecker
	Hairy Woodpecker
	Northern Flicker
	Western Wood-Pewee
	Willow Flycatcher
	Hammond's Flycatcher
	Pacific Slope Flycatcher
(3) III	Black Phoebe
	Say's Phoebe
(3) III	Ash-throated Flycatcher
	Brown-crested Flycatcher
	Cassin's Kingbird
(2) II	Western Kingbird
	Horned Lark
	Tree Swallow
	Violet-green Swallow
(4)	N. Rough-winged Swallow
	Bank Swallow
(10)	Cliff Swallow
(5) 3 2	Barn Swallow OE
(3) III	Scrub Jay
(5)	American Crow
(3) 2 1	Common Raven
	Plain Titmouse
(6) 4 2	Bushtit
	Rock Wren
	Bewick's Wren
	Ruby-crowned Kinglet
	Blue-gray Gnatcatcher
	Western Bluebird
	Swainson's Thrush
	Hermit Thrush
	American Robin
(2) II	Wrentit
	Northern Mockingbird
	California Thrasher
	American Pipit
	Cedar Waxwing
	Phainopepla
	Loggerhead Shrike
	European Starling
(1)	**Bell's Vireo**
	Solitary Vireo
	Warbling Vireo
	Orange-crowned Warbler
(1)	Yellow Warbler
	Yellow-rumped Warbler
	Black-th. Gray Warbler
	Townsend's Warbler
	MacGillivray's Warbler
(12) II IIII IIII I	Common Yellowthroat
	Wilson's Warbler
(3) III	Yellow-breasted Chat
	Summer Tanager
	Western Tanager
(7) II IIII	Black-headed Grosbeak
(5) IIII	Blue Grosbeak
(6) I IIII	Lazuli Bunting
(4) IIII	Rufous-sided Towhee
	California Towhee
	Lark Sparrow
	Savannah Sparrow
	Fox Sparrow
(18) 3 3 3 3 3 3	Song Sparrow
	Lincoln's Sparrow
	White-crowned Sparrow
(5) 2 3	Red-winged Blackbird
	Western Meadowlark
	Brewer's Blackbird
(2)	Brown-headed Cowbird
	Hooded Oriole
	Northern Oriole
(2)	House Finch
	Pine Siskin
(5) 3 2	Lesser Goldfinch
	Lawrence's Goldfinch
	American Goldfinch
	House Sparrow

Additional Species

BIRDS OF Santa Clara River System

Locality 645-745 McBride Rd Date 4-5

Time

Upper River 1997

Area 2

NIGHT

- Great Blue Heron
- Green Heron
- (2) II Mallard
- Cinnamon Teal
- (3) 12 Turkey Vulture P, T, N
- (2) II White-tailed Kite
- ? (1) Sharp-shinned Hawk
- Cooper's Hawk S NW - Side
- (1) Red-shouldered Hawk
- Red-tailed Hawk
- Golden Eagle
- American Kestrel
- (21) 4 5 3 2 3 4 California Quail
- American Coot
- (3) 12 Killdeer
- Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- Rock Dove
- (1) Mourning Dove
- **Yellow-billed Cuckoo**
- (1) Greater Roadrunner
- (1) Barn Owl
- Great Horned Owl
- White-throated Swift
- (1) Black-ch. Hummingbird
- (1) Anna's Hummingbird
- Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- (2) II Nuttall's Woodpecker
- (1) Downy Woodpecker
- Hairy Woodpecker
- Northern Flicker
- Western Wood-Pewee
- Willow Flycatcher
- Hammond's Flycatcher
- Pacific Slope Flycatcher
- (1) Black Phoebe
- Say's Phoebe
- Ash-throated Flycatcher
- **Brown-crested Flycatcher**
- Cassin's Kingbird
- (1) Western Kingbird
- Horned Lark
- Tree Swallow
- Violet-green Swallow
- (25) (12) 4 6 N. Rough-winged Swallow
- Bank Swallow
- Cliff Swallow
- Barn Swallow
- (2) II Scrub Jay
- (6) I IIII American Crow
- (6) 1 2 3 Common Raven
- (5) IIII Plain Titmouse
- (4) 1 2 Bushtit (NB)
- Rock Wren
- (8) II IIII Bewick's Wren
- IIII House Wren ON
- Ruby-crowned Kinglet
- Blue-gray Gnatcatcher
- (4) 1 2 Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- (1) American Robin
- Wrentit
- Northern Mockingbird
- (4) IIII California Thrasher
- American Pipit
- Cedar Waxwing
- Phainopepla
- Loggerhead Shrike
- (7) 4 III European Starling
- **Bell's Vireo**
- Solitary Vireo
- Warbling Vireo
- Orange-crowned Warbler
- Yellow Warbler
- (11) 2 6 III Yellow-rumped Warbler
- Black-th. Gray Warbler
- Townsend's Warbler
- MacGillivray's Warbler
- (4) IIII Common Yellowthroat
- Wilson's Warbler
- Yellow-breasted Chat
- **Summer Tananger**
- Western Tanager
- (2) II Black-headed Grosbeak
- Blue Grosbeak
- Lazuli Bunting
- (2) II Rufous-sided Towhee
- California Towhee
- Lark Sparrow
- Savannah Sparrow
- Fox Sparrow
- (26) I IIII II IIII IIII IIII IIII Song Sparrow
- Lincoln's Sparrow
- White-crowned Sparrow
- (10) 8 1 Red-winged Blackbird
- Western Meadowlark
- Brewer's Blackbird
- (5) IIII Brown-headed Cowbird
- Hooded Oriole
- (3) III Northern Oriole
- (8) 4 4 House Finch
- Pine Siskin
- Lesser Goldfinch
- Lawrence's Goldfinch
- (13) 6,7 American Goldfinch
- House Sparrow

Additional Species

(1) Swainson's Hawk.

~~5 Common~~

(1) BC N Harr

BIRDS OF Santa Clara River System

Locality McG → Ord rd Date 4-22

Time

6:45 – 8

~~[illegible]~~

F/S Sw

- | Great Blue Heron
- Green Heron
- 2 Mallard
- Cinnamon Teal
- Turkey Vulture
- | White-tailed Kite
- Sharp-shinned Hawk
- | Cooper's Hawk
- | Red-shouldered Hawk
- | Red-tailed Hawk
- Golden Eagle
- American Kestrel
- 2 | 2 3 California Quail
- American Coot
- 2 Killdeer DD
- Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- Rock Dove
- Mourning Dove
- **Yellow-billed Cuckoo**
- Greater Roadrunner
- Barn Owl
- Great Horned Owl
- White-throated Swift
- Black-ch. Hummingbird
- || Anna's Hummingbird
- Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- | ||||| Nuttall's Woodpecker
- | Downy Woodpecker
- Hairy Woodpecker
- Northern Flicker
- Western Wood-Pewee
- Willow Flycatcher
- Hammond's Flycatcher
- | Pacific Slope Flycatcher
- Black Phoebe
- Say's Phoebe
- |||| Ash-throated Flycatcher
- **Brown-crested Flycatcher**
- Cassin's Kingbird
- Western Kingbird
- Horned Lark
- Tree Swallow
- Violet-green Swallow
- (24) (20) 4 N. Rough-winged Swallow
- Bank Swallow
- (20) Cliff Swallow
- Barn Swallow
- |||| Scrub Jay
- ||| American Crow
- | Common Raven
- 2 Plain Titmouse
- 4 2 2 Bushtit
- Rock Wren
- ||| ||||| Bewick's Wren
- || House Wren
- Ruby-crowned Kinglet
- Blue-gray Gnatcatcher
- 1 2 Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- American Robin
- Wrentit
- Northern Mockingbird
- ||| California Thrasher
- American Pipit
- Cedar Waxwing
- Phainopepla
- Loggerhead Shrike
- 5 4 | 2 4 European Starling
- **Bell's Vireo**
- Solitary Vireo
- Warbling Vireo
- Orange-crowned Warbler
- | Yellow Warbler
- 3 || Yellow-rumped Warbler
- Black-th. Gray Warbler
- Townsend's Warbler
- MacGillivray's Warbler
- ||||| ||||| 4 Common Yellowthroat
- | Wilson's Warbler
- ~~4~~ Yellow-breasted Chat
- **Summer Tananger**
- Western Tanager
- |||| Black-headed Grosbeak
- | Blue Grosbeak
- Lazuli Bunting
- |||| Rufous-sided Towhee
- || 2 California Towhee
- Lark Sparrow
- Savannah Sparrow
- Fox Sparrow
- ||||| ||||| ||||| ||||| ||||| ||||| 3 Song Sparrow
- Lincoln's Sparrow
- White-crowned Sparrow
- 5 (10) 5 Red-winged Blackbird
- Western Meadowlark
- Brewer's Blackbird
- 2 | 3 2 2 Brown-headed Cowbird
- Hooded Oriole
- 2 Northern Oriole
- 4 2 6 House Finch
- Pine Siskin
- Lesser Goldfinch
- Lawrence's Goldfinch
- 4 American Goldfinch
- House Sparrow

Additional Species

1 Gt Egret

~~[illegible]~~?

BIRDS OF Santa Clara River System

Locality McB → old Rd. Date 5-8 THURS

Time 6:45 → 8 AM SSW

- Great Blue Heron
- (1) Green Heron
- Mallard
- Cinnamon Teal
- Turkey Vulture
- White-tailed Kite
- Sharp-shinned Hawk
- Cooper's Hawk
- (2) II Red-shouldered Hawk
- (1) Red-tailed Hawk
- Golden Eagle
- American Kestrel
- (9) 2 223 California Quail
- American Coot
- (2) Killdeer
- Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- Rock Dove
- (2) Mourning Dove
- Yellow-billed Cuckoo
- (1) Greater Roadrunner
- Barn Owl
- Great Horned Owl
- White-throated Swift
- Black-ch. Hummingbird
- Anna's Hummingbird
- Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- (6) IIII Nuttall's Woodpecker ON
- (4) 112 Downy Woodpecker ON
- Hairy Woodpecker
- Northern Flicker
- Western Wood-Pewee
- Willow Flycatcher
- Hammond's Flycatcher
- Pacific Slope Flycatcher
- (1) Black Phoebe
- Say's Phoebe
- (4) IIII Ash-throated Flycatcher
- Brown-crested Flycatcher
- Cassin's Kingbird
- Western Kingbird
- Horned Lark
- (2) Tree Swallow (ON)
- Violet-green Swallow
- (16) (12) 4 N. Rough-winged Swallow
- Bank Swallow
- (30) Cliff Swallow (ON)
- Barn Swallow
- (3) III Scrub Jay
- (2) 2 American Crow
- (5) 2 2 Common Raven
- (3) 2 3 2 Plain Titmouse FY
- (4) 22 Bushtit
- Rock Wren
- (31) IIII IIII IIII IIII IIII I Bewick's Wren
- House Wren
- Ruby-crowned Kinglet
- Blue-gray Gnatcatcher
- (2) Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- American Robin
- Wrentit
- Northern Mockingbird
- (4) IIII California Thrasher
- American Pipit
- Cedar Waxwing
- Phainopepla
- Loggerhead Shrike
- (33) 6 8 3 6 6 3 2 European Starling
- Bell's Vireo
- Solitary Vireo
- (1) Warbling Vireo
- Orange-crowned Warbler
- (9) III IIII Yellow Warbler
- Yellow-rumped Warbler
- Black-th. Gray Warbler
- Townsend's Warbler
- MacGillivray's Warbler
- (4) IIII Common Yellowthroat
- (5) IIII Wilson's Warbler
- (6) IIII Yellow-breasted Chat
- Summer Tananger
- (2) II Western Tanager
- (5) IIII Black-headed Grosbeak
- (1) I Blue Grosbeak
- Lazuli Bunting
- (4) IIII Rufous-sided Towhee
- (2) 2 California Towhee
- Lark Sparrow
- Savannah Sparrow
- Fox Sparrow
- IIII Song Sparrow
- Lincoln's Sparrow
- White-crowned Sparrow
- (28) 6 6 (16) Red-winged Blackbird
- Western Meadowlark
- Brewer's Blackbird
- (2) Brown-headed Cowbird
- Hooded Oriole
- Northern Oriole
- (15) 6 4 2 3 House Finch
- Pine Siskin
- Lesser Goldfinch
- Lawrence's Goldfinch
- American Goldfinch
- House Sparrow

Brewers about

Additional Species

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Birds of Santa Clara River System

Locality mcb → end rd. Date MAY 2[illegible]

Time

_____ Great Blue Heron
_____ Green Heron
_____ Mallard
_____ Cinnamon Teal
_____ Turkey Vulture
_____ White-tailed Kite
_____ Sharp-shinned Hawk
_____ Cooper's Hawk
_____ Red-shouldered Hawk
2 Red-tailed Hawk
_____ Golden Eagle
_____ American Kestrel
2 2 2 California Quail
_____ American Coot
_____ Killdeer
_____ Spotted Sandpiper
_____ Least Sandpiper
_____ Common Snipe
_____ Rock Dove
2 Mourning Dove
_____ **Yellow-billed Cuckoo**
_____ Greater Roadrunner
_____ Barn Owl
_____ Great Horned Owl
_____ White-throated Swift
_____ Black-ch. Hummingbird
_____ Anna's Hummingbird
_____ Costa's Hummingbird
_____ Belted Kingfisher
_____ Acorn Woodpecker
_____ Nuttall's Woodpecker
_____ Downy Woodpecker
_____ Hairy Woodpecker
_____ Northern Flicker
_____ Western Wood-Pewee
_____ Willow Flycatcher
_____ Hammond's Flycatcher
_____ Pacific Slope Flycatcher
_____ Black Phoebe
_____ Say's Phoebe
_____ Ash-throated Flycatcher
_____ **Brown-crested Flycatcher**
_____ Cassin's Kingbird
_____ Western Kingbird
_____ Horned Lark
_____ Tree Swallow
_____ Violet-green Swallow
(12) 6 N. Rough-winged Swallow
_____ Bank Swallow
50 Cliff Swallow
_____ Barn Swallow
2 Scrub Jay
4 4 American Crow
_____ Common Raven
2 Plain Titmouse
4 6 4 2 Bushtit
_____ Rock Wren
Bewick's Wren
House Wren

AM SIDE

630 – 8AM

_____ Ruby-crowned Kinglet
_____ Blue-gray Gnatcatcher
Western Bluebird
_____ Swainson's Thrush
_____ Hermit Thrush
_____ American Robin
_____ Wrentit
_____ Northern Mockingbird
California Thrasher
_____ American Pipit
_____ Cedar Waxwing
_____ Phainopepla
_____ Loggerhead Shrike
4 European Starling
_____ **Bell's Vireo**
_____ Solitary Vireo
_____ Warbling Vireo
_____ Orange-crowned Warbler
Yellow Warbler
_____ Yellow-rumped Warbler
_____ Black-th. Gray Warbler
_____ Townsend's Warbler
_____ MacGillivray's Warbler
Common Yellowthroat
Wilson's Warbler
Yellow-breasted Chat
_____ **Summer Tananger**
Western Tanager
Black-headed Grosbeak
Blue Grosbeak
_____ Lazuli Bunting
Rufous-sided Towhee
California Towhee
_____ Lark Sparrow
_____ Savannah Sparrow
Fox Sparrow
Song Sparrow
_____ Lincoln's Sparrow
_____ White-crowned Sparrow
8 Red-winged Blackbird
_____ Western Meadowlark
_____ Brewer's Blackbird
Brown-headed Cowbird
_____ Hooded Oriole
_____ Northern Oriole
6 House Finch
_____ Pine Siskin
2 Lesser Goldfinch
_____ Lawrence's Goldfinch
_____ American Goldfinch
_____ House Sparrow

Additional Species

1 W Bs woodpecker

BIRDS OF Santa Clara River System

Locality ___Mc B → Old Rd___ Date ___6-5___

Time ________

640–8AM

Spirit

Count	Tally	Species
		Great Blue Heron
	✓	Green Heron
		Mallard
		Cinnamon Teal
		Turkey Vulture
		White-tailed Kite
		Sharp-shinned Hawk
		Cooper's Hawk
	1	Red-shouldered Hawk
2	II	Red-tailed Hawk
		Golden Eagle
		American Kestrel
13	1 2 4 4 2	California Quail
		American Coot
		Killdeer
		Spotted Sandpiper
		Least Sandpiper
		Common Snipe
		Rock Dove
7	II 2 1 2	Mourning Dove
		Yellow-billed Cuckoo
		Greater Roadrunner
		Barn Owl
		Great Horned Owl
		White-throated Swift
		Black-ch. Hummingbird
3	III	Anna's Hummingbird
		Costa's Hummingbird
		Belted Kingfisher
		Acorn Woodpecker
4	IIII	Nuttall's Woodpecker
2	II	Downy Woodpecker
		Hairy Woodpecker
	1	Northern Flicker
		Western Wood-Pewee
	1	Willow Flycatcher
		Hammond's Flycatcher
		Pacific Slope Flycatcher
3	III	Black Phoebe
		Say's Phoebe
6	I HHH	Ash-throated Flycatcher
		Brown-crested Flycatcher
		Cassin's Kingbird
2	II	Western Kingbird
		Horned Lark
		Tree Swallow
		Violet-green Swallow
22	10 12	N. Rough-winged Swallow
		Bank Swallow
	50	Cliff Swallow
		Barn Swallow
5	HHH	Scrub Jay
9	3 2 2 2	American Crow
		Common Raven
5	2 2 1	Plain Titmouse
		Bushtit
		Rock Wren
13	1 HHH HHH 2	Bewick's Wren
	1	House Wren

Count	Tally	Species
		Ruby-crowned Kinglet
		Blue-gray Gnatcatcher
	3	Western Bluebird
		Swainson's Thrush
		Hermit Thrush
		American Robin
		Wrentit
		Northern Mockingbird
		California Thrasher
		American Pipit
		Cedar Waxwing
		Phainopepla
		Loggerhead Shrike
6	3 1 2	European Starling
		Bell's Vireo
		Solitary Vireo
		Warbling Vireo
		Orange-crowned Warbler
	1	Yellow Warbler
		Yellow-rumped Warbler
		Black-th. Gray Warbler
		Townsend's Warbler
		MacGillivray's Warbler
11	II IIII HHH	Common Yellowthroat
		Wilson's Warbler
4	IIII	Yellow-breasted Chat
		Summer Tanager
		Western Tanager
6	I HHH	Black-headed Grosbeak
2	II	Blue Grosbeak
		Lazuli Bunting
5	HHH	Rufous-sided Towhee
5	III 2	California Towhee
		Lark Sparrow
		Savannah Sparrow
		Fox Sparrow
37	HHH II HHH HHH HHH HHH HHH HHH	Song Sparrow
		Lincoln's Sparrow
		White-crowned Sparrow
	2	Red-winged Blackbird
		Western Meadowlark
		Brewer's Blackbird
6	4 1 2 1	Brown-headed Cowbird
		Hooded Oriole
15	5	Northern Oriole
132	3 2 2 3	House Finch
		Pine Siskin
15	4 1	Lesser Goldfinch
		Lawrence's Goldfinch
		American Goldfinch
		House Sparrow

Additional Species

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BIRDS OF Santa Clara River System

Locality McB → Old Rd   Date 6-20 9?

Time ____________________

6 ~~#~~ 5

N ~~#~~ site

Total	Tally	Species
		Great Blue Heron
		Green Heron
		Mallard
		Cinnamon Teal
		Turkey Vulture
		White-tailed Kite
		Sharp-shinned Hawk
		Cooper's Hawk
3	III	Red-shouldered Hawk
		Red-tailed Hawk
		Golden Eagle
		American Kestrel
		California Quail
		American Coot
	2	Killdeer
		Spotted Sandpiper
		Least Sandpiper
		Common Snipe
		Rock Dove
4	I 2 I	Mourning Dove
		Yellow-billed Cuckoo
		Greater Roadrunner
		Barn Owl
		Great Horned Owl
		White-throated Swift
		Black-ch. Hummingbird
5	~~IIII~~	Anna's Hummingbird
		Costa's Hummingbird
		Belted Kingfisher
		Acorn Woodpecker
9	IIII ~~IIII~~	Nuttall's Woodpecker
4	IIII	Downy Woodpecker
		Hairy Woodpecker
		Northern Flicker
		Western Wood-Pewee
		Willow Flycatcher
		Hammond's Flycatcher
		Pacific Slope Flycatcher
4	IIII	Black Phoebe
		Say's Phoebe
3	III	Ash-throated Flycatcher
		Brown-crested Flycatcher
		Cassin's Kingbird
	1	Western Kingbird
		Horned Lark
		Tree Swallow
		Violet-green Swallow
22	10 12	N. Rough-winged Swallow
		Bank Swallow
70	70	Cliff Swallow
	8	Barn Swallow
6	I ~~IIII~~	Scrub Jay
	II	American Crow
4	2 2	Common Raven
4	2 2	Plain Titmouse
		Bushtit
		Rock Wren
6	I ~~IIII~~	Bewick's Wren
		House Wren

Total	Tally	Species
		Ruby-crowned Kinglet
		Blue-gray Gnatcatcher
		Western Bluebird
		Swainson's Thrush
		Hermit Thrush
		American Robin
3	III	Wrentit
		Northern Mockingbird
2	II	California Thrasher
		American Pipit
		Cedar Waxwing
		Phainopepla
		Loggerhead Shrike
8	3 1 2 2	European Starling
		Bell's Vireo
		Solitary Vireo
		Warbling Vireo
		Orange-crowned Warbler
2	II	Yellow Warbler
		Yellow-rumped Warbler
		Black-th. Gray Warbler
		Townsend's Warbler
		MacGillivray's Warbler
10	~~IIII~~ ~~IIII~~	Common Yellowthroat
		Wilson's Warbler
5	~~IIII~~	Yellow-breasted Chat
		Summer Tananger
		Western Tanager
3	III	Black-headed Grosbeak
	1	Blue Grosbeak
3	III	Lazuli Bunting
6	I ~~IIII~~	Rufous-sided Towhee
4	2 2	California Towhee
		Lark Sparrow
		Savannah Sparrow
		Fox Sparrow
37	3 3 3 3 3 3 3 3 3 3 3 3 1	Song Sparrow
		Lincoln's Sparrow
		White-crowned Sparrow
		Red-winged Blackbird
		Western Meadowlark
		Brewer's Blackbird
3	2 1	Brown-headed Cowbird
		Hooded Oriole
		Northern Oriole
16	6 6 2 2	House Finch
		Pine Siskin
7	4 1 2	Lesser Goldfinch
		Lawrence's Goldfinch
	1	American Goldfinch
		House Sparrow

Additional Species

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BIRDS OF Santa Clara River System

Locality: Bouquet + McBean

Date: 4-8-97

Time: ______

- ____ Great Blue Heron
- √ Green Heron
- 2 Mallard
- ____ Cinnamon Teal
- ____ Turkey Vulture
- ____ White-tailed Kite
- ____ Sharp-shinned Hawk
- ____ Cooper's Hawk
- ____ Red-shouldered Hawk
- 1 Red-tailed Hawk
- ____ Golden Eagle
- ____ American Kestrel
- 15 California Quail
- ____ American Coot
- 4 Killdeer
- ____ Spotted Sandpiper
- ____ Least Sandpiper
- ____ Common Snipe
- 4 Rock Dove
- 5 Mourning Dove
- ____ **Yellow-billed Cuckoo**
- ____ Greater Roadrunner
- ____ Barn Owl
- ____ Great Horned Owl
- ____ White-throated Swift
- ____ Black-ch. Hummingbird
- 3 Anna's Hummingbird
- ____ Costa's Hummingbird
- ____ Belted Kingfisher
- ____ Acorn Woodpecker
- 3 Nuttall's Woodpecker
- ____ Downy Woodpecker
- ____ Hairy Woodpecker
- 4 Northern Flicker
- ____ Western Wood-Pewee
- ____ Willow Flycatcher
- ____ Hammond's Flycatcher
- ____ Pacific Slope Flycatcher
- 2 Black Phoebe
- ____ Say's Phoebe
- ____ Ash-throated Flycatcher
- ____ **Brown-crested Flycatcher**
- ____ Cassin's Kingbird
- ____ Western Kingbird
- ____ Horned Lark
- ____ Tree Swallow
- ____ Violet-green Swallow
- 19 N. Rough-winged Swallow
- ____ Bank Swallow
- 2 Cliff Swallow
- ____ Barn Swallow
- 8 Scrub Jay
- 19 American Crow
- 38 Common Raven
- 2 Plain Titmouse
- 4 Bushtit
- ____ Rock Wren
- 7 Bewick's Wren
- 1 House Wren
- ____ Ruby-crowned Kinglet
- ____ Blue-gray Gnatcatcher
- ____ Western Bluebird
- ____ Swainson's Thrush
- ____ Hermit Thrush
- ____ American Robin
- 1 Wrentit
- ____ Northern Mockingbird
- 2 California Thrasher
- ____ American Pipit
- ____ Cedar Waxwing
- ____ Phainopepla
- ____ Loggerhead Shrike
- ____ European Starling
- ____ **Bell's Vireo**
- ____ Solitary Vireo
- ____ Warbling Vireo
- 1 Orange-crowned Warbler
- 2 Yellow Warbler
- 13 Yellow-rumped Warbler
- ____ Black-th. Gray Warbler
- ____ Townsend's Warbler
- ____ MacGillivray's Warbler
- 7 Common Yellowthroat
- ____ Wilson's Warbler
- ____ Yellow-breasted Chat
- ____ **Summer Tanager**
- ____ Western Tanager
- 1 Black-headed Grosbeak
- ____ Blue Grosbeak
- ____ Lazuli Bunting
- 7 Rufous-sided Towhee
- 4 California Towhee
- ____ Lark Sparrow
- ____ Savannah Sparrow
- ____ Fox Sparrow
- 24 Song Sparrow
- ____ Lincoln's Sparrow
- 21 White-crowned Sparrow
- 35 Red-winged Blackbird
- 1 Western Meadowlark
- ____ Brewer's Blackbird
- 4 Brown-headed Cowbird
- ____ Hooded Oriole
- 1 Northern Oriole
- 11 House Finch
- ____ Pine Siskin
- 5 Lesser Goldfinch
- ____ Lawrence's Goldfinch
- 9 American Goldfinch
- ____ House Sparrow

Additional Species

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BIRDS OF Santa Clara River System

Locality Bogert to McBean Date 4-19-97

Time

Overcast
Cool

- ___ Great Blue Heron
- ___ Green Heron
- ___ Mallard
- ___ Cinnamon Teal
- ___ Turkey Vulture
- ___ White-tailed Kite
- ___ Sharp-shinned Hawk
- ___ Cooper's Hawk
- 2 Red-shouldered Hawk
- 4 Red-tailed Hawk
- 1 Golden Eagle — soaring, riverbed
- ___ American Kestrel
- 6 California Quail
- ___ American Coot
- 4 Killdeer 2 pair
- ___ Spotted Sandpiper
- ___ Least Sandpiper
- ___ Common Snipe
- ___ Rock Dove
- 5 Mourning Dove
- ___ **Yellow-billed Cuckoo**
- ___ Greater Roadrunner
- ___ Barn Owl
- ___ Great Horned Owl
- ___ White-throated Swift
- ___ Black-ch. Hummingbird
- 2 Anna's Hummingbird
- ___ Costa's Hummingbird
- ___ Belted Kingfisher
- ___ Acorn Woodpecker
- 2 Nuttall's Woodpecker
- 2 Downy Woodpecker
- ___ Hairy Woodpecker
- ___ Northern Flicker
- ___ Western Wood-Pewee
- ___ Willow Flycatcher
- ___ Hammond's Flycatcher
- ___ Pacific Slope Flycatcher
- 2 Black Phoebe
- ___ Say's Phoebe
- 1 Ash-throated Flycatcher
- ___ **Brown-crested Flycatcher**
- ___ Cassin's Kingbird
- 2 Western Kingbird
- ___ Horned Lark
- ___ Tree Swallow
- ___ Violet-green Swallow
- 6 N. Rough-winged Swallow
- ___ Bank Swallow
- ___ Cliff Swallow
- ___ Barn Swallow
- 9 Scrub Jay
- 12 American Crow
- 31 Common Raven nest material
- ___ Plain Titmouse
- 4 Bushtit 2 pair
- ___ Rock Wren
- 7 Bewick's Wren — singing
- 1 House Wren
- ___ Ruby-crowned Kinglet
- ___ Blue-gray Gnatcatcher
- ___ Western Bluebird
- ___ Swainson's Thrush
- ___ Hermit Thrush
- ___ American Robin
- 2 Wrentit
- ___ Northern Mockingbird
- 5 California Thrasher — terr. singing
- ___ American Pipit
- ___ Cedar Waxwing
- ___ Phainopepla
- ___ Loggerhead Shrike
- 6 European Starling
- ___ **Bell's Vireo**
- ___ Solitary Vireo
- ___ Warbling Vireo
- 1 Orange-crowned Warbler
- 2 Yellow Warbler
- 3 Yellow-rumped Warbler
- ___ Black-th. Gray Warbler
- ___ Townsend's Warbler
- ___ MacGillivray's Warbler
- 6 Common Yellowthroat — terr singing
- ___ Wilson's Warbler
- 1 Yellow-breasted Chat — singing
- ___ **Summer Tananger**
- ___ Western Tanager
- 3 Black-headed Grosbeak — singing
- ___ Blue Grosbeak
- ___ Lazuli Bunting
- 2 Rufous-sided Towhee — singing
- 3 California Towhee
- ___ Lark Sparrow
- ___ Savannah Sparrow
- ___ Fox Sparrow
- 27 Song Sparrow — most singing
- ___ Lincoln's Sparrow
- ___ White-crowned Sparrow
- 35 Red-winged Blackbird — outer rim, marsh
- ___ Western Meadowlark
- ___ Brewer's Blackbird
- 6 Brown-headed Cowbird
- ___ Hooded Oriole
- 1 Northern Oriole
- 6 House Finch
- ___ Pine Siskin
- 2 Lesser Goldfinch
- ___ Lawrence's Goldfinch
- ___ American Goldfinch
- 2 House Sparrow — nest at file of post office roof

Additional Species

55 California gull flew overhead

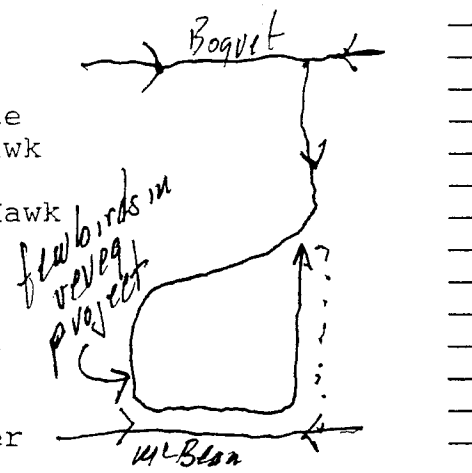
Coyote left fair share

BIRDS OF Santa Clara River System

Locality Bogvet to McBean Date 5-4-97

Time

- ___ Great Blue Heron
- 1 Green Heron
- ___ Mallard
- ___ Cinnamon Teal
- ___ Turkey Vulture
- ___ White-tailed Kite
- ___ Sharp-shinned Hawk
- ___ Cooper's Hawk
- ___ Red-shouldered Hawk
- 2 Red-tailed Hawk
- ___ Golden Eagle
- ___ American Kestrel
- 11 California Quail
- ___ American Coot
- 4 Killdeer
- ___ Spotted Sandpiper
- ___ Least Sandpiper
- ___ Common Snipe
- ___ Rock Dove
- 6 Mourning Dove
- ___ **Yellow-billed Cuckoo**
- ___ Greater Roadrunner
- ___ Barn Owl
- ___ Great Horned Owl
- ___ White-throated Swift
- ___ Black-ch. Hummingbird
- 2 Anna's Hummingbird
- ___ Costa's Hummingbird
- ___ Belted Kingfisher
- ___ Acorn Woodpecker
- 3 Nuttall's Woodpecker
- 2 Downy Woodpecker
- ___ Hairy Woodpecker
- ___ Northern Flicker
- 9 Western Wood-Pewee
- ___ Willow Flycatcher
- ___ Hammond's Flycatcher
- ___ Pacific Slope Flycatcher
- 2 Black Phoebe
- ___ Say's Phoebe
- 6 Ash-throated Flycatcher
- ___ **Brown-crested Flycatcher**
- ___ Cassin's Kingbird
- 2 Western Kingbird
- ___ Horned Lark
- ___ Tree Swallow
- ___ Violet-green Swallow
- 36 N. Rough-winged Swallow bridge nest
- ___ Bank Swallow
- 25 Cliff Swallow 3 nest at bridge
- ___ Barn Swallow
- 9 Scrub Jay
- 11 American Crow
- 35 Common Raven 2 young in nest
- ___ Plain Titmouse
- 2 Bushtit
- ___ Rock Wren
- 12 Bewick's Wren
- 2 House Wren



- ___ Ruby-crowned Kinglet
- ___ Blue-gray Gnatcatcher
- ___ Western Bluebird
- ___ Swainson's Thrush
- ___ Hermit Thrush
- ___ American Robin
- 1 Wrentit
- ___ Northern Mockingbird
- 2 California Thrasher
- ___ American Pipit
- ___ Cedar Waxwing
- ___ Phainopepla
- ___ Loggerhead Shrike
- 4 European Starling
- ___ **Bell's Vireo**
- ___ Solitary Vireo
- ___ Warbling Vireo
- ___ Orange-crowned Warbler
- 4 Yellow Warbler
- ___ Yellow-rumped Warbler
- ___ Black-th. Gray Warbler
- ___ Townsend's Warbler
- ___ MacGillivray's Warbler
- ___ Common Yellowthroat
- ___ Wilson's Warbler
- 1 Yellow-breasted Chat
- ___ **Summer Tananger**
- ___ Western Tanager
- 2 Black-headed Grosbeak
- ___ Blue Grosbeak
- ___ Lazuli Bunting
- 2 Rufous-sided Towhee
- 3 California Towhee
- ___ Lark Sparrow
- ___ Savannah Sparrow
- ___ Fox Sparrow
- 26 Song Sparrow
- ___ Lincoln's Sparrow
- ___ White-crowned Sparrow
- 45 Red-winged Blackbird
- ___ Western Meadowlark
- ___ Brewer's Blackbird
- 12 Brown-headed Cowbird
- ___ Hooded Oriole
- 4 Northern Oriole
- 12 House Finch
- ___ Pine Siskin
- 2 Lesser Goldfinch
- ___ Lawrence's Goldfinch
- ___ American Goldfinch
- ___ House Sparrow

Additional Species

1 Great egret

BIRDS OF Santa Clara River System

Locality Boquet → McBean Date 5/29/97

Time

- ___ Great Blue Heron
- ___ Green Heron
- ___ Mallard
- ___ Cinnamon Teal
- ___ Turkey Vulture
- ___ White-tailed Kite
- ___ Sharp-shinned Hawk
- ___ Cooper's Hawk
- ___ Red-shouldered Hawk
- 3 Red-tailed Hawk
- ___ Golden Eagle
- ___ American Kestrel
- 6 California Quail
- ___ American Coot
- !! ~~0~~ Killdeer
- ___ Spotted Sandpiper
- ___ Least Sandpiper
- ___ Common Snipe
- ___ Rock Dove
- 5 Mourning Dove
- ___ **Yellow-billed Cuckoo**
- ___ Greater Roadrunner
- ___ Barn Owl
- ___ Great Horned Owl
- ___ White-throated Swift
- ___ Black-ch. Hummingbird
- 4 Anna's Hummingbird
- ___ Costa's Hummingbird
- ___ Belted Kingfisher
- ___ Acorn Woodpecker
- 2 Nuttall's Woodpecker
- ___ Downy Woodpecker
- ___ Hairy Woodpecker
- ___ Northern Flicker
- ___ Western Wood-Pewee
- ___ Willow Flycatcher
- ___ Hammond's Flycatcher
- ___ Pacific Slope Flycatcher
- 5 Black Phoebe
- ___ Say's Phoebe
- 2 Ash-throated Flycatcher
- ___ **Brown-crested Flycatcher**
- ___ Cassin's Kingbird
- 2 Western Kingbird
- ___ Horned Lark
- ___ Tree Swallow
- ___ Violet-green Swallow
- 20 N. Rough-winged Swallow
- ___ Bank Swallow
- 6 Cliff Swallow
- ___ Barn Swallow
- 9 Scrub Jay
- 31 American Crow
- 55 Common Raven
- ___ Plain Titmouse
- 6 Bushtit
- ___ Rock Wren
- ___ Bewick's Wren
- 6 House Wren
- ___ Ruby-crowned Kinglet
- ___ Blue-gray Gnatcatcher
- ___ Western Bluebird
- ___ Swainson's Thrush
- ___ Hermit Thrush
- ___ American Robin
- 1 Wrentit
- ___ Northern Mockingbird
- 7 California Thrasher
- ___ American Pipit
- ___ Cedar Waxwing
- ___ Phainopepla
- ___ Loggerhead Shrike
- ___ European Starling
- ___ **Bell's Vireo**
- ___ Solitary Vireo
- ___ Warbling Vireo
- ___ Orange-crowned Warbler
- ___ Yellow Warbler
- ___ Yellow-rumped Warbler
- ___ Black-th. Gray Warbler
- ___ Townsend's Warbler
- ___ MacGillivray's Warbler
- 10 Common Yellowthroat
- ___ Wilson's Warbler
- ___ Yellow-breasted Chat
- ___ **Summer Tananger**
- ___ Western Tanager
- juveniles 3 Black-headed Grosbeak
- ___ Blue Grosbeak
- ___ Lazuli Bunting
- 2 Rufous-sided Towhee
- 4 California Towhee
- ___ Lark Sparrow
- ___ Savannah Sparrow
- ___ Fox Sparrow
- 34 Song Sparrow
- ___ Lincoln's Sparrow
- ___ White-crowned Sparrow
- 18 Red-winged Blackbird
- ___ Western Meadowlark
- ___ Brewer's Blackbird
- 3 Brown-headed Cowbird
- ___ Hooded Oriole
- 2 Northern Oriole
- 12 House Finch
- ___ Pine Siskin
- 4 Lesser Goldfinch
- ___ Lawrence's Goldfinch
- ___ American Goldfinch
- 2 House Sparrow

Additional Species

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BIRDS OF Santa Clara River System

Locality Soule - S. Fork Date 6/6/97

Time

_____ Great Blue Heron
_____ Green Heron
_____ Mallard
_____ Cinnamon Teal
_____ Turkey Vulture
_____ White-tailed Kite
_____ Sharp-shinned Hawk
_____ Cooper's Hawk
2 Red-shouldered Hawk
2 Red-tailed Hawk
_____ Golden Eagle
_____ American Kestrel
_____ California Quail
_____ American Coot
_____ Killdeer
_____ Spotted Sandpiper
_____ Least Sandpiper
_____ Common Snipe
_____ Rock Dove
2 Mourning Dove
_____ **Yellow-billed Cuckoo**
_____ Greater Roadrunner
_____ Barn Owl
_____ Great Horned Owl
_____ White-throated Swift
1 Black-ch. Hummingbird
5 Anna's Hummingbird
_____ Costa's Hummingbird
_____ Belted Kingfisher
_____ Acorn Woodpecker
5 Nuttall's Woodpecker
2 Downy Woodpecker pair
_____ Hairy Woodpecker
_____ Northern Flicker
_____ Western Wood-Pewee
→ 1 Willow Flycatcher
_____ Hammond's Flycatcher
_____ Pacific Slope Flycatcher
3 Black Phoebe
_____ Say's Phoebe
2 Ash-throated Flycatcher
_____ **Brown-crested Flycatcher**
_____ Cassin's Kingbird
_____ Western Kingbird
_____ Horned Lark
_____ Tree Swallow
_____ Violet-green Swallow
36 N. Rough-winged Swallow
_____ Bank Swallow
15 Cliff Swallow
2 Barn Swallow
9 Scrub Jay
6 American Crow
→ 61 Common Raven
_____ Plain Titmouse
2 Bushtit
_____ Rock Wren
6 Bewick's Wren
_____ House Wren

slow day many birds appear to have dispersed

_____ Ruby-crowned Kinglet
_____ Blue-gray Gnatcatcher
_____ Western Bluebird
_____ Swainson's Thrush
_____ Hermit Thrush
_____ American Robin
_____ Wrentit
_____ Northern Mockingbird
_____ California Thrasher
_____ American Pipit
_____ Cedar Waxwing
_____ Phainopepla
_____ Loggerhead Shrike
_____ European Starling
_____ **Bell's Vireo**
_____ Solitary Vireo
_____ Warbling Vireo
_____ Orange-crowned Warbler
_____ Yellow Warbler
_____ Yellow-rumped Warbler
_____ Black-th. Gray Warbler
_____ Townsend's Warbler
_____ MacGillivray's Warbler
9 Common Yellowthroat
_____ Wilson's Warbler
_____ Yellow-breasted Chat
_____ **Summer Tananger**
_____ Western Tanager
ONLY 1 Black-headed Grosbeak
_____ Blue Grosbeak
_____ Lazuli Bunting
_____ Rufous-sided Towhee
2 California Towhee
_____ Lark Sparrow
_____ Savannah Sparrow
_____ Fox Sparrow
29 Song Sparrow
_____ Lincoln's Sparrow
_____ White-crowned Sparrow
54 Red-winged Blackbird
_____ Western Meadowlark
_____ Brewer's Blackbird
3 Brown-headed Cowbird
_____ Hooded Oriole
3 Northern Oriole
16 House Finch
_____ Pine Siskin
5 Lesser Goldfinch
_____ Lawrence's Goldfinch
_____ American Goldfinch
_____ House Sparrow

Additional Species

_____
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_____
_____
_____

BIRDS OF Santa Clara River System

Locality Boquet → McBean Tab 3 Date 6-19

Time

_____ Great Blue Heron
_____ Green Heron
_____ Mallard
_____ Cinnamon Teal
_____ Turkey Vulture
_____ White-tailed Kite
_____ Sharp-shinned Hawk
1 Cooper's Hawk
_____ Red-shouldered Hawk
1 Red-tailed Hawk
_____ Golden Eagle
_____ American Kestrel
6 California Quail
_____ American Coot
2 Killdeer
_____ Spotted Sandpiper
_____ Least Sandpiper
_____ Common Snipe
_____ Rock Dove
9 Mourning Dove
_____ **Yellow-billed Cuckoo**
_____ Greater Roadrunner
_____ Barn Owl
_____ Great Horned Owl
_____ White-throated Swift
_____ Black-ch. Hummingbird
7 Anna's Hummingbird
_____ Costa's Hummingbird
_____ Belted Kingfisher
_____ Acorn Woodpecker
3 Nuttall's Woodpecker
_____ Downy Woodpecker
_____ Hairy Woodpecker
_____ Northern Flicker
_____ Western Wood-Pewee
_____ Willow Flycatcher
_____ Hammond's Flycatcher
_____ Pacific Slope Flycatcher
3 Black Phoebe 1 imm.
_____ Say's Phoebe
5 Ash-throated Flycatcher
_____ **Brown-crested Flycatcher**
_____ Cassin's Kingbird
2 Western Kingbird
_____ Horned Lark
_____ Tree Swallow
_____ Violet-green Swallow
19 N. Rough-winged Swallow
_____ Bank Swallow
30 Cliff Swallow
6 Barn Swallow
10 Scrub Jay
9 American Crow
14 Common Raven
_____ Plain Titmouse
_____ Bushtit
_____ Rock Wren
5 Bewick's Wren
_____ House Wren

_____ Ruby-crowned Kinglet
_____ Blue-gray Gnatcatcher
_____ Western Bluebird
_____ Swainson's Thrush
_____ Hermit Thrush
_____ American Robin
1 Wrentit
_____ Northern Mockingbird
2 California Thrasher
_____ American Pipit
_____ Cedar Waxwing
_____ Phainopepla
_____ Loggerhead Shrike
2 European Starling
_____ **Bell's Vireo**
_____ Solitary Vireo
_____ Warbling Vireo
_____ Orange-crowned Warbler
_____ Yellow Warbler
_____ Yellow-rumped Warbler
_____ Black-th. Gray Warbler
_____ Townsend's Warbler
_____ MacGillivray's Warbler
Juveniles 14 Common Yellowthroat
_____ Wilson's Warbler
_____ Yellow-breasted Chat
_____ **Summer Tananger**
_____ Western Tanager
1 Black-headed Grosbeak
_____ Blue Grosbeak
_____ Lazuli Bunting
1 Rufous-sided Towhee
4 California Towhee
_____ Lark Sparrow
_____ Savannah Sparrow
_____ Fox Sparrow
F4 & Juv. 47 Song Sparrow
_____ Lincoln's Sparrow
_____ White-crowned Sparrow
Juv. 116 Red-winged Blackbird
_____ Western Meadowlark
_____ Brewer's Blackbird
5 Brown-headed Cowbird
_____ Hooded Oriole
_____ Northern Oriole
28 House Finch
_____ Pine Siskin
5 Lesser Goldfinch
_____ Lawrence's Goldfinch
_____ American Goldfinch
_____ House Sparrow

Additional Species

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BIRDS OF Santa Clara River System

Locality Castaic Creek 6-9 Date 7-5-97

Time

Upper River 1997

Area 5

____ Great Blue Heron
____ Green Heron
____ Mallard
____ Cinnamon Teal
____ Turkey Vulture
____ White-tailed Kite
____ Sharp-shinned Hawk
____ Cooper's Hawk
____ Red-shouldered Hawk
____ Red-tailed Hawk
____ Golden Eagle
1 American Kestrel
15 California Quail
____ American Coot
2 Killdeer
____ Spotted Sandpiper
____ Least Sandpiper
____ Common Snipe
25 Rock Dove
11 Mourning Dove
____ **Yellow-billed Cuckoo**
____ Greater Roadrunner
____ Barn Owl
____ Great Horned Owl
____ White-throated Swift
____ Black-ch. Hummingbird
4 Anna's Hummingbird
____ Costa's Hummingbird
____ Belted Kingfisher
____ Acorn Woodpecker
3 Nuttall's Woodpecker
____ Downy Woodpecker
____ Hairy Woodpecker
1 Northern Flicker
____ Western Wood-Pewee
____ Willow Flycatcher
____ Hammond's Flycatcher
____ Pacific Slope Flycatcher
____ Black Phoebe
____ Say's Phoebe
____ Ash-throated Flycatcher
____ **Brown-crested Flycatcher**
____ Cassin's Kingbird
4 Western Kingbird
2 Horned Lark
____ Tree Swallow
____ Violet-green Swallow
37 N. Rough-winged Swallow
____ Bank Swallow
____ Cliff Swallow
____ Barn Swallow
5 Scrub Jay
8 American Crow
2 Common Raven
1 Plain Titmouse
____ Bushtit
____ Rock Wren
6 Bewick's Wren
House Wren

____ Ruby-crowned Kinglet
____ Blue-gray Gnatcatcher
____ Western Bluebird
____ Swainson's Thrush
____ Hermit Thrush
3 American Robin
____ Wrentit
____ Northern Mockingbird
2 California Thrasher
____ American Pipit
____ Cedar Waxwing
____ Phainopepla
____ Loggerhead Shrike
5 European Starling
____ **Bell's Vireo**
____ Solitary Vireo
____ Warbling Vireo
2 Orange-crowned Warbler
____ Yellow Warbler
____ Yellow-rumped Warbler
____ Black-th. Gray Warbler
____ Townsend's Warbler
____ MacGillivray's Warbler
2 Common Yellowthroat
____ Wilson's Warbler
____ Yellow-breasted Chat
____ **Summer Tananger**
____ Western Tanager
1 Black-headed Grosbeak
____ Blue Grosbeak
____ Lazuli Bunting
2 Rufous-sided Towhee
5 California Towhee
____ Lark Sparrow
11 Savannah Sparrow
____ Fox Sparrow
____ Song Sparrow
1 Lincoln's Sparrow
25 White-crowned Sparrow
43 Red-winged Blackbird
____ Western Meadowlark
5 Brewer's Blackbird
4 Brown-headed Cowbird
____ Hooded Oriole
6 Northern Oriole
15 House Finch
____ Pine Siskin
____ Lesser Goldfinch
____ Lawrence's Goldfinch
____ American Goldfinch
____ House Sparrow

Additional Species

1 White faced Ibis

BIRDS OF Santa Clara River System

Locality Castaic Cr Date 4-26-97

Time

- ___ Great Blue Heron
- 1 Green Heron
- ___ Mallard
- ___ Cinnamon Teal
- ___ Turkey Vulture
- ___ White-tailed Kite
- ___ Sharp-shinned Hawk
- ___ Cooper's Hawk
- ___ Red-shouldered Hawk
- 2 Red-tailed Hawk
- ___ Golden Eagle
- ___ American Kestrel
- 16 California Quail
- ___ American Coot
- 4 Killdeer
- ___ Spotted Sandpiper
- ___ Least Sandpiper
- ___ Common Snipe
- ___ Rock Dove
- 11 Mourning Dove
- ___ **Yellow-billed Cuckoo**
- ___ Greater Roadrunner
- ___ Barn Owl
- ___ Great Horned Owl
- ___ White-throated Swift
- ___ Black-ch. Hummingbird
- 5 Anna's Hummingbird
- ___ Costa's Hummingbird
- ___ Belted Kingfisher
- ___ Acorn Woodpecker
- 4 Nuttall's Woodpecker
- ___ Downy Woodpecker
- ___ Hairy Woodpecker
- ___ Northern Flicker
- ___ Western Wood-Pewee
- ___ Willow Flycatcher
- ___ Hammond's Flycatcher
- ___ Pacific Slope Flycatcher
- ___ Black Phoebe
- ___ Say's Phoebe
- 3 Ash-throated Flycatcher
- ___ **Brown-crested Flycatcher**
- ___ Cassin's Kingbird
- 4 Western Kingbird
- ___ Horned Lark
- ___ Tree Swallow
- ___ Violet-green Swallow
- 36 N. Rough-winged Swallow
- ___ Bank Swallow
- 10 Cliff Swallow
- ___ Barn Swallow
- 11 Scrub Jay
- 6 American Crow
- 1 Common Raven
- 2 Plain Titmouse
- 4 Bushtit
- ___ Rock Wren
- 5 Bewick's Wren
- ___ House Wren
- ___ Ruby-crowned Kinglet
- ___ Blue-gray Gnatcatcher
- ___ Western Bluebird
- ___ Swainson's Thrush
- ___ Hermit Thrush
- ___ American Robin (Chasing scrub jay)
- 3 Wrentit
- ___ Northern Mockingbird
- 3 California Thrasher
- ___ American Pipit
- ___ Cedar Waxwing
- ___ Phainopepla
- ___ Loggerhead Shrike
- 4 European Starling
- ___ **Bell's Vireo**
- ___ Solitary Vireo
- ___ Warbling Vireo
- ___ Orange-crowned Warbler
- 2 Yellow Warbler
- ___ Yellow-rumped Warbler
- ___ Black-th. Gray Warbler
- ___ Townsend's Warbler
- ___ MacGillivray's Warbler
- 8 Common Yellowthroat
- ___ Wilson's Warbler
- ___ Yellow-breasted Chat
- ___ **Summer Tananger**
- 2 Western Tanager
- 12 Black-headed Grosbeak
- 5 Blue Grosbeak
- ___ Lazuli Bunting
- 3 Rufous-sided Towhee
- 5 California Towhee
- ___ Lark Sparrow
- 1 Savannah Sparrow
- ___ Fox Sparrow
- 20 Song Sparrow
- ___ Lincoln's Sparrow
- ___ White-crowned Sparrow
- 60 Red-winged Blackbird
- 1 Western Meadowlark
- 4 Brewer's Blackbird
- 6 Brown-headed Cowbird
- ___ Hooded Oriole
- 6 Northern Oriole
- 12 House Finch
- ___ Pine Siskin
- ___ Lesser Goldfinch
- 2 Lawrence's Goldfinch (singing ♂)
- ___ American Goldfinch
- 2 House Sparrow

Additional Species

2 Blk crown nuthatch adults

BIRDS OF Santa Clara River System

Locality Castaic Cr Date 5-8-97

Time

_____ Great Blue Heron
_____ Green Heron
_____ Mallard
_____ Cinnamon Teal
_____ Turkey Vulture
_____ White-tailed Kite
_____ Sharp-shinned Hawk
_____ Cooper's Hawk
1 Red-shouldered Hawk
1 Red-tailed Hawk
_____ Golden Eagle
_____ American Kestrel
28 California Quail
_____ American Coot
4 Killdeer
_____ Spotted Sandpiper
_____ Least Sandpiper
_____ Common Snipe
6 Rock Dove
5 Mourning Dove
_____ **Yellow-billed Cuckoo**
_____ Greater Roadrunner
_____ Barn Owl
_____ Great Horned Owl
_____ White-throated Swift
_____ Black-ch. Hummingbird
3 Anna's Hummingbird
_____ Costa's Hummingbird
_____ Belted Kingfisher
_____ Acorn Woodpecker
4 Nuttall's Woodpecker
_____ Downy Woodpecker
_____ Hairy Woodpecker
2 Northern Flicker
_____ Western Wood-Pewee
_____ Willow Flycatcher
_____ Hammond's Flycatcher
_____ Pacific Slope Flycatcher
2 Black Phoebe
_____ Say's Phoebe
3 Ash-throated Flycatcher
_____ **Brown-crested Flycatcher**
_____ Cassin's Kingbird
6 Western Kingbird 3 pairs
2 Horned Lark
_____ Tree Swallow
_____ Violet-green Swallow
50 N. Rough-winged Swallow nest in bridge holes
_____ Bank Swallow
35 Cliff Swallow mud nest on bridge
_____ Barn Swallow
13 Scrub Jay
5 American Crow
1 Common Raven
2 Plain Titmouse
6 Bushtit
_____ Rock Wren
10 Bewick's Wren

_____ Ruby-crowned Kinglet
_____ Blue-gray Gnatcatcher
2 Western Bluebird at nest cavity
_____ Swainson's Thrush
_____ Hermit Thrush
2 American Robin
2 Wrentit
_____ Northern Mockingbird
4 California Thrasher
_____ American Pipit
18 Cedar Waxwing
_____ Phainopepla
_____ Loggerhead Shrike
25 European Starling
_____ **Bell's Vireo**
_____ Solitary Vireo
_____ Warbling Vireo
_____ Orange-crowned Warbler
_____ Yellow Warbler
_____ Yellow-rumped Warbler
_____ Black-th. Gray Warbler
_____ Townsend's Warbler
_____ MacGillivray's Warbler
5 Common Yellowthroat
_____ Wilson's Warbler
_____ Yellow-breasted Chat
_____ **Summer Tanager**
_____ Western Tanager
9 Black-headed Grosbeak
11 Blue Grosbeak
_____ Lazuli Bunting
4 Rufous-sided Towhee
10 California Towhee
_____ Lark Sparrow
_____ Savannah Sparrow
_____ Fox Sparrow
18 Song Sparrow
_____ Lincoln's Sparrow
_____ White-crowned Sparrow
70 Red-winged Blackbird
_____ Western Meadowlark
_____ Brewer's Blackbird
10 Brown-headed Cowbird
_____ Hooded Oriole
5 Northern Oriole
8 House Finch
_____ Pine Siskin
_____ Lesser Goldfinch
_____ Lawrence's Goldfinch
_____ American Goldfinch
_____ House Sparrow

Additional Species

30 Calif. gull
10 Yellow-headed blackbird ♀

BIRDS OF Santa Clara River System

Locality Castaic Date 5/26/92

Time

_____ Great Blue Heron
_____ Green Heron
_____ Mallard
_____ Cinnamon Teal
_____ Turkey Vulture
_____ White-tailed Kite
_____ Sharp-shinned Hawk
_____ Cooper's Hawk
_____ Red-shouldered Hawk
2 Red-tailed Hawk
_____ Golden Eagle
1 American Kestrel
15 California Quail
_____ American Coot
2 Killdeer
_____ Spotted Sandpiper
_____ Least Sandpiper
_____ Common Snipe
2 Rock Dove
8 Mourning Dove
_____ **Yellow-billed Cuckoo**
_____ Greater Roadrunner
_____ Barn Owl
_____ Great Horned Owl
_____ White-throated Swift
_____ Black-ch. Hummingbird
7 Anna's Hummingbird
_____ Costa's Hummingbird
_____ Belted Kingfisher
_____ Acorn Woodpecker
5 Nuttall's Woodpecker
1 Downy Woodpecker
_____ Hairy Woodpecker
_____ Northern Flicker
_____ Western Wood-Pewee
_____ Willow Flycatcher
_____ Hammond's Flycatcher
_____ Pacific Slope Flycatcher
2 Black Phoebe
_____ Say's Phoebe
1 Ash-throated Flycatcher
_____ **Brown-crested Flycatcher**
_____ Cassin's Kingbird
2 Western Kingbird
_____ Horned Lark
_____ Tree Swallow
_____ Violet-green Swallow
38 N. Rough-winged Swallow
_____ Bank Swallow
8 Cliff Swallow
4 Barn Swallow
7 Scrub Jay
3 American Crow
4 Common Raven
2 Plain Titmouse
8 Bushtit in one flock
_____ Rock Wren
8 Bewick's Wren
_____ House Wren

_____ Ruby-crowned Kinglet
_____ Blue-gray Gnatcatcher
_____ Western Bluebird
_____ Swainson's Thrush
_____ Hermit Thrush
_____ American Robin
2 Wrentit
_____ Northern Mockingbird
4 California Thrasher
_____ American Pipit
_____ Cedar Waxwing
_____ Phainopepla
_____ Loggerhead Shrike
4 European Starling
_____ **Bell's Vireo**
_____ Solitary Vireo
_____ Warbling Vireo
_____ Orange-crowned Warbler
_____ Yellow Warbler
_____ Yellow-rumped Warbler
_____ Black-th. Gray Warbler
_____ Townsend's Warbler
_____ MacGillivray's Warbler
5 Common Yellowthroat
_____ Wilson's Warbler
_____ Yellow-breasted Chat
_____ **Summer Tananger**
_____ Western Tanager
10 Black-headed Grosbeak
2 Blue Grosbeak pair
_____ Lazuli Bunting
6 Rufous-sided Towhee
6 California Towhee
_____ Lark Sparrow
3 Savannah Sparrow
_____ Fox Sparrow
22 Song Sparrow
_____ Lincoln's Sparrow
_____ White-crowned Sparrow
54 Red-winged Blackbird
_____ Western Meadowlark
_____ Brewer's Blackbird
6 Brown-headed Cowbird
_____ Hooded Oriole
5 Northern Oriole
6 House Finch
_____ Pine Siskin
_____ Lesser Goldfinch
_____ Lawrence's Goldfinch
_____ American Goldfinch
_____ House Sparrow

Additional Species

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BIRDS OF Santa Clara River System

Locality Castaic Date 6/5/97

Time

- Great Blue Heron
- (2) || Green Heron
- Mallard
- Cinnamon Teal
- Turkey Vulture
- White-tailed Kite
- Sharp-shinned Hawk
- (1) | Cooper's Hawk adult
- (1) | Red-shouldered Hawk
- (3) ||| Red-tailed Hawk
- Golden Eagle
- American Kestrel
- (13) 2 2 9 California Quail 2nd nest 8 chicks
- American Coot
- Killdeer
- Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- (6) 1 ++++ Rock Dove
- (9) ||| ++++ Mourning Dove
- **Yellow-billed Cuckoo**
- Greater Roadrunner
- Barn Owl
- Great Horned Owl
- White-throated Swift
- Black-ch. Hummingbird
- (9) |||| ++++ Anna's Hummingbird
- Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- (4) |||| Nuttall's Woodpecker
- (1) | Downy Woodpecker
- Hairy Woodpecker
- Northern Flicker
- Western Wood-Pewee
- Willow Flycatcher
- Hammond's Flycatcher
- Pacific Slope Flycatcher
- (2) || Black Phoebe juvenile
- Say's Phoebe
- (1) | Ash-throated Flycatcher
- **Brown-crested Flycatcher**
- Cassin's Kingbird
- (1) | Western Kingbird
- Horned Lark
- Tree Swallow
- Violet-green Swallow
- (30) 5 8 5 5 5 ++++ N. Rough-winged Swallow
- Bank Swallow
- → 57 ~~nests~~ Cliff Swallow south side
- Barn Swallow
- (13) ||| ++++ ++++ Scrub Jay
- (2) || American Crow
- (5) ++++ Common Raven
- Plain Titmouse
- (4) |||| Bushtit
- Rock Wren
- (11) | ++++ ++++ Bewick's Wren
- Ruby-crowned Kinglet
- Blue-gray Gnatcatcher
- Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- American Robin
- (2) || Wrentit
- Northern Mockingbird
- (3) ||| California Thrasher
- American Pipit
- Cedar Waxwing
- (1) | Phainopepla
- Loggerhead Shrike
- (5) ++++ European Starling
- (1) | **Bell's Vireo**
- Solitary Vireo
- Warbling Vireo
- Orange-crowned Warbler
- Yellow Warbler
- Yellow-rumped Warbler
- Black-th. Gray Warbler
- Townsend's Warbler
- MacGillivray's Warbler
- (6) 1 ++++ Common Yellowthroat
- Wilson's Warbler
- (2) || Yellow-breasted Chat
- **Summer Tananger**
- Western Tanager
- (11) 1 ++++ ++++ Black-headed Grosbeak
- (3) ||| Blue Grosbeak
- Lazuli Bunting
- (6) 1 ++++ Rufous-sided Towhee
- (10) ++++ ++++ California Towhee
- Lark Sparrow
- Savannah Sparrow
- Fox Sparrow
- (11) 1 ++++ ++++ Song Sparrow
- Lincoln's Sparrow
- White-crowned Sparrow
- (45) 9 9 9 9 9 Red-winged Blackbird
- Western Meadowlark
- Brewer's Blackbird
- (5) ++++ Brown-headed Cowbird
- Hooded Oriole
- (8) |||| ++++ Northern Oriole
- (14) |||| ++++ ++++ House Finch F9
- Pine Siskin
- (4) |||| Lesser Goldfinch
- Lawrence's Goldfinch
- American Goldfinch
- House Sparrow

a new development

Additional Species

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BIRDS OF Santa Clara River System

Locality Castaic Creek Date 6-20-97

Time

- ___ Great Blue Heron
- ___ Green Heron
- ___ Mallard
- ___ Cinnamon Teal
- 1 Turkey Vulture
- ___ White-tailed Kite
- ___ Sharp-shinned Hawk
- ___ Cooper's Hawk
- 1 Red-shouldered Hawk (IMPL.)
- 2 Red-tailed Hawk
- ___ Golden Eagle
- 1 American Kestrel
- 26 California Quail incl. 7 chicks
- ___ American Coot
- 2 Killdeer
- ___ Spotted Sandpiper
- ___ Least Sandpiper
- ___ Common Snipe
- 2 Rock Dove
- 14 Mourning Dove
- ___ **Yellow-billed Cuckoo**
- ___ Greater Roadrunner
- ___ Barn Owl
- ___ Great Horned Owl
- ___ White-throated Swift
- ___ Black-ch. Hummingbird
- 4 Anna's Hummingbird
- ___ Costa's Hummingbird
- ___ Belted Kingfisher
- ___ Acorn Woodpecker
- 5 Nuttall's Woodpecker
- ___ Downy Woodpecker
- ___ Hairy Woodpecker
- 4 Northern Flicker
- ___ Western Wood-Pewee
- ___ Willow Flycatcher
- ___ Hammond's Flycatcher
- ___ Pacific Slope Flycatcher
- 7 Black Phoebe
- 2 Say's Phoebe
- 7 Ash-throated Flycatcher
- ___ **Brown-crested Flycatcher**
- ___ Cassin's Kingbird
- 3 Western Kingbird
- ___ Horned Lark
- 6 Tree Swallow
- ___ Violet-green Swallow
- 36 N. Rough-winged Swallow
- ___ Bank Swallow
- 6 Cliff Swallow 65 nest south side of bridge
- ___ Barn Swallow
- 15 Scrub Jay
- 6 American Crow
- 10 Common Raven
- ___ Plain Titmouse
- 8 Bushtit
- ___ Rock Wren
- 7 Bewick's Wren
- ___ Ruby-crowned Kinglet
- ___ Blue-gray Gnatcatcher
- ___ Western Bluebird
- ___ Swainson's Thrush
- ___ Hermit Thrush
- ___ American Robin
- 2 Wrentit
- ___ Northern Mockingbird
- 1 juvenile 5 California Thrasher
- ___ American Pipit
- ___ Cedar Waxwing
- ___ Phainopepla
- 2 Loggerhead Shrike
- ___ European Starling
- ___ **Bell's Vireo**
- ___ Solitary Vireo
- ___ Warbling Vireo
- ___ Orange-crowned Warbler
- ___ Yellow Warbler
- ___ Yellow-rumped Warbler
- ___ Black-th. Gray Warbler
- ___ Townsend's Warbler
- ___ MacGillivray's Warbler
- 4 Common Yellowthroat
- ___ Wilson's Warbler
- ___ Yellow-breasted Chat
- ___ **Summer Tananger**
- ___ Western Tanager
- 8 Black-headed Grosbeak
- pair chase — 6 Blue Grosbeak
- ___ Lazuli Bunting
- 1 juvenile 5 Rufous-sided Towhee
- 4 California Towhee
- 2 Lark Sparrow
- ___ Savannah Sparrow
- ___ Fox Sparrow
- 7 Song Sparrow
- ___ Lincoln's Sparrow
- ___ White-crowned Sparrow
- 39 Red-winged Blackbird
- ___ Western Meadowlark
- ___ Brewer's Blackbird
- ___ Brown-headed Cowbird
- ___ Hooded Oriole
- 2 Northern Oriole
- 28 House Finch
- ___ Pine Siskin
- 2 Lesser Goldfinch
- ___ Lawrence's Goldfinch
- ___ American Goldfinch
- ___ House Sparrow

Additional Species

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BIRDS OF Santa Clara River System

Locality Lower San Francisquito Creek Date 5/15/97

Time _____

10 cedar waxwing in main river

Upper River 1997

Area 6

_____ Great Blue Heron
_____ Green Heron
_____ Mallard
_____ Cinnamon Teal
_____ Turkey Vulture
_____ White-tailed Kite
_____ Sharp-shinned Hawk
_____ Cooper's Hawk
_____ Red-shouldered Hawk
_____ Red-tailed Hawk
_____ Golden Eagle
_____ American Kestrel
2222|222 California Quail
_____ American Coot
_____ Killdeer
_____ Spotted Sandpiper
_____ Least Sandpiper
_____ Common Snipe
_____ Rock Dove
2|2 Mourning Dove
_____ **Yellow-billed Cuckoo**
_____ Greater Roadrunner
_____ Barn Owl
_____ Great Horned Owl
_____ White-throated Swift
_____ Black-ch. Hummingbird
||| Anna's Hummingbird
_____ Costa's Hummingbird
_____ Belted Kingfisher
_____ Acorn Woodpecker
|||| Nuttall's Woodpecker Feeding young in hole
_____ Downy Woodpecker
_____ Hairy Woodpecker
_____ Northern Flicker
_____ Western Wood-Pewee
_____ Willow Flycatcher
_____ Hammond's Flycatcher
_____ Pacific Slope Flycatcher
| Black Phoebe
_____ Say's Phoebe
22| Ash-throated Flycatcher
_____ **Brown-crested Flycatcher**
_____ Cassin's Kingbird
_____ Western Kingbird
_____ Horned Lark
_____ Tree Swallow
_____ Violet-green Swallow
_____ N. Rough-winged Swallow
_____ Bank Swallow
||| Cliff Swallow
_____ Barn Swallow
2|2 Scrub Jay
_____ American Crow
|22 Common Raven nest w/ young
2 Plain Titmouse
_____ Bushtit
_____ Rock Wren
||| Bewick's Wren
|2 House Wren

_____ Ruby-crowned Kinglet
_____ Blue-gray Gnatcatcher
_____ Western Bluebird
_____ Swainson's Thrush
_____ Hermit Thrush
_____ American Robin
_____ Wrentit
| Northern Mockingbird
3| California Thrasher
_____ American Pipit
_____ Cedar Waxwing
|| Phainopepla
_____ Loggerhead Shrike
|12|3 European Starling
_____ **Bell's Vireo**
_____ Solitary Vireo
_____ Warbling Vireo
_____ Orange-crowned Warbler
_____ Yellow Warbler
_____ Yellow-rumped Warbler
_____ Black-th. Gray Warbler
_____ Townsend's Warbler
_____ MacGillivray's Warbler
_____ Common Yellowthroat
_____ Wilson's Warbler
_____ Yellow-breasted Chat
_____ **Summer Tananger**
_____ Western Tanager
2 Black-headed Grosbeak
_____ Blue Grosbeak
_____ Lazuli Bunting
|| Rufous-sided Towhee
112222|13 California Towhee
_____ Lark Sparrow
_____ Savannah Sparrow
_____ Fox Sparrow
2||| Song Sparrow
_____ Lincoln's Sparrow
_____ White-crowned Sparrow
_____ Red-winged Blackbird
_____ Western Meadowlark
_____ Brewer's Blackbird
4|2||| Brown-headed Cowbird
| Hooded Oriole
3211| Northern Oriole
122 House Finch
_____ Pine Siskin
|||| 2 Lesser Goldfinch
_____ Lawrence's Goldfinch
_____ American Goldfinch
_____ House Sparrow

Additional Species

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BIRDS OF Santa Clara River System

Locality Lower San Francisquito Creek Date 6/10/97

Time _____

_____ Great Blue Heron
_____ Green Heron
_____ Mallard
_____ Cinnamon Teal
_____ Turkey Vulture
_____ White-tailed Kite
_____ Sharp-shinned Hawk
_____ Cooper's Hawk
_____ Red-shouldered Hawk
_____ Red-tailed Hawk
_____ Golden Eagle
_____ American Kestrel
4, 15, 2 2 2 2 2 2 California Quail
_____ American Coot
_____ Killdeer
_____ Spotted Sandpiper
_____ Least Sandpiper
_____ Common Snipe
10 Rock Dove
11 2 2 3 2 2 Mourning Dove
_____ **Yellow-billed Cuckoo**
_____ Greater Roadrunner
_____ Barn Owl
_____ Great Horned Owl
_____ White-throated Swift
_____ Black-ch. Hummingbird
_____ Anna's Hummingbird
_____ Costa's Hummingbird
_____ Belted Kingfisher
_____ Acorn Woodpecker
1 2 Nuttall's Woodpecker
_____ Downy Woodpecker
_____ Hairy Woodpecker
_____ Northern Flicker
_____ Western Wood-Pewee
_____ Willow Flycatcher
_____ Hammond's Flycatcher
_____ Pacific Slope Flycatcher
_____ Black Phoebe
_____ Say's Phoebe
_____ Ash-throated Flycatcher
_____ **Brown-crested Flycatcher**
_____ Cassin's Kingbird
2 1 2 Western Kingbird
_____ Horned Lark
_____ Tree Swallow
_____ Violet-green Swallow
4 2 N. Rough-winged Swallow
_____ Bank Swallow
1 1 3 3 Cliff Swallow
_____ Barn Swallow
_____ Scrub Jay
_____ American Crow
6 1 4 1 1 Common Raven
_____ Plain Titmouse
1 2 2 Bushtit
_____ Rock Wren
_____ Bewick's Wren

_____ Ruby-crowned Kinglet
_____ Blue-gray Gnatcatcher
_____ Western Bluebird
_____ Swainson's Thrush
_____ Hermit Thrush
_____ American Robin
_____ Wrentit
_____ Northern Mockingbird
_____ California Thrasher
_____ American Pipit
_____ Cedar Waxwing
_____ Phainopepla
_____ Loggerhead Shrike
4 2 European Starling
_____ **Bell's Vireo**
_____ Solitary Vireo
_____ Warbling Vireo
_____ Orange-crowned Warbler
_____ Yellow Warbler
_____ Yellow-rumped Warbler
_____ Black-th. Gray Warbler
_____ Townsend's Warbler
_____ MacGillivray's Warbler
_____ Common Yellowthroat
_____ Wilson's Warbler
_____ Yellow-breasted Chat
_____ **Summer Tananger**
_____ Western Tanager
_____ Black-headed Grosbeak
1 2 Blue Grosbeak
_____ Lazuli Bunting
_____ Rufous-sided Towhee
1 2 California Towhee
_____ Lark Sparrow
_____ Savannah Sparrow
_____ Fox Sparrow
_____ Song Sparrow
_____ Lincoln's Sparrow
_____ White-crowned Sparrow
_____ Red-winged Blackbird
_____ Western Meadowlark
_____ Brewer's Blackbird
_____ Brown-headed Cowbird
_____ Hooded Oriole
_____ Northern Oriole
4 6 8 4 House Finch
_____ Pine Siskin
_____ Lesser Goldfinch
_____ Lawrence's Goldfinch
_____ American Goldfinch
_____ House Sparrow

Additional Species

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BIRDS OF Santa Clara River System

Locality San Fernando Cr. Date 6-10-97

Time _____ Dry !!

_____ Great Blue Heron
_____ Green Heron
_____ Mallard
_____ Cinnamon Teal
_____ Turkey Vulture
_____ White-tailed Kite
_____ Sharp-shinned Hawk
_____ Cooper's Hawk
_____ Red-shouldered Hawk
1 Red-tailed Hawk
_____ Golden Eagle
_____ American Kestrel
20 California Quail incl. 8 chicks
_____ American Coot
2 Killdeer
_____ Spotted Sandpiper
_____ Least Sandpiper
_____ Common Snipe
58 Rock Dove
13 Mourning Dove
_____ **Yellow-billed Cuckoo**
1 Greater Roadrunner
_____ Barn Owl
_____ Great Horned Owl
_____ White-throated Swift
_____ Black-ch. Hummingbird
7 Anna's Hummingbird
_____ Costa's Hummingbird
_____ Belted Kingfisher
_____ Acorn Woodpecker
12 Nuttall's Woodpecker
_____ Downy Woodpecker
_____ Hairy Woodpecker
_____ Northern Flicker
_____ Western Wood-Pewee
_____ Willow Flycatcher
_____ Hammond's Flycatcher
_____ Pacific Slope Flycatcher
_____ Black Phoebe
_____ Say's Phoebe
5 Ash-throated Flycatcher
_____ **Brown-crested Flycatcher**
_____ Cassin's Kingbird
2 Western Kingbird
_____ Horned Lark
_____ Tree Swallow
_____ Violet-green Swallow
24 N. Rough-winged Swallow
_____ Bank Swallow
_____ Cliff Swallow
_____ Barn Swallow
22 Scrub Jay
5 American Crow
5 Common Raven
4 Plain Titmouse incl. 2 juv.
10 Bushtit
_____ Rock Wren
5 Bewick's Wren
_____ House Wren
_____ Ruby-crowned Kinglet
_____ Blue-gray Gnatcatcher
_____ Western Bluebird
_____ Swainson's Thrush
_____ Hermit Thrush
_____ American Robin
_____ Wrentit
2 Northern Mockingbird
4 California Thrasher
_____ American Pipit
_____ Cedar Waxwing
2 Phainopepla pair
_____ Loggerhead Shrike
2 European Starling
_____ **Bell's Vireo**
_____ Solitary Vireo
_____ Warbling Vireo
_____ Orange-crowned Warbler
_____ Yellow Warbler
_____ Yellow-rumped Warbler
_____ Black-th. Gray Warbler
_____ Townsend's Warbler
_____ MacGillivray's Warbler
_____ Common Yellowthroat
_____ Wilson's Warbler
_____ Yellow-breasted Chat
_____ **Summer Tananger**
_____ Western Tanager
1 Black-headed Grosbeak
_____ Blue Grosbeak
_____ Lazuli Bunting
5 Rufous-sided Towhee
11 California Towhee
_____ Lark Sparrow
_____ Savannah Sparrow
_____ Fox Sparrow
2 Song Sparrow
_____ Lincoln's Sparrow
_____ White-crowned Sparrow
_____ Red-winged Blackbird
_____ Western Meadowlark
_____ Brewer's Blackbird
_____ Brown-headed Cowbird
_____ Hooded Oriole
6 Northern Oriole
51 House Finch
_____ Pine Siskin
6 Lesser Goldfinch
_____ Lawrence's Goldfinch
_____ American Goldfinch
_____ House Sparrow

Additional Species

1 Red Valley

BIRDS OF Santa Clara River System

Locality 5 FUNK CANYON Date 5/15

Time

Upper River 1997 Count

730 - 830

_____ Great Blue Heron
_____ Green Heron
_____ Mallard
_____ Cinnamon Teal
_____ Turkey Vulture
_____ White-tailed Kite
_____ Sharp-shinned Hawk
_____ Cooper's Hawk
_____ Red-shouldered Hawk
_____ Red-tailed Hawk
_____ Golden Eagle
_____ American Kestrel
22 California Quail
_____ American Coot
_____ Killdeer
_____ Spotted Sandpiper
_____ Least Sandpiper
_____ Common Snipe
_____ Rock Dove
_____ Mourning Dove
_____ **Yellow-billed Cuckoo**
_____ Greater Roadrunner
_____ Barn Owl
_____ Great Horned Owl
_____ White-throated Swift
_____ Black-ch. Hummingbird
_____ Anna's Hummingbird
_____ Costa's Hummingbird
_____ Belted Kingfisher
_____ Acorn Woodpecker
_____ Nuttall's Woodpecker
_____ Downy Woodpecker
_____ Hairy Woodpecker
_____ Northern Flicker
_____ Western Wood-Pewee
_____ Willow Flycatcher
_____ Hammond's Flycatcher
_____ Pacific Slope Flycatcher
_____ Black Phoebe
_____ Say's Phoebe
_____ Ash-throated Flycatcher
_____ **Brown-crested Flycatcher**
_____ Cassin's Kingbird
_____ Western Kingbird
_____ Horned Lark
_____ Tree Swallow
_____ Violet-green Swallow
15 N. Rough-winged Swallow 126 St Bridge.
_____ Bank Swallow
_____ Cliff Swallow
_____ Barn Swallow
12 Scrub Jay
_____ American Crow
_____ Common Raven
_____ Plain Titmouse
_____ Bushtit
_____ Rock Wren
_____ Bewick's Wren
_____ House Wren
_____ Ruby-crowned Kinglet
_____ Blue-gray Gnatcatcher
2 Western Bluebird
_____ Swainson's Thrush
_____ Hermit Thrush
_____ American Robin
_____ Wrentit
_____ Northern Mockingbird
_____ California Thrasher
_____ American Pipit
_____ Cedar Waxwing
_____ Phainopepla
_____ Loggerhead Shrike
_____ European Starling
_____ **Bell's Vireo**
_____ Solitary Vireo
_____ Warbling Vireo
_____ Orange-crowned Warbler
_____ Yellow Warbler
_____ Yellow-rumped Warbler
_____ Black-th. Gray Warbler
_____ Townsend's Warbler
_____ MacGillivray's Warbler
_____ Common Yellowthroat
_____ Wilson's Warbler
_____ Yellow-breasted Chat
_____ **Summer Tananger**
_____ Western Tanager
_____ Black-headed Grosbeak
_____ Blue Grosbeak
_____ Lazuli Bunting
_____ Rufous-sided Towhee
22 California Towhee
_____ Lark Sparrow
_____ Savannah Sparrow
_____ Fox Sparrow
_____ Song Sparrow
_____ Lincoln's Sparrow
_____ White-crowned Sparrow
6 Red-winged Blackbird
_____ Western Meadowlark
_____ Brewer's Blackbird
_____ Brown-headed Cowbird
_____ Hooded Oriole
_____ Northern Oriole
4 22 House Finch
_____ Pine Siskin
_____ Lesser Goldfinch
_____ Lawrence's Goldfinch
_____ American Goldfinch
_____ House Sparrow

Additional Species

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BIRDS OF Santa Clara River System

Locality S Fork Lures Date 6-9

Time

- Great Blue Heron
- Green Heron
- Mallard
- Cinnamon Teal
- Turkey Vulture
- White-tailed Kite
- Sharp-shinned Hawk
- Cooper's Hawk
- Red-shouldered Hawk
- Red-tailed Hawk
- Golden Eagle
- American Kestrel
- (4) 2 2 California Quail
- American Coot
- Killdeer
- Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- Rock Dove
- (1) Mourning Dove
- **Yellow-billed Cuckoo**
- Greater Roadrunner
- Barn Owl
- Great Horned Owl
- White-throated Swift
- Black-ch. Hummingbird
- (1) Anna's Hummingbird
- Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- (1) Nuttall's Woodpecker
- Downy Woodpecker
- Hairy Woodpecker
- Northern Flicker
- Western Wood-Pewee
- Willow Flycatcher
- Hammond's Flycatcher
- Pacific Slope Flycatcher
- (1) Black Phoebe
- Say's Phoebe
- (2) 1 1 Ash-throated Flycatcher
- **Brown-crested Flycatcher**
- Cassin's Kingbird
- (1) Western Kingbird
- Horned Lark
- Tree Swallow
- (4) Violet-green Swallow
- 2 N. Rough-winged Swallow ON
- Bank Swallow
- (20) Cliff Swallow ON
- Barn Swallow
- 2(2) (2) 1 1 Scrub Jay
- (2) American Crow
- (2) Common Raven ON MCB Bukst
- Plain Titmouse
- Bushtit
- Rock Wren
- (3) 1 1 1 Bewick's Wren

730

- Ruby-crowned Kinglet
- Blue-gray Gnatcatcher
- Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- American Robin
- Wrentit
- (2) 1 1 Northern Mockingbird
- (2) 1 1 California Thrasher
- American Pipit
- Cedar Waxwing
- 4 Phainopepla
- Loggerhead Shrike
- (1) European Starling
- **Bell's Vireo**
- Solitary Vireo
- Warbling Vireo
- Orange-crowned Warbler
- Yellow Warbler
- Yellow-rumped Warbler
- Black-th. Gray Warbler
- Townsend's Warbler
- MacGillivray's Warbler
- Common Yellowthroat
- Wilson's Warbler
- Yellow-breasted Chat
- **Summer Tananger**
- Western Tanager
- Black-headed Grosbeak
- Blue Grosbeak
- Lazuli Bunting
- Rufous-sided Towhee
- California Towhee
- (1) Lark Sparrow
- Savannah Sparrow
- Fox Sparrow
- (1) Song Sparrow
- Lincoln's Sparrow
- White-crowned Sparrow
- (FE) (3) Red-winged Blackbird
- Western Meadowlark
- Brewer's Blackbird
- Brown-headed Cowbird
- Hooded Oriole
- Northern Oriole
- (9) 4 3 2 House Finch
- Pine Siskin
- (6) 4 2 Lesser Goldfinch
- Lawrence's Goldfinch
- American Goldfinch
- House Sparrow

Additional Species

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BIRDS OF Santa Clara River System

Locality SEGMENT UPPER Date 5-15

Time

Upper River Area 8

1997

630 –

_____ Great Blue Heron
_____ Green Heron
2 Mallard
_____ Cinnamon Teal
_____ Turkey Vulture
_____ White-tailed Kite
_____ Sharp-shinned Hawk
_____ Cooper's Hawk
_____ Red-shouldered Hawk
| Red-tailed Hawk
_____ Golden Eagle
_____ American Kestrel
2 2 2 California Quail
_____ American Coot
|||| Killdeer
_____ Spotted Sandpiper
_____ Least Sandpiper
_____ Common Snipe
_____ Rock Dove
43 11 2 2 Mourning Dove
_____ **Yellow-billed Cuckoo**
_____ Greater Roadrunner
_____ Barn Owl
_____ Great Horned Owl
_____ White-throated Swift
_____ Black-ch. Hummingbird
_____ Anna's Hummingbird
_____ Costa's Hummingbird
_____ Belted Kingfisher
_____ Acorn Woodpecker
_____ Nuttall's Woodpecker
_____ Downy Woodpecker
_____ Hairy Woodpecker
| Northern Flicker
_____ Western Wood-Pewee
_____ Willow Flycatcher
_____ Hammond's Flycatcher
_____ Pacific Slope Flycatcher
|| Black Phoebe
_____ Say's Phoebe
_____ Ash-throated Flycatcher
_____ **Brown-crested Flycatcher**
_____ Cassin's Kingbird
_____ Western Kingbird
_____ Horned Lark
_____ Tree Swallow
_____ Violet-green Swallow
_____ N. Rough-winged Swallow
_____ Bank Swallow
_____ Cliff Swallow
_____ Barn Swallow
||| Scrub Jay
_____ American Crow
| Common Raven
_____ Plain Titmouse
(12) 6 (10) Bushtit
_____ Rock Wren
|||| Bewick's Wren
_____ House Wren
_____ Ruby-crowned Kinglet
_____ Blue-gray Gnatcatcher
_____ Western Bluebird
_____ Swainson's Thrush
_____ Hermit Thrush
_____ American Robin
_____ Wrentit
| Northern Mockingbird
| California Thrasher
_____ American Pipit
8 Cedar Waxwing
_____ Phainopepla
_____ Loggerhead Shrike
|| European Starling
_____ **Bell's Vireo**
_____ Solitary Vireo
_____ Warbling Vireo
_____ Orange-crowned Warbler
| Yellow Warbler
_____ Yellow-rumped Warbler
_____ Black-th. Gray Warbler
_____ Townsend's Warbler
_____ MacGillivray's Warbler
_____ Common Yellowthrat
_____ Wilson's Warbler
_____ Yellow-breasted Chat
_____ **Summer Tananger**
_____ Western Tanager
_____ Black-headed Grosbeak
| Blue Grosbeak
_____ Lazuli Bunting
_____ Rufous-sided Towhee
11 2 2 2 || California Towhee
_____ Lark Sparrow
_____ Savannah Sparrow
_____ Fox Sparrow
HH HH Song Sparrow
_____ Lincoln's Sparrow
_____ White-crowned Sparrow
_____ Red-winged Blackbird
_____ Western Meadowlark
_____ Brewer's Blackbird
| Brown-headed Cowbird
_____ Hooded Oriole
2 ||| Northern Oriole
4 1 2 2 2 2 House Finch
_____ Pine Siskin
2 Lesser Goldfinch
_____ Lawrence's Goldfinch
_____ American Goldfinch
_____ House Sparrow

Additional Species

_____
_____
_____
_____
_____
_____

BIRDS OF Santa Clara River System

Locality S Fork Upper Date 6-8

Time

630

- Great Blue Heron
- Green Heron
- Mallard
- Cinnamon Teal
- Turkey Vulture
- White-tailed Kite
- Sharp-shinned Hawk
- Cooper's Hawk
- Red-shouldered Hawk
- (1) Red-tailed Hawk
- Golden Eagle
- American Kestrel
- 1 (6), 2 (6) 2 California Quail
- American Coot
- (4) 2 || Killdeer
- Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- Rock Dove
- (6) 2 2 || Mourning Dove
- **Yellow-billed Cuckoo**
- Greater Roadrunner
- Barn Owl
- Great Horned Owl
- White-throated Swift
- Black-ch. Hummingbird
- (4) |||| Anna's Hummingbird
- Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- (1) Nuttall's Woodpecker
- Downy Woodpecker
- Hairy Woodpecker
- Northern Flicker
- Western Wood-Pewee
- Willow Flycatcher
- Hammond's Flycatcher
- Pacific Slope Flycatcher
- Black Phoebe
- Say's Phoebe
- Ash-throated Flycatcher
- **Brown-crested Flycatcher**
- Cassin's Kingbird
- Western Kingbird
- Horned Lark
- Tree Swallow
- Violet-green Swallow
- (2N) Rough-winged Swallow
- Bank Swallow
- Cliff Swallow
- Barn Swallow
- (3) 1 2 Scrub Jay
- 1 American Crow
- (5) 2 1 2 Common Raven
- Plain Titmouse
- (5) Bushtit
- Rock Wren
- (5) |||| Bewick's Wren

N

- Ruby-crowned Kinglet
- Blue-gray Gnatcatcher
- Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- American Robin
- Wrentit
- (2) || Northern Mockingbird
- (2) || California Thrasher
- American Pipit
- Cedar Waxwing
- Phainopepla
- Loggerhead Shrike
- European Starling
- **Bell's Vireo**
- Solitary Vireo
- Warbling Vireo
- Orange-crowned Warbler
- Yellow Warbler
- Yellow-rumped Warbler
- Black-th. Gray Warbler
- Townsend's Warbler
- MacGillivray's Warbler
- (1) 1 Common Yellowthroat
- Wilson's Warbler
- Yellow-breasted Chat
- **Summer Tananger**
- Western Tanager
- Black-headed Grosbeak
- Blue Grosbeak
- Lazuli Bunting
- (1) 1 Rufous-sided Towhee
- (4 (1)) 2 (1) 3 California Towhee
- Lark Sparrow
- Savannah Sparrow
- Fox Sparrow
- (4) ||| Song Sparrow 57
- Lincoln's Sparrow
- White-crowned Sparrow
- Red-winged Blackbird
- Western Meadowlark
- Brewer's Blackbird
- (2) || Brown-headed Cowbird
- Hooded Oriole
- (3) 1 2 Northern Oriole
- (17) 4 6 3 4 House Finch
- Pine Siskin
- (1) 1 Lesser Goldfinch
- Lawrence's Goldfinch
- American Goldfinch
- House Sparrow

Additional Species

_____

_____

_____

_____

_____

_____

Guthrie, Daniel. *Bird Surveys Along a Portion of the Santa Clara River and Its Tributaries Near Valencia, California.* July 1996.

BIRD SURVEYS ALONG THE SANTA CLARA RIVER AND ITS TRIBUTARIES NEAR VALENCIA, CALIFORNIA, 1996

Prepared for:

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July 10, 1996

Bird Surveys along the Santa Clara River and its Tributaries near Valencia, California, 1996

Prepared by: Daniel A. Guthrie
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Nature and Scope of Surveys

During the spring and early summer of 1996 surveys were conducted along a section of the Santa Clara River and its tributaries in the vicinity of Valencia, California to determine presence or absence of Least Bell's Vireo and other Species of Concern. Numbers of all species observed were noted, and special attention was placed on locating species considered rare and endangered.

Each survey was conducted on foot by observers well acquainted with both visual and auditory patterns of southern California birds. All surveys occurred between 6 and 10 a.m. If no vireos were found during the first two surveys, calls of Least Bell's Vireo were played during subsequent censuses to elicit response from territorial males. Survey routes were designed to cover all areas of each section of the river, with emphasis placed on wetter habitats where Least Bell's Vireos and other sensitive riparian species are most likely to occur. Personnel for all surveys were Daniel A. Guthrie, Richard F. Clements, and Judith A. Sugden.

To facilitate surveys, the area was divided into eight sections (Figure 1). Delineation of the eight areas and comments on each follow. Surveys of the normally dry sections of the river system (Areas 7 - 8) where Least Bell's Vireos have not been observed in the past were conducted twice during the nesting season. The second survey was delayed until June to insure that late arriving species such as Yellow-billed Cuckoo and Willow Flycatcher would not be missed. Surveys of the remaining sections of the Santa Clara River (Areas 1 -6) were conducted according to the protocol outlined by the Fish and Wildlife Service (Appendix 1), except that surveys were limited to 6 in number.

Habitat Condition and Bird Observations.

Rainfall during 1996 was good during winter months, but there was little rainfall during the spring, resulting in fairly dry conditions away from the river and little runoff. The result was generally dry conditions in intermittent sections of streams, such as Castaic Creek and San Francisquito Creek. However, lack of spring flooding resulted in luxuriant growth along the main section of the Santa Clara river.

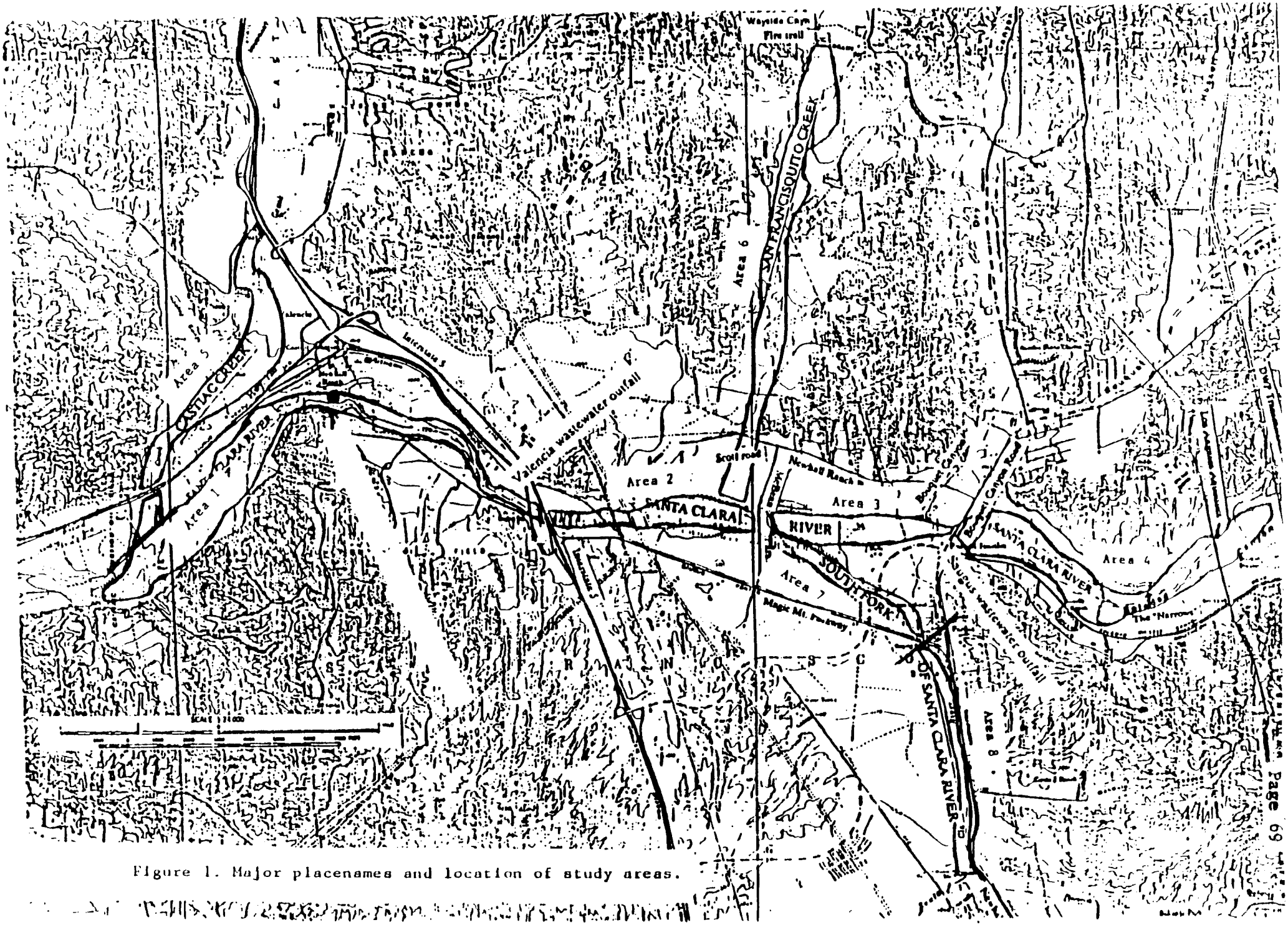


Figure 1. Major placenames and location of study areas.

Tables 1 through 8 present bird observations in each of the specific study areas for 1995. Different species breed at different times of the year. In general, species are most easily observed when they are actively defending territories by song during the establishment of breeding pairs. Once pairs are established and nesting begins song often decreases and the numbers of birds observed, therefore, also decreases. After young leave the nest, numbers observed increase. Thus, for most resident species, numbers of adult birds are most accurately censused in April and May, when territorial activity is at a maximum. A few species such as Anna's Hummingbird that nest early in the season may be underestimated. Numbers observed may decrease slightly in June and early July when birds are less active during nesting, and increase in late June and July when young birds leave the nest.

Several species that are not considered riparian species but are common in adjacent coastal sage and chaparral habitats come into the riparian zone in late summer when other vegetational areas are dry. The increase in numbers of Lazuli Bunting, Lark Sparrow, House Finch, Phainopepla and Mourning Dove in late June follow this trend.

Following are specific comments on the habitat and bird observations in each area.

Area 1. Santa Clara River; Old Highway to the mouth of Castaic Creek and Castaic Creek from this confluence to State Route 126.

Length of section, 3.5 miles. The Santa Clara River flows continuously in this section and is augmented by the Valencia waste water outfall near the upstream end of this section. Near Castaic Junction, a low area on the south side of the river is kept wet by runoff from Magic Mountain. The result is a thick forest of willows in which two singing Least Bell's Vireos were found (Fig. 2; see additional comments in section on Least Bell's Vireo).

Area 2. Santa Clara River; Old Highway to McBean Parkway.

Length of section, 1.4 miles. The Santa Clara River flows continuously in this section. The channel is braided and wet riparian vegetation is well developed along this section of the river. As in previous years, this area was heavily impacted by off road vehicles during the study period. However, vehicles remained for the most part in the unvegetated section of the river channel.

Area 3. Santa Clara River; McBean Parkway to Boquet Canyon Road.

Length of section, 1.2 miles. Water, supplied by the Saugus wastewater outfall at the Boquet Canyon Bridge, is continuous in this section of the Santa Clara River. Riparian vegetation was considerably improved over past years.

Area 4. Santa Clara River; Boquet Canyon Road upstream to DWP transmission lines.

Length of section, 2.3 miles. This section of the Santa Clara River in past years has been wet only briefly during spring rains. and due to water release from the DWP aqueduct 2.0 miles upstream from Boquet Canyon Road. This year water flowed only in a section below the pipeline, disappearing into the sand after about 1/2 mile. The result was fewer riparian species compared with 1995 when water was more abundant.

Area 5. Castaic Creek; Route 125 to Old Road next to Interstate 5.

Length of section, 1.8 miles. Because of low spring rains there was no release of water from upstream dams during the study period and, except for a short section receiving water from street runoff at the north end of the section, and a pond at the east side of the creek, this section was dry during the study period. The result was many fewer riparian species compared to last year when water flowed continuously throughout the study. Two singing Least Bell's Vireos were observed along this section in an area where they have been found in previous years (Fig. 2; see additional comments on section on Least Bell's Vireo).

Area 6. San Francisquito Creek; Santa Clara River upstream 2.5 miles.

Length of section, 2.5 miles. This section was dry throughout the study period, except for a short section near a well at the middle of the section where water flowed during April and May. There were many fewer riparian species compared to last year when this section contained flowing water.

Area 7. South Fork of the Santa Clara River; McBean Parkway to Magic Mountain Parkway (Route 126).

Length of section, 1.0 miles. The channel along this section of the South Fork is narrow and very sandy. Almost all vegetation along the bottom of the channel was removed by spring floods. Some standing water was present near the McBean bridge.

Area 8. South Fork of the Santa Clara River, Route 126 upstream to Newhall Creek.

Length of section, 1.4 miles. This section of the river was dry except for damp areas formed by runoff from culverts along the west side of the creek. Cattails developed in these wet areas supported fewer Song Sparrows than in previous years and no Redwing Blackbirds, perhaps a sign of human disturbance near the wet areas.

Comments on Sensitive Species

Cooper's Hawk

Cooper's Hawk is considered a Species of Special Concern by the State of California. Coopers hawks were observed on all sections of the main river in 1996, There were probably three pair present, one more than were found in 1995. This species is a resident that nests and hunts in riparian woodland habitat.

White-tailed Kite

This species, formerly the Black-shouldered Kite, is considered "Special" by the State of California. The pair of kites that nested in the dry woodland on the north side of the Santa Clara River near the confluence with Castaic Creek in 1995 was not found in 1996, perhaps disturbed by road construction. A single kite was observed along San Francisquito Creek and may have nested upstream from the study section.

Willow Flycatcher

This species is considered a Category 1 Candidate for listing under the Federal Endangered Species Act. Willow Flycatchers were once widespread in wet riparian woodland in southern California but now only a few individuals exist. The main California breeding populations of this species are along the Kern River and in northern California. Individuals of this species have been observed in previous years during late May and early June. A single bird was observed on May 17 but could not be relocated on subsequent visits. This was probably a migrant passing through the area.

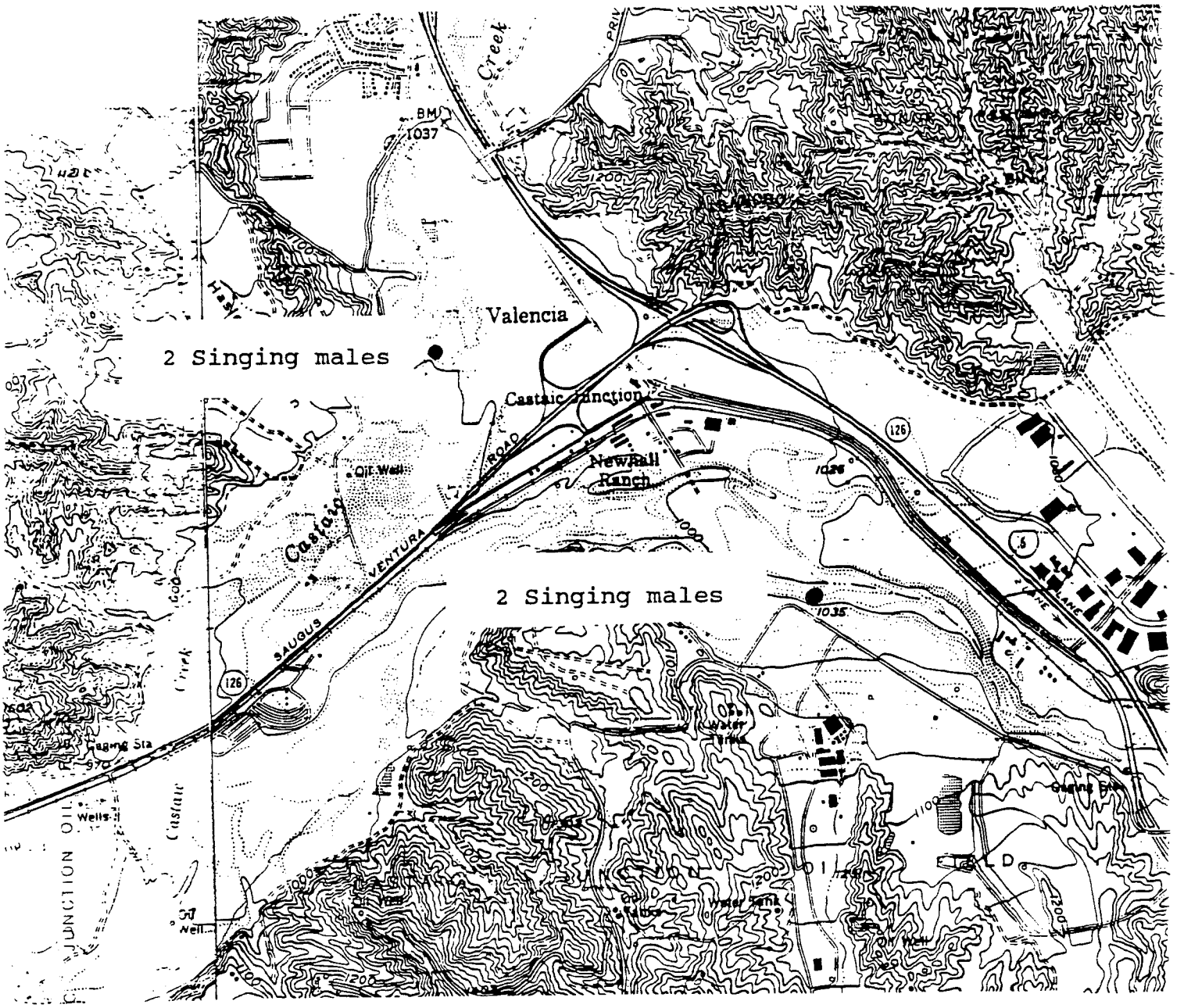
California Horned Lark

This species is a candidate for listing under the Federal Endangered Species Act. Horned Larks nest on dry hillsides above Castaic Creek and were observed in late summer on plowed fields adjacent to the Castaic Creek and near the main river at Castaic Junction.

Least Bell's Vireo

Two singing Least Bell's Vireos were observed along Castaic Creek, as indicated in Figure 2. As only males, sing, this was considered evidence of two territorial males. In order to avoid disturbance of possibly nesting birds, no search for nests or mates was conducted. However, on July 12 one of these birds was

Figure 2. Location of Least Bell's Vireo Sightings in 1995



accompanied by a juvenile, suggesting successful nesting. The area where they were found was mostly cleared of vegetation by floods in 1993 but, due to recent wet years and lack of flooding, is now covered with dense early succession riparian growth. This dense low vegetation is the type in which Least Bell's Vireos usually nest.

Least Bell's Vireos were discovered for the first time on the south side of the Santa Clara River near Magic Mountain (Fig. 2). This area is a low lying section separated from the main river channel by sand bars. It receives runoff water from Magic Mountain. Due to flood damage, there were no birds or habitat present in this area in 1993 and 1994 and birds were probably not present here in 1995, although the area was not searched thoroughly that year. Although birds were heard in four different places on May 13th, males often follow an intruder, singing from different locations. On subsequent visits, only two singing birds could be found, suggesting that only two territories were in this area. Again, in order to avoid disturbance of possibly nesting birds, no search for nests or mates was conducted. However, based on the observation of a juvenile bird on June 25th, at least one of these birds mated and nested.

Yellow Warbler

The Yellow Warbler is considered a Species of Special Concern by the State of California. Yellow Warblers prefer wet riparian habitat but are also found in large cottonwoods in drier riparian areas. Singing yellow warblers were observed along nearly every section of the Santa Clara River and Castaic Creek. The drop in numbers observed between May and June indicate that most of the earlier birds observed were migrants passing through the area. Numbers of Yellow Warblers were reduced from 1995, especially along Castaic and San Francisquito Creeks due to drier conditions.

Yellow-breasted Chat

The yellow-breasted chat is considered a Species of Special Concern by the State of California. Chats were observed sparingly along the wet sections of the Santa Clara River. Numbers were about the same as 1995.

Tricolored Blackbird

The tricolored blackbird is a Category 2 Candidate for listing under the Federal Endangered Species Act. A colony of about 200 breeding pairs of this species occupied a small marsh area along the side of the Santa Clara River at Castaic Junction and another smaller group of about 20 pair nested in a pond beside Castaic Creek in 1994. In years prior to 1994 this species was not

observed. During 1995 and again this year a small number of tricolored blackbirds appeared in April and May and inspected the Castaic Creek site. However, the birds apparently found the site unsuitable and did not attempt to breed.

Table 1. Bird Observations along the Santa Clara River System, 1996: Santa Clara River from Old Highway along I-5 to the mouth of Castaic Creek and Castaic Creek from this confluence to State Route 126.

Species	date: 4/28	5/13	5/21	6/12	6/25	7/9	status
Great Egret	1	-	-	-	-	-	W,M
Snowy Egret	8	-	-	-	-	-	W,M
Green Heron	1	1	5	1	-	4	R*
Mallard	6	3	7	-	-	-	R*
Turkey Vulture	-	-	-	-	1	-	S
Cooper's Hawk	-	-	1	-	1	-	R*
Red-shouldered Hawk	3	-	1	4	5	3	R*
Red-tailed Hawk	2	2	-	-	3	2	R*
American Kestrel	-	-	1	-	-	1	R*
California Quail	15	4	22	2	17	24	R*
Killdeer	7	12	20	6	4	-	R*
Spotted Sandpiper	2	8	5	-	7	3	S*
Least Sandpiper	4	-	-	-	-	-	M
Domestic Pigeon	17	34	1	-	-	1	R*
Mourning Dove	19	-	14	-	17	14	R*
Vaux's Swift	4	-	-	-	-	-	M
White-th. Swift	-	-	11	-	3	3	R*
Black-ch. Hummingbird	2	1	1	1	1	4	S
Anna's Hummingbird	12	7	10	10	6	27	R*
Nuttall's Woodpecker	5	5	7	8	12	9	R*
Downy Woodpecker	-	1	6	4	7	10	R*
Hairy Woodpecker	-	2	3	1	3	2	R*
Northern Flicker	1	-	2	-	3	2	R*
Pac.-slope Flycatcher	1	-	-	-	-	-	M
Black Phoebe	-	3	3	3	11	9	R*
Ash-thr. Flycatcher	14	13	9	3	14	17	S*
Western Kingbird	-	-	3	-	-	3	S*
Tree Swallow	1	-	2	-	5	-	S*
Violet-green Swallow	-	-	-	-	3	3	S*
N. Rough-w. Swallow	11	22	21	20	83	11	S*
Barn Swallow	-	-	-	4	-	-	S
Cliff Swallow	130	120	150	40	118	34	S*
Scrub Jay	20	8	11	11	14	20	R*
American Crow	14	19	10	11	21	36	R*
Common Raven	6	-	4	1	22	15	R*
Plain Titmouse	10	17	9	7	7	2	R*
Bushtit	11	8	8	14	4	12	R*
Canyon Wren	-	-	-	-	-	1	R?
Bewick's Wren	39	26	34	23	37	57	R*
House Wren	6	50	13	11	14	1	R*
Western Bluebird	-	1	4	-	3(2)	-	R*
Swainson's Thrush	-	-	1	-	-	-	M
American Robin	2	-	-	-	-	1	R*
Wrentit	-	-	1	-	-	3	R*
Calif. Thrasher	2	1	3	-	3	5	R*

Table 1 (cont.). Bird Observations along the Santa Clara River System, 1996: Santa Clara River from Old Highway along I-5 to the mouth of Castaic Creek and Castaic Creek from this confluence to State Route 126.

Species	date: 4/28	5/13	5/21	6/12	6/25	7/9	status
Phainopepla	-	2	-	-	31	41	R*
European Starling	15	15	12	4	2	6	R*
Bell's Vireo	**-**	**4**	**-**	**-**	**3**	**1**	**S***
Orange-cr. Warbler	1	-	-	-	-	-	M
Yellow Warbler	8	11	13	9	5	1	S*
Common Yellowthroat	15	33	49	44	33	67	R*
Wilson's Warbler	2	2	7	-	-	-	M
Yellow-br. Chat	1	-	4	5	5	9	S*
Western Tanager	1	-	8	-	-	-	M
Black-headed Grosbeak	5	6	15	18	15	5	S*
Blue Grosbeak	3	-	3	2	13	13	S*
Lazuli Bunting	-	-	1	9	35	31	S*
Spotted Towhee	11	14	19	8	24	5	R*
California Towhee	13	26	30	10	11	9	R*
Lark Sparrow	-	-	-	-	-	29	R
Song Sparrow	68	105	104	54	87	77	R*
White-cr. Sparrow	1	-	-	-	-	-	W
Red-winged Blackbird	12	49	24	23	5	23	S*
Tricolored Redwing	6	-	-	-	-	-	M
Brewer's Blackbird	-	-	1	-	-	-	R*
Brown-headed Cowbird	19	26	17	6	1	46	S*
Bullock's Oriole	1	1	2	1	1	2	S*
House Finch	15	4	6	35	74	68	R*
Lesser Goldfinch	7	2	5	10	7	24	R*
American Goldfinch	8	-	2	-	1(1)	-	W,M
House Sparrow	-	-	-	2	-	-	R*
Total Species:	51	39	53	37	48	50	
Total Individuals:	723	668	725	425	805	796	

Total Species on all visits: 71
Total Probable Breeding species: 54 (marked with *)

Status: M - Migrant; R - Resident; S - Summer Only; W - Winter Only

() = dependent young birds

Censuses of 4/28, 5/21, 7/9 on the north side of river,
Censuses of 5/13, 6/12, 6/25 on south side of river.

Table 2. Bird Observations along the Santa Clara River System, 1996: Santa Clara River from McBean Parkway to Old Highway along I-5.

Species	date: 4/28	5/10	5/21	6/12	6/25	7/9	status
Great Blue Heron	-	-	-	-	-	1	
American Bittern	1	-	-	-	-	-	M
Snowy Egret	1	-	-	-	-	-	W,M
Green Heron	1	2	-	-	-	-	R*
Bl. cr. Night Heron	-	-	1	-	-	-	M
Mallard	4	4	1	2	1	1	R*
Cooper's Hawk	2	-	-	1	1	-	R*
Red-shouldered Hawk	1	1	2	2	3	4	R*
Red-tailed Hawk	2	2	3	1	1	-	R*
California Quail	17	6	6	4	-	4	R*
Killdeer	4	8	5	2	-	-	R*
Spotted Sandpiper	1	2	-	-	-	-	S*
Mourning Dove	4	2	-	-	1	1	R*
Barn Owl	-	-	-	-	1	-	R*
Vaux's Swift	10	-	-	-	-	-	M
Bl.-ch. Hummingbird	2	-	-	-	-	-	S
Anna's Hummingbird	-	2	3	1	1	2	R*
Nuttall's Woodpecker	2	7	1	11	4	6	R*
Downy Woodpecker	-	1	1	1	3	3	R*
Hairy Woodpecker	1	-	-	1	1	-	R*
Northern Flicker	1	-	-	2	-	-	R*
Pac.-slope Flycatcher	-	-	1	-	-	-	M
Black Phoebe	2	2	2	6	8	9	R*
Ash-thr. Flycatcher	3	4	3	8	4	5	S*
Western Kingbird	1	-	-	-	-	1	S*
N. Rough-w. Swallow	22	34	10	31	54	3	S*
Cliff Swallow	-	-	6	-	28	17	S*
Scrub Jay	4	4	6	-	1	3	R*
American Crow	9	24	6	11	10	3	R*
Common Raven	-	4	-	2	2	-	R*
Plain Titmouse	3	2	2	4	6	8	R*
Bushtit	5	2	11	9	3	11	R*
White-br. Nuthatch	-	-	1	3	1	-	R*
Bewick's Wren	23	6	21	15	11	12	R*
House Wren	8	3	7	3	5	-	R*
Western Bluebird	2	2	-	5	-	-	R*
Wrentit	-	-	1	1	-	1	R*
Calif. Thrasher	1	2	1	2	-	-	R*
Cedar Waxwing	20	-	15	-	-	-	W
Phainopepla	-	-	-	-	2	1	R*
European Starling	15	9	8	13	1	9	R*
Warbling Vireo	3	-	-	-	-	-	M
Orange-cr. Warbler	4	-	1	-	-	-	M
Yellow Warbler	7	5	3	1	4	-	S*

Table 2 (cont.). Bird Observations along the Santa Clara River System, 1996: Santa Clara River from McBean Parkway to Old Highway along I-5.

Species	date: 4/28	5/10	5/21	6/12	6/25	7/9	status
Yellow- r. Warbler	2	-	-	-	-	-	W,M
Bl.-th. Gray Warbler	1	-	-	-	-	-	M
Common Yellowthroat	-	-	6	16	5	3	R*
Wilson's Warbler	1	2	-	-	-	-	M
Yellow-br. Chat	1	1	1	-	-	-	S*
Western Tanager	1	2	-	-	-	-	M
Black-headed Grosbeak	4	4	3	7	2	8	S*
Blue Grosbeak	-	1	-	-	2	3	S*
Lazuli Bunting	-	-	-	-	-	8	S*
Spotted Towhee	9	2	7	5	9	8	R*
California Towhee	3	2	2	6	6	3	R*
Lark Sparrow	-	-	-	-	-	11	R
Song Sparrow	35	24	37	36	11	22	R*
White-cr. Sparrow	1	-	-	-	-	-	W
Red-winged Blackbird	8	25	3	-	-	-	S*
Brown-headed Cowbird	7	21	10	5	1	12	S*
Bullock's Oriole	1	2	-	-	-	-	S*
House Finch	4	4	11	5	11	39	R*
Lesser Goldfinch	-	-	6	9	6	5	R*
Lawrence's Goldfinch	-	-	2	-	-	-	R*
American Goldfinch	-	-	-	2	-	-	W,M
Total Species:	47	37	38	35	34	32	
Total Individuals:	264	230	216	235	210	225	

Total Species on all visits: 65
Total Probable Breeding species: 48 (marked with *)

Status: M - Migrant; R - Resident; S - Summer Only; W - Winter Only

() = dependent young birds

Censuses of 4/28, 5/21, 6/25 on the north side of river,
Censuses of 5/10, 6/12, 7/9 on south side of river.

Table 3. Bird Observations along the Santa Clara River System, 1996: Santa Clara River from Boquet Canyon Rd. to McBean Parkway.

Species	date: 4/20	5/6	5/17	6/10	6/24	7/8	status
Snowy Egret	-	-	-	1	-	-	M
Green Heron	-	-	-	-	-	2	R*
Mallard	1	2	2	-	3	-	R*
Cooper's Hawk	1	-	-	-	-	1	R*
Red-tailed Hawk	1	3	2	1	1	2	R*
California Quail	7	15	7	-	6	6	R*
Killdeer	2	5	7	8	4	4	R*
Spotted Dove	1	-	-	-	-	-	R*
Mourning Dove	12	6	2	3	6	2	R*
Roadrunner	-	1	-	-	-	-	R*
Barn Owl	3	-	-	-	-	-	R*
Vaux's Swift	5	-	-	-	-	-	M
Bl.-ch. Hummingbird	2	-	-	-	-	-	S
Anna's Hummingbird	1	3	3	3	2	3	R*
Nuttall's Woodpecker	3	2	3	4	2	3	R*
Downy Woodpecker	3	-	-	2	1	1	R*
Hairy Woodpecker	1	1	-	-	-	-	R*
Northern Flicker	-	-	1	1	2	-	R*
Black Phoebe	4	5	5	5	3	6	R*
Ash-thr. Flycatcher	5	2	-	-	2	4	S*
Western Kingbird	17	4	3	-	-	4	S*
N. Rough-w. Swallow	-	13	9	11	35	6	S*
Barn Swallow	6	-	-	-	-	5	S
Cliff Swallow	22	-	2	-	4	21	S*
Scrub Jay	3	7	6	4	5	6	R*
American Crow	13	4	35	30	24	25	R*
Common Raven	5	30	15	30	8	45	R*
Plain Titmouse	-	-	-	1	-	-	R*
Bushtit	5	4	5	4	6	7	R*
Bewick's Wren	7	9	5	1	2	6	R*
Robin	-	-	-	-	2	-	R
Calif. Thrasher	2	2	4	1	1	2	R*
European Starling	-	4	-	-	-	-	R*
Orange-cr. Warbler	9	1	-	-	-	-	M
Yellow Warbler	2	4	2	-	1	-	S*
Yellow- r. Warbler	2	-	-	-	-	-	W,M
Bl.-th. Grey Warbler	-	2	-	-	-	-	M
Common Yellowthroat	2	1	5	3	5	3	R*
Wilson's Warbler	-	2	-	-	-	-	M
Yellow-br. Chat	-	1	-	-	-	-	S*
Western Tanager	2	-	-	-	-	-	M
Black-h. Grosbeak	10	8	4	1	-	1	S*
Blue Grosbeak	-	1	2	-	2	1	S*

Table 3. (cont.) Bird Observations along the Santa Clara River System, 1996: Santa Clara River from Boquet Canyon Rd. to McBean Parkway.

Species	date: 4/20	5/6	5/17	6/10	6/24	7/8	status
Lazuli Bunting	-	-	-	2	2	2	S*
Spotted Towhee	2	6	3	2	2	1	R*
California Towhee	1	4	3	2	3	3	R*
Song Sparrow	24	18	15	15	18	8	R*
White-cr. Sparrow	2	-	-	-	-	-	W
Red-winged Blackbird	-	4	21	25	21	21	S*
Brown-headed Cowbird	-	5	7	8	-	3	S*
Bullock's Oriole	4	-	3	1	5	9	S*
House Finch	4	4	10	18	19	43	R*
Lesser Goldfinch	25	2	2	4	2	3	R*
Lawrence's Goldfinch	-	-	2	-	-	-	R*
House Sparrow	-	2	2	2	4	-	R*
Total Species:	38	36	32	29	32	33	
Total Individuals:	225	187	197	193	203	259	

Total Species on all visits: 55
Total Probable Breeding species: 44 (marked with *)

Status: M - Migrant; R - Resident; S - Summer Only; W - Winter Only

() = dependent young birds

Table 4. Bird Observations along the Santa Clara River System, 1996: Santa Clara River from Power Line 2.5 miles upstream from Boquet Canyon Rd. to Boquet Canyon Road Crossing.

Species	date: 4/20	5/6	5/17	6/10	6/24	7/8	status
Mallard	1	2	-	-	-	-	R*
Cooper's Hawk	-	1	-	-	-	-	R*
Red-shouldered Hawk	1	-	-	1	1	2	R*
Red-tailed Hawk	-	-	3	1	2	2	R*
American Kestrel	1	-	-	-	-	-	R*
California Quail	35	22	34	34	73	15	R*
Killdeer	6	2	2	1	-	-	R*
Domestic Pigeon	-	-	1	32	-	25	R*
Mourning Dove	9	3	16	18	35	17	R*
Roadrunner	1	-	3	1	-	1	R*
Barn Owl	-	-	-	-	2	-	R*
Chimney Swift	-	-	1	-	-	-	M
Vaux's Swift	24	-	-	-	-	-	M
White-th. Swift	-	-	4	-	-	-	R
Black-ch. Hummingbird	-	-	6	-	1	5	S
Anna's Hummingbird	4	2	2	3	8	20	R*
Costa's Hummingbird	-	1	1	1	2	1	S
Nuttall's Woodpecker	3	3	10	1	8	8	R*
Downy Woodpecker	-	-	1	4	-	5	R*
Hairy Woodpecker	-	-	-	1	-	1	R*
Northern Flicker	1	1	2	-	-	1	R*
Willow Flycatcher	-	-	1	-	-	-	M
Black Phoebe	-	-	1	-	-	-	R*
Ash-thr. Flycatcher	1	-	4	3	1	9	S*
Western Kingbird	2	2	2	-	-	14	S*
Violet-green Swallow	4	-	-	-	-	-	S
N. Rough-w. Swallow	1	3	12	2	10	9	S*
Barn Swallow	2	-	1	1	-	-	S
Cliff Swallow	-	-	10	3	20	8	S*
Scrub Jay	11	9	19	11	14	16	R*
American Crow	1	2	7	5	35	11	R*
Common Raven	16	15	9	4	7	27	R*
Plain Titmouse	-	-	1	-	-	2	R*
Bushtit	5	4	10	14	8	8	R*
Bewick's Wren	24	25	21	14	15	17	R*
House Wren	-	-	1	-	-	2	R*
Western Bluebird	-	2	2	-	-	-	R*
Swainson's Thrush	-	1	-	-	-	-	M
American Robin	-	1	-	-	-	-	R*
Wrentit	5	4	5	7	6	2	R*
N. Mockingbird	-	1	2	6(2)	4	7	R*
Calif. Thrasher	5	2	7	3	5(3)	6	R*
Phainopepla	-	2	27	14	8	8	R*
European Starling	1	3	1	2	1	-	R*

Table 4 (cont.). Bird Observations along the Santa Clara River System, 1996: Santa Clara River from Power Line 2.5 miles upstream from Boquet Canyon Rd. to Boquet Canyon Road Crossing.

Species	date: 4/20	5/6	5/17	6/10	6/24	7/8	status
Warbling Vireo	-	1	2	-	-	-	M
Orange-cr. Warbler	6	1	-	-	-	-	M
Yellow Warbler	-	6	7	2	1	1	S*
Yellow- r. Warbler	3	1	-	-	-	-	W,M
Bl.-thr. Grey Warbler	-	-	1	-	-	-	M
Common Yellowthroat	3	2	-	12	3	3	R*
Wilson's Warbler	-	3	1	-	-	-	M
Yellow-br. Chat	-	-	2	-	-	-	S*
Western Tanager	-	3	-	-	-	-	M
Black-headed Grosbeak	-	1	2	2	7	2	S*
Blue Grosbeak	1	-	1	1	3	4	S*
Lazuli Bunting	-	1	2	1(3)	1(4)	1	S*
Spotted Towhee	8	7	15	11	8(3)	6	R*
California Towhee	5	9	16	18	31	18	R*
Song Sparrow	16	13	22	32	8	23	R*
Red-winged Blackbird	6	27	11	8	5	-	S*
Western Meadowlark	-	-	-	2	-	-	R*
Brewer's Blackbird	-	-	1	-	-	-	R*
Brown-headed Cowbird	22	4	9	11	3	7	S*
Hooded Oriole	-	-	2	3	-	1	S*
Bullock's Oriole	4	8	7	2	20	2	S*
House Finch	14	20	32	33	82	92	R*
Lesser Goldfinch	5	6	-	2	12	14	R*
Lawrence's Goldfinch	-	1	-	-	-	-	R*
House Sparrow	-	-	1	2	-	-	R*
Total Species:	36	42	52	42	35	41	
Total Individuals:	257	227	363	334	460	423	

Total Species on all visits: 69
Total Probable Breeding species: 54 (marked with *)

Status: M - Migrant; R - Resident; S - Summer Only; W - Winter Only

() = dependent young birds

Censuses of 5/6, 5/15, 6/24 on the north side of river,
Censuses of 4/20, 6/10, 7/8 on south side of river.

Table 5. Bird Observations along the Santa Clara River System, 1996: Castaic Creek from Old Road west to Rte. 126.

Species	date: 4/28	5/13	5/21	6/12	6/25	7/9	status
Great Blue Heron	-	-	-	-	1	1	W,M
Green Heron	-	2	1	-	-	-	R*
Bl. cr. Night Heron	8	-	1	-	-	1	M
Mallard	-	2	-	-	-	-	R*
Cooper's Hawk	1	-	-	1	-	-	R*
Red-tailed Hawk	3	-	1	3	2	-	R*
American Kestrel	-	1	1	-	-	-	R*
California Quail	12	18	20	21	28	29	R*
Common Moorhen	-	-	-	-	-	-	M?
Killdeer	-	-	2	2	-	-	R*
Domestic Pigeon	3	2	7	2	1	2	R*
Mourning Dove	6	4	5	7	5	3	R*
Bl.-ch. Hummingbird	2	-	-	-	-	-	S*
Anna's Hummingbird	4	5	5	1	3	7	R*
Costa's Hummingbird	-	-	-	-	-	2	S
Acorn Woodpecker	1	-	-	-	-	-	R*
Nuttall's Woodpecker	4	5	2	3	3	6	R*
Downy Woodpecker	-	-	1	-	1	1	R*
Hairy Woodpecker	-	-	1	-	-	-	R*
Northern Flicker	1	1	3	2	2	2	R*
Black Phoebe	1	3	2	-	4	6	R*
Say's Phoebe	-	-	-	-	-	-	M?
Ash-thr. Flycatcher	4	4	4	4	3	-	S*
Western Kingbird	3	-	1	-	1	3	S*
Horned Lark	-	-	2	-	-	25	R
Violet-green Swallow	7	4	-	-	-	-	S*
N. Rough-w. Swallow	110	51	53	43	46	22	S*
Cliff Swallow	-	9	12	6	10	11	S*
Scrub Jay	6	12	11	9	12	8	R*
American Crow	4	5	3	14	9	5	R*
Common Raven	4	2	1	8	3	6	R*
Plain Titmouse	-	-	-	-	-	3	R
Bushtit	2	3	6	9	9	9	R*
Bewick's Wren	9	9	15	5	5	3	R*
Western Bluebird	-	1	2	-	-	-	R*
Wrentit	-	2	-	-	2	2	R*
Calif. Thrasher	1	4	2	2	4	-	R*
Phainopepla	-	-	-	-	2	-	R*
European Starling	7	5	2	6	2	-	R*
Bell's Vireo	**2**	**2**	**2**	**2(1)**	**-**	**-**	**S***
Solitary Vireo	1	-	-	-	-	-	M
Yellow Warbler	-	3	2	1	-	-	S*
Yellow- r. Warbler	1	-	-	-	-	-	W,M
Common Yellowthroat	7	3	3	12	4	2	R*

Table 5 (cont.). Bird Observations along the Santa Clara River System, 1996: Castaic Creek from Old Road west to Rte. 126.

Species	date: 4/28	5/13	5/21	6/12	6/25	7/9	status
Yellow-br. Chat	2	2	-	1	-	-	S*
Western Tanager	4	-	1	-	-	-	M
Black-h. Grosbeak	10	9	7	5	5	4	S*
Blue Grosbeak	6	5	4	2	2	4	S*
Lazuli Bunting	1	1	-	-	2	-	S*
Spotted Towhee	4	10	6	8	3	1	R*
California Towhee	5	8	10	7	6	11	R*
Song Sparrow	16	21	16	26	17	13	R*
Red-w. Blackbird	150	175	172	60	-	2	S*
Tricolored Redwing	6	-	-	-	-	-	S
Brown-headed Cowbird	6	22	9	4	-	6	S*
Bullock's Oriole	6	5	9	2	2	2	S*
House Finch	8	13	31	39	43	48	R*
Lesser Goldfinch	6	4	2	6	5	5	R*
Total Species:	41	42	41	33	33	35	
Total Individuals:	449	437	440	324	247	256	

Total Species on all visits: 58
Total Probable Breeding species: 46 (marked with *)

Status: M - Migrant; R - Resident; S - Summer Only; W - Winter Only

() = dependent young birds

Censuses of 5/13, 5/21, 6/25 on the north side of river,
Censuses of 4/28, 6/12, 7/9 on south side of river.

Table 6. Bird Observations along the Santa Clara River System, 1996: San Francisquito Creek for 2 Miles above Main Channel.

Species	date: 4/25	5/10	5/17	6/10	6/24	7/8	status
Great Blue Heron	-	-	-	-	1	-	W,M
Green Heron	1	-	-	-	-	-	R*
Turkey Vulture	-	-	-	-	1	-	S
White-tailed Kite	1	-	-	-	-	1	R*
Red-shouldered Hawk	1	-	-	1	1	-	R*
Red-tailed Hawk	2	2(3)	2(3)	2	2	2	R*
California Quail	87	42	38	18	36	20	R*
Killdeer	5	7	2	3	1	1	R*
Domestic Pigeon	-	6	2	-	-	4	R*
Mourning Dove	61	12	8	10	6	21	R*
Roadrunner	-	-	-	-	-	1	R*
Bl.-ch. Hummingbird	1	1	1	-	2	-	S*
Anna's Hummingbird	10	3	3	5	5	12	R*
Costa's Hummingbird	2	1	1	-	-	-	S*
Nuttall's Woodpecker	5	5	11	3	4(3)	7	R*
Downy Woodpecker	-	2	-	-	2	2	R*
Northern Flicker	-	1	-	-	-	-	R*
Black Phoebe	1	-	3	1	1	-	R*
Ash-thr. Flycatcher	5	2	5	5	3	3	S*
Western Kingbird	33	2	2	4	6(2)	2	S*
N. Rough-w. Swallow	4	1	4	12	9	-	S*
Cliff Swallow	-	6	2	5	24	-	S*
Scrub Jay	9	8	9	11	9	15	R*
American Crow	12	1	3	2	2	-	R*
Common Raven	10	3	3	7	10	4	R*
Plain Titmouse	7	1	-	4	1	5	R*
Bushtit	10	8	17	-	4	3	R*
Bewick's Wren	26	10	21	16	10	10	R*
House Wren	4	6	4	-	-	-	R*
Western Bluebird	2	-	-	-	-	-	R*
Swainson's Thrush	-	1	2	-	-	-	M
American Robin	-	1	-	-	-	-	R*
Wrentit	-	1	3	2	1	-	R*
N. Mockingbird	2	2	1	5	1	7	R*
Calif. Thrasher	2	2	3	4	1	3	R*
Phainopepla	-	2	8	5	6(2)	14(5)	R*
European Starling	17	6	4	12	1	9	R*
Warbling Vireo	-	5	-	-	-	-	M
Orange-cr. Warbler	1	-	-	-	-	-	M
Nashville Warbler	1	-	-	-	-	-	M
Yellow Warbler	1	3	5	-	-	-	S*
Yellow- r. Warbler	2	-	-	-	-	-	W,M
MacGilliv. Warbler	-	-	-	1	-	-	M
Common Yellowthroat	5	2	3	-	-	1	R*

Table 6 (cont.). Bird Observations along the Santa Clara River System, 1996: San Francisquito Creek for 2 Miles above Main Channel.

Species	date: 4/25	5/10	5/17	6/10	6/24	7/8	status
Wilson's Warbler	2	5	-	-	-	-	M
Yellow-br. Chat	-	3	-	1	-	-	S*
Western Tanager	1	4	-	-	-	-	M
Black-headed Grosbeak	7	5	4	1	1	-	S*
Blue Grosbeak	4	2	3	1	2	1	S*
Lazuli Bunting	5	-	1	-	-	2	S*
Spotted Towhee	16	10	15	7	4	4	R*
California Towhee	34	8	16	5	6	8	R*
Rufous-cr. Sparrow	-	-	1	-	-	-	R
Chipping Sparrow	2	-	-	-	-	-	M
Lark Sparrow	3	-	-	-	-	1	R*
Song Sparrow	31	11	20	5	3	-	R*
Red-winged Blackbird	-	1	-	-	-	-	S*
Brown-headed Cowbird	46	13	11	6	1	-	S*
Hooded Oriole	1	-	-	-	-	-	S*
Bullock's Oriole	7	6	6	8	6(2)	2	S*
House Finch	37	5	12	29	19	57	R*
Lesser Goldfinch	15	13	15	18	9	30	R*
Lawrence's Goldfinch	-	5	-	-	2	-	R*
American Goldfinch	4	6	-	-	-	-	W,M
Total Species:	47	47	39	34	37	30	
Total Individuals:	545	255	277	219	213	257	

Total Species on all visits: 64
Total Probable Breeding species: 51 (marked with *)

Status: M - Migrant; R - Resident; S - Summer Only; W - Winter Only

() = dependent young birds

Censuses of 4/26, 5/17, 7/8 on the west side of river,
Censuses of 5/20, 6/10, 6/24 on east side of river.

Table 7. Bird Observations along the Santa Clara River System, 1996: South Fork from Rte. 126 to McBean Parkway.

Species	date: 5/6	6/17	status
Mallard	4(5)	9	R*
American Kestrel	1	-	R*
California Quail	-	6	R*
Killdeer	8	4	R*
Mourning Dove	10	9	R*
Anna's Hummingbird	3	1	R*
Nuttall's Woodpecker	-	1	R*
Black Phoebe	3	3	R*
Ash-thr. Flycatcher	2	1	S*
N. Rough-w. Swallow	3	30	S*
Cliff Swallow	-	60	S*
Scrub Jay	3	1	R*
American Crow	9	48	R*
Common Raven	-	9	R*
Bushtit	4	-	R*
Bewick's Wren	7	7	R*
N. Mockingbird	-	2	R*
Calif. Thrasher	1	2	R*
Loggerhead Shrike	-	1	
Yellow Warbler	8	-	S*
Black-headed Grosbeak	-	1	S*
Blue Grosbeak	-	1	S*
Spotted Towhee	4	-	R*
California Towhee	9	1	R*
Song Sparrow	3	8	R*
Brown-headed Cowbird	1	2	S*
Bullock's Oriole	-	2	S*
House Finch	4	16	R*
Lesser Goldfinch	1	-	R*
Total Species:	20	24	
Total Individuals:	93	227	

Total Species on all visits: 29
Total Probable Breeding species: 29 (marked with *)

Status: M - Migrant; R - Resident; S - Summer Only; W - Winter Only

() = dependent young birds

Table 8. Bird Observations along the Santa Clara River System, 1996: South Fork from Newhall Creek to Rte. 126.

Species	date: 5/6	6/17	status
American Kestrel	1	-	R*
California Quail	8	8	R*
Killdeer	4	1	R*
Domestic Pigeon	5	-	R*
Mourning Dove	10	21	R*
Bl.-ch. Hummingbird	-	1	S*
Anna's Hummingbird	4	4	R*
Black Phoebe	5	2	R*
Ash-thr. Flycatcher	1	1	S*
Western Kingbird	2	-	S*
Scrub Jay	5	5	R*
American Crow	3	3	R*
Common Raven	-	2	R*
Bushtit	8	3	R*
Bewick's Wren	4	9	R*
N. Mockingbird	2	4	R*
Calif. Thrasher	-	1	R*
European Starling	-	2	R*
Yellow Warbler	4	-	S*
Wilson's Warbler	4	-	M
Western Tanager	4	-	M
Black-headed Grosbeak	1	-	S*
Spotted Towhee	3	1	R*
California Towhee	16	6	R*
Song Sparrow	9	2	R*
Brewer's Blackbird	1	9	R*
Hooded Oriole	1	-	S*
Bullock's Oriole	4	-	S*
House Finch	34	28	R*
Lesser Goldfinch	1	5	R*
House Sparrow	2	1	R*
Total Species:	27	22	
Total Individuals:	146	119	

Total Species on all visits: 31
Total Probable Breeding species: 29 (marked with *)

Status: M - Migrant; R - Resident; S - Summer Only; W - Winter Only

() = dependent young birds

Appendix 1. Fish and Wildlife Rules for Least Bell's Vireo Censuses.

LEAST BELL'S VIREO SURVEY GUIDELINES

1. All riparian areas should be surveyed once a week from April 1 to July 31. These dates encompass the period during which most vireo nesting activity occurs. If additional information on vireo habitat utilization is needed, these surveys should be extended to August 31. Information typically collected after July 31 will reflect a broader extent of the riparian habitat and other adjacent habitat types that the vireo utilizes during the latter phase of the breeding season, especially when the young become independent of the adults.

2. Surveys must be conducted by qualified biologist(s) familiar with song and plumage characteristics of the vireo.

3. Surveys shall be conducted between dawn and 11:00 a.m. Surveys shall avoid periods of excessive heat, wind, and rain.

4. All vireo detections (e.g., vocalization points, areas used for foraging, etc.) should be used to define individual home range. These data need to be mapped on a large-scale aerial photograph.

5. Data on vireo breeding status (e.g., number and location of paired or unpaired territorial males, nest building efforts, feeding of nestlings, location of vireo nests, etc.) should be noted during each survey.

6. All sightings of cowbirds and their numbers in vireo territories should be noted during each survey.

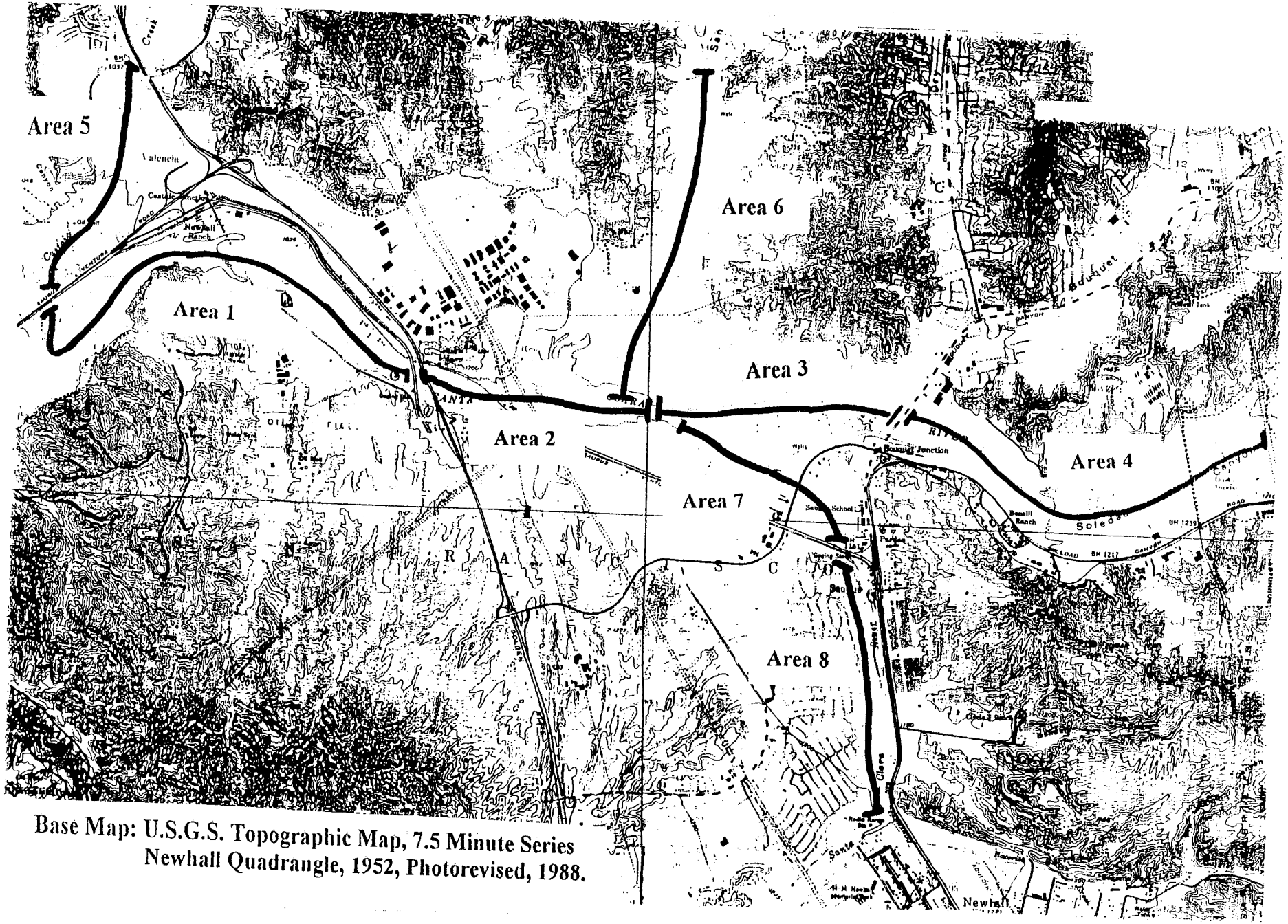
7. No attempts should be made to locate or examine vireo nests unless authorized by permits issued by California Department of Fish and Game and the U.S. Fish and Wildlife Service.

8. A final report should be prepared which describes survey dates, methods, locations, and information identified in items 4, 5, and 6 above.

If you have any questions regarding these survey guidelines, please contact the U.S. Fish and Wildlife Service at (714) 643-4270.

12-91

Figure 1. Survey Areas along the Santa Clara River and Tributaries.



Base Map: U.S.G.S. Topographic Map, 7.5 Minute Series
Newhall Quadrangle, 1952, Photorevised, 1988.

Upper Riv 1996

Area 1

BIRDS OF Santa Clara River System

Locality Blue Moon to Castaic Date 4/28 Time

NORTH BRANCH then dry.

- Great Blue Heron
- Green Heron
- (3) Mallard
- Cinnamon Teal
- Turkey Vulture
- White-tailed Kite
- Sharp-shinned Hawk
- Cooper's Hawk
- (2) II Red-shouldered Hawk
- (2) II Red-tailed Hawk
- Golden Eagle
- American Kestrel
- (14) 2 7 2 4 2 California Quail
- American Coot
- (4) 2 2 2 Killdeer FY
- (1) Spotted Sandpiper
- (4) Least Sandpiper
- Common Snipe
- (17) 13, 2 II Rock Dove
- (19) 1 22 4 2 6 Mourning Dove
- **Yellow-billed Cuckoo**
- Greater Roadrunner
- Barn Owl
- Great Horned Owl
- (2) White-throated Swift
- (1) Black-ch. Hummingbird
- (11) 1 12 8 Anna's Hummingbird
- Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- (5) IIII Nuttall's Woodpecker
- Downy Woodpecker
- Hairy Woodpecker
- Northern Flicker
- (1) Western Wood-Pewee
- Willow Flycatcher
- Hammond's Flycatcher
- Pacific Slope Flycatcher
- Black Phoebe
- Say's Phoebe
- (7) II IIII Ash-throated Flycatcher
- **Brown-crested Flycatcher**
- Cassin's Kingbird
- Western Kingbird
- Horned Lark
- (2) Tree Swallow N
- Violet-green Swallow
- (1) N. Rough-winged Swallow
- Bank Swallow
- (130) 1 Cliff Swallow N at least 75 nests on cliff southwest.
- Barn Swallow
- (13) 1 2 2 2 2 2 1 Scrub Jay
- (7) 2 2 2 American Crow
- 1 Common Raven
- (7) 2 2 2 1 Plain Titmouse
- (11) 1 2 2 2 2 Bushtit
- (27) 4 6 2 2 II 2 1 Bewick's Wren
- III House Wren
- (5) Ruby-crowned Kinglet
- Blue-gray Gnatcatcher
- Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- (2) American Robin
- Varied Thrush
- Northern Mockingbird
- California Thrasher
- American Pipit
- Cedar Waxwing
- Phainopepla
- Loggerhead Shrike
- (15) 2 8 1 4 European Starling
- **Bell's Vireo**
- Solitary Vireo
- Warbling Vireo
- Orange-crowned Warbler
- (6) IIII Yellow Warbler
- Yellow-rumped Warbler
- Black-th. Gray Warbler
- Townsend's Warbler
- MacGillivray's Warbler
- (13) 4 2 2 3 Common Yellowthroat
- (1) Wilson's Warbler
- (2) Yellow-breasted Chat
- **Summer Tananger**
- (1) Western Tanager
- (4) III Black-headed Grosbeak
- (3) III Blue Grosbeak
- Lazuli Bunting
- (8) IIII IIII Rufous-sided Towhee
- (10) IIII IIII California Towhee
- Lark Sparrow
- Savannah Sparrow
- Fox Sparrow
- (44) 4 6 4 2 4 9 4 6 4 Song Sparrow
- Lincoln's Sparrow
- White-crowned Sparrow
- (9) Red-winged Blackbird
- Western Meadowlark
- Brewer's Blackbird
- (17) 1 3 5 2 3 2 Brown-headed Cowbird
- Hooded Oriole
- (1) Northern Oriole
- (10) 2 II 2 2 House Finch
- Pine Siskin
- (5) 1 2 II Lesser Goldfinch
- Lawrence's Goldfinch
- (2) American Goldfinch
- House Sparrow

Additional Species

(1) Great Egret

BIRDS OF Santa Clara River System

Locality OLD Rd → Blue M Date 4-28 Time 8 → 9

- Great Blue Heron
- (1) Green Heron
- (3) 111 Mallard
- Cinnamon Teal
- Turkey Vulture
- White-tailed Kite 3-4 SOAR. ELM
- Sharp-shinned Hawk (7)
- Cooper's Hawk
- (1) Red-shouldered Hawk
- Red-tailed Hawk
- Golden Eagle
- American Kestrel
- (1) California Quail
- American Coot
- (3) 12 Killdeer N
- (1) Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- Rock Dove
- Mourning Dove
- **Yellow-billed Cuckoo**
- Greater Roadrunner
- Barn Owl
- Great Horned Owl
- (4) ~~White-throated~~ Swift MVK.
- (1) Black-ch. Hummingbird
- (3) 21 Anna's Hummingbird
- Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- Nuttall's Woodpecker
- Downy Woodpecker
- Hairy Woodpecker
- (1) Northern Flicker
- Western Wood-Pewee
- Willow Flycatcher
- Hammond's Flycatcher
- (1) Pacific Slope Flycatcher
- Black Phoebe
- Say's Phoebe
- (7) 11 Ash-throated Flycatcher
- **Brown-crested Flycatcher**
- Cassin's Kingbird
- Western Kingbird
- Horned Lark
- Tree Swallow
- Violet-green Swallow
- (10) 6 4 N. Rough-winged Swallow N
- Bank Swallow
- Cliff Swallow
- Barn Swallow
- (4) 22 Scrub Jay
- (7) 34 American Crow FY
- (5) 3 2 Common Raven
- (3) 12 Plain Titmouse FY.
- Bushtit

(24) 111 1111 1111 1111

- (12) Rock Wren
- N 1111 1111 Bewick's Wren FY
- (3) 111 House Wren
- Ruby-crowned Kinglet
- Blue-gray Gnatcatcher
- Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- American Robin
- Wrentit
- Northern Mockingbird
- (2) 11 California Thrasher
- American Pipit
- Cedar Waxwing
- Phainopepla
- Loggerhead Shrike
- European Starling
- **Bell's Vireo**
- Solitary Vireo
- Warbling Vireo
- (1) Orange-crowned Warbler
- (3) 111 Yellow Warbler
- Yellow-rumped Warbler
- Black-th. Gray Warbler
- Townsend's Warbler
- MacGillivray's Warbler
- (2) 11 Common Yellowthroat
- (1) Wilson's Warbler
- Yellow-breasted Chat
- **Summer Tananger**
- Western Tanager
- (1) Black-headed Grosbeak
- Blue Grosbeak
- Lazuli Bunting
- (3) 111 Rufous-sided Towhee
- (3) 111 California Towhee
- Lark Sparrow
- Savannah Sparrow
- Fox Sparrow
- Song Sparrow 1111
- Lincoln's Sparrow
- (1) White-crowned Sparrow
- (3) Red-winged Blackbird
- Western Meadowlark
- Brewer's Blackbird
- (2) Brown-headed Cowbird
- Hooded Oriole
- Northern Oriole (6) TRUCK
- (5) 23 House Finch
- Pine Siskin
- (2) Lesser Goldfinch
- Lawrence's Goldfinch
- (6) American Goldfinch
- House Sparrow

Additional Species

_____

BIRDS OF Santa Clara River System

Locality FREEWAY to CASTAIC Date 5/13/96 Time

- Great Blue Heron
- Green Heron
- 3 Mallard
- Cinnamon Teal
- Turkey Vulture
- White-tailed Kite
- Sharp-shinned Hawk
- Cooper's Hawk
- Red-shouldered Hawk
- 11 Red-tailed Hawk carrying food into nest tree
- Golden Eagle
- American Kestrel
- 22 California Quail
- American Coot
- 7 2 1 2 Killdeer
- 1 1 2 2 1 1 Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- 17, 17, Rock Dove
- Mourning Dove
- **Yellow-billed Cuckoo**
- Greater Roadrunner
- Barn Owl
- Great Horned Owl
- White-throated Swift
- 1 Black-ch. Hummingbird
- 1 IIII Anna's Hummingbird
- Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- III Nuttall's Woodpecker
- 1 Downy Woodpecker
- 2 Hairy Woodpecker
- Northern Flicker
- Western Wood-Pewee
- Willow Flycatcher
- Hammond's Flycatcher
- Pacific Slope Flycatcher
- 111 Black Phoebe
- Say's Phoebe
- 111 IIII IIII Ash-throated Flycatcher
- **Brown-crested Flycatcher**
- Cassin's Kingbird
- Western Kingbird
- Horned Lark
- Tree Swallow
- Violet-green Swallow
- 26 4 7 3 N. Rough-winged Swallow
- Bank Swallow
- 1 Cliff Swallow
- Barn Swallow
- 1 2 2 Scrub Jay
- (4) 1 1 1 2, 2 (2) American Crow
- Common Raven
- 9 5 3 Plain Titmouse (feeding juv.)
- 6, 2 Bushtit
- Rock Wren
- 9 1 1 2 1 2 2 1 IIII Bewick's Wren
- 9 9 9 1 2 3 4 2 8 2 1 House Wren
- Ruby-crowned Kinglet
- Blue-gray Gnatcatcher
- 1 Western Bluebird female at nest hole
- Swainson's Thrush
- Hermit Thrush
- American Robin
- Wrentit
- 1 Northern Mockingbird
- California Thrasher
- American Pipit
- Cedar Waxwing
- 11 Phainopepla
- Loggerhead Shrike
- 2 1 2 1 3 4 1 European Starling
- 22 **Bell's Vireo** all singing
- Solitary Vireo
- Warbling Vireo
- Orange-crowned Warbler
- 4 IIII 2 Yellow Warbler
- Yellow-rumped Warbler
- Black-th. Gray Warbler
- Townsend's Warbler
- MacGillivray's Warbler
- 9 9 9 1 IIII Common Yellowthroat
- 11 Wilson's Warbler
- 11 Yellow-breasted Chat
- **Summer Tananger**
- Western Tanager
- 1 IIII Black-headed Grosbeak
- 1 Blue Grosbeak
- Lazuli Bunting
- 4 2 11 2 3 1 1 Rufous-sided Townee
- 9 1 1 2 2 2 2 1 IIII California Townee
- Lark Sparrow
- Savannah Sparrow
- Fox Sparrow
- 4 2 2 2 2 1 2 3 1 2 1 2 Song Sparrow
- Lincoln's Sparrow
- White-crowned Sparrow
- 10, 10, 8 6 4 2 3 2 4 Red-winged Blackbird
- Western Meadowlark
- Brewer's Blackbird
- 6 2 8 2 2 11 3 1 Brown-headed Cowbird
- Hooded Oriole
- 1 Northern Oriole
- 2 1 1 House Finch
- Pine Siskin
- 11 Lesser Goldfinch
- Lawrence's Goldfinch
- American Goldfinch
- House Sparrow

9, 9, 20, 4 8 6 8

Additional Species

Lots of tiger swallowtail butterflys on ?

BIRDS OF Santa Clara River System

SUGDEN

Locality Blue Moon to Castaic Date 5/24 Time

Northside

Deer
Treefrog
JackRabbit
Cottont. Rab

- Great Blue Heron
- 2 Green Heron (pair)
- 2 Mallard
- Cinnamon Teal
- Turkey Vulture
- White-tailed Kite
- Sharp-shinned Hawk
- Cooper's Hawk
- Red-shouldered Hawk
- Red-tailed Hawk
- Golden Eagle
- American Kestrel
- 22 California Quail
- American Coot
- 2 Killdeer
- 2 Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- Rock Dove
- 2 Mourning Dove
- **Yellow-billed Cuckoo**
- Greater Roadrunner
- Barn Owl
- Great Horned Owl
- 8 White-throated Swift (at cliff)
- Black-cn. Hummingbird
- Anna's Hummingbird
- Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- Nuttall's Woodpecker
- 2 Downy Woodpecker (in nesting hole)
- Hairy Woodpecker
- Northern Flicker
- Western Wood-Pewee
- Willow Flycatcher
- Hammond's Flycatcher
- Pacific Slope Flycatcher
- 2 Black Phoebe
- Say's Phoebe
- Ash-throated Flycatcher
- **Brown-crested Flycatcher**
- Cassin's Kingbird
- 2 Western Kingbird
- Horned Lark
- 2 Tree Swallow (usual area of nesting tree)
- Violet-green Swallow
- 42 N. Rough-winged Swallow
- Bank Swallow
- 22 Cliff Swallow (cliff/14 nests)
- Barn Swallow
- 2 Scrub Jay
- 14 American Crow
- Common Raven
- 2222 Plain Titmouse
- 2 Busntit
- Rock Wren
- 2 Bewick's Wren (5/22)
- House Wren
- Ruby-crowned Kinglet
- Blue-gray Gnatcatcher
- Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- American Robin
- 2 Wrentit
- Northern Mockingbird
- California Thrasher
- American Pipit
- Cedar Waxwing
- Phainopepla
- Loggerhead Shrike
- 2 2 2 2 European Starling
- **Bell's Vireo**
- Solitary Vireo
- Warbling Vireo
- Orange-crowned Warbler
- Yellow Warbler
- Yellow-rumped Warbler
- Black-th. Gray Warbler
- Townsend's Warbler
- MacGillivray's Warbler
- Common Yellowthroat
- Wilson's Warbler
- Yellow-breasted Chat (Carounded bird - display)
- **Summer Tananger**
- 6 Western Tanager
- Black-headed Grosbeak (w. young)
- 2 Blue Grosbeak (w. young in bush)
- Lazuli Bunting
- Rufous-sided Towhee
- California Towhee
- Lark Sparrow
- Savannah Sparrow
- Fox Sparrow
- Song Sparrow (begging young)
- Lincoln's Sparrow
- White-crowned Sparrow
- 18 Red-winged Blackbird
- Western Meadowlark
- Brewer's Blackbird
- 3 Brown-headed Cowbird
- Hooded Oriole
- Northern Oriole
- 2 House Finch
- Pine Siskin
- Lesser Goldfinch
- Lawrence's Goldfinch
- American Goldfinch
- House Sparrow

Additional Species

BIRDS OF Santa Clara River System

Locality Old Rd + Blue Moon Date 5-21 Time 8 – 9

- Great Blue Heron
- (1) Green Heron
- (5) 3 2 Mallard
- Cinnamon Teal
- Turkey Vulture
- White-tailed Kite
- Sharp-shinned Hawk
- Cooper's Hawk
- (1) Red-shouldered Hawk
- Red-tailed Hawk
- Golden Eagle
- American Kestrel
- (4) California Quail
- American Coot
- (10) 7 2 Killdeer
- (1) Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- Rock Dove
- (2) || Mourning Dove
- **Yellow-billed Cuckoo**
- Greater Roadrunner
- Barn Owl
- Great Horned Owl
- (3) White-throated Swift
- Black-ch. Hummingbird
- (2) || Anna's Hummingbird
- Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- (2) || Nuttall's Woodpecker
- (1) Downy Woodpecker
- Hairy Woodpecker
- Northern Flicker
- Western Wood-Pewee
- Willow Flycatcher
- Hammond's Flycatcher
- Pacific Slope Flycatcher
- (1) Black Phoebe
- Say's Phoebe
- (3) ||| Ash-throated Flycatcher
- **Brown-crested Flycatcher**
- Cassin's Kingbird
- Western Kingbird
- Horned Lark
- Tree Swallow
- Violet-green Swallow
- (13) 6 4 3 N. Rough-winged Swallow
- Bank Swallow
- Cliff Swallow
- Barn Swallow
- (1) Scrub Jay
- (5) 1 2 American Crow
- (2) 2 Common Raven
- (1) Plain Titmouse
- (6) Bushtit
- (2) || Rock Wren
- (2) || Bewick's Wren
- House Wren
- Ruby-crowned Kinglet
- Blue-gray Gnatcatcher
- (2) Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- American Robin
- Wrentit
- Northern Mockingbird
- California Thrasher
- American Pipit
- Cedar Waxwing
- Phainopepla
- Loggerhead Shrike
- (3) European Starling
- **Bell's Vireo**
- Solitary Vireo
- Warbling Vireo
- Orange-crowned Warbler
- (1) Yellow Warbler
- (1) Yellow-rumped Warbler
- Black-th. Gray Warbler
- Townsend's Warbler
- MacGillivray's Warbler
- (14) |||| |||| Common Yellowthroat
- Wilson's Warbler
- (1) Yellow-breasted Chat
- (1) **Summer Tananger**
- Western Tanager
- (1) Black-headed Grosbeak
- (1) Blue Grosbeak
- Lazuli Bunting
- (4) |||| Rufous-sided Towhee
- (4) 2 2 California Towhee
- Lark Sparrow
- Savannah Sparrow
- (25) |||| |||| |||| |||| Fox Sparrow
- |||| Song Sparrow
- Lincoln's Sparrow
- White-crowned Sparrow
- (6) Red-winged Blackbird
- Western Meadowlark
- Brewer's Blackbird
- (4) 2 2 Brown-headed Cowbird
- Hooded Oriole
- (2) Northern Oriole
- (4) 2 2 House Finch
- Pine Siskin
- (5) 3 2 Lesser Goldfinch
- Lawrence's Goldfinch
- (2) American Goldfinch
- House Sparrow

2 coyotes

Additional Species

SUGDEN

BIRDS OF Santa Clara River System

Locality Magic Mountain Parking Lot to Blue Moon Date 6/12 Time

5 pairs.

- Great Blue Heron
- (1) | Green Heron
- Mallard
- Cinnamon Teal
- Turkey Vulture
- White-tailed Kite
- Sharp-shinned Hawk
- Cooper's Hawk
- (4) 2 Red-shouldered Hawk (2 ad juv.)
- Red-tailed Hawk
- Golden Eagle
- American Kestrel
- (4) 2 California Quail
- American Coot
- (6) 42 Killdeer
- Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- Rock Dove
- Mourning Dove
- **Yellow-billed Cuckoo**
- Greater Roadrunner
- Barn Owl
- Great Horned Owl
- White-throated Swift
- (1) | Black-ch. Hummingbird
- (10) 1 2221 Anna's Hummingbird
- Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- (8) 1412 Nuttall's Woodpecker
- (4) 111 Downy Woodpecker
- (1) Hairy Woodpecker
- Northern Flicker
- Western Wood-Pewee
- Willow Flycatcher
- Hammond's Flycatcher
- Pacific Slope Flycatcher
- (3) 1 2 Black Phoebe
- Say's Phoebe
- (3) 111 Ash-throated Flycatcher
- **Brown-crested Flycatcher**
- Cassin's Kingbird
- Western Kingbird
- Horned Lark
- Tree Swallow
- Violet-green Swallow
- (20) 8 N. Rough-winged Swallow
- Bank Swallow
- (40) Cliff Swallow
- (4) 111 Barn Swallow
- (11) 1022 Scrub Jay
- (11) 412 American Crow
- (1) Common Raven
- (7) 1122 Plain Titmouse
- (14) 95 Bushtit
- Rock Wren
- (23) 2 6 3 1 4 Bewick's Wren
- (12) 9121 House Wren
- Ruby-crowned Kinglet
- Blue-gray Gnatcatcher
- Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- American Robin
- (4) 111 Wrentit
- Northern Mockingbird
- California Thrasher
- American Pipit
- Cedar Waxwing
- Phainopepla
- Loggerhead Shrike
- (4) European Starling
- **Bell's Vireo**
- Solitary Vireo
- Warbling Vireo
- Orange-crowned Warbler
- (9) 2124 Yellow Warbler (2 juv.)
- Yellow-rumped Warbler
- Black-th. Gray Warbler
- Townsend's Warbler
- MacGillivray's Warbler
- (44) 6 8 6 8 6 2 1111 Common Yellowthroat
- Wilson's Warbler
- (5) 111 Yellow-breasted Chat
- **Summer Tananger**
- Western Tanager
- (14) 1 1 2 2 4 2 4 Black-headed Grosbeak
- Blue Grosbeak
- (9) 112 Lazuli Bunting
- (8) 1122 Rufous-sided Townee
- (10) 2221 California Townee
- Lark Sparrow
- Savannah Sparrow
- Fox Sparrow
- (54) 9 4 8 4 2 2 1 8 11 Song Sparrow
- 26
- Lincoln's Sparrow
- White-crowned Sparrow
- (23) 8 4 8 3 Red-winged Blackbird
- Western Meadowlark
- Brewer's Blackbird
- (6) 32 Brown-headed Cowbird
- Hooded Oriole
- (4) Northern Oriole
- (35) 19 House Finch
- Pine Siskin
- (10) Lesser Goldfinch
- Lawrence's Goldfinch
- American Goldfinch
- (2) House Sparrow

Additional Species

BIRDS OF Santa Clara River System

Locality OLDR → CAST Date 6/12 Time 8 →

___ Great Blue Heron
___ Green Heron
___ Mallard
___ Cinnamon Teal
___ Turkey Vulture
___ White-tailed Kite
___ Sharp-shinned Hawk
___ Cooper's Hawk
1 Red-shouldered Hawk
IIII Red-tailed Hawk
___ Golden Eagle
___ American Kestrel
2 California Quail
___ American Coot
___ Killdeer
___ Spotted Sandpiper
___ Least Sandpiper
___ Common Snipe
___ Rock Dove
___ Mourning Dove
___ **Yellow-billed Cuckoo**
___ Greater Roadrunner
___ Barn Owl
___ Great Horned Owl
___ White-throated Swift
___ Black-ch. Hummingbird
___ Anna's Hummingbird
___ Costa's Hummingbird
___ Belted Kingfisher
___ Acorn Woodpecker
___ Nuttall's Woodpecker
1 Downy Woodpecker
___ Hairy Woodpecker
___ Northern Flicker
___ Western Wood-Pewee
___ Willow Flycatcher
___ Hammond's Flycatcher
___ Pacific Slope Flycatcher
___ Black Phoebe
___ Say's Phoebe
___ Ash-throated Flycatcher
___ **Brown-crested Flycatcher**
___ Cassin's Kingbird
___ Western Kingbird
___ Horned Lark
___ Tree Swallow
___ Violet-green Swallow
84 N. Rough-winged Swallow
___ Bank Swallow
___ Cliff Swallow
1 Barn Swallow
1 Scrub Jay
22 American Crow
___ Common Raven
___ Plain Titmouse
___ Bushtit

___ Rock Wren
1 Bewick's Wren
1 House Wren
___ Ruby-crowned Kinglet
___ Blue-gray Gnatcatcher
___ Western Bluebird
___ Swainson's Thrush
___ Hermit Thrush
___ American Robin
1 Wrentit
___ Northern Mockingbird
___ California Thrasher
___ American Pipit
___ Cedar Waxwing
___ Phainopepla
___ Loggerhead Shrike
4 European Starling
___ **Bell's Vireo**
___ Solitary Vireo
___ Warbling Vireo
___ Orange-crowned Warbler
___ Yellow Warbler
___ Yellow-rumped Warbler
___ Black-th. Gray Warbler
___ Townsend's Warbler
___ MacGillivray's Warbler
1 Common Yellowthroat
___ Wilson's Warbler
___ Yellow-breasted Chat
___ **Summer Tananger**
___ Western Tanager
1 Black-headed Grosbeak
___ Blue Grosbeak
2 Lazuli Bunting
1 Rufous-sided Towhee
___ California Towhee
___ Lark Sparrow
___ Savannah Sparrow
___ Fox Sparrow
IIII Song Sparrow
___ Lincoln's Sparrow
___ White-crowned Sparrow
___ Red-winged Blackbird
___ Western Meadowlark
___ Brewer's Blackbird
___ Brown-headed Cowbird
___ Hooded Oriole
___ Northern Oriole
4 46 House Finch
___ Pine Siskin
4 Lesser Goldfinch
___ Lawrence's Goldfinch
___ American Goldfinch
___ House Sparrow

Additional Species

___

BIRDS OF Santa Clara River System

Locality Blue Moon to Castaic (North side & River) Date June 25/96 Time

- Great Blue Heron
- Green Heron
- Mallard
- Cinnamon Teal
- Turkey Vulture
- White-tailed Kite
- Sharp-shinned Hawk
- Cooper's Hawk
- 11 Red-shouldered Hawk
- 111 Red-tailed Hawk
- Golden Eagle
- American Kestrel
- 692 California Quail
- American Coot
- 111 Killdeer
- 2212 Spotted Sandpiper (broken dying wing decoy)
- Least Sandpiper (startled a female off nest in nest hab. of new growth)
- Common Snipe
- Rock Dove
- 44 2121 Mourning Dove
- **Yellow-billed Cuckoo**
- Greater Roadrunner
- Barn Owl
- Great Horned Owl
- 2 White-throated Swift
- 1 Black-ch. Hummingbird
- 1 Anna's Hummingbird
- Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- 111 1111 Nuttall's Woodpecker
- 1211 Downy Woodpecker
- 11 Hairy Woodpecker
- 2 Northern Flicker
- Western Wood-Pewee
- Willow Flycatcher
- Hammond's Flycatcher
- Pacific Slope Flycatcher
- 2 1111 Black Phoebe
- Say's Phoebe
- 2 1111 2 Ash-throated Flycatcher
- **Brown-crested Flycatcher** 9 2 9 12 3 4 6 8 4 4 2 2 1 2 6 2
- Cassin's Kingbird
- Western Kingbird
- Horned Lark
- 5 Tree Swallow (looked like mid air feeding)
- 3 Violet-green Swallow
- 35, 20, 2 N. Rough-winged Swallow
- Bank Swallow
- ±100, 10,8 Cliff Swallow only about 20 nests on cliff still have activity - others have fledged 4,10,10, 5 9 4
- Barn Swallow
- 32 2121 Scrub Jay
- 4 4 6 4 1 American Crow
- 136 4 1 4 3 Common Raven
- 1 3 Plain Titmouse
- 2 Bushtit
- Rock Wren
- 21 9 1426 Bewick's Wren
- 3 6 5 House Wren
- Ruby-crowned Kinglet
- Blue-gray Gnatcatcher
- (3)2 Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- American Robin
- Wrentit
- Northern Mockingbird
- 2 California Thrasher
- American Pipit
- Cedar Waxwing
- 48 (2344 Phainopepla (14 in glasses at once)
- Loggerhead Shrike
- 1 European Starling
- **Bell's Vireo**
- 1 Solitary Vireo
- Warbling Vireo
- Orange-crowned Warbler
- 111 Yellow Warbler
- Yellow-rumped Warbler
- Black-th. Gray Warbler
- Townsend's Warbler
- MacGillivray's Warbler
- 25 6 23 111 Common Yellowthroat
- Wilson's Warbler
- 1 Yellow-breasted Chat
- **Summer Tananger**
- Western Tanager
- 1111 2 2 111 Black-headed Grosbeak (some juveniles)
- 5 1111 Blue Grosbeak
- 3 2 7 4 2 1 2 1 3 12 Lazuli Bunting (feeding fledge)
- 1 1 2 2 1 2 6 2 2 Rufous-sided Towhee
- 4 1 2 1 California Towhee
- Lark Sparrow
- Savannah Sparrow
- Fox Sparrow
- 2 12 6 2 Song Sparrow
- Lincoln's Sparrow
- White-crowned Sparrow
- 1 Red-winged Blackbird
- Western Meadowlark
- Brewer's Blackbird
- 32 2 1 2 Brown-headed Cowbird
- Hooded Oriole
- 1 Northern Oriole
- 4 2 8 2 2 House Finch
- Pine Siskin
- 1 2 Lesser Goldfinch
- Lawrence's Goldfinch
- American Goldfinch
- House Sparrow

Additional Species

BIRDS OF Santa Clara River System

Locality ROAD - CASTAIC Date 6/25 Time 745 — 4

- Great Blue Heron
- Green Heron
- Mallard
- Cinnamon Teal
- Turkey Vulture
- White-tailed Kite
- Sharp-shinned Hawk
- Cooper's Hawk
- II Red-shouldered Hawk
- Red-tailed Hawk
- Golden Eagle
- American Kestrel
- California Quail
- American Coot
- Killdeer
- Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- Rock Dove
- 2 Mourning Dove
- **Yellow-billed Cuckoo**
- Greater Roadrunner
- Barn Owl
- Great Horned Owl
- White-throated Swift
- Black-ch. Hummingbird
- IIII Anna's Hummingbird
- Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- IIII II Nuttall's Woodpecker
- I Downy Woodpecker
- I Hairy Woodpecker
- I Northern Flicker
- Western Wood-Pewee
- Willow Flycatcher
- Hammond's Flycatcher
- Pacific Slope Flycatcher
- II 2 Black Phoebe
- Say's Phoebe
- IIII Ash-throated Flycatcher
- **Brown-crested Flycatcher**
- Cassin's Kingbird
- Western Kingbird
- Horned Lark
- Tree Swallow
- Violet-green Swallow
- (26) N. Rough-winged Swallow
- Bank Swallow
- Cliff Swallow
- Barn Swallow
- II Scrub Jay
- 2 American Crow
- I Common Raven
- 2 I Plain Titmouse
- 2 Bushtit
- Rock Wren
- II IIII IIII Bewick's Wren
- House Wren
- Ruby-crowned Kinglet
- Blue-gray Gnatcatcher
- Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- American Robin
- II Wrentit
- Northern Mockingbird
- I California Thrasher
- American Pipit
- Cedar Waxwing
- II Phainopepla
- Loggerhead Shrike
- I European Starling
- 12 **Bell's Vireo**
- Solitary Vireo
- Warbling Vireo
- Orange-crowned Warbler
- II Yellow Warbler
- Yellow-rumped Warbler
- Black-th. Gray Warbler
- Townsend's Warbler
- MacGillivray's Warbler
- II IIII IIII Common Yellowthroat
- Wilson's Warbler
- IIII Yellow-breasted Chat
- **Summer Tananger**
- Western Tanager
- Black-headed Grosbeak
- IIII Blue Grosbeak
- 1 IIII Lazuli Bunting
- IIII I Rufous-sided Towhee
- II California Towhee
- Lark Sparrow
- Savannah Sparrow
- Fox Sparrow
- 6 16 7 11 IIII Song Sparrow
- Lincoln's Sparrow
- White-crowned Sparrow
- 4 Red-winged Blackbird
- Western Meadowlark
- Brewer's Blackbird
- I Brown-headed Cowbird
- Hooded Oriole
- Northern Oriole
- 4623 House Finch
- Pine Siskin
- 22 Lesser Goldfinch
- Lawrence's Goldfinch
- 4 American Goldfinch SY
- House Sparrow

Additional Species

N 51064 L67 V.

BIRDS OF Santa Clara River System

Locality Blue Moon to Castaic South side Date 7/9/96 Time Tues

- Great Blue Heron
- (2) || Green Heron
- Mallard
- Cinnamon Teal
- Turkey Vulture
- White-tailed Kite
- Sharp-shinned Hawk
- Cooper's Hawk
- (2) || Red-shouldered Hawk
- Red-tailed Hawk
- Golden Eagle
- American Kestrel
- (27) 9 California Quail
- American Coot
- Killdeer
- (3) Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- Rock Dove
- (13) 6 Mourning Dove
- **Yellow-billed Cuckoo**
- Greater Roadrunner
- Barn Owl
- Great Horned Owl
- (3) 2 White-throated Swift
- (27) Black-ch. Hummingbird
- 1 2 4 2 Anna's Hummingbird
- Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- (6) Nuttall's Woodpecker
- (8) Downy Woodpecker
- Hairy Woodpecker
- Northern Flicker
- Western Wood-Pewee
- Willow Flycatcher
- Hammond's Flycatcher
- Pacific Slope Flycatcher
- (6) 4 Black Phoebe
- Say's Phoebe
- (13) Ash-throated Flycatcher
- **Brown-crested Flycatcher**
- Cassin's Kingbird
- (3) Western Kingbird
- Horned Lark
- Tree Swallow
- (3) (12) Violet-green Swallow
- (8) 6 N. Rough-winged Swallow
- Bank Swallow
- (30) 10, 20 Cliff Swallow
- Barn Swallow
- (11) Scrub Jay
- (31) American Crow
- (13) Common Raven
- (2) Plain Titmouse
- (12) Bushtit
- Rock Wren
- (51) 10, 10, 10, 6 Bewick's Wren
- House Wren
- Ruby-crowned Kinglet
- Blue-gray Gnatcatcher
- Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- American Robin
- (3) Wrentit
- Northern Mockingbird
- (5) California Thrasher
- American Pipit
- Cedar Waxwing
- Phainopepla
- (47) Loggerhead Shrike
- (2) European Starling
- **Bell's Vireo**
- Solitary Vireo
- Warbling Vireo
- Orange-crowned Warbler
- Yellow Warbler
- Yellow-rumped Warbler
- Black-th. Gray Warbler
- Townsend's Warbler
- MacGillivray's Warbler
- (59) 10, 10, 8 Common Yellowthroat
- Wilson's Warbler
- (8) Yellow-breasted Chat
- **Summer Tananger**
- Western Tanager
- Black-headed Grosbeak
- (7) (4) Blue Grosbeak
- (26) Lazuli Bunting
- (4) Rufous-sided Towhee
- (9) California Towhee
- (11) 6, 5 Lark Sparrow
- Savannah Sparrow
- Fox Sparrow
- Song Sparrow
- (52) 10, 10, 2, 10, 6 Lincoln's Sparrow
- White-crowned Sparrow
- (9) Red-winged Blackbird
- Western Meadowlark
- Brewer's Blackbird
- Brown-headed Cowbird
- (36) 6, 3, 13, Hooded Oriole
- Northern Oriole
- (44) 20, 10, 9, 10 House Finch
- Pine Siskin
- (13) Lesser Goldfinch
- Lawrence's Goldfinch
- American Goldfinch
- House Sparrow

Additional Species

1) Common Yellowthroat

BIRDS OF Santa Clara River System

Locality OUTER COAST JUNCT 79 Date 7 Time 8 – 9 15

- Great Blue Heron
- (2) II Green Heron
- Mallard
- Cinnamon Teal
- Turkey Vulture
- White-tailed Kite
- Sharp-shinned Hawk
- Cooper's Hawk
- (1) Red-shouldered Hawk
- (1) Red-tailed Hawk
- Golden Eagle
- American Kestrel
- California Quail
- American Coot
- Killdeer
- Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- Rock Dove
- (1) Mourning Dove
- **Yellow-billed Cuckoo**
- Greater Roadrunner
- Barn Owl
- Great Horned Owl
- White-throated Swift
- Black-ch. Hummingbird
- (6) III 3 Anna's Hummingbird
- Costa's Hummingbird
- Belted Kingfisher
- (3) Acorn Woodpecker
- Nuttall's Woodpecker
- (2) II Downy Woodpecker
- (1) Hairy Woodpecker
- Northern Flicker
- Western Wood-Pewee
- Willow Flycatcher
- Hammond's Flycatcher
- Pacific Slope Flycatcher
- (3) III Black Phoebe
- Say's Phoebe
- (4) III Ash-throated Flycatcher
- **Brown-crested Flycatcher**
- Cassin's Kingbird
- Western Kingbird
- Horned Lark
- Tree Swallow
- Violet-green Swallow
- (3) N. Rough-winged Swallow
- Bank Swallow
- (4) Cliff Swallow
- Barn Swallow
- (6) II 2 II Scrub Jay
- (5) 3 2 American Crow
- (2) Common Raven
- Plain Titmouse
- Bushtit
- Rock Wren
- (6) IIII Bewick's Wren
- House Wren
- Ruby-crowned Kinglet
- Blue-gray Gnatcatcher
- Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- (1) American Robin
- Varied Thrush
- (3) Northern Mockingbird
- California Thrasher
- American Pipit
- Cedar Waxwing
- Phainopepla
- Loggerhead Shrike
- (4) European Starling
- (1) **Bell's Vireo**
- Solitary Vireo
- Warbling Vireo
- Orange-crowned Warbler
- Yellow Warbler
- Yellow-rumped Warbler
- Black-th. Gray Warbler
- Townsend's Warbler
- MacGillivray's Warbler
- (8) 3 2 2 I Common Yellowthroat
- Wilson's Warbler
- (1) Yellow-breasted Chat
- **Summer Tananger**
- Western Tanager
- (1) Black-headed Grosbeak
- (6) I IIII Blue Grosbeak
- (5) II 2 I Lazuli Bunting
- (1) Rufous-sided Towhee
- California Towhee
- (18) 2 4 (12) Lark Sparrow
- Savannah Sparrow
- Fox Sparrow
- (25) 3 4 4 2 2 II 2 5 I Song Sparrow
- Lincoln's Sparrow
- White-crowned Sparrow
- (14) 6 6 Red-winged Blackbird
- Western Meadowlark
- Brewer's Blackbird
- (10) 2 II 2 II 2 II Brown-headed Cowbird
- Hooded Oriole
- I Northern Oriole
- (24) 6 3 6 3 3 3 House Finch
- Pine Siskin
- (11) 2 2 4 3 Lesser Goldfinch
- Lawrence's Goldfinch
- American Goldfinch
- House Sparrow

Additional Species

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SIR 4

Area 2 1996 Upper R

BIRDS OF Santa Clara River System

Locality McB → Oldrd Date 4-28 Time 645

- Great Blue Heron
- (1) Green Heron
- (4) 2 1 Mallard
- Cinnamon Teal
- (1) SNOW EGRET
- Turkey Vulture
- White-tailed Kite
- Sharp-shinned Hawk
- (2) II Cooper's Hawk N
- (1) Red-shouldered Hawk
- (2) II Red-tailed Hawk N
- Golden Eagle
- American Kestrel
- (17) 6 3 4 2 2 California Quail
- American Coot
- (4) 2 2 Killdeer
- (1) Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- Rock Dove
- (4) IIII Mourning Dove
- **Yellow-billed Cuckoo**
- Greater Roadrunner
- Barn Owl
- Great Horned Owl
- (10) ~~White-throated~~ Swift VA VX
- (2) II Black-ch. Hummingbird
- Anna's Hummingbird
- Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- (2) II Nuttall's Woodpecker
- Downy Woodpecker
- (1) Hairy Woodpecker
- (1) Northern Flicker
- Western Wood-Pewee
- Willow Flycatcher
- Hammond's Flycatcher
- Pacific Slope Flycatcher
- (1) Black Phoebe
- Say's Phoebe
- (3) III Ash-throated Flycatcher
- **Brown-crested Flycatcher**
- Cassin's Kingbird
- (10) Western Kingbird
- Horned Lark
- Tree Swallow
- Violet-green Swallow
- (22) (15) 6 1 N. Rough-winged Swallow N
- Bank Swallow
- Cliff Swallow
- Barn Swallow
- (4) 2 2 Scrub Jay
- (9) 3 2 2 II American Crow
- Common Raven
- (3) III Plain Titmouse
- (5) 2 3 Bushtit

- (23) IIII IIII III Rock Wren
- IIII IIII III Bewick's Wren N N
- (8) III IIII House Wren
- Ruby-crowned Kinglet
- Blue-gray Gnatcatcher
- (2) II Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- American Robin
- Wrentit
- Northern Mockingbird
- (1) California Thrasher
- American Pipit
- (20) Cedar Waxwing
- Phainopepla
- Loggerhead Shrike
- (15) 8 2 2 III European Starling N
- **Bell's Vireo**
- Solitary Vireo
- (3) III Warbling Vireo
- (4) IIII Orange-crowned Warbler
- (7) II IIII Yellow Warbler
- (2) II Yellow-rumped Warbler
- (1) I Black-th. Gray Warbler
- Townsend's Warbler
- MacGillivray's Warbler
- Common Yellowthroat
- (1) Wilson's Warbler
- (1) Yellow-breasted Chat
- **Summer Tananger**
- (1) Western Tanager
- (4) IIII Black-headed Grosbeak
- Blue Grosbeak
- Lazuli Bunting
- (9) IIII IIII Rufous-sided Townee
- (3) 2 1 California Townee
- Lark Sparrow
- Savannah Sparrow
- IIII IIII I (35) Fox Sparrow
- IIII IIII IIII IIII Song Sparrow
- Lincoln's Sparrow
- (1) White-crowned Sparrow
- (8) 4 2 2 Red-winged Blackbird
- Western Meadowlark
- Brewer's Blackbird
- (7) 2 1 2 II Brown-headed Cowbird
- Hooded Oriole
- (1) Northern Oriole
- (4) House Finch
- Pine Siskin
- Lesser Goldfinch
- Lawrence's Goldfinch
- American Goldfinch
- House Sparrow

(1) AM PELICAN

Additional Species

BIRDS OF Santa Clara River System

Locality W Bnd to Old Rd Date 5-10 Time

- ___ Great Blue Heron
- 2 Green Heron
- 4 Mallard
- ___ Cinnamon Teal
- ___ Turkey Vulture
- ___ White-tailed Kite
- ___ Sharp-shinned Hawk
- ___ Cooper's Hawk
- 1 Red-shouldered Hawk
- 2 Red-tailed Hawk
- ___ Golden Eagle
- ___ American Kestrel
- 6 California Quail
- ___ American Coot
- 8 Killdeer
- 2 Spotted Sandpiper
- ___ Least Sandpiper
- ___ Common Snipe
- ___ Rock Dove
- 2 Mourning Dove
- ___ **Yellow-billed Cuckoo**
- ___ Greater Roadrunner
- ___ Barn Owl
- ___ Great Horned Owl
- ___ White-throated Swift
- ___ Black-ch. Hummingbird
- 2 Anna's Hummingbird
- ___ Costa's Hummingbird
- ___ Belted Kingfisher
- ___ Acorn Woodpecker
- 7 Nuttall's Woodpecker
- 1 Downy Woodpecker
- ___ Hairy Woodpecker
- ___ Northern Flicker
- ___ Western Wood-Pewee
- ___ Willow Flycatcher
- ___ Hammond's Flycatcher
- ___ Pacific Slope Flycatcher
- 2 Black Phoebe
- ___ Say's Phoebe
- 4 Ash-throated Flycatcher
- ___ **Brown-crested Flycatcher**
- ___ Cassin's Kingbird
- ___ Western Kingbird
- ___ Horned Lark
- ___ Tree Swallow
- ___ Violet-green Swallow
- 34 N. Rough-winged Swallow
- ___ Bank Swallow
- ___ Cliff Swallow
- ___ Barn Swallow
- 4 Scrub Jay
- 24 American Crow
- 4 Common Raven
- 2 Plain Titmouse
- 2 Bushtit
- ___ Rock Wren
- 6 Bewick's Wren
- 3 House Wren
- ___ Ruby-crowned Kinglet
- ___ Blue-gray Gnatcatcher
- 2 Western Bluebird
- ___ Swainson's Thrush
- ___ Hermit Thrush
- ___ American Robin
- ___ Wrentit
- ___ Northern Mockingbird
- 2 California Thrasher
- ___ American Pipit
- ___ Cedar Waxwing
- ___ Phainopepla
- ___ Loggerhead Shrike
- 9 European Starling
- ___ **Bell's Vireo**
- ___ Solitary Vireo
- ___ Warbling Vireo
- ___ Orange-crowned Warbler
- 5 Yellow Warbler
- ___ Yellow-rumped Warbler
- ___ Black-th. Gray Warbler
- ___ Townsend's Warbler
- ___ MacGillivray's Warbler
- ___ Common Yellowthroat
- 2 Wilson's Warbler
- 1 Yellow-breasted Chat
- ___ **Summer Tananger**
- 2 Western Tanager
- 4 Black-headed Grosbeak
- 1 Blue Grosbeak
- ___ Lazuli Bunting
- 2 Rufous-sided Towhee
- 2 California Towhee
- ___ Lark Sparrow
- ___ Savannah Sparrow
- ___ Fox Sparrow
- 24 Song Sparrow
- ___ Lincoln's Sparrow
- ___ White-crowned Sparrow
- 25 Red-winged Blackbird
- ___ Western Meadowlark
- ___ Brewer's Blackbird
- 21 Brown-headed Cowbird
- ___ Hooded Oriole
- 2 Northern Oriole
- 4 House Finch
- ___ Pine Siskin
- ___ Lesser Goldfinch
- ___ Lawrence's Goldfinch
- ___ American Goldfinch
- ___ House Sparrow

Additional Species

BIRDS OF Santa Clara River System

Locality MCB → Old Rd. Date 5-21 Time 630 — 8 -

- Great Blue Heron
- Green Heron
- (1) Mallard
- Cinnamon Teal
- Turkey Vulture
- White-tailed Kite
- Sharp-shinned Hawk
- Cooper's Hawk
- (1) Red-shouldered Hawk
- (3) 1 2 Red-tailed Hawk
- Golden Eagle
- American Kestrel
- (6) 2 2 2 California Quail
- American Coot
- (5) 2 1 2 Killdeer
- Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- Rock Dove
- Mourning Dove
- **Yellow-billed Cuckoo**
- Greater Roadrunner
- Barn Owl
- Great Horned Owl
- White-throated Swift
- Black-ch. Hummingbird
- (3) III Anna's Hummingbird
- Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- (1) Nuttall's Woodpecker
- (1) Downy Woodpecker
- Hairy Woodpecker
- Northern Flicker
- Western Wood-Pewee
- Willow Flycatcher
- Hammond's Flycatcher
- (1) Pacific Slope Flycatcher
- (2) II Black Phoebe (N)
- Say's Phoebe
- (3) III Ash-throated Flycatcher
- **Brown-crested Flycatcher**
- Cassin's Kingbird
- Western Kingbird
- Horned Lark
- Tree Swallow
- Violet-green Swallow
- (10) Rough-winged Swallow
- Bank Swallow
- (6) Cliff Swallow N
- Barn Swallow
- (6) III 3 Scrub Jay
- (6) 2 2 2 American Crow
- Common Raven
- (2) II Plain Titmouse
- Bushtit

- Rock Wren
- (21) Bewick's Wren
- (17) House Wren
- Ruby-crowned Kinglet
- Blue-gray Gnatcatcher
- Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- American Robin
- (1) Wrentit
- Northern Mockingbird
- (1) California Thrasher
- American Pipit
- (15) Cedar Waxwing
- Phainopepla
- Loggerhead Shrike
- (8) 3 2 3 European Starling
- **Bell's Vireo**
- Solitary Vireo
- Warbling Vireo
- (1) Orange-crowned Warbler N?
- (3) III Yellow Warbler
- Yellow-rumped Warbler
- Black-th. Gray Warbler
- Townsend's Warbler
- MacGillivray's Warbler
- (6) IIII I Common Yellowthroat
- Wilson's Warbler
- (1) I Yellow-breasted Chat
- **Summer Tanager**
- Western Tanager
- (3) III Black-headed Grosbeak
- Blue Grosbeak
- Lazuli Bunting
- (7) IIII II Rufous-sided Towhee
- (2) California Towhee
- Lark Sparrow
- Savannah Sparrow
- Fox Sparrow
- (37) Song Sparrow
- Lincoln's Sparrow
- White-crowned Sparrow
- (3) Red-winged Blackbird
- Western Meadowlark
- Brewer's Blackbird
- (10) 1 2 2 1 2 2 Brown-headed Cowbird
- Hooded Oriole
- Northern Oriole
- (11) 8 3 House Finch
- Pine Siskin
- (6) 4 2 Lesser Goldfinch
- (2) Lawrence's Goldfinch
- American Goldfinch
- House Sparrow

Additional Species

BCNA — (1)

W Br Nuthatch — (1)

N S I D

6 mile cold water 15 ohe.

BIRDS OF Santa Clara River System

Locality McMan → Old Rd Date 6-12 Time 6:30 – 8 AM

- Great Blue Heron
- Green Heron
- (2) Mallard
- Cinnamon Teal
- Turkey Vulture
- White-tailed Kite
- Sharp-shinned Hawk
- (1) Cooper's Hawk
- (2) || Red-shouldered Hawk
- (1) Red-tailed Hawk YB
- Golden Eagle
- American Kestrel
- (4) 2 2 California Quail
- American Coot
- (2) | | Killdeer
- Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- Rock Dove
- Mourning Dove
- **Yellow-billed Cuckoo**
- Greater Roadrunner
- Barn Owl
- Great Horned Owl
- White-throated Swift
- Black-ch. Hummingbird
- (1) Anna's Hummingbird
- Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- (11) 4 |||| |||| Nuttall's Woodpecker YB
- (1) Downy Woodpecker
- (1) Hairy Woodpecker
- (2) || Northern Flicker
- Western Wood-Pewee
- Willow Flycatcher
- Hammond's Flycatcher
- Pacific Slope Flycatcher
- (6) 1 |||| Black Phoebe
- Say's Phoebe
- (8) 1 1 1 2 || Ash-throated Flycatcher YB
- **Brown-crested Flycatcher**
- Cassin's Kingbird
- Western Kingbird
- Horned Lark
- Tree Swallow
- (31) Violet-green Swallow
- 8 6 8 4 3 2 N. Rough-winged Swallow
- Bank Swallow
- Cliff Swallow
- Barn Swallow
- Scrub Jay
- (11) 4 2 2 | 2 American Crow
- (2) | 1 Common Raven
- (4) 2 2 Plain Titmouse
- (9) 6 3 Bushtit
- (15) 4 |||| |||| Rock Wren
- Bewick's Wren
- (3) | | House Wren
- Ruby-crowned Kinglet
- Blue-gray Gnatcatcher
- (5) |||| Western Bluebird YB
- Swainson's Thrush
- Hermit Thrush
- American Robin
- (1) | Wrentit
- Northern Mockingbird
- (2) || California Thrasher
- American Pipit
- Cedar Waxwing
- Phainopepla
- Loggerhead Shrike
- (13) 6 || |||| European Starling
- **Bell's Vireo**
- Solitary Vireo
- Warbling Vireo
- Orange-crowned Warbler
- (1) Yellow Warbler
- Yellow-rumped Warbler
- Black-th. Gray Warbler
- Townsend's Warbler
- MacGillivray's Warbler
- 1 |||| |||| || Common Yellowthroat
- Wilson's Warbler
- (16) Yellow-breasted Chat
- **Summer Tananger**
- Western Tanager
- (7) | |||| Black-headed Grosbeak
- Blue Grosbeak
- Lazuli Bunting
- (5) |||| Rufous-sided Towhee YB
- (6) | | 3 | California Towhee YB
- 1 (36) Lark Sparrow
- |||| || |||| Savannah Sparrow
- |||| |||| |||| |||| Fox Sparrow
- |||| |||| |||| |||| Song Sparrow FY
- Lincoln's Sparrow
- White-crowned Sparrow
- Red-winged Blackbird
- Western Meadowlark
- Brewer's Blackbird
- (5) | 2 || Brown-headed Cowbird
- Hooded Oriole
- Northern Oriole
- (3) WB NUT NAT YB
- (5) 2 || House Finch
- Pine Siskin
- (9) 4 3 | | Lesser Goldfinch FY
- Lawrence's Goldfinch
- (2) American Goldfinch
- House Sparrow

S SIDE

Additional Species

BIRDS OF Santa Clara River System

Locality McB → Old Rd Date 6/25 Time 630 :: 745

- Great Blue Heron
- Green Heron
- 2 Mallard
- Cinnamon Teal
- Turkey Vulture
- White-tailed Kite
- Sharp-shinned Hawk
- 1 Cooper's Hawk
- 3 Red-shouldered Hawk
- 1 Red-tailed Hawk
- Golden Eagle
- American Kestrel
- California Quail
- American Coot
- Killdeer
- Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- Rock Dove
- 1 Mourning Dove
- **Yellow-billed Cuckoo**
- Greater Roadrunner
- 1 Barn Owl
- Great Horned Owl
- White-throated Swift
- Black-ch. Hummingbird
- 1 Anna's Hummingbird
- Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- 4 Nuttall's Woodpecker
- 3 Downy Woodpecker
- 1 Hairy Woodpecker
- Northern Flicker
- Western Wood-Pewee
- Willow Flycatcher
- Hammond's Flycatcher
- Pacific Slope Flycatcher
- 3 5 Black Phoebe SY
- Say's Phoebe
- 4 Ash-throated Flycatcher (SY)
- **Brown-crested Flycatcher**
- Cassin's Kingbird
- Western Kingbird
- Horned Lark
- Tree Swallow
- Violet-green Swallow
- (25) (20) 6 3 N. Rough-winged Swallow
- Bank Swallow
- (35) (20) 6 2 Cliff Swallow
- Barn Swallow
- 1 Scrub Jay
- 6 2 1 American Crow
- 2 Common Raven
- 1 2 3 Plain Titmouse
- 3 Bushtit
- 1 5 Rock Wren
- 1 5 Bewick's Wren
- 5 House Wren
- Ruby-crowned Kinglet
- Blue-gray Gnatcatcher
- Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- American Robin
- Wrentit
- Northern Mockingbird
- California Thrasher
- American Pipit
- Cedar Waxwing
- 2 Phainopepla
- Loggerhead Shrike
- 1 European Starling
- **Bell's Vireo**
- Solitary Vireo
- Warbling Vireo
- Orange-crowned Warbler
- 1 5 Yellow Warbler
- Yellow-rumped Warbler
- Black-th. Gray Warbler
- Townsend's Warbler
- MacGillivray's Warbler
- 5 Common Yellowthroat
- Wilson's Warbler
- Yellow-breasted Chat
- **Summer Tananger**
- Western Tanager
- 2 Black-headed Grosbeak
- 2 Blue Grosbeak
- Lazuli Bunting
- 7 10 Rufous-sided Townee
- 1 9 California Townee
- Lark Sparrow
- Savannah Sparrow
- Fox Sparrow
- 1 5 5 Song Sparrow
- Lincoln's Sparrow
- White-crowned Sparrow
- Red-winged Blackbird
- Western Meadowlark
- Brewer's Blackbird
- 1 Brown-headed Cowbird
- Hooded Oriole
- Northern Oriole
- 4 2 3 2 House Finch
- Pine Siskin
- 1 3 2 Lesser Goldfinch
- Lawrence's Goldfinch
- American Goldfinch
- House Sparrow

Additional Species

1 W Bl NUTMG

N SIDE

BIRDS OF Santa Clara River System

Locality McB → Oxnard Date 7 9 Time 6 30 — 8

(1) Great Blue Heron
Green Heron
(1) Mallard
Cinnamon Teal
Turkey Vulture
White-tailed Kite
Sharp-shinned Hawk
Cooper's Hawk
(4) 1111 Red-shouldered Hawk
Red-tailed Hawk
Golden Eagle
American Kestrel
(4) 22 California Quail
American Coot
Killdeer
Spotted Sandpiper
Least Sandpiper
Common Snipe
Rock Dove
(1) Mourning Dove
Yellow-billed Cuckoo
Greater Roadrunner
Barn Owl
Great Horned Owl
White-throated Swift
Black-ch. Hummingbird
(2) 11 Anna's Hummingbird
Costa's Hummingbird
Belted Kingfisher
Acorn Woodpecker
(6) 2211 Nuttall's Woodpecker
(3) 111 Downy Woodpecker
Hairy Woodpecker
Northern Flicker
Western Wood-Pewee
Willow Flycatcher
Hammond's Flycatcher
Pacific Slope Flycatcher
(9) 1111 1111 Black Phoebe
Say's Phoebe
(5) 1211 Ash-throated Flycatcher
Brown-crested Flycatcher
Cassin's Kingbird
(1) Western Kingbird
Horned Lark
Tree Swallow
Violet-green Swallow
(3) N. Rough-winged Swallow
Bank Swallow
(17) 9 8 Cliff Swallow
Barn Swallow
(3) 12 Scrub Jay
(3) 21 American Crow
Common Raven
(8) 2231 Plain Titmouse
Bushtit

Rock Wren
(12) 11 1111 1111 Bewick's Wren
House Wren
Ruby-crowned Kinglet
Blue-gray Gnatcatcher
Western Bluebird
Swainson's Thrush
Hermit Thrush
American Robin
(1) Wrentit
Northern Mockingbird
California Thrasher
American Pipit
Cedar Waxwing
(1) Phainopepla
Loggerhead Shrike
(9) 81 European Starling
Bell's Vireo
Solitary Vireo
Warbling Vireo
Orange-crowned Warbler
Yellow Warbler
Yellow-rumped Warbler
Black-th. Gray Warbler
Townsend's Warbler
MacGillivray's Warbler
(3) 21 Common Yellowthroat
Wilson's Warbler
Yellow-breasted Chat
Summer Tananger
Western Tanager
(8) 111 1111 Black-headed Grosbeak
(3) 111 Blue Grosbeak
(8) 3 1111 Lazuli Bunting
(6) 1 1111 Rufous-sided Townee
(3) 111 California Townee
(11) 3 5 12 Lark Sparrow
Savannah Sparrow
Fox Sparrow
1111 Song Sparrow
(22) 2 1111 1111 Lincoln's Sparrow
White-crowned Sparrow
Red-winged Blackbird
Western Meadowlark
Brewer's Blackbird
(12) 322 2 111 Brown-headed Cowbird
Hooded Oriole
Northern Oriole
(39) 6 53 8 4 2 47 House Finch
Pine Siskin
(5) 3 2 Lesser Goldfinch
Lawrence's Goldfinch
American Goldfinch
House Sparrow

Additional Species

Upper R 1996
Area 3

BIRDS OF Santa Clara River System

Locality Bouquet to McBean Date 4/20 Time

- Great Blue Heron
- Green Heron
- (1) Mallard
- Cinnamon Teal
- Turkey Vulture
- White-tailed Kite
- Sharp-shinned Hawk
- (1) Cooper's Hawk
- Red-shouldered Hawk
- (1) Red-tailed Hawk
- Golden Eagle
- American Kestrel
- California Quail
- American Coot
- (2) Killdeer
- Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- Rock Dove
- (12) 8 Mourning Dove
- **Yellow-billed Cuckoo**
- Greater Roadrunner
- Barn Owl
- Great Horned Owl
- White-throated Swift
- (2) || Black-ch. Hummingbird
- (1) Anna's Hummingbird
- Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- (3) ||| Nuttall's Woodpecker
- (3) 2 | Downy Woodpecker
- (1) | Hairy Woodpecker
- Northern Flicker
- Western Wood-Pewee
- Willow Flycatcher
- Hammond's Flycatcher
- Pacific Slope Flycatcher
- (4) ||2 Black Phoebe
- Say's Phoebe
- (5) | 2 2 Ash-throated Flycatcher
- **Brown-crested Flycatcher**
- Cassin's Kingbird
- (17) 3 4,3,7 Western Kingbird (flocks!)
- Horned Lark
- Tree Swallow
- Violet-green Swallow
- N. Rough-winged Swallow
- Bank Swallow
- (22) 8,10,4 Cliff Swallow 18 nests under Bouquet Bridge & birds = Bridge
- (6) 3 2 | Barn Swallow
- (3) ||| Scrub Jay
- (13) 3,8,2 American Crow
- (5) 2,3 Common Raven
- Plain Titmouse
- (5) | 2 2 Bushtit
- Rock Wren
- (7) 2|2 Bewick's Wren
- House Wren
- Ruby-crowned Kinglet
- Blue-gray Gnatcatcher
- Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- American Robin
- Wrentit
- Northern Mockingbird
- (2) || California Thrasher
- American Pipit
- Cedar Waxwing
- Phainopepla
- Loggerhead Shrike
- European Starling
- **Bell's Vireo**
- Solitary Vireo
- Warbling Vireo
- (9) |||3/2 Orange-crowned Warbler
- (2) || Yellow Warbler
- (2) || Yellow-rumped Warbler
- Black-th. Gray Warbler
- Townsend's Warbler
- MacGillivray's Warbler
- (2) || Common Yellowthroat
- (5) |||| Wilson's Warbler
- Yellow-breasted Chat
- **Summer Tananger**
- (2) 2 Western Tanager
- (10) |||4||| Black-headed Grosbeak
- Blue Grosbeak
- Lazuli Bunting
- (2) || Rufous-sided Towhee
- (1) | California Towhee
- Lark Sparrow
- Savannah Sparrow
- Fox Sparrow
- (24) 24 6 |||| 3 Song Sparrow
- Lincoln's Sparrow
- (2) White-crowned Sparrow
- Red-winged Blackbird
- Western Meadowlark
- Brewer's Blackbird
- Brown-headed Cowbird
- Hooded Oriole
- (4) 2|| Northern Oriole
- (4) 4 House Finch
- Pine Siskin
- (25) 25 Lesser Goldfinch
- Lawrence's Goldfinch
- American Goldfinch
- House Sparrow

(3) Barn Owl under McBean Bridge

Additional Species

(5) — 2,2,VAUX SWIFT

(1) — 1 Spotted Dow

BIRDS OF Santa Clara River System

Locality Bogert → McBean Date 5/6/96 Time 6:30
northside

___ Great Blue Heron	___ Rock Wren
___ Green Heron	9 Bewick's Wren
2 Mallard	___ House Wren
___ Cinnamon Teal	___ Ruby-crowned Kinglet
___ Turkey Vulture	___ Blue-gray Gnatcatcher
___ White-tailed Kite	___ Western Bluebird
___ Sharp-shinned Hawk	___ Swainson's Thrush
___ Cooper's Hawk	___ Hermit Thrush
___ Red-shouldered Hawk	___ American Robin
3 Red-tailed Hawk	___ Wrentit
___ Golden Eagle	___ Northern Mockingbird
___ American Kestrel	2 California Thrasher
15 California Quail	___ American Pipit
___ American Coot	___ Cedar Waxwing
5 Killdeer	___ Phainopepla
___ Spotted Sandpiper	___ Loggerhead Shrike
___ Least Sandpiper	4 European Starling
___ Common Snipe	___ **Bell's Vireo**
___ Rock Dove	___ Solitary Vireo
6 Mourning Dove	___ Warbling Vireo
___ **Yellow-billed Cuckoo**	1 Orange-crowned Warbler
1 Greater Roadrunner	4 Yellow Warbler
___ Barn Owl	___ Yellow-rumped Warbler
___ Great Horned Owl	(2) 11 Black-th. Gray Warbler
___ White-throated Swift	___ Townsend's Warbler
___ Black-ch. Hummingbird	___ MacGillivray's Warbler
3 Anna's Hummingbird	1 Common Yellowthroat
___ Costa's Hummingbird	(2) 11 Wilson's Warbler
___ Belted Kingfisher	1 Yellow-breasted Chat
___ Acorn Woodpecker	___ **Summer Tananger**
2 Nuttall's Woodpecker	___ Western Tanager
___ Downy Woodpecker	8 Black-headed Grosbeak
___ Hairy Woodpecker	1 Blue Grosbeak
1 Northern Flicker	___ Lazuli Bunting
___ Western Wood-Pewee	6 Rufous-sided Towhee
___ Willow Flycatcher	4 California Towhee
___ Hammond's Flycatcher	___ Lark Sparrow
___ Pacific Slope Flycatcher	___ Savannah Sparrow
5 Black Phoebe	___ Fox Sparrow
___ Say's Phoebe	18 Song Sparrow
2 Ash-throated Flycatcher	___ Lincoln's Sparrow
___ **Brown-crested Flycatcher**	___ White-crowned Sparrow
___ Cassin's Kingbird	4 Red-winged Blackbird
4 Western Kingbird	___ Western Meadowlark
___ Horned Lark	___ Brewer's Blackbird
___ Tree Swallow	5 Brown-headed Cowbird
___ Violet-green Swallow	___ Hooded Oriole
13 N. Rough-winged Swallow	___ Northern Oriole
___ Bank Swallow	4 House Finch
___ Cliff Swallow	___ Pine Siskin
___ Barn Swallow	2 Lesser Goldfinch
7 Scrub Jay	___ Lawrence's Goldfinch
4 American Crow	___ American Goldfinch
30 Common Raven	2 House Sparrow
___ Plain Titmouse	
4 Bushtit	Additional Species
	___

BIRDS OF Santa Clara River System

Locality Boyle - McBain Date 5-16 Time _____

_____ Great Blue Heron
_____ Green Heron
2 Mallard
_____ Cinnamon Teal
_____ Turkey Vulture
_____ White-tailed Kite
_____ Sharp-shinned Hawk
_____ Cooper's Hawk
_____ Red-shouldered Hawk
2 Red-tailed Hawk
_____ Golden Eagle
_____ American Kestrel
7 California Quail
_____ American Coot
7 Killdeer
_____ Spotted Sandpiper
_____ Least Sandpiper
_____ Common Snipe
_____ Rock Dove
2 Mourning Dove
_____ **Yellow-billed Cuckoo**
_____ Greater Roadrunner
_____ Barn Owl
_____ Great Horned Owl
_____ White-throated Swift
_____ Black-ch. Hummingbird
3 Anna's Hummingbird
_____ Costa's Hummingbird
_____ Belted Kingfisher
_____ Acorn Woodpecker
3 Nuttall's Woodpecker
_____ Downy Woodpecker
_____ Hairy Woodpecker
1 Northern Flicker
_____ Western Wood-Pewee
_____ Willow Flycatcher
_____ Hammond's Flycatcher
_____ Pacific Slope Flycatcher
5 Black Phoebe
_____ Say's Phoebe
2 Ash-throated Flycatcher
_____ **Brown-crested Flycatcher**
_____ Cassin's Kingbird
3 Western Kingbird
_____ Horned Lark
_____ Tree Swallow
_____ Violet-green Swallow
9 N. Rough-winged Swallow
_____ Bank Swallow
2 Cliff Swallow
_____ Barn Swallow
6 Scrub Jay
35 American Crow
15 Common Raven
_____ Plain Titmouse
5 Bushtit

_____ Rock Wren
5 Bewick's Wren
_____ House Wren
_____ Ruby-crowned Kinglet
_____ Blue-gray Gnatcatcher
_____ Western Bluebird
_____ Swainson's Thrush
_____ Hermit Thrush
_____ American Robin
_____ Wrentit
_____ Northern Mockingbird
4 California Thrasher
_____ American Pipit
_____ Cedar Waxwing
_____ Phainopepla
_____ Loggerhead Shrike
_____ European Starling
_____ **Bell's Vireo**
_____ Solitary Vireo
_____ Warbling Vireo
_____ Orange-crowned Warbler
2 Yellow Warbler
_____ Yellow-rumped Warbler
_____ Black-th. Gray Warbler
_____ Townsend's Warbler
_____ MacGillivray's Warbler
5 Common Yellowthroat
_____ Wilson's Warbler
_____ Yellow-breasted Chat
_____ **Summer Tananger**
_____ Western Tanager
4 Black-headed Grosbeak
2 Blue Grosbeak
_____ Lazuli Bunting
3 Rufous-sided Towhee
3 California Towhee
_____ Lark Sparrow
_____ Savannah Sparrow
_____ Fox Sparrow
15 Song Sparrow
_____ Lincoln's Sparrow
_____ White-crowned Sparrow
21 Red-winged Blackbird
_____ Western Meadowlark
_____ Brewer's Blackbird
7 Brown-headed Cowbird
_____ Hooded Oriole
3 Northern Oriole
10 House Finch
_____ Pine Siskin
2 Lesser Goldfinch
2 Lawrence's Goldfinch
_____ American Goldfinch
2 House Sparrow

Additional Species

_____

BIRDS OF Santa Clara River System

Locality SCR Bogert-McBean Date 6-10 Time

- ___ Great Blue Heron
- ___ Green Heron
- ___ Mallard
- ___ Cinnamon Teal
- ___ Turkey Vulture
- ___ White-tailed Kite
- ___ Sharp-shinned Hawk
- ___ Cooper's Hawk
- ___ Red-shouldered Hawk
- 1 Red-tailed Hawk
- ___ Golden Eagle
- ___ American Kestrel
- ___ California Quail
- ___ American Coot
- 8 Killdeer
- ___ Spotted Sandpiper
- ___ Least Sandpiper
- ___ Common Snipe
- ___ Rock Dove
- 3 Mourning Dove
- ___ **Yellow-billed Cuckoo**
- ___ Greater Roadrunner
- ___ Barn Owl
- ___ Great Horned Owl
- ___ White-throated Swift
- ___ Black-ch. Hummingbird
- 3 Anna's Hummingbird
- ___ Costa's Hummingbird
- ___ Belted Kingfisher
- ___ Acorn Woodpecker
- 4 Nuttall's Woodpecker
- 2 Downy Woodpecker
- ___ Hairy Woodpecker
- 1 Northern Flicker
- ___ Western Wood-Pewee
- ___ Willow Flycatcher
- ___ Hammond's Flycatcher
- ___ Pacific Slope Flycatcher
- 5 Black Phoebe
- ___ Say's Phoebe
- ___ Ash-throated Flycatcher
- ___ **Brown-crested Flycatcher**
- ___ Cassin's Kingbird
- ___ Western Kingbird
- ___ Horned Lark
- ___ Tree Swallow
- ___ Violet-green Swallow
- 11 N. Rough-winged Swallow
- ___ Bank Swallow
- ___ Cliff Swallow
- ___ Barn Swallow
- 4 Scrub Jay
- 30 American Crow
- 30 Common Raven
- 1 Plain Titmouse
- ___ Bushtit
- ___ Rock Wren
- 4 Bewick's Wren
- 1 House Wren
- ___ Ruby-crowned Kinglet
- ___ Blue-gray Gnatcatcher
- ___ Western Bluebird
- ___ Swainson's Thrush
- ___ Hermit Thrush
- ___ American Robin
- ___ Wrentit
- ___ Northern Mockingbird
- 1 California Thrasher
- ___ American Pipit
- ___ Cedar Waxwing
- ___ Phainopepla
- ___ Loggerhead Shrike
- ___ European Starling
- ___ **Bell's Vireo**
- ___ Solitary Vireo
- ___ Warbling Vireo
- ___ Orange-crowned Warbler
- ___ Yellow Warbler
- ___ Yellow-rumped Warbler
- ___ Black-th. Gray Warbler
- ___ Townsend's Warbler
- ___ MacGillivray's Warbler
- 3 Common Yellowthroat
- ___ Wilson's Warbler
- ___ Yellow-breasted Chat
- ___ **Summer Tananger**
- ___ Western Tanager
- 1 Black-headed Grosbeak
- ___ Blue Grosbeak
- 2 Lazuli Bunting
- 2 Rufous-sided Townee
- 2 California Towhee
- ___ Lark Sparrow
- ~~15~~ Savannah Sparrow ~~Sm. Juv.~~
- ___ Fox Sparrow
- 15 Song Sparrow some juv.
- ___ Lincoln's Sparrow
- ___ White-crowned Sparrow
- 25 Red-winged Blackbird
- ___ Western Meadowlark
- ___ Brewer's Blackbird
- 8 Brown-headed Cowbird
- ___ Hooded Oriole
- 1 Northern Oriole
- 18 House Finch
- ___ Pine Siskin
- 4 Lesser Goldfinch
- ___ Lawrence's Goldfinch
- ___ American Goldfinch
- 2 House Sparrow

Additional Species

1 Snowy egret

BIRDS OF Santa Clara River System

Locality Bogert → McBean Date 6/24 Time _____

___ Great Blue Heron	___ Rock Wren
___ Green Heron	2 Bewick's Wren
3 Mallard	___ House Wren
___ Cinnamon Teal	___ Ruby-crowned Kinglet
___ Turkey Vulture	___ Blue-gray Gnatcatcher
___ White-tailed Kite	___ Western Bluebird
___ Sharp-shinned Hawk	___ Swainson's Thrush
___ Cooper's Hawk	___ Hermit Thrush
___ Red-shouldered Hawk	2 American Robin
1 Red-tailed Hawk	___ Wrentit
___ Golden Eagle	___ Northern Mockingbird
___ American Kestrel	1 California Thrasher
6 California Quail	___ American Pipit
___ American Coot	___ Cedar Waxwing
4 Killdeer	___ Phainopepla
___ Spotted Sandpiper	___ Loggerhead Shrike
___ Least Sandpiper	___ European Starling
___ Common Snipe	___ **Bell's Vireo**
___ Rock Dove	___ Solitary Vireo
6 Mourning Dove	___ Warbling Vireo
___ **Yellow-billed Cuckoo**	___ Orange-crowned Warbler
___ Greater Roadrunner	1 Yellow Warbler singing
___ Barn Owl	___ Yellow-rumped Warbler
___ Great Horned Owl	___ Black-th. Gray Warbler
___ White-throated Swift	___ Townsend's Warbler
___ Black-ch. Hummingbird	___ MacGillivray's Warbler
2 Anna's Hummingbird	5 Common Yellowthroat 2 juv.
___ Costa's Hummingbird	___ Wilson's Warbler
___ Belted Kingfisher	___ Yellow-breasted Chat
___ Acorn Woodpecker	___ **Summer Tananger**
2 Nuttall's Woodpecker	___ Western Tanager
1 Downy Woodpecker	___ Black-headed Grosbeak
___ Hairy Woodpecker	2 Blue Grosbeak
2 Northern Flicker	2 Lazuli Bunting ♂♀
___ Western Wood-Pewee	2 Rufous-sided Towhee 1 juv.
___ Willow Flycatcher	3 California Towhee
___ Hammond's Flycatcher	___ Lark Sparrow
___ Pacific Slope Flycatcher	___ Savannah Sparrow
3 Black Phoebe	___ Fox Sparrow
___ Say's Phoebe	20 Song Sparrow
2 Ash-throated Flycatcher	___ Lincoln's Sparrow
___ **Brown-crested Flycatcher**	___ White-crowned Sparrow
___ Cassin's Kingbird	21 Red-winged Blackbird
___ Western Kingbird	___ Western Meadowlark
___ Horned Lark	___ Brewer's Blackbird
___ Tree Swallow	___ Brown-headed Cowbird
___ Violet-green Swallow	___ Hooded Oriole
35 N. Rough-winged Swallow	5 Northern Oriole 3 juv.
___ Bank Swallow	19 House Finch
4 Cliff Swallow	___ Pine Siskin
___ Barn Swallow	2 Lesser Goldfinch
5 Scrub Jay	___ Lawrence's Goldfinch
24 American Crow	___ American Goldfinch
8 Common Raven	4 House Sparrow
___ Plain Titmouse	
6 Bushtit flock	Additional Species

BIRDS OF Santa Clara River System

Locality Bogert → McBean Date 7-8-96 Time

	Great Blue Heron		Rock Wren
2	Green Heron	6	Bewick's Wren
	Mallard		House Wren
	Cinnamon Teal		Ruby-crowned Kinglet
	Turkey Vulture		Blue-gray Gnatcatcher
	White-tailed Kite		Western Bluebird
	Sharp-shinned Hawk		Swainson's Thrush
1	Cooper's Hawk		Hermit Thrush
	Red-shouldered Hawk		American Robin
2	Red-tailed Hawk		Wrentit
	Golden Eagle		Northern Mockingbird
	American Kestrel	2	California Thrasher
6	California Quail		American Pipit
	American Coot		Cedar Waxwing
4	Killdeer		Phainopepla
	Spotted Sandpiper		Loggerhead Shrike
	Least Sandpiper		European Starling
	Common Snipe		**Bell's Vireo**
	Rock Dove		Solitary Vireo
2	Mourning Dove		Warbling Vireo
	Yellow-billed Cuckoo		Orange-crowned Warbler
	Greater Roadrunner		Yellow Warbler
	Barn Owl		Yellow-rumped Warbler
	Great Horned Owl		Black-th. Gray Warbler
	White-throated Swift		Townsend's Warbler
	Black-cn. Hummingbird		MacGillivray's Warbler
3	Anna's Hummingbird	3	Common Yellowthroat
	Costa's Hummingbird		Wilson's Warbler
	Belted Kingfisher		Yellow-breasted Chat
	Acorn Woodpecker		**Summer Tananger**
3	Nuttall's Woodpecker		Western Tanager
1	Downy Woodpecker	1	Black-headed Grosbeak
	Hairy Woodpecker	1	Blue Grosbeak
	Northern Flicker	2	Lazuli Bunting
	Western Wood-Pewee	1	Rufous-sided Townee
	Willow Flycatcher	3	California Townee
	Hammond's Flycatcher		Lark Sparrow
	Pacific Slope Flycatcher		Savannah Sparrow
6	Black Phoebe		Fox Sparrow
	Say's Phoebe	8	Song Sparrow
4	Ash-throated Flycatcher family		Lincoln's Sparrow
	Brown-crested Flycatcher		White-crowned Sparrow
	Cassin's Kingbird	21	Red-winged Blackbird
4	Western Kingbird		Western Meadowlark
	Horned Lark		Brewer's Blackbird
	Tree Swallow	3	Brown-headed Cowbird
	Violet-green Swallow		Hooded Oriole
6	N. Rough-winged Swallow	9	Northern Oriole 2 families
	Bank Swallow	43	House Finch
21	Cliff Swallow		Pine Siskin
5	Barn Swallow	3	Lesser Goldfinch
6	Scrub Jay		Lawrence's Goldfinch
25	American Crow		American Goldfinch
45	Common Raven		House Sparrow
	Plain Titmouse		
1	Bushtit		Additional Species

Upper River Area 4 1996

BIRDS OF Santa Clara River System

645 - 8:15

Locality: Upper - Bouquet Date: 4-20 Time: 4-20

SA SRC

- Great Blue Heron
- Green Heron
- (1) Mallard
- Cinnamon Teal
- Turkey Vulture
- White-tailed Kite
- Sharp-shinned Hawk
- Cooper's Hawk
- (1) Red-shouldered Hawk
- Red-tailed Hawk
- Golden Eagle
- (1) American Kestrel
- (35) 9 6 4 4 6 ~~||||~~ California Quail
- American Coot
- (6) 2 || Killdeer
- Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- Rock Dove
- (9) 3 4 || Mourning Dove
- **Yellow-billed Cuckoo**
- (1) Greater Roadrunner
- Barn Owl
- Great Horned Owl
- (24) (20) 3 ~~White-throated~~ Swift VMVX
- Black-ch. Hummingbird
- (4) |||| Anna's Hummingbird
- Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- (3) ||| Nuttall's Woodpecker
- Downy Woodpecker
- Hairy Woodpecker
- (1) Northern Flicker
- Western Wood-Pewee
- Willow Flycatcher
- Hammond's Flycatcher
- Pacific Slope Flycatcher
- Black Phoebe
- Say's Phoebe
- (1) Ash-throated Flycatcher
- **Brown-crested Flycatcher**
- Cassin's Kingbird
- (4) 2 Western Kingbird
- Horned Lark
- Tree Swallow
- (4) Violet-green Swallow
- (1) N. Rough-winged Swallow
- Bank Swallow
- Cliff Swallow
- (2) Barn Swallow
- 6. ~~||||~~ | ~~||||~~ Scrub Jay
- (1) American Crow
- (16) 9 4 1 ~~||||~~ Common Raven
- Plain Titmouse
- (5) 3 || Bushtit
- Rock Wren
- (24) ||| ~~||||~~ ~~||||~~ ~~||||~~ ~~||||~~ Bewick's Wren
- House Wren
- (1) Ruby-crowned Kinglet
- Blue-gray Gnatcatcher
- Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- American Robin
- (5) ~~||||~~ Wrentit
- Northern Mockingbird
- (5) ~~||||~~ California Thrasher
- American Pipit
- Cedar Waxwing
- Phainopepla
- Loggerhead Shrike
- (1) European Starling
- **Bell's Vireo**
- Solitary Vireo
- Warbling Vireo
- (6) || 3 | Orange-crowned Warbler
- Yellow Warbler
- (3) ||| Yellow-rumped Warbler
- Black-th. Gray Warbler
- Townsend's Warbler
- MacGillivray's Warbler
- (3) ||| Common Yellowthroat
- Wilson's Warbler
- (1) Yellow-breasted Chat
- **Summer Tanager**
- Western Tanager
- Black-headed Grosbeak
- (1) Blue Grosbeak
- Lazuli Bunting
- (8) ||| ~~||||~~ Rufous-sided Towhee
- (5) ~~||||~~ California Towhee
- Lark Sparrow
- Savannah Sparrow
- Fox Sparrow
- (16) | ~~||||~~ ~~||||~~ ~~||||~~ Song Sparrow
- Lincoln's Sparrow
- White-crowned Sparrow
- (6) Red-winged Blackbird
- Western Meadowlark
- Brewer's Blackbird
- (4) 2 2 Brown-headed Cowbird
- Hooded Oriole
- (4) |||| Northern Oriole
- (14) 3 4 5 || House Finch
- Pine Siskin
- (5) 2 3 | Lesser Goldfinch
- Lawrence's Goldfinch
- American Goldfinch
- House Sparrow

Additional Species

No H2O 6 of pre
see H2O at pump
...

Blew pipe in Trestle.
water diverted at ... ?

BIRDS OF Santa Clara River System

Locality UPPER → BOGUET Date 5-6 Time 6:30—

11 5/06

- ___ Great Blue Heron
- ___ Green Heron
- (2) 2 Mallard
- ___ Cinnamon Teal
- ___ Turkey Vulture
- ___ White-tailed Kite
- ___ Sharp-shinned Hawk
- (1) 1 Cooper's Hawk
- ___ Red-shouldered Hawk
- ___ Red-tailed Hawk
- ___ Golden Eagle
- ___ American Kestrel
- 2 4 3 3 4 2 2 California Quail
- ___ American Coot
- (2) 2 Killdeer
- ___ Spotted Sandpiper
- ___ Least Sandpiper
- ___ Common Snipe
- ___ Rock Dove
- (3) 21 Mourning Dove
- ___ **Yellow-billed Cuckoo**
- (1) 1 Greater Roadrunner
- ___ Barn Owl
- ___ Great Horned Owl
- ___ White-throated Swift
- ___ Black-ch. Hummingbird
- (2) II Anna's Hummingbird
- (1) 1 Costa's Hummingbird
- ___ Belted Kingfisher
- ___ Acorn Woodpecker
- (3) III Nuttall's Woodpecker
- ___ Downy Woodpecker
- ___ Hairy Woodpecker
- (1) 1 Northern Flicker
- ___ Western Wood-Pewee
- ___ Willow Flycatcher
- ___ Hammond's Flycatcher
- ___ Pacific Slope Flycatcher
- ___ Black Phoebe
- ___ Say's Phoebe
- ___ Ash-throated Flycatcher
- ___ **Brown-crested Flycatcher**
- ___ Cassin's Kingbird
- (2) 2 Western Kingbird
- ___ Horned Lark
- ___ Tree Swallow
- ___ Violet-green Swallow
- (1) 1 N. Rough-winged Swallow
- ___ Bank Swallow
- ___ Cliff Swallow
- ___ Barn Swallow
- (5) IIII Scrub Jay
- (2) 1 American Crow
- (15) 6 2 5 11 Common Raven
- ___ Plain Titmouse
- (4) 2 2 Bushtit
- (25) IIII IIII IIII IIII IIII Rock Wren
- IIII Bewick's Wren
- ___ House Wren
- ___ Ruby-crowned Kinglet
- ___ Blue-gray Gnatcatcher
- (2) 2 Western Bluebird
- ___ Swainson's Thrush
- (1) 1 ~~Hermit~~ Thrush SUMMER
- (1) 1 American Robin
- (4) IIII Wrentit
- (1) 1 Northern Mockingbird
- (2) II California Thrasher
- ___ American Pipit
- ___ Cedar Waxwing
- (2) II Phainopepla
- ___ Loggerhead Shrike
- (3) III European Starling
- ___ **Bell's Vireo**
- ___ Solitary Vireo
- (1) 1 Warbling Vireo
- (1) 1 Orange-crowned Warbler
- (8) IIII Yellow Warbler
- (1) 1 Yellow-rumped Warbler
- ___ Black-th. Gray Warbler
- ___ Townsend's Warbler
- ___ MacGillivray's Warbler
- (2) II Common Yellowthroat
- (3) III Wilson's Warbler
- ___ Yellow-breasted Chat
- ___ **Summer Tananger**
- (3) III Western Tanager
- (1) 1 Black-headed Grosbeak
- ___ Blue Grosbeak
- (1) 1 Lazuli Bunting
- (7) II IIII Rufous-sided Townee
- (9) II IIII California Townee
- ___ Lark Sparrow
- ___ Savannah Sparrow
- ___ Fox Sparrow
- (13) II II 6 2 II Song Sparrow
- ___ Lincoln's Sparrow
- ___ White-crowned Sparrow
- (27) (15) 6 6 Red-winged Blackbird
- ___ Western Meadowlark
- ___ Brewer's Blackbird
- (4) 2 2 Brown-headed Cowbird
- ___ Hooded Oriole
- (8) II IIII Northern Oriole
- (20) 2 3 6 3 4 2 House Finch
- ___ Pine Siskin
- (6) 2 2 2 Lesser Goldfinch
- (1) 1 Lawrence's Goldfinch
- ___ American Goldfinch
- ___ House Sparrow

Additional Species

___

BIRDS OF Santa Clara River System

Locality Upper River Date 5/17/96 Time Include Lists now

- Great Blue Heron
- Green Heron
- Mallard
- Cinnamon Teal
- Turkey Vulture
- White-tailed Kite
- Sharp-shinned Hawk
- Cooper's Hawk
- Red-shouldered Hawk
- (3) 2 Red-tailed Hawk
- Golden Eagle
- American Kestrel
- (34) 22 4 22 6 28 California Quail
- American Coot
- (2) II Killdeer
- Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- (1) Rock Dove
- (16) II 2 2 3 2 2 Mourning Dove
- **Yellow-billed Cuckoo**
- (3) Greater Roadrunner
- Barn Owl
- Great Horned Owl
- (4) White-throated Swift
- (6) I Black-ch. Hummingbird
- (2) II Anna's Hummingbird
- (1) I Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- (10) 2 3 II Nuttall's Woodpecker nesting
- (1) Downy Woodpecker
- Hairy Woodpecker
- (2) Northern Flicker
- Western Wood-Pewee
- (1) Willow Flycatcher
- Hammond's Flycatcher
- Pacific Slope Flycatcher
- (1) Black Phoebe
- Say's Phoebe
- (4) Ash-throated Flycatcher
- **Brown-crested Flycatcher**
- Cassin's Kingbird
- (2) Western Kingbird
- Horned Lark
- Tree Swallow
- Violet-green Swallow
- (12) 8 4 N. Rough-winged Swallow
- Bank Swallow
- (10) Cliff Swallow
- (1) Barn Swallow
- (19) I II III Scrub Jay
- (7) 2 American Crow
- (9) 2 2 Common Raven
- (1) Plain Titmouse
- (10) 2 6 Bushtit
- Rock Wren
- (21) (4 III Bewick's Wren
- (1) I House Wren
- Ruby-crowned Kinglet
- Blue-gray Gnatcatcher
- (2) Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- American Robin
- (5) III Wrentit
- (2) II Northern Mockingbird
- (7) III California Thrasher
- American Pipit
- Cedar Waxwing
- (27) 4 2 3 8 Phainopepla
- Loggerhead Shrike
- (1) European Starling
- **Bell's Vireo**
- Solitary Vireo
- (2) Warbling Vireo
- Orange-crowned Warbler
- (7) III Yellow Warbler
- Yellow-rumped Warbler
- (1) Black-th. Gray Warbler
- Townsend's Warbler
- MacGillivray's Warbler
- Common Yellowthroat
- (1) I Wilson's Warbler
- (5) II Yellow-breasted Chat
- **Summer Tananger**
- Western Tanager
- (2) II Black-headed Grosbeak
- (1) I Blue Grosbeak
- (2) I I Lazuli Bunting
- (15) I 2 I 2 Rufous-sided Towhee
- (16) 2 III IX 2 California Towhee
- Lark Sparrow
- Savannah Sparrow
- Fox Sparrow
- (27 8) 2 2 II 2 2 Song Sparrow
- Lincoln's Sparrow
- White-crowned Sparrow
- (11) 5 III Red-winged Blackbird
- Western Meadowlark
- (5) Brewer's Blackbird
- (9) I 3 2 2 Brown-headed Cowbird
- (2) Hooded Oriole
- (7) 2 2 I Northern Oriole
- (32) 2 I 2 2 + 2 House Finch
- Pine Siskin
- Lesser Goldfinch
- Lawrence's Goldfinch
- American Goldfinch
- (1) House Sparrow

Additional Species .

(1) Chimney Swift

BIRDS OF Santa Clara River System

Locality Upstream from Bouquet Bridge Date 5-16 Time _____

___	Great Blue Heron
___	Green Heron
___	Mallard
___	Cinnamon Teal
___	Turkey Vulture
___	White-tailed Kite
___	Sharp-shinned Hawk
___	Cooper's Hawk
___	Red-shouldered Hawk
1	Red-tailed Hawk
___	Golden Eagle
___	American Kestrel
4	California Quail
___	American Coot
___	Killdeer
___	Spotted Sandpiper
___	Least Sandpiper
___	Common Snipe
1	Rock Dove
2	Mourning Dove
___	**Yellow-billed Cuckoo**
___	Greater Roadrunner
___	Barn Owl
___	Great Horned Owl
___	White-throated Swift
___	Black-ch. Hummingbird
___	Anna's Hummingbird
___	Costa's Hummingbird
___	Belted Kingfisher
___	Acorn Woodpecker
4	Nuttall's Woodpecker
___	Downy Woodpecker
___	Hairy Woodpecker
2	Northern Flicker
___	Western Wood-Pewee
1	Willow Flycatcher
___	Hammond's Flycatcher
___	Pacific Slope Flycatcher
___	Black Phoebe
___	Say's Phoebe
3	Ash-throated Flycatcher
___	**Brown-crested Flycatcher**
___	Cassin's Kingbird
___	Western Kingbird
___	Horned Lark
___	Tree Swallow
___	Violet-green Swallow
___	N. Rough-winged Swallow
___	Bank Swallow
___	Cliff Swallow
___	Barn Swallow
9	Scrub Jay
5	American Crow
5	Common Raven
___	Plain Titmouse
2	Bushtit
___	Rock Wren
8	Bewick's Wren
___	House Wren
___	Ruby-crowned Kinglet
___	Blue-gray Gnatcatcher
2	Western Bluebird
___	Swainson's Thrush
___	Hermit Thrush
___	American Robin
2	Wrentit
___	Northern Mockingbird
2	California Thrasher
___	American Pipit
___	Cedar Waxwing
44	Phainopepla
___	Loggerhead Shrike
___	European Starling
___	**Bell's Vireo**
___	Solitary Vireo
___	Warbling Vireo
___	Orange-crowned Warbler
3	Yellow Warbler
___	Yellow-rumped Warbler
1	Black-th. Gray Warbler
___	Townsend's Warbler
___	MacGillivray's Warbler
___	Common Yellowthroat
___	Wilson's Warbler
1	Yellow-breasted Chat
___	**Summer Tananger**
___	Western Tanager
___	Black-headed Grosbeak
___	Blue Grosbeak
___	Lazuli Bunting
5	Rufous-sided Townee
3	California Townee
___	Lark Sparrow
___	Savannah Sparrow
___	Fox Sparrow
2	Song Sparrow
___	Lincoln's Sparrow
___	White-crowned Sparrow
___	Red-winged Blackbird
___	Western Meadowlark
___	Brewer's Blackbird
___	Brown-headed Cowbird
___	Hooded Oriole
2	Northern Oriole
18	House Finch
___	Pine Siskin
___	Lesser Goldfinch
___	Lawrence's Goldfinch
___	American Goldfinch
___	House Sparrow

Additional Species

_____

BIRDS OF Santa Clara River System

Locality Upper River down to Bodquet South side Date June 10, 96 Time 7:00

- Great Blue Heron
- Green Heron
- Mallard
- Cinnamon Teal
- Turkey Vulture
- White-tailed Kite
- Sharp-shinned Hawk
- Cooper's Hawk
- (2) Red-shouldered Hawk
- (1) Red-tailed Hawk
- Golden Eagle
- American Kestrel
- (4) 86 | 22 4 (8) 2 California Quail
- American Coot
- (1) Killdeer
- Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- (32) 18,14 Rock Dove
- (18) 2 | 22 | 2 4 2 2 Mourning Dove
- **Yellow-billed Cuckoo**
- (1) Greater Roadrunner
- Barn Owl
- Great Horned Owl
- White-throated Swift
- Black-ch. Hummingbird
- (3) || Anna's Hummingbird
- (1) Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- (1) Nuttall's Woodpecker
- (4) |||| Downy Woodpecker
- (1) Hairy Woodpecker
- Northern Flicker
- Western Wood-Pewee
- Willow Flycatcher
- Hammond's Flycatcher
- Pacific Slope Flycatcher
- Black Phoebe
- Say's Phoebe
- (3) 12 Ash-throated Flycatcher
- **Brown-crested Flycatcher**
- Cassin's Kingbird
- Western Kingbird
- Horned Lark
- Tree Swallow
- Violet-green Swallow
- (2) Rough-winged Swallow
- Bank Swallow
- (3) 2 Cliff Swallow
- (1) Barn Swallow
- (11) | ||| 1 2 2 Scrub Jay
- (5) American Crow
- (4) 1, 3 Common Raven
- Plain Titmouse
- (14) Bushtit
- (14) 11221 | 2 2 Bewick's Wren
- House Wren
- Ruby-crowned Kinglet
- Blue-gray Gnatcatcher
- Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- American Robin
- (7) 2 2 2 Wrentit
- (6) (2) 2 2 2 (2) Northern Mockingbird
- (3) 1 2 California Thrasher
- American Pipit
- Cedar Waxwing
- (14) 13 | 2 1 2 Phainopepla babies squeaking in nest
- Loggerhead Shrike
- (2) || European Starling
- **Bell's Vireo**
- Solitary Vireo
- Warbling Vireo
- Orange-crowned Warbler
- (2) || Yellow Warbler
- Yellow-rumped Warbler
- Black-th. Gray Warbler
- Townsend's Warbler
- MacGillivray's Warbler
- (12) 62 | Common Yellowthroat
- Wilson's Warbler
- Yellow-breasted Chat
- **Summer Tananger**
- Western Tanager
- (2) || Black-headed Grosbeak
- (1) Blue Grosbeak
- (13) Lazuli Bunting
- (11) || 2 2 2 2 Rufous-sided Towhee
- (18) 2 || 1 2 3 | 2 2 1 2 California Towhee
- Lark Sparrow
- Savannah Sparrow
- Fox Sparrow
- (32) 2982 | || 2 2 2 | | Song Sparrow
- Lincoln's Sparrow
- White-crowned Sparrow
- (8) 6 2 Red-winged Blackbird
- (2) || Western Meadowlark
- Brewer's Blackbird
- (11) ||| ||| 2 Brown-headed Cowbird
- Hooded Oriole
- (2) || Northern Oriole
- (33) 22 6 4 6 9 House Finch
- Pine Siskin
- (2) Lesser Goldfinch
- Lawrence's Goldfinch
- American Goldfinch
- (1) House Sparrow

Additional Species

BIRDS OF Santa Clara River System

Locality Upstream from Bogert Date 6/24 Time _____

___	Great Blue Heron	___	Rock Wren
___	Green Heron	3	Bewick's Wren
___	Mallard	___	House Wren
___	Cinnamon Teal	___	Ruby-crowned Kinglet
___	Turkey Vulture	___	Blue-gray Gnatcatcher
___	White-tailed Kite	___	Western Bluebird
___	Sharp-shinned Hawk	___	Swainson's Thrush
___	Cooper's Hawk	___	Hermit Thrush
___	Red-shouldered Hawk	___	American Robin
1	Red-tailed Hawk	1	Wrentit
___	Golden Eagle	___	Northern Mockingbird
___	American Kestrel	1	California Thrasher
14	California Quail	___	American Pipit
___	American Coot	___	Cedar Waxwing
___	Killdeer	___	Phainopepla
___	Spotted Sandpiper	___	Loggerhead Shrike
___	Least Sandpiper	___	European Starling
___	Common Snipe	___	**Bell's Vireo**
___	Rock Dove	___	Solitary Vireo
4	Mourning Dove	___	Warbling Vireo
___	**Yellow-billed Cuckoo**	___	Orange-crowned Warbler
___	Greater Roadrunner	___	Yellow Warbler
___	Barn Owl	___	Yellow-rumped Warbler
___	Great Horned Owl	___	Black-th. Gray Warbler
___	White-throated Swift	___	Townsend's Warbler
___	Black-ch. Hummingbird	___	MacGillivray's Warbler
1	Anna's Hummingbird	___	Common Yellowthroat
___	Costa's Hummingbird	___	Wilson's Warbler
___	Belted Kingfisher	___	Yellow-breasted Chat
___	Acorn Woodpecker	___	**Summer Tananger**
4	Nuttall's Woodpecker	___	Western Tanager
___	Downy Woodpecker	___	Black-headed Grosbeak
___	Hairy Woodpecker	___	Blue Grosbeak
___	Northern Flicker	___	Lazuli Bunting
___	Western Wood-Pewee	1	Rufous-sided Townee
___	Willow Flycatcher	4	California Townee
___	Hammond's Flycatcher	___	Lark Sparrow
___	Pacific Slope Flycatcher	___	Savannah Sparrow
___	Black Phoebe	___	Fox Sparrow
___	Say's Phoebe	4	Song Sparrow
1	Ash-throated Flycatcher	___	Lincoln's Sparrow
___	**Brown-crested Flycatcher**	___	White-crowned Sparrow
___	Cassin's Kingbird	___	Red-winged Blackbird
___	Western Kingbird	___	Western Meadowlark
___	Horned Lark	___	Brewer's Blackbird
___	Tree Swallow	___	Brown-headed Cowbird
___	Violet-green Swallow	___	Hooded Oriole
4	N. Rough-winged Swallow	2	Northern Oriole
___	Bank Swallow	21	House Finch
2	Cliff Swallow	___	Pine Siskin
___	Barn Swallow	4	Lesser Goldfinch
9	Scrub Jay	___	Lawrence's Goldfinch
13	American Crow	___	American Goldfinch
4	Common Raven	___	House Sparrow
___	Plain Titmouse		
53	Bushtit 1 flock	Additional Species	
		_____	

BIRDS OF Santa Clara River System

Locality Upper Rivers to Barnett Date June 24/96 Time

North edge

1 BOBCAT

___ Great Blue Heron
___ Green Heron
___ Mallard
___ Cinnamon Teal
___ Turkey Vulture
___ White-tailed Kite
___ Sharp-shinned Hawk
___ Cooper's Hawk
1 Red-shouldered Hawk
1 Red-tailed Hawk
___ Golden Eagle
___ American Kestrel
15,10,12,42 682 California Quail
___ American Coot
___ Killdeer
___ Spotted Sandpiper
___ Least Sandpiper
___ Common Snipe
___ Rock Dove
8,10, 2 1 1 62 Mourning Dove
___ **Yellow-billed Cuckoo**
___ Greater Roadrunner
___ Barn Owl
___ Great Horned Owl
___ White-throated Swift
1 Black-ch. Hummingbird
11 11 Anna's Hummingbird
2 Costa's Hummingbird
___ Belted Kingfisher
___ Acorn Woodpecker
1 2 1 Nuttall's Woodpecker
___ Downy Woodpecker
___ Hairy Woodpecker
___ Northern Flicker
___ Western Wood-Pewee
___ Willow Flycatcher
___ Hammond's Flycatcher
___ Pacific Slope Flycatcher
___ Black Phoebe
___ Say's Phoebe
___ Ash-throated Flycatcher
___ **Brown-crested Flycatcher**
___ Cassin's Kingbird
___ Western Kingbird
___ Horned Lark
___ Tree Swallow
___ Violet-green Swallow
6 N. Rough-winged Swallow
___ Bank Swallow
16,8,4 Cliff Swallow
___ Barn Swallow
1 1 2 Scrub Jay
10, 12 American Crow
1 1 1 Common Raven
___ Plain Titmouse
___ Bushtit

___ Rock Wren
1 1 2 5 3 Bewick's Wren
___ House Wren
___ Ruby-crowned Kinglet
___ Blue-gray Gnatcatcher
___ Western Bluebird
___ Swainson's Thrush
___ Hermit Thrush
___ American Robin
2 1 2 Wrentit
1 1 2 Northern Mockingbird
(3) 1 2 4 California Thrasher
___ American Pipit
___ Cedar Waxwing
3 1 1 2 Phainopepla
___ Loggerhead Shrike
___ European Starling
___ **Bell's Vireo**
___ Solitary Vireo
___ Warbling Vireo
___ Orange-crowned Warbler
1 Yellow Warbler
___ Yellow-rumped Warbler
___ Black-th. Gray Warbler
___ Townsend's Warbler
___ MacGillivray's Warbler
2 Common Yellowthroat
___ Wilson's Warbler
___ Yellow-breasted Chat
___ **Summer Tananger**
___ Western Tanager
4 2 Black-headed Grosbeak
1 1 Blue Grosbeak
5 Lazuli Bunting — female feeding fledglings
22 1 3 2 Rufous-sided Towhee
1 6,4,5,4 2 11 California Towhee
___ Lark Sparrow
___ Savannah Sparrow
___ Fox Sparrow
1 2 Song Sparrow
___ Lincoln's Sparrow
___ White-crowned Sparrow
5 Red-winged Blackbird
___ Western Meadowlark
___ Brewer's Blackbird
3 Brown-headed Cowbird
3 Hooded Oriole
5 2 1 2 5 2 Northern Oriole
10,10,10,10,10,8 2 2 1 2 4 House Finch
___ Pine Siskin
3 5 Lesser Goldfinch
___ Lawrence's Goldfinch
___ American Goldfinch
___ House Sparrow

Additional Species
2 BARN OWLS

BIRDS OF Santa Clara River System

Locality Above Bouquet Bridge Date 7-8-96 Time

____ Great Blue Heron
____ Green Heron
____ Mallard
____ Cinnamon Teal
____ Turkey Vulture
____ White-tailed Kite
____ Sharp-shinned Hawk
____ Cooper's Hawk
____ Red-shouldered Hawk
____ Red-tailed Hawk
____ Golden Eagle
____ American Kestrel
9 California Quail
____ American Coot
____ Killdeer
____ Spotted Sandpiper
____ Least Sandpiper
____ Common Snipe
____ Rock Dove
4 Mourning Dove
____ **Yellow-billed Cuckoo**
____ Greater Roadrunner
____ Barn Owl
____ Great Horned Owl
____ White-throated Swift
____ Black-ch. Hummingbird
8 Anna's Hummingbird
____ Costa's Hummingbird
____ Belted Kingfisher
____ Acorn Woodpecker
2 Nuttall's Woodpecker
____ Downy Woodpecker
____ Hairy Woodpecker
1 Northern Flicker
____ Western Wood-Pewee
____ Willow Flycatcher
____ Hammond's Flycatcher
____ Pacific Slope Flycatcher
____ Black Phoebe
____ Say's Phoebe
4 Ash-throated Flycatcher
____ **Brown-crested Flycatcher**
____ Cassin's Kingbird
____ Western Kingbird
____ Horned Lark
____ Tree Swallow
____ Violet-green Swallow
____ N. Rough-winged Swallow
____ Bank Swallow
____ Cliff Swallow
____ Barn Swallow
11 Scrub Jay
7 American Crow
8 Common Raven
____ Plain Titmouse
8 Bushtit

____ Rock Wren
3 Bewick's Wren
____ House Wren
____ Ruby-crowned Kinglet
____ Blue-gray Gnatcatcher
____ Western Bluebird
____ Swainson's Thrush
____ Hermit Thrush
____ American Robin
____ Wrentit
____ Northern Mockingbird
____ California Thrasher
____ American Pipit
____ Cedar Waxwing
____ Phainopepla
____ Loggerhead Shrike
____ European Starling
____ **Bell's Vireo**
____ Solitary Vireo
____ Warbling Vireo
____ Orange-crowned Warbler
____ Yellow Warbler
____ Yellow-rumped Warbler
____ Black-th. Gray Warbler
____ Townsend's Warbler
____ MacGillivray's Warbler
____ Common Yellowthroat
____ Wilson's Warbler
____ Yellow-breasted Chat
____ **Summer Tananger**
____ Western Tanager
____ Black-headed Grosbeak
1 Blue Grosbeak
____ Lazuli Bunting
1 Rufous-sided Townee
5 California Townee
____ Lark Sparrow
____ Savannah Sparrow
____ Fox Sparrow
____ Song Sparrow
____ Lincoln's Sparrow
____ White-crowned Sparrow
____ Red-winged Blackbird
____ Western Meadowlark
____ Brewer's Blackbird
____ Brown-headed Cowbird
____ Hooded Oriole
____ Northern Oriole
6 House Finch
____ Pine Siskin
2 Lesser Goldfinch
____ Lawrence's Goldfinch
____ American Goldfinch
____ House Sparrow

Additional Species

BIRDS OF Santa Clara River System

Locality Upper to Bouquet Date 7/8/96 Time _____

- Great Blue Heron
- Green Heron
- Mallard
- Cinnamon Teal
- Turkey Vulture
- White-tailed Kite
- Sharp-shinned Hawk
- Cooper's Hawk
- (2) II Red-shouldered Hawk
- (2) Red-tailed Hawk
- Golden Eagle
- American Kestrel
- (6) IIII California Quail
- American Coot
- Killdeer
- Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- (26) Rock Dove
- (13) 0223 Mourning Dove
- **Yellow-billed Cuckoo**
- (1) Greater Roadrunner
- Barn Owl
- Great Horned Owl
- White-throated Swift
- (5) III Black-ch. Hummingbird
- (12) III 2 3 Anna's Hummingbird
- (1) Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- (6) IIII Nuttall's Woodpecker
- (5) III Downy Woodpecker
- (1) I Hairy Woodpecker
- Northern Flicker
- Western Wood-Pewee
- Willow Flycatcher
- Hammond's Flycatcher
- Pacific Slope Flycatcher
- Black Phoebe
- Say's Phoebe
- (5) III Ash-throated Flycatcher
- **Brown-crested Flycatcher**
- Cassin's Kingbird
- (14) 4 2 3, 5 Western Kingbird
- Horned Lark
- Tree Swallow
- Violet-green Swallow
- (9) 8 1 N. Rough-winged Swallow
- Bank Swallow
- (8) 6 2 Cliff Swallow
- Barn Swallow
- (5) III Scrub Jay
- (4) 4 American Crow
- (19) 2 3 4 Common Raven
- (2) II Plain Titmouse
- Bushtit
- Rock Wren
- (14) 2 III 3 2 II Bewick's Wren
- (2) II House Wren
- Ruby-crowned Kinglet
- Blue-gray Gnatcatcher
- Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- American Robin
- (2) II Wrentit
- (3) III 2 Northern Mockingbird
- (6) X II California Thrasher
- American Pipit
- Cedar Waxwing
- (8) 6 2 Phainopepla
- Loggerhead Shrike
- European Starling
- **Bell's Vireo**
- Solitary Vireo
- Warbling Vireo
- Orange-crowned Warbler
- (1) Yellow Warbler
- Yellow-rumped Warbler
- Black-th. Gray Warbler
- Townsend's Warbler
- MacGillivray's Warbler
- (3) III Common Yellowthroat
- Wilson's Warbler
- Yellow-breasted Chat
- **Summer Tananger**
- Western Tanager
- (2) II Black-headed Grosbeak
- (3) III Blue Grosbeak
- (1) I Lazuli Bunting
- (5) III Rufous-sided Townee
- (13) III 3 III California Townee
- Lark Sparrow
- Savannah Sparrow
- Fox Sparrow
- (23) 4 8, 6, 5 Song Sparrow
- Lincoln's Sparrow
- White-crowned Sparrow
- Red-winged Blackbird
- Western Meadowlark
- Brewer's Blackbird
- (7) 2 3 II Brown-headed Cowbird
- (1) I Hooded Oriole
- (2) 1 2 Northern Oriole
- (86) 8, 25, 10, 10, 8, 10, 3 House Finch
- Pine Siskin
- (12) 2 6 12 Lesser Goldfinch
- Lawrence's Goldfinch
- American Goldfinch
- House Sparrow

Additional Species

Upper Reach Dec. 5 19?-

BIRDS OF Santa Clara River System

Locality Castaic Cr Date 4/28 Time 0630

- ___ Great Blue Heron
- ___ Green Heron
- ___ Mallard
- ___ Cinnamon Teal
- ___ Turkey Vulture
- ___ White-tailed Kite
- ___ Sharp-shinned Hawk
- 1 Cooper's Hawk
- ___ Red-shouldered Hawk
- 3 Red-tailed Hawk
- ___ Golden Eagle
- ___ American Kestrel
- 12 California Quail
- ___ American Coot
- ___ Killdeer
- ___ Spotted Sandpiper
- ___ Least Sandpiper
- ___ Common Snipe
- 3 Rock Dove
- 6 Mourning Dove
- ___ **Yellow-billed Cuckoo**
- ___ Greater Roadrunner
- ___ Barn Owl
- ___ Great Horned Owl
- ___ White-throated Swift
- 2 Black-ch. Hummingbird
- 4 Anna's Hummingbird
- ___ Costa's Hummingbird
- ___ Belted Kingfisher
- 1 Acorn Woodpecker
- 4 Nuttall's Woodpecker
- ___ Downy Woodpecker
- ___ Hairy Woodpecker
- 1 Northern Flicker
- ___ Western Wood-Pewee
- ___ Willow Flycatcher
- ___ Hammond's Flycatcher
- ___ Pacific Slope Flycatcher
- 1 Black Phoebe
- ___ Say's Phoebe
- 4 Ash-throated Flycatcher
- ___ **Brown-crested Flycatcher**
- ___ Cassin's Kingbird
- 3 Western Kingbird
- ___ Horned Lark
- ___ Tree Swallow
- 7 Violet-green Swallow
- 110 N. Rough-winged Swallow incl. 75@ 1 ridge
- ___ Bank Swallow
- ___ Cliff Swallow
- ___ Barn Swallow
- 6 Scrub Jay
- 4 American Crow
- 4 Common Raven
- ___ Plain Titmouse
- 2 Bushtit
- ___ Rock Wren
- 9 Bewick's Wren
- ___ House Wren
- ___ Ruby-crowned Kinglet
- ___ Blue-gray Gnatcatcher
- ___ Western Bluebird
- ___ Swainson's Thrush
- ___ Hermit Thrush
- ___ American Robin
- ___ Wrentit
- ___ Northern Mockingbird
- 1 California Thrasher
- ___ American Pipit
- ___ Cedar Waxwing
- ___ Phainopepla
- ___ Loggerhead Shrike
- 7 European Starling
- 2 **Bell's Vireo** no band
- 1 Solitary Vireo
- ___ Warbling Vireo
- ___ Orange-crowned Warbler
- ___ Yellow Warbler
- 1 Yellow-rumped Warbler
- ___ Black-th. Gray Warbler
- ___ Townsend's Warbler
- ___ MacGillivray's Warbler
- 7 Common Yellowthroat
- ___ Wilson's Warbler
- 2 Yellow-breasted Chat
- ___ **Summer Tananger**
- 4 Western Tanager
- 10 Black-headed Grosbeak
- 6 Blue Grosbeak
- 1 Lazuli Bunting
- 4 Rufous-sided Towhee
- 15 California Towhee
- ___ Lark Sparrow
- ___ Savannah Sparrow
- ___ Fox Sparrow
- 16 Song Sparrow
- ___ Lincoln's Sparrow
- ___ White-crowned Sparrow
- 150 Red-winged Blackbird
- ___ Western Meadowlark
- ___ Brewer's Blackbird
- 6 Brown-headed Cowbird
- ___ Hooded Oriole
- 6 Northern Oriole
- 8 House Finch
- ___ Pine Siskin
- 9 Lesser Goldfinch
- ___ Lawrence's Goldfinch
- ___ American Goldfinch
- ___ House Sparrow

Additional Species

8 Night heron

BIRDS OF Santa Clara River System

Locality Castaic Cr Date 5/13 Time

____ Great Blue Heron
2 Green Heron
2 Mallard
____ Cinnamon Teal
____ Turkey Vulture
____ White-tailed Kite
____ Sharp-shinned Hawk
____ Cooper's Hawk
____ Red-shouldered Hawk
____ Red-tailed Hawk
____ Golden Eagle
1 American Kestrel
18 California Quail
____ American Coot
____ Killdeer
____ Spotted Sandpiper
____ Least Sandpiper
____ Common Snipe
2 Rock Dove
4 Mourning Dove
____ **Yellow-billed Cuckoo**
____ Greater Roadrunner
____ Barn Owl
____ Great Horned Owl
____ White-throated Swift
____ Black-ch. Hummingbird
5 Anna's Hummingbird
____ Costa's Hummingbird
____ Belted Kingfisher
____ Acorn Woodpecker
5 Nuttall's Woodpecker
____ Downy Woodpecker
____ Hairy Woodpecker
1 Northern Flicker
____ Western Wood-Pewee
____ Willow Flycatcher
____ Hammond's Flycatcher
____ Pacific Slope Flycatcher
3 Black Phoebe
____ Say's Phoebe
4 Ash-throated Flycatcher
____ **Brown-crested Flycatcher**
____ Cassin's Kingbird
____ Western Kingbird
____ Horned Lark
____ Tree Swallow
____ Violet-green Swallow
51 N. Rough-winged Swallow
____ Bank Swallow
9 Cliff Swallow
____ Barn Swallow
12 Scrub Jay
5 American Crow
2 Common Raven
____ Plain Titmouse
3 Bushtit

____ Rock Wren
9 Bewick's Wren
____ House Wren
____ Ruby-crowned Kinglet
____ Blue-gray Gnatcatcher
1 Western Bluebird
____ Swainson's Thrush
____ Hermit Thrush
____ American Robin
2 Wrentit
____ Northern Mockingbird
4 California Thrasher
____ American Pipit
____ Cedar Waxwing
____ Phainopepla
____ Loggerhead Shrike
5 European Starling
2 **Bell's Vireo**
____ Solitary Vireo
____ Warbling Vireo
____ Orange-crowned Warbler
3 11 Yellow Warbler
____ Yellow-rumped Warbler
____ Black-th. Gray Warbler
____ Townsend's Warbler
____ MacGillivray's Warbler
3 Common Yellowthroat
____ Wilson's Warbler
2 Yellow-breasted Chat
____ **Summer Tananger**
____ Western Tanager
9 Black-headed Grosbeak
5 Blue Grosbeak (2 definite pair)
1 Lazuli Bunting
10 Rufous-sided Townee
8 California Townee
____ Lark Sparrow
____ Savannah Sparrow
____ Fox Sparrow
21 Song Sparrow
____ Lincoln's Sparrow
____ White-crowned Sparrow
175 Red-winged Blackbird
____ Western Meadowlark
____ Brewer's Blackbird
22 Brown-headed Cowbird
____ Hooded Oriole
5 Northern Oriole
13 House Finch
____ Pine Siskin
4 Lesser Goldfinch
____ Lawrence's Goldfinch
____ American Goldfinch
____ House Sparrow

Additional Species

BIRDS OF Santa Clara River System

Locality CASTAIC Date 5-21 Time 7-9

___ Great Blue Heron	___ Rock Wren
1 Green Heron	15 Bewick's Wren
___ Mallard	___ House Wren
___ Cinnamon Teal	___ Ruby-crowned Kinglet
___ Turkey Vulture	___ Blue-gray Gnatcatcher
___ White-tailed Kite	2 Western Bluebird
___ Sharp-shinned Hawk	___ Swainson's Thrush
___ Cooper's Hawk	___ Hermit Thrush
___ Red-shouldered Hawk	___ American Robin
1 Red-tailed Hawk	___ Wrentit
___ Golden Eagle	___ Northern Mockingbird
1 American Kestrel	2 California Thrasher
20 California Quail	___ American Pipit
___ American Coot	___ Cedar Waxwing
2 Killdeer	___ Phainopepla
___ Spotted Sandpiper	___ Loggerhead Shrike
___ Least Sandpiper	7 European Starling
___ Common Snipe	2 **Bell's Vireo** singing ♂♂
7 Rock Dove	___ Solitary Vireo
5 Mourning Dove	___ Warbling Vireo
___ **Yellow-billed Cuckoo**	___ Orange-crowned Warbler
___ Greater Roadrunner	2 Yellow Warbler
___ Barn Owl	___ Yellow-rumped Warbler
___ Great Horned Owl	___ Black-th. Gray Warbler
___ White-throated Swift	___ Townsend's Warbler
___ Black-ch. Hummingbird	___ MacGillivray's Warbler
5 Anna's Hummingbird	3 Common Yellowthroat
___ Costa's Hummingbird	___ Wilson's Warbler
___ Belted Kingfisher	___ Yellow-breasted Chat
___ Acorn Woodpecker	___ **Summer Tananger**
2 Nuttall's Woodpecker	1 Western Tanager
1 Downy Woodpecker	7 Black-headed Grosbeak
1 Hairy Woodpecker	4 Blue Grosbeak
3 Northern Flicker	___ Lazuli Bunting
___ Western Wood-Pewee	6 Rufous-sided Towhee
___ Willow Flycatcher	10 California Towhee
___ Hammond's Flycatcher	___ Lark Sparrow
___ Pacific Slope Flycatcher	___ Savannah Sparrow
2 Black Phoebe	___ Fox Sparrow
___ Say's Phoebe	16 Song Sparrow
4 Ash-throated Flycatcher	___ Lincoln's Sparrow
___ **Brown-crested Flycatcher**	___ White-crowned Sparrow
___ Cassin's Kingbird	172 Red-winged Blackbird
1 Western Kingbird	___ Western Meadowlark
2 Horned Lark copulation	___ Brewer's Blackbird
___ Tree Swallow	9 Brown-headed Cowbird
___ Violet-green Swallow	___ Hooded Oriole
53 N. Rough-winged Swallow	9 Northern Oriole
___ Bank Swallow	31 House Finch
12 Cliff Swallow	___ Pine Siskin
___ Barn Swallow	2 Lesser Goldfinch
11 Scrub Jay	___ Lawrence's Goldfinch
3 American Crow	___ American Goldfinch
1 Common Raven	___ House Sparrow
___ Plain Titmouse	
6 Bushtit	

Additional Species

1 Night Heron adult

BIRDS OF Santa Clara River System

Locality Castaic Date 6/12/96 Time

___ Great Blue Heron
___ Green Heron
___ Mallard
___ Cinnamon Teal
___ Turkey Vulture
___ White-tailed Kite
___ Sharp-shinned Hawk
1 Cooper's Hawk
3 Red-shouldered Hawk
3 Red-tailed Hawk
___ Golden Eagle
___ American Kestrel
21 California Quail
___ American Coot
2 Killdeer
___ Spotted Sandpiper
___ Least Sandpiper
___ Common Snipe
2 Rock Dove
7 Mourning Dove
___ **Yellow-billed Cuckoo**
___ Greater Roadrunner
___ Barn Owl
___ Great Horned Owl
___ White-throated Swift
___ Black-ch. Hummingbird
1 Anna's Hummingbird
___ Costa's Hummingbird
___ Belted Kingfisher
___ Acorn Woodpecker
3 Nuttall's Woodpecker
___ Downy Woodpecker
___ Hairy Woodpecker
2 Northern Flicker
___ Western Wood-Pewee
___ Willow Flycatcher
___ Hammond's Flycatcher
___ Pacific Slope Flycatcher
___ Black Phoebe
___ Say's Phoebe
4 Ash-throated Flycatcher
___ **Brown-crested Flycatcher**
___ Cassin's Kingbird
___ Western Kingbird
___ Horned Lark
___ Tree Swallow
___ Violet-green Swallow
43 N. Rough-winged Swallow
___ Bank Swallow
6 Cliff Swallow
___ Barn Swallow
9 Scrub Jay
14 American Crow
8 Common Raven
___ Plain Titmouse
9 Bushtit

___ Rock Wren
5 Bewick's Wren
___ House Wren
___ Ruby-crowned Kinglet
___ Blue-gray Gnatcatcher
___ Western Bluebird
___ Swainson's Thrush
___ Hermit Thrush
___ American Robin
___ Wrentit
___ Northern Mockingbird
2 California Thrasher
___ American Pipit
___ Cedar Waxwing
___ Phainopepla
___ Loggerhead Shrike
6 European Starling
3 **Bell's Vireo** INCL. 1 JUV.
___ Solitary Vireo
___ Warbling Vireo
___ Orange-crowned Warbler
1 Yellow Warbler
___ Yellow-rumped Warbler
___ Black-th. Gray Warbler
___ Townsend's Warbler
___ MacGillivray's Warbler
12 Common Yellowthroat
___ Wilson's Warbler
1 Yellow-breasted Chat
___ **Summer Tananger**
___ Western Tanager
5 Black-headed Grosbeak
2 Blue Grosbeak ♂♂
___ Lazuli Bunting
8 Rufous-sided Townee
7 California Townee
___ Lark Sparrow
___ Savannah Sparrow
___ Fox Sparrow
26 Song Sparrow incl. juv.
___ Lincoln's Sparrow
___ White-crowned Sparrow
60 Red-winged Blackbird
___ Western Meadowlark
___ Brewer's Blackbird
4 Brown-headed Cowbird
___ Hooded Oriole
2 Northern Oriole
39 House Finch
___ Pine Siskin
6 Lesser Goldfinch
___ Lawrence's Goldfinch
___ American Goldfinch
___ House Sparrow

Additional Species

BIRDS OF Santa Clara River System

Locality ~~Ft~~ Castaic Date 6/25/91 Time

1	Great Blue Heron
	Green Heron
	Mallard
	Cinnamon Teal
	Turkey Vulture
	White-tailed Kite
	Sharp-shinned Hawk
	Cooper's Hawk
	Red-shouldered Hawk
2	Red-tailed Hawk
	Golden Eagle
	American Kestrel
28	California Quail
	American Coot
	Killdeer
	Spotted Sandpiper
	Least Sandpiper
	Common Snipe
1	Rock Dove
5	Mourning Dove
	Yellow-billed Cuckoo
	Greater Roadrunner
	Barn Owl
	Great Horned Owl
	White-throated Swift
	Black-ch. Hummingbird
3	Anna's Hummingbird
	Costa's Hummingbird
	Belted Kingfisher
	Acorn Woodpecker
3	Nuttall's Woodpecker
1	Downy Woodpecker
	Hairy Woodpecker
2	Northern Flicker
	Western Wood-Pewee
	Willow Flycatcher
	Hammond's Flycatcher
	Pacific Slope Flycatcher
4	Black Phoebe
	Say's Phoebe
3	Ash-throated Flycatcher
	Brown-crested Flycatcher
	Cassin's Kingbird
1	Western Kingbird
	Horned Lark
	Tree Swallow
	Violet-green Swallow
46	N. Rough-winged Swallow
	Bank Swallow
10	Cliff Swallow
	Barn Swallow
12	Scrub Jay
9	American Crow
3	Common Raven
	Plain Titmouse
9	Bushtit

	Rock Wren
5	Bewick's Wren
	House Wren
	Ruby-crowned Kinglet
	Blue-gray Gnatcatcher
	Western Bluebird
	Swainson's Thrush
	Hermit Thrush
	American Robin
2	Wrentit
	Northern Mockingbird
4	California Thrasher
	American Pipit
	Cedar Waxwing
2	Phainopepla
	Loggerhead Shrike
2	European Starling
	Bell's Vireo
	Solitary Vireo
	Warbling Vireo
	Orange-crowned Warbler
	Yellow Warbler
	Yellow-rumped Warbler
	Black-th. Gray Warbler
	Townsend's Warbler
	MacGillivray's Warbler
4	Common Yellowthroat
	Wilson's Warbler
	Yellow-breasted Chat
	Summer Tananger
	Western Tanager
5	Black-headed Grosbeak
2	Blue Grosbeak
2	Lazuli Bunting
3	Rufous-sided Townee
6	California Townee
	Lark Sparrow
	Savannah Sparrow
	Fox Sparrow
17	Song Sparrow
	Lincoln's Sparrow
	White-crowned Sparrow
	Red-winged Blackbird
	Western Meadowlark
	Brewer's Blackbird
	Brown-headed Cowbird
	Hooded Oriole
2	Northern Oriole
43	House Finch
	Pine Siskin
5	Lesser Goldfinch
	Lawrence's Goldfinch
	American Goldfinch
	House Sparrow

Additional Species

BIRDS OF Santa Clara River System

Locality Castaic CA Date 7-9-96 Time

1 Great Blue Heron
Green Heron
Mallard
Cinnamon Teal
Turkey Vulture
White-tailed Kite
Sharp-shinned Hawk
Cooper's Hawk
Red-shouldered Hawk
Red-tailed Hawk
Golden Eagle
American Kestrel
29 California Quail
American Coot
Killdeer
Spotted Sandpiper
Least Sandpiper
Common Snipe
2 Rock Dove
3 Mourning Dove
Yellow-billed Cuckoo
Greater Roadrunner
Barn Owl
Great Horned Owl
White-throated Swift
Black-ch. Hummingbird
7 Anna's Hummingbird
2 Costa's Hummingbird
Belted Kingfisher
Acorn Woodpecker
6 Nuttall's Woodpecker
1 Downy Woodpecker
Hairy Woodpecker
2 Northern Flicker
Western Wood-Pewee
Willow Flycatcher
Hammond's Flycatcher
Pacific Slope Flycatcher
6 Black Phoebe
1 Say's Phoebe
Ash-throated Flycatcher
Brown-crested Flycatcher
Cassin's Kingbird
3 Western Kingbird
25 Horned Lark
Tree Swallow
Violet-green Swallow
22 N. Rough-winged Swallow
Bank Swallow
11 Cliff Swallow
Barn Swallow
8 Scrub Jay
5 American Crow
6 Common Raven
3 Plain Titmouse
9 Bushtit

Rock Wren
3 Bewick's Wren
House Wren
Ruby-crowned Kinglet
Blue-gray Gnatcatcher
Western Bluebird
Swainson's Thrush
Hermit Thrush
American Robin
2 Wrentit
Northern Mockingbird
California Thrasher
American Pipit
Cedar Waxwing
Phainopepla
Loggerhead Shrike
European Starling
Bell's Vireo
Solitary Vireo
Warbling Vireo
Orange-crowned Warbler
Yellow Warbler
Yellow-rumped Warbler
Black-th. Gray Warbler
Townsend's Warbler
MacGillivray's Warbler
2 Common Yellowthroat
Wilson's Warbler
Yellow-breasted Chat
Summer Tananger
Western Tanager
4 Black-headed Grosbeak
4 Blue Grosbeak 2 pair
Lazuli Bunting
1 Rufous-sided Townee
11 California Towhee
Lark Sparrow
Savannah Sparrow
Fox Sparrow
13 Song Sparrow
Lincoln's Sparrow
White-crowned Sparrow
2 Red-winged Blackbird
Western Meadowlark
Brewer's Blackbird
6 Brown-headed Cowbird
Hooded Oriole
2 Northern Oriole
48 House Finch
Pine Siskin
5 Lesser Goldfinch
Lawrence's Goldfinch
American Goldfinch
House Sparrow

Additional Species
1 Night Heron imm.

Spring Creek 1996 Very dry. Water only in ¼ mi section

BIRDS OF Santa Clara River System

Locality San Francisquito Cr Upper Section Date 4-25 Time 6:30

- ___ Great Blue Heron
- ___ Green Heron
- ___ Mallard
- ___ Cinnamon Teal
- ___ Turkey Vulture
- 1 White-tailed Kite
- ___ Sharp-shinned Hawk
- ___ Cooper's Hawk
- ___ Red-shouldered Hawk
- 1 Red-tailed Hawk
- ___ Golden Eagle
- ___ American Kestrel
- 46 California Quail
- ___ American Coot
- 4 Killdeer
- ___ Spotted Sandpiper
- ___ Least Sandpiper
- ___ Common Snipe
- ___ Rock Dove
- 51 Mourning Dove
- ___ **Yellow-billed Cuckoo**
- ___ Greater Roadrunner
- ___ Barn Owl
- ___ Great Horned Owl
- ___ White-throated Swift
- ___ Black-cn. Hummingbird
- 1 Anna's Hummingbird
- 1 Costa's Hummingbird
- ___ Belted Kingfisher
- ___ Acorn Woodpecker
- 2 Nuttall's Woodpecker
- ___ Downy Woodpecker
- ___ Hairy Woodpecker
- ___ Northern Flicker
- ___ Western Wood-Pewee
- ___ Willow Flycatcher
- ___ Hammond's Flycatcher
- ___ Pacific Slope Flycatcher
- ___ Black Phoebe
- ___ Say's Phoebe
- 2 Ash-throated Flycatcher
- ___ **Brown-crested Flycatcher**
- ___ Cassin's Kingbird
- 15 Western Kingbird
- ___ Horned Lark
- ___ Tree Swallow
- ___ Violet-green Swallow
- 2 N. Rough-winged Swallow
- ___ Bank Swallow
- ___ Cliff Swallow
- ___ Barn Swallow
- 2 Scrub Jay
- 5 American Crow
- 7 Common Raven
- 2 Plain Titmouse
- ___ Bushtit

There were 2 pair, the rest in small flocks of 4, 3, 3, 1

- ___ Rock Wren
- 10 Bewick's Wren
- 4 House Wren
- ___ Ruby-crowned Kinglet
- ___ Blue-gray Gnatcatcher
- ___ Western Bluebird
- ___ Swainson's Thrush
- ___ Hermit Thrush
- 7 American Robin
- ___ Wrentit
- 2 Northern Mockingbird
- 2 California Thrasher
- ___ American Pipit
- ___ Cedar Waxwing
- ___ Phainopepla
- ___ Loggerhead Shrike
- 4 European Starling
- ___ **Bell's Vireo**
- ___ Solitary Vireo
- ___ Warbling Vireo
- ___ Orange-crowned Warbler
- ___ Yellow Warbler
- 1 Yellow-rumped Warbler
- ___ Black-th. Gray Warbler
- ___ Townsend's Warbler
- ___ MacGillivray's Warbler
- 2 Common Yellowthroat
- 1 Wilson's Warbler
- ___ Yellow-breasted Chat
- ___ **Summer Tananger**
- 1 Western Tanager
- 3 Black-headed Grosbeak
- 1 Blue Grosbeak
- ___ Lazuli Bunting
- 6 Rufous-sided Towhee
- 8 California Towhee
- 2 Lark Sparrow
- ___ Savannah Sparrow
- ___ Fox Sparrow
- 11 Song Sparrow
- ___ Lincoln's Sparrow
- ___ White-crowned Sparrow
- ___ Red-winged Blackbird
- ___ Western Meadowlark
- ___ Brewer's Blackbird
- 8 Brown-headed Cowbird
- ___ Hooded Oriole
- 4 Northern Oriole
- 32 House Finch
- ___ Pine Siskin
- 9 Lesser Goldfinch
- ___ Lawrence's Goldfinch
- ___ American Goldfinch
- ___ House Sparrow

Additional Species

2 CHIPPING SPARROW!

5-9:50

BIRDS OF Santa Clara River System

Locality Lower San Francisquito Date _____ Time 4/25/96

windy

_____ Great Blue Heron
_____ Green Heron
_____ Mallard
_____ Cinnamon Teal
_____ Turkey Vulture
_____ White-tailed Kite
_____ Sharp-shinned Hawk
_____ Cooper's Hawk
_____ Red-shouldered Hawk
_____ Red-tailed Hawk
_____ Golden Eagle
_____ American Kestrel
14,1422,15,10 California Quail
_____ American Coot
_____ Killdeer
_____ Spotted Sandpiper
_____ Least Sandpiper
_____ Common Snipe
_____ Rock Dove
3231 Mourning Dove
_____ **Yellow-billed Cuckoo**
_____ Greater Roadrunner
_____ Barn Owl
_____ Great Horned Owl
_____ White-throated Swift
_____ Black-ch. Hummingbird
12121 Anna's Hummingbird
_____ Costa's Hummingbird
_____ Belted Kingfisher
_____ Acorn Woodpecker
_____ Nuttall's Woodpecker
_____ Downy Woodpecker
_____ Hairy Woodpecker
_____ Northern Flicker
_____ Western Wood-Pewee
_____ Willow Flycatcher
_____ Hammond's Flycatcher
_____ Pacific Slope Flycatcher
_____ Black Phoebe
_____ Say's Phoebe
_____ Ash-throated Flycatcher
_____ **Brown-crested Flycatcher**
_____ Cassin's Kingbird
7,5,16 Western Kingbird
_____ Horned Lark
_____ Tree Swallow
_____ Violet-green Swallow
2 N. Rough-winged Swallow
_____ Bank Swallow
_____ Cliff Swallow
_____ Barn Swallow
1121 Scrub Jay
6 American Crow
111 Common Raven
112 Plain Titmouse
22222 Busntit

_____ Rock Wren
11112121 Bewick's Wren
_____ House Wren
_____ Ruby-crowned Kinglet
_____ Blue-gray Gnatcatcher
2 Western Bluebird
_____ Swainson's Thrush
_____ Hermit Thrush
_____ American Robin
_____ Wrentit
_____ Northern Mockingbird
_____ California Thrasher
_____ American Pipit
_____ Cedar Waxwing
_____ Phainopepla
_____ Loggerhead Shrike
13 European Starling
_____ **Bell's Vireo**
_____ Solitary Vireo
_____ Warbling Vireo
_____ Orange-crowned Warbler
_____ Yellow Warbler
_____ Yellow-rumped Warbler
_____ Black-th. Gray Warbler
_____ Townsend's Warbler
_____ MacGillivray's Warbler
_____ Common Yellowthroat
_____ Wilson's Warbler
_____ Yellow-breasted Chat
_____ **Summer Tananger**
_____ Western Tanager
_____ Black-headed Grosbeak
_____ Blue Grosbeak
_____ Lazuli Bunting
_____ Rufous-sided Townee
12212 California Townee
_____ Lark Sparrow
_____ Savannah Sparrow
_____ Fox Sparrow
22 Song Sparrow
_____ Lincoln's Sparrow
_____ White-crowned Sparrow
_____ Red-winged Blackbird
_____ Western Meadowlark
_____ Brewer's Blackbird
12,15,126 Brown-headed Cowbird
_____ Hooded Oriole
_____ Northern Oriole
23 House Finch
_____ Pine Siskin
6 Lesser Goldfinch
_____ Lawrence's Goldfinch
4 American Goldfinch
_____ House Sparrow

Additional Species
1 Nashville Warbler

BIRDS OF Santa Clara River System

Locality ______________ Date ______ Time ______________

Great Blue Heron	Rock Wren
Green Heron	Bewick's Wren
Mallard	House Wren
Cinnamon Teal	Ruby-crowned Kinglet
Turkey Vulture	Blue-gray Gnatcatcher
White-tailed Kite	Western Bluebird
Sharp-shinned Hawk	Swainson's Thrush
Cooper's Hawk	~~Hermit~~ Thrush Swainson's
Red-shouldered Hawk	American Robin
Red-tailed Hawk YOUNG on Nest.	Wrentit
Golden Eagle	Northern Mockingbird
American Kestrel	California Thrasher
California Quail	American Pipit
American Coot	Cedar Waxwing
Killdeer	Phainopepla
Spotted Sandpiper	Loggerhead Shrike
Least Sandpiper	European Starling
Common Snipe	**Bell's Vireo**
Rock Dove	Solitary Vireo
Mourning Dove N	Warbling Vireo
Yellow-billed Cuckoo	Orange-crowned Warbler
Greater Roadrunner	Yellow Warbler
Barn Owl	Yellow-rumped Warbler
Great Horned Owl	Black-th. Gray Warbler
White-throated Swift	Townsend's Warbler
Black-ch. Hummingbird	MacGillivray's Warbler
Anna's Hummingbird	Common Yellowthroat
Costa's Hummingbird	Wilson's Warbler
Belted Kingfisher	Yellow-breasted Chat
Acorn Woodpecker	**Summer Tananger**
Nuttall's Woodpecker	Western Tanager
Downy Woodpecker	Black-headed Grosbeak
Hairy Woodpecker	Blue Grosbeak P
Northern Flicker	Lazuli Bunting
Western Wood-Pewee	Rufous-sided Towhee
Willow Flycatcher	California Towhee
Hammond's Flycatcher	Lark Sparrow
Pacific Slope Flycatcher	Savannah Sparrow
Black Phoebe	Fox Sparrow
Say's Phoebe	Song Sparrow
Ash-throated Flycatcher	Lincoln's Sparrow
Brown-crested Flycatcher	White-crowned Sparrow
Cassin's Kingbird	Red-winged Blackbird
Western Kingbird	Western Meadowlark
Horned Lark	Brewer's Blackbird
Tree Swallow	Brown-headed Cowbird
Violet-green Swallow	Hooded Oriole
N. Rough-winged Swallow	Northern Oriole
Bank Swallow	House Finch
Cliff Swallow	Pine Siskin
Barn Swallow	Lesser Goldfinch
Scrub Jay	Lawrence's Goldfinch
American Crow	American Goldfinch
Common Raven	House Sparrow
Plain Titmouse	
Bushtit	Additional Species

BIRDS OF Santa Clara River System

Locality SAN SANT Date MAY 17th Time 6 45 - 8:30

- Great Blue Heron
- Green Heron
- Mallard
- Cinnamon Teal
- Turkey Vulture
- White-tailed Kite
- Sharp-shinned Hawk
- Cooper's Hawk
- Red-shouldered Hawk
- 2 (3) Red-tailed Hawk (3)
- Golden Eagle
- American Kestrel
- 4 (38) 2 4 4 2 6 2 2 California Quail
- American Coot
- (2) Killdeer
- Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- (2) Rock Dove
- (8) 12 2 Mourning Dove
- **Yellow-billed Cuckoo**
- Greater Roadrunner
- Barn Owl
- Great Horned Owl
- White-throated Swift
- (1) Black-ch. Hummingbird
- (3) Anna's Hummingbird
- (1) Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- (11) 2 Nuttall's Woodpecker
- Downy Woodpecker
- Hairy Woodpecker
- Northern Flicker
- Western Wood-Pewee
- Willow Flycatcher
- Hammond's Flycatcher
- Pacific Slope Flycatcher
- (3) Black Phoebe
- Say's Phoebe
- (5) Ash-throated Flycatcher FY
- **Brown-crested Flycatcher**
- Cassin's Kingbird
- (2) Western Kingbird
- Horned Lark
- Tree Swallow
- Violet-green Swallow
- (4) 2 2 N. Rough-winged Swallow
- Bank Swallow
- (2) Cliff Swallow
- Barn Swallow
- 3 2 1 Scrub Jay
- (3) 1 2 American Crow
- (3) 2 1 Common Raven
- Plain Titmouse
- (17) 3 3 3 6 2 Bushtit
- (21) Rock Wren
- (4) Bewick's Wren
- House Wren
- Ruby-crowned Kinglet
- Blue-gray Gnatcatcher
- Western Bluebird
- (1) Swainson's Thrush
- Hermit Thrush
- American Robin
- (3) Wrentit
- (1) Northern Mockingbird
- (3) California Thrasher
- American Pipit
- Cedar Waxwing
- (8) 2 5 1 Phainopepla
- Loggerhead Shrike
- (4) European Starling
- **Bell's Vireo**
- Solitary Vireo
- Warbling Vireo
- Orange-crowned Warbler
- (5) Yellow Warbler
- Yellow-rumped Warbler
- Black-th. Gray Warbler
- Townsend's Warbler
- MacGillivray's Warbler
- (3) Common Yellowthroat
- Wilson's Warbler
- Yellow-breasted Chat
- **Summer Tananger**
- Western Tanager
- (4) Black-headed Grosbeak
- (3) 2 1 Blue Grosbeak
- (1) Lazuli Bunting
- (15) Rufous-sided Towhee
- (16) 2 2 3 2 2 2 California Towhee
- Lark Sparrow
- Savannah Sparrow
- (20) Fox Sparrow
- Song Sparrow
- Lincoln's Sparrow
- White-crowned Sparrow
- Red-winged Blackbird
- Western Meadowlark
- Brewer's Blackbird
- (11) 2 2 2 Brown-headed Cowbird
- Hooded Oriole
- (6) 2 2 2 Northern Oriole
- (12) 2 3 3 4 House Finch
- Pine Siskin
- (15) 2 2 3 4 2 2 Lesser Goldfinch
- Lawrence's Goldfinch
- American Goldfinch
- House Sparrow

Additional Species

(1) R C Sparrow

FY

E mile

BIRDS OF Santa Clara River System

Locality 6-10-76 San Fernando Date _____ Time 645 - 830

_____ Great Blue Heron
_____ Green Heron
_____ Mallard
_____ Cinnamon Teal
_____ Turkey Vulture
_____ White-tailed Kite
_____ Sharp-shinned Hawk
_____ Cooper's Hawk
(1) Red-shouldered Hawk
(2) 1 Red-tailed Hawk
_____ Golden Eagle
_____ American Kestrel
(18) 6 4 2 2 2 2 California Quail
_____ American Coot
(3) 1 1 Killdeer
_____ Spotted Sandpiper
_____ Least Sandpiper
_____ Common Snipe
_____ Rock Dove
(10) 2 1 2 2 1 Mourning Dove
Yellow-billed Cuckoo
_____ Greater Roadrunner
_____ Barn Owl
_____ Great Horned Owl
_____ White-throated Swift
_____ Black-ch. Hummingbird
(5) 2 1 1 Anna's Hummingbird
_____ Costa's Hummingbird
_____ Belted Kingfisher
_____ Acorn Woodpecker
(3) 1 1 1 Nuttall's Woodpecker
_____ Downy Woodpecker
_____ Hairy Woodpecker
_____ Northern Flicker
_____ Western Wood-Pewee
_____ Willow Flycatcher
_____ Hammond's Flycatcher
_____ Pacific Slope Flycatcher
(1) Black Phoebe
_____ Say's Phoebe
(5) 1 1 1 1 Ash-throated Flycatcher
Brown-crested Flycatcher
_____ Cassin's Kingbird
(4) 1 2 Western Kingbird
_____ Horned Lark
_____ Tree Swallow
_____ Violet-green Swallow
(12) N. Rough-winged Swallow
_____ Bank Swallow
(5) 3 2 Cliff Swallow
_____ Barn Swallow
(11) 1 1 1 1 1 Scrub Jay
(2) 1 1 American Crow
(7) 2 1 1 3 Common Raven
(4) 2 2 Plain Titmouse
_____ Bushtit

(16) 1 1 1 1 1 Rock Wren
_____ Bewick's Wren
_____ House Wren
_____ Ruby-crowned Kinglet
_____ Blue-gray Gnatcatcher
_____ Western Bluebird
_____ Swainson's Thrush
_____ Hermit Thrush
(2) American Robin
(2) 1 1 Wrentit
(5) 2 1 1 1 Northern Mockingbird
(4) 2 1 1 California Thrasher
_____ American Pipit
_____ Cedar Waxwing
(5) 3 1 1 Phainopepla
_____ Loggerhead Shrike
(12) 6 5 1 European Starling
Bell's Vireo
_____ Solitary Vireo
_____ Warbling Vireo
_____ Orange-crowned Warbler
_____ Yellow Warbler
_____ Yellow-rumped Warbler
_____ Black-th. Gray Warbler
_____ Townsend's Warbler
(1) MacGillivray's Warbler SINGING
_____ Common Yellowthroat
_____ Wilson's Warbler
(1) Yellow-breasted Chat
Summer Tananger
_____ Western Tanager
(1) Black-headed Grosbeak
(1) Blue Grosbeak
_____ Lazuli Bunting
(7) 1 1 1 1 Rufous-sided Towhee
(5) 1 1 1 2 California Towhee
_____ Lark Sparrow
_____ Savannah Sparrow
_____ Fox Sparrow
(5) 1 2 1 1 Song Sparrow
_____ Lincoln's Sparrow
_____ White-crowned Sparrow
_____ Red-winged Blackbird
_____ Western Meadowlark
_____ Brewer's Blackbird
(6) 1 1 3 Brown-headed Cowbird
_____ Hooded Oriole
(8) 1 2 1 2 2 Northern Oriole
(29) 3 4 5 3 2 2 4 4 2 House Finch
_____ Pine Siskin
(18) 3 3 2 2 2 8 2 1 Lesser Goldfinch
_____ Lawrence's Goldfinch
_____ American Goldfinch
_____ House Sparrow

Additional Species

_____

BIRDS OF Santa Clara River System

Locality SAN FRANCISQUITO Date 6/24 Time 630 - 830

1	Great Blue Heron
	Green Heron
	Mallard
	Cinnamon Teal
1	Turkey Vulture
	White-tailed Kite
	Sharp-shinned Hawk
	Cooper's Hawk
1	Red-shouldered Hawk
II	Red-tailed Hawk
	Golden Eagle
	American Kestrel
242	California Quail
	American Coot
1	Killdeer
	Spotted Sandpiper
	Least Sandpiper
	Common Snipe
	Rock Dove
2 II	Mourning Dove
	Yellow-billed Cuckoo
	Greater Roadrunner
	Barn Owl
	Great Horned Owl
	White-throated Swift
II	Black-ch. Hummingbird
IIII	Anna's Hummingbird
	Costa's Hummingbird
	Belted Kingfisher
	Acorn Woodpecker
IIII	Nuttall's Woodpecker FY
2	Downy Woodpecker
	Hairy Woodpecker
	Northern Flicker
	Western Wood-Pewee
	Willow Flycatcher
	Hammond's Flycatcher
	Pacific Slope Flycatcher
1	Black Phoebe
	Say's Phoebe
III	Ash-throated Flycatcher
	Brown-crested Flycatcher
	Cassin's Kingbird
1122	Western Kingbird (2) FY.
	Horned Lark
	Tree Swallow
	Violet-green Swallow
54	N. Rough-winged Swallow
	Bank Swallow
27	Cliff Swallow
	Barn Swallow
111 IIII	Scrub Jay
2	American Crow
226	Common Raven
1	Plain Titmouse
4	Bushtit
	Rock Wren
IIII IIII	Bewick's Wren
	House Wren
	Ruby-crowned Kinglet
	Blue-gray Gnatcatcher
	Western Bluebird
	Swainson's Thrush
	Hermit Thrush
	American Robin
1	Wrentit
1	Northern Mockingbird
1	California Thrasher
	American Pipit
	Cedar Waxwing
2 IIII	Phainopepla (FY)
	Loggerhead Shrike
1	European Starling
	Bell's Vireo
	Solitary Vireo
	Warbling Vireo
	Orange-crowned Warbler
	Yellow Warbler
	Yellow-rumped Warbler
	Black-th. Gray Warbler
	Townsend's Warbler
	MacGillivray's Warbler
	Common Yellowthroat
	Wilson's Warbler
	Yellow-breasted Chat
	Summer Tananger
	Western Tanager
1	Black-headed Grosbeak
II	Blue Grosbeak
	Lazuli Bunting
IIII	Rufous-sided Towhee
1 IIII	California Towhee
	Lark Sparrow
	Savannah Sparrow
	Fox Sparrow
III	Song Sparrow
	Lincoln's Sparrow
	White-crowned Sparrow
	Red-winged Blackbird
	Western Meadowlark
	Brewer's Blackbird
1	Brown-headed Cowbird
	Hooded Oriole
1221	Northern Oriole (FY)
46243	House Finch
	Pine Siskin
4212	Lesser Goldfinch
2	Lawrence's Goldfinch
	American Goldfinch
	House Sparrow

Additional Species

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E SIDE @ VAQUERO ST.

N

BIRDS OF Santa Clara River System

Locality San Fran Cisquito Date 7-8 Time 6-30

- Great Blue Heron
- Green Heron
- Mallard
- Cinnamon Teal
- Turkey Vulture
- (1) White-tailed Kite
- Sharp-shinned Hawk
- Cooper's Hawk
- Red-shouldered Hawk
- (2) II Red-tailed Hawk
- Golden Eagle
- American Kestrel
- (22) 6 3 12 13 California Quail
- American Coot
- (1) Killdeer
- Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- (21) (4) Rock Dove
- 57 II 12 1 Mourning Dove
- **Yellow-billed Cuckoo**
- (1) Greater Roadrunner
- Barn Owl
- Great Horned Owl
- White-throated Swift
- Black-ch. Hummingbird
- (12) IIII IIII Anna's Hummingbird
- Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- (7) II IIII Nuttall's Woodpecker
- II Downy Woodpecker
- (2) Hairy Woodpecker
- Northern Flicker
- Western Wood-Pewee
- Willow Flycatcher
- Hammond's Flycatcher
- Pacific Slope Flycatcher
- Black Phoebe
- Say's Phoebe
- (3) 12 Ash-throated Flycatcher
- **Brown-crested Flycatcher**
- Cassin's Kingbird
- (2) Western Kingbird
- Horned Lark
- Tree Swallow
- Violet-green Swallow
- N. Rough-winged Swallow
- Bank Swallow
- Cliff Swallow
- (15) Barn Swallow
- 1 1 2 2 1 2 IIII Scrub Jay
- American Crow
- (4) 2 1 Common Raven
- (5) 2 3 Plain Titmouse
- (3) Bushtit
- (10) 1 1 1 1 IIII Rock Wren
- Bewick's Wren
- House Wren
- Ruby-crowned Kinglet
- Blue-gray Gnatcatcher
- Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- American Robin
- Wrentit
- (7) 1 1 Northern Mockingbird
- (3) III California Thrasher
- American Pipit
- Cedar Waxwing
- (19) 5 6 1 1 IIII Phainopepla (FY)
- Loggerhead Shrike
- (9) 36 European Starling
- **Bell's Vireo**
- Solitary Vireo
- Warbling Vireo
- Orange-crowned Warbler
- Yellow Warbler
- Yellow-rumped Warbler
- Black-th. Gray Warbler
- Townsend's Warbler
- MacGillivray's Warbler
- (1) Common Yellowthroat
- Wilson's Warbler
- Yellow-breasted Chat
- **Summer Tanager**
- Western Tanager
- Black-headed Grosbeak
- (1) Blue Grosbeak
- (2) II Lazuli Bunting
- (4) IIII Rufous-sided Towhee
- (8) 1 1 IIII California Towhee
- (1) Lark Sparrow
- Savannah Sparrow
- Fox Sparrow
- Song Sparrow
- Lincoln's Sparrow
- White-crowned Sparrow
- Red-winged Blackbird
- Western Meadowlark
- Brewer's Blackbird
- Brown-headed Cowbird
- Hooded Oriole
- (2) Northern Oriole
- (57) 6 4 9 5 6 6 4 2 2 1 3 3 4 House Finch
- Pine Siskin
- (30) 3 2 3 2 3 2 4 3 1 2 Lesser Goldfinch
- Lawrence's Goldfinch
- American Goldfinch
- House Sparrow

Additional Species

W 5106.

Small colony obs.

BIRDS OF Santa Clara River System

Locality South Fork - lower   Date 5/6/96   Time ______

- Great Blue Heron
- Green Heron
- 4 (5) 15 3 Mallard
- Cinnamon Teal
- Turkey Vulture
- White-tailed Kite
- Sharp-shinned Hawk
- Cooper's Hawk
- Red-shouldered Hawk
- Red-tailed Hawk
- Golden Eagle
- (1) American Kestrel
- California Quail
- American Coot
- (8) 4 22 Killdeer
- Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- Rock Dove
- (16) 28 Mourning Dove
- **Yellow-billed Cuckoo**
- Greater Roadrunner
- Barn Owl
- Great Horned Owl
- White-throated Swift
- Black-ch. Hummingbird
- (3) 3 Anna's Hummingbird
- Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- Nuttall's Woodpecker
- Downy Woodpecker
- Hairy Woodpecker
- Northern Flicker
- Western Wood-Pewee
- Willow Flycatcher
- Hammond's Flycatcher
- Pacific Slope Flycatcher
- (3) 21 Black Phoebe Immature
- Say's Phoebe
- (2) 11 Ash-throated Flycatcher
- **Brown-crested Flycatcher**
- Cassin's Kingbird
- Western Kingbird
- Horned Lark
- Tree Swallow
- Violet-green Swallow
- (3) 21 N. Rough-winged Swallow
- Bank Swallow
- Cliff Swallow
- Barn Swallow
- (3) 11 Scrub Jay
- (9) 72 American Crow
- Common Raven
- Plain Titmouse
- (5) 2 | 2 Bushtit
- Rock Wren
- (7) 1222 Bewick's Wren
- House Wren
- Ruby-crowned Kinglet
- Blue-gray Gnatcatcher
- Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- American Robin
- Wrentit
- Northern Mockingbird
- (1) California Thrasher
- American Pipit
- Cedar Waxwing
- Phainopepla
- Loggerhead Shrike
- European Starling
- **Bell's Vireo**
- Solitary Vireo
- Warbling Vireo
- Orange-crowned Warbler
- (8) 22 111 Yellow Warbler
- Yellow-rumped Warbler
- Black-th. Gray Warbler
- Townsend's Warbler
- MacGillivray's Warbler
- Common Yellowthroat
- Wilson's Warbler
- Yellow-breasted Chat
- **Summer Tananger**
- Western Tanager
- Black-headed Grosbeak
- Blue Grosbeak
- Lazuli Bunting
- (4) 11 2 Rufous-sided Townee
- (9) 1 22 1 2 California Townee
- Lark Sparrow
- Savannah Sparrow
- Fox Sparrow
- Song Sparrow
- Lincoln's Sparrow
- White-crowned Sparrow
- Red-winged Blackbird
- Western Meadowlark
- Brewer's Blackbird
- (1) Brown-headed Cowbird
- Hooded Oriole
- Northern Oriole
- (4) 22 House Finch
- Pine Siskin
- (1) Lesser Goldfinch
- Lawrence's Goldfinch
- American Goldfinch
- House Sparrow

Additional Species

______

BIRDS OF Santa Clara River System

Locality So Fork - Lower Date 6/19/96 Time

____ Great Blue Heron
____ Green Heron
24 Mallard
____ Cinnamon Teal
____ Turkey Vulture
____ White-tailed Kite
____ Sharp-shinned Hawk
____ Cooper's Hawk
____ Red-shouldered Hawk
____ Red-tailed Hawk
____ Golden Eagle
____ American Kestrel
132 California Quail
____ American Coot
2 Killdeer
____ Spotted Sandpiper
____ Least Sandpiper
____ Common Snipe
____ Rock Dove
12 Mourning Dove
____ **Yellow-billed Cuckoo**
____ Greater Roadrunner
____ Barn Owl
____ Great Horned Owl
____ White-throated Swift
____ Black-ch. Hummingbird
1 Anna's Hummingbird
____ Costa's Hummingbird
____ Belted Kingfisher
____ Acorn Woodpecker
1 Nuttall's Woodpecker
____ Downy Woodpecker
____ Hairy Woodpecker
____ Northern Flicker
____ Western Wood-Pewee
____ Willow Flycatcher
____ Hammond's Flycatcher
____ Pacific Slope Flycatcher
2 Black Phoebe
____ Say's Phoebe
1 Ash-throated Flycatcher
____ **Brown-crested Flycatcher**
____ Cassin's Kingbird
____ Western Kingbird
____ Horned Lark
____ Tree Swallow
____ Violet-green Swallow
10 20 N. Rough-winged Swallow
____ Bank Swallow
60 Cliff Swallow ± 30 Nests under Bridge
____ Barn Swallow
____ Scrub Jay
25, 986 American Crow
36 Common Raven
____ Plain Titmouse
____ Bushtit

____ Rock Wren
2 11 Bewick's Wren
____ House Wren
____ Ruby-crowned Kinglet
____ Blue-gray Gnatcatcher
____ Western Bluebird
____ Swainson's Thrush
____ Hermit Thrush
____ American Robin
____ Wrentit
11 Northern Mockingbird
1 California Thrasher
____ American Pipit
____ Cedar Waxwing
____ Phainopepla
1 Loggerhead Shrike
____ European Starling
____ **Bell's Vireo**
____ Solitary Vireo
____ Warbling Vireo
____ Orange-crowned Warbler
____ Yellow Warbler
____ Yellow-rumped Warbler
____ Black-th. Gray Warbler
____ Townsend's Warbler
____ MacGillivray's Warbler
____ Common Yellowthroat
____ Wilson's Warbler
____ Yellow-breasted Chat
____ **Summer Tananger**
____ Western Tanager
1 Black-headed Grosbeak
1 Blue Grosbeak
____ Lazuli Bunting
____ Rufous-sided Townee
1 California Townee
____ Lark Sparrow
____ Savannah Sparrow
____ Fox Sparrow
8 Song Sparrow
____ Lincoln's Sparrow
____ White-crowned Sparrow
____ Red-winged Blackbird
____ Western Meadowlark
____ Brewer's Blackbird
2 Brown-headed Cowbird
____ Hooded Oriole
2 Northern Oriole
2 1 6 122 House Finch
____ Pine Siskin
____ Lesser Goldfinch
____ Lawrence's Goldfinch
____ American Goldfinch
____ House Sparrow

Additional Species

____

Upper Area 1996

BIRDS OF Santa Clara River System Y → MAGIC

Locality South Fork - Upper Date 5/6/96 Time

Once 8

- Great Blue Heron
- Green Heron
- Mallard
- Cinnamon Teal
- Turkey Vulture
- White-tailed Kite
- Sharp-shinned Hawk
- Cooper's Hawk
- Red-shouldered Hawk
- Red-tailed Hawk
- Golden Eagle
- (1) American Kestrel
- (8) 2|2|2 California Quail
- American Coot
- (4) |||| Killdeer
- Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- (5) Rock Dove
- (10) |2 2 N| Mourning Dove
- **Yellow-billed Cuckoo**
- Greater Roadrunner
- Barn Owl
- Great Horned Owl
- White-throated Swift
- Black-ch. Hummingbird
- (4) |||| Anna's Hummingbird
- Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- Nuttall's Woodpecker
- Downy Woodpecker
- Hairy Woodpecker
- Northern Flicker
- Western Wood-Pewee
- Willow Flycatcher
- Hammond's Flycatcher
- Pacific Slope Flycatcher
- (5) 2 ||| Black Phoebe
- Say's Phoebe
- (1) Ash-throated Flycatcher
- **Brown-crested Flycatcher**
- Cassin's Kingbird
- (2) || Western Kingbird
- Horned Lark
- Tree Swallow
- Violet-green Swallow
- N. Rough-winged Swallow
- Bank Swallow
- Cliff Swallow
- Barn Swallow
- (5) ||| Scrub Jay
- (3) American Crow
- Common Raven
- Plain Titmouse
- (8) 2|1|2 Bushtit
- Rock Wren
- (9) 2 || Bewick's Wren
- House Wren
- Ruby-crowned Kinglet
- Blue-gray Gnatcatcher
- Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- American Robin
- Wrentit
- (2) 2 Northern Mockingbird
- California Thrasher
- American Pipit
- Cedar Waxwing
- Phainopepla
- Loggerhead Shrike
- European Starling
- **Bell's Vireo**
- Solitary Vireo
- Warbling Vireo
- Orange-crowned Warbler
- (4) ||2 Yellow Warbler
- Yellow-rumped Warbler
- Black-th. Gray Warbler
- Townsend's Warbler
- MacGillivray's Warbler
- Common Yellowthroat
- (4) |||| Wilson's Warbler
- Yellow-breasted Chat
- **Summer Tananger**
- (4) 12 Western Tanager
- (1) Black-headed Grosbeak
- Blue Grosbeak
- Lazuli Bunting
- (3) 1 2 Rufous-sided Townee
- (16) 2 2 2 2 2 2 2 2 California Townee
- Lark Sparrow
- Savannah Sparrow
- Fox Sparrow
- (9) 2 2 2 2 Song Sparrow
- Lincoln's Sparrow
- White-crowned Sparrow
- Red-winged Blackbird
- Western Meadowlark
- (1) Brewer's Blackbird
- Brown-headed Cowbird
- (1) Hooded Oriole
- (4) |||| Northern Oriole
- (34) 1 2 2 2 3 2 4 1 2 2 3 House Finch
- Pine Siskin
- (1) Lesser Goldfinch
- Lawrence's Goldfinch
- American Goldfinch
- (1) House Sparrow

Additional Species

_____

SUGDT

BIRDS OF Santa Clara River System

Locality Upper South Fork Date 6/17/96 Time _____

	Great Blue Heron
	Green Heron
	Mallard
	Cinnamon Teal
	Turkey Vulture
	White-tailed Kite
	Sharp-shinned Hawk
	Cooper's Hawk
	Red-shouldered Hawk
	Red-tailed Hawk
	Golden Eagle
	American Kestrel
2222	California Quail
	American Coot
1	Killdeer
	Spotted Sandpiper
	Least Sandpiper
	Common Snipe
	Rock Dove
8 1 1 2 2 3 2	Mourning Dove
	Yellow-billed Cuckoo
	Greater Roadrunner
	Barn Owl
	Great Horned Owl
	White-throated Swift
1	Black-ch. Hummingbird
1 2 1	Anna's Hummingbird
	Costa's Hummingbird
	Belted Kingfisher
	Acorn Woodpecker
	Nuttall's Woodpecker
	Downy Woodpecker
	Hairy Woodpecker
	Northern Flicker
	Western Wood-Pewee
	Willow Flycatcher
	Hammond's Flycatcher
	Pacific Slope Flycatcher
1 1	Black Phoebe
	Say's Phoebe
1	Ash-throated Flycatcher
	Brown-crested Flycatcher
	Cassin's Kingbird
	Western Kingbird
	Horned Lark
	Tree Swallow
	Violet-green Swallow
	N. Rough-winged Swallow
	Bank Swallow
	Cliff Swallow
	Barn Swallow
1 1 2	Scrub Jay
3	American Crow
2	Common Raven
	Plain Titmouse
1 2	Bushtit

	Rock Wren
2 1 1 2 1	Bewick's Wren
	House Wren
	Ruby-crowned Kinglet
	Blue-gray Gnatcatcher
	Western Bluebird
	Swainson's Thrush
	Hermit Thrush
	American Robin
	Wrentit
1 1 2	Northern Mockingbird
1	California Thrasher
	American Pipit
	Cedar Waxwing
	Phainopepla
	Loggerhead Shrike
1 1	European Starling
	Bell's Vireo
	Solitary Vireo
	Warbling Vireo
	Orange-crowned Warbler
	Yellow Warbler
	Yellow-rumped Warbler
	Black-th. Gray Warbler
	Townsend's Warbler
	MacGillivray's Warbler
	Common Yellowthroat
	Wilson's Warbler
	Yellow-breasted Chat
	Summer Tananger
	Western Tanager
	Black-headed Grosbeak
	Blue Grosbeak
	Lazuli Bunting
1	Rufous-sided Towhee
1 1 1 2	California Towhee
	Lark Sparrow
	Savannah Sparrow
	Fox Sparrow
2	Song Sparrow
	Lincoln's Sparrow
	White-crowned Sparrow
	Red-winged Blackbird
	Western Meadowlark
9	Brewer's Blackbird
	Brown-headed Cowbird
	Hooded Oriole
	Northern Oriole
7 2 2 2 4 1 3 2 1 2 2	House Finch
	Pine Siskin
2 1 2	Lesser Goldfinch
	Lawrence's Goldfinch
	American Goldfinch
1	House Sparrow

Additional Species

Guthrie, Daniel. *Bird Surveys Along a Portion of the Santa Clara River and Its Tributaries Near Valencia, California.* July 1995.

BIRD SURVEYS ALONG THE SANTA CLARA RIVER AND ITS TRIBUTARIES

NEAR VALENCIA, CALIFORNIA, 1995

Prepared for:

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July 12, 1995

Bird Surveys along the Santa Clara River and its Tributaries near Valencia, California, 1995

Prepared by: Daniel A. Guthrie
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925 N. Mills Ave
Claremont Ca. 91711
(909) 607-2836

Nature and Scope of Surveys

During the spring and early summer of 1995 surveys were conducted of a section of the Santa Clara River and its tributaries in the vicinity of Valencia, California to determine presence or absence of least Bell's vireo and other Species of Concern. Numbers of all species observed were noted, and special attention was placed on locating species considered rare and endangered.

Each survey was conducted on foot by observers well acquainted with both visual and auditory patterns of southern California birds. All surveys occurred between 6 and 10 a.m. If no vireos were found during the first two surveys, calls of least Bell's vireo were played during subsequent censuses to elicit response from territorial males. Survey routes were designed to cover all areas of each section of the river, with emphasis placed on wetter habitats where least Bell's vireos and other sensitive riparian species are most likely to occur. Personnel for all surveys were Daniel A. Guthrie, Richard F. Clements, and Judith A. Sugden.

To facilitate surveys, the area was divided into eight sections (Figure 1). Delineation of the eight areas and comments on each follow. Surveys of the normally dry sections of the river system (Areas 7 - 8) where least Bell's vireos have not been observed during the past 5 years were conducted twice during the nesting season. The second survey was delayed until June to insure that late arriving species such as yellow-billed cuckoo and willow flycatcher would not be missed. Surveys of the remaining sections of the Santa Clara River (Areas 1 -6) were conducted according to the protocol outlined by the Fish and Wildlife Service (Appendix 1), except that surveys were limited to 6 in number.

Habitat Condition and Bird Observations.

In general, 1995 was a very wet year. This was both good and bad for birds. Late rains and floods eliminated much streamside undergrowth along the river so that species dependent upon this habitat, such as Song Sparrow, were down in numbers. However, the late rains maintained weeds and vegetation along the river and kept water running in all sections of the river except for the South Fork throughout the study period. The result was expansion of

riparian species such as Blue Grosbeak and Yellow-breasted Chat into sections of the river where they were absent in previous years when these sections were dry.

Tables 1 through 8 present bird observations in each of the specific study areas for 1994. Different species breed at different times of the year. In general, species are most easily observed when they are actively defending territories by song during the establishement of breeding pairs. Once pairs are established and nesting begins song often decreases and the numbers of birds observed, therefore, also decreases. After young leave the nest, numbers observed increase. Thus, for most resident species, numbers of adult birds are most accurately censused in April and May, when territorial activity is at a maximum. A few species such as Anna's Hummingbird that nest early in the season may be underestimated. Numbers observed may decrease slightly in June and early July when birds are less active during nesting, and increase in late June and July when young birds leave the nest.

Several species that are not considered riparian species but are common in adjacent coastal sage and chaparral habiats come into the riparian zone in late summer when other vegetaional areas are dry. The increase in numbers of lazuli bunting, lark sparrow, house finch, phainopepla and mourning dove in late June follow this trend.

Following are specific comments on the habitat and bird observations in each area.

Area 1. Santa Clara River; Old Highway to the mouth of Castaic Creek and Castiac Creek from this confluence to State Route 126.

Length of section, 3.5 miles. The Santa Clara River flows continuously in this section and is augmented by the Valencia waste water outfall near the upstream end of this section. Near Castaic Junction, large flats of wet riparian vegetation were heavily used by red-winged blackbirds, song sparrows and common yellowthroats, all of which were more common than in previous years when these flats did not exist. The pond at Castaic Junction, a remnant of an old water cress field, that was home to a colony of up to 200 pairs of tricolored redwings in 1994, was drier this year and the blackbirds, although present in small numbers at the beginning of the season, did not nest.

Area 2. Santa Clara River; Old Highway to McBean Parkway.

Length of section, 1.4 miles. The Santa Clara River flows continuously in this section. The channel is braided and wet riparian vegetation is well developed along this section of the river. Repairs to the I-5 and Old Highway bridges were in progress during April and May and probably decreased the number of swallows observed as they nest under these bridges. This area was heavily impacted by off road vehicles during the study period. However, vehicles remained for the most part in the unvegetated

section of the river channel.

Area 3. Santa Clara River; McBean Parkway to Boquet Canyon Road.

Length of section, 1.2 miles. Water, supplied by the Saugus wastewater outfall at the Boquet Canyon Bridge, is continuous in this section of the Santa Clara River. Riparian vegetation was considerably improved over 1993 as indicated by increase in song sparrows.

Area 4. Santa Clara River; Boquet Canyon Road upstream to DWP transmission lines.

Length of section, 2.3 miles. This section of the Santa Clara River in past years has been wet only briefly during spring rains. and due to water release from the DWP aqueduct 2.0 miles upstream from Boquet Canyon Road. This year water flowed continually through the census period resulting in the development of wet riparian habitat. Numbers of birds increased accordingly. Song sparrows and red-winged blackbirds increased dramatically along this section over previous years, a mallard duck nested successfully and Yellow Warblers, Blue Grosbeak and Common Yellowthroat were much more numerous than in previous years.

Area 5. Castaic Creek; Route 125 to Old Road next to Interstate 5.

Length of section, 1.8 miles. Prior to 1993 drought had killed much of the young willows along this section. The floods of 1993 removed the dead wood, but left many barren gravel bars. In 1994 these areas were well vegetated, the vegetation supported by flowing water due to upstream releases during the spring. The result was development of much wet riparian growth. During 1995 controlled water release prevented damage to this riparian habitat. Water flowed continually throughout the census period. The result was an increase in most wet riparian species, including yellowthroat, chat, and yellow warbler. Although a few redwinged Blackbirds nested, no tricolored redwings remained in the area to nest. At least three least Bell's vireos apparently nested and are discussed under Species of Special Concern.

Area 6. San Francisquito Creek; Santa Clara River upstream 2.5 miles.

Length of section, 2.5 miles. This section, which is usually dry in June and July, was wet this year throughout the survey period. Due to better development of wet riparian vegetation, song sparrow and red-winged blackbird numbers were up from previous years and other riparian species such as chat and yellowthroat were also present for the first time in several years. Observation of a single least Bell's vireo is discussed under Species of Special Concern.

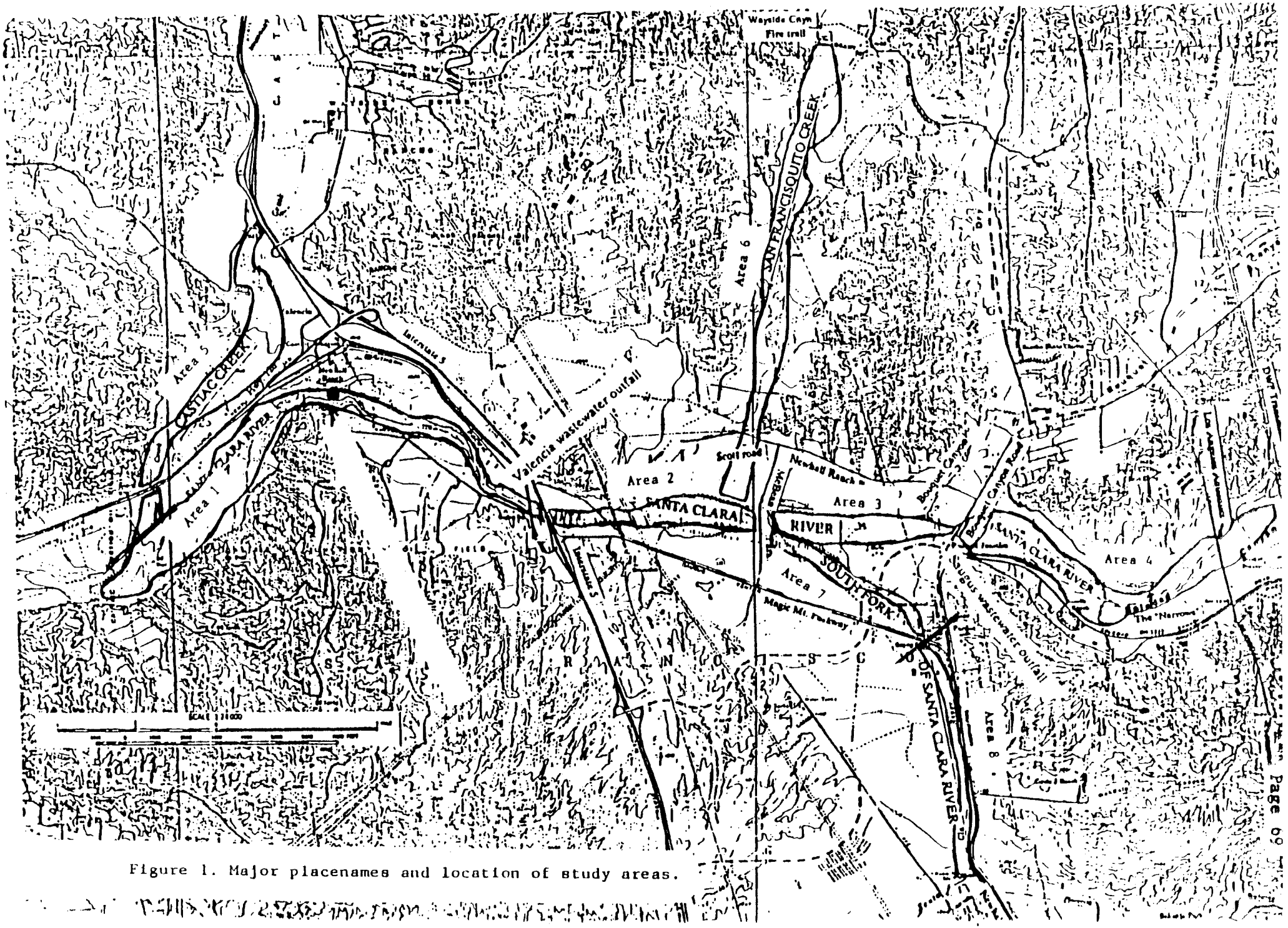
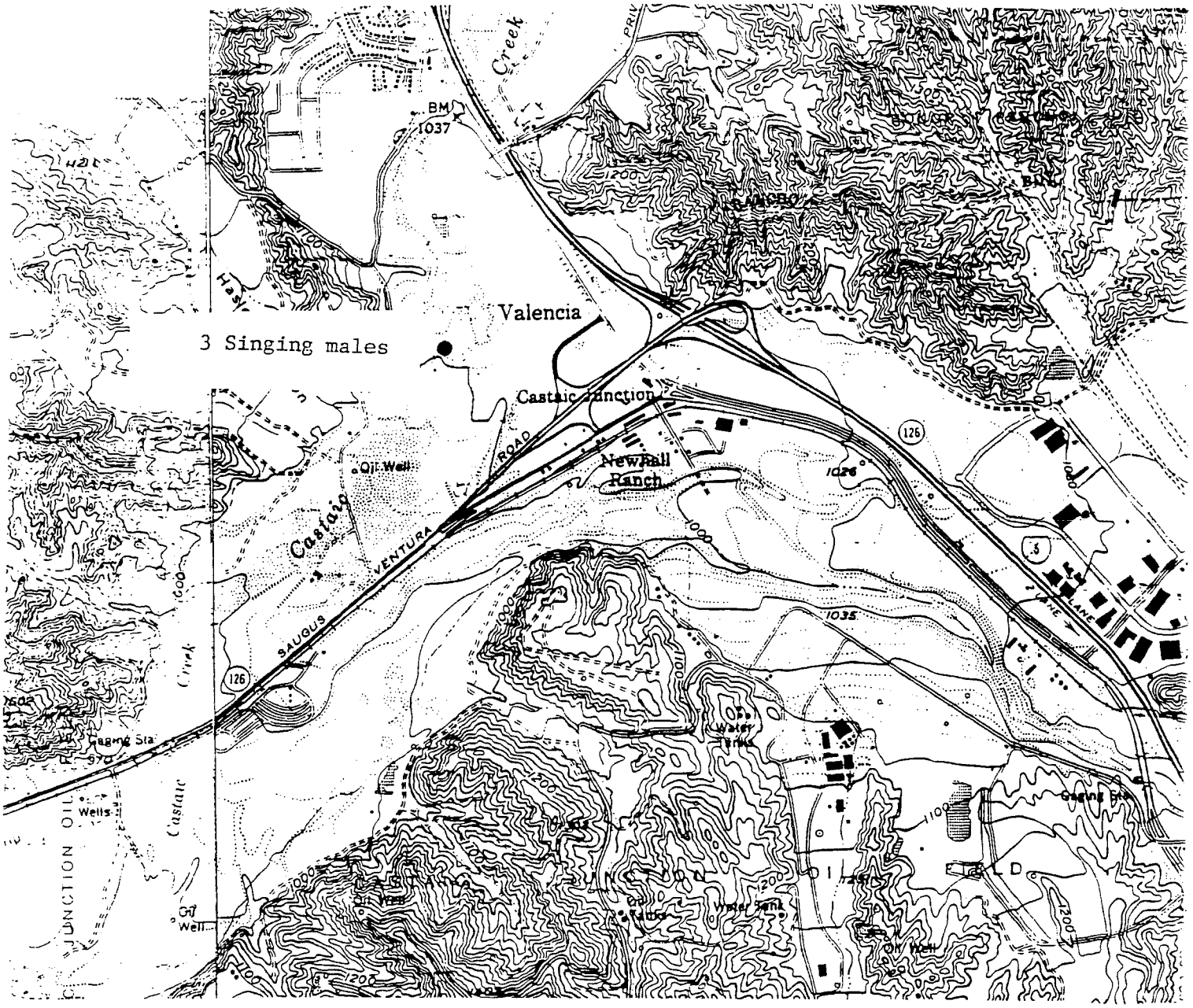


Figure 1. Major placenames and location of study areas.

Figure 2. Location of Least Bell's Vireo Sightings in 1995



Appendix 1. Fish and Wildlife Rules for Least Bell's Vireo Censuses.

LEAST BELL'S VIREO SURVEY GUIDELINES

1. All riparian areas should be surveyed once a week from April 1 to July 31. These dates encompass the period during which most vireo nesting activity occurs. If additional information on vireo habitat utilization is needed, these surveys should be extended to August 31. Information typically collected after July 31 will reflect a broader extent of the riparian habitat and other adjacent habitat types that the vireo utilizes during the latter phase of the breeding season, especially when the young become independent of the adults.

2. Surveys must be conducted by qualified biologist(s) familiar with song and plumage characteristics of the vireo.

3. Surveys shall be conducted between dawn and 11:00 a.m. Surveys shall avoid periods of excessive heat, wind, and rain.

4. All vireo detections (e.g., vocalization points, areas used for foraging, etc.) should be used to define individual home range. These data need to be mapped on a large-scale aerial photograph.

5. Data on vireo breeding status (e.g., number and location of paired or unpaired territorial males, nest building efforts, feeding of nestlings, location of vireo nests, etc.) should be noted during each survey.

6. All sightings of cowbirds and their numbers in vireo territories should be noted during each survey.

7. No attempts should be made to locate or examine vireo nests unless authorized by permits issued by California Department of Fish and Game and the U.S. Fish and Wildlife Service.

8. A final report should be prepared which describes survey dates, methods, locations, and information identified in items 4, 5, and 6 above.

If you have any questions regarding these survey guidelines, please contact the U.S. Fish and Wildlife Service at (714) 643-4270.

12-91

Area 7. South Fork of the Santa Clara River; McBean Parkway to Magic Mountain Parkway (Route 126).

Length of section, 1.0 miles. The channel along this section of the South Fork is narrow and very sandy. Almost all vegetation along the bottom of the channel was removed by spring floods. Some standing water was present near the McBean bridge.

Area 8. South Fork of the Santa Clara River, Route 126 upstream to Newhall Creek.

Length of section, 1.4 miles. This section of the river was dry except for damp areas formed by runoff from culverts along the west side of the creek. Cattails developed in these wet areas supported fewer song sparrows than in previous years and no redwing blackbirds, perhaps a sign of human disturbance near the wet areas.

Comments on Sensitive Species

Cooper's Hawk

Cooper's Hawk is considered a Species of Special Concern by the State of California. Two pairs of Coopers hawks were observed in 1994, the same number as observed in 1992 and 1993. This species is a resident that nests and hunts in riparian woodland habitat.

White-tailed Kite

This species, formerly the Black-shouldered Kite, is considered "Special" by the State of California. A pair of kites nested in the dry woodland on the north side of the Santa Clara River near the confluence with Castaic Creek.

Willow Flycatcher

This species is considered a Category 1 Candidate for listing under the Federal Endangered Species Act. Willow flycatchers were once widespread in wet riparian woodland in southern California but now only a few individuals exist. The main California breeding populations of this species are along the Kern River and in northern California. Individuals of this species have been observed in previous years during late May and early June. No Willow Flycatchers were observed in 1995. It seems likely that the individuals observed were migrants resting during migration to localities further north.

California Horned Lark

This species is a candidate for listing under the Federal Endangered Species Act. Horned larks were observed near Castaic Junction in plowed fields adjacent to the Santa Clara River.

Least Bell's Vireo

During 1995 least Bell's vireos were observed at two locations. On June 8 a single bird was observed near the mouth of San Francisquito Creek. This bird did not sing but responded to a tape. The bird appeared to be a young individual and probably represents post-breeding wandering by a young of the year.

Three singing least Bell's vireos were observed along Castaic Creek, as indicated in figure 2. On July 10 one of these birds was accompanied by a juvenile. The area where they were found looks like ideal habitat, and is an area where juvenile birds were observed late in the 1994 field season. This appears to be a new ~~colony~~ NESTING LOCATION of the species.

Yellow Warbler

The yellow warbler is considered a Species of Special Concern by the State of California. Yellow warblers prefer wet riparian habitat but are also found in large cottonwoods in drier riparian areas. Singing yellow warblers were observed along nearly every section of the Santa Clara River and Castaic Creek. A few of the birds observed were probably migrants and this species is known to sing its territorial song during migration. Numbers in 1995 were higher than those observed in previous years.

Yellow-breasted Chat

The yellow-breasted chat is considered a Species of Special Concern by the State of California. Chats were observed sparingly along the wet sections of the Santa Clara River. Numbers were up from the previous year.

Tricolored Blackbird

The tricolored blackbird is a Category 2 Candidate for listing under the Federal Endangered Species Act. A colony of about 200 breeding pairs of this species occupied a small marsh area along the side of the Santa Clara River at Castaic Junction and another smaller group of about 20 pair nested in a pond beside Castaic Creek in 1994. In years prior to 1994 this species was not observed. During 1995 a small number of tricolored blackbirds appeared in April and May and inspected the Castaic Creek site. However, the birds apparently found the site unsuitable and did not attempt to breed.

Table 1. Bird Observations along the Santa Clara River System, 1995: Santa Clara River from Old Highway along I-5 to the mouth of Castaic Creek and Castaic Creek from this confluence to State Route 126.

Species	date: 4/27	5/11	5/25	6/14	6/26	7/10	status
Great Blue Heron	1	-	-	-	-	-	W,M
Great Egret	-	-	2	-	-	-	W,M
Green Heron	-	4	1	-	-	3	R
Bl. cr. Night Heron	2	2	-	-	-	-	M
Mallard	8	4	5	2	2	-	R
Turkey Vulture	-	-	-	-	-	1	S
White-tailed Kite	-	1	-	2	1	-	R
Golden Eagle	-	1	-	-	1	-	R
Cooper's Hawk	-	-	-	1	-	1	R
Red-shouldered Hawk	2	3	3	4	2	3	R
Red-tailed Hawk	4	3	5	2	4	4	R
American Kestrel	1	-	-	-	-	-	R
California Quail	10	10	20	16	21	23	R
Black-necked Stilt	-	-	1	-	-	-	M
Killdeer	29	4	25	25	23	24	R
Spotted Sandpiper	-	6	6	-	9	8	S
Western Sandpiper	24	-	-	-	-	-	M
Domestic Pigeon	3	-	13	4	-	-	R
Mourning Dove	7	15	15	8	4	9	R
White-th. Swift	-	-	-	12	-	-	R
Anna's Hummingbird	2	6	6	6	4	3	R
Belted Kingfisher	-	1	-	-	-	-	M
Nuttall's Woodpecker	9	8	14	14	6	10	R
Downy Woodpecker	3	1	2	2	2	1	R
Hairy Woodpecker	-	-	-	-	1	1	R
Northern Flicker	3	1	3	3	-	2	R
Black Phoebe	-	-	6	8(1)	7	10	R
Ash-thr. Flycatcher	11	9	17	18	13	8	S
Western Kingbird	3	2	2	2	1	2	S
Horned Lark	1	-	-	-	-	1	R
Violet-green Swallow	-	4	5	6	5	5	S
N. Rough-w. Swallow	26	34	70	33	30	11	S
Barn Swallow	-	-	-	-	-	1	S
Cliff Swallow	60	-	20	15	70	65	S
Scrub Jay	17	21	24	19	19	20	R
American Crow	8	12	15	11(2)	12	14	R
Common Raven	10	12	14	10	29	18	R
Plain Titmouse	6	7	4	4(2)	11	8	R
Bushtit	-	2	6	9	2	7	R
Bewick's Wren	26	27	21	20	18	21	R
House Wren	14	9	11	7	5	4	R
Western Bluebird	-	6	4	6(4)	9	10	R
N. Mockingbird	-	1	-	-	-	-	R
Calif. Thrasher	3	4	5	3	3	5	R
Phainopepla	-	-	2	3(2)	2	1	R
European Starling	17	13	8	18	37	6	R

Table 1 (cont.). Bird Observations along the Santa Clara River System, 1995: Santa Clara River from Old Highway along I-5 to the mouth of Castaic Creek and Castaic Creek from this confluence to State Route 126.

Species	date: 4/27	5/11	5/25	6/14	6/26	7/10	status
Warbling Vireo	-	1	-	-	-	-	M
Orange-cr. Warbler	1	5	-	-	-	-	M
Yellow Warbler	5	8	2	4	2	3	S
Yellow- r. Warbler	-	1	-	-	-	-	W,M
Common Yellowthroat	3	8	11	10	9	16	R
Wilson's Warbler	2	14	-	-	-	-	M
Yellow-br. Chat	2	2	3	3	3	5	S
Western Tanager	-	4	-	-	-	-	M
Black-headed Grosbeak	8	13	11	8	6	4	S
Blue Grosbeak	4	2	5	3	4	6	S
Lazuli Bunting	-	-	-	2(4)	-	6	S
Rufous-sided Towhee	8	8	18	8	12	5	R
California Towhee	7	8	9	5	4	18	R
Lark Sparrow	-	-	-	-	-	3	R
Song Sparrow	38	34	47	43	40	39	R
Red-winged Blackbird	18	11	5	10	6	11	S
Western Meadowlark	1	-	-	-	-	-	R
Brewer's Blackbird	-	-	-	2	-	-	R
Brown-headed Cowbird	19	22	41	15	11	8	S
Northern Oriole	5	5	4	5	-	1	S
House Finch	8	10	21	26	20	16	R
Lesser Goldfinch	4	-	4	-	2	12	R
Lawrence's Goldfinch	4	-	-	-	-	-	R
American Goldfinch	-	2	-	-	-	-	W,M
Total Species:	45	49	45	45	42	47	
Total Individuals:	447	391	536	452	472	456	

Total Species on all visits: 71
Total Probable Breeding species: 44 (marked with *)

Status: M - Migrant; R - Resident; S - Summer Only; W - Winter Only

() = dependent young birds

Censuses of 4/27, 5/25 and 6/26 on the north side of river,
Censuses of 5/11, 6/14 and 7/10 on south side of river.

Table 2. Bird Observations along the Santa Clara River System, 1995: Santa Clara River from McBean Parkway to Old Highway along I-5.

Species	date: 4/27	5/11	5/25	6/14	6/26	7/10	status
Black-cr. Night Heron	-	-	-	1	-	-	M
Green Heron	1	2	1	-	1	-	R
Mallard	3	2	1	-	-	-	R
Sharp-sh. Hawk	-	-	1	-	-	-	M
Cooper's Hawk	-	1	-	-	1	-	R
Red-shouldered Hawk	1	-	1	2	2	1	R
Red-tailed Hawk	-	-	2	2(2)	2	1	R
California Quail	3	4	16	1	9	5	R
Killdeer	4	6	2	10	4	-	R
Least Sandpiper	3	-	-	-	-	-	M
Domestic Pigeon	-	-	-	-	1	-	R
Mourning Dove	-	-	2	-	-	-	R
Barn Owl	-	-	-	1	-	-	R
Bl.-ch. Hummingbird	-	-	1	-	-	-	S
Anna's Hummingbird	-	-	4	-	2	-	R
Belted Kingfisher	1	-	-	-	-	-	M
Acorn Woodpecker	-	1	-	-	-	-	R
Nuttall's Woodpecker	4	1	10	3	9	13	R
Downy Woodpecker	1	2	15	3(1)	3	4	R
Hairy Woodpecker	-	-	1	1	3	1	R
Northern Flicker	-	-	-	1	1	2	R
Western Wood Pewee	-	-	1	-	-	-	M
Black Phoebe	1	-	-	1	5	13	R
Ash-thr. Flycatcher	2	9	6	4	3	10	S
Western Kingbird	-	1	-	-	-	-	S
Violet-green Swallow	-	-	1	-	-	-	S
N. Rough-w. Swallow	9	17	35	11	-	5	S
Cliff Swallow	-	20	3	-	-	-	S
Scrub Jay	5	3	7	5	5	5	R
American Crow	3	6	4	3	7	1	R
Common Raven	3	1	12	2	1	-	R
Plain Titmouse	5	6	16	6	9	13	R
Bushtit	6	4	20	11	-	-	R
Bewick's Wren	16	16	35	12	19	28	R
House Wren	7	3	-	8	4	1	R
Western Bluebird	2	2	4	5	2	12	R
Swainson's Thrush	-	-	1	-	-	-	S,M
American Robin	-	1	-	-	-	-	R
Calif. Thrasher	-	2	5	2	1	1	R
European Starling	14	5	18	15	2	9	R
Solitary Vireo	-	2	-	-	-	-	M
Warbling Vireo	-	1	2	-	-	-	M
Orange-cr. Warbler	-	2	1	-	-	-	M
Yellow Warbler	2	8	5	-	-	1	S
Yellow- r. Warbler	1	-	-	-	-	-	W,M

Table 2 (cont.). Bird Observations along the Santa Clara River System, 1995: Santa Clara River from McBean Parkway to Old Highway along I-5.

Species date:	4/27	5/11	5/25	6/14	6/26	7/10	status
Black-th. Grey Warbler	-	-	2	-	-	-	M
Common Yellowthroat	1	-	1	-	-	2	R*
Wilson's Warbler	-	10	3	-	-	-	M
Black-headed Grosbeak	6	4	6	5	8	6	S*
Blue Grosbeak	-	1	2	-	1	2	S*
Lazuli Bunting	-	-	-	-	-	2	S
Rufous-sided Towhee	5	2	12	3	5	3	R*
California Towhee	-	2	10	-	2	3	R*
Lark Sparrow	-	-	-	-	-	1	R
Song Sparrow	19	16	36	21	14	25	R*
Brown-headed Cowbird	17	9	9	6	5	8	S*
Northern Oriole	1	-	1	-	-	-	S*
House Finch	4	6	6	1	3	9	R*
Lesser Goldfinch	-	-	3	1	3	9	R*
Lawrence's Goldfinch	-	-	-	4	8	1	R*
American Goldfinch	-	-	2	-	-	-	W,M
Total Species:	30	35	44	29	31	31	
Total Individuals:	150	178	326	152	140	196	

Total Species on all visits: 59
Total Probable Breeding species: 36 (marked with *)

Status: M - Migrant; R - Resident; S - Summer Only; W - Winter Only

() = dependent young

Censuses of 5/11, 5/23 and 6/26 on north side of river,
Censuses of 4/27, 6/14 and 7/10 on south side of river.

Table 3. Bird Observations along the Santa Clara River System, 1995: Santa Clara River from Boquet Canyon Rd. to McBean Parkway.

Species	date: 4/20	5/9	5/23	6/9	6/23	7/8	status
Great Blue Heron	-	1	-	1	-	-	W,M
Green Heron	-	-	1	-	-	-	R
Mallard	-	2	2	6	-	-	R*
Cooper's Hawk	-	-	1	-	-	-	R
Red-shouldered Hawk	-	-	-	-	-	2	R
Red-tailed Hawk	3	1	1	1	3	1	R*
California Quail	45	4	16	10	6	3	R*
Killdeer	-	6	-	4	4	16	R*
Domestic Pigeon	-	-	4	2	-	-	R
Mourning Dove	3	6	12	6	2	4	R*
Greater Roadrunner	-	-	2	-	-	-	R
Anna's Hummingbird	5	-	4	2	-	2	R*
Nuttall's Woodpecker	3	3	2	3	3	3	R*
Downy Woodpecker	2	1	-	1	1	-	R*
Northern Flicker	2	-	1	-	1	4	R*
Pac. Slope Flycatcher	-	-	1	-	-	-	M
Black Phoebe	4	2	-	2	2	6	R*
Ash-thr. Flycatcher	5	2	2	3	1	-	S*
Western Kingbird	3	2	2	2	2	2	S*
Horned Lark	1	-	-	-	-	-	R
Violet-green Swallow	-	-	3	-	-	-	S
N. Rough-w. Swallow	28	9	20	30	10	-	S*
Cliff Swallow	100	-	10	10	30	30	S*
Scrub Jay	5	5	5	12	7	12	R*
American Crow	-	10	20	6	4	9	R*
Common Raven	18	2	40	25	35	34	R*
Plain Titmouse	-	-	2	3	-	3	R*
Bushtit	5	-	2	2	-	8	R*
Bewick's Wren	12	7	5	7	3	12	R*
House Wren	1	-	-	3	3	-	R*
Western Bluebird	1	-	1	-	-	-	R
N. Mockingbird	-	-	2	-	-	-	R
Calif. Thrasher	1	2	4	2	2	2	R*
Cedar Waxwing	-	2	-	-	-	-	W,M
European Starling	3	4	3	12	4	2	R*
Warbling Vireo	2	-	-	-	-	-	M
Orange-cr. Warbler	6	1	1	-	-	-	M
Nashville Warbler	2	-	-	-	-	-	M
Yellow Warbler	-	3	2	-	1	1	S*
Yellow- r. Warbler	6	-	-	-	-	-	W,M
Black-th. grey Warbler	2	-	-	-	-	-	M
Macgillivray's Warbler	1	-	-	-	-	-	M
Common Yellowthroat	1	6	4	4	3	3	R*
Wilson's Warbler	2	11	6	-	-	-	M

Table 3. (cont.) Bird Observations along the Santa Clara River System, 1995: Santa Clara River from Boquet Canyon Rd. to McBean Parkway.

Species	date: 4/20	5/9	5/23	6/9	6/23	7/8	status
Yellow-br. Chat	-	-	-	-	3	2	S*
Black-headed Grosbeak	4	4	3	7	2	4	S*
Blue Grosbeak	-	-	-	2	-	1	S*
Rufous-sided Towhee	1	1	4	2	1	-	R*
California Towhee	1	2	4	5	4	6	R*
Lincoln's Sparrow	1	-	-	-	-	-	W,M
Song Sparrow	17	14	16	9	14	32	R*
White-cr. Sparrow	21	-	-	-	-	-	W
Red-winged Blackbird	-	100	50	55	8	35	S*
Western Meadowlark	1	-	-	-	-	-	R
Brown-headed Cowbird	-	7	6	9	4	8	S*
Northern Oriole	-	1	1	3	-	-	S*
House Finch	12	6	10	10	7	25	R*
Lesser Goldfinch	6	3	2	2	-	4	R*
American Goldfinch	67	-	-	-	-	-	W,M
House Sparrow	1	3	-	-	-	6	R
Total Species:	40	33	40	35	29	31	
Total Individuals:	404	233	277	262	170	282	

Total Species on all visits: 60
Total Probable Breeding species: 36 (marked with *)

Status: M - Migrant; R - Resident; S - Summer Only; W - Winter Only

() = dependent young birds

Table 4. Bird Observations along the Santa Clara River System, 1995: Santa Clara River from Power Line 2.5 miles upstream from Boquet Canyon Rd. to Boquet Canyon Road Crossing.

Species	date: 4/20	5/9	5/23	6/9	6/23	7/8	status
Green Heron	1	-	-	-	1	1	R
American Bittern	-	-	1	-	-	-	M
Mallard	6	-	7	-	-	-	R*
Sharp-shinned Hawk	1	-	-	-	-	-	W,M
Cooper's Hawk	-	-	1	-	-	-	R
Red-shouldered Hawk	1	-	1	1	-	-	R
Red-tailed Hawk	4	4	3	3	5(2)	3	R*
American Kestrel	1	-	1	-	-	-	R
California Quail	24	36	26	91	46	31	R*
Killdeer	7	3	2	2(1)	3	7	R*
Common Snipe	2	-	-	-	-	-	M
Domestic Pigeon	-	-	2	40	-	-	R
Mourning Dove	8	17	20	14	52	56	R*
Greater Roadrunner	-	1	-	-	-	-	R
White-throated Swift	4	-	6	-	2	-	R
Black-ch. Hummingbird	-	-	-	2	1	3	S*
Anna's Hummingbird	4	14	8	4	10	7	R*
Nuttall's Woodpecker	4	2	4	10	3	11	R*
Downy Woodpecker	-	2	-	-	-	-	R
Northern Flicker	3	2	3	5(1)	1	-	R*
Black Phoebe	-	-	-	6	-	8	R
Ash-thr. Flycatcher	-	8	2	2	3	-	S*
Western Kingbird	-	7	-	11	-	5	S*
N. Rough-w. Swallow	6	2	5	28	8	3	S*
Barn Swallow	3	-	-	-	-	-	M
Cliff Swallow	90	-	2	85	10	2	S*
Scrub Jay	14	12	27	24	21	15	R*
American Crow	-	2	14	1	3	2	R*
Common Raven	19	16	41	36	21	24	R*
Plain Titmouse	1	2	-	2	-	3	R*
Bushtit	5	21	12	8	10	22	R*
Bewick's Wren	8	15	25	32	15	12	R*
House Wren	1	-	-	-	-	-	R
Western Bluebird	-	-	1	2	-	-	R
American Robin	1	-	-	-	-	-	R
Wrentit	3	-	1	-	-	-	R
N. Mockingbird	3	5	4	3	2	6	R*
Calif. Thrasher	-	10	4	10	3	2	R*
Cedar Waxwing	-	-	30	-	-	-	W,M
Phainopepla	-	3	1	9	5	2	R*
Loggerhead Shrike	-	-	-	-	1	-	R
European Starling	2	3	22	13	35	5	R*
Warbling Vireo	-	2	-	-	-	-	M
Yellow Warbler	1	12	7	4	3	1	S*
Yellow- r. Warbler	-	-	-	1	-	-	W,M

Table 4 (cont.). Bird Observations along the Santa Clara River System, 1995: Santa Clara River from Power Line 2.5 miles upstream from Boquet Canyon Rd. to Boquet Canyon Road Crossing.

Species	date: 4/20	5/9	5/23	6/9	6/23	7/8	status
Common Yellowthroat	1	2	3	14	2	3	R*
Wilson's Warbler	-	12	3	-	-	-	M
Yellow-br. Chat	-	-	-	2	-	-	S
Black-headed Grosbeak	4	6	2	15	2	20	S*
Blue Grosbeak	2	3	1	3	3	4	S*
Lazuli Bunting	-	4	-	8	-	-	S
Rufous-sided Towhee	6	15	22	20	23	8	R*
California Towhee	7	20	19	27	11	14	R*
Song Sparrow	11	18	43	24	34	18	R*
White-cr. Sparrow	15	-	-	-	-	-	W
Red-winged Blackbird	18	4	59	-	35	-	S*
Tricolored Redwing	-	1	-	-	-	-	S
Brewer's Blackbird	-	1	4	-	1	-	R*
Brown-headed Cowbird	8	8	8	15	9	-	S*
Hooded Oriole	-	3	-	10	-	1	S*
Northern Oriole	3	7	6(2)	32	1	5	S*
House Finch	27	4	52	33	115	24	R*
Lesser Goldfinch	11	2	4	1	-	28	R*
American Goldfinch	-	22	-	-	-	1	R,M
House Sparrow	-	2	3	-	3	-	R*
Total Species:	40	42	44	41	35	34	
Total Individuals:	340	335	523	655	502	358	

Total Species on all visits: 65
Total Probable Breeding species: 38 (marked with *)

Status: M - Migrant; R - Resident; S - Summer Only; W - Winter Only

Censuses of 5/9,6/9,7/8 on north side of river,
Censuses of 4/20,5/25, 6/23 on south side of river.

() = dependent young birds

Table 5. Bird Observations along the Santa Clara River System, 1995: Castaic Creek from Old Road west to Rte. 126.

Species	date: 4/29	5/11	5/28	6/14	6/28	7/10	status
Great Egret	-	1	-	-	-	-	W,M
Snowy Egret	1	-	-	-	-	-	W,M
Black-cr. Night Heron	-	-	-	-	2	-	R?
Green Heron	1	-	-	2	-	-	R*
Red-shouldered Hawk	-	-	-	2	1	-	R*
Red-tailed Hawk	2	1	1	2	-	3	R*
American Kestrel	3	1	2	2	-	4	R*
California Quail	15	18	35	47	18	16	R*
Killdeer	7	2	-	6	4	-	R*
Domestic Pigeon	16	19	5	18	-	-	R
Mourning Dove	5	6	9	13	2	10	R*
Barn Owl	-	1	-	-	-	-	R
Greater Roadrunner	-	-	1	-	-	-	R
Black-ch. Hummingbird	-	-	-	2	2	3	S*
Anna's Hummingbird	3	4	4	9	5	8	R*
Costa's Hummingbird	-	-	2	-	-	-	S
Belted Kingfisher	-	-	-	1	-	-	M
Acorn Woodpecker	-	-	1	-	-	-	R
Nuttall's Woodpecker	-	-	4	9	4	3	R*
Downy Woodpecker	-	1	2	5	3	-	R*
Hairy Woodpecker	1	2	-	-	-	-	R
Northern Flicker	-	-	-	1	2	-	R
Black Phoebe	-	-	-	1	-	1	R
Ash-thr. Flycatcher	7	8	6	4	5	4	S*
Western Kingbird	-	-	-	2	2	2	S*
N. Rough-w. Swallow	3	12	-	13	5	1	S*
Cliff Swallow	94	60	175	40	45	2	S*
Scrub Jay	8	15	16	13	14	9	R*
American Crow	2	-	2	10	8	5	R*
Common Raven	9	2	1	-	-	7	R*
Plain Titmouse	4	-	-	-	-	3	R
Bushtit	14	4	11	14	13	23	R*
Bewick's Wren	27	16	23	44	21	8	R*
House Wren	-	1	3	-	1	-	R*
Western Bluebird	-	2	-	-	-	-	R
Swainson's Thrush	-	2	-	-	-	-	S,M
American Robin	-	1	-	4	2	1	R
Wrentit	-	-	-	1	-	-	R
N. Mockingbird	-	-	1	-	-	-	R
Calif. Thrasher	5	6	6	8	2	1	R*
Phainopepla	-	1	-	-	-	-	R
Loggerhead Shrike	1	-	-	-	-	-	R
European Starling	5	8	-	6	-	-	R*
Bell's Vireo	-	-	2	2	-	4	S*
Warbling Vireo	-	1	-	-	-	-	M

Table 5 (cont.). Bird Observations along the Santa Clara River System, 1995: Castaic Creek from Old Road west to Rte. 126.

Species	date: 4/29	5/11	5/28	6/14	6/28	7/10	status
Yellow Warbler	15	12	16	3	2	-	S*
Hermit Warbler	1	-	-	-	-	-	M
Common Yellowthroat	3	11	7	7	9	-	R*
Wilson's Warbler	2	11	2	-	-	-	M
Yellow-br. Chat	-	-	3	5	2	-	S*
Western Tanager	3	14	1	-	-	-	M
Black-headed Grosbeak	10	13	12	14	18	10	S*
Blue Grosbeak	8	1	1	-	-	5	S*
Indigo Bunting	-	-	1	-	-	-	S
Lazuli Bunting	-	-	-	-	-	11	S
Rufous-sided Towhee	13	5	5	22	14	8	R*
California Towhee	21	7	15	13	9	28	R*
Song Sparrow	23	36	22	40	26	18	R*
Red-winged Blackbird	9	55	98	97	8	15	S*
Tricolored Redwing	11	40	-	-	-	-	S
Brewer's Blackbird	-	-	2	-	-	-	R
Brown-headed Cowbird	58	29	19	15	4	9	S*
Hooded Oriole	-	-	2	1	1	-	S*
Northern Oriole	3	6	4	4	7	1	S*
House Finch	2	7	9	10	11	52	R*
Lesser Goldfinch	-	17	-	8	4	-	R*
American Goldfinch	4	2	-	-	-	4	W,M
House Sparrow	2	-	-	-	-	3	R
Total Species:	39	42	39	41	34	33	
Total Individuals:	421	460	531	520	276	282	

Total Species on all visits: 67
Total Probable Breeding species: 38

Status: M - Migrant; R - Resident; S - Summer Only; W - Winter Only

Censuses of 4/29, 5/23, and 7/10 on north side of river,
Censuses of 5/11, 6/14, and 6/28 on south side of river.

Table 6. Bird Observations along the Santa Clara River System, 1995: San Francisquito Creek for 2 Miles above Main Channel.

Species date:	4/27	5/13	5/27	6/8	6/23	7/8	status
Great Blue Heron	-	-	1	-	-	-	W,M
Green Heron	-	1	1	-	-	-	R
Mallard	2	-	-	-	2	1	R*
White-tailed Kite	-	-	1	1	-	2	R*
Red-shouldered Hawk	-	2	-	-	-	1	R*
Red-tailed Hawk	4	2	4(2)	2(2)	3	2	R*
California Quail	57	41	23	32	24	38	R*
Killdeer	21	15	16(2)	16	18	15	R*
Western Sandpiper	8	-	-	-	-	-	M
Domestic Pigeon	-	-	2	2	-	5	R
Mourning Dove	26	19	24	27	28	16	R*
Greater Roadrunner	-	-	-	1	1	-	R
Black-ch. Hummingbird	-	-	3	1	1	-	S*
Anna's Hummingbird	10	5	7	6	8	5	R*
Costa's Hummingbird	-	-	-	-	2	-	S
Nuttall's Woodpecker	5	9	6	9	6	3	R*
Downy Woodpecker	1	-	1	4	2	2	R*
Hairy Woodpecker	-	1	-	-	-	-	R
Northern Flicker	1	-	2	1	2	-	R*
Black Phoebe	1	-	4	4	3	-	R*
Ash-thr. Flycatcher	3	9	6	10	5	6	S*
Western Kingbird	4	5	3	6	4	8(3)	S*
N. Rough-w. Swallow	2	11	9	15	-	-	S
Cliff Swallow	-	-	-	2	6	25	S
Scrub Jay	7	11	11	13	15	23	R*
American Crow	11	4	6	7	1	4	R*
Common Raven	39	8	8	15	8	14	R*
Plain Titmouse	1	3	7	2	6	2	R*
Bushtit	5	2	20	4	2	6	R*
Bewick's Wren	15	14	21	17	9	28	R*
House Wren	4	11	5	4	3	-	R*
Western Bluebird	-	-	-	-	-	1	R
Swainson's Thrush	-	1	-	-	-	-	S,M
American Robin	-	-	2	-	-	-	R
Wrentit	-	-	-	-	1	-	R
N. Mockingbird	7	2	1	-	5	3	R*
Calif. Thrasher	6	4	4	10	6	2	R*
Phainopepla	-	2	4	2	4	7	R*
Loggerhead Shrike	-	2	1	3	-	2	R*
European Starling	18	9	18	21	33	3	R*
Bell's Vireo	-	-	-	1	-	-	S
Yellow Warbler	5	5	3	7	1	1	S*
Yellow- r. Warbler	1	-	-	-	-	-	W,M

Table 6 (cont.). Bird Observations along the Santa Clara River System, 1995: San Francisquito Creek for 2 Miles above Main Channel.

Species date:	4/27	5/13	5/27	6/8	6/23	7/8	status
Common Yellowthroat	8	9	4	4	6	5	R*
Wilson's Warbler	3	5	1	-	-	-	M
Yellow-br. Chat	3	5	3	4	1	2	S*
Western Tanager	-	1	1	-	-	-	M
Black-headed Grosbeak	7	9	11	20	3	8	S*
Blue Grosbeak	2	4	1	2	-	1	S*
Lazuli Bunting	-	2	-	3	-	-	S
Rufous-sided Towhee	8	2	5	16	5	8	R*
California Towhee	21	7	12	19	14	18	R*
Song Sparrow	30	30	29	60	26	10	R*
Yellow-h. Blackbird	1	-	1	-	-	-	M
Red-winged Blackbird	21	25	13	30	27	7	S*
Western Meadowlark	6	3	-	-	-	-	R
Brewer's Blackbird	12	-	14	-	5	8	R*
Brown-headed Cowbird	11	20	17	11	11	3	S*
Northern Oriole	7	8	6	10	11	8	S*
House Finch	10	10	21	14	25	37	R*
Lesser Goldfinch	4	-	7	2	6	3	R*
Total Species:	42	41	47	43	42	41	
Total Individuals:	418	338	374	442	349	347	

Total Species on all visits: 61
Total Probable Breeding species: 41 (marked with *)

Status: M - Migrant; R - Resident; S - Summer Only; W - Winter Only

() = dependent young birds

Table 7. Bird Observations along the Santa Clara River System, 1995: South Fork from Rte. 126 to McBean Parkway.

Species	date: 5/13	6/20	status
Great Blue Heron	-	1	M
Great Egret	-	1	M
Green Heron	3	-	R
Mallard	9	3	R*
Turkey Vulture	1	-	M
Red-shouldered Hawk	1	-	R
Red-tailed Hawk	2	2	R*
American Kestrel	-	1	R
California Quail	6	2	R*
Killdeer	4	13	R*
Domestic Pigeon	6	-	R
Mourning Dove	18	10	R*
Greater Roadrunner	3	-	R*
Vaux's Swift	4	-	M
Black-ch. Hummingbird	2	1	S*
Anna's Hummingbird	8	1	R*
Nuttall's Woodpecker	1	1	R*
Downy Woodpecker	-	1	R
Black Phoebe	4	10	R*
Ash-thr. Flycatcher	4	2	S*
Western Kingbird	3	1	S*
N. Rough-w. Swallow	8	14	S*
Cliff Swallow	22	18	S*
Scrub Jay	6	8	R*
American Crow	2	5	R*
Common Raven	14	11	R*
Bushtit	2	-	R
Bewick's Wren	4	7	R*
Swainson's Thrush	1	-	S,M
N. Mockingbird	4	-	R
Calif. Thrasher	2	3	R*
European Starling	6	3	R*
Orange-cr. Warbler	2	-	M
Yellow Warbler	5	1	S*
Wilson's Warbler	9	-	M
Western Tanager	7	-	M
Black-headed Grosbeak	1	-	S
Rufous-sided Towhee	2	1	R*
California Towhee	7	2	R*
Song Sparrow	5	4	R*
Red-winged Blackbird	3	11	S*
Brewer's Blackbird	22	4	R*

Table 7 (cont.). Bird Observations along the Santa Clara River System, 1995: South Fork from Rte. 126 to McBean Parkway.

Species	date: 5/13	6/20	status
Brown-headed Cowbird	2	11	S*
Hooded Oriole	1	-	S*
Northern Oriole	-	3	S*
House Finch	26	14	R*
Lesser Goldfinch	2	2	R*
House Sparrow	8	2	R*
Total Species:	43	34	
Total Individuals:	252	175	

Total Species on all visits: 48
Total Probable Breeding species: 32

Status: M - Migrant; R - Resident; S - Summer Only; W - Winter Only

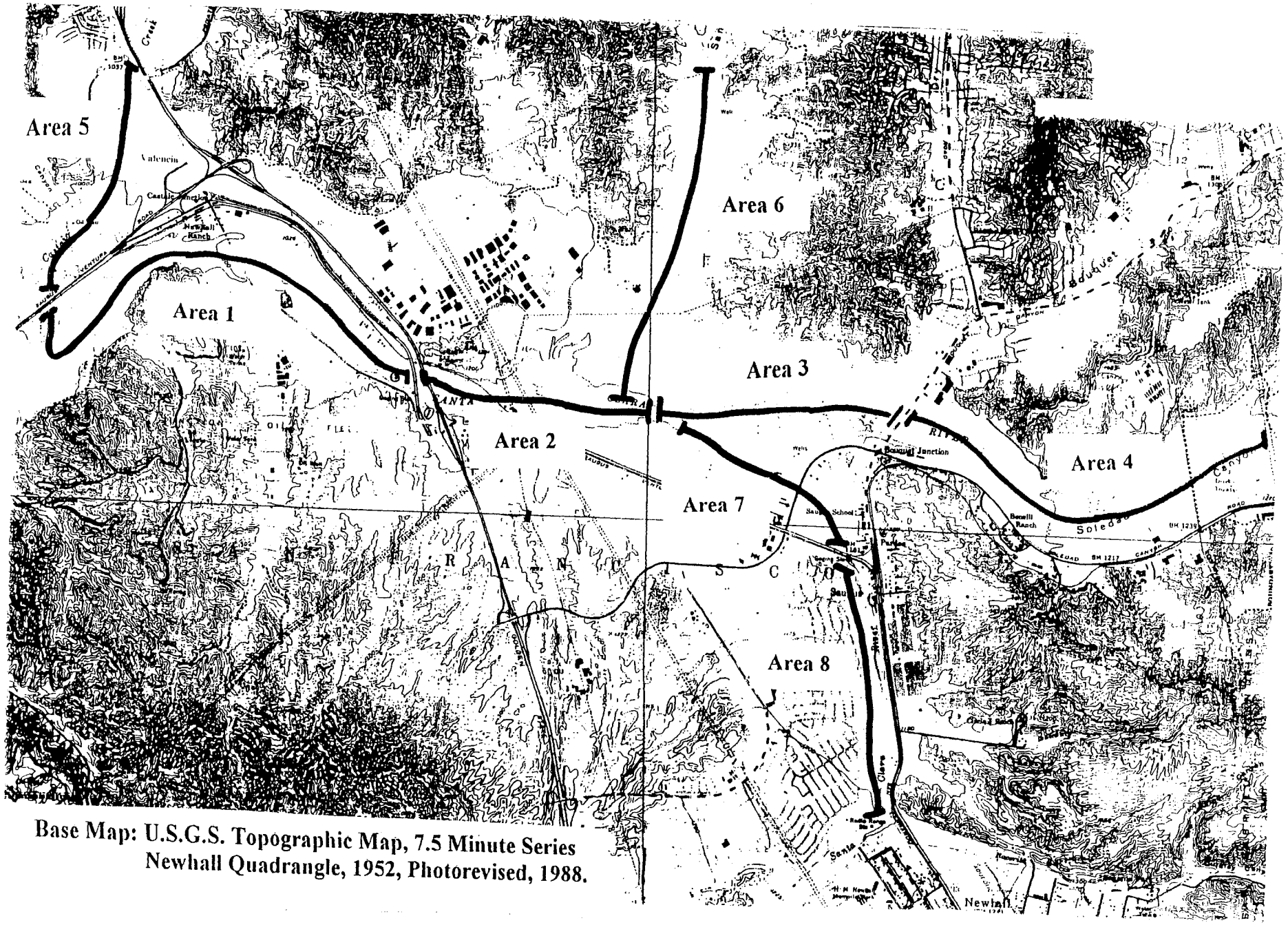
Table 8. Bird Observations along the Santa Clara River System, 1995: South Fork from Newhall Creek to Rte. 126.

Species	date: 5/13	6/20	status
Green Heron	1	-	R
Turkey Vulture	1	-	M
Red-tailed Hawk	-	2	R
California Quail	6	6	R*
Killdeer	6	3	R*
Domestic Pigeon	6	-	R
Mourning Dove	25	2	R*
Vaux's Swift	2	-	M
Black-ch. Hummingbird	2	-	S*
Anna's Hummingbird	8	4	R*
Black Phoebe	2	3	R*
Western Kingbird	2	-	S*
Rough-w. Swallow	4	-	S
Cliff Swallow	-	1	S
Scrub Jay	4	13	R*
American Crow	2	-	R
Common Raven	7	1	R*
Bushtit	4	-	R*
Bewick's Wren	13	7	R*
Swainson's Thrush	8	-	S,M
N. Mockingbird	4	3	R*
European Starling	10	4	R*
Solitary Vireo	1	-	M
Orange-cr. Warbler	2	-	M
Yellow Warbler	7	-	S
Wilson's Warbler	6	-	M
Western Tanager	17	-	M
California Towhee	2	4	R*
Song Sparrow	7	6	R*
Brewer's Blackbird	11	3	R*
Brown-headed Cowbird	2	-	S*
Hooded Oriole	1	-	S
House Finch	40	20	R*
Lesser Goldfinch	-	6	R*
House Sparrow	14	1	R*
Total Species:	32	18	
Total Individuals:	228	108	

Total Species on all visits: 35
Total Probable Breeding species: 20

Status: M - Migrant; R - Resident; S - Summer Only; W - Winter Only

Figure 1. Survey Areas along the Santa Clara River and Tributaries.



Base Map: U.S.G.S. Topographic Map, 7.5 Minute Series
Newhall Quadrangle, 1952, Photorevised, 1988.

BIRDS OF Santa Clara River System Chan I Upper Cove 1995

Locality I 5 — East JUNCTION Date 4-27

Time 730-830 Foggy

7:30 → 8:30

_____ Great Blue Heron
_____ Green Heron
(1) Mallard
_____ Cinnamon Teal
_____ Turkey Vulture
_____ White-tailed Kite
_____ Sharp-shinned Hawk
_____ Cooper's Hawk
1 Red-shouldered Hawk
1 Red-tailed Hawk
_____ Golden Eagle
_____ American Kestrel
_____ California Quail
_____ American Coot
(4) 2 2 Killdeer
_____ Spotted Sandpiper
_____ Least Sandpiper
_____ Common Snipe
_____ Rock Dove
_____ Mourning Dove
_____ **Yellow-billed Cuckoo**
_____ Greater Roadrunner
_____ Barn Owl
_____ Great Horned Owl
_____ White-throated Swift
_____ Black-ch. Hummingbird
_____ Anna's Hummingbird
_____ Costa's Hummingbird
_____ Belted Kingfisher
_____ Acorn Woodpecker
(3) 1 1 1 Nuttall's Woodpecker
(2) 1 1 Downy Woodpecker
_____ Hairy Woodpecker
(2) 1 1 Northern Flicker
_____ Western Wood-Pewee
_____ Willow Flycatcher
_____ Hammond's Flycatcher
_____ Pacific Slope Flycatcher
_____ Black Phoebe
_____ Say's Phoebe
(4) 1 1 1 1 Ash-throated Flycatcher
_____ **Brown-crested Flycatcher**
_____ Cassin's Kingbird
(1) Western Kingbird
_____ Horned Lark
_____ Tree Swallow
_____ Violet-green Swallow
(16) 4 4 4 4 N. Rough-winged Swallow
_____ Bank Swallow
(60) Cliff Swallow
_____ Barn Swallow
(6) 1 1 1 1 1 Scrub Jay
(4) 2 2 American Crow
(6) 2 2 2 Common Raven
(4) 1 1 2 Plain Titmouse
_____ Bushtit
_____ Rock Wren
(16) 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 Bewick's Wren
_____ House Wren
_____ Ruby-crowned Kinglet
_____ Blue-gray Gnatcatcher
_____ Western Bluebird
_____ Swainson's Thrush
_____ Hermit Thrush
_____ American Robin
_____ Wrentit
_____ Northern Mockingbird
_____ California Thrasher
_____ American Pipit
_____ Cedar Waxwing
_____ Phainopepla
_____ Loggerhead Shrike
(6) European Starling
_____ **Bell's Vireo**
_____ Solitary Vireo
_____ Warbling Vireo
(1) Orange-crowned Warbler
(3) 1 1 1 Yellow Warbler
_____ Yellow-rumped Warbler
_____ Black-th. Gray Warbler
_____ Townsend's Warbler
_____ MacGillivray's Warbler
(1) Common Yellowthroat
_____ Wilson's Warbler
_____ Yellow-breasted Chat
_____ **Summer Tananger**
_____ Western Tanager
(3) 1 1 1 Black-headed Grosbeak
(2) Blue Grosbeak
_____ Lazuli Bunting
(6) 1 1 1 1 1 Rufous-sided Towhee
(2) 2 California Towhee
_____ Lark Sparrow
_____ Savannah Sparrow
_____ Fox Sparrow
(25) 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 Song Sparrow
_____ Lincoln's Sparrow
_____ White-crowned Sparrow
(14) 6, 8 Red-winged Blackbird
_____ Western Meadowlark
_____ Brewer's Blackbird
(10) 4 3 3 Brown-headed Cowbird
_____ Hooded Oriole
(1) Northern Oriole
_____ House Finch
_____ Pine Siskin
_____ Lesser Goldfinch
_____ Lawrence's Goldfinch
_____ American Goldfinch
_____ House Sparrow

Additional Species

(1) B C N Heron
(15) W SANDPIPER

NO TF COLONY?

BIRDS OF Santa Clara River System

Locality Santa Clara R. "Blue Moon" to Castaic Cr. Date 4-29-05

Time _____ Clements

1	Great Blue Heron
	Green Heron
7	Mallard
	Cinnamon Teal
	Turkey Vulture
	White-tailed Kite
	Sharp-shinned Hawk
	Cooper's Hawk
1	Red-shouldered Hawk
3	Red-tailed Hawk
	Golden Eagle
1	American Kestrel
10	California Quail
	American Coot
25	Killdeer
	Spotted Sandpiper
	Least Sandpiper
	Common Snipe
3	Rock Dove
7	Mourning Dove
	Yellow-billed Cuckoo
	Greater Roadrunner
	Barn Owl
	Great Horned Owl
	White-throated Swift
	Black-ch. Hummingbird
2	Anna's Hummingbird
	Costa's Hummingbird
	Belted Kingfisher
	Acorn Woodpecker
6	Nuttall's Woodpecker
1	Downy Woodpecker
	Hairy Woodpecker
1	Northern Flicker
	Western Wood-Pewee
	Willow Flycatcher
	Hammond's Flycatcher
	Pacific Slope Flycatcher
	Black Phoebe
	Say's Phoebe
7	Ash-throated Flycatcher
	Brown-crested Flycatcher
	Cassin's Kingbird
2	Western Kingbird
1	Horned Lark
	Tree Swallow
	Violet-green Swallow
10	N. Rough-winged Swallow
	Bank Swallow
	Cliff Swallow
	Barn Swallow
11	Scrub Jay
4	American Crow
4	Common Raven
2	Plain Titmouse
	Bushtit
	Rock Wren
10	Bewick's Wren
	House Wren
	Ruby-crowned Kinglet
	Blue-gray Gnatcatcher
	Western Bluebird
	Swainson's Thrush
	Hermit Thrush
	American Robin
	Wrentit
	Northern Mockingbird
3	California Thrasher
	American Pipit
	Cedar Waxwing
	Phainopepla
	Loggerhead Shrike
11	European Starling
	Bell's Vireo
	Solitary Vireo
	Warbling Vireo
	Orange-crowned Warbler
2	Yellow Warbler
	Yellow-rumped Warbler
	Black-th. Gray Warbler
	Townsend's Warbler
	MacGillivray's Warbler
2	Common Yellowthroat
2	Wilson's Warbler
2	Yellow-breasted Chat
	Summer Tananger
	Western Tanager
5	Black-headed Grosbeak
2	Blue Grosbeak
	Lazuli Bunting
2	Rufous-sided Towhee
5	California Towhee
	Lark Sparrow
	Savannah Sparrow
	Fox Sparrow
13	Song Sparrow
	Lincoln's Sparrow
	White-crowned Sparrow
4	Red-winged Blackbird
1	Western Meadowlark
	Brewer's Blackbird
9	Brown-headed Cowbird
	Hooded Oriole
4	Northern Oriole
8	House Finch
	Pine Siskin
4	Lesser Goldfinch
4	Lawrence's Goldfinch
	American Goldfinch
	House Sparrow

Additional Species

9 western sandp.per

4 mule deer

BIRDS OF Santa Clara River System

Locality Adrd Rd → CAST JUNC Date 5-11

Time 730 — 830

- Great Blue Heron
- (2) II Green Heron
- (2) Mallard — 2 BCN Hens
- Cinnamon Teal
- Turkey Vulture
- White-tailed Kite
- Sharp-shinned Hawk
- Cooper's Hawk
- (1) Red-shouldered Hawk
- (1) Red-tailed Hawk
- Golden Eagle
- American Kestrel
- (4) 2 2 California Quail
- American Coot
- (4) 22 Killdeer
- (2) II Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- Rock Dove
- (4) 22 Mourning Dove
- **Yellow-billed Cuckoo**
- Greater Roadrunner
- Barn Owl
- Great Horned Owl
- White-throated Swift
- Black-ch. Hummingbird
- (3) III Anna's Hummingbird
- Costa's Hummingbird
- (1) Belted Kingfisher
- Acorn Woodpecker
- (1) Nuttall's Woodpecker
- (1) Downy Woodpecker
- Hairy Woodpecker
- Northern Flicker
- Western Wood-Pewee
- Willow Flycatcher
- Hammond's Flycatcher
- Pacific Slope Flycatcher
- Black Phoebe
- Say's Phoebe
- (2) II Ash-throated Flycatcher
- **Brown-crested Flycatcher**
- Cassin's Kingbird
- Western Kingbird
- Horned Lark
- Tree Swallow
- Violet-green Swallow
- (9) 4,5 N. Rough-winged Swallow N
- Bank Swallow
- Cliff Swallow
- Barn Swallow
- (5) 22 1 Scrub Jay
- (2) American Crow
- (7) 22 1 Common Raven
- (4) 22 Plain Titmouse
- Bushtit
- (18) T-1 Rock Wren
- HH HH 1 III Bewick's Wren
- (2) II House Wren

Jim Sightings

- Ruby-crowned Kinglet
- Blue-gray Gnatcatcher
- (2) Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- American Robin
- Wrentit
- Northern Mockingbird
- (2) II California Thrasher
- American Pipit
- Cedar Waxwing
- Phainopepla
- Loggerhead Shrike
- (5) 2 3 European Starling
- **Bell's Vireo**
- Solitary Vireo
- Warbling Vireo
- (2) II Orange-crowned Warbler
- (2) II Yellow Warbler
- (1) Yellow-rumped Warbler
- Black-th. Gray Warbler
- Townsend's Warbler
- MacGillivray's Warbler
- (4) 1 2 1 Common Yellowthroat
- (6) 1 22 1 Wilson's Warbler
- Yellow-breasted Chat
- **Summer Tananger**
- (2) Western Tanager
- (3) III Black-headed Grosbeak
- Blue Grosbeak
- Lazuli Bunting
- (6) III II 1 Rufous-sided Towhee
- (2) California Towhee
- Lark Sparrow
- Savannah Sparrow
- Fox Sparrow
- (19) 1 11 1 HH HH HH Song Sparrow
- Lincoln's Sparrow
- White-crowned Sparrow
- (6) Red-winged Blackbird
- Western Meadowlark
- Brewer's Blackbird
- (4) 1 12 Brown-headed Cowbird
- Hooded Oriole
- Northern Oriole
- (2) House Finch
- Pine Siskin
- Lesser Goldfinch
- Lawrence's Goldfinch
- (2) American Goldfinch
- House Sparrow

Additional Species

SIDES N. O — N.

A T — N

N F. N

Crow B. Nest

BIRDS OF Santa Clara River System

Locality Santa Clara R. Castaic Jct → Castaic Cr. Date 5-11-95

Time _____

- ___ Great Blue Heron
- 2 Green Heron
- 2 Mallard
- ___ Cinnamon Teal
- ___ Turkey Vulture
- 1 White-tailed Kite
- ___ Sharp-shinned Hawk
- ___ Cooper's Hawk
- 2 Red-shouldered Hawk
- 2 Red-tailed Hawk
- 1 Golden Eagle
- ___ American Kestrel
- 6 California Quail
- ___ American Coot
- ___ Killdeer
- 4 Spotted Sandpiper 2 obvious pairs
- ___ Least Sandpiper
- ___ Common Snipe
- ___ Rock Dove
- 11 Mourning Dove / copulating pair
- ___ **Yellow-billed Cuckoo**
- ___ Greater Roadrunner
- ___ Barn Owl
- ___ Great Horned Owl
- ___ White-throated Swift
- ___ Black-ch. Hummingbird
- 3 Anna's Hummingbird ♂ display
- ___ Costa's Hummingbird
- ___ Belted Kingfisher
- ___ Acorn Woodpecker
- 7 Nuttall's Woodpecker
- ___ Downy Woodpecker
- ___ Hairy Woodpecker
- 1 Northern Flicker
- ___ Western Wood-Pewee
- ___ Willow Flycatcher
- ___ Hammond's Flycatcher
- ___ Pacific Slope Flycatcher
- ___ Black Phoebe
- ___ Say's Phoebe
- 7 Ash-throated Flycatcher / pair @ cavity
- ___ **Brown-crested Flycatcher**
- ___ Cassin's Kingbird
- 2 Western Kingbird
- ___ Horned Lark
- ___ Tree Swallow
- 4 Violet-green Swallow
- 25 N. Rough-winged Swallow
- ___ Bank Swallow
- ___ Cliff Swallow
- ___ Barn Swallow
- 16 Scrub Jay
- 10 American Crow
- 5 Common Raven
- 3 Plain Titmouse
- 2 Bushtit
- ___ Rock Wren
- 9 Bewick's Wren singing

- ___ Ruby-crowned Kinglet
- ___ Blue-gray Gnatcatcher
- 4 Western Bluebird bring food to west cavity
- ___ Swainson's Thrush
- ___ Hermit Thrush
- ___ American Robin
- ___ Wrentit
- 1 Northern Mockingbird
- 2 California Thrasher
- ___ American Pipit
- ___ Cedar Waxwing
- ___ Phainopepla
- ___ Loggerhead Shrike
- 8 European Starling
- ___ **Bell's Vireo**
- ___ Solitary Vireo
- 1 Warbling Vireo
- 3 Orange-crowned Warbler
- singing ♂♂ 6 Yellow Warbler
- ___ Yellow-rumped Warbler
- ___ Black-th. Gray Warbler
- ___ Townsend's Warbler
- ___ MacGillivray's Warbler
- singing 4 Common Yellowthroat
- 8 Wilson's Warbler
- singing 2 Yellow-breasted Chat
- ___ **Summer Tananger**
- 2 Western Tanager
- singing ♂♂ 10 Black-headed Grosbeak
- 2 Blue Grosbeak
- ___ Lazuli Bunting
- 2 Rufous-sided Towhee
- 6 California Towhee
- ___ Lark Sparrow
- ___ Savannah Sparrow
- ___ Fox Sparrow
- singing 15 Song Sparrow
- ___ Lincoln's Sparrow
- ___ White-crowned Sparrow
- 5 Red-winged Blackbird
- ___ Western Meadowlark
- ___ Brewer's Blackbird
- 18 Brown-headed Cowbird
- ___ Hooded Oriole
- singing 5 Northern Oriole
- singing 8 House Finch
- ___ Pine Siskin
- ___ Lesser Goldfinch
- ___ Lawrence's Goldfinch
- ___ American Goldfinch
- ___ House Sparrow

Additional Species

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BIRDS OF Santa Clara River System

Locality SCR I-5 to ~~Bel~~ Blue Moon Date 5-25-95

Time

	Great Blue Heron
	Green Heron
1	Mallard
	Cinnamon Teal
	Turkey Vulture
	White-tailed Kite
	Sharp-shinned Hawk
	Cooper's Hawk
2	Red-shouldered Hawk
2	Red-tailed Hawk
	Golden Eagle
	American Kestrel
4	California Quail
	American Coot
	Killdeer
2	Spotted Sandpiper
	Least Sandpiper
	Common Snipe
11	Rock Dove
7	Mourning Dove
	Yellow-billed Cuckoo
	Greater Roadrunner
	Barn Owl
	Great Horned Owl
	White-throated Swift
	Black-ch. Hummingbird
2	Anna's Hummingbird
	Costa's Hummingbird
	Belted Kingfisher
	Acorn Woodpecker
5	Nuttall's Woodpecker
	Downy Woodpecker
	Hairy Woodpecker
1	Northern Flicker
	Western Wood-Pewee
	Willow Flycatcher
	Hammond's Flycatcher
	Pacific Slope Flycatcher
2	Black Phoebe
	Say's Phoebe
6	Ash-throated Flycatcher pair@nest
	Brown-crested Flycatcher
	Cassin's Kingbird
2	Western Kingbird
	Horned Lark
	Tree Swallow
	Violet-green Swallow
45	N. Rough-winged Swallow
	Bank Swallow
10	Cliff Swallow
1	Barn Swallow
5	Scrub Jay
6	American Crow
7	Common Raven
2	Plain Titmouse
2	Bushtit
	Rock Wren
10	Bewick's Wren
2	House Wren
	Ruby-crowned Kinglet
	Blue-gray Gnatcatcher
	Western Bluebird
	Swainson's Thrush
	Hermit Thrush
	American Robin
	Wrentit
	Northern Mockingbird
2	California Thrasher
	American Pipit
	Cedar Waxwing
	Phainopepla
	Loggerhead Shrike
2	European Starling
	Bell's Vireo
	Solitary Vireo
	Warbling Vireo
	Orange-crowned Warbler
1	Yellow Warbler
	Yellow-rumped Warbler
	Black-th. Gray Warbler
	Townsend's Warbler
	MacGillivray's Warbler
4	Common Yellowthroat
	Wilson's Warbler
	Yellow-breasted Chat
	Summer Tananger
	Western Tanager
4	Black-headed Grosbeak
obvious pair 2	Blue Grosbeak pair
	Lazuli Bunting
saw 1 fledgling 9	Rufous-sided Towhee
0	California Towhee
	Lark Sparrow
	Savannah Sparrow
	Fox Sparrow
24	Song Sparrow
	Lincoln's Sparrow
	White-crowned Sparrow
colony at mouth gone 5	Red-winged Blackbird
	Western Meadowlark
	Brewer's Blackbird
22	Brown-headed Cowbird
	Hooded Oriole
2	Northern Oriole
6	House Finch
	Pine Siskin
2	Lesser Goldfinch
	Lawrence's Goldfinch
	American Goldfinch
	House Sparrow

Additional Species

1 Black-necked stilt

Birds of Santa Clara River System

Locality SCR Blue Moon to Castaic Cr Date 5-26-95

Time

	Great Blue Heron
1	Green Heron
4	Mallard
	Cinnamon Teal
	Turkey Vulture
	White-tailed Kite
	Sharp-shinned Hawk
	Cooper's Hawk
1	Red-shouldered Hawk
3	Red-tailed Hawk
	Golden Eagle
	American Kestrel
16	California Quail
	American Coot
25	Killdeer
4	Spotted Sandpiper
	Least Sandpiper
	Common Snipe
2	Rock Dove
8	Mourning Dove
	Yellow-billed Cuckoo
	Greater Roadrunner
	Barn Owl
	Great Horned Owl
	White-throated Swift
	Black-ch. Hummingbird
4	Anna's Hummingbird
	Costa's Hummingbird
	Belted Kingfisher
	Acorn Woodpecker
9	Nuttall's Woodpecker
2	Downy Woodpecker
	Hairy Woodpecker
2	Northern Flicker
	Western Wood-Pewee
	Willow Flycatcher
	Hammond's Flycatcher
	Pacific Slope Flycatcher
4	Black Phoebe
	Say's Phoebe
11	Ash-throated Flycatcher
	Brown-crested Flycatcher
	Cassin's Kingbird
	Western Kingbird
	Horned Lark
	Tree Swallow
5	Violet-green Swallow
25	N. Rough-winged Swallow
	Bank Swallow
10	Cliff Swallow
	Barn Swallow
19	Scrub Jay
9	American Crow
7	Common Raven
2	Plain Titmouse
4	Bushtit
	Rock Wren
11	Bewick's Wren
	Ruby-crowned Kinglet
	Blue-gray Gnatcatcher
4	Western Bluebird
	Swainson's Thrush
	Hermit Thrush
	American Robin
	Wrentit
	Northern Mockingbird
3	California Thrasher
	American Pipit
	Cedar Waxwing
2	Phainopepla
	Loggerhead Shrike
6	European Starling
	Bell's Vireo
	Solitary Vireo
	Warbling Vireo
	Orange-crowned Warbler
1	Yellow Warbler
	Yellow-rumped Warbler
	Black-th. Gray Warbler
	Townsend's Warbler
	MacGillivray's Warbler
7	Common Yellowthroat
	Wilson's Warbler
3	Yellow-breasted Chat
	Summer Tananger
	Western Tanager
7	Black-headed Grosbeak
3	Blue Grosbeak
	Lazuli Bunting
9	Rufous-sided Towhee
9	California Towhee
	Lark Sparrow
	Savannah Sparrow
	Fox Sparrow
23	Song Sparrow
	Lincoln's Sparrow
	White-crowned Sparrow
	Red-winged Blackbird
	Western Meadowlark
	Brewer's Blackbird
19	Brown-headed Cowbird
	Hooded Oriole
2	Northern Oriole
15	House Finch
	Pine Siskin
2	Lesser Goldfinch
	Lawrence's Goldfinch
	American Goldfinch
	House Sparrow

Additional Species

2 Great egret

BIRDS OF Santa Clara River System

Locality SCR Blue Hron → Castaic Date 6-14-95

Time

	Great Blue Heron	
	Green Heron	
2	Mallard	
	Cinnamon Teal	
	Turkey Vulture	
juvenile 1	White-tailed Kite	
	Sharp-shinned Hawk	
	Cooper's Hawk	
3	Red-shouldered Hawk	
2	Red-tailed Hawk	
	Golden Eagle	
	American Kestrel	
12	California Quail	
	American Coot	
21	Killdeer	
	Spotted Sandpiper	
	Least Sandpiper	
	Common Snipe	
3	Rock Dove	
7	Mourning Dove	
	Yellow-billed Cuckoo	
	Greater Roadrunner	
	Barn Owl	
	Great Horned Owl	
12	White-throated Swift	
	Black-ch. Hummingbird	
5	Anna's Hummingbird	
	Costa's Hummingbird	
	Belted Kingfisher	
	Acorn Woodpecker	
9	Nuttall's Woodpecker	
	Downy Woodpecker	
	Hairy Woodpecker	
2	Northern Flicker	
	Western Wood-Pewee	
	Willow Flycatcher	
	Hammond's Flycatcher	
	Pacific Slope Flycatcher	
4	Black Phoebe	
	Say's Phoebe	
12	Ash-throated Flycatcher	
	Brown-crested Flycatcher	
	Cassin's Kingbird	
2	Western Kingbird	
	Horned Lark	
	Tree Swallow	
6	Violet-green Swallow	
15	N. Rough-winged Swallow	
	Bank Swallow	
15	Cliff Swallow	
	Barn Swallow	
19	Scrub Jay	
7	American Crow	
8	Common Raven	
juvenile 3	Plain Titmouse	
2	Bushtit	
	Rock Wren	
	Ruby-crowned Kinglet	
	Blue-gray Gnatcatcher	
juvenile 9	Western Bluebird	
	Swainson's Thrush	
	Hermit Thrush	
	American Robin	
	Wrentit	
	Northern Mockingbird	
2	California Thrasher	
	American Pipit	
	Cedar Waxwing	
juvenile 5	Phainopepla	
	Loggerhead Shrike	
15	European Starling	
	Bell's Vireo	
	Solitary Vireo	
	Warbling Vireo	
	Orange-crowned Warbler	
3	Yellow Warbler	
	Yellow-rumped Warbler	
	Black-th. Gray Warbler	
	Townsend's Warbler	
	MacGillivray's Warbler	
6	Common Yellowthroat	
	Wilson's Warbler	
3	Yellow-breasted Chat	
	Summer Tananger	
	Western Tanager	
7	Black-headed Grosbeak	
3	Blue Grosbeak	
juvenile 6	Lazuli Bunting	
5	Rufous-sided Towhee	
5	California Towhee	
	Lark Sparrow	
	Savannah Sparrow	
	Fox Sparrow	
27	Song Sparrow	
	Lincoln's Sparrow	
	White-crowned Sparrow	
2	Red-winged Blackbird	
	Western Meadowlark	
	Brewer's Blackbird	
9	Brown-headed Cowbird	
	Hooded Oriole	
5	Northern Oriole	
26	House Finch	
	Pine Siskin	
	Lesser Goldfinch	
	Lawrence's Goldfinch	
	American Goldfinch	
	House Sparrow	

Additional Species

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BIRDS OF Santa Clara River System

Locality Old Rd & Blue Moon Date 5-14

Time 7:15 – 9:00

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- ____ Great Blue Heron
- ____ Green Heron
- ____ Mallard
- ____ Cinnamon Teal
- ____ Turkey Vulture
- (1) White-tailed Kite
- ____ Sharp-shinned Hawk
- (1) Cooper's Hawk
- (1) Red-shouldered Hawk
- ____ Red-tailed Hawk
- ____ Golden Eagle
- ____ American Kestrel
- (4) 2 11 California Quail
- ____ American Coot
- (4) 2 2 Killdeer
- ____ Spotted Sandpiper
- ____ Least Sandpiper
- ____ Common Snipe
- (1) Rock Dove
- (1) Mourning Dove
- ____ **Yellow-billed Cuckoo**
- ____ Greater Roadrunner
- ____ Barn Owl
- ____ Great Horned Owl
- ____ White-throated Swift
- ____ Black-ch. Hummingbird
- (1) Anna's Hummingbird
- ____ Costa's Hummingbird
- ____ Belted Kingfisher
- ____ Acorn Woodpecker
- (5) 1111 Nuttall's Woodpecker
- (2) 11 Downy Woodpecker
- ____ Hairy Woodpecker
- (1) 1 Northern Flicker
- ____ Western Wood-Pewee
- ____ Willow Flycatcher
- ____ Hammond's Flycatcher
- ____ Pacific Slope Flycatcher
- (4(1)) 13 Black Phoebe (1)
- ____ Say's Phoebe
- (6) 2 1111 Ash-throated Flycatcher
- ____ **Brown-crested Flycatcher**
- ____ Cassin's Kingbird
- ____ Western Kingbird
- ____ Horned Lark
- ____ Tree Swallow
- ____ Violet-green Swallow
- (18) 8 3 133 N. Rough-winged Swallow
- ____ Bank Swallow
- ____ Cliff Swallow
- ____ Barn Swallow
- ____ Scrub Jay
- (4(2)) 2 2 American Crow (2)
- (2) 11 Common Raven
- (2) 2 Plain Titmouse
- (2) 43 Bushtit
- ____ Rock Wren

- ____ Ruby-crowned Kinglet
- ____ Blue-gray Gnatcatcher
- (1) Western Bluebird
- ____ Swainson's Thrush
- ____ Hermit Thrush
- ____ American Robin
- ____ Wrentit
- ____ Northern Mockingbird
- (1) California Thrasher
- ____ American Pipit
- ____ Cedar Waxwing
- ____ Phainopepla
- ____ Loggerhead Shrike
- (3) 11 European Starling
- ____ **Bell's Vireo**
- ____ Solitary Vireo
- ____ Warbling Vireo
- ____ Orange-crowned Warbler
- (1) Yellow Warbler
- ____ Yellow-rumped Warbler
- ____ Black-th. Gray Warbler
- ____ Townsend's Warbler
- ____ MacGillivray's Warbler
- (4) 111 Common Yellowthroat
- ____ Wilson's Warbler
- ____ Yellow-breasted Chat
- ____ **Summer Tananger**
- ____ Western Tanager
- (1) Black-headed Grosbeak
- ____ Blue Grosbeak
- ____ Lazuli Bunting
- (3) 111 Rufous-sided Towhee
- ____ California Towhee
- ____ Lark Sparrow
- ____ Savannah Sparrow
- ____ Fox Sparrow
- (16) 1 1111 1111 1111 Song Sparrow
- ____ Lincoln's Sparrow
- ____ White-crowned Sparrow
- (8) 6 2 Red-winged Blackbird
- ____ Western Meadowlark
- (2) Brewer's Blackbird
- (6) 2 2 2 Brown-headed Cowbird
- ____ Hooded Oriole
- ____ Northern Oriole
- ____ House Finch
- ____ Pine Siskin
- ____ Lesser Goldfinch
- ____ Lawrence's Goldfinch
- ____ American Goldfinch
- ____ House Sparrow

Additional Species

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Locality Blue Moon to Castaic Date 6-26

Time

_____ Great Blue Heron
_____ Green Heron
2 Mallard
_____ Cinnamon Teal
_____ Turkey Vulture
1 White-tailed Kite
_____ Sharp-shinned Hawk
_____ Cooper's Hawk
2 Red-shouldered Hawk
4 Red-tailed Hawk
1 Golden Eagle
_____ American Kestrel
4 California Quail
_____ American Coot
19 Killdeer
7 Spotted Sandpiper defug territorial
_____ Least Sandpiper
_____ Common Snipe
_____ Rock Dove
4 Mourning Dove
_____ **Yellow-billed Cuckoo**
_____ Greater Roadrunner
_____ Barn Owl
_____ Great Horned Owl
_____ White-throated Swift
_____ Black-ch. Hummingbird
2 Anna's Hummingbird
_____ Costa's Hummingbird
_____ Belted Kingfisher
_____ Acorn Woodpecker
3 Nuttall's Woodpecker
1 Downy Woodpecker
_____ Hairy Woodpecker
_____ Northern Flicker
_____ Western Wood-Pewee
_____ Willow Flycatcher
_____ Hammond's Flycatcher
_____ Pacific Slope Flycatcher
4 Black Phoebe
_____ Say's Phoebe
10 Ash-throated Flycatcher
_____ **Brown-crested Flycatcher**
_____ Cassin's Kingbird
_____ Western Kingbird
_____ Horned Lark
_____ Tree Swallow
5 Violet-green Swallow
20 N. Rough-winged Swallow
_____ Bank Swallow
70 Cliff Swallow
_____ Barn Swallow
15 Scrub Jay
3 American Crow
21 Common Raven
2 Plain Titmouse
_____ Bushtit
_____ Rock Wren
5 Bewick's Wren
2 House Wren

_____ Ruby-crowned Kinglet
_____ Blue-gray Gnatcatcher
7 Western Bluebird
_____ Swainson's Thrush
_____ Hermit Thrush
_____ American Robin
_____ Wrentit
_____ Northern Mockingbird
2 California Thrasher
_____ American Pipit
_____ Cedar Waxwing
2 Phainopepla
_____ Loggerhead Shrike
36 European Starling
_____ **Bell's Vireo**
_____ Solitary Vireo
_____ Warbling Vireo
_____ Orange-crowned Warbler
2 Yellow Warbler
_____ Yellow-rumped Warbler
_____ Black-th. Gray Warbler
_____ Townsend's Warbler
_____ MacGillivray's Warbler
5 Common Yellowthroat
_____ Wilson's Warbler
3 Yellow-breasted Chat
_____ **Summer Tananger**
_____ Western Tanager
5 Black-headed Grosbeak
1 Blue Grosbeak
_____ Lazuli Bunting
9 Rufous-sided Towhee
4 California Towhee
_____ Lark Sparrow
_____ Savannah Sparrow
_____ Fox Sparrow
21 Song Sparrow
_____ Lincoln's Sparrow
_____ White-crowned Sparrow
_____ Red-winged Blackbird
_____ Western Meadowlark
_____ Brewer's Blackbird
9 Brown-headed Cowbird
_____ Hooded Oriole
_____ Northern Oriole
15 House Finch
_____ Pine Siskin
2 Lesser Goldfinch
_____ Lawrence's Goldfinch
_____ American Goldfinch
_____ House Sparrow

Additional Species

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Locality OLD RD - EAST JUNCT Date 6-26

Time 8 - 9

6

N-S 106

_____ Great Blue Heron
_____ Green Heron
_____ Mallard
_____ Cinnamon Teal
_____ Turkey Vulture
_____ White-tailed Kite
_____ Sharp-shinned Hawk
_____ Cooper's Hawk
_____ Red-shouldered Hawk
_____ Red-tailed Hawk
_____ Golden Eagle
_____ American Kestrel
_____ California Quail
_____ American Coot
2 II Killdeer
2 Spotted Sandpiper OP
_____ Least Sandpiper
_____ Common Snipe
_____ Rock Dove
_____ Mourning Dove
_____ **Yellow-billed Cuckoo**
_____ Greater Roadrunner
_____ Barn Owl
_____ Great Horned Owl
_____ White-throated Swift
_____ Black-ch. Hummingbird
II Anna's Hummingbird
_____ Costa's Hummingbird
_____ Belted Kingfisher
_____ Acorn Woodpecker
10 Nuttall's Woodpecker
I Downy Woodpecker
I Hairy Woodpecker
_____ Northern Flicker
_____ Western Wood-Pewee
_____ Willow Flycatcher
_____ Hammond's Flycatcher
_____ Pacific Slope Flycatcher
III Black Phoebe
_____ Say's Phoebe
III Ash-throated Flycatcher
_____ **Brown-crested Flycatcher**
_____ Cassin's Kingbird
I Western Kingbird
_____ Horned Lark
_____ Tree Swallow
_____ Violet-green Swallow
4 5 I N. Rough-winged Swallow
_____ Bank Swallow
_____ Cliff Swallow
_____ Barn Swallow
II 2 Scrub Jay
~2 3 2 American Crow FY
2 2 3 I Common Raven
~III 2 2 II Plain Titmouse FY
2 Bushtit
_____ Rock Wren
III/IIII III Bewick's Wren
II House Wren

_____ Ruby-crowned Kinglet
_____ Blue-gray Gnatcatcher
2 Western Bluebird
_____ Swainson's Thrush
_____ Hermit Thrush
_____ American Robin
_____ Wrentit
_____ Northern Mockingbird
I California Thrasher
_____ American Pipit
_____ Cedar Waxwing
_____ Phainopepla
_____ Loggerhead Shrike
I European Starling
_____ **Bell's Vireo**
_____ Solitary Vireo
_____ Warbling Vireo
_____ Orange-crowned Warbler
_____ Yellow Warbler
_____ Yellow-rumped Warbler
_____ Black-th. Gray Warbler
_____ Townsend's Warbler
_____ MacGillivray's Warbler
III Common Yellowthroat
_____ Wilson's Warbler
_____ Yellow-breasted Chat
_____ **Summer Tananger**
_____ Western Tanager
I Black-headed Grosbeak
III Blue Grosbeak
_____ Lazuli Bunting
III Rufous-sided Towhee
_____ California Towhee
_____ Lark Sparrow
_____ Savannah Sparrow
_____ Fox Sparrow
IIIIIII IIII IIII Song Sparrow
_____ Lincoln's Sparrow
_____ White-crowned Sparrow
6 Red-winged Blackbird
_____ Western Meadowlark
_____ Brewer's Blackbird
II Brown-headed Cowbird
_____ Hooded Oriole
_____ Northern Oriole
23 House Finch
_____ Pine Siskin
_____ Lesser Goldfinch
_____ Lawrence's Goldfinch
_____ American Goldfinch
_____ House Sparrow

Additional Species

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Locality ___ old W → Blue Moon – MT Cany. ___ Date ___ 7-90 ___
Time ___ 730 – 830 ___

- Great Blue Heron
- Green Heron
- Mallard
- Cinnamon Teal
- Turkey Vulture
- White-tailed Kite
- Sharp-shinned Hawk
- Cooper's Hawk
- Red-shouldered Hawk
- Red-tailed Hawk
- Golden Eagle
- American Kestrel
- California Quail
- American Coot
- Killdeer
- Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- Rock Dove
- Mourning Dove
- **Yellow-billed Cuckoo**
- Greater Roadrunner
- Barn Owl
- Great Horned Owl
- White-throated Swift
- Black-ch. Hummingbird
- Anna's Hummingbird
- Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- Nuttall's Woodpecker
- ~~Downy Woodpecker~~
- Hairy Woodpecker
- Northern Flicker
- Western Wood-Pewee
- Willow Flycatcher
- Hammond's Flycatcher
- Pacific Slope Flycatcher
- ~~Black Phoebe~~
- Say's Phoebe
- Ash-throated Flycatcher
- **Brown-crested Flycatcher**
- Cassin's Kingbird
- Western Kingbird
- Horned Lark
- Tree Swallow
- Violet-green Swallow
- N. Rough-winged Swallow
- Bank Swallow
- Cliff Swallow
- Barn Swallow
- Scrub Jay
- American Crow
- Common Raven
- Plain Titmouse
- Bushtit
- Rock Wren
- Bewick's Wren
- House Wren
- Ruby-crowned Kinglet
- Blue-gray Gnatcatcher
- Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- American Robin
- Wrentit
- Northern Mockingbird
- California Thrasher
- American Pipit
- Cedar Waxwing
- Phainopepla
- Loggerhead Shrike
- European Starling
- **Bell's Vireo**
- Solitary Vireo
- Warbling Vireo
- Orange-crowned Warbler
- ~~Yellow~~ Warbler
- Yellow-rumped Warbler
- Black-th. Gray Warbler
- Townsend's Warbler
- MacGillivray's Warbler
- ~~Common~~ Yellowthroat
- Wilson's Warbler
- ~~Yellow~~-breasted Chat
- **Summer Tananger**
- Western Tanager
- Black-headed Grosbeak
- ~~Blue~~ Grosbeak
- Lazuli Bunting
- ~~Rufous-sided~~ Towhee
- California Towhee
- Lark Sparrow
- Savannah Sparrow
- Fox Sparrow
- ~~Song~~ Sparrow
- Lincoln's Sparrow
- White-crowned Sparrow
- ~~Red-winged~~ Blackbird
- Western Meadowlark
- Brewer's Blackbird
- Brown-headed Cowbird
- Hooded Oriole
- Northern Oriole
- House Finch
- Pine Siskin
- Lesser Goldfinch
- Lawrence's Goldfinch
- American Goldfinch
- House Sparrow

Additional Species

BIRDS OF Santa Clara River System

1995 Area 2

Locality McB → Bel rd

Date 4-27-95

Time 630 - 730

- (1) Green Heron
- (32) 17 Mallard
- Great Blue Heron
- Cinnamon Teal
- Turkey Vulture
- White-tailed Kite
- Sharp-shinned Hawk
- Cooper's Hawk
- (1) Red-shouldered Hawk (w)
- Red-tailed Hawk
- Golden Eagle
- American Kestrel
- (3) 21 California Quail
- American Coot
- (4) |||| Killdeer (P)
- Spotted Sandpiper
- (3) Least Sandpiper
- Common Snipe
- Rock Dove
- Mourning Dove
- **Yellow-billed Cuckoo**
- Greater Roadrunner
- Barn Owl
- Great Horned Owl
- White-throated Swift
- Black-ch. Hummingbird
- Anna's Hummingbird
- Costa's Hummingbird
- (1) Belted Kingfisher
- Acorn Woodpecker
- (4) |||| Nuttall's Woodpecker
- (1) | Downy Woodpecker
- Hairy Woodpecker
- Northern Flicker
- Western Wood-Pewee
- Willow Flycatcher
- Hammond's Flycatcher
- Pacific Slope Flycatcher
- (1) Black Phoebe
- Say's Phoebe
- (2) || Ash-throated Flycatcher
- **Brown-crested Flycatcher**
- Cassin's Kingbird
- Western Kingbird
- Horned Lark
- Tree Swallow
- Violet-green Swallow
- (9) 4311 N. Rough-winged Swallow (w)
- Bank Swallow
- Cliff Swallow
- Barn Swallow
- (5) 𝍸 Scrub Jay
- (3) 12 American Crow
- (3) ||| Common Raven
- (5) 122 Plain Titmouse
- (6) 24 Bushtit
- Rock Wren
- (16) 1 𝍸 𝍸 𝍸 Bewick's Wren
- House Wren

S. SIDE

low riparian wet grass w

low Song Sp.

- Ruby-crowned Kinglet
- Blue-gray Gnatcatcher
- (2) Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- American Robin
- Wrentit
- Northern Mockingbird
- California Thrasher
- American Pipit
- Cedar Waxwing
- Phainopepla
- Loggerhead Shrike
- (14) 4 44 2 European Starling fy
- **Bell's Vireo**
- Solitary Vireo
- Warbling Vireo
- Orange-crowned Warbler
- (2) || Yellow Warbler
- (1) Yellow-rumped Warbler
- Black-th. Gray Warbler
- Townsend's Warbler
- MacGillivray's Warbler
- (1) Common Yellowthroat
- Wilson's Warbler
- Yellow-breasted Chat
- **Summer Tanager**
- Western Tanager
- (6) | 𝍸 Black-headed Grosbeak
- Blue Grosbeak
- Lazuli Bunting
- (5) 𝍸 Rufous-sided Towhee
- California Towhee
- Lark Sparrow
- Savannah Sparrow
- Fox Sparrow
- (19) |||| 𝍸 𝍸 𝍸 Song Sparrow
- Lincoln's Sparrow
- White-crowned Sparrow
- Red-winged Blackbird
- Western Meadowlark
- Brewer's Blackbird
- (17) 2 3 3 2 3 1 1 1 Brown-headed Cowbird
- Hooded Oriole
- (1) Northern Oriole
- (4) House Finch
- Pine Siskin
- Lesser Goldfinch
- Lawrence's Goldfinch
- American Goldfinch
- House Sparrow

Additional Species

2 coyote

BIRDS of Santa Clara River System

Locality MCB → OLD HWY Date MAY 11

Time 630 — 230

N SIDE.

- ____ Great Blue Heron
- (2) Green Heron
- (2) Mallard
- ____ Cinnamon Teal
- ____ Turkey Vulture
- ____ White-tailed Kite
- ____ Sharp-shinned Hawk
- (1) Cooper's Hawk N
- ____ Red-shouldered Hawk
- ____ Red-tailed Hawk
- ____ Golden Eagle
- ____ American Kestrel
- (4) 2 2 California Quail
- ____ American Coot
- (6) 2, 1, 3 Killdeer Y
- ____ Spotted Sandpiper
- ____ Least Sandpiper
- ____ Common Snipe
- ____ Rock Dove
- ____ Mourning Dove
- ____ **Yellow-billed Cuckoo**
- ____ Greater Roadrunner
- ____ Barn Owl
- ____ Great Horned Owl
- ____ White-throated Swift
- ____ Black-ch. Hummingbird
- ____ Anna's Hummingbird
- ____ Costa's Hummingbird
- ____ Belted Kingfisher
- (1) Acorn Woodpecker
- (1) Nuttall's Woodpecker
- (2) 11 Downy Woodpecker
- ____ Hairy Woodpecker
- ____ Northern Flicker
- ____ Western Wood-Pewee
- ____ Willow Flycatcher
- ____ Hammond's Flycatcher
- ____ Pacific Slope Flycatcher
- ____ Black Phoebe
- ____ Say's Phoebe
- (9) VIII Ash-throated Flycatcher
- ____ **Brown-crested Flycatcher**
- ____ Cassin's Kingbird
- (1) Western Kingbird
- ____ Horned Lark
- ____ Tree Swallow
- ____ Violet-green Swallow
- (17) 8, 8, 1 N. Rough-winged Swallow N
- ____ Bank Swallow
- (20) Cliff Swallow MCB Bldg.
- ____ Barn Swallow
- (3) 111 Scrub Jay
- (6) 2 2 2 American Crow N
- (1) 1 Common Raven
- (6) 2 2 2 Plain Titmouse
- (4) Bushtit
- ____ Rock Wren
- (16) 1 HH HH HH Bewick's Wren
- (3) 111 House Wren
- ____ Ruby-crowned Kinglet
- ____ Blue-gray Gnatcatcher
- (2) 11 Western Bluebird FY
- ____ Swainson's Thrush
- ____ Hermit Thrush
- (1) American Robin
- ____ Wrentit
- ____ Northern Mockingbird
- (2) 11 California Thrasher
- ____ American Pipit
- ____ Cedar Waxwing
- ____ Phainopepla
- ____ Loggerhead Shrike
- (5) 2 2 1 European Starling
- ____ **Bell's Vireo**
- (2) Solitary Vireo
- (1) Warbling Vireo
- (2) 11 Orange-crowned Warbler
- (8) 1 1 HHI Yellow Warbler
- ____ Yellow-rumped Warbler
- ____ Black-th. Gray Warbler
- ____ Townsend's Warbler
- ____ MacGillivray's Warbler
- ____ Common Yellowthroat
- (10) 2 2 1 2 3 Wilson's Warbler
- ____ Yellow-breasted Chat
- ____ **Summer Tananger**
- ____ Western Tanager
- (4) 1111 Black-headed Grosbeak
- (1) Blue Grosbeak
- ____ Lazuli Bunting
- (2) 11 Rufous-sided Towhee
- (2) California Towhee
- ____ Lark Sparrow
- ____ Savannah Sparrow
- ____ Fox Sparrow
- (16) 1 HH HH 1 HH Song Sparrow
- ____ Lincoln's Sparrow
- ____ White-crowned Sparrow
- ____ Red-winged Blackbird
- ____ Western Meadowlark
- ____ Brewer's Blackbird
- (9) 1, 8 Brown-headed Cowbird
- ____ Hooded Oriole
- ____ Northern Oriole
- (6) 2 2 2 House Finch
- ____ Pine Siskin
- ____ Lesser Goldfinch
- ____ Lawrence's Goldfinch
- ____ American Goldfinch
- ____ House Sparrow

Additional Species

_____

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BIRDS OF Santa Clara River System

Locality McBean South to Ferry to Old Road — Date 5/25/95

Time 6-10:35 — North side

_____ Great Blue Heron
1 Green Heron
1 Mallard
_____ Cinnamon Teal
_____ Turkey Vulture
_____ White-tailed Kite
1 Sharp-shinned Hawk
_____ Cooper's Hawk
1 Red-shouldered Hawk
2 Red-tailed Hawk
_____ Golden Eagle
_____ American Kestrel
13 2 11 25 California Quail
_____ American Coot
2 Killdeer
_____ Spotted Sandpiper
_____ Least Sandpiper
_____ Common Snipe
_____ Rock Dove
2 Mourning Dove
_____ **Yellow-billed Cuckoo**
_____ Greater Roadrunner
_____ Barn Owl
_____ Great Horned Owl
_____ White-throated Swift
1 Black-ch. Hummingbird
2 11 Anna's Hummingbird
_____ Costa's Hummingbird
_____ Belted Kingfisher
_____ Acorn Woodpecker
IIII NN Nuttall's Woodpecker
7 3 2 1 2 Downy Woodpecker some juveniles
1 Hairy Woodpecker
_____ Northern Flicker
1 Western Wood-Pewee
_____ Willow Flycatcher
_____ Hammond's Flycatcher
_____ Pacific Slope Flycatcher
_____ Black Phoebe
_____ Say's Phoebe
1 IIII Ash-throated Flycatcher
_____ **Brown-crested Flycatcher**
_____ Cassin's Kingbird
_____ Western Kingbird
_____ Horned Lark
_____ Tree Swallow
1 Violet-green Swallow
20, 9 1 IIII N. Rough-winged Swallow
_____ Bank Swallow
2 Cliff Swallow
1 Barn Swallow
II IIII Scrub Jay
2 11 American Crow
2 3 4 21 Common Raven
2 3 1 2 7 2 11 2 Plain Titmouse
4 6 5 3 2 Bushtit
_____ Rock Wren
III 2 11 1 2 2 4 22 1 R 2 2 2 2 Bewick's Wren young in hole
_____ House Wren
_____ Ruby-crowned Kinglet
_____ Blue-gray Gnatcatcher
11 3 Western Bluebird
1 Swainson's Thrush
_____ Hermit Thrush
_____ American Robin
_____ Wrentit
_____ Northern Mockingbird
12 11 California Thrasher
_____ American Pipit
_____ Cedar Waxwing
_____ Phainopepla
_____ Loggerhead Shrike
4 8 4 8 European Starling
_____ **Bell's Vireo**
_____ Solitary Vireo
2 Warbling Vireo
1 Orange-crowned Warbler
IIII Yellow Warbler
_____ Yellow-rumped Warbler
11 Black-th. Gray Warbler 2 on fence adj a ar
_____ Townsend's Warbler
_____ MacGillivray's Warbler
1 Common Yellowthrat
III Wilson's Warbler
_____ Yellow-breasted Chat
_____ **Summer Tananger**
_____ Western Tanager
1 13 1 Black-headed Grosbeak
11 Blue Grosbeak
_____ Lazuli Bunting
IIII NN 12 Rufous-sided Towhee
2 12 22 California Towhee
_____ Lark Sparrow
_____ Savannah Sparrow
_____ Fox Sparrow
1 4 3 11 12 11 1 4 2 2 2 IIII III Song Sparrow some juvenile some foraging in field
_____ Lincoln's Sparrow
_____ White-crowned Sparrow
_____ Red-winged Blackbird
_____ Western Meadowlark
_____ Brewer's Blackbird
4 2 11 Brown-headed Cowbird
_____ Hooded Oriole
1 Northern Oriole
6 House Finch
_____ Pine Siskin
11 N Lesser Goldfinch
_____ Lawrence's Goldfinch
2 American Goldfinch
_____ House Sparrow

Additional Species

_____
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BIRDS OF Santa Clara River System

Locality ___McB→ old Rd___ Date ___6-14___
Time ___6-713___

SS Ne

(1) BCNH (imm)

Bush Rabbit

___ Great Blue Heron	___ Ruby-crowned Kinglet
___ Green Heron	___ Blue-gray Gnatcatcher
___ Mallard	(5) 2 1 2 Western Bluebird
___ Cinnamon Teal	___ Swainson's Thrush
___ Turkey Vulture	___ Hermit Thrush
___ White-tailed Kite	___ American Robin
___ Sharp-shinned Hawk	___ Wrentit
___ Cooper's Hawk	___ Northern Mockingbird
(2) 11 Red-shouldered Hawk	(2) 11 California Thrasher
4(N) 1 2 Red-tailed Hawk N	___ American Pipit
___ Golden Eagle	___ Cedar Waxwing
___ American Kestrel	___ Phainopepla
1 California Quail	___ Loggerhead Shrike
___ American Coot	(15) 3 (10) 2 European Starling
(10) 2 1 1 2 4 Killdeer	___ **Bell's Vireo**
___ Spotted Sandpiper	___ Solitary Vireo
___ Least Sandpiper	___ Warbling Vireo
___ Common Snipe	___ Orange-crowned Warbler
___ Rock Dove	___ Yellow Warbler
___ Mourning Dove	___ Yellow-rumped Warbler
___ **Yellow-billed Cuckoo**	___ Black-th. Gray Warbler
___ Greater Roadrunner	___ Townsend's Warbler
(1) Barn Owl	___ MacGillivray's Warbler
___ Great Horned Owl	___ Common Yellowthroat
___ White-throated Swift	___ Wilson's Warbler
___ Black-ch. Hummingbird	___ Yellow-breasted Chat
___ Anna's Hummingbird	___ **Summer Tanager**
___ Costa's Hummingbird	___ Western Tanager
___ Belted Kingfisher	(5) HHT Black-headed Grosbeak
___ Acorn Woodpecker	___ Blue Grosbeak
(3) 1 2 Nuttall's Woodpecker	___ Lazuli Bunting
3(1) 111 Downy Woodpecker (1)	(3) 111 Rufous-sided Towhee
(1) Hairy Woodpecker	___ California Towhee
(1) Northern Flicker	___ Lark Sparrow
___ Western Wood-Pewee	___ Savannah Sparrow
___ Willow Flycatcher	___ Fox Sparrow
___ Hammond's Flycatcher	(21) 1 HHT HHT HHT 2 1 Song Sparrow
___ Pacific Slope Flycatcher	___ Lincoln's Sparrow
(1) Black Phoebe	___ White-crowned Sparrow
___ Say's Phoebe	___ Red-winged Blackbird
(4) 11 2 Ash-throated Flycatcher	___ Western Meadowlark
___ **Brown-crested Flycatcher**	___ Brewer's Blackbird
___ Cassin's Kingbird	(6) 2 1 2 1 Brown-headed Cowbird
___ Western Kingbird	___ Hooded Oriole
___ Horned Lark	___ Northern Oriole
___ Tree Swallow	(1) 1 House Finch
___ Violet-green Swallow	___ Pine Siskin
(11) 7 2 2 N. Rough-winged Swallow	___ Lesser Goldfinch
___ Bank Swallow	(4) 2 11 Lawrence's Goldfinch
___ Cliff Swallow	___ American Goldfinch
___ Barn Swallow	___ House Sparrow
(5) HHT Scrub Jay	
(3) 2 1 American Crow	Additional Species
(2) 11 Common Raven	___
(6) 1 2 1 11 Plain Titmouse	___
(11) (11) Bushtit	___
___ Rock Wren	___
(12) 11 HHT HHT Bewick's Wren	___
(8) 111 HHT House Wren	___

Locality MCB 7 OCO Rd

Date JUNE 26

Time 7 AM 8

N-SIDE

- ____ Great Blue Heron
- 1 Green Heron
- ____ Mallard
- ____ Cinnamon Teal
- ____ Turkey Vulture
- ____ White-tailed Kite
- ____ Sharp-shinned Hawk
- 1 Cooper's Hawk
- 11 Red-shouldered Hawk
- 2 Red-tailed Hawk
- ____ Golden Eagle
- ____ American Kestrel
- 4 5 California Quail
- ____ American Coot
- 13 Killdeer
- ____ Spotted Sandpiper
- ____ Least Sandpiper
- ____ Common Snipe
- 1 Rock Dove
- ____ Mourning Dove
- ____ **Yellow-billed Cuckoo**
- ____ Greater Roadrunner
- ____ Barn Owl
- ____ Great Horned Owl
- ____ White-throated Swift
- ____ Black-ch. Hummingbird
- 11 Anna's Hummingbird
- ____ Costa's Hummingbird
- ____ Belted Kingfisher
- ____ Acorn Woodpecker
- 1111 Nuttall's Woodpecker
- 111 Downy Woodpecker
- 111 Hairy Woodpecker
- 11 Northern Flicker
- ____ Western Wood-Pewee
- ____ Willow Flycatcher
- ____ Hammond's Flycatcher
- ____ Pacific Slope Flycatcher
- 1112 Black Phoebe
- ____ Say's Phoebe
- ____ Ash-throated Flycatcher
- ____ **Brown-crested Flycatcher**
- ____ Cassin's Kingbird
- ____ Western Kingbird
- ____ Horned Lark
- ____ Tree Swallow
- ____ Violet-green Swallow
- ____ N. Rough-winged Swallow
- ____ Bank Swallow
- ____ Cliff Swallow
- ____ Barn Swallow
- 4 Scrub Jay
- 2 American Crow
- 1 Common Raven
- 1111 Plain Titmouse F.Y.
- ____ Bushtit
- 1111 Rock Wren
- 1111 Bewick's Wren
- 1111 House Wren
- ____ Ruby-crowned Kinglet
- ____ Blue-gray Gnatcatcher
- 2 Western Bluebird
- ____ Swainson's Thrush
- ____ Hermit Thrush
- ____ American Robin
- ____ Wrentit
- ____ Northern Mockingbird
- 1 California Thrasher
- ____ American Pipit
- ____ Cedar Waxwing
- ____ Phainopepla
- ____ Loggerhead Shrike
- 2 European Starling
- ____ **Bell's Vireo**
- ____ Solitary Vireo
- ____ Warbling Vireo
- ____ Orange-crowned Warbler
- ____ Yellow Warbler
- ____ Yellow-rumped Warbler
- ____ Black-th. Gray Warbler
- ____ Townsend's Warbler
- ____ MacGillivray's Warbler
- ____ Common Yellowthroat
- ____ Wilson's Warbler
- ____ Yellow-breasted Chat
- ____ **Summer Tananger**
- ____ Western Tanager
- 11 1111 Black-headed Grosbeak
- 1 Blue Grosbeak
- ____ Lazuli Bunting
- 1111 Rufous-sided Towhee
- 2 California Towhee
- ____ Lark Sparrow
- ____ Savannah Sparrow
- ____ Fox Sparrow
- 1111 1111 1111 Song Sparrow
- ____ Lincoln's Sparrow
- ____ White-crowned Sparrow
- ____ Red-winged Blackbird
- ____ Western Meadowlark
- ____ Brewer's Blackbird
- 2 111 Brown-headed Cowbird
- ____ Hooded Oriole
- ____ Northern Oriole
- 3 House Finch
- ____ Pine Siskin
- 1 Lesser Goldfinch
- ____ Lawrence's Goldfinch
- ____ American Goldfinch
- ____ House Sparrow

Additional Species

_____

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_____

Locality Mcb → Odd Date 7-9

Time 6 30 - 736

_____ Great Blue Heron
_____ Green Heron
_____ Mallard
_____ Cinnamon Teal
_____ Turkey Vulture
_____ White-tailed Kite
_____ Sharp-shinned Hawk
_____ Cooper's Hawk
1 Red-shouldered Hawk
1 Red-tailed Hawk
_____ Golden Eagle
_____ American Kestrel
5, 23 California Quail
_____ American Coot
_____ Killdeer
_____ Spotted Sandpiper
_____ Least Sandpiper
_____ Common Snipe
_____ Rock Dove
_____ Mourning Dove
_____ **Yellow-billed Cuckoo**
_____ Greater Roadrunner
_____ Barn Owl
_____ Great Horned Owl
_____ White-throated Swift
_____ Black-ch. Hummingbird
_____ Anna's Hummingbird
_____ Costa's Hummingbird
_____ Belted Kingfisher
_____ Acorn Woodpecker
13, 13 11 321 Nuttall's Woodpecker 0Y
4, 1 11 Downy Woodpecker
1 Hairy Woodpecker
2 11 Northern Flicker
_____ Western Wood-Pewee
_____ Willow Flycatcher
_____ Hammond's Flycatcher
_____ Pacific Slope Flycatcher
13, 3 2 1 2 IIII Black Phoebe 0Y
_____ Say's Phoebe
10 1 1 3 4 1 Ash-throated Flycatcher Nest FY
_____ **Brown-crested Flycatcher**
_____ Cassin's Kingbird
_____ Western Kingbird
_____ Horned Lark
_____ Tree Swallow
_____ Violet-green Swallow
5 4 1 N. Rough-winged Swallow N
_____ Bank Swallow
_____ Cliff Swallow
_____ Barn Swallow
5 1111 Scrub Jay DY
1 1 American Crow
_____ Common Raven
13 4 2 2 32 Plain Titmouse 0Y
_____ Bushtit
IIII III Rock Wren
28 IIII IIII IIII II Bewick's Wren 0Y
1 House Wren

Spike

_____ Ruby-crowned Kinglet
_____ Blue-gray Gnatcatcher
12 11 2 32 2 Western Bluebird DY
_____ Swainson's Thrush
_____ Hermit Thrush
_____ American Robin
_____ Wrentit
_____ Northern Mockingbird
1 California Thrasher
_____ American Pipit
_____ Cedar Waxwing
_____ Phainopepla
_____ Loggerhead Shrike
9 1 3 22 European Starling
_____ **Bell's Vireo**
_____ Solitary Vireo
_____ Warbling Vireo
_____ Orange-crowned Warbler
1 Yellow Warbler
_____ Yellow-rumped Warbler
_____ Black-th. Gray Warbler
_____ Townsend's Warbler
_____ MacGillivray's Warbler
2 11 Common Yellowthroat
_____ Wilson's Warbler
_____ Yellow-breasted Chat
_____ **Summer Tananger**
_____ Western Tanager
6 1 IIII Black-headed Grosbeak
2 11 Blue Grosbeak
2 2 Lazuli Bunting
3 111 Rufous-sided Towhee
3 21 California Towhee
1 Dark Sparrow
_____ Savannah Sparrow
_____ Fox Sparrow
25 2 3 3 11 2 IIII 3 11 Song Sparrow
_____ Lincoln's Sparrow
_____ White-crowned Sparrow
_____ Red-winged Blackbird
_____ Western Meadowlark
_____ Brewer's Blackbird
8 12 IIII Brown-headed Cowbird
_____ Hooded Oriole
_____ Northern Oriole
9 4 2 3 House Finch
_____ Pine Siskin
8 3 3 2 Lesser Goldfinch
1 Lawrence's Goldfinch
_____ American Goldfinch
_____ House Sparrow

Additional Species

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BIRDS OF Santa Clara River System 1992 Cloudy - 68-81-1050

Locality Above Fillmore Store to McBean Date April 22

Time _____ north side

_____ Great Blue Heron
_____ Green Heron
_____ Mallard
_____ Cinnamon Teal
_____ Turkey Vulture
_____ White-tailed Kite
_____ Sharp-shinned Hawk
_____ Cooper's Hawk
_____ Red-shouldered Hawk
(3) III Red-tailed Hawk
_____ Golden Eagle
_____ American Kestrel
(45) 20,25 California Quail
_____ American Coot
_____ Killdeer
_____ Spotted Sandpiper
_____ Least Sandpiper
_____ Common Snipe
_____ Rock Dove
(3) 1 2 Mourning Dove
_____ **Yellow-billed Cuckoo**
_____ Greater Roadrunner
_____ Barn Owl
_____ Great Horned Owl
_____ White-throated Swift
_____ Black-ch. Hummingbird
(5) 2 2 Anna's Hummingbird
_____ Costa's Hummingbird
_____ Belted Kingfisher
_____ Acorn Woodpecker
(3) II Nuttall's Woodpecker
(2) II Downy Woodpecker
_____ Hairy Woodpecker
(2) Northern Flicker copulate
_____ Western Wood-Pewee
_____ Willow Flycatcher
_____ Hammond's Flycatcher
_____ Pacific Slope Flycatcher
(4) 1 2 Black Phoebe
_____ Say's Phoebe
(5) 1 2 Ash-throated Flycatcher
_____ **Brown-crested Flycatcher**
_____ Cassin's Kingbird
(3) 1 2 Western Kingbird
_____ Horned Lark
_____ Tree Swallow
_____ Violet-green Swallow
(38) 20,8 N. Rough-winged Swallow
_____ Bank Swallow
(100) Cliff Swallow hundreds flying above
_____ Barn Swallow
(5) 1 4 Scrub Jay
_____ American Crow
(18) 2844 Common Raven (N)
_____ Plain Titmouse
(3) (7) 2 2 Bushtit
_____ Rock Wren
(12) 2 2 2 II 7 Bewick's Wren
(1) _____ 1 House Wren

_____ Ruby-crowned Kinglet
_____ Blue-gray Gnatcatcher
(1) Western Bluebird
_____ Swainson's Thrush
_____ Hermit Thrush
_____ American Robin
_____ Wrentit
_____ Northern Mockingbird
(1) California Thrasher
_____ American Pipit
_____ Cedar Waxwing
_____ Phainopepla
_____ Loggerhead Shrike
(3) European Starling
_____ **Bell's Vireo**
_____ Solitary Vireo
(2) II Warbling Vireo
(6) 1 2 III Orange-crowned Warbler
_____ Yellow Warbler
(6) II Yellow-rumped Warbler
(2) 1 Black-th. Gray Warbler
_____ Townsend's Warbler
(1) 1 MacGillivray's Warbler
(1) 1 Common Yellowthroat
(2) II Wilson's Warbler
_____ Yellow-breasted Chat
_____ **Summer Tananger**
_____ Western Tanager
(4) III Black-headed Grosbeak
_____ Blue Grosbeak
_____ Lazuli Bunting
(1) Rufous-sided Towhee
(1) 1 California Towhee
_____ Lark Sparrow
_____ Savannah Sparrow
_____ Fox Sparrow
(17) 2 2 2 2 4 7 2 Song Sparrow
(1) 1 Lincoln's Sparrow
(21) 10 II White-crowned Sparrow
_____ Red-winged Blackbird
(1) 1 Western Meadowlark
_____ Brewer's Blackbird
_____ Brown-headed Cowbird
_____ Hooded Oriole
_____ Northern Oriole
(12) 2,10 House Finch
_____ Pine Siskin
(6) 6 Lesser Goldfinch
_____ Lawrence's Goldfinch
(67) 40,10,17 American Goldfinch
(1) 1 House Sparrow

Additional Species

(3) T ~~Warbler~~ Warbler NASHVILLE

(2) Horned Lark

BIRDS OF Santa Clara River System

Locality Santa Clara R. Bouquet Cyn to McBean Date 5/9/98

Time

1	Great Blue Heron
	Green Heron
2	Mallard
	Cinnamon Teal
	Turkey Vulture
	White-tailed Kite
	Sharp-shinned Hawk
	Cooper's Hawk
	Red-shouldered Hawk
1	Red-tailed Hawk
	Golden Eagle
	American Kestrel
4	California Quail
	American Coot
6	Killdeer
	Spotted Sandpiper
	Least Sandpiper
	Common Snipe
	Rock Dove
6	Mourning Dove
	Yellow-billed Cuckoo
	Greater Roadrunner
	Barn Owl
	Great Horned Owl
	White-throated Swift
	Black-ch. Hummingbird
	Anna's Hummingbird
	Costa's Hummingbird
	Belted Kingfisher
	Acorn Woodpecker
3	Nuttall's Woodpecker
1	Downy Woodpecker
	Hairy Woodpecker
	Northern Flicker
	Western Wood-Pewee
	Willow Flycatcher
	Hammond's Flycatcher
	Pacific Slope Flycatcher
2	Black Phoebe
	Say's Phoebe
2	Ash-throated Flycatcher
	Brown-crested Flycatcher
	Cassin's Kingbird
2	Western Kingbird
	Horned Lark
	Tree Swallow
	Violet-green Swallow
9	N. Rough-winged Swallow
	Bank Swallow
	Cliff Swallow
	Barn Swallow
5	Scrub Jay
10	American Crow
2	Common Raven
	Plain Titmouse
	Bushtit
	Rock Wren
7	Bewick's Wren
	House Wren
	Ruby-crowned Kinglet
	Blue-gray Gnatcatcher
	Western Bluebird
	Swainson's Thrush
	Hermit Thrush
	American Robin
	Wrentit
	Northern Mockingbird
2	California Thrasher
	American Pipit
2	Cedar Waxwing
	Phainopepla
	Loggerhead Shrike
4	European Starling
	Bell's Vireo
	Solitary Vireo
2	Warbling Vireo
1	Orange-crowned Warbler
3	Yellow Warbler
	Yellow-rumped Warbler
	Black-th. Gray Warbler
	Townsend's Warbler
	MacGillivray's Warbler
6	Common Yellowthroat
11	Wilson's Warbler
	Yellow-breasted Chat
	Summer Tananger
	Western Tanager
4	Black-headed Grosbeak
	Blue Grosbeak
	Lazuli Bunting
1	Rufous-sided Towhee
2	California Towhee
	Lark Sparrow
	Savannah Sparrow
	Fox Sparrow
14	Song Sparrow
	Lincoln's Sparrow
	White-crowned Sparrow
100	Red-winged Blackbird
	Western Meadowlark
	Brewer's Blackbird
7	Brown-headed Cowbird
	Hooded Oriole
1	Northern Oriole
6	House Finch
	Pine Siskin
3	Lesser Goldfinch
	Lawrence's Goldfinch
	American Goldfinch
3	House Sparrow

Additional Species

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BIRDS OF Santa Clara River System

Locality ______ Date ______
Time ______

Count	Species
	Great Blue Heron
1	Green Heron
2	Mallard
	Cinnamon Teal
	Turkey Vulture
	White-tailed Kite
	Sharp-shinned Hawk
1	Cooper's Hawk
	Red-shouldered Hawk
1	Red-tailed Hawk
	Golden Eagle
	American Kestrel
16	California Quail
	American Coot
NONE	Killdeer
	Spotted Sandpiper
	Least Sandpiper
	Common Snipe
4	Rock Dove
12	Mourning Dove
	Yellow-billed Cuckoo
2	Greater Roadrunner
	Barn Owl
	Great Horned Owl
	White-throated Swift
	Black-ch. Hummingbird
4	Anna's Hummingbird
	Costa's Hummingbird
	Belted Kingfisher
	Acorn Woodpecker
2	Nuttall's Woodpecker
	Downy Woodpecker
	Hairy Woodpecker
1	Northern Flicker
	Western Wood-Pewee
	Willow Flycatcher
	Hammond's Flycatcher
1	Pacific Slope Flycatcher
	Black Phoebe
	Say's Phoebe
2	Ash-throated Flycatcher
	Brown-crested Flycatcher
	Cassin's Kingbird
2	Western Kingbird
	Horned Lark
	Tree Swallow
3	Violet-green Swallow
20	N. Rough-winged Swallow
	Bank Swallow
10	Cliff Swallow
	Barn Swallow
5	Scrub Jay
20	American Crow
40	Common Raven
2	Plain Titmouse
2	Bushtit
	Rock Wren
5	Bewick's Wren
	House Wren
	Ruby-crowned Kinglet
	Blue-gray Gnatcatcher
1	Western Bluebird
	Swainson's Thrush
	Hermit Thrush
	American Robin
	Wrentit
2	Northern Mockingbird
4	California Thrasher
	American Pipit
	Cedar Waxwing
	Phainopepla
	Loggerhead Shrike
3	European Starling
	Bell's Vireo
	Solitary Vireo
	Warbling Vireo
1	Orange-crowned Warbler
2	Yellow Warbler
	Yellow-rumped Warbler
	Black-th. Gray Warbler
	Townsend's Warbler
	MacGillivray's Warbler
4	Common Yellowthroat
6	Wilson's Warbler
	Yellow-breasted Chat
	Summer Tananger
	Western Tanager
3	Black-headed Grosbeak
	Blue Grosbeak
	Lazuli Bunting
4	Rufous-sided Towhee
4	California Towhee
	Lark Sparrow
	Savannah Sparrow
	Fox Sparrow
16	Song Sparrow
	Lincoln's Sparrow
	White-crowned Sparrow
50	Red-winged Blackbird
	Western Meadowlark
	Brewer's Blackbird
6	Brown-headed Cowbird
	Hooded Oriole
1	Northern Oriole
10	House Finch
	Pine Siskin
2	Lesser Goldfinch
	Lawrence's Goldfinch
	American Goldfinch
	House Sparrow

Additional Species

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40

BIRDS OF Santa Clara River System

Locality Bouquet Can Bridge to McBean Date 6-9-95
Time

1	Great Blue Heron
	Green Heron
6	Mallard
	Cinnamon Teal
	Turkey Vulture
	White-tailed Kite
	Sharp-shinned Hawk
	Cooper's Hawk
	Red-shouldered Hawk
1	Red-tailed Hawk
	Golden Eagle
	American Kestrel
	California Quail
	American Coot
4	Killdeer
	Spotted Sandpiper
	Least Sandpiper
	Common Snipe
2	Rock Dove
6	Mourning Dove
	Yellow-billed Cuckoo
	Greater Roadrunner
	Barn Owl
	Great Horned Owl
	White-throated Swift
	Black-ch. Hummingbird
2	Anna's Hummingbird
	Costa's Hummingbird
	Belted Kingfisher
	Acorn Woodpecker
3	Nuttall's Woodpecker
1	Downy Woodpecker
	Hairy Woodpecker
	Northern Flicker
	Western Wood-Pewee
	Willow Flycatcher
	Hammond's Flycatcher
	Pacific Slope Flycatcher
2	Black Phoebe
	Say's Phoebe
3	Ash-throated Flycatcher
	Brown-crested Flycatcher
	Cassin's Kingbird
2	Western Kingbird
	Horned Lark
	Tree Swallow
	Violet-green Swallow
30	N. Rough-winged Swallow
	Bank Swallow
10	Cliff Swallow
	Barn Swallow
12	Scrub Jay
6	American Crow
25	Common Raven
3	Plain Titmouse
2	Bushtit
	Rock Wren
7	Bewick's Wren

	Ruby-crowned Kinglet
	Blue-gray Gnatcatcher
	Western Bluebird
	Swainson's Thrush
	Hermit Thrush
	American Robin
	Wrentit
	Northern Mockingbird
2	California Thrasher
	American Pipit
	Cedar Waxwing
	Phainopepla
	Loggerhead Shrike
12	European Starling
	Bell's Vireo
	Solitary Vireo
	Warbling Vireo
	Orange-crowned Warbler
	Yellow Warbler
	Yellow-rumped Warbler
	Black-th. Gray Warbler
	Townsend's Warbler
	MacGillivray's Warbler
2 JUV. 4	Common Yellowthroat
	Wilson's Warbler
	Yellow-breasted Chat
	Summer Tananger
	Western Tanager
7	Black-headed Grosbeak
2	Blue Grosbeak
	Lazuli Bunting
2	Rufous-sided Towhee
5	California Towhee
	Lark Sparrow
	Savannah Sparrow
	Fox Sparrow
4 JUV. 9	Song Sparrow
	Lincoln's Sparrow
	White-crowned Sparrow
55	Red-winged Blackbird
	Western Meadowlark
	Brewer's Blackbird
9	Brown-headed Cowbird
	Hooded Oriole
3	Northern Oriole
10	House Finch
	Pine Siskin
2	Lesser Goldfinch
	Lawrence's Goldfinch
	American Goldfinch
	House Sparrow

Additional Species

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Locality Boquet Bridge → W McBean Date 6-23-95

Time ______

Count	Species
	Great Blue Heron
	Green Heron
	Mallard
	Cinnamon Teal
	Turkey Vulture
	White-tailed Kite
	Sharp-shinned Hawk
	Cooper's Hawk
	Red-shouldered Hawk
3	Red-tailed Hawk
	Golden Eagle
	American Kestrel
6	California Quail
	American Coot
4	Killdeer
	Spotted Sandpiper
	Least Sandpiper
	Common Snipe
	Rock Dove
2	Mourning Dove
	Yellow-billed Cuckoo
	Greater Roadrunner
	Barn Owl
	Great Horned Owl
	White-throated Swift
	Black-ch. Hummingbird
	Anna's Hummingbird
	Costa's Hummingbird
	Belted Kingfisher
	Acorn Woodpecker
3	Nuttall's Woodpecker 1 juvenile
1	Downy Woodpecker juvenile
	Hairy Woodpecker
1	Northern Flicker
	Western Wood-Pewee
	Willow Flycatcher
	Hammond's Flycatcher
	Pacific Slope Flycatcher
2	Black Phoebe
	Say's Phoebe
1	Ash-throated Flycatcher
	Brown-crested Flycatcher
	Cassin's Kingbird
2	Western Kingbird
	Horned Lark
	Tree Swallow
	Violet-green Swallow
10	N. Rough-winged Swallow
	Bank Swallow
30	Cliff Swallow Nests under McBean
	Barn Swallow
7	Scrub Jay
4	American Crow
35	Common Raven
	Plain Titmouse
	Bushtit
	Rock Wren
3	Bewick's Wren
3	House Wren
	Ruby-crowned Kinglet
	Blue-gray Gnatcatcher
	Western Bluebird
	Swainson's Thrush
	Hermit Thrush
	American Robin
	Wrentit
	Northern Mockingbird
2	California Thrasher
	American Pipit
	Cedar Waxwing
	Phainopepla
	Loggerhead Shrike
4	European Starling
	Bell's Vireo
	Solitary Vireo
	Warbling Vireo
	Orange-crowned Warbler
1	Yellow Warbler
	Yellow-rumped Warbler
	Black-th. Gray Warbler
	Townsend's Warbler
	MacGillivray's Warbler
3	Common Yellowthroat 1 juv
	Wilson's Warbler
3	Yellow-breasted Chat 1 juv
	Summer Tananger
	Western Tanager
2	Black-headed Grosbeak
	Blue Grosbeak
	Lazuli Bunting
1	Rufous-sided Towhee
4	California Towhee
	Lark Sparrow
	Savannah Sparrow
	Fox Sparrow
14	Song Sparrow + juv.
	Lincoln's Sparrow
	White-crowned Sparrow
8	Red-winged Blackbird
	Western Meadowlark
	Brewer's Blackbird
4	Brown-headed Cowbird
	Hooded Oriole
	Northern Oriole
7	House Finch
	Pine Siskin
	Lesser Goldfinch
	Lawrence's Goldfinch
	American Goldfinch
	House Sparrow

Additional Species

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______

Locality SCR Beach - McB Date 7-8-95

Time _____

_____ Great Blue Heron
_____ Green Heron
_____ Mallard
_____ Cinnamon Teal
_____ Turkey Vulture
_____ White-tailed Kite
_____ Sharp-shinned Hawk
_____ Cooper's Hawk
2 Red-shouldered Hawk
1 Red-tailed Hawk
_____ Golden Eagle
_____ American Kestrel
_____ California Quail
_____ American Coot
16 Killdeer
_____ Spotted Sandpiper
_____ Least Sandpiper
_____ Common Snipe
_____ Rock Dove
4 Mourning Dove
_____ **Yellow-billed Cuckoo**
_____ Greater Roadrunner
_____ Barn Owl
_____ Great Horned Owl
_____ White-throated Swift
_____ Black-ch. Hummingbird
2 Anna's Hummingbird
_____ Costa's Hummingbird
_____ Belted Kingfisher
_____ Acorn Woodpecker
3 Nuttall's Woodpecker
_____ Downy Woodpecker
_____ Hairy Woodpecker
4 Northern Flicker
_____ Western Wood-Pewee
_____ Willow Flycatcher
_____ Hammond's Flycatcher
_____ Pacific Slope Flycatcher
6 Black Phoebe
_____ Say's Phoebe
NONE Ash-throated Flycatcher
_____ **Brown-crested Flycatcher**
_____ Cassin's Kingbird
2 Western Kingbird
_____ Horned Lark
_____ Tree Swallow
_____ Violet-green Swallow
_____ N. Rough-winged Swallow
_____ Bank Swallow
30 Cliff Swallow
_____ Barn Swallow
12 Scrub Jay
9 American Crow
34 Common Raven
3 Plain Titmouse
8 Bushtit
_____ Rock Wren
12 Bewick's Wren
_____ House Wren

_____ Ruby-crowned Kinglet
_____ Blue-gray Gnatcatcher
_____ Western Bluebird
_____ Swainson's Thrush
_____ Hermit Thrush
_____ American Robin
_____ Wrentit
_____ Northern Mockingbird
2 California Thrasher
_____ American Pipit
_____ Cedar Waxwing
_____ Phainopepla
_____ Loggerhead Shrike
2 European Starling
_____ **Bell's Vireo**
_____ Solitary Vireo
_____ Warbling Vireo
_____ Orange-crowned Warbler
1 Yellow Warbler
_____ Yellow-rumped Warbler
_____ Black-th. Gray Warbler
_____ Townsend's Warbler
_____ MacGillivray's Warbler
3 Common Yellowthroat
_____ Wilson's Warbler
2 Yellow-breasted Chat
_____ **Summer Tananger**
_____ Western Tanager
4 Black-headed Grosbeak
1 Blue Grosbeak
_____ Lazuli Bunting
_____ Rufous-sided Towhee
6 California Towhee
_____ Lark Sparrow
_____ Savannah Sparrow
_____ Fox Sparrow
32 Song Sparrow
_____ Lincoln's Sparrow
_____ White-crowned Sparrow
35 Red-winged Blackbird
_____ Western Meadowlark
_____ Brewer's Blackbird
8 Brown-headed Cowbird
_____ Hooded Oriole
_____ Northern Oriole
25 House Finch
_____ Pine Siskin
4 Lesser Goldfinch
_____ Lawrence's Goldfinch
_____ American Goldfinch
6 House Sparrow

Additional Species

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_____

BIRDS OF Santa Clara River System

Locality UPRR SC S Side 830- AP 20 Date Dec 4 1995

Time

- Great Blue Heron
- (1) 1 Green Heron
- (6) 2 2 2 Mallard (6)
- Cinnamon Teal
- Turkey Vulture
- White-tailed Kite
- (1) Sharp-shinned Hawk
- Cooper's Hawk
- (1) Red-shouldered Hawk
- (4) 12 Red-tailed Hawk (N)
- Golden Eagle
- (1) American Kestrel
- 1 2 4 2 2 2 4 California Quail (3)
- (24) American Coot
- (7) 2 1 2 Killdeer (N)
- Spotted Sandpiper
- Least Sandpiper
- (2) 11 Common Snipe
- Rock Dove
- (6) 134 Mourning Dove
- **Yellow-billed Cuckoo**
- Greater Roadrunner
- Barn Owl
- Great Horned Owl
- (4) White-throated Swift
- Black-ch. Hummingbird
- (4) 1111 Anna's Hummingbird
- Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- (4) 1111 Nuttall's Woodpecker
- Downy Woodpecker
- Hairy Woodpecker
- (3) 111 Northern Flicker
- Western Wood-Pewee
- Willow Flycatcher
- Hammond's Flycatcher
- Pacific Slope Flycatcher
- Black Phoebe
- Say's Phoebe
- Ash-throated Flycatcher
- **Brown-crested Flycatcher**
- Cassin's Kingbird
- Western Kingbird
- Horned Lark
- Tree Swallow
- Violet-green Swallow
- (6) N. Rough-winged Swallow
- Bank Swallow
- (90) (30) (30) Cliff Swallow
- (3) Barn Swallow
- 2 1 1 1 2 1 1 Scrub Jay
- American Crow
- (9) (10) 4 12 1 Common Raven
- (1) Plain Titmouse
- (5) Bushtit
- Rock Wren
- (8) 1 1 111 Bewick's Wren
- (1) 1 House Wren

5 pair

7-11

62 mi

- Ruby-crowned Kinglet
- Blue-gray Gnatcatcher
- Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- (1) American Robin
- (3) 111 Wrentit
- (3) 111 Northern Mockingbird
- California Thrasher
- American Pipit
- Cedar Waxwing
- Phainopepla
- Loggerhead Shrike
- (2) European Starling
- **Bell's Vireo**
- Solitary Vireo
- Warbling Vireo
- Orange-crowned Warbler
- (1) Yellow Warbler
- Yellow-rumped Warbler
- Black-th. Gray Warbler
- Townsend's Warbler
- MacGillivray's Warbler
- (1) Common Yellowthroat
- Wilson's Warbler
- Yellow-breasted Chat
- **Summer Tananger**
- Western Tanager
- (4) 1111 Black-headed Grosbeak
- (2) Blue Grosbeak
- Lazuli Bunting
- (6) 2 1 1 1 Rufous-sided Towhee
- (7) 1 2 2 2 2 California Towhee (N)
- Lark Sparrow
- Savannah Sparrow
- Fox Sparrow
- (11) 1 1 1 2 1 1 1 3 Song Sparrow
- Lincoln's Sparrow
- (15) 3 3 4 3 2 White-crowned Sparrow
- (10) (3) Red-winged Blackbird
- (18) Western Meadowlark
- Brewer's Blackbird
- (8) 5 2 1 Brown-headed Cowbird
- Hooded Oriole
- (3) 12 Northern Oriole
- (27) 4 3 4 4 6 3 3 House Finch
- Pine Siskin
- (11) 4 4 2 1 Lesser Goldfinch
- Lawrence's Goldfinch
- American Goldfinch
- House Sparrow

Additional Species

River Slough -

BIRDS OF Santa Clara River System

Locality Upper most to Bouquet Date 5/8/95

Time 5-10:30

_____ Great Blue Heron
_____ Green Heron
_____ Mallard
_____ Cinnamon Teal
_____ Turkey Vulture
_____ White-tailed Kite
_____ Sharp-shinned Hawk
_____ Cooper's Hawk
_____ Red-shouldered Hawk
(4) || 2 Red-tailed Hawk
_____ Golden Eagle
_____ American Kestrel
(6) IV||222-22/64/22 California Quail
_____ American Coot
(3) | 2 Killdeer
_____ Spotted Sandpiper
_____ Least Sandpiper
_____ Common Snipe
_____ Rock Dove
(17) 232||/2222 Mourning Dove
_____ **Yellow-billed Cuckoo**
_____ 1 Greater Roadrunner
_____ Barn Owl
_____ Great Horned Owl
_____ White-throated Swift
_____ Black-ch. Hummingbird
(11) 1111 IIII/II Anna's Hummingbird
_____ Costa's Hummingbird
_____ Belted Kingfisher
_____ Acorn Woodpecker
(2) || Nuttall's Woodpecker
(2) || Downy Woodpecker
_____ Hairy Woodpecker
(2) || Northern Flicker
_____ Western Wood-Pewee
_____ Willow Flycatcher
_____ Hammond's Flycatcher
_____ Pacific Slope Flycatcher
_____ Black Phoebe
_____ Say's Phoebe
(8) |2 /// Ash-throated Flycatcher
_____ **Brown-crested Flycatcher**
_____ Cassin's Kingbird
(7) |24 Western Kingbird
_____ Horned Lark
_____ Tree Swallow
_____ Violet-green Swallow
(2) N. Rough-winged Swallow
_____ Bank Swallow
_____ Cliff Swallow
_____ Barn Swallow
(12) 2/13/// Scrub Jay
(2) 2 American Crow
(16) 9||22 Common Raven
(2) || Plain Titmouse
(11) 2224/22/22 Bushtit
_____ Rock Wren
(15) 13//// Bewick's Wren
_____ House Wren

_____ Ruby-crowned Kinglet
_____ Blue-gray Gnatcatcher
_____ Western Bluebird
_____ Swainson's Thrush
_____ Hermit Thrush
_____ American Robin
_____ Wrentit
(5) 122 Northern Mockingbird
(10) 222/3 California Thrasher
_____ American Pipit
_____ Cedar Waxwing
(3) // Phainopepla
_____ Loggerhead Shrike
(3) 12 European Starling
_____ **Bell's Vireo**
_____ Solitary Vireo
(2) 2 Warbling Vireo
_____ Orange-crowned Warbler
(12) 1/IIII/// Yellow Warbler
_____ Yellow-rumped Warbler
_____ Black-th. Gray Warbler
_____ Townsend's Warbler
_____ MacGillivray's Warbler
(2) || Common Yellowthroat
(12) ///6/// Wilson's Warbler
_____ Yellow-breasted Chat
_____ **Summer Tananger**
_____ Western Tanager
(6) ||2|| Black-headed Grosbeak
(3) 2 Blue Grosbeak
(4) 22 Lazuli Bunting
(15) 122 /// /// Rufous-sided Towhee
(20) 1 ///2 2/// California Towhee
_____ Lark Sparrow
_____ Savannah Sparrow
_____ Fox Sparrow
(18) /// 22 42 12 // Song Sparrow
_____ Lincoln's Sparrow
_____ White-crowned Sparrow
(4) 22 Red-winged Blackbird
_____ Western Meadowlark
_____ 1 Brewer's Blackbird
(8) 1142 Brown-headed Cowbird
(3) |2 Hooded Oriole
(7) |3// Northern Oriole
(4) 22 House Finch
_____ Pine Siskin
(2) 2 Lesser Goldfinch
_____ Lawrence's Goldfinch
(4) 22 American Goldfinch
(2) 2 House Sparrow

Additional Species

(1) 1 Tricolor BB

BIRDS OF Santa Clara River System

Locality Upper River down to Bouquet Bridge (South side) Date 5/23/95 TUES.
Time 5-10:30

Cloudy & Cool

- ____ Great Blue Heron
- ____ Green Heron
- 1 2 4 Mallard
- ____ Cinnamon Teal
- ____ Turkey Vulture
- ____ White-tailed Kite
- ____ Sharp-shinned Hawk
- 1 Cooper's Hawk
- 1 Red-shouldered Hawk
- 1, 2 Red-tailed Hawk
- ____ Golden Eagle
- 1 American Kestrel
- 5 1 2 2 5 2 2 11 California Quail
- ____ American Coot
- 11 Killdeer
- ____ Spotted Sandpiper
- ____ Least Sandpiper
- ____ Common Snipe
- 2 Rock Dove
- 4 1 2 2 11 2 2 4 Mourning Dove
- ____ **Yellow-billed Cuckoo**
- ____ Greater Roadrunner
- ____ Barn Owl
- ____ Great Horned Owl
- 1 White-throated Swift
- ____ Black-ch. Hummingbird
- 2 1 IIII Anna's Hummingbird
- ____ Costa's Hummingbird
- ____ Belted Kingfisher
- ____ Acorn Woodpecker
- 3 1 Nuttall's Woodpecker
- ____ Downy Woodpecker
- ____ Hairy Woodpecker
- 2 1 Northern Flicker
- ____ Western Wood-Pewee
- ____ Willow Flycatcher
- ____ Hammond's Flycatcher
- ____ Pacific Slope Flycatcher
- ____ Black Phoebe
- ____ Say's Phoebe
- 1 1 Ash-throated Flycatcher
- ____ **Brown-crested Flycatcher**
- ____ Cassin's Kingbird
- ____ Western Kingbird
- ____ Horned Lark
- ____ Tree Swallow
- ____ Violet-green Swallow
- 4 1 N. Rough-winged Swallow
- ____ Bank Swallow
- 11 Cliff Swallow
- ____ Barn Swallow
- 5 1 2 2 IIII 2 2 2 Scrub Jay
- 2 5 4 American Crow
- 7 6, 10, 9, IIII 22 Common Raven
- ____ Plain Titmouse
- 2 11 2 2 2 2 Bushtit
- ____ Rock Wren
- 6 11 9 1 5 11 22 Bewick's Wren
- ____ House Wren
- ____ Ruby-crowned Kinglet
- ____ Blue-gray Gnatcatcher
- 1 Western Bluebird
- ____ Swainson's Thrush
- ____ Hermit Thrush
- ____ American Robin
- 1 Wrentit
- 111 Northern Mockingbird
- 2 11 California Thrasher
- ____ American Pipit
- ____ Cedar Waxwing
- 1 Phainopepla
- ____ Loggerhead Shrike
- 4 6 4 8 European Starling
- ____ **Bell's Vireo**
- ____ Solitary Vireo
- ____ Warbling Vireo
- ____ Orange-crowned Warbler
- 2 IIII Yellow Warbler
- ____ Yellow-rumped Warbler
- ____ Black-th. Gray Warbler
- ____ Townsend's Warbler
- ____ MacGillivray's Warbler
- 1 11 Common Yellowthroat
- 1 11 Wilson's Warbler
- ____ Yellow-breasted Chat
- ____ **Summer Tananger**
- ____ Western Tanager
- 11 Black-headed Grosbeak
- 1 Blue Grosbeak
- ____ Lazuli Bunting
- 4 1 2 2 2 2 1 2 2 Rufous-sided Towhee
- 3 2 2 1 2 2 1 2 11 California Towhee
- ____ Lark Sparrow
- ____ Savannah Sparrow
- ____ Fox Sparrow
- 7 2 11 6 1 22 IIII 8 2 11 2 Song Sparrow
- ____ Lincoln's Sparrow
- ____ White-crowned Sparrow
- 9, 8, 10, 10, 24, 16, Red-winged Blackbird
- ____ Western Meadowlark
- 4 Brewer's Blackbird
- 5 111 Brown-headed Cowbird
- ____ Hooded Oriole
- 1 2 2 (many 2nd) Northern Oriole
- 4, 20, 5 IIII 22 4 4 6 House Finch
- ____ Pine Siskin
- 2 2 Lesser Goldfinch
- ____ Lawrence's Goldfinch
- ____ American Goldfinch
- 1, 2 House Sparrow

Additional Species

1 Bittern

30 Cedar Waxwing

BIRDS OF Santa Clara River System

Locality Upper River - Soledad Canyon north side Date 6/9/95

Time 5-10:30

Note: 47 Oaks in bend field must home the most oriole families of anywhere in county. ± 2 nests per tree by river & some in back trees = lots of young oriole. also many phenopla & W. Kingbirds

- Great Blue Heron
- Green Heron
- Mallard
- Cinnamon Teal
- Turkey Vulture
- White-tailed Kite
- Sharp-shinned Hawk
- Cooper's Hawk
- 1 Red-shouldered Hawk
- 2 1 Red-tailed Hawk
- Golden Eagle
- American Kestrel
- babies 5,8,10,6 2 2 1 2 2 California Quail
- 5 American Coot
- 1 1 Killdeer w baby
- Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- 40. Rock Dove
- 1 2 2 1 2 2 3 Mourning Dove
- **Yellow-billed Cuckoo**
- Greater Roadrunner
- Barn Owl
- Great Horned Owl
- White-throated Swift
- 1 1 Black-ch. Hummingbird
- 1 1 2 Anna's Hummingbird
- Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- 3 2 1 2 2 Nuttall's Woodpecker
- Downy Woodpecker
- Hairy Woodpecker
- 1 jvv. 3 2 Northern Flicker
- 1 Western Wood-Pewee
- Willow Flycatcher
- Hammond's Flycatcher
- Pacific Slope Flycatcher
- 1 1 Black Phoebe w young
- Say's Phoebe
- 1 1 Ash-throated Flycatcher
- **Brown-crested Flycatcher**
- Cassin's Kingbird
- 2 1 2 2 4 Western Kingbird
- Horned Lark
- Tree Swallow
- Violet-green Swallow
- 10 4, 8, 6 N. Rough-winged Swallow
- Bank Swallow
- 20 10, 30, 25 Cliff Swallow
- Barn Swallow
- 4 2 1 2 2 2 1 2 1 1 Scrub Jay
- 1 American Crow
- 12 3 9 4 6 4 Common Raven
- 2 Plain Titmouse
- 13 4 Bushtit
- Rock Wren
- Ruby-crowned Kinglet
- Blue-gray Gnatcatcher
- 2 Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- American Robin
- Wrentit
- 17 Northern Mockingbird
- 4 1 22 California Thrasher
- American Pipit
- Cedar Waxwing
- 6 1 1 Phainopepla
- Loggerhead Shrike
- 13 European Starling
- **Bell's Vireo**
- Solitary Vireo
- Warbling Vireo
- Orange-crowned Warbler
- 22 Yellow Warbler
- Yellow-rumped Warbler
- Black-th. Gray Warbler
- Townsend's Warbler
- MacGillivray's Warbler
- 2 jvv → 2 2 2 1 2 Common Yellowthroat
- Wilson's Warbler
- 2 Yellow-breasted Chat
- **Summer Tananger**
- Western Tanager
- 4 3 1 2 2 2 1 Black-headed Grosbeak
- 2 1 Blue Grosbeak
- 4 2 2 Lazuli Bunting
- 3 2 1 2 2 2 4 1 2 Rufous-sided Towhee w juvenile
- 4 2 3 3 2 4 2 3 2 2 2 1 California Towhee
- Lark Sparrow
- Savannah Sparrow
- Fox Sparrow
- jvv. 1 1 2 1 2 2 2 2 8 2 2 2 2 1 Song Sparrow 5 jvv
- Lincoln's Sparrow
- White-crowned Sparrow
- Red-winged Blackbird
- Western Meadowlark
- Brewer's Blackbird
- 3 3 2 1 6 Brown-headed Cowbird
- 2 1 4 1 2 Hooded Oriole
- 5 7 2 5 5 1 8 3 2 4 Northern Oriole w young
- 4 5 3 4 2 2 7 6 House Finch
- Pine Siskin
- 1 Lesser Goldfinch
- Lawrence's Goldfinch
- American Goldfinch
- House Sparrow

Additional Species

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Locality Upper to Bouquet South Side Date 6/23/95
Time 11

Bobcat tracks always big & small so numerous and fresh that must have lair behind trailer park

- ____ Great Blue Heron
- 1 Green Heron
- ____ Mallard
- ____ Cinnamon Teal
- ____ Turkey Vulture
- ____ White-tailed Kite
- ____ Sharp-shinned Hawk
- ____ Cooper's Hawk
- ____ Red-shouldered Hawk
- 2 | Red-tailed Hawk
- ____ Golden Eagle
- ____ American Kestrel
- 42, 24 8, 2, 2, 8 California Quail
- ____ American Coot
- ____ Killdeer
- ____ Spotted Sandpiper
- ____ Least Sandpiper
- ____ Common Snipe
- ____ Rock Dove
- 26, 10, 8, 1, 4, 1 Mourning Dove
- ____ **Yellow-billed Cuckoo**
- ____ Greater Roadrunner
- ____ Barn Owl
- ____ Great Horned Owl
- ____ White-throated Swift
- 1 Black-ch. Hummingbird
- 111 2 1, 2 Anna's Hummingbird
- ____ Costa's Hummingbird
- ____ Belted Kingfisher
- ____ Acorn Woodpecker
- 11 Nuttall's Woodpecker
- ____ Downy Woodpecker
- ____ Hairy Woodpecker
- ____ Northern Flicker
- ____ Western Wood-Pewee
- ____ Willow Flycatcher
- ____ Hammond's Flycatcher
- ____ Pacific Slope Flycatcher
- ____ Black Phoebe
- ____ Say's Phoebe
- 11 Ash-throated Flycatcher
- ____ **Brown-crested Flycatcher**
- ____ Cassin's Kingbird
- ____ Western Kingbird
- ____ Horned Lark
- ____ Tree Swallow
- ____ Violet-green Swallow
- 1 5 N. Rough-winged Swallow
- ____ Bank Swallow
- 6 Cliff Swallow
- ____ Barn Swallow
- 25, 1 Scrub Jay
- ____ American Crow
- 9, 2, 2 Common Raven
- ____ Plain Titmouse
- 4 2 Bushtit
- ____ Rock Wren
- 111 2 11 Bewick's Wren
- ____ House Wren
- ____ Ruby-crowned Kinglet
- ____ Blue-gray Gnatcatcher
- ____ Western Bluebird
- ____ Swainson's Thrush
- ____ Hermit Thrush
- ____ American Robin
- ____ Wrentit
- 2 Northern Mockingbird
- ____ California Thrasher
- ____ American Pipit
- ____ Cedar Waxwing
- 1 22 Phainopepla
- 1 Loggerhead Shrike
- 35, 8, 2 European Starling
- ____ **Bell's Vireo**
- ____ Solitary Vireo
- ____ Warbling Vireo
- ____ Orange-crowned Warbler
- 111 Yellow Warbler
- ____ Yellow-rumped Warbler
- ____ Black-th. Gray Warbler
- ____ Townsend's Warbler
- ____ MacGillivray's Warbler
- 11 Common Yellowthroat
- ____ Wilson's Warbler
- ____ Yellow-breasted Chat
- ____ **Summer Tananger**
- ____ Western Tanager
- 1 Black-headed Grosbeak
- 2 Blue Grosbeak
- ____ Lazuli Bunting
- 1 111 11 2 2 Rufous-sided Towhee
- 111 2 1 2 California Towhee
- ____ Lark Sparrow
- ____ Savannah Sparrow
- ____ Fox Sparrow
- 16, 4 1 2 3 11 22 1 62 Song Sparrow
- ____ Lincoln's Sparrow
- ____ White-crowned Sparrow
- 35 Red-winged Blackbird
- ____ Western Meadowlark
- 1 Brewer's Blackbird
- 2 1 2 Brown-headed Cowbird
- ____ Hooded Oriole
- ____ Northern Oriole
- 20, 25, 30, 35, 8, 2 House Finch
- ____ Pine Siskin
- ____ Lesser Goldfinch
- ____ Lawrence's Goldfinch
- ____ American Goldfinch
- 111 House Sparrow

Additional Species

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Locality Upper Rincon From Rincon School to Roquet Bridge Date 6-23-95
Time

_____ Great Blue Heron
_____ Green Heron
_____ Mallard
_____ Cinnamon Teal
_____ Turkey Vulture
_____ White-tailed Kite
_____ Sharp-shinned Hawk
_____ Cooper's Hawk
_____ Red-shouldered Hawk
4 Red-tailed Hawk 2 juv.
_____ Golden Eagle
_____ American Kestrel
14 California Quail
_____ American Coot
_____ Killdeer
_____ Spotted Sandpiper
_____ Least Sandpiper
_____ Common Snipe
_____ Rock Dove
2 Mourning Dove
_____ **Yellow-billed Cuckoo**
_____ Greater Roadrunner
_____ Barn Owl
_____ Great Horned Owl
2 White-throated Swift
_____ Black-ch. Hummingbird
2 Anna's Hummingbird
_____ Costa's Hummingbird
_____ Belted Kingfisher
_____ Acorn Woodpecker
1 Nuttall's Woodpecker
_____ Downy Woodpecker
_____ Hairy Woodpecker
1 Northern Flicker
_____ Western Wood-Pewee
_____ Willow Flycatcher
_____ Hammond's Flycatcher
_____ Pacific Slope Flycatcher
_____ Black Phoebe
_____ Say's Phoebe
1 Ash-throated Flycatcher
_____ **Brown-crested Flycatcher**
_____ Cassin's Kingbird
_____ Western Kingbird
_____ Horned Lark
_____ Tree Swallow
_____ Violet-green Swallow
2 N. Rough-winged Swallow
_____ Bank Swallow
4 Cliff Swallow
_____ Barn Swallow
13 Scrub Jay
3 American Crow
8 Common Raven
_____ Plain Titmouse
4 Bushtit
_____ Rock Wren
8 Bewick's Wren
_____ House Wren
_____ Ruby-crowned Kinglet
_____ Blue-gray Gnatcatcher
_____ Western Bluebird
_____ Swainson's Thrush
_____ Hermit Thrush
_____ American Robin
_____ Wrentit
_____ Northern Mockingbird
3 California Thrasher/juvenile
_____ American Pipit
_____ Cedar Waxwing
_____ Phainopepla
_____ Loggerhead Shrike
17 European Starling
_____ **Bell's Vireo**
_____ Solitary Vireo
_____ Warbling Vireo
_____ Orange-crowned Warbler
_____ Yellow Warbler
_____ Yellow-rumped Warbler
_____ Black-th. Gray Warbler
_____ Townsend's Warbler
_____ MacGillivray's Warbler
_____ Common Yellowthroat
_____ Wilson's Warbler
_____ Yellow-breasted Chat
_____ **Summer Tananger**
_____ Western Tanager
1 Black-headed Grosbeak
1 Blue Grosbeak
_____ Lazuli Bunting
1 Rufous-sided Towhee
3 California Towhee
_____ Lark Sparrow
_____ Savannah Sparrow
_____ Fox Sparrow
2 Song Sparrow
_____ Lincoln's Sparrow
_____ White-crowned Sparrow
_____ Red-winged Blackbird
_____ Western Meadowlark
_____ Brewer's Blackbird
4 Brown-headed Cowbird
_____ Hooded Oriole
1 Northern Oriole
5 House Finch
_____ Pine Siskin
_____ Lesser Goldfinch
_____ Lawrence's Goldfinch
_____ American Goldfinch
_____ House Sparrow

Additional Species

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Locality *Upper Mort to Bouquet* (*north side*) Date *July 9 /95* (*last walk*)

Time ____

• not much singing
- still small amount of water flowing all the way.

	Great Blue Heron
1	Green Heron
	Mallard
	Cinnamon Teal
	Turkey Vulture
	White-tailed Kite
	Sharp-shinned Hawk
	Cooper's Hawk
	Red-shouldered Hawk
3	Red-tailed Hawk
	Golden Eagle
	American Kestrel
3 1113 8 1183	California Quail
	American Coot
1 5 1	Killdeer
	Spotted Sandpiper
	Least Sandpiper
	Common Snipe
	Rock Dove
9 4 111 221 12223	Mourning Dove
	Yellow-billed Cuckoo
	Greater Roadrunner
	Barn Owl
	Great Horned Owl
	White-throated Swift
111	Black-ch. Hummingbird
1113	Anna's Hummingbird
	Costa's Hummingbird
	Belted Kingfisher
	Acorn Woodpecker
2 111 112	Nuttall's Woodpecker
	Downy Woodpecker
	Hairy Woodpecker
	Northern Flicker
	Western Wood-Pewee
	Willow Flycatcher
	Hammond's Flycatcher
	Pacific Slope Flycatcher
4 1 2	Black Phoebe
	Say's Phoebe
	Ash-throated Flycatcher
	Brown-crested Flycatcher
	Cassin's Kingbird
12 1	Western Kingbird
	Horned Lark
	Tree Swallow
	Violet-green Swallow
3	N. Rough-winged Swallow
	Bank Swallow
2	Cliff Swallow
	Barn Swallow
3 2 8 8	Scrub Jay
2	American Crow
7 9 3 6	Common Raven
1 2	Plain Titmouse
2 4 8 6	Bushtit
	Rock Wren
5 2 卌	Bewick's Wren
	House Wren
	Ruby-crowned Kinglet
	Blue-gray Gnatcatcher
	Western Bluebird
	Swainson's Thrush
	Hermit Thrush
	American Robin
	Wrentit
1 1 2	Northern Mockingbird
11	California Thrasher
	American Pipit
	Cedar Waxwing
11	Phainopepla
	Loggerhead Shrike
3 2	European Starling
	Bell's Vireo
	Solitary Vireo
	Warbling Vireo
	Orange-crowned Warbler
1	Yellow Warbler
	Yellow-rumped Warbler
	Black-th. Gray Warbler
	Townsend's Warbler
	MacGillivray's Warbler
111	Common Yellowthroat
	Wilson's Warbler
	Yellow-breasted Chat
	Summer Tananger
	Western Tanager
11 9 7 2	Black-headed Grosbeak
1111	Blue Grosbeak
	Lazuli Bunting
111 卌	Rufous-sided Towhee
1 1 1 2 2 卌	California Towhee
	Lark Sparrow
	Savannah Sparrow
	Fox Sparrow
4 8 6	Song Sparrow
	Lincoln's Sparrow
	White-crowned Sparrow
	Red-winged Blackbird
	Western Meadowlark
	Brewer's Blackbird
	Brown-headed Cowbird
1	Hooded Oriole
2 1 1	Northern Oriole
6 8 5 卌	House Finch
	Pine Siskin
25 3	Lesser Goldfinch
	Lawrence's Goldfinch
1	American Goldfinch
	House Sparrow

Additional Species

______
______
______
______
______
______

BIRDS OF Santa Clara River System Dec 5 1995

Locality CASTAIC CREEK - north west side Date 4/29/95

Time 6:30 - 10

SUBDEN

- Great Blue Heron
- (1) Green Heron
- Mallard
- Cinnamon Teal
- Turkey Vulture
- White-tailed Kite
- Sharp-shinned Hawk
- Cooper's Hawk
- Red-shouldered Hawk
- (2) 11 Red-tailed Hawk
- Golden Eagle
- (3) American Kestrel mating/pairing
- (15) 4 9 2 1 California Quail
- American Coot
- (7) 4 1 2 Killdeer
- Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- (16) 5 2 9 Rock Dove
- (5) 2 2 Mourning Dove
- **Yellow-billed Cuckoo**
- Greater Roadrunner
- Barn Owl
- Great Horned Owl
- White-throated Swift
- Black-ch. Hummingbird
- (3) 1 1 1 Anna's Hummingbird
- Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- Nuttall's Woodpecker
- Downy Woodpecker
- (1) Hairy Woodpecker nesting
- Northern Flicker
- Western Wood-Pewee
- Willow Flycatcher
- Hammond's Flycatcher
- Pacific Slope Flycatcher
- Black Phoebe
- Say's Phoebe
- (7) 1 1 2 2 Ash-throated Flycatcher nest
- **Brown-crested Flycatcher**
- Cassin's Kingbird
- Western Kingbird
- Horned Lark
- Tree Swallow
- Violet-green Swallow
- (3) N. Rough-winged Swallow
- Bank Swallow
- (94) 4 0 5 1 Cliff Swallow 27 nests under 127 Bridge
- Barn Swallow
- (8) 2 3 3 Scrub Jay
- (2) American Crow
- (9) 4 2 3 Common Raven
- (4) 2 2 Plain Titmouse
- (14) 2 8 2 2 Bushtit
- Rock Wren
- 72 1 4 1 2 2 1 4 1 2 3 1 2 Bewick's Wren
- House Wren
- Ruby-crowned Kinglet
- Blue-gray Gnatcatcher
- Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- American Robin
- Wrentit
- Northern Mockingbird
- (5) 1 1 2 California Thrasher
- American Pipit
- Cedar Waxwing
- Phainopepla
- Loggerhead Shrike
- (5) 1 2 2 European Starling
- **Bell's Vireo**
- Solitary Vireo
- (1) Warbling Vireo
- Orange-crowned Warbler
- (15) 1 2 2 2 2 1 2 Yellow Warbler
- Yellow-rumped Warbler
- Black-th. Gray Warbler
- Townsend's Warbler
- MacGillivray's Warbler
- (3) 1 1 1 Common Yellowthroat
- (2) 1 1 Wilson's Warbler
- Yellow-breasted Chat
- **Summer Tananger**
- (3) 1 1 1 Western Tanager
- (10) 2 2 1 1 1 1 Black-headed Grosbeak
- (8) 1 1 1 2 1 1 Blue Grosbeak
- Lazuli Bunting
- (13) 1 1 2 1 1 2 1 2 Rufous-sided Towhee
- (21) 2 2 1 2 2 2 2 2 2 2 1 California Towhee
- Lark Sparrow
- Savannah Sparrow
- Fox Sparrow
- (23) 2 2 2 1 2 2 2 2 1 1 2 2 1 Song Sparrow
- Lincoln's Sparrow
- White-crowned Sparrow
- (9) 2 4 2 Red-winged Blackbird
- Western Meadowlark
- Brewer's Blackbird
- (58) 15, 20, 3 2 4 1 8 5 Brown-headed Cowbird
- Hooded Oriole
- (3) 2 1 Northern Oriole
- (2) House Finch
- Pine Siskin
- Lesser Goldfinch
- Lawrence's Goldfinch
- (1) American Goldfinch
- (2) House Sparrow nest

Additional Species

(1) Hermit Warbler

(11) 3 1 4 2 Tricolor B.B.

(1) snowy egret

Tricolor ... Marsh

BIRDS OF Santa Clara River System

Locality Castaic Creek east side Date 5/11/95
Time

_____ Great Blue Heron
_____ Green Heron
_____ Mallard
_____ Cinnamon Teal
_____ Turkey Vulture
_____ White-tailed Kite
_____ Sharp-shinned Hawk
_____ Cooper's Hawk
_____ Red-shouldered Hawk
(1) | Red-tailed Hawk
_____ Golden Eagle
(1) | American Kestrel
(18) 4 2 6 3 2 California Quail
_____ American Coot
2 Killdeer
_____ Spotted Sandpiper
_____ Least Sandpiper
_____ Common Snipe
(18) 2,16,2 Rock Dove
(6) 2 1 2 Mourning Dove
_____ **Yellow-billed Cuckoo**
_____ Greater Roadrunner
(1) Barn Owl under freeway
_____ Great Horned Owl
_____ White-throated Swift
_____ Black-ch. Hummingbird
(4) ||| Anna's Hummingbird
_____ Costa's Hummingbird
_____ Belted Kingfisher
_____ Acorn Woodpecker
_____ Nuttall's Woodpecker
(1) Downy Woodpecker
(2) Hairy Woodpecker at nest hole
_____ Northern Flicker
_____ Western Wood-Pewee
_____ Willow Flycatcher
_____ Hammond's Flycatcher
(36) 18, 18 2 2 2 2 2 + 2 2 2 | 2 | 2 | 2 | Pacific Slope Flycatcher
_____ Black Phoebe
_____ Say's Phoebe
(8) |||| Ash-throated Flycatcher
_____ **Brown-crested Flycatcher**
_____ Cassin's Kingbird
_____ Western Kingbird
_____ Horned Lark
_____ Tree Swallow
_____ Violet-green Swallow 8 nests in holes under freeway
(12) 8 4 N. Rough-winged Swallow 2 nests under Bridge 2...
_____ Bank Swallow
(60) Cliff Swallow 30 nests to cliff (Bridge 2...)
_____ Barn Swallow
(13) 2 | 1 | 2 2 4 | 2 Scrub Jay
_____ American Crow
(2) || Common Raven
_____ Plain Titmouse
(4) 2 2 Bushtit
_____ Rock Wren
(18) 2 2 4 | 1 Bewick's Wren
(1) | House Wren

_____ Ruby-crowned Kinglet
_____ Blue-gray Gnatcatcher
(2) Western Bluebird
(2) || Swainson's Thrush
_____ Hermit Thrush
(1) American Robin
_____ Wrentit
_____ Northern Mocking bird
(6) 2 2 | | California Thrasher
_____ American Pipit
_____ Cedar Waxwing
(1) Phainopepla
(1) Loggerhead Shrike
(8) 2 2 4 European Starling
_____ **Bell's Vireo**
_____ Solitary Vireo
(1) Warbling Vireo
_____ Orange-crowned Warbler
(12) || | 2 2 | 2 | || Yellow Warbler
_____ Yellow-rumped Warbler
_____ Black-th. Gray Warbler
_____ Townsend's Warbler
_____ MacGillivray's Warbler
(11) 2 3 2 | || Common Yellowthroat
(11) 2 2 3 | 2 | || Wilson's Warbler
_____ Yellow-breasted Chat
_____ **Summer Tananger**
(14) 1 2 | | | 8 Western Tanager
(13) || 12 ||| Black-headed Grosbeak
(1) Blue Grosbeak
_____ Lazuli Bunting
(5) 2 || Rufous-sided Towhee
(7) || ||| California Towhee
_____ Lark Sparrow
_____ Savannah Sparrow
_____ Fox Sparrow
(36) 18, 18 2 2 2 2 + 2 2 2 | 2 | 2 | 2 | Song Sparrow
_____ Lincoln's Sparrow
_____ White-crowned Sparrow
(55) 4, 5, 20, 20, 6 Red-winged Blackbird
_____ Western Meadowlark
_____ Brewer's Blackbird
(29) 10, 10, 3 2 | 2 | Brown-headed Cowbird
_____ Hooded Oriole
(6) | ||| Northern Oriole
(7) 2 2 House Finch
_____ Pine Siskin
10 2 2 | 2 Lesser Goldfinch
(17) Lawrence's Goldfinch
(2) American Goldfinch
_____ House Sparrow

Additional Species
(1) Great Egret flying down river
(40) Tri-colored

BIRDS OF Santa Clara River System

Locality Castaic Creek • Thurs. often in family groups Date 5/28/95
Time 5-11:30 • This week song sparrows up on field
• beginning Aug no water

Lower

- Great Blue Heron
- Green Heron
- Mallard
- Cinnamon Teal
- Turkey Vulture
- White-tailed Kite
- Sharp-shinned Hawk
- Cooper's Hawk
- Red-shouldered Hawk
- 1 Red-tailed Hawk
- Golden Eagle
- 1 American Kestrel
- 2 1 2 2 2 2 6 2 California Quail 2 2 2 1 5
- American Coot
- Killdeer
- Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- 4 1 Rock Dove
- 1 1 2 Mourning Dove 2 2 1
- **Yellow-billed Cuckoo**
- Greater Roadrunner 1
- Barn Owl
- Great Horned Owl
- White-throated Swift
- Black-ch. Hummingbird
- 1 1 Anna's Hummingbird 1 1
- 2 Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker 1
- 1 1 Nuttall's Woodpecker 2
- 1 Downy Woodpecker 1
- Hairy Woodpecker
- Northern Flicker
- Western Wood-Pewee
- Willow Flycatcher
- Hammond's Flycatcher
- Pacific Slope Flycatcher
- Black Phoebe
- Say's Phoebe
- 1 2 1 1 Ash-throated Flycatcher
- **Brown-crested Flycatcher**
- Cassin's Kingbird
- Western Kingbird
- Horned Lark
- Tree Swallow
- Violet-green Swallow
- N. Rough-winged Swallow
- Bank Swallow
- 1 2 5 4 8 Cliff Swallow 24 nests under 27 bridge 1 upstream 63 nests under waste water bunker at south west field
- Barn Swallow
- 1 1 2 1 3 2 Scrub Jay 2 1
- 2 American Crow
- 1 Common Raven
- Plain Titmouse
- 5 6 Bushtit
- Rock Wren
- 5 4 1 2 1 1 Bewick's Wren 8
- House Wren 3

Upper

- Ruby-crowned Kinglet
- Blue-gray Gnatcatcher
- Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- American Robin
- Wrentit
- 1 Northern Mockingbird
- 1 2 2 1 California Thrasher
- American Pipit
- Cedar Waxwing
- Phainopepla
- Loggerhead Shrike
- European Starling
- **Bell's Vireo** (2) where heard last year north BB MM
- Solitary Vireo
- Warbling Vireo
- Orange-crowned Warbler
- 1 1 3 1 Yellow Warbler juvenile? 1 2 2 1 1 1
- Yellow-rumped Warbler
- Black-th. Gray Warbler
- Townsend's Warbler
- MacGillivray's Warbler
- 3 Common Yellowthroat 1 1 1
- Wilson's Warbler 1 1
- Yellow-breasted Chat 1 1 1
- **Summer Tananger**
- Western Tanager 1
- * 1 1 Black-headed Grosbeak 1 1 2
- 1 Blue Grosbeak
- Lazuli Bunting
- Rufous-sided Towhee 2 2 1
- 2 1 2 2 3 2 1 California Towhee 2
- Lark Sparrow
- Savannah Sparrow
- Fox Sparrow
- 2 2 1 2 5 Song Sparrow 2 2 2 1 1
- Lincoln's Sparrow
- White-crowned Sparrow
- 7 5 6 Red-winged Blackbird 40 c
- Western Meadowlark
- 2 Brewer's Blackbird
- 19 Brown-headed Cowbird
- 1 1 Hooded Oriole
- 1 1 1 Northern Oriole
- 1 2 2 2 House Finch
- Pine Siskin
- Lesser Goldfinch
- Lawrence's Goldfinch
- American Goldfinch
- House Sparrow

Additional Species

1 Indigo bunting

Whowhowowowo

BIRDS OF Santa Clara River System

Locality Santa Clarita River - Castaic Cr. Date 6/14/95

Time _____

_____ Great Blue Heron
2 Green Heron
_____ Mallard
_____ Cinnamon Teal
_____ Turkey Vulture
_____ White-tailed Kite
_____ Sharp-shinned Hawk
_____ Cooper's Hawk
| | Red-shouldered Hawk
|| Red-tailed Hawk
_____ Golden Eagle
2 American Kestrel
10,2,3,2,3,9 California Quail
_____ American Coot
|| Killdeer
| Spotted Sandpiper
_____ Least Sandpiper
_____ Common Snipe
2,16, Rock Dove
1|1|2|1, 3, 2 Mourning Dove
_____ **Yellow-billed Cuckoo**
_____ Greater Roadrunner
_____ Barn Owl
_____ Great Horned Owl
_____ White-throated Swift
|| Black-ch. Hummingbird
1|2|2|2 Anna's Hummingbird
_____ Costa's Hummingbird
| Belted Kingfisher
_____ Acorn Woodpecker
|||| 2 Nuttall's Woodpecker
1|2|1 Downy Woodpecker
_____ Hairy Woodpecker
| Northern Flicker
_____ Western Wood-Pewee
_____ Willow Flycatcher
_____ Hammond's Flycatcher
_____ Pacific Slope Flycatcher
| Black Phoebe
_____ Say's Phoebe
| 2 | Ash-throated Flycatcher
_____ **Brown-crested Flycatcher**
_____ Cassin's Kingbird
|| Western Kingbird
_____ Horned Lark
_____ Tree Swallow
_____ Violet-green Swallow
4,9 N. Rough-winged Swallow
_____ Bank Swallow
10, 10, 20 Cliff Swallow
_____ Barn Swallow
1|2|2|2|2|2 Scrub Jay
2242 American Crow
_____ Common Raven
_____ Plain Titmouse
6|2|2,3 Bushtit
_____ Rock Wren
_____ Bewick's Wren

_____ Ruby-crowned Kinglet
_____ Blue-gray Gnatcatcher
_____ Western Bluebird
_____ Swainson's Thrush
_____ Hermit Thrush
|||| American Robin
| Wrentit
_____ Northern Mockingbird
1|2|2|2 California Thrasher
_____ American Pipit
_____ Cedar Waxwing
_____ Phainopepla
_____ Loggerhead Shrike
1, 3, 2 European Starling
2 **Bell's Vireo** - both singing
_____ Solitary Vireo
_____ Warbling Vireo
_____ Orange-crowned Warbler
||| Yellow Warbler
_____ Yellow-rumped Warbler
_____ Black-th. Gray Warbler
_____ Townsend's Warbler
_____ MacGillivray's Warbler
4|2 Common Yellowthroat
_____ Wilson's Warbler
|||| Yellow-breasted Chat
_____ **Summer Tananger**
_____ Western Tanager
|||4|2|||| Black-headed Grosbeak
_____ Blue Grosbeak
_____ Lazuli Bunting
2|8|1|2|||| 2|| Rufous-sided Towhee
2|2|2|1|2|| California Towhee
_____ Lark Sparrow
_____ Savannah Sparrow
_____ Fox Sparrow
1, 10, 2|2|4|2|2|| 5|6|2| Song Sparrow
_____ Lincoln's Sparrow
_____ White-crowned Sparrow
40 6,8 40 1,2 Red-winged Blackbird
_____ Western Meadowlark
_____ Brewer's Blackbird
8|3|3 Brown-headed Cowbird
| Hooded Oriole
|| 2 Northern Oriole
2|2|2|2 House Finch
_____ Pine Siskin
3|3|2 Lesser Goldfinch
_____ Lawrence's Goldfinch
_____ American Goldfinch
_____ House Sparrow

Additional Species

_____
_____
_____
_____
_____
_____

Locality LOWER CASTAIC Date 6/28/95

Time

_____ Great Blue Heron
_____ Green Heron
_____ Mallard
_____ Cinnamon Teal
_____ Turkey Vulture
_____ White-tailed Kite
_____ Sharp-shinned Hawk
_____ Cooper's Hawk
| _____ Red-shouldered Hawk
_____ Red-tailed Hawk
_____ Golden Eagle
_____ American Kestrel
12|6|2 California Quail
_____ American Coot
| _____ Killdeer
_____ Spotted Sandpiper
_____ Least Sandpiper
_____ Common Snipe
_____ Rock Dove
| _____ Mourning Dove
_____ **Yellow-billed Cuckoo**
_____ Greater Roadrunner
_____ Barn Owl
_____ Great Horned Owl
_____ White-throated Swift
/ _____ Black-ch. Hummingbird
/// _____ Anna's Hummingbird
_____ Costa's Hummingbird
_____ Belted Kingfisher
_____ Acorn Woodpecker
|||| _____ Nuttall's Woodpecker
|| _____ Downy Woodpecker
_____ Hairy Woodpecker
| _____ Northern Flicker
_____ Western Wood-Pewee
_____ Willow Flycatcher
_____ Hammond's Flycatcher
_____ Pacific Slope Flycatcher
_____ Black Phoebe
_____ Say's Phoebe
||| _____ Ash-throated Flycatcher
_____ **Brown-crested Flycatcher**
_____ Cassin's Kingbird
2 _____ Western Kingbird
_____ Horned Lark
_____ Tree Swallow
_____ Violet-green Swallow
2 _____ N. Rough-winged Swallow
_____ Bank Swallow
40 _____ Cliff Swallow
_____ Barn Swallow
2|22 _____ Scrub Jay
|||2 _____ American Crow
_____ Common Raven
_____ Plain Titmouse
_____ Bushtit
_____ Rock Wren
|||| ||| 8 _____ Bewick's Wren
| _____ House Wren
_____ Ruby-crowned Kinglet
_____ Blue-gray Gnatcatcher
_____ Western Bluebird
_____ Swainson's Thrush
_____ Hermit Thrush
_____ American Robin
_____ Wrentit
_____ Northern Mockingbird
|| _____ California Thrasher
_____ American Pipit
_____ Cedar Waxwing
_____ Phainopepla
_____ Loggerhead Shrike
_____ European Starling
_____ **Bell's Vireo**
_____ Solitary Vireo
_____ Warbling Vireo
_____ Orange-crowned Warbler
|| _____ Yellow Warbler
_____ Yellow-rumped Warbler
_____ Black-th. Gray Warbler
_____ Townsend's Warbler
_____ MacGillivray's Warbler
| _____ Common Yellowthroat
_____ Wilson's Warbler
_____ Yellow-breasted Chat
_____ **Summer Tananger**
_____ Western Tanager
|||5 _____ Black-headed Grosbeak
|| _____ Blue Grosbeak
_____ Lazuli Bunting
//22 _____ Rufous-sided Towhee
|||2 _____ California Towhee
_____ Lark Sparrow
_____ Savannah Sparrow
_____ Fox Sparrow
12|2|1 _____ Song Sparrow
_____ Lincoln's Sparrow
_____ White-crowned Sparrow
_____ Red-winged Blackbird
_____ Western Meadowlark
_____ Brewer's Blackbird
| _____ Brown-headed Cowbird
| _____ Hooded Oriole
| || _____ Northern Oriole
|||4| _____ House Finch
_____ Pine Siskin
| _____ Lesser Goldfinch
_____ Lawrence's Goldfinch
_____ American Goldfinch
_____ House Sparrow

Additional Species

_____
_____
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_____

Locality Upper Cuyler Date 6 28

Time 6-730

1-BCNH AP

Spnk

_____ Great Blue Heron
_____ Green Heron
_____ Mallard
_____ Cinnamon Teal
_____ Turkey Vulture
_____ White-tailed Kite
_____ Sharp-shinned Hawk
_____ Cooper's Hawk
_____ Red-shouldered Hawk
_____ Red-tailed Hawk
_____ Golden Eagle
_____ American Kestrel
~~2~~ California Quail
_____ American Coot
III Killdeer
_____ Spotted Sandpiper
_____ Least Sandpiper
_____ Common Snipe
_____ Rock Dove
I Mourning Dove
_____ **Yellow-billed Cuckoo**
_____ Greater Roadrunner
_____ Barn Owl
_____ Great Horned Owl
_____ White-throated Swift
I Black-ch. Hummingbird
II Anna's Hummingbird
_____ Costa's Hummingbird
_____ Belted Kingfisher
_____ Acorn Woodpecker
_____ Nuttall's Woodpecker
I Downy Woodpecker
_____ Hairy Woodpecker
I Northern Flicker
_____ Western Wood-Pewee
_____ Willow Flycatcher
_____ Hammond's Flycatcher
_____ Pacific Slope Flycatcher
_____ Black Phoebe
_____ Say's Phoebe
_____ Ash-throated Flycatcher
_____ **Brown-crested Flycatcher**
_____ Cassin's Kingbird
_____ Western Kingbird
_____ Horned Lark
_____ Tree Swallow
_____ Violet-green Swallow
3 N. Rough-winged Swallow
_____ Bank Swallow
_____ Cliff Swallow
_____ Barn Swallow
II2II Scrub Jay
II American Crow
_____ Common Raven
_____ Plain Titmouse
(10)~~2~~1 Bushtit
_____ Rock Wren
III IIII Bewick's Wren
I House Wren

_____ Ruby-crowned Kinglet
_____ Blue-gray Gnatcatcher
_____ Western Bluebird
_____ Swainson's Thrush
_____ Hermit Thrush
2 American Robin
_____ Wrentit
_____ Northern Mockingbird
_____ California Thrasher
_____ American Pipit
_____ Cedar Waxwing
_____ Phainopepla
_____ Loggerhead Shrike
_____ European Starling
_____ **Bell's Vireo**
_____ Solitary Vireo
_____ Warbling Vireo
_____ Orange-crowned Warbler
_____ Yellow Warbler
_____ Yellow-rumped Warbler
_____ Black-th. Gray Warbler
_____ Townsend's Warbler
_____ MacGillivray's Warbler
II IIII Common Yellowthroat
_____ Wilson's Warbler
II Yellow-breasted Chat
_____ **Summer Tananger**
_____ Western Tanager
IIII IIII Black-headed Grosbeak
_____ Blue Grosbeak
_____ Lazuli Bunting
)) IIII Rufous-sided Towhee
_____ California Towhee
_____ Lark Sparrow
_____ Savannah Sparrow
_____ Fox Sparrow
I IIII IIII IIII Song Sparrow
_____ Lincoln's Sparrow
_____ White-crowned Sparrow
26 Red-winged Blackbird
_____ Western Meadowlark
_____ Brewer's Blackbird
12 Brown-headed Cowbird
_____ Hooded Oriole
IIII Northern Oriole
3 House Finch
_____ Pine Siskin
12 Lesser Goldfinch
_____ Lawrence's Goldfinch
_____ American Goldfinch
_____ House Sparrow

Additional Species

_____
_____
_____
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_____

Locality Castaic Date July 10?/93

Time

_____ Great Blue Heron
_____ Green Heron
_____ Mallard
_____ Cinnamon Teal
_____ Turkey Vulture
_____ White-tailed Kite
_____ Sharp-shinned Hawk
_____ Cooper's Hawk
_____ Red-shouldered Hawk
_____ Red-tailed Hawk
_____ Golden Eagle
_____ American Kestrel
12 1 2 3 6 California Quail
_____ American Coot
_____ Killdeer
_____ Spotted Sandpiper
_____ Least Sandpiper
_____ Common Snipe
_____ Rock Dove
1 3 1 2 Mourning Dove
_____ **Yellow-billed Cuckoo**
_____ Greater Roadrunner
_____ Barn Owl
_____ Great Horned Owl
_____ White-throated Swift
_____ Black-ch. Hummingbird
2 1 2 1 Anna's Hummingbird
_____ Costa's Hummingbird
_____ Belted Kingfisher
_____ Acorn Woodpecker
_____ Nuttall's Woodpecker
_____ Downy Woodpecker
_____ Hairy Woodpecker
_____ Northern Flicker
_____ Western Wood-Pewee
_____ Willow Flycatcher
_____ Hammond's Flycatcher
_____ Pacific Slope Flycatcher
_____ Black Phoebe
_____ Say's Phoebe
_____ Ash-throated Flycatcher
_____ **Brown-crested Flycatcher**
_____ Cassin's Kingbird
_____ Western Kingbird
_____ Horned Lark
_____ Tree Swallow
_____ Violet-green Swallow
_____ N. Rough-winged Swallow
_____ Bank Swallow
_____ Cliff Swallow
_____ Barn Swallow
4 Scrub Jay
14 American Crow
4 1 2 Common Raven
3 Plain Titmouse
8 9 6 Bushtit
_____ Rock Wren
Bewick's Wren
_____ House Wren

• no swallows remaining at nest site under bridge.

_____ Ruby-crowned Kinglet
_____ Blue-gray Gnatcatcher
_____ Western Bluebird
_____ Swainson's Thrush
_____ Hermit Thrush
_____ American Robin
_____ Wrentit
_____ Northern Mockingbird
_____ California Thrasher young
_____ American Pipit
_____ Cedar Waxwing
_____ Phainopepla
_____ Loggerhead Shrike
_____ European Starling (3 singing
_____ **Bell's Vireo** (1 pr. north edge; male singing other chasing?
_____ Solitary Vireo
_____ Warbling Vireo – baby?
_____ Orange-crowned Warbler
_____ Yellow Warbler
_____ Yellow-rumped Warbler
_____ Black-th. Gray Warbler
_____ Townsend's Warbler
_____ MacGillivray's Warbler
_____ Common Yellowthroat
_____ Wilson's Warbler
_____ Yellow-breasted Chat
_____ **Summer Tananger**
_____ Western Tanager
Black-headed Grosbeak
Blue Grosbeak
1 3 4 Lazuli Bunting
Rufous-sided Towhee
23 1 2 4 22 3 2 2 12 California Towhee
_____ Lark Sparrow
_____ Savannah Sparrow
_____ Fox Sparrow
2 4 5 1 32 Song Sparrow
_____ Lincoln's Sparrow
_____ White-crowned Sparrow
3 2 8 4 Red-winged Blackbird
_____ Western Meadowlark
_____ Brewer's Blackbird
1 1 3 2 1 Brown-headed Cowbird
_____ Hooded Oriole
_____ Northern Oriole
4 6, 8, 10, 18, 21 1 1 House Finch
_____ Pine Siskin
_____ Lesser Goldfinch
_____ Lawrence's Goldfinch
4 American Goldfinch
3 House Sparrow

Additional Species

_____
_____
_____
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_____

BIRDS OF Santa Clara River System Upper River Area 6 1995

Locality San Francisquito (UPPER) Date 4-27-95

Time 0720 - 830

_____ Great Blue Heron
_____ Green Heron
_____ Mallard
_____ Cinnamon Teal
_____ Turkey Vulture
_____ White-tailed Kite
_____ Sharp-shinned Hawk
_____ Cooper's Hawk
_____ Red-shouldered Hawk
2 Red-tailed Hawk
_____ Golden Eagle
_____ American Kestrel
45 California Quail
_____ American Coot
12 Killdeer
_____ Spotted Sandpiper
_____ Least Sandpiper
_____ Common Snipe
_____ Rock Dove
14 Mourning Dove
_____ **Yellow-billed Cuckoo**
_____ Greater Roadrunner
_____ Barn Owl
_____ Great Horned Owl
_____ White-throated Swift
_____ Black-ch. Hummingbird
2 Anna's Hummingbird
_____ Costa's Hummingbird
_____ Belted Kingfisher
_____ Acorn Woodpecker
5 Nuttall's Woodpecker
_____ Downy Woodpecker
_____ Hairy Woodpecker
1 Northern Flicker
_____ Western Wood-Pewee
_____ Willow Flycatcher
_____ Hammond's Flycatcher
_____ Pacific Slope Flycatcher
1 Black Phoebe
_____ Say's Phoebe
1 Ash-throated Flycatcher
_____ **Brown-crested Flycatcher**
_____ Cassin's Kingbird
_____ Western Kingbird
_____ Horned Lark
_____ Tree Swallow
_____ Violet-green Swallow
2 N. Rough-winged Swallow
_____ Bank Swallow
_____ Cliff Swallow
_____ Barn Swallow
5 Scrub Jay
4 American Crow
31 Common Raven
_____ Plain Titmouse
_____ Bushtit
_____ Rock Wren
8 Bewick's Wren
_____ House Wren
_____ Ruby-crowned Kinglet
_____ Blue-gray Gnatcatcher
_____ Western Bluebird
_____ Swainson's Thrush
_____ Hermit Thrush
_____ American Robin
_____ Wrentit
2 Northern Mockingbird
6 California Thrasher
_____ American Pipit
_____ Cedar Waxwing
_____ Phainopepla
_____ Loggerhead Shrike
16 European Starling
_____ **Bell's Vireo**
_____ Solitary Vireo
_____ Warbling Vireo
_____ Orange-crowned Warbler
1 Yellow Warbler
_____ Yellow-rumped Warbler
_____ Black-th. Gray Warbler
_____ Townsend's Warbler
_____ MacGillivray's Warbler
2 Common Yellowthroat
2 Wilson's Warbler
3 Yellow-breasted Chat
_____ **Summer Tananger**
_____ Western Tanager
3 Black-headed Grosbeak
2 Blue Grosbeak
_____ Lazuli Bunting
4 Rufous-sided Towhee
9 California Towhee
_____ Lark Sparrow
_____ Savannah Sparrow
_____ Fox Sparrow
13 Song Sparrow
_____ Lincoln's Sparrow
_____ White-crowned Sparrow
16 Red-winged Blackbird
6 Western Meadowlark
12 Brewer's Blackbird
7 Brown-headed Cowbird
_____ Hooded Oriole
5 Northern Oriole
4 House Finch
_____ Pine Siskin
_____ Lesser Goldfinch
_____ Lawrence's Goldfinch
_____ American Goldfinch
_____ House Sparrow

Additional Species

1 yellow-headed blackbird

BIRDS OF Santa Clara River System

Locality San Francisquito to McBean (Lower) Date 4/27/95
Time _____

_____ Great Blue Heron
_____ Green Heron
2 Mallard
_____ Cinnamon Teal
_____ Turkey Vulture
_____ White-tailed Kite
_____ Sharp-shinned Hawk
_____ Cooper's Hawk
_____ Red-shouldered Hawk
2 Red-tailed Hawk
_____ Golden Eagle
_____ American Kestrel
12 246 California Quail
_____ American Coot
10 2 \|\| 23\| Killdeer
_____ Spotted Sandpiper
_____ Least Sandpiper
_____ Common Snipe
_____ Rock Dove
12 53,4 Mourning Dove
_____ **Yellow-billed Cuckoo**
_____ Greater Roadrunner
_____ Barn Owl
_____ Great Horned Owl
_____ White-throated Swift
_____ Black-ch. Hummingbird
8 \|\|23 Anna's Hummingbird
_____ Costa's Hummingbird
_____ Belted Kingfisher
_____ Acorn Woodpecker
_____ Nuttall's Woodpecker
1 \| Downy Woodpecker
_____ Hairy Woodpecker
_____ Northern Flicker
_____ Western Wood-Pewee
_____ Willow Flycatcher
_____ Hammond's Flycatcher
_____ Pacific Slope Flycatcher
_____ Black Phoebe
_____ Say's Phoebe
2 \|\| Ash-throated Flycatcher
_____ **Brown-crested Flycatcher**
_____ Cassin's Kingbird
4 1,3 Western Kingbird
_____ Horned Lark
_____ Tree Swallow
_____ Violet-green Swallow
_____ N. Rough-winged Swallow
_____ Bank Swallow
_____ Cliff Swallow
_____ Barn Swallow
2 \|\| Scrub Jay
7 232 American Crow
2 \|\| Common Raven
1 \| Plain Titmouse
5 2\|2 Bushtit
_____ Rock Wren
7 \|22\| Bewick's Wren
_____ House Wren

_____ Ruby-crowned Kinglet
_____ Blue-gray Gnatcatcher
_____ Western Bluebird
_____ Swainson's Thrush
_____ Hermit Thrush
_____ American Robin
_____ Wrentit
5 \|\|2 Northern Mockingbird
_____ California Thrasher
_____ American Pipit
_____ Cedar Waxwing
_____ Phainopepla
_____ Loggerhead Shrike
2 European Starling nesting
_____ **Bell's Vireo**
_____ Solitary Vireo
_____ Warbling Vireo
_____ Orange-crowned Warbler
4 2\|\| Yellow Warbler
1 Yellow-rumped Warbler
_____ Black-th. Gray Warbler
_____ Townsend's Warbler
_____ MacGillivray's Warbler
6 22\|\| Common Yellowthroat
1 Wilson's Warbler
_____ Yellow-breasted Chat
_____ **Summer Tananger**
_____ Western Tanager
4 \|2\| Black-headed Grosbeak nesting
_____ Blue Grosbeak
_____ Lazuli Bunting
4 \|\|\| Rufous-sided Towhee
12 223 \|\|\| California Towhee
_____ Lark Sparrow
_____ Savannah Sparrow
_____ Fox Sparrow
17 2222\|\|2 Song Sparrow
_____ Lincoln's Sparrow
_____ White-crowned Sparrow
5 22\| Red-winged Blackbird
_____ Western Meadowlark
_____ Brewer's Blackbird
2\|\| Brown-headed Cowbird
_____ Hooded Oriole
2 \|\| Northern Oriole
6 \|23 House Finch
_____ Pine Siskin
4 3 \| Lesser Goldfinch
_____ Lawrence's Goldfinch
_____ American Goldfinch
_____ House Sparrow

Additional Species
8 western Sandpiper

BIRDS OF Santa Clara River System

Locality Sa Fernando Co Date 5-12-95

Time

	Great Blue Heron	
1	Green Heron	
	Mallard	
	Cinnamon Teal	
	Turkey Vulture	
	White-tailed Kite	
	Sharp-shinned Hawk	
	Cooper's Hawk	
2	Red-shouldered Hawk	
2	Red-tailed Hawk	
	Golden Eagle	
	American Kestrel	
41	California Quail	
	American Coot	
15	Killdeer	distr/rep display
	Spotted Sandpiper	
	Least Sandpiper	
	Common Snipe	
	Rock Dove	
19	Mourning Dove	
	Yellow-billed Cuckoo	
	Greater Roadrunner	
	Barn Owl	
	Great Horned Owl	
	White-throated Swift	
	Black-ch. Hummingbird	
5	Anna's Hummingbird	d singing
	Costa's Hummingbird	
	Belted Kingfisher	
	Acorn Woodpecker	
9	Nuttall's Woodpecker	
	Downy Woodpecker	
1	Hairy Woodpecker	
	Northern Flicker	
	Western Wood-Pewee	
	Willow Flycatcher	
	Hammond's Flycatcher	
	Pacific Slope Flycatcher	
	Black Phoebe	
	Say's Phoebe	
9	Ash-throated Flycatcher	
	Brown-crested Flycatcher	
	Cassin's Kingbird	
5	Western Kingbird	at nest -
	Horned Lark	
	Tree Swallow	
	Violet-green Swallow	
11	N. Rough-winged Swallow	
	Bank Swallow	
	Cliff Swallow	
	Barn Swallow	
11	Scrub Jay	
4	American Crow	
8	Common Raven	
3	Plain Titmouse	
2	Bushtit	pair
	Rock Wren	
14	Bewick's Wren	Singing
	House Wren	

	Ruby-crowned Kinglet	
	Blue-gray Gnatcatcher	
	Western Bluebird	
1	Swainson's Thrush	
	Hermit Thrush	
	American Robin	
	Wrentit	
2	Northern Mockingbird	
4	California Thrasher	2 fledglings —
	American Pipit	
	Cedar Waxwing	
2	Phainopepla	
2	Loggerhead Shrike	
9	European Starling	taking food to cavity —
	Bell's Vireo	
	Solitary Vireo	
	Warbling Vireo	
	Orange-crowned Warbler	
5	Yellow Warbler	singing ♂♂
	Yellow-rumped Warbler	
	Black-th. Gray Warbler	
	Townsend's Warbler	
	MacGillivray's Warbler	
9	Common Yellowthroat	singing ♂♂
5	Wilson's Warbler	
5	Yellow-breasted Chat	singing ♂
	Summer Tananger	
1	Western Tanager	
9	Black-headed Grosbeak	
4	Blue Grosbeak	1 interacting pair
2	Lazuli Bunting	
2	Rufous-sided Towhee	
7	California Towhee	
	Lark Sparrow	
	Savannah Sparrow	
	Fox Sparrow	
30	Song Sparrow	singing
	Lincoln's Sparrow	
	White-crowned Sparrow	
25	Red-winged Blackbird	in colony
3	Western Meadowlark	
	Brewer's Blackbird	
20	Brown-headed Cowbird	
	Hooded Oriole	
8	Northern Oriole	
10	House Finch	
	Pine Siskin	
	Lesser Goldfinch	
	Lawrence's Goldfinch	
	American Goldfinch	
	House Sparrow	

Additional Species

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BIRDS OF Santa Clara River System

Locality Lower San Francisquito Date 5/27/95

Time 5:00 - 10:30 cloudy / cold

lots Construction in channel

- ___ Great Blue Heron
- 1 Green Heron
- ___ Mallard
- ___ Cinnamon Teal
- ___ Turkey Vulture
- ___ White-tailed Kite
- ___ Sharp-shinned Hawk
- ___ Cooper's Hawk
- ___ Red-shouldered Hawk
- ___ Red-tailed Hawk
- ___ Golden Eagle
- ___ American Kestrel
- 125 California Quail
- ___ American Coot
- 2122 Killdeer
- ___ Spotted Sandpiper
- ___ Least Sandpiper
- ___ Common Snipe
- 2 Rock Dove
- 3222 Mourning Dove
- ___ **Yellow-billed Cuckoo**
- ___ Greater Roadrunner
- ___ Barn Owl
- ___ Great Horned Owl
- ___ White-throated Swift
- 2 Black-ch. Hummingbird
- 1 Anna's Hummingbird
- ___ Costa's Hummingbird
- ___ Belted Kingfisher
- ___ Acorn Woodpecker
- 1 Nuttall's Woodpecker
- 1 Downy Woodpecker
- ___ Hairy Woodpecker
- ___ Northern Flicker
- ___ Western Wood-Pewee
- ___ Willow Flycatcher
- ___ Hammond's Flycatcher
- ___ Pacific Slope Flycatcher
- ___ Black Phoebe
- ___ Say's Phoebe
- 11 Ash-throated Flycatcher
- ___ **Brown-crested Flycatcher**
- ___ Cassin's Kingbird
- 1 Western Kingbird
- ___ Horned Lark
- ___ Tree Swallow
- ___ Violet-green Swallow
- ___ N. Rough-winged Swallow
- ___ Bank Swallow
- ___ Cliff Swallow
- ___ Barn Swallow
- ___ Scrub Jay
- 1 American Crow
- 4 Common Raven
- 11 Plain Titmouse
- 7295 Bushtit
- ___ Rock Wren
- 11111 Bewick's Wren
- ___ House Wren
- ___ Ruby-crowned Kinglet
- ___ Blue-gray Gnatcatcher
- ___ Western Bluebird
- ___ Swainson's Thrush
- ___ Hermit Thrush
- 2 American Robin pair
- ___ Wrentit
- 1 Northern Mockingbird
- 1 California Thrasher
- ___ American Pipit
- ___ Cedar Waxwing
- ___ Phainopepla
- ___ Loggerhead Shrike
- 12 European Starling
- ___ **Bell's Vireo**
- ___ Solitary Vireo
- ___ Warbling Vireo
- ___ Orange-crowned Warbler
- 11 Yellow Warbler
- ___ Yellow-rumped Warbler
- ___ Black-th. Gray Warbler
- ___ Townsend's Warbler
- ___ MacGillivray's Warbler
- ___ Common Yellowthroat
- 1 Wilson's Warbler
- ___ Yellow-breasted Chat
- ___ **Summer Tananger**
- 1 Western Tanager
- 422 Black-headed Grosbeak 3 pairs
- ___ Blue Grosbeak
- ___ Lazuli Bunting
- 11 Rufous-sided Towhee
- 11212 California Towhee (1 EASTERN)
- ___ Lark Sparrow
- ___ Savannah Sparrow
- ___ Fox Sparrow
- 1111211 Song Sparrow
- ___ Lincoln's Sparrow
- ___ White-crowned Sparrow
- 83 Red-winged Blackbird
- ___ Western Meadowlark
- 6242 Brewer's Blackbird carrying bu
- 11412 Brown-headed Cowbird
- ___ Hooded Oriole
- 11 Northern Oriole
- 1229 House Finch
- ___ Pine Siskin
- 1112 Lesser Goldfinch
- ___ Lawrence's Goldfinch
- ___ American Goldfinch
- ___ House Sparrow

Additional Species

1 yellow head Black Bird

BIRDS OF Santa Clara River System

Locality UPPER SAN FRANCISQUITO Date 5-27-95

Time

1	Great Blue Heron
	Green Heron
	Mallard
	Cinnamon Teal
	Turkey Vulture
1	White-tailed Kite
	Sharp-shinned Hawk
	Cooper's Hawk
	Red-shouldered Hawk
4 (young in nest)	Red-tailed Hawk
	Golden Eagle
	American Kestrel
15	California Quail
	American Coot
10 (2 babies)	Killdeer
	Spotted Sandpiper
	Least Sandpiper
	Common Snipe
2	Rock Dove
15	Mourning Dove
	Yellow-billed Cuckoo
	Greater Roadrunner
	Barn Owl
	Great Horned Owl
	White-throated Swift
	Black-ch. Hummingbird
4	Anna's Hummingbird
	Costa's Hummingbird
	Belted Kingfisher
	Acorn Woodpecker
5	Nuttall's Woodpecker
	Downy Woodpecker
	Hairy Woodpecker
2	Northern Flicker
	Western Wood-Pewee
	Willow Flycatcher
	Hammond's Flycatcher
	Pacific Slope Flycatcher
4	Black Phoebe
	Say's Phoebe
3	Ash-throated Flycatcher
	Brown-crested Flycatcher
	Cassin's Kingbird
2	Western Kingbird
	Horned Lark
	Tree Swallow
	Violet-green Swallow
9	N. Rough-winged Swallow
	Bank Swallow
	Cliff Swallow
·	Barn Swallow
11	Scrub Jay
5	American Crow
4	Common Raven
5	Plain Titmouse
4	Bushtit
·	Rock Wren
9	Bewick's Wren
2	House Wren
	Ruby-crowned Kinglet
	Blue-gray Gnatcatcher
	Western Bluebird
	Swainson's Thrush
	Hermit Thrush
	American Robin
	Wrentit
	Northern Mockingbird
3	California Thrasher
	American Pipit
	Cedar Waxwing
4 (2 juvenile)	Phainopepla
1	Loggerhead Shrike
6	European Starling
	Bell's Vireo
	Solitary Vireo
	Warbling Vireo
	Orange-crowned Warbler
1	Yellow Warbler
	Yellow-rumped Warbler
	Black-th. Gray Warbler
	Townsend's Warbler
	MacGillivray's Warbler
4	Common Yellowthroat
	Wilson's Warbler
3	Yellow-breasted Chat
	Summer Tananger
	Western Tanager
3	Black-headed Grosbeak
1	Blue Grosbeak
	Lazuli Bunting
3 (1 fledgling)	Rufous-sided Towhee
4	California Towhee
	Lark Sparrow
	Savannah Sparrow
	Fox Sparrow
17 (few fledglings)	Song Sparrow
	Lincoln's Sparrow
	White-crowned Sparrow
2	Red-winged Blackbird
	Western Meadowlark
	Brewer's Blackbird
8	Brown-headed Cowbird
	Hooded Oriole
4	Northern Oriole
12	House Finch
	Pine Siskin
2	Lesser Goldfinch
	Lawrence's Goldfinch
	American Goldfinch
	House Sparrow

Additional Species

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BIRDS OF Santa Clara River System

Locality Upper Sa Francisquito Cr Date 6-8-95

Time ~~6-8-95~~

	Great Blue Heron
	Green Heron
	Mallard
	Cinnamon Teal
	Turkey Vulture
flying from	White-tailed Kite
	Sharp-shinned Hawk
	Cooper's Hawk
	Red-shouldered Hawk
2 juv.	Red-tailed Hawk
	Golden Eagle
	American Kestrel
25	California Quail
	American Coot
12	Killdeer
	Spotted Sandpiper
	Least Sandpiper
	Common Snipe
	Rock Dove
23	Mourning Dove
	Yellow-billed Cuckoo
1	Greater Roadrunner
	Barn Owl
	Great Horned Owl
	White-throated Swift
	Black-ch. Hummingbird
4	Anna's Hummingbird
	Costa's Hummingbird
	Belted Kingfisher
	Acorn Woodpecker
5	Nuttall's Woodpecker
	Downy Woodpecker
	Hairy Woodpecker
1	Northern Flicker
	Western Wood-Pewee
	Willow Flycatcher
	Hammond's Flycatcher
	Pacific Slope Flycatcher
4	Black Phoebe
	Say's Phoebe
4	Ash-throated Flycatcher
	Brown-crested Flycatcher
	Cassin's Kingbird
6 also seen	Western Kingbird
	Horned Lark
	Tree Swallow
	Violet-green Swallow
12	N. Rough-winged Swallow
	Bank Swallow
	Cliff Swallow
	Barn Swallow
11	Scrub Jay
5	American Crow
12	Common Raven
2	Plain Titmouse
2	Bushtit
	Rock Wren
	Ruby-crowned Kinglet
	Blue-gray Gnatcatcher
	Western Bluebird
	Swainson's Thrush
	Hermit Thrush
	American Robin
	Wrentit
	Northern Mockingbird
8	California Thrasher
	American Pipit
	Cedar Waxwing
2	Phainopepla
1	Loggerhead Shrike
21	European Starling
	Bell's Vireo
	Solitary Vireo
	Warbling Vireo
	Orange-crowned Warbler
2	Yellow Warbler
	Yellow-rumped Warbler
	Black-th. Gray Warbler
	Townsend's Warbler
	MacGillivray's Warbler
3	Common Yellowthroat
	Wilson's Warbler
3	Yellow-breasted Chat
	Summer Tananger
	Western Tanager
1	Black-headed Grosbeak
2 ♂♀	Blue Grosbeak
3 juvenile	Lazuli Bunting
7	Rufous-sided Towhee
8	California Towhee
	Lark Sparrow
	Savannah Sparrow
	Fox Sparrow
37	Song Sparrow
	Lincoln's Sparrow
	White-crowned Sparrow
25	Red-winged Blackbird
	Western Meadowlark
	Brewer's Blackbird
5	Brown-headed Cowbird
	Hooded Oriole
4	Northern Oriole
12	House Finch
	Pine Siskin
2	Lesser Goldfinch
	Lawrence's Goldfinch
	American Goldfinch
	House Sparrow

Additional Species

_____

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_____

BIRDS OF Santa Clara River System

Locality Lower San Francisquito Creek Date 6/8/95
Time 5-10:20

_____ Great Blue Heron
_____ Green Heron
_____ Mallard
_____ Cinnamon Teal
_____ Turkey Vulture
_____ White-tailed Kite
_____ Sharp-shinned Hawk
_____ Cooper's Hawk
_____ Red-shouldered Hawk
_____ Red-tailed Hawk
_____ Golden Eagle
_____ American Kestrel
|222 California Quail
_____ American Coot
22 Killdeer
_____ Spotted Sandpiper
_____ Least Sandpiper
_____ Common Snipe
2 Rock Dove
|| 2 Mourning Dove
_____ **Yellow-billed Cuckoo**
_____ Greater Roadrunner
_____ Barn Owl
_____ Great Horned Owl
_____ White-throated Swift
(Black-ch. Hummingbird
|| Anna's Hummingbird
_____ Costa's Hummingbird
_____ Belted Kingfisher
_____ Acorn Woodpecker
22 Nuttall's Woodpecker
2|| Downy Woodpecker
_____ Hairy Woodpecker
_____ Northern Flicker
_____ Western Wood-Pewee
_____ Willow Flycatcher
_____ Hammond's Flycatcher
_____ Pacific Slope Flycatcher
_____ Black Phoebe
_____ Say's Phoebe
222 Ash-throated Flycatcher
_____ **Brown-crested Flycatcher**
_____ Cassin's Kingbird
_____ Western Kingbird
_____ Horned Lark
_____ Tree Swallow
_____ Violet-green Swallow
3 N. Rough-winged Swallow
_____ Bank Swallow
|| Cliff Swallow
_____ Barn Swallow
|| Scrub Jay
|| American Crow
| 2 Common Raven
_____ Plain Titmouse
2 Bushtit
_____ Rock Wren

_____ Ruby-crowned Kinglet
_____ Blue-gray Gnatcatcher
_____ Western Bluebird
_____ Swainson's Thrush
_____ Hermit Thrush
_____ American Robin
_____ Wrentit
_____ Northern Mockingbird
2 California Thrasher
_____ American Pipit
_____ Cedar Waxwing
_____ Phainopepla
1 Loggerhead Shrike
_____ European Starling
heard only? | probable **Bell's Vireo** at mouth
_____ Solitary Vireo
_____ Warbling Vireo
_____ Orange-crowned Warbler
||| Yellow Warbler
_____ Yellow-rumped Warbler
_____ Black-th. Gray Warbler
_____ Townsend's Warbler
_____ MacGillivray's Warbler
1 Common Yellowthroat
_____ Wilson's Warbler
| Yellow-breasted Chat
_____ **Summer Tananger**
_____ Western Tanager
8 2)222 Black-headed Grosbeak
_____ Blue Grosbeak
_____ Lazuli Bunting
22|2 Rufous-sided Towhee
|2|2|2 California Towhee
_____ Lark Sparrow
_____ Savannah Sparrow
_____ Fox Sparrow
8 22222222 |2||2| Song Sparrow
_____ Lincoln's Sparrow
_____ White-crowned Sparrow
122 Red-winged Blackbird
_____ Western Meadowlark
_____ Brewer's Blackbird
|||2 Brown-headed Cowbird
_____ Hooded Oriole
|3|| Northern Oriole
2 House Finch
_____ Pine Siskin
_____ Lesser Goldfinch
_____ Lawrence's Goldfinch
_____ American Goldfinch
_____ House Sparrow

Additional Species

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_____
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Locality SAN FRAN DISQUITO Date 6-25

Time 6 45 — 9 AM

- Great Blue Heron
- Green Heron
- 1 Mallard
- Cinnamon Teal
- Turkey Vulture
- White-tailed Kite
- Sharp-shinned Hawk
- Cooper's Hawk
- Red-shouldered Hawk
- III Red-tailed Hawk
- Golden Eagle
- American Kestrel
- 63 2 14 California Quail
- American Coot
- 24 34 2 12 Killdeer
- Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- Rock Dove
- 66 46 12 III Mourning Dove
- **Yellow-billed Cuckoo**
- 1 Greater Roadrunner
- Barn Owl
- Great Horned Owl
- White-throated Swift
- 1 Black-ch. Hummingbird
- 1 IIII Anna's Hummingbird
- II Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- 1 2 1 2 Nuttall's Woodpecker
- 2 Downy Woodpecker
- Hairy Woodpecker
- 1 Northern Flicker
- Western Wood-Pewee
- Willow Flycatcher
- Hammond's Flycatcher
- Pacific Slope Flycatcher
- 2 1 Black Phoebe
- Say's Phoebe
- 1 III Ash-throated Flycatcher
- **Brown-crested Flycatcher**
- Cassin's Kingbird
- 2 2 Western Kingbird
- Horned Lark
- Tree Swallow
- Violet-green Swallow
- N. Rough-winged Swallow
- Bank Swallow
- 6 Cliff Swallow
- Barn Swallow
- 2 3 12 1 IIII Scrub Jay
- 1 American Crow
- 12 13 1 Common Raven
- 2 2 2 Plain Titmouse
- 2 Bushtit
- Rock Wren
- 5 2 1 IIII Bewick's Wren
- 1 1 House Wren
- Ruby-crowned Kinglet
- Blue-gray Gnatcatcher
- Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- American Robin
- 1 Wrentit
- IIII Northern Mockingbird
- 1 III California Thrasher
- American Pipit
- Cedar Waxwing
- 2 1 1 Phainopepla
- Loggerhead Shrike
- 6 (20) 7 European Starling
- **Bell's Vireo**
- Solitary Vireo
- Warbling Vireo
- Orange-crowned Warbler
- 1 Yellow Warbler
- Yellow-rumped Warbler
- Black-th. Gray Warbler
- Townsend's Warbler
- MacGillivray's Warbler
- 1 IIII Common Yellowthroat
- Wilson's Warbler
- 1 Yellow-breasted Chat
- **Summer Tananger**
- Western Tanager
- 1 III Black-headed Grosbeak
- Blue Grosbeak
- Lazuli Bunting
- III Rufous-sided Towhee
- 2222 1 2 1 2 California Towhee
- Lark Sparrow
- Savannah Sparrow
- Fox Sparrow
- 51 IIII IIII IIII IIII Song Sparrow
- Lincoln's Sparrow
- White-crowned Sparrow
- (20) 6 1 Red-winged Blackbird
- Western Meadowlark
- 5 Brewer's Blackbird
- (10) 1 Brown-headed Cowbird
- Hooded Oriole
- 1 IIII IIII Northern Oriole
- 33 (40) 43 2 House Finch
- Pine Siskin
- 2 2 2 Lesser Goldfinch
- Lawrence's Goldfinch
- American Goldfinch
- House Sparrow

Additional Species

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Locality SAN FRANCISQUITO Date 7/8

Time 645 — 430

_____ Great Blue Heron
_____ Green Heron
(1) Mallard
_____ Cinnamon Teal
_____ Turkey Vulture
(2) White-tailed Kite
_____ Sharp-shinned Hawk
_____ Cooper's Hawk
(1) Red-shouldered Hawk
(2) || Red-tailed Hawk
(8) _____ Golden Eagle
4 3 4 _____ American Kestrel
(10) 3 2 4 3 2 2 California Quail
_____ American Coot
2 2 3 1 2 3 1 Killdeer
(15) _____ Spotted Sandpiper
_____ Least Sandpiper
_____ Common Snipe
(5) Rock Dove
(16) 2 2 2 3 5 1 1 Mourning Dove
_____ **Yellow-billed Cuckoo**
_____ Greater Roadrunner
_____ Barn Owl
_____ Great Horned Owl
_____ White-throated Swift
_____ Black-ch. Hummingbird
(5) |||| Anna's Hummingbird
_____ Costa's Hummingbird
_____ Belted Kingfisher
(3) _____ Acorn Woodpecker
(3) ||| Nuttall's Woodpecker
(2) 2 Downy Woodpecker
_____ Hairy Woodpecker
_____ Northern Flicker
_____ Western Wood-Pewee
_____ Willow Flycatcher
_____ Hammond's Flycatcher
_____ Pacific Slope Flycatcher
_____ Black Phoebe
_____ Say's Phoebe
(6) 1 |||| Ash-throated Flycatcher
_____ **Brown-crested Flycatcher**
_____ Cassin's Kingbird
(8) 2 2 1 2 Western Kingbird (3)
_____ Horned Lark
_____ Tree Swallow
_____ Violet-green Swallow
_____ N. Rough-winged Swallow
_____ Bank Swallow
(25) 7 4 Cliff Swallow
(3) 2 3 7 _____ Barn Swallow
2 1 1 2 1 1 2 Scrub Jay
(4) 2 2 American Crow
(14) 4 8 1 1 Common Raven
(2) _____ Plain Titmouse
(6) _____ Bushtit
2 2 2 1 2 _____ Rock Wren
2 1 2 2 1 1 1 1 2 1 Bewick's Wren
_____ House Wren

_____ Ruby-crowned Kinglet
_____ Blue-gray Gnatcatcher
(1) Western Bluebird
_____ Swainson's Thrush
_____ Hermit Thrush
_____ American Robin
(1) Wrentit
(3) ||| Northern Mockingbird
(2) California Thrasher
_____ American Pipit
_____ Cedar Waxwing
(7) 2 2 1 Phainopepla
(2) 2 Loggerhead Shrike
(3) 1 2 European Starling
_____ **Bell's Vireo**
_____ Solitary Vireo
_____ Warbling Vireo
_____ Orange-crowned Warbler
1 Yellow Warbler
_____ Yellow-rumped Warbler
_____ Black-th. Gray Warbler
_____ Townsend's Warbler
_____ MacGillivray's Warbler
(5) |||| Common Yellowthroat
_____ Wilson's Warbler
(2) || Yellow-breasted Chat
_____ **Summer Tananger**
_____ Western Tanager
(3) || Black-headed Grosbeak
(1) 1 Blue Grosbeak
_____ Lazuli Bunting
(8) 2 |||| Rufous-sided Towhee
(18) 2 2 2 1 1 2 2 2 1 1 California Towhee
_____ Lark Sparrow
_____ Savannah Sparrow
_____ Fox Sparrow
(10) 2 1 1 2 1 Song Sparrow
_____ Lincoln's Sparrow
_____ White-crowned Sparrow
(7) 5 2 Red-winged Blackbird
(8) _____ Western Meadowlark
8 Brewer's Blackbird
(3) 1 2 Brown-headed Cowbird
_____ Hooded Oriole
(8) 2 3 2 1 Northern Oriole
(37) 4 4 6 1 3 3 2 4 2 2 4 2 House Finch
_____ Pine Siskin
(3) Lesser Goldfinch
_____ Lawrence's Goldfinch
_____ American Goldfinch
_____ House Sparrow

Additional Species

_____
_____
_____
_____
_____
_____

NO water

BIRDS OF Santa Clara River System 1995 Upper R Area 7

Locality North (Lower) South Fork Date 5/13/95

Time

- Great Blue Heron
- 3 Green Heron
- 18 Mallard
- Cinnamon Teal
- 1 Turkey Vulture
- White-tailed Kite
- Sharp-shinned Hawk
- Cooper's Hawk
- 1 Red-shouldered Hawk
- 2 Red-tailed Hawk
- Golden Eagle
- American Kestrel
- 1122 California Quail
- American Coot
- 22 Killdeer
- Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- 24 Rock Dove
- 116, 2 Mourning Dove
- **Yellow-billed Cuckoo**
- 1 2 Greater Roadrunner pr. singing duet
- Barn Owl
- Great Horned Owl
- White-throated Swift
- 1 Black-ch. Hummingbird
- 11 IIII Anna's Hummingbird
- Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- 1 Nuttall's Woodpecker
- Downy Woodpecker
- Hairy Woodpecker
- Northern Flicker
- Western Wood-Pewee
- Willow Flycatcher
- Hammond's Flycatcher
- Pacific Slope Flycatcher
- 4 Black Phoebe (2 young)
- Say's Phoebe
- 2 11 Ash-throated Flycatcher
- **Brown-crested Flycatcher**
- Cassin's Kingbird
- 1 2 Western Kingbird
- Horned Lark
- Tree Swallow
- Violet-green Swallow
- 8 N. Rough-winged Swallow nest
- Bank Swallow
- 6, 4, 12 Cliff Swallow
- Barn Swallow
- 2112 Scrub Jay
- 11 American Crow
- 4, 10, Common Raven
- Plain Titmouse
- 2 Bushtit
- Rock Wren
- 11, 2 Bewick's Wren
- House Wren
- Ruby-crowned Kinglet
- Blue-gray Gnatcatcher
- Western Bluebird
- 1 Swainson's Thrush
- Hermit Thrush
- American Robin
- Wrentit
- 112 Northern Mockingbird
- 11 California Thrasher
- American Pipit
- Cedar Waxwing
- Phainopepla
- Loggerhead Shrike
- 24 European Starling
- **Bell's Vireo**
- Solitary Vireo
- Warbling Vireo
- 2 Orange-crowned Warbler
- 111 2 Yellow Warbler
- Yellow-rumped Warbler
- Black-th. Gray Warbler
- Townsend's Warbler
- MacGillivray's Warbler
- Common Yellowthroat
- 11422 Wilson's Warbler
- Yellow-breasted Chat
- **Summer Tananger**
- 11, 2, 3 Western Tanager
- 1 Black-headed Grosbeak
- Blue Grosbeak
- Lazuli Bunting
- 2 Rufous-sided Towhee
- 21112 California Towhee
- Lark Sparrow
- Savannah Sparrow
- Fox Sparrow
- 1112 Song Sparrow
- Lincoln's Sparrow
- White-crowned Sparrow
- 3 Red-winged Blackbird
- Western Meadowlark
- 1, 5, 16 Brewer's Blackbird
- 2 Brown-headed Cowbird
- Hooded Oriole
- 1 Northern Oriole
- 6, 20, House Finch
- Pine Siskin
- 11 Lesser Goldfinch
- Lawrence's Goldfinch
- American Goldfinch
- 8 House Sparrow

Additional Species

4 VAUX SWIFT

Lo Y Lower South Fork Date 6/30/95

Tir

2 egret

1 coyote

- at Blue Heron
- en Heron
- llard
- mamon Teal
- rkey Vulture
- ite-tailed Kite
- arp-shinned Hawk
- oper's Hawk
- ed-shouldered Hawk
- ed-tailed Hawk
- olden Eagle
- American Kestrel
- California Quail
- American Coot

3, 3 Killdeer

- Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- Rock Dove

22 2 Mourning Dove

- **Yellow-billed Cuckoo**
- Greater Roadrunner
- Barn Owl
- Great Horned Owl
- White-throated Swift
- Black-ch. Hummingbird
- Anna's Hummingbird
- Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- Nuttall's Woodpecker

2 Downy Woodpecker

- Hairy Woodpecker
- Northern Flicker
- Western Wood-Pewee
- Willow Flycatcher
- Hammond's Flycatcher
- Pacific Slope Flycatcher

1 2 6 Black Phoebe family in nest

- Say's Phoebe

11 Ash-throated Flycatcher

- **Brown-crested Flycatcher**
- Cassin's Kingbird

1 Western Kingbird

- Horned Lark
- Tree Swallow
- Violet-green Swallow

10 3 1 N. Rough-winged Swallow

- Bank Swallow

10 35 Cliff Swallow nesting in drain holes

- Barn Swallow

4 1 3 Scrub Jay

1 1 2 American Crow

1 3 2 1 4 Common Raven

- Plain Titmouse
- Bushtit
- Rock Wren

1 3 2 11 Bewick's Wren

- House Wren

CHANGE GRAZING

- Ruby-crowned Kinglet
- Blue-gray Gnatcatcher
- Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- American Robin
- Wrentit
- Northern Mockingbird

11 California Thrasher

- American Pipit
- Cedar Waxwing
- Phainopepla
- Loggerhead Shrike

3 European Starling

- **Bell's Vireo**
- Solitary Vireo
- Warbling Vireo
- Orange-crowned Warbler

1 Yellow Warbler

- Yellow-rumped Warbler
- Black-th. Gray Warbler
- Townsend's Warbler
- MacGillivray's Warbler
- Common Yellowthroat
- Wilson's Warbler
- Yellow-breasted Chat
- **Summer Tananger**
- Western Tanager
- Black-headed Grosbeak
- Blue Grosbeak
- Lazuli Bunting

1 Rufous-sided Towhee

2 California Towhee

- Lark Sparrow
- Savannah Sparrow
- Fox Sparrow

12 Song Sparrow

- Lincoln's Sparrow
- White-crowned Sparrow

8, 3 Red-winged Blackbird

- Western Meadowlark

2 2 Brewer's Blackbird

3 1, 3, 4 Brown-headed Cowbird

- Hooded Oriole

111 Northern Oriole

22 4, 4, 2 House Finch

- Pine Siskin

1 1 Lesser Goldfinch

- Lawrence's Goldfinch
- American Goldfinch

2 House Sparrow

Additional Species

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_____

BIRDS OF Santa Clara River System 1995 Upper Area 8

Locality Upper South Fork Date 5/13/95

Time 8→

- Great Blue Heron
- 1 Green Heron
- Mallard
- Cinnamon Teal
- 1 Turkey Vulture
- White-tailed Kite
- Sharp-shinned Hawk
- Cooper's Hawk
- Red-shouldered Hawk
- Red-tailed Hawk
- Golden Eagle
- American Kestrel
- 222 California Quail
- American Coot
- 1222 Killdeer
- Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- 6 Rock Dove
- 16, 2222 Mourning Dove
- **Yellow-billed Cuckoo**
- Greater Roadrunner
- Barn Owl
- Great Horned Owl
- White-throated Swift
- 11 Black-ch. Hummingbird
- 3 IIII Anna's Hummingbird
- Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- Nuttall's Woodpecker
- Downy Woodpecker
- Hairy Woodpecker
- Northern Flicker
- Western Wood-Pewee
- Willow Flycatcher
- Hammond's Flycatcher
- Pacific Slope Flycatcher
- 2 Black Phoebe
- Say's Phoebe
- Ash-throated Flycatcher
- **Brown-crested Flycatcher**
- Cassin's Kingbird
- 11 Western Kingbird
- Horned Lark
- Tree Swallow
- Violet-green Swallow
- 22 N. Rough-winged Swallow
- Bank Swallow
- Cliff Swallow
- Barn Swallow
- 12 Scrub Jay
- 11 American Crow
- 241 Common Raven
- Plain Titmouse
- 22 Bushtit
- Rock Wren
- 8 112 Bewick's Wren
- House Wren
- Ruby-crowned Kinglet
- Blue-gray Gnatcatcher
- Western Bluebird
- 1241 Swainson's Thrush
- Hermit Thrush
- American Robin
- Wrentit
- 112 Northern Mockingbird
- California Thrasher
- American Pipit
- Cedar Waxwing
- Phainopepla
- Loggerhead Shrike
- 7, 8 European Starling
- **Bell's Vireo**
- 1 Solitary Vireo
- Warbling Vireo
- 11 Orange-crowned Warbler
- 1222 Yellow Warbler
- Yellow-rumped Warbler
- Black-th. Gray Warbler
- Townsend's Warbler
- MacGillivray's Warbler
- Common Yellowthroat
- 1 IIII Wilson's Warbler
- Yellow-breasted Chat
- **Summer Tananger**
- 23 1141311 Western Tanager
- Black-headed Grosbeak
- Blue Grosbeak
- Lazuli Bunting
- Rufous-sided Towhee
- 212 California Towhee
- Lark Sparrow
- Savannah Sparrow
- Fox Sparrow
- 2212 Song Sparrow
- Lincoln's Sparrow
- White-crowned Sparrow
- Red-winged Blackbird
- Western Meadowlark
- 11, Brewer's Blackbird
- 11 Brown-headed Cowbird
- Hooded Oriole
- Northern Oriole
- 10, 20, 4 IIII 22 House Finch
- Pine Siskin
- Lesser Goldfinch
- Lawrence's Goldfinch
- American Goldfinch
- 8, 6 House Sparrow

Additional Species

1 VAUX SWIFT

Locality S Fork Yuba Date JUNE 20, 95
Time 630 – 730

_____ Great Blue Heron
_____ Green Heron
_____ Mallard
_____ Cinnamon Teal
_____ Turkey Vulture
_____ White-tailed Kite
_____ Sharp-shinned Hawk
_____ Cooper's Hawk
_____ Red-shouldered Hawk
2 Red-tailed Hawk
_____ Golden Eagle
_____ American Kestrel
6 California Quail
_____ American Coot
2 1 Killdeer
_____ Spotted Sandpiper
_____ Least Sandpiper
_____ Common Snipe
_____ Rock Dove
11 Mourning Dove
_____ **Yellow-billed Cuckoo**
_____ Greater Roadrunner
_____ Barn Owl
_____ Great Horned Owl
_____ White-throated Swift
_____ Black-ch. Hummingbird
11 2 Anna's Hummingbird
_____ Costa's Hummingbird
_____ Belted Kingfisher
_____ Acorn Woodpecker
_____ Nuttall's Woodpecker
_____ Downy Woodpecker
_____ Hairy Woodpecker
_____ Northern Flicker
_____ Western Wood-Pewee
_____ Willow Flycatcher
_____ Hammond's Flycatcher
_____ Pacific Slope Flycatcher
111 Black Phoebe
_____ Say's Phoebe
_____ Ash-throated Flycatcher
_____ **Brown-crested Flycatcher**
_____ Cassin's Kingbird
_____ Western Kingbird
_____ Horned Lark
_____ Tree Swallow
_____ Violet-green Swallow
_____ N. Rough-winged Swallow
_____ Bank Swallow
1 Cliff Swallow
_____ Barn Swallow
7 12 111 Scrub Jay
_____ American Crow
1 Common Raven
_____ Plain Titmouse
_____ Bushtit
_____ Rock Wren
11 1111 Bewick's Wren
_____ House Wren
_____ Ruby-crowned Kinglet
_____ Blue-gray Gnatcatcher
_____ Western Bluebird
_____ Swainson's Thrush
_____ Hermit Thrush
_____ American Robin
_____ Wrentit
111 Northern Mockingbird
_____ California Thrasher
_____ American Pipit
_____ Cedar Waxwing
_____ Phainopepla
_____ Loggerhead Shrike
11 2 European Starling
_____ **Bell's Vireo**
_____ Solitary Vireo
_____ Warbling Vireo
_____ Orange-crowned Warbler
_____ Yellow Warbler
_____ Yellow-rumped Warbler
_____ Black-th. Gray Warbler
_____ Townsend's Warbler
_____ MacGillivray's Warbler
_____ Common Yellowthrat
_____ Wilson's Warbler
_____ Yellow-breasted Chat
_____ **Summer Tananger**
_____ Western Tanager
_____ Black-headed Grosbeak
_____ Blue Grosbeak
_____ Lazuli Bunting
_____ Rufous-sided Towhee
2 11 California Towhee
_____ Lark Sparrow
_____ Savannah Sparrow
_____ Fox Sparrow
1111 Song Sparrow
_____ Lincoln's Sparrow
_____ White-crowned Sparrow
_____ Red-winged Blackbird
_____ Western Meadowlark
1 2 Brewer's Blackbird
_____ Brown-headed Cowbird
_____ Hooded Oriole
_____ Northern Oriole
2 (10) 2 222 House Finch
_____ Pine Siskin
* 2 1 2 Lesser Goldfinch
_____ Lawrence's Goldfinch
_____ American Goldfinch
1 House Sparrow

Additional Species

_____
_____
_____
_____
_____
_____

Guthrie, Daniel. *Bird Surveys Along a Portion of the Santa Clara River and Its Tributaries Near Valencia, California.* July 1994.

BIRD SURVEYS ALONG THE SANTA CLARA RIVER AND ITS TRIBUTARIES NEAR VALENCIA, CALIFORNIA, 1994

Prepared for:

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Valencia Corporation
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July 5, 1994

Bird Surveys along the Santa Clara River and its Tributaries

near Valencia, California, 1994

Prepared by: Daniel A. Guthrie
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(909) 621-8000 x 2836

Nature and Scope of Surveys

During the spring and early summer of 1994 surveys were conducted of a section of the Santa Clara River and its tributaries in the vicinity of Valencia, California to determine presence or absence of least Bell's vireo and other Species of Concern. Numbers of all species observed were noted, and special attention was placed on locating species considered rare and endangered.

Each survey was conducted on foot by observers well acquainted with both visual and auditory patterns of southern California birds. All surveys occurred between 6 and 10 a.m. After initial surveys, which found no vireos, calls of least Bell's vireo were played during a subsequent census to elicit response from territorial males. Survey routes were designed to cover all areas of each section of the river, with emphasis placed on wetter habitats where least Bell's vireos and other sensitive riparian species are most likely to occur. Personnel for all surveys were Daniel A. Guthrie, Richard F. Clements, and Judith A. Sugden.

To facilitate surveys, the area was divided into eight sections (Figure 1). Delineation of the eight areas and comments on each follow. Surveys of the normally dry sections of the river system (Areas 3 - 8) where least Bell's vireos have not been observed during the past 5 years were conducted twice during the nesting season. The second survey was delayed until June to ensure that late arriving species such as yellow-billed cuckoo and willow flycatcher would not be missed. Surveys of the two sections of the Santa Clara River (Areas 1 and 2) where least Bell's vireos have been observed during the last 5 years were conducted according to the protocol outlined by the Fish and Wildlife Service (Appendix 1), except that surveys were not conducted during July. Additional visits were conducted to areas where least Bell's vireos were observed to determine continued presence.

Habitat Condition and Bird Observations.

In general, 1994 was a very good year for riparian habitat along the Santa Clara River. Flooding in 1993 removed much of the dead vegetation from the earlier period of drought and flattened out the river channel. The result was that large areas of sand adjacent to the river remained wet throughout the observation period. The 1994 floods were mild and did not damage developing wet riparian vegetation on these flats. Spring rains also allowed for development of this vegetation.

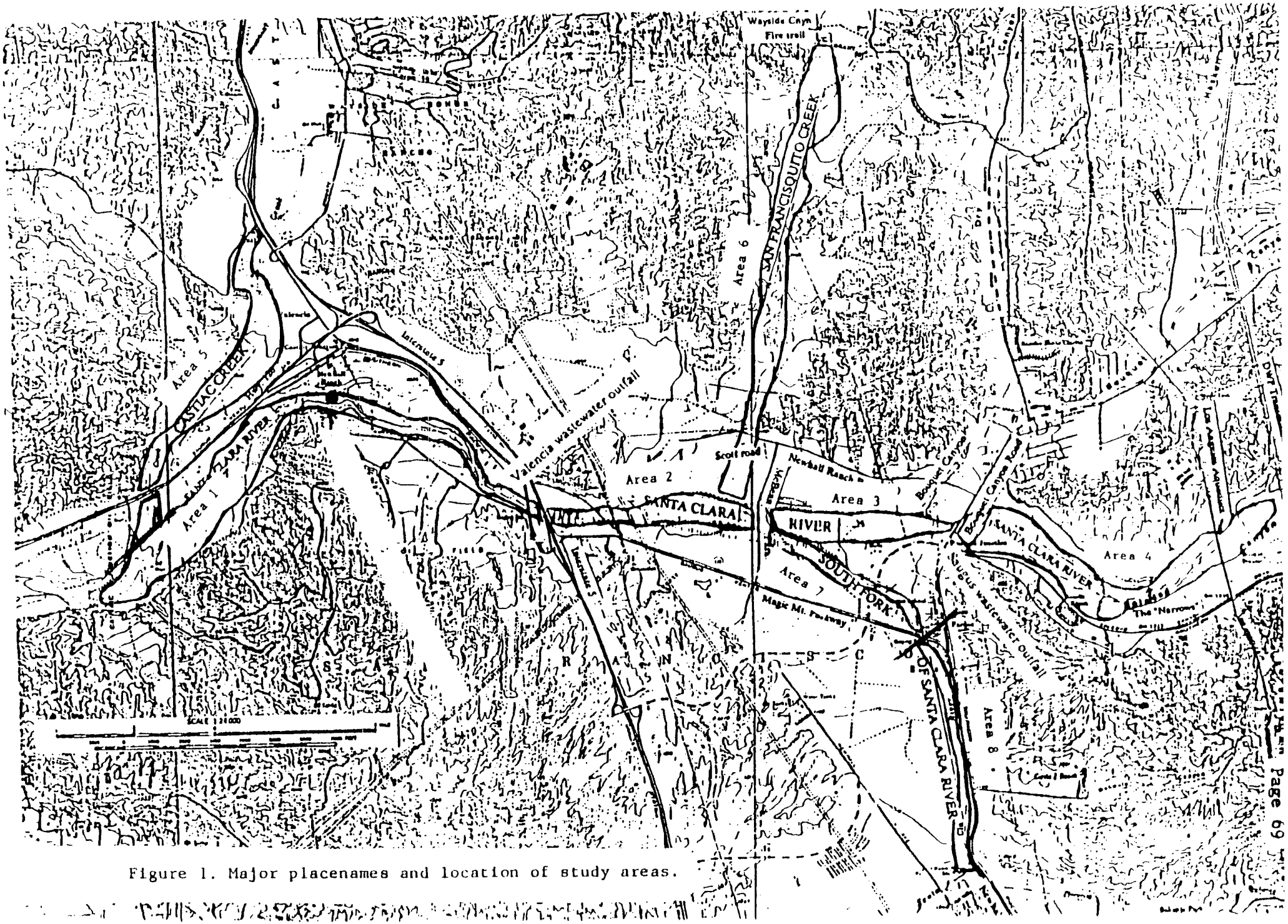


Figure 1. Major placenames and location of study areas.

Tables 1 through 6 present bird observations in each of the specific study areas for 1994. Different species breed at different times of the year. In general, species are most easily observed when they are actively defending territories by song during the establishement of breeding pairs. Once pairs are established and nesting begins song often decreases and the numbers of birds observed, therefore, also decreases. After young leave the nest, numbers observed increase. Thus, for most resident species, numbers of adult birds are most accurately censused in April, when territorial activity is at a maximum. A few species such as Anna's Hummingbird that nest early in the season may be underestimated. Numbers observed may decrease slightly in May and early June when birds are less active during nesting, and increase in late June and July when young birds leave the nest.

Several species that are not considered riparian species but are common in adjacent coastal sage and chaparral habiats come into the riparian zone in late summer when other vegetaional areas are dry. The increase in numbers of lazuli bunting, lark sparrow, house finch, phainopepla and mourning dove in late June follow this trend.

Following are specific comments on the habitat and bird observations in each area.

Area 1. Santa Clara River; Old Highway to the mouth of Castaic Creek and Castiac Creek from this confluence to State Route 126.

Length of section, 3.5 miles. The Santa Clara River flows continuously in this section and is augmented by the Valencia waste water outfall near the upstream end of this section. Although this section was affected by an oil spill during the winter of 1993-4, no effects of this spill were observable at the time of the census. Near Castaic Junction, large flats of wet riparian vegetation were heavily used by red-winged blackbirds, song sparrows and common yellowthroats, all of which were more common than in previous years when these flats did not exist. Virginia rails were also seen regularly in this area and probably nested. In addition, a pond at Castaic Junction, a remnant of an old water cress field, was home to a colony of up to 200 pairs of tricolored redwings, a species not seen in any numbers in previous years.

Area 2. Santa Clara River; Old Highway to McBean Parkway.

Length of section, 1.4 miles. The Santa Clara River flows continuously in this section. The channel is braided and wet riparian vegetation is well developed along this section of the river. Although this section was affected by an oil spill during the winter of 1993-4, no effects of this spill were observable at the time of the census. Repairs to the I-5 and Old Highway bridges were in progress during the census period and probably decreased the number of swallows observed as they nest under these bridges. A slight increase in song sparrows and a large increase in red-winged blackbirds attests to the improved quality of the wet riparian habitat. This area was heavily impacted by off road vehicles during the study period. However, vehicles remained for the most part in the unvegetated section of the river channel. A comparison of numbers of song sparrows per mile nesting in this section (14.3) compared to Area 1, where vehicle disturbance was very minimal (17.1) shows little or no impact. A single least Bell's vireo was observed, and in discussed under Species of Special Concern.

Area 3. Santa Clara River; McBean Parkway to Boquet Canyon Road.

Length of section, 1.2 miles. Water, supplied by the Saugus wastewater outfall at the Boquet Canyon Bridge, is continuous in this section of the Santa Clara River. Riparian vegetation was considerably improved over 1993 as indicated by increase in song sparrows.

Area 4. Santa Clara River; Boquet Canyon Road upstream to DWP transmission lines.

Length of section, 2.3 miles. This section of the Santa Clara River is past years has been wet only briefly during spring rains. In 1994 a water release from the DWP aqueduct 2.0 miles upstream from Boquet Canyon Road kept this section wet throughout the winter and spring and resulted in the development of wet riparian habitat. Numbers of birds increased accordingly. Song sparrows and red-winged blackbirds increased dramatically along this section over previous years and a mallard duck nested successfully.

Area 5. Castaic Creek; Route 125 to Old Road next to Interstate 5.

Length of section, 1.8 miles. Prior to 1993 drought had killed much of the young willows along this section. The floods of 1993 removed the dead wood, but left many barren gravel bars. In 1994 these areas were well vegetated, the vegetation supported by flowing water due to upstream releases during the spring. The result was development of much wet riparian growth. Numbers of song sparrows and red-winged blackbirds increased over previous years and a small colony of tricolored redwings also appeared. A single least Bell's vireo was observed, and is discussed under Species of Special Concern.

Area 6. San Francisquito Creek; Santa Clara River upstream 2.5 miles.

Length of section, 2.5 miles. This section was wet in April and May but dry during June and July. Due to better development of wet riparian vegetation, song sparrow and red-winged blackbird numbers were up from previous years. Observations of least Bell's vireo and Willow flycatcher are discussed under Species of Special Concern.

Area 7. South Fork of the Santa Clara River; McBean Parkway to Magic Mountain Parkway (Route 126).

Length of section, 1.0 miles. The channel along this section of the South Fork is narrow and very sandy. Almost all vegetation along the bottom of the channel was removed by spring floods. Some standing water was present near the McBean bridge. A great horned owl nested under the rte 126 bridge. This bridge was removed in May for replacement after the owls had fledged.

Area 8. South Fork of the Santa Clara River, Route 126 upstream to Newhall Creek.

Length of section, 1.4 miles. This section of the river was dry except for damp areas formed by runoff from culverts along the west side of the creek. Cattails developed in these wet areas supported fewer song sparrows than in previous years and no redwing blackbirds, perhaps a sign of human disturbance near the wet areas.

General Comments on Habitat Quality

Table 9 presents census data from the past 5 years on selected species. Song sparrows are dependent upon the narrow band of wet riparian vegetation found along permanent streams. The decrease in numbers from 1990 to 1991 is a reflection of the severe drought experience in southern California during this period. Although 1992 was a comparatively wet year, the removal of most wet riparian vegetation by spring floods further reduced the numbers of this species, especially in area 1. In 1993, spring flooding further removed wet riparian vegetation and there was little regrowth prior to the nesting season. Low numbers of song sparrows are an indication of this destruction of wet riparian habitat.

As shown in table 9, during 1994 wet riparian vegetation improved dramatically along Castaic Creek (area 5) and San Francisquito Creek (area 6). Numbers of song sparrows in areas 2 and 3, the Santa Clara River between I-5 and Bouquet Canyon Road, continue to be depressed from high numbers in 1990. This may be due to off road vehicle damage or simply to slow recovery flowing the 1993 floods.

Numbers of yellow warblers, another species dependent upon wet riparian vegetation, were up slightly in 1994. Bewick's wren is a common innabitant of the drier sections of the riparian zone that were not so heavily impacted by spring flooding. Numbers of this species show an increase in 1992 and 1993, wet years, over the numbers in drier 1991. This is presumably due to increases in insect food. The slight decrease in 1994, especially along the Santa Clara River between I-5 and the confluence with Castaic Creek, may be due to observer concentration on wetter portions of the river.

Comments on Sensitive Species

Cooper's Hawk

Cooper's Hawk is considered a Species of Special Concern by the State of California. Two pairs of Coopers hawks were observed in 1994, the same number as observed in 1992 and 1993. This species is a resident that nests and hunts in riparian woodland habitat.

White-tailed Kite

This species, formerly the Black-shouldered Kite, is considered "Special" by the State of California. A pair of kites nested in the dry woodland on the north side of the Santa Clara River near the confluence with Castaic Creek.

Willow Flycatcher

This species is considered a Category 1 Candidate for listing under the Federal Endangered Species Act. Willow flycatchers were once widespread in wet riparian woodland in southern California but now only a few individuals exist. The main California breeding populations of this species are along the Kern River

Figure 2. Locations of Least Bell's Vireo and Willow Flycatcher sightings, 1994.

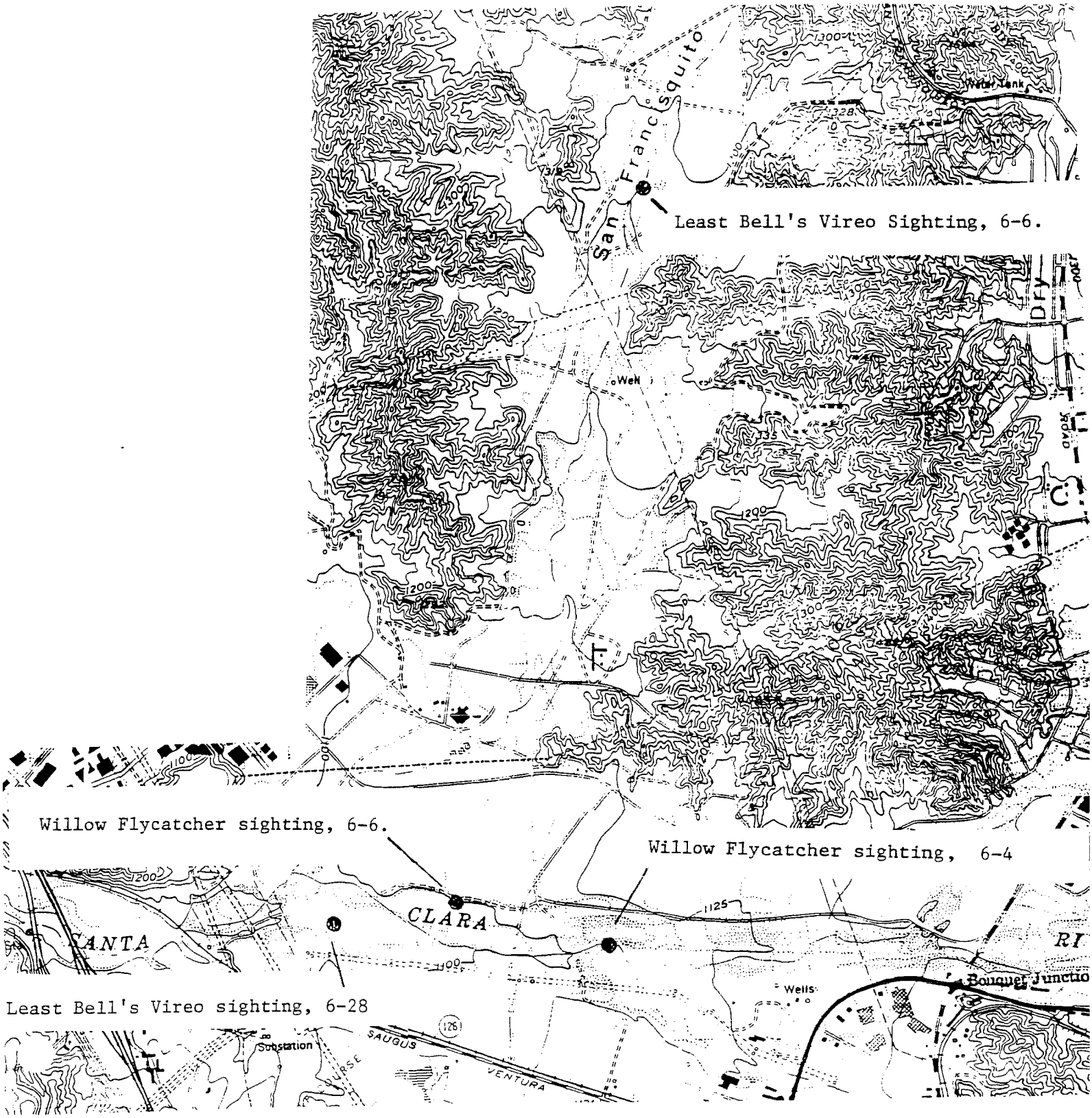
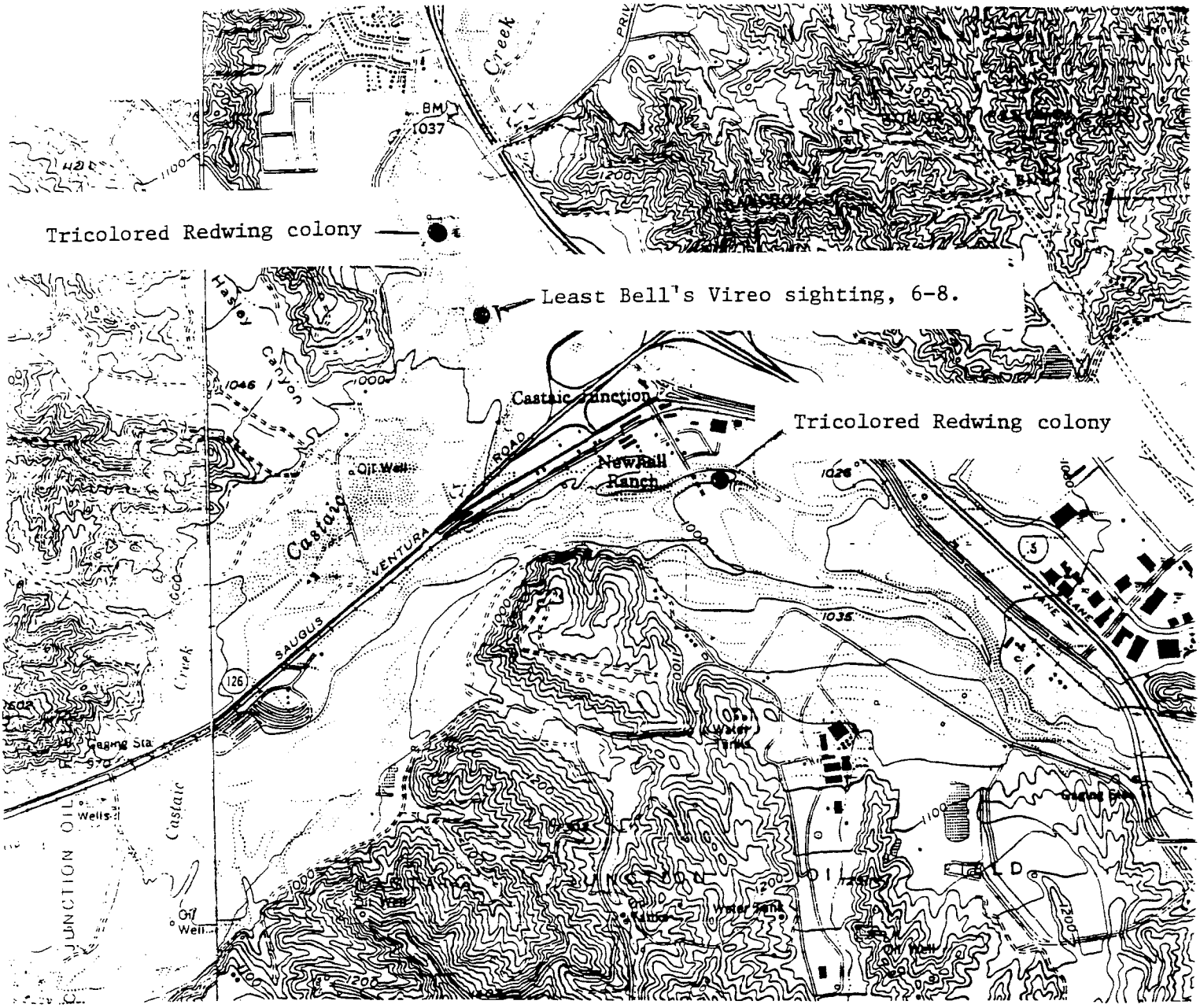


Figure 3. Location of Least Bell's Vireo and Tricolored Redwing Sightings, 1994.



and in northern California. Individuals of this species were observed in late May and early June at locations shown on figures 2 and 3. However, none of these birds could be relocated on subsequent visits. It seems likely that the individuals observed were migrants resting during migration to localities further north.

California Horned Lark

This species is a candidate for listing under the Federal Endangered Species Act. Horned larks were observed near Castaic Junction in plowed fields adjacent to the Santa Clara River.

Least Bell's Vireo

Three least Bell's vireos were observed in 1994 at locations indicated in figures 2 and 3. Only the bird on San Francisquito Creek was singing. The other two did not sing spontaneously but only in response to a tape. Despite revisits to each of the three locations on two separate occasions, none of the three vireos could be relocated. All observations occurred late in the year and may be of juveniles wandering from their nesting area after fledging. When observed, the birds seemed to move along the stream channels rather than remain in a single location. However, both the Castaic Creek and Santa Clara River Channel localities are in suitable breeding habitat for vireos and should be checked for vireo occurrence in future years.

Yellow Warbler

The yellow warbler is considered a Species of Special Concern by the State of California. Yellow warblers prefer wet riparian habitat but are also found in large cottonwoods in drier riparian areas. Singing yellow warblers were observed along nearly every section of the Santa Clara River and Castaic Creek. A few of the birds observed were probably migrants and this species is known to sing its territorial song during migration. Numbers in 1994 were about the same as those observed in previous years.

Yellow-breasted Chat

The yellow-breasted chat is considered a Species of Special Concern by the State of California. Chats were observed sparingly along the wet sections of the Santa Clara River. Numbers were up from the previous year.

Tricolored Blackbird

The tricolored blackbird is a Category 2 Candidate for listing under the Federal Endangered Species Act. A colony of about 200 breeding pairs of this species occupied a small marsh area along the side of the Santa Clara River at Castaic Junction and another smaller group of about 20 pair nested in a pond beside Castaic Creek (figure 3). Neither of these colonies existed in previous years. Both occur in small pockets of cattail contained in enclosed areas. The pocket on Castaic Creek appears to be an old barrow pit left over from work on flood control dikes. The area along the Santa Clara River was an active watercress field until destroyed by the 1993 floods. Rains during 1994 resulted in standing water and lush growth of cattails in both locations.

Table 1. Bird Observations along the Santa Clara River System, 1994: Santa Clara River from Old Highway along I-5 to the mouth of Castaic Creek and Castaic Creek from this confluence to State Route 126.

Species	date: 4-12	5-3	5-13	5-31	6-15	6-28	status
Great Blue Heron	-	-	-	-	-	-	W,M
Great Egret	1	2	-	1	-	-	W,M
Snowy Egret	1	-	-	-	-	-	W,M
Green Heron	-	-	6	-	2	3	R
Bl. cr. Night Heron	-	-	4	1	2	-	R?
Canada Goose	2	2	-	-	-	-	M
Mallard	4	2	2	2	2	-	R
Cinnamon Teal	3	-	-	-	-	-	M
Turkey Vulture	-	-	1	-	-	-	M
White-tailed Kite	-	1	2	-	-	-	R
Red-shouldered Hawk	1	-	-	1	2	5	R
Red-tailed Hawk	-	1	1	2	1	3	R
American Kestrel	-	-	2	-	2	-	R
California Quail	12	34	23	12	16	20	R
American Coot	2	-	-	-	-	-	M
Sora Rail	-	-	1	-	1	-	M
Virginia Rail	-	1	2	-	1	1	R?
Killdeer	14	16	14	4	13	10	R
Spotted Sandpiper	-	1	4	6	8	6	S
Solitary Sandpiper	1	-	-	-	-	-	M
Least Sandpiper	5	-	-	-	-	-	M
Common Snipe	1	-	-	-	-	-	M
Domestic Pigeon	3	12	26	2	21	9	R
Mourning Dove	4	4	20	17	15	8	R
Barn Owl	-	-	-	-	2	-	R
Greater Roadrunner	-	1	1	-	-	-	R
White-throated Swift	-	-	6	1	-	-	R
Vaux's Swift	-	-	30	-	-	-	M
Black-ch. Hummingbird	-	-	1	-	-	2	S
Anna's Hummingbird	1	4	6	5	4	3	R
Costa's Hummingbird	-	-	-	-	-	1	S
Nuttall's Woodpecker	2	9	7	13	8	8	R
Downy Woodpecker	3	2	3	1	4	8	R
Hairy Woodpecker	1	1	-	4	4	-	R
Northern Flicker	2	-	-	1	-	3	R
Western Wood Pewee	-	-	1	-	-	-	M
Pac. Slope Flycatcher	1	-	-	-	-	-	M
Black Phoebe	1	4	2	4	5	6	R
Ash-thr. Flycatcher	4	14	8	8	14	13	S
Western Kingbird	1	4	2	2	4	3	S
Horned Lark	-	2	2	2	2	-	R
Violet-green Swallow	-	-	1	-	4	-	S
N. Rough-w. Swallow	8	11	24	69	51	36	S
Barn Swallow	1	2	2	-	-	4	M
Cliff Swallow	-	11	4	4	56	21	S

Table 1 (cont.). Bird Observations along the Santa Clara River System, 1994: Santa Clara River from Old Highway along I-5 to the mouth of Castaic Creek and Castaic Creek from this confluence to State Route 126.

Species	date: 4-12	5-3	5-13	5-31	6-15	6-28	status
Scrub Jay	6	12	18	22	12	8	R
American Crow	3	10	15	13	11	18	R
Common Raven	9	4	6	6	16	11	R
Plain Titmouse	2	16	12	9	15	18	R
Bushtit	8	11	22	7	25	17	R
Bewick's Wren	28	27	35	14	41	17	R
House Wren	6	13	6	6	5	1	R
Western Bluebird	5	2	-	-	5	-	R
Swainson's Thrush	-	1	-	-	1	-	S,M
American Robin	-	-	-	-	-	2	R
Wrentit	4	-	-	1	-	-	R
N. Mockingbird	-	-	-	-	2	-	R
Calif. Thrasher	1	4	2	5	4	1	R
Cedar Waxwing	-	25	25	-	-	-	W,M
Phainopepla	-	1	1	4	9	9	R
European Starling	10	26	51	12	12	37	R
Solitary Vireo	-	1	-	-	-	-	M
Warbling Vireo	-	2	-	-	-	-	M
Orange-cr. Warbler	1	1	-	-	-	-	M
Yellow Warbler	2	15	4	3	3	4	S
Yellow- r. Warbler	20	1	-	-	-	-	W,M
Common Yellowthroat	12	26	11	12	24	29	R
Wilson's Warbler	-	11	7	-	-	-	M
Yellow-br. Chat	1	-	-	1	2	5	S
Western Tanager	-	16	3	-	-	-	M
Black-headed Grosbeak	8	19	17	11	4	26	S
Blue Grosbeak	-	2	-	-	1	2	S
Lazuli Bunting	-	14	-	9	4	6	S
Rufous-sided Towhee	8	5	12	12	9	7	R
California Towhee	2	6	9	6	8	1	R
Savannah Sparrow	4	-	-	-	-	-	W,M
Lark Sparrow	-	-	-	-	-	11	R
Song Sparrow	41	67	55	54	101	96	R
White-cr. Sparrow	17	-	-	-	-	-	W
Red-winged Blackbird	67	152	150	66	65	20	S
Tricolored Redwing	-	-	300	400	150	2	S
Western Meadowlark	-	2	-	-	-	-	R
Brewer's Blackbird	-	-	-	10	-	-	R
Brown-headed Cowbird	8	38	27	25	24	36	S
Hooded Oriole	-	-	-	-	1	-	S
Northern Oriole	-	4	6	3	2	10	S
House Finch	2	17	6	2	20	21	R

Table 1 (cont.). Bird Observations along the Santa Clara River System, 1994: Santa Clara River from Old Highway along I-5 to the mouth of Castaic Creek and Castaic Creek from this confluence to State Route 126.

Species	date: 4-12	5-3	5-13	5-31	6-15	6-28	status
Lesser Goldfinch	8	2	29	2	6	-	R
Lawrence's Goldfinch	2	-	-	-	-	-	R
American Goldfinch	6	6	-	-	-	-	W,M
Total Species:	53	57	55	48	54	48	
Total Individuals:	370	700	1037	872	827	589	

Total Species on all visits: 90
Total Probable Breeding species: 55

Status: M - Migrant; R - Resident; S - Summer Only; W - Winter Only

Censuses of 4-12, 5-13 and 6-15 on north side of river,
Censuses of 5-3, 5-31 and 6-28 on south side of river.

Table 2. Bird Observations along the Santa Clara River System, 1994: Santa Clara River from McBean Parkway to Old Highway along I-5.

Species	date: 4-12	5-3	5-13	5-31	6-15	6-28	Status
Bl. cr. Night Heron	-	-	1	-	-	-	R?
Mallard	4	-	-	-	-	-	R
White-tailed Kite	1	-	-	-	-	-	R
Cooper's Hawk	-	-	-	1	-	-	R
Red-shouldered Hawk	1	-	1	1	1	2	R
Red-tailed Hawk	-	1	-	-	1	-	R
California Quail	6	-	7	2	-	2	R
Killdeer	3	2	4	4	2	4	R
Spotted Sandpiper	-	-	1	-	-	-	S
Domestic Pigeon	-	4	3	-	-	-	R
Mourning Dove	3	5	2	2	-	3	R
Greater Roadrunner	-	-	1	-	-	-	R
Black-ch. Hummingbird	2	-	-	-	-	-	S
Anna's Hummingbird	4	1	1	2	-	2	R
Nuttall's Woodpecker	2	7	3	3	3	8	R
Downy Woodpecker	-	3	-	3	2	5	R
Hairy Woodpecker	-	-	-	1	3	-	R
Northern Flicker	-	1	-	1	-	-	R
Pac. Slope Flycatcher	-	-	1	-	-	-	M
Black Phoebe	-	-	-	3	1	5	R
Ash-thr. Flycatcher	-	3	1	4	1	5	S
Western Kingbird	-	-	-	-	-	6	S
N. Rough-w. Swallow	10	11	19	6	18	13	S
Cliff Swallow	-	-	-	-	7	-	S
Scrub Jay	4	2	2	2	2	7	R
American Crow	-	2	2	2	8	5	R
Common Raven	2	1	1	2	2	2	R
Plain Titmouse	2	6	6	6	4	13	R
Bushtit	5	-	2	4	3	8	R
Bewick's Wren	21	16	18	11	13	11	R
House Wren	3	5	2	2	1	-	R
Western Bluebird	-	3	-	2	1	10	R
Swainson's Thrush	-	2	2	-	-	-	M
American Robin	-	2	-	-	-	-	R
Wrentit	-	-	-	1	1	1	R
N. Mockingbird	-	-	1	-	-	-	R
Calif. Thrasher	-	1	-	3	1	-	R
Phainopepla	-	-	1	-	-	1	R
European Starling	2	4	1	3	-	3	R
Bell's Vireo	-	-	-	-	-	1	S
Warbling Vireo	-	4	-	-	-	-	M
Orange-cr. Warbler	10	0	0	0	-	-	M
Yellow Warbler	2	10	4	2	2	2	S,M
Yellow- r. Warbler	54	1	-	-	-	-	W,M
Black-th. grey Warbler	2	-	-	-	-	-	M
Common Yellowthroat	5	-	3	3	2	5	R
Wilson's Warbler	1	6	11	-	-	-	M
Yellow-br. Chat	1	1	-	-	1	-	S

Table 2 (cont.). Bird Observations along the Santa Clara River System, 1994: Santa Clara River from McBean Parkway to Old Highway along I-5.

Species date:	4-12	5-3	5-13	5-31	6-15	6-28	Status
Western Tanager	-	5	-	-	-	-	M
Black-headed Grosbeak	4	10	7	5	4	8	S
Blue Grosbeak	-	-	2	-	-	1	S
Lazuli Bunting	-	-	-	-	-	1	S
Rufous-sided Towhee	4	4	4	5	3	4	R
California Towhee	-	2	1	4	2	-	R
Song Sparrow	24	20	21	17	18	42	R
Red-winged Blackbird	5	4	20	3	10	-	S
Brown-headed Cowbird	4	13	7	6	3	19	S
Northern Oriole	-	1	-	-	-	2	S
House Finch	-	2	-	4	12	18	R
Lesser Goldfinch	1	7	2	-	5	7	R
Lawrence's Goldfinch	-	-	-	1	-	-	R
American Goldfinch	18	-	-	-	-	-	W,M
Total Species:	31	36	35	34	31	33	
Total Individuals:	210	172	165	121	137	225	

Total Species on all visits: 62
Total Probable Breeding Species: 44

Status: M - Migrant; R - Resident; S - Summer Only; W - Winter Only

Table 3. Bird Observations along the Santa Clara River System, 1994: Santa Clara River from Boquet Canyon Rd. to McBean Parkway.

Species	date: 4-12	6-4	Status
Cooper's Hawk	-	1	R
Red-tailed Hawk	1	1	R
California Quail	14	12	R
Killdeer	2	7	R
Domestic Pigeon	18	-	R
Mourning Dove	4	6	R
Rufous Hummingbird	1	-	M
Black-ch. Hummingbird	3	2	S
Anna's Hummingbird	1	4	R
Nuttall's Woodpecker	3	6	R
Downy Woodpecker	3	1	R
Northern Flicker	-	3	R
Willow Flycatcher	-	1	S
Black Phoebe	2	4	R
Ash-thr. Flycatcher	7	3	S
Western Kingbird	-	3	S
N. Rough-w. Swallow	11	4	S
Cliff Swallow	6	-	S
Scrub Jay	7	14	R
American Crow	7	4	R
Common Raven	12	8	R
Plain Titmouse	4	6	R
Bushtit	16	12	R
Bewick's Wren	6	2	R
House Wren	1	-	R
Western Bluebird	2	2	R
Calif. Thrasher	2	4	R
Phainopepla	1	2	R
European Starling	1	18	R
Orange-cr. Warbler	1		M
Yellow Warbler	1	3	S
Yellow-r. Warbler	23	-	W,M
Black-th. grey Warbler	1	-	M
Common Yellowthroat	6	-	R
Wilson's Warbler	4	-	M
Yellow-br. Chat	-	1	S
Black-headed Grosbeak	3	1	S
Blue Grosbeak	-	2	S
Lazuli Bunting	-	1	S
Rufous-sided Towhee	4	2	R
California Towhee	5	3	R
Song Sparrow	15	31	R
White-cr. Sparrow	15	-	W
Red-winged Blackbird	5	3	S
Brown-headed Cowbird	14	2	S

Table 3. (cont.) Bird Observations along the Santa Clara River System, 1994: Santa Clara River from Boquet Canyon Rd. to McBean Parkway.

Species	Date: 4-12	6-4	Status
Northern Oriole	6	-	S
House Finch	6	17	R
Lesser Goldfinch	3	8	R
Total Species:	41	36	
Total Individuals:	247	201	

Total Species on all visits: 48
Total Probable Breeding Birds: 41

Status: M - Migrant; R - Resident; S - Summer Only; W - Winter Only

Table 4. Bird Observations along the Santa Clara River System, 1994: Santa Clara River from Power Line 2.5 miles upstream from Boquet Canyon Rd. to Boquet Canyon Road Crossing.

Species	Date: 4-28	6-4	Status
Mallard	2	1(8)	R
Red-tailed Hawk	1	4	R
American Kestrel	-	5	R
California Quail	37	12	R
Killdeer	18	14	R
Mourning Dove	15	47	R
Greater Roadrunner	-	1	R
Anna's Hummingbird	5	2	R
Nuttall's Woodpecker	1	3	R
Northern Flicker	2	3	R
Black Phoebe	1	1	R
Ash-thr. Flycatcher	1	3	S
Western Kingbird	-	2	S
N. Rough-w. Swallow	1	-	S
Cliff Swallow	-	3	S
Scrub Jay	17	7	R
Common Raven	22	9	R
Bushtit	10	7	R
Bewick's Wren	21	9	R
Western Bluebird	-	1	R
Wrentit	1	-	R
N. Mockingbird	5	4	R
Calif. Thrasher	5	5	R
Phainopepla	-	7	R
European Starling	4	18	R
Yellow- r. Warbler	1	-	M
Wilson's Warbler	2	-	M
Black-headed Grosbeak	-	2	S
Rufous-sided Towhee	6	3	R
California Towhee	12	5	R
Song Sparrow	7	6	R
Red-winged Blackbird	41	38	S
Brewer's Blackbird	6	6	S
Brown-headed Cowbird	5	3	S
Northern Oriole	7	1	S
House Finch	16	21	R
Lesser Goldfinch	5	9	R
Total Species:	30	33	
Total Individuals:	277	272	

Total Species on all visits: 37
Total Possible Breeding Species: 32

Status: M - Migrant; R - Resident; S - Summer Only; W - Winter Only

() = Young Birds

Table 5. Bird Observations along the Santa Clara River System, 1993: Castaic Creek from Old Road west to Rte. 126.

Species	date: 4-21	6-8	Status
Green Heron	-	1	R
Bl. cr. Night Heron	-	1	R
Mallard	2	-	R
White-tailed Kite	1	1	R
Cooper's Hawk	-	1	R
Red-tailed Hawk	3	2	R
California Quail	35	57	R
American Coot	-	2(1)	R
Killdeer	6	4	R
Domestic Pigeon	2	10	R
Mourning Dove	2	2	R
Black-ch. Hummingbird	3	-	S
Anna's Hummingbird	12	6	R
Costa's Hummingbird	1	-	S
Nuttall's Woodpecker	1	6	R
Downy Woodpecker	-	5	R
Hairy Woodpecker	-	1	R
Northern Flicker	1	-	R
Black Phoebe	-	8	R
Ash-thr. Flycatcher	5	7	S
Western Kingbird	4	2	S
Violet-green Swallow	3	-	S
N. Rough-w. Swallow	58	14	S
Barn Swallow	-	1	S
Cliff Swallow	30	68	S
Scrub Jay	14	17	R
American Crow	14	13	R
Common Raven	7	17	R
Plain Titmouse	-	12	R
Bushtit	11	46	R
Bewick's Wren	23	18	R
House Wren	2	2	R
Wrentit	-	1	R
Calif. Thrasher	9	8	R
European Starling	17	4	R
Bell's Vireo	-	1	S
Orange-cr. Warbler	1	-	M
Yellow Warbler	-	2	S
Yellow- r. Warbler	3	-	M,W
Common Yellowthroat	-	8	R
Wilson's Warbler	3	-	M
Yellow-br. Chat	-	3	S
Black-headed Grosbeak	4	7	S
Blue Grosbeak	1	7	S
Lazuli Bunting	-	1	S
Rufous-sided Towhee	17	17	R
California Towhee	13	13	R

Table 5 (cont.). Bird Observations along the Santa Clara River System, 1993: Castaic Creek from Old Road west to Rte. 126.

Species Date:	4-21	6-8	Status
Song Sparrow	44	18	R
Red-winged Blackbird	40	25	S
Tricolored Redwing	-	30	S
Brown-headed Cowbird	19	23	S
Northern Oriole	4	2	S
House Finch	14	12	R
Lesser Goldfinch	8	4	R
Total Species:	38	45	
Total Individuals:	437	480	

Total Species on all visits: 54
Total Possible Breeding Species: 46

Status: M - Migrant; R - Resident; S - Summer Only; W - Winter Only

( ) = Young Birds

Table 6. Bird Observations along the Santa Clara River System, 1994: San Francisquito Creek for 2 Miles above Main Channel.

Species	Date: 4-28	6-6	Status
White-tailed Kite	2	-	R
Cooper's Hawk	-	1	R
Red-tailed Hawk	1	2	R
American Kestrel	1	1	R
California Quail	128	13	R
Killdeer	7	2	R
Domestic Pigeon	-	2	R
Mourning Dove	17	26	R
Greater Roadrunner	-	1	R
Black-ch. Hummingbird	2	4	S
Anna's Hummingbird	2	4	R
Costa's Hummingbird	2	-	R
Nuttall's Woodpecker	10	10	R
Downy Woodpecker	2	-	R
Northern Flicker	1	-	R
Western Wood Pewee	1	-	M
Pac. Slope Flycatcher	1	-	M
Willow Flycatcher	-	4	S
Ash-thr. Flycatcher	9	9	S
Western Kingbird	5	2	S
N. Rough-w. Swallow	-	6	S
Cliff Swallow	-	29	S
Scrub Jay	13	23	R
American Crow	10	2	R
Common Raven	8	11	R
Plain Titmouse	2	1	R
Bushtit	10	10	R
Bewick's Wren	20	15	R
House Wren	10	3	R
Western Bluebird	-	2	R
N. Mockingbird	1	4	R
Calif. Thrasher	8	3	R
Phainopepla	-	3	R
European Starling	4	4	R
Bell's Vireo	-	1	S
Orange-cr. Warbler	1	-	M
Yellow Warbler	6	1	S
Common Yellowthroat	6	1	R
Wilson's Warbler	6	-	M
Black-headed Grosbeak	6	3	S
Rufous-sided Towhee	8	24	R
California Towhee	11	16	R
Song Sparrow	42	40	R
Lincoln's Sparrow	1	-	W
White-cr. Sparrow	4	-	W
Red-winged Blackbird	100	26	S
Western Meadowlark	14	5	R

Table 6 (cont.). Bird Observations along the Santa Clara River System, 1994: San Francisquito Creek for 2 Miles above Main Channel.

Species	date: 4-28	6-6	Status
Brown-headed Cowbird	12	18	S
Northern Oriole	11	10	S
House Finch	22	42	R
Lesser Goldfinch	-	4	R
Lawrence's Goldfinch	-	2	R
Total Species:	41	42	
Total Individuals:	527	390	

Total Species on all visits: 52
Total Possible Breeding Species: 42

Status: M - Migrant; R - Resident; S - Summer Only; W - Winter Only

() = Young Birds

Table 7. Bird Observations along the Santa Clara River System, 1994: South Fork from Rte. 126 to McBean Parkway.

Species	date:	4-21	6-6	Status
Red-tailed Hawk		1	-	R
American Kestrel		1	-	R
California Quail		8	4	R
Killdeer		4	2	R
Mourning Dove		2	3	R
Great Horned Owl		2	1	R
Anna's Hummingbird		1	1	R
Nuttall's Woodpecker		1	1	R
Northern Flicker		-	1	R
Black Phoebe		-	2	R
Ash-thr. Flycatcher		-	1	S
Rough-winged Swallow		-	2	S
Scrub Jay		3	6	R
American Crow		1	-	R
Common Raven		5	-	R
Bushtit		-	4	R
Bewick's Wren		5	1	R
N. Mockingbird		1	1	R
Calif. Thrasher		1	1	R
Wilson's Warbler		4	-	M
California Towhee		4	-	R
House Finch		4	7	R
Total Species:		17	16	
Total Individuals:		48	38	

Total Species on all visits: 22
Total Possible Breeding species: 21

Status: M - Migrant; R - Resident; S - Summer Only; W - Winter Only

Table 8. Bird Observations along the Santa Clara River System, 1994: South Fork from Newhall Creek to Rte. 126.

Species date:	4/21	6-6	Status
Red-tailed Hawk	-	1	R
California Quail	2	-	R
Killdeer	4	5	R
Mourning Dove	7	1	R
Anna's Hummingbird	5	2	R
N. Rough-w. Swallow	2	-	S
Scrub Jay	1	5	R
Common Raven	2	3	R
Bushtit	2	4	R
Bewick's Wren	4	1	R
American Robin	1	-	R
N. Mockingbird	2	4	R
Phainopepla	1	-	R
European Starling	2	2	R
Yellow-rumped Warbler	2	-	M
Wilson's Warbler	1	-	M
California Towhee	1	-	R
Song Sparrow	5	7	R
Brown-headed Cowbird	-	1	S
Northern Oriole	2	1	S
House Finch	2	7	R
Lesser Goldfinch	4	-	R
Total Species:	20	14	
Total Individuals:	52	44	

Total Species on all visits: 22
Total Possible Breeding Species: 18

Status: M - Migrant; R - Resident; S - Summer Only; W - Winter Only

() = Young Birds

Table 9. Comparison of Populations of Selected Species, 1990 - 1994.

Species	Year	Census Areas 1	2	3	4	5	6	7	8	Total
Song Sparrow	1994	67	20	15	7	44	40	0	5	198
	1993	63	15	6	2	18	11	0	13	128
	1992	63	38	28	2	5	14	7	10	167
	1991	112	30	39	0	9	7	12	24	233
	1990	117	82	36	0	11	16	15	30	307
Yellow Warbler	1994	3	2	2	0	2	1	0	0	10
	1993	5	2	0	0	1	0	0	0	8
	1992	9	5	3	1	0	3	0	0	21
	1991	23	8	2	2	17	4	0	4	60
	1990	16	20	2	1	10	0	3	1	53
Bewick's Wren	1994	28	18	6	21	23	20	4	2	122
	1993	51	11	4	26	27	9	10	1	139
	1992	35	29	3	10	6	11	8	-	102
	1991	46	5	8	8	3	13	5	3	91
	1990	77	15	14	27	48	17	7	10	215

Upper R Area 1 R SIOG

BIRDS OF Santa Clara River System

Locality SCR Old R → Blue M... Date 4-12 Time 7:15 – 8:45

Count	Species	Count	Species
	Great Blue Heron		Rock Wren
	Green Heron (Great Egret)	(16) 11 ~~2~~	Bewick's Wren
	Mallard	(1) 1	House Wren
(3)	Cinnamon Teal		Ruby-crowned Kinglet
	Turkey Vulture		Blue-gray Gnatcatcher
	White-tailed Kite	(3) 1 2	Western Bluebird
	Sharp-shinned Hawk		Swainson's Thrush
	Cooper's Hawk		Hermit Thrush
(1)	Red-shouldered Hawk		American Robin
	Red-tailed Hawk		Wrentit
	Golden Eagle		Northern Mockingbird
	American Kestrel		California Thrasher
(2)	California Quail		American Pipit
(2)	American Coot		Cedar Waxwing
(4) 2 2	Killdeer		Phainopepla
	Spotted Sandpiper		Loggerhead Shrike
	Least Sandpiper (1 Solitary SP)	(8) 2 4 2	European Starling
	Common Snipe		**Bell's Vireo**
	Rock Dove		Solitary Vireo
(2)	Mourning Dove		Warbling Vireo
	Yellow-billed Cuckoo		Orange-crowned Warbler
	Greater Roadrunner		Yellow Warbler
	Barn Owl	(18) 8 8 2	Yellow-rumped Warbler
	Great Horned Owl		Black-th. Gray Warbler
	White-throated Swift		Townsend's Warbler
	Black-ch. Hummingbird		MacGillivray's Warbler
(1)	Anna's Hummingbird	(5) 1 1111	Common Yellowthroat
	Costa's Hummingbird		Wilson's Warbler
	Belted Kingfisher		Yellow-breasted Chat
	Acorn Woodpecker		**Summer Tananger**
(2) 11	Nuttall's Woodpecker		Western Tanager
(3) 1 2	Downy Woodpecker	(2) 11	Black-headed Grosbeak
(1) 1	Hairy Woodpecker		Blue Grosbeak
	Northern Flicker		Lazuli Bunting
	Western Wood-Pewee	(3) 111	Rufous-sided Towhee
	Willow Flycatcher	(2)	California Towhee
	Hammond's Flycatcher		Lark Sparrow
(1)	Pacific Slope Flycatcher	(4)	Savannah Sparrow
(1)	Black Phoebe		Fox Sparrow
	Say's Phoebe	(23) 1111 ~~1111~~ ~~1111~~ ~~1111~~	Song Sparrow
	Ash-throated Flycatcher		Lincoln's Sparrow
	Brown-crested Flycatcher	(17) 6 6 5	White-crowned Sparrow
	Cassin's Kingbird	(43) (15) (10) (10) 4 2 11	Red-winged Blackbird
	Western Kingbird		Western Meadowlark
	Horned Lark		Brewer's Blackbird
2	Tree Swallow	(4) 1 2 1	Brown-headed Cowbird
	Violet-green Swallow		Hooded Oriole
(4) 2 2	N. Rough-winged Swallow		Northern Oriole
	Bank Swallow		House Finch
	Cliff Swallow		Pine Siskin
	Barn Swallow		Lesser Goldfinch
(2) 11	Scrub Jay	(2)	Lawrence's Goldfinch
(1) 1	American Crow		American Goldfinch
(5) ~~1111~~	Common Raven		House Sparrow
(1) 1	Plain Titmouse		
	Bushtit		

(Tree Swallow)

Additional Species (2) Canada Goose

Woodpecker Nest / Old Rd Bridge I-5 Bridge

BIRDS OF Santa Clara River System

Locality Blue Moon → CASTAIC Date 4-18 Time 7-8 AM

- Great Blue Heron
- Green Heron
- (4) 2 11 Mallard
- Cinnamon Teal
- (1) Snowy Egret
- Turkey Vulture
- (1) White-tailed Kite
- (1) GT Egret
- Sharp-shinned Hawk
- Cooper's Hawk
- Red-shouldered Hawk
- Red-tailed Hawk
- Golden Eagle
- American Kestrel
- (10) ~ 4 2 2 California Quail
- American Coot
- (16) 2 2 2 2 2 2 Killdeer
- Spotted Sandpiper
- (6) Least Sandpiper
- (1) Common Snipe
- (3) Rock Dove
- (2) Mourning Dove
- **Yellow-billed Cuckoo**
- Greater Roadrunner
- Barn Owl
- Great Horned Owl
- White-throated Swift
- Black-ch. Hummingbird
- Anna's Hummingbird
- Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- Nuttall's Woodpecker
- Downy Woodpecker
- Hairy Woodpecker
- (2) 11 Northern Flicker
- Western Wood-Pewee
- Willow Flycatcher
- Hammond's Flycatcher
- Pacific Slope Flycatcher
- Black Phoebe
- Say's Phoebe
- (4) 1111 Ash-throated Flycatcher
- **Brown-crested Flycatcher**
- Cassin's Kingbird
- (1) Western Kingbird
- Horned Lark
- Tree Swallow
- Violet-green Swallow
- (4) 3 1 N. Rough-winged Swallow
- Bank Swallow
- Cliff Swallow
- (1) Barn Swallow
- (4) 111 Scrub Jay
- (2) 2 American Crow
- (4) 2 1 Common Raven
- (1) Plain Titmouse
- (8) 3 2 3 Bushtit
- (12) 11 HH 11 Rock Wren
- Bewick's Wren
- (5) HH House Wren
- Ruby-crowned Kinglet
- Blue-gray Gnatcatcher
- (2) Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- American Robin
- (4) 1111 Wrentit
- Northern Mockingbird
- (1) California Thrasher
- American Pipit
- Cedar Waxwing
- Phainopepla
- Loggerhead Shrike
- (2) European Starling
- **Bell's Vireo**
- Solitary Vireo
- Warbling Vireo
- (1) Orange-crowned Warbler
- (2) 11 Yellow Warbler
- (2) 11 Yellow-rumped Warbler
- Black-th. Gray Warbler
- Townsend's Warbler
- MacGillivray's Warbler
- (7) 11 1HH Common Yellowthroat
- Wilson's Warbler
- (1) Yellow-breasted Chat
- **Summer Tananger**
- Western Tanager
- (6) 2 2 2 Black-headed Grosbeak
- Blue Grosbeak
- Lazuli Bunting
- (5) 1HH1 Rufous-sided Towhee
- California Towhee
- Lark Sparrow
- Savannah Sparrow
- Fox Sparrow
- (18) 2 2 2 2 2 2 2 2 Song Sparrow
- Lincoln's Sparrow
- White-crowned Sparrow
- (24) 4 (10) (10) Red-winged Blackbird
- Western Meadowlark
- Brewer's Blackbird
- (4) 2 2 Brown-headed Cowbird
- Hooded Oriole
- Northern Oriole
- (2) 2 House Finch
- Pine Siskin
- (8) 3 5 Lesser Goldfinch
- Lawrence's Goldfinch
- (6) 5 1 American Goldfinch
- House Sparrow

Additional Species

_____

BIRDS OF Santa Clara River System

Locality [illegible] Date 5-3 Time 730 — 130

(5) Left Side

Count	Species
	Great Blue Heron
	Green Heron
	Mallard
	Cinnamon Teal
	Turkey Vulture
	White-tailed Kite
	Sharp-shinned Hawk
	Cooper's Hawk
	Red-shouldered Hawk
	Red-tailed Hawk
	Golden Eagle
	American Kestrel
2	California Quail
	American Coot
2 2 2 2	Killdeer
	Spotted Sandpiper
	Least Sandpiper
	Common Snipe
	Rock Dove
	Mourning Dove
	Yellow-billed Cuckoo
	Greater Roadrunner
	Barn Owl
	Great Horned Owl
	White-throated Swift
	Black-ch. Hummingbird
III	Anna's Hummingbird
	Costa's Hummingbird
	Belted Kingfisher
	Acorn Woodpecker
II 2 I	Nuttall's Woodpecker
	Downy Woodpecker
I	Hairy Woodpecker
	Northern Flicker
	Western Wood-Pewee
	Willow Flycatcher
	Hammond's Flycatcher
	Pacific Slope Flycatcher
I	Black Phoebe
	Say's Phoebe
IIII	Ash-throated Flycatcher
	Brown-crested Flycatcher
	Cassin's Kingbird
	Western Kingbird
	Horned Lark
	Tree Swallow
	Violet-green Swallow
2 5	N. Rough-winged Swallow
	Bank Swallow
	Cliff Swallow
2	Barn Swallow
2 2 2 I	Scrub Jay
1 2 I	American Crow
II	Common Raven
2 2	Plain Titmouse
2 2	Bushtit

Count	Species
	Rock Wren
11 IIII IIII II	Bewick's Wren
I 2	House Wren
	Ruby-crowned Kinglet
	Blue-gray Gnatcatcher
	Western Bluebird
I	Swainson's Thrush
	Hermit Thrush
	American Robin
	Wrentit
	Northern Mockingbird
I	California Thrasher
	American Pipit
	Cedar Waxwing
I	Phainopepla
	Loggerhead Shrike
2 2	European Starling
	Bell's Vireo
	Solitary Vireo
	Warbling Vireo
I	Orange-crowned Warbler
III	Yellow Warbler
I	Yellow-rumped Warbler
	Black-th. Gray Warbler
	Townsend's Warbler
	MacGillivray's Warbler
2 2 2 2 2 2 2 I	Common Yellowthroat
I	Wilson's Warbler
	Yellow-breasted Chat
	Summer Tananger
8	Western Tanager
III IIII	Black-headed Grosbeak
I	Blue Grosbeak
	Lazuli Bunting
II	Rufous-sided Towhee
II	California Towhee
	Lark Sparrow
	Savannah Sparrow
	Fox Sparrow
IIII IIII IIII IIII	Song Sparrow
	Lincoln's Sparrow
	White-crowned Sparrow
9 9 6 9 8 6, 8	Red-winged Blackbird
	Western Meadowlark
	Brewer's Blackbird
2 3 2 2	Brown-headed Cowbird
	Hooded Oriole
	Northern Oriole
3	House Finch
	Pine Siskin
	Lesser Goldfinch
	Lawrence's Goldfinch
6	American Goldfinch
	House Sparrow

Additional Species

2 Common Crow

5 Vaux Swift

BIRDS OF Santa Clara River System 5-3

Locality Blue Moon to Castaic Date 5-3 Time 730-900

1 Great Egret
Great Blue Heron
Green Heron
Mallard
Cinnamon Teal
Turkey Vulture
White-tailed Kite
Sharp-shinned Hawk
Cooper's Hawk
Red-shouldered Hawk
Red-tailed Hawk
Golden Eagle
American Kestrel
4 3, 6, 10, 4, 6 California Quail
American Coot
2 2 2, 2 Killdeer
Spotted Sandpiper
Least Sandpiper
Common Snipe
, 12, Rock Dove
22 Mourning Dove
Yellow-billed Cuckoo
Greater Roadrunner
Barn Owl
Great Horned Owl
White-throated Swift
Black-ch. Hummingbird
Anna's Hummingbird
Costa's Hummingbird
Belted Kingfisher
Acorn Woodpecker
Nuttall's Woodpecker
Downy Woodpecker
Hairy Woodpecker
Northern Flicker
Western Wood-Pewee
Willow Flycatcher
Hammond's Flycatcher
Pacific Slope Flycatcher
Black Phoebe
Say's Phoebe
1 1 1 8 2 Ash-throated Flycatcher
2 **Brown-crested Flycatcher**
Cassin's Kingbird
2 Western Kingbird
2 Horned Lark
Tree Swallow
Violet-green Swallow
2 N. Rough-winged Swallow
Bank Swallow
4 2 2 2 Cliff Swallow
Barn Swallow
Scrub Jay
American Crow
2 Common Raven
2 4 2 2 2 Plain Titmouse
2 2 2 2 Bushtit
Rock Wren
1 2 2 1 2 2 Bewick's Wren
1 1 2 2 1 2 House Wren
Ruby-crowned Kinglet
Blue-gray Gnatcatcher
2 Western Bluebird
Swainson's Thrush
Hermit Thrush
American Robin
Wrentit
Northern Mockingbird
California Thrasher
American Pipit
Cedar Waxwing
Phainopepla
Loggerhead Shrike
20+ 2 European Starling
Bell's Vireo
Solitary Vireo
Warbling Vireo
Orange-crowned Warbler
22 1 2 2 2 Yellow Warbler
Yellow-rumped Warbler
Black-th. Gray Warbler
Townsend's Warbler
MacGillivray's Warbler
1 2 1 2 1 2 Common Yellowthroat
1 1 2 1 1 3 Wilson's Warbler
Yellow-breasted Chat
Summer Tananger
1 2 3 Western Tanager
1 Black-headed Grosbeak
Blue Grosbeak
4 6 4 Lazuli Bunting
Rufous-sided Towhee
1 2 California Towhee
Lark Sparrow
Savannah Sparrow
Fox Sparrow
2 2 2 2 2, 10, 10, 10, 2 Song Sparrow
Lincoln's Sparrow
White-crowned Sparrow
30, 20, 20, 20 Red-winged Blackbird
2 Western Meadowlark
Brewer's Blackbird
4 4 4, 10, 6 Brown-headed Cowbird
Hooded Oriole
1 2 Northern Oriole
4 4 6 House Finch
Pine Siskin
Lesser Goldfinch
Lawrence's Goldfinch
American Goldfinch
House Sparrow

Additional Species 1 Paul Virgin
6 3 3 1 2 Swifts (Vaux's ?)
25 Cedar Wax Wing

BIRDS OF Santa Clara River System

Locality Blue Moon to Castaic — mostly dry areas — overcast / Date May 13/94 T Time 6:45-9 R Sandhill Cranes

- Great Blue Heron
- 2 Green Heron
- 2 Mallard
- Cinnamon Teal
- 1 Turkey Vulture
- 11 White-tailed Kite
- Sharp-shinned Hawk
- Cooper's Hawk
- Red-shouldered Hawk
- 1 Red-tailed Hawk
- Golden Eagle
- 11 American Kestrel
- 2222,8,22 California Quail
- American Coot
- 1222 Killdeer
- Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- 6,8,12 Rock Dove
- 28,62 Mourning Dove
- **Yellow-billed Cuckoo**
- 1 Greater Roadrunner
- Barn Owl
- Great Horned Owl
- 6 White-throated Swift
- 1 Black-ch. Hummingbird
- 1111 Anna's Hummingbird
- Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- 1111 Nuttall's Woodpecker
- 1 Downy Woodpecker
- Hairy Woodpecker
- Northern Flicker
- 1 Western Wood-Pewee
- Willow Flycatcher
- Hammond's Flycatcher
- Pacific Slope Flycatcher
- Black Phoebe
- Say's Phoebe
- 112 Ash-throated Flycatcher
- **Brown-crested Flycatcher**
- Cassin's Kingbird
- 2 Western Kingbird
- Horned Lark
- 1 Tree Swallow
- Violet-green Swallow
- 6,8,4 N. Rough-winged Swallow
- Bank Swallow
- 4 Cliff Swallow
- Barn Swallow
- 31112 Scrub Jay
- 24 American Crow
- Common Raven
- 12222 Plain Titmouse
- 1212222-22-12 Busntit
- Rock Wren
- 2311222223 Bewick's Wren
- 112 House Wren
- Ruby-crowned Kinglet
- Blue-gray Gnatcatcher
- Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- American Robin
- Wrentit
- Northern Mockingbird
- 1 California Thrasher
- American Pipit
- Cedar Waxwing
- 1 Phainopepla
- Loggerhead Shrike
- 20,26 European Starling
- **Bell's Vireo**
- Solitary Vireo
- Warbling Vireo
- Orange-crowned Warbler
- 11 Yellow Warbler
- Yellow-rumped Warbler
- Black-th. Gray Warbler
- Townsend's Warbler
- MacGillivray's Warbler
- 223 Common Yellowthroat
- 211 Wilson's Warbler
- Yellow-breasted Chat
- **Summer Tananger**
- 111 Western Tanager
- 1211 Black-headed Grosbeak
- Blue Grosbeak
- Lazuli Bunting
- 1111 Rufous-sided Towhee
- 12212 California Towhee
- Lark Sparrow
- Savannah Sparrow
- Fox Sparrow
- 4281496 Song Sparrow
- Lincoln's Sparrow
- White-crowned Sparrow
- 20,20,20 Red-winged Blackbird
- Western Meadowlark
- Brewer's Blackbird
- 36,32211 Brown-headed Cowbird
- Hooded Oriole
- 22 Northern Oriole
- 22 House Finch
- Pine Siskin
- 2,10,15 Lesser Goldfinch
- Lawrence's Goldfinch
- American Goldfinch
- House Sparrow

Additional Species

2 BAILVNGO. 1 SORA RAIL

3 Black Cr. Night Heron

R 5/06

BIRDS OF Santa Clara River System

Locality *Old Rd → Blue Moon* Date *5-13* Time *8 → 9* *Bridge ...*

- ___ Great Blue Heron
- *||||* Green Heron *(4 BCNH)*
- ___ Mallard
- ___ Cinnamon Teal
- ___ Turkey Vulture
- ___ White-tailed Kite
- ___ Sharp-shinned Hawk
- ___ Cooper's Hawk
- ___ Red-shouldered Hawk
- ___ Red-tailed Hawk
- ___ Golden Eagle
- ___ American Kestrel
- *3* California Quail
- ___ American Coot
- *2) / / 2* Killdeer
- *2 ||* Spotted Sandpiper
- ___ Least Sandpiper
- ___ Common Snipe
- ___ Rock Dove
- *2* Mourning Dove
- ___ **Yellow-billed Cuckoo**
- ___ Greater Roadrunner
- ___ Barn Owl
- ___ Great Horned Owl
- ___ White-throated Swift
- ___ Black-ch. Hummingbird
- *||* Anna's Hummingbird
- ___ Costa's Hummingbird
- ___ Belted Kingfisher
- ___ Acorn Woodpecker
- *|||* Nuttall's Woodpecker
- *2* Downy Woodpecker
- ___ Hairy Woodpecker
- ___ Northern Flicker
- ___ Western Wood-Pewee
- ___ Willow Flycatcher
- ___ Hammond's Flycatcher
- ___ Pacific Slope Flycatcher
- *2* Black Phoebe
- ___ Say's Phoebe
- *|||* Ash-throated Flycatcher
- *|* **Brown-crested Flycatcher** *(correctly moved on previous list)*
- ___ Cassin's Kingbird
- ___ Western Kingbird
- *2* Horned Lark
- ___ Tree Swallow
- ___ Violet-green Swallow
- *6* N. Rough-winged Swallow
- ___ Bank Swallow
- ___ Cliff Swallow
- *2* Barn Swallow
- *||| HHT||* Scrub Jay
- *3 4 2* American Crow
- *2 3 1* Common Raven
- *2 |* Plain Titmouse
- *2* Bushtit

- ___ Rock Wren
- *|| HHT HHT| HHT|* Bewick's Wren
- *||* House Wren
- ___ Ruby-crowned Kinglet
- ___ Blue-gray Gnatcatcher
- ___ Western Bluebird
- ___ Swainson's Thrush
- ___ Hermit Thrush
- ___ American Robin
- ___ Wrentit
- ___ Northern Mockingbird
- *|* California Thrasher
- ___ American Pipit
- *(25)* Cedar Waxwing
- ___ Phainopepla
- ___ Loggerhead Shrike
- *2 4 2* European Starling
- ___ **Bell's Vireo**
- ___ Solitary Vireo
- ___ Warbling Vireo
- ___ Orange-crowned Warbler
- *|* Yellow Warbler
- ___ Yellow-rumped Warbler
- ___ Black-th. Gray Warbler
- ___ Townsend's Warbler
- ___ MacGillivray's Warbler
- *|||* Common Yellowthroat
- *||* Wilson's Warbler
- ___ Yellow-breasted Chat
- ___ **Summer Tananger**
- ___ Western Tanager
- *||| HHT|* Black-headed Grosbeak
- ___ Blue Grosbeak
- ___ Lazuli Bunting
- *||||* Rufous-sided Towhee
- ___ California Towhee
- ___ Lark Sparrow
- ___ Savannah Sparrow
- *|||| HHT HHT* Fox Sparrow
- *HHT HHT HHT* Song Sparrow
- ___ Lincoln's Sparrow
- ___ White-crowned Sparrow
- *(20) (25) (15) (12)* Red-winged Blackbird
- ___ Western Meadowlark
- ___ Brewer's Blackbird
- *2 || 2 2 2 2* Brown-headed Cowbird
- ___ Hooded Oriole
- *2* Northern Oriole
- ___ House Finch
- ___ Pine Siskin
- *3* Lesser Goldfinch
- ___ Lawrence's Goldfinch
- ___ American Goldfinch
- ___ House Sparrow

Additional Species

___

– in abandoned watercress ... Cast T.

TRIC RW. 300

BIRDS OF Santa Clara River System

Locality SR126 → Blue Point Date 5-31 Time 730-830

1	Great ~~Blue Heron~~ Egret
	Green Heron
	Mallard
	Cinnamon Teal
	Turkey Vulture
	White-tailed Kite
	Sharp-shinned Hawk
	Cooper's Hawk
	Red-shouldered Hawk
	Red-tailed Hawk
	Golden Eagle
	American Kestrel
6	California Quail
	American Coot
4	Killdeer
	Spotted Sandpiper
	Least Sandpiper
	Common Snipe
2	Rock Dove
4	Mourning Dove
	Yellow-billed Cuckoo
	Greater Roadrunner
	Barn Owl
	Great Horned Owl
1	White-throated Swift
	Black-ch. Hummingbird
2	Anna's Hummingbird
	Costa's Hummingbird
	Belted Kingfisher
	Acorn Woodpecker
6	Nuttall's Woodpecker
1	Downy Woodpecker
4	Hairy Woodpecker
	Northern Flicker
	Western Wood-Pewee
	Willow Flycatcher
	Hammond's Flycatcher
	Pacific Slope Flycatcher
2	Black Phoebe
	Say's Phoebe
3	Ash-throated Flycatcher
	Brown-crested Flycatcher
	Cassin's Kingbird
	Western Kingbird
2	Horned Lark
	Tree Swallow
	Violet-green Swallow
9	N. Rough-winged Swallow
	Bank Swallow
	Cliff Swallow
	Barn Swallow
11	Scrub Jay
8	American Crow
3	Common Raven
7	Plain Titmouse
	Bushtit
	Rock Wren
9	Bewick's Wren
2	House Wren
	Ruby-crowned Kinglet
	Blue-gray Gnatcatcher
	Western Bluebird
	Swainson's Thrush
	Hermit Thrush
	American Robin
	Wrentit
	Northern Mockingbird
2	California Thrasher
	American Pipit
	Cedar Waxwing
	Phainopepla
	Loggerhead Shrike
2	European Starling
	Bell's Vireo
	Solitary Vireo
	Warbling Vireo
	Orange-crowned Warbler
1	Yellow Warbler
	Yellow-rumped Warbler
	Black-th. Gray Warbler
	Townsend's Warbler
	MacGillivray's Warbler
6	Common Yellowthroat
	Wilson's Warbler
	Yellow-breasted Chat
	Summer Tananger
	Western Tanager
6	Black-headed Grosbeak
	Blue Grosbeak
	Lazuli Bunting
3	Rufous-sided Towhee
1	California Towhee
	Lark Sparrow
	Savannah Sparrow
	Fox Sparrow
29	Song Sparrow
	Lincoln's Sparrow
	White-crowned Sparrow
35	Red-winged Blackbird
	Western Meadowlark
10	Brewer's Blackbird
	Brown-headed Cowbird
	Hooded Oriole
	Northern Oriole
	House Finch
	Pine Siskin
	Lesser Goldfinch
	Lawrence's Goldfinch
	American Goldfinch
	House Sparrow

YOUNG OF MOTHERS HARLEY STAYS THERE & FLYING.

Additional Species

200 PAIR → TRICOLORED Redwing

BIRDS OF Santa Clara River System

Locality Blue Cut to Castaic Date 5/5/12 Time _____

- ___ Great Blue Heron
- ___ Green Heron
- 2 Mallard
- ___ Cinnamon Teal
- ___ Turkey Vulture
- ___ White-tailed Kite
- ___ Sharp-shinned Hawk
- ___ Cooper's Hawk
- 1 Red-shouldered Hawk
- 2 Red-tailed Hawk
- ___ Golden Eagle
- ___ American Kestrel
- 6 California Quail
- ___ American Coot
- ___ Killdeer
- 6 Spotted Sandpiper
- ___ Least Sandpiper
- ___ Common Snipe
- ___ Rock Dove
- 13 Mourning Dove
- ___ **Yellow-billed Cuckoo**
- ___ Greater Roadrunner
- ___ Barn Owl
- ___ Great Horned Owl
- ___ White-throated Swift
- ___ Black-ch. Hummingbird
- 3 Anna's Hummingbird
- ___ Costa's Hummingbird
- ___ Belted Kingfisher
- ___ Acorn Woodpecker
- 7 Nuttall's Woodpecker
- ___ Downy Woodpecker
- ___ Hairy Woodpecker
- 1 Northern Flicker
- ___ Western Wood-Pewee
- ___ Willow Flycatcher
- ___ Hammond's Flycatcher
- ___ Pacific Slope Flycatcher
- 2 Black Phoebe
- ___ Say's Phoebe
- 5 Ash-throated Flycatcher
- ___ **Brown-crested Flycatcher**
- ___ Cassin's Kingbird
- 2 Western Kingbird
- ___ Horned Lark
- ___ Tree Swallow
- ___ Violet-green Swallow
- 60 N. Rough-winged Swallow
- ___ Bank Swallow
- 4 Cliff Swallow
- ___ Barn Swallow
- 11 Scrub Jay
- 5 American Crow
- 3 Common Raven
- 2 Plain Titmouse
- 7 Busntit
- ___ Rock Wren
- 5 Bewick's Wren
- 4 House Wren
- ___ Ruby-crowned Kinglet
- ___ Blue-gray Gnatcatcher
- ___ Western Bluebird
- ___ Swainson's Thrush
- ___ Hermit Thrush
- ___ American Robin
- 1 Wrentit
- ___ Northern Mockingbird
- 3 California Thrasher
- ___ American Pipit
- ___ Cedar Waxwing
- 4 Phainopepla
- ___ Loggerhead Shrike
- 10 European Starling
- ___ **Bell's Vireo**
- ___ Solitary Vireo
- ___ Warbling Vireo
- ___ Orange-crowned Warbler
- 2 Yellow Warbler
- ___ Yellow-rumped Warbler
- ___ Black-th. Gray Warbler
- ___ Townsend's Warbler
- ___ MacGillivray's Warbler
- 6 Common Yellowthroat
- ___ Wilson's Warbler
- 1 Yellow-breasted Chat
- ___ **Summer Tananger**
- ___ Western Tanager
- 5 Black-headed Grosbeak
- ___ Blue Grosbeak
- 9 Lazuli Bunting
- 9 Rufous-sided Towhee
- 5 California Towhee
- ___ Lark Sparrow
- ___ Savannah Sparrow
- ___ Fox Sparrow
- 25 Song Sparrow
- ___ Lincoln's Sparrow
- ___ White-crowned Sparrow
- 31 Red-winged Blackbird
- ___ Western Meadowlark
- ___ Brewer's Blackbird
- 15 Brown-headed Cowbird
- ___ Hooded Oriole
- 3 Northern Oriole
- 2 House Finch
- ___ Pine Siskin
- 2 Lesser Goldfinch
- ___ Lawrence's Goldfinch
- ___ American Goldfinch
- ___ House Sparrow

Additional Species

1 Black-crowned night-heron

BIRDS OF Santa Clara River System

Locality Blue Moon to Castaic Date 6/15/94 Time Overcast 6:30

- Great Blue Heron
- 1 Green Heron
- 1 Mallard
- Cinnamon Teal
- Turkey Vulture
- 1 White-tailed Kite
- Sharp-shinned Hawk
- Cooper's Hawk
- 1 Red-shouldered Hawk
- 1 Red-tailed Hawk
- Golden Eagle
- 2 American Kestrel
- 2,4,8 California Quail
- American Coot
- 2,2,3 Killdeer
- 1 3,1,2 Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- 3 Rock Dove
- 22,2,3,2 Mourning Dove
- **Yellow-billed Cuckoo**
- Greater Roadrunner
- 2 Barn Owl
- Great Horned Owl
- White-throated Swift
- Black-ch. Hummingbird
- 1 Anna's Hummingbird
- Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- 1 Nuttall's Woodpecker
- 1 Downy Woodpecker
- 2 Hairy Woodpecker
- Northern Flicker
- Western Wood-Pewee
- Willow Flycatcher
- Hammond's Flycatcher
- Pacific Slope Flycatcher
- 1 Black Phoebe
- Say's Phoebe
- 1 2,1,3 Ash-throated Flycatcher
- **Brown-crested Flycatcher**
- Cassin's Kingbird
- 1 2 Western Kingbird
- Horned Lark
- Tree Swallow
- 4 Violet-green Swallow
- 10,5,2,4 N. Rough-winged Swallow
- Bank Swallow
- 15,6 Cliff Swallow
- Barn Swallow
- 1 22 Scrub Jay
- 3,4 American Crow
- 4,2,1,2,3 Common Raven
- 1 4,5 Plain Titmouse
- 4,6,9 Bushtit
- Rock Wren
- 4,6,8,1,4,5 Bewick's Wren
- 4 House Wren
- Ruby-crowned Kinglet
- Blue-gray Gnatcatcher
- 2(3) Western Bluebird
- 1 Swainson's Thrush
- Hermit Thrush
- American Robin
- Wrentit
- 2 Northern Mockingbird
- 1 California Thrasher
- American Pipit
- Cedar Waxwing
- 2,4,1,1 Phainopepla
- Loggerhead Shrike
- 6,2,2 European Starling
- **Bell's Vireo**
- Solitary Vireo
- Warbling Vireo
- Orange-crowned Warbler
- 1 1 Yellow Warbler
- Yellow-rumped Warbler
- Black-th. Gray Warbler
- Townsend's Warbler
- MacGillivray's Warbler
- 2,1,1,4,3,4,3 Common Yellowthroat
- Wilson's Warbler
- 1 1 Yellow-breasted Chat
- **Summer Tananger**
- Western Tanager
- 1 1 Black-headed Grosbeak
- 1 Blue Grosbeak
- 1 1 1 Lazuli Bunting
- 2,1,2,2 Rufous-sided Towhee
- 2,3 California Towhee
- Lark Sparrow
- Savannah Sparrow
- Fox Sparrow
- 20,20,10,10,20 Song Sparrow
- Lincoln's Sparrow
- White-crowned Sparrow
- 20,25 Red-winged Blackbird
- Western Meadowlark
- Brewer's Blackbird
- 3,10,3,8 Brown-headed Cowbird
- 1 Hooded Oriole
- 2 Northern Oriole
- 6,9,4 House Finch
- Pine Siskin
- 22 Lesser Goldfinch
- Lawrence's Goldfinch
- American Goldfinch
- House Sparrow

BLACK C NIGHT H

Additional Species

1 VIRGINIA RAIL

1 WHITE WING BLACKBIRD

BIRDS OF Santa Clara River System

Locality Old NWR → Blue Mtn Date 6/5 Time 8AM → 9

- Great Blue Heron
- Green Heron
- 1 Mallard
- Cinnamon Teal
- Turkey Vulture
- White-tailed Kite
- Sharp-shinned Hawk
- Cooper's Hawk
- 1 Red-shouldered Hawk
- Red-tailed Hawk
- Golden Eagle
- American Kestrel
- 4 California Quail
- American Coot
- 12 Killdeer
- 1 Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- (11) 6 Rock Dove
- 2 Mourning Dove
- **Yellow-billed Cuckoo**
- Greater Roadrunner
- Barn Owl
- Great Horned Owl
- White-throated Swift
- Black-ch. Hummingbird
- Anna's Hummingbird
- Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- 2 III Nuttall's Woodpecker
- 2 Downy Woodpecker
- Hairy Woodpecker
- Northern Flicker
- Western Wood-Pewee
- Willow Flycatcher
- Hammond's Flycatcher
- Pacific Slope Flycatcher
- III Black Phoebe
- Say's Phoebe
- 2 II Ash-throated Flycatcher
- **Brown-crested Flycatcher**
- Cassin's Kingbird
- Western Kingbird
- 2 Horned Lark
- Tree Swallow
- Violet-green Swallow
- 534 N. Rough-winged Swallow
- Bank Swallow
- (95) Cliff Swallow
- Barn Swallow
- IIII Scrub Jay
- 2 2 American Crow
- 2 2 Common Raven
- 1 2 2 Plain Titmouse
- 5 Bushtit
- Rock Wren
- III Bewick's Wren
- 1 House Wren
- Ruby-crowned Kinglet
- Blue-gray Gnatcatcher
- Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- American Robin
- Wrentit
- Northern Mockingbird
- 12 California Thrasher
- American Pipit
- Cedar Waxwing
- Phainopepla
- Loggerhead Shrike
- II European Starling
- **Bell's Vireo**
- Solitary Vireo
- Warbling Vireo
- Orange-crowned Warbler
- Yellow Warbler
- Yellow-rumped Warbler
- Black-th. Gray Warbler
- Townsend's Warbler
- MacGillivray's Warbler
- 1 IIII Common Yellowthroat
- Wilson's Warbler
- Yellow-breasted Chat
- **Summer Tananger**
- Western Tanager
- 1 Black-headed Grosbeak
- 3 Blue Grosbeak
- Lazuli Bunting
- II Rufous-sided Towhee
- 2 California Towhee
- Lark Sparrow
- Savannah Sparrow
- Fox Sparrow
- III Song Sparrow
- Lincoln's Sparrow
- White-crowned Sparrow
- (21) Red-winged Blackbird
- Western Meadowlark
- Brewer's Blackbird
- II Brown-headed Cowbird
- 1 Hooded Oriole
- Northern Oriole
- 24 House Finch
- Pine Siskin
- Lesser Goldfinch
- Lawrence's Goldfinch
- American Goldfinch
- House Sparrow

Additional Species

_____

_____

BCNH-V

SOLN 1

1 IIII IIII IIII

TRIC RW (150)

(25)

BIRDS OF Santa Clara River System

Locality Blue Moon south to Castaic Date 6/28/94 Time 6:30 - 830

1	1	Great Blue Heron		17	11	12	Bewick's Wren
3	2	Green Heron		1	1		House Wren
		Mallard					Ruby-crowned Kinglet
		Cinnamon Teal					Blue-gray Gnatcatcher
		Turkey Vulture					Western Bluebird
		White-tailed Kite					Swainson's Thrush
		Sharp-shinned Hawk					Hermit Thrush
		Cooper's Hawk					
5	3	12	Red-shouldered Hawk	2	2		American Robin
3	3	III	Red-tailed Hawk				Wrentit
			Golden Eagle				Northern Mockingbird
			American Kestrel	1	1		California Thrasher
20	5	III 2	California Quail				American Pipit
			American Coot				Cedar Waxwing
10	2	II	Killdeer	9	9	18	Phainopepla
6	5	2 2	Spotted Sandpiper				Loggerhead Shrike
			Least Sandpiper	37	18	18,6,11	European Starling
			Common Snipe				**Bell's Vireo**
9	5	6	Rock Dove				Solitary Vireo
8	6	2 2	Mourning Dove				Warbling Vireo
			Yellow-billed Cuckoo				Orange-crowned Warbler
			Greater Roadrunner	4	3	III	Yellow Warbler
			Barn Owl				Yellow-rumped Warbler
			Great Horned Owl				Black-th. Gray Warbler
			White-throated Swift				Townsend's Warbler
2	2	II	Black-ch. Hummingbird				MacGillivray's Warbler
3	1		Anna's Hummingbird	29	21	6,4,4,3	Common Yellowthroat
	1		Costa's Hummingbird				Wilson's Warbler
1			Belted Kingfisher	5	5	13	Yellow-breasted Chat
			Acorn Woodpecker				**Summer Tananger**
8	3	12	Nuttall's Woodpecker				Western Tanager
8	7	III 3	Downy Woodpecker	26	22	7,4,2,5,4,1	Black-headed Grosbeak
			Hairy Woodpecker	2	2		Blue Grosbeak
3	3	III	Northern Flicker	6	6	4 2	Lazuli Bunting
			Western Wood-Pewee	7	3	III	Rufous-sided Towhee
			Willow Flycatcher	1	1		California Towhee
			Hammond's Flycatcher	11	3	2	Lark Sparrow
			Pacific Slope Flycatcher				Savannah Sparrow
6	3	II	Black Phoebe				Fox Sparrow
			Say's Phoebe	96	50	10,10,20,10	Song Sparrow
13	6	1 III	Ash-throated Flycatcher				Lincoln's Sparrow
			Brown-crested Flycatcher				White-crowned Sparrow
			Cassin's Kingbird	20	20	20	Red-winged Blackbird
3	3	1 2	Western Kingbird				Western Meadowlark
			Horned Lark				Brewer's Blackbird
			Tree Swallow	36	25	3,4,6,2,8	Brown-headed Cowbird
			Violet-green Swallow			1	Hooded Oriole
36	12	10,2	N. Rough-winged Swallow	10	10	10,2	Northern Oriole
			Bank Swallow	21	19	4,8,4,1	House Finch
21	12	4 2,5	Cliff Swallow				Pine Siskin
4			Barn Swallow				Lesser Goldfinch
	4	2,2	Scrub Jay				Lawrence's Goldfinch
18	2	2	American Crow				American Goldfinch
11	9	4,5	Common Raven				House Sparrow
18	10	1 2,3 +	Plain Titmouse				
14	15	8,7	Bushtit				

90
170
96
84
53
96
589

5P 418

IND: 589

Additional Species

1 Quail

2 tricolored Blackbirds

BIRDS OF Santa Clara River System

Locality Old Nyr → Blue Moon Date 6-28 Time 730 - 830

- Great Blue Heron
- (1) Green Heron
- Mallard
- Cinnamon Teal
- Turkey Vulture
- White-tailed Kite
- Sharp-shinned Hawk
- Cooper's Hawk
- (2) II Red-shouldered Hawk
- Red-tailed Hawk
- Golden Eagle
- American Kestrel
- (15) 4 3 4 4 California Quail
- American Coot
- (8) 2 1 2 2 Killdeer
- (1) Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- (4) 2 II Rock Dove
- (2) Mourning Dove
- **Yellow-billed Cuckoo**
- Greater Roadrunner
- Barn Owl
- Great Horned Owl
- White-throated Swift
- Black-ch. Hummingbird
- (2) II Anna's Hummingbird
- Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- (5) 1 1 2 II Nuttall's Woodpecker
- (1) Downy Woodpecker
- Hairy Woodpecker
- Northern Flicker
- Western Wood-Pewee
- Willow Flycatcher
- Hammond's Flycatcher
- Pacific Slope Flycatcher
- (3) 2 1 Black Phoebe
- Say's Phoebe
- (7) 2 III Ash-throated Flycatcher
- **Brown-crested Flycatcher**
- Cassin's Kingbird
- Western Kingbird
- Horned Lark
- Tree Swallow
- Violet-green Swallow
- (24) (20) 4 N. Rough-winged Swallow
- Bank Swallow
- (9) 6 3 Cliff Swallow
- (47) 12 1 Barn Swallow
- (4) 1 1 2 Scrub Jay
- (16) 8 2 4 2 American Crow
- (2) 2 Common Raven
- (8) 2 2 2 Plain Titmouse
- (2) Bushtit

- Rock Wren
- (6) III Bewick's Wren
- House Wren
- Ruby-crowned Kinglet
- Blue-gray Gnatcatcher
- Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- American Robin
- Wrentit
- Northern Mockingbird
- California Thrasher
- American Pipit
- Cedar Waxwing
- Phainopepla
- Loggerhead Shrike
- (19) 8 7 2 2 European Starling
- **Bell's Vireo**
- Solitary Vireo
- Warbling Vireo
- Orange-crowned Warbler
- (1) Yellow Warbler
- Yellow-rumped Warbler
- Black-th. Gray Warbler
- Townsend's Warbler
- MacGillivray's Warbler
- (8) 1 1 III Common Yellowthroat
- Wilson's Warbler
- Yellow-breasted Chat
- **Summer Tananger**
- Western Tanager
- (4) 1 2 1 Black-headed Grosbeak
- Blue Grosbeak
- Lazuli Bunting
- (4) III Rufous-sided Townee
- California Towhee
- (8) 2 6 Lark Sparrow
- Savannah Sparrow
- Fox Sparrow
- 5 6 2 6 4 4 6 2 2 5 Song Sparrow
- (46)
- Lincoln's Sparrow
- White-crowned Sparrow
- Red-winged Blackbird
- Western Meadowlark
- Brewer's Blackbird
- (11) 4 3 2 2 Brown-headed Cowbird
- Hooded Oriole
- Northern Oriole
- (2) II House Finch
- Pine Siskin
- Lesser Goldfinch
- Lawrence's Goldfinch
- American Goldfinch
- House Sparrow

Additional Species

0 - Rocky Trail

BIRDS OF Santa Clara River System

Upper River - Area 2 (Right Side)

Locality mo E → Old Rd on River Date 4-12 Time 645-745

- ____ Great Blue Heron
- ____ Green Heron
- (4) 2 2 Mallard
- ____ Cinnamon Teal
- ____ Turkey Vulture
- (1) White-tailed Kite
- ____ Sharp-shinned Hawk
- ____ Cooper's Hawk
- (1) Red-shouldered Hawk
- ____ Red-tailed Hawk
- ____ Golden Eagle
- ____ American Kestrel
- (6) 2-4 California Quail
- ____ American Coot
- (3) Killdeer
- ____ Spotted Sandpiper
- ____ Least Sandpiper
- ____ Common Snipe
- ____ Rock Dove
- (3) III Mourning Dove
- ____ **Yellow-billed Cuckoo**
- ____ Greater Roadrunner
- ____ Barn Owl
- ____ Great Horned Owl
- ____ White-throated Swift
- (2) II Black-ch. Hummingbird
- (4) IIII Anna's Hummingbird
- ____ Costa's Hummingbird
- ____ Belted Kingfisher
- ____ Acorn Woodpecker
- (2) II Nuttall's Woodpecker
- ____ Downy Woodpecker
- ____ Hairy Woodpecker
- ____ Northern Flicker
- ____ Western Wood-Pewee
- ____ Willow Flycatcher
- ____ Hammond's Flycatcher
- ____ Pacific Slope Flycatcher
- ____ Black Phoebe
- ____ Say's Phoebe
- ____ Ash-throated Flycatcher
- ____ **Brown-crested Flycatcher**
- ____ Cassin's Kingbird
- ____ Western Kingbird
- ____ Horned Lark
- ____ Tree Swallow
- ____ Violet-green Swallow
- (10) N. Rough-winged Swallow
- ____ Bank Swallow
- ____ Cliff Swallow
- ____ Barn Swallow
- (9) IIII Scrub Jay
- ____ American Crow
- (3) II Common Raven
- (2) II Plain Titmouse
- (5) 3 2 Bushtit
- (21) IIII IIII Rock Wren
- IIII IIII I Bewick's Wren
- (3) II House Wren
- ____ Ruby-crowned Kinglet
- ____ Blue-gray Gnatcatcher
- ____ Western Bluebird
- ____ Swainson's Thrush
- ____ Hermit Thrush
- ____ American Robin
- ____ Wrentit
- ____ Northern Mockingbird
- ____ California Thrasher
- ____ American Pipit
- ____ Cedar Waxwing
- ____ Phainopepla
- ____ Loggerhead Shrike
- (2) European Starling
- ____ **Bell's Vireo**
- ____ Solitary Vireo
- ____ Warbling Vireo
- (10) 2 4 2 2 Orange-crowned Warbler
- II Yellow Warbler
- (54) 4 8 8 4 3 6 4 6 III Yellow-rumped Warbler
- (2) Black-th. Gray Warbler
- ____ Townsend's Warbler
- ____ MacGillivray's Warbler
- (5) IIII Common Yellowthroat
- (1) I Wilson's Warbler
- (1) Yellow-breasted Chat
- ____ **Summer Tananger**
- ____ Western Tanager
- (7) III Black-headed Grosbeak
- ____ Blue Grosbeak
- ____ Lazuli Bunting
- (4) IIII Rufous-sided Towhee
- ____ California Towhee
- ____ Lark Sparrow
- ____ Savannah Sparrow
- (24) ____ Fox Sparrow
- IN IIII IIII IIII IIII Song Sparrow
- ____ Lincoln's Sparrow
- ____ White-crowned Sparrow
- (5) IIII Red-winged Blackbird
- ____ Western Meadowlark
- ____ Brewer's Blackbird
- (9) IIII Brown-headed Cowbird
- ____ Hooded Oriole
- ____ Northern Oriole
- ____ House Finch
- ____ Pine Siskin
- (1) Lesser Goldfinch
- ____ Lawrence's Goldfinch
- (18) 6 (12) American Goldfinch
- ____ House Sparrow

Additional Species

____

BIRDS OF Santa Clara River System

Locality McBean → Oak Rd Date 5-3 Time 6:30—7:30

- Great Blue Heron
- Green Heron
- 1 Mallard
- Cinnamon Teal
- Turkey Vulture
- White-tailed Kite
- Sharp-shinned Hawk
- Cooper's Hawk
- Red-shouldered Hawk
- 1 Red-tailed Hawk
- Golden Eagle
- American Kestrel
- 2 California Quail
- American Coot
- 2 Killdeer
- Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- 4 Rock Dove
- 122 Mourning Dove
- **Yellow-billed Cuckoo**
- Greater Roadrunner
- Barn Owl
- Great Horned Owl
- White-throated Swift
- Black-ch. Hummingbird
- 1 Anna's Hummingbird
- Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- 2 | 211 Nuttall's Woodpecker
- | 2 Downy Woodpecker
- Hairy Woodpecker
- 1 Northern Flicker
- Western Wood-Pewee
- Willow Flycatcher
- Hammond's Flycatcher
- Pacific Slope Flycatcher
- Black Phoebe
- Say's Phoebe
- 111 Ash-throated Flycatcher
- **Brown-crested Flycatcher**
- Cassin's Kingbird
- Western Kingbird
- Horned Lark
- Tree Swallow
- Violet-green Swallow
- 83 N. Rough-winged Swallow
- Bank Swallow
- Cliff Swallow
- Barn Swallow
- 11 Scrub Jay
- 11 American Crow
- 1 Common Raven
- 2211 Plain Titmouse
- Bushtit
- Rock Wren
- 0 HH 1111 Bewick's Wren
- 1111 House Wren
- Ruby-crowned Kinglet
- Blue-gray Gnatcatcher
- 111 Western Bluebird
- 2 Swainson's Thrush
- 1 Hermit Thrush
- 11 American Robin
- 1 Wrentit
- Northern Mockingbird
- 1 California Thrasher
- American Pipit
- Cedar Waxwing
- Phainopepla
- Loggerhead Shrike
- 22 European Starling
- **Bell's Vireo**
- Solitary Vireo
- 112 Warbling Vireo
- Orange-crowned Warbler
- 8 1111 1111 Yellow Warbler
- 1 Yellow-rumped Warbler
- Black-th. Gray Warbler
- Townsend's Warbler
- MacGillivray's Warbler
- Common Yellowthroat
- 2 1111 Wilson's Warbler
- 1 Yellow-breasted Chat
- **Summer Tananger**
- 1111 Western Tanager
- 121 1112 Black-headed Grosbeak
- Blue Grosbeak
- Lazuli Bunting
- 1111 Rufous-sided Towhee
- 2 California Towhee
- Lark Sparrow
- Savannah Sparrow
- Fox Sparrow
- 111 1111 1111 1111 Song Sparrow
- Lincoln's Sparrow
- White-crowned Sparrow
- 22 Red-winged Blackbird
- Western Meadowlark
- Brewer's Blackbird
- 223 222 Brown-headed Cowbird
- Hooded Oriole
- 1 Northern Oriole
- 2 House Finch
- Pine Siskin
- 34 Lesser Goldfinch
- Lawrence's Goldfinch
- American Goldfinch
- House Sparrow

Additional Species

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BIRDS OF Santa Clara River System

Locality McB → old Rd. Date 5-13 Time 6:45 –

- Great Blue Heron
- Green Heron
- Mallard
- Cinnamon Teal
- Turkey Vulture
- White-tailed Kite
- Sharp-shinned Hawk
- Cooper's Hawk
- 1 Red-shouldered Hawk
- Red-tailed Hawk
- Golden Eagle
- American Kestrel
- 31 California Quail
- American Coot
- 22 Killdeer
- 1 Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- 3 Rock Dove
- 2 Mourning Dove
- **Yellow-billed Cuckoo**
- 1 Greater Roadrunner
- Barn Owl
- Great Horned Owl
- White-throated Swift
- Black-ch. Hummingbird
- 1 Anna's Hummingbird
- Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- 111 Nuttall's Woodpecker
- Downy Woodpecker
- Hairy Woodpecker
- Northern Flicker
- Western Wood-Pewee
- Willow Flycatcher
- Hammond's Flycatcher
- 1 Pacific Slope Flycatcher
- Black Phoebe
- Say's Phoebe
- 1 Ash-throated Flycatcher
- **Brown-crested Flycatcher**
- Cassin's Kingbird
- Western Kingbird
- Horned Lark
- Tree Swallow
- Violet-green Swallow
- 10 6 3 N. Rough-winged Swallow
- Bank Swallow
- Cliff Swallow
- Barn Swallow
- 11 Scrub Jay
- 2 American Crow
- 1 Common Raven
- 1122 Plain Titmouse
- 2 Bushtit
- 1111 Rock Wren
- 1111 1111 Bewick's Wren
- 11 House Wren
- Ruby-crowned Kinglet
- Blue-gray Gnatcatcher
- Western Bluebird
- 11 Swainson's Thrush
- Hermit Thrush
- American Robin
- Wrentit
- 1 Northern Mockingbird
- California Thrasher
- American Pipit
- Cedar Waxwing
- 1 Phainopepla
- Loggerhead Shrike
- 1 European Starling
- **Bell's Vireo**
- Solitary Vireo
- Warbling Vireo
- Orange-crowned Warbler
- 11 2 Yellow Warbler
- Yellow-rumped Warbler
- Black-th. Gray Warbler
- Townsend's Warbler
- MacGillivray's Warbler
- 111 Common Yellowthroat
- 2 3 33 Wilson's Warbler
- Yellow-breasted Chat
- **Summer Tananger**
- Western Tanager
- 11 1111 Black-headed Grosbeak
- 2 Blue Grosbeak
- Lazuli Bunting
- 1111 Rufous-sided Towhee
- 1 California Towhee
- Lark Sparrow
- Savannah Sparrow
- Fox Sparrow
- 1 1111 1111 1111 22 Song Sparrow
- Lincoln's Sparrow
- White-crowned Sparrow
- (10) (10) Red-winged Blackbird
- Western Meadowlark
- Brewer's Blackbird
- 1 22 Brown-headed Cowbird
- Hooded Oriole
- Northern Oriole
- House Finch
- Pine Siskin
- 2 Lesser Goldfinch
- Lawrence's Goldfinch
- American Goldfinch
- House Sparrow

Additional Species

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Bridge work

BIRDS OF Santa Clara River System

Locality NCB → old Rd Date 5-31 Time 630 — 730 — 830

S SIDE

- Great Blue Heron
- Green Heron
- Mallard
- Cinnamon Teal
- Turkey Vulture
- White-tailed Kite
- Sharp-shinned Hawk
- (1) Cooper's Hawk
- (1) Red-shouldered Hawk
- Red-tailed Hawk
- Golden Eagle
- American Kestrel
- (2) California Quail 2 22
- American Coot
- (4) 22 Killdeer 12 |
- Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- Rock Dove 2
- (2) 2 Mourning Dove | 3
- **Yellow-billed Cuckoo**
- Greater Roadrunner
- Barn Owl
- Great Horned Owl
- White-throated Swift |
- Black-ch. Hummingbird
- (2) Anna's Hummingbird ||
- Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- (3) Nuttall's Woodpecker (2 11) 1
- (3) Downy Woodpecker 1
- (1) Hairy Woodpecker (4)
- (1) Northern Flicker
- Western Wood-Pewee
- Willow Flycatcher
- Hammond's Flycatcher
- Pacific Slope Flycatcher
- (3) Black Phoebe
- Say's Phoebe
- (4) Ash-throated Flycatcher
- **Brown-crested Flycatcher**
- Cassin's Kingbird
- Western Kingbird
- Horned Lark 2
- Tree Swallow
- Violet-green Swallow
- (6) 3 2 N. Rough-winged Swallow 3 6
- Bank Swallow
- Cliff Swallow
- Barn Swallow
- (2) Scrub Jay 1 222
- (2) American Crow 2 222
- (2) Common Raven 1 2
- (6) 22 Plain Titmouse 2 2 young Nuttalls
- (4) 4 Bushtit

- Rock Wren
- (11) J Bewick's Wren 11
- (2) House Wren 1
- Ruby-crowned Kinglet
- Blue-gray Gnatcatcher
- (2) Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- American Robin
- (1) Wrentit
- Northern Mockingbird
- (3) California Thrasher
- American Pipit
- Cedar Waxwing
- Phainopepla
- Loggerhead Shrike
- (3) 21 European Starling
- **Bell's Vireo**
- Solitary Vireo
- Warbling Vireo
- Orange-crowned Warbler
- (2) Yellow Warbler
- Yellow-rumped Warbler
- Black-th. Gray Warbler
- Townsend's Warbler
- MacGillivray's Warbler
- (3) Common Yellowthroat 1
- Wilson's Warbler
- Yellow-breasted Chat
- **Summer Tananger**
- Western Tanager
- (5) 12 Black-headed Grosbeak 1
- Blue Grosbeak
- Lazuli Bunting
- (5) Rufous-sided Towhee
- (4) 2 California Towhee
- Lark Sparrow
- Savannah Sparrow
- Fox Sparrow
- (17) Song Sparrow
- Lincoln's Sparrow
- White-crowned Sparrow
- (3) 12 Red-winged Blackbird 5 (10) (20)
- Western Meadowlark
- Brewer's Blackbird
- (6) Brown-headed Cowbird 4 2 4
- Hooded Oriole
- Northern Oriole
- (4) 4 House Finch
- Pine Siskin
- Lesser Goldfinch
- (12) Lawrence's Goldfinch
- American Goldfinch
- House Sparrow

(250 P)

Additional Species TRIC - 50

BIRDS OF Santa Clara River System

Locality McBean Pkwy. Date 6-15 Time 0845

R(W) 5/6 Cloudy

- Great Blue Heron
- Green Heron
- Mallard
- Cinnamon Teal
- Turkey Vulture
- White-tailed Kite
- Sharp-shinned Hawk
- Cooper's Hawk
- | Red-shouldered Hawk
- | Red-tailed Hawk
- Golden Eagle
- American Kestrel
- California Quail
- American Coot
- 2 Killdeer
- Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- Rock Dove
- Mourning Dove
- **Yellow-billed Cuckoo**
- Greater Roadrunner
- Barn Owl
- Great Horned Owl
- White-throated Swift
- Black-ch. Hummingbird
- Anna's Hummingbird
- Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- 1 || Nuttall's Woodpecker
- || Downy Woodpecker
- 3 Hairy Woodpecker
- Northern Flicker
- Western Wood-Pewee
- Willow Flycatcher
- Hammond's Flycatcher
- Pacific Slope Flycatcher
- | Black Phoebe
- Say's Phoebe
- | Ash-throated Flycatcher
- **Brown-crested Flycatcher**
- Cassin's Kingbird
- Western Kingbird
- Horned Lark
- Tree Swallow
- Violet-green Swallow
- 6 (12) N. Rough-winged Swallow
- Bank Swallow
- 7 Cliff Swallow
- Barn Swallow
- || Scrub Jay
- 4 2 2 American Crow
- 2 Common Raven
- 2 2 Plain Titmouse
- 3 Bushtit
- Rock Wren
- ||| HHT HHT Bewick's Wren
- | House Wren
- Ruby-crowned Kinglet
- Blue-gray Gnatcatcher
- | Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- American Robin
- | Wrentit
- Northern Mockingbird
- | California Thrasher
- American Pipit
- Cedar Waxwing
- Phainopepla
- Loggerhead Shrike
- European Starling
- **Bell's Vireo**
- Solitary Vireo
- Warbling Vireo
- Orange-crowned Warbler
- || Yellow Warbler
- Yellow-rumped Warbler
- Black-th. Gray Warbler
- Townsend's Warbler
- MacGillivray's Warbler
- || Common Yellowthroat
- Wilson's Warbler
- | Yellow-breasted Chat
- **Summer Tanager**
- Western Tanager
- |||| Black-headed Grosbeak
- Blue Grosbeak
- Lazuli Bunting
- ||| Rufous-sided Towhee
- 2 California Towhee
- Lark Sparrow
- Savannah Sparrow
- Fox Sparrow
- ||| HHT HHT HHT Song Sparrow
- Lincoln's Sparrow
- White-crowned Sparrow
- 6 4 Red-winged Blackbird
- Western Meadowlark
- Brewer's Blackbird
- 2 | Brown-headed Cowbird
- Hooded Oriole
- Northern Oriole
- 4 4 4 House Finch
- Pine Siskin
- 3 2 Lesser Goldfinch
- Lawrence's Goldfinch
- American Goldfinch
- House Sparrow

Additional Species

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BIRDS OF Santa Clara River System

Locality Mc B-> Bd Hn Date 9-28 Time 630—730

S mill

BCNH (1) 1 ||||

- Great Blue Heron
- Green Heron
- Mallard
- Cinnamon Teal
- Turkey Vulture
- White-tailed Kite
- Sharp-shinned Hawk
- Cooper's Hawk
- (2) 11 Red-shouldered Hawk
- Red-tailed Hawk
- Golden Eagle
- American Kestrel
- (2) California Quail
- American Coot
- (4) 22 Killdeer
- Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- Rock Dove
- (3) 12 Mourning Dove
- **Yellow-billed Cuckoo**
- Greater Roadrunner
- Barn Owl
- Great Horned Owl
- White-throated Swift
- Black-ch. Hummingbird
- (2) 11 Anna's Hummingbird
- Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- (8) 2 2 2 1 Nuttall's Woodpecker
- (5) 3 1 1 Downy Woodpecker
- Hairy Woodpecker
- Northern Flicker
- Western Wood-Pewee
- Willow Flycatcher
- Hammond's Flycatcher
- Pacific Slope Flycatcher
- (5) 2 11 Black Phoebe
- Say's Phoebe
- (5) |||| Ash-throated Flycatcher
- **Brown-crested Flycatcher**
- Cassin's Kingbird
- (6) 3 2 1 Western Kingbird
- Horned Lark
- Tree Swallow
- Violet-green Swallow
- (13) 5 4 4 N. Rough-winged Swallow
- Bank Swallow
- Cliff Swallow
- Barn Swallow
- (7) 2 2 2 1 Scrub Jay
- (5) 2 3 American Crow
- (2) 11 Common Raven
- (13) 2 3 2 2 2 2 Plain Titmouse
- (8) Bushtit

135 (90)

- (11) Rock Wren
- |||| Bewick's Wren
- House Wren
- Ruby-crowned Kinglet
- Blue-gray Gnatcatcher
- (10) 2 1 3 2 2 Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- American Robin
- (1) Wrentit
- Northern Mockingbird
- California Thrasher
- American Pipit
- Cedar Waxwing
- (1) Phainopepla
- Loggerhead Shrike
- (2) European Starling
- (1) **Bell's Vireo**
- Solitary Vireo
- Warbling Vireo
- Orange-crowned Warbler
- (2) 11 Yellow Warbler
- Yellow-rumped Warbler
- Black-th. Gray Warbler
- Townsend's Warbler
- MacGillivray's Warbler
- (5) |||| Common Yellowthroat
- Wilson's Warbler
- Yellow-breasted Chat
- **Summer Tananger**
- Western Tanager
- (8) 1 2 1 2 1 Black-headed Grosbeak
- (1) Blue Grosbeak
- (1) Lazuli Bunting
- (4) |||| Rufous-sided Towhee
- California Towhee
- Lark Sparrow
- Savannah Sparrow
- Fox Sparrow
- (42) 24 (10) 6 4 6 2 2 |||| Song Sparrow
- Lincoln's Sparrow
- White-crowned Sparrow
- Red-winged Blackbird
- Western Meadowlark
- Brewer's Blackbird
- (19) 2 4 2 1 4 2 2 2 Brown-headed Cowbird
- Hooded Oriole
- 2 Northern Oriole
- (18) 3 3 3 4 5 House Finch
- Pine Siskin
- (7) 3 4 Lesser Goldfinch
- Lawrence's Goldfinch
- American Goldfinch
- House Sparrow

Additional Species

E B 1st rep on 5' mls. moving w/ flock

33

225

125

BIRDS OF Santa Clara River System

5 10 AM 1:28 PM Upper R Area 3

Locality Bogert south to McBean Date 4-12 Time

	Great Blue Heron	
	Green Heron	
	Mallard	
	Cinnamon Teal	
	Turkey Vulture	
	White-tailed Kite	
	Sharp-shinned Hawk	
	Cooper's Hawk	
	Red-shouldered Hawk	
(1)	Red-tailed Hawk	
	Golden Eagle	
	American Kestrel	
(14)	2,2,2,2,2,2 California Quail	
	American Coot	
(2)	Killdeer	
	Spotted Sandpiper	
	Least Sandpiper	
	Common Snipe	
(18)	2,12,4 Rock Dove	
(4)	2,2 Mourning Dove	
	Yellow-billed Cuckoo	
	Greater Roadrunner	
	Barn Owl	
	Great Horned Owl	
	White-throated Swift	
(3)	III Black-ch. Hummingbird	
(1)	I Anna's Hummingbird	
	Costa's Hummingbird	
	Belted Kingfisher	
	Acorn Woodpecker	
(3)	III Nuttall's Woodpecker	
(3)	1,1 Downy Woodpecker	
	Hairy Woodpecker	
	Northern Flicker	
	Western Wood-Pewee	
	Willow Flycatcher	
	Hammond's Flycatcher	
	Pacific Slope Flycatcher	
(2)	II Black Phoebe	
	Say's Phoebe	
(7)	IIIIII Ash-throated Flycatcher	
	Brown-crested Flycatcher	
	Cassin's Kingbird	
	Western Kingbird	
	Horned Lark	
	Tree Swallow	
	Violet-green Swallow	
(11)	1,6,4 N. Rough-winged Swallow	
	Bank Swallow	
(6)	6 Cliff Swallow	
	Barn Swallow	
(7)	2 IIII Scrub Jay	
(7)	1,4,2 American Crow	
(12)	3,4,3,1 Common Raven	
(4)	2,1 Plain Titmouse	
(16)	2,1,2,1,2,2,4 Bushtit	

	Rock Wren	
(6)	II Bewick's Wren	
(1)	I House Wren	
	Ruby-crowned Kinglet	
	Blue-gray Gnatcatcher	
(2)	2 Western Bluebird	
	Swainson's Thrush	
	Hermit Thrush	
	American Robin	
	Wrentit	
	Northern Mockingbird	
(2)	II California Thrasher	
	American Pipit	
	Cedar Waxwing	
(1)	I Phainopepla	
	Loggerhead Shrike	
(1)	I European Starling	
	Bell's Vireo	
	Solitary Vireo	
	Warbling Vireo	
(1)	Orange-crowned Warbler	
	I Yellow Warbler	
(23)	1,2,3,5,5,2 Yellow-rumped Warbler	
(1)	I Black-th. Gray Warbler	
	Townsend's Warbler	
	MacGillivray's Warbler	
(6)	I IIII Common Yellowthroat	
(4)	2,2 Wilson's Warbler	
	Yellow-breasted Chat	
	Summer Tananger	
	Western Tanager	
(3)	III Black-headed Grosbeak	
	Blue Grosbeak	
(4)	Lazuli Bunting	
(5)	1,1,2 Rufous-sided Towhee	
	IIII California Towhee	
	Lark Sparrow	
	Savannah Sparrow	
	Fox Sparrow	
(15)	2 IIII II Song Sparrow	
	Lincoln's Sparrow	
(15)	1,8,4,3 White-crowned Sparrow	
(5)	2,2 Red-winged Blackbird	
	Western Meadowlark	
	Brewer's Blackbird	
(14)	6,2,4,2 Brown-headed Cowbird	
	Hooded Oriole	
(6)	1,4 Northern Oriole	
(6)	2,1,3 House Finch	
	Pine Siskin	
(3)	1,2 Lesser Goldfinch	
	Lawrence's Goldfinch	
	American Goldfinch	
	House Sparrow	

Additional Species

(1) 1 Rufous/allens Hum ♀

BIRDS OF Santa Clara River System

Locality Bouquet to McBean Date 6/4/94 Time

- Great Blue Heron
- Green Heron
- Mallard
- Cinnamon Teal
- Turkey Vulture
- White-tailed Kite
- Sharp-shinned Hawk
- Cooper's Hawk
- Red-shouldered Hawk
- Red-tailed Hawk
- Golden Eagle
- American Kestrel
- 2122 California Quail
- American Coot
- 2 22 Killdeer
- Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- Rock Dove
- 222 Mourning Dove
- **Yellow-billed Cuckoo**
- Greater Roadrunner
- Barn Owl
- Great Horned Owl
- White-throated Swift
- Black-ch. Hummingbird
- Anna's Hummingbird
- Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- Nuttall's Woodpecker
- Downy Woodpecker
- Hairy Woodpecker
- 2 Northern Flicker
- Western Wood-Pewee
- Willow Flycatcher
- Hammond's Flycatcher
- Pacific Slope Flycatcher
- 2 Black Phoebe
- Say's Phoebe
- 2 Ash-throated Flycatcher
- **Brown-crested Flycatcher**
- Cassin's Kingbird
- 3 Western Kingbird
- Horned Lark
- Tree Swallow
- Violet-green Swallow
- 4 N. Rough-winged Swallow
- Bank Swallow
- Cliff Swallow
- Barn Swallow
- 22222 Scrub Jay
- 4 American Crow
- 242 Common Raven
- 22 Plain Titmouse
- 22214 Bushtit
- Rock Wren
- Bewick's Wren
- House Wren
- Ruby-crowned Kinglet
- Blue-gray Gnatcatcher
- Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- American Robin
- Wrentit
- Northern Mockingbird
- 2 California Thrasher
- American Pipit
- Cedar Waxwing
- Phainopepla
- Loggerhead Shrike
- 18 European Starling
- **Bell's Vireo**
- Solitary Vireo
- Warbling Vireo
- Orange-crowned Warbler
- Yellow Warbler
- Yellow-rumped Warbler
- Black-th. Gray Warbler
- Townsend's Warbler
- MacGillivray's Warbler
- Common Yellowthroat
- Wilson's Warbler
- Yellow-breasted Chat
- **Summer Tananger**
- Western Tanager
- Black-headed Grosbeak
- Blue Grosbeak
- Lazuli Bunting
- Rufous-sided Townee
- 2 California Towhee
- Lark Sparrow
- Savannah Sparrow
- Fox Sparrow
- 2 4 4 25 Song Sparrow
- Lincoln's Sparrow
- White-crowned Sparrow
- 2 Red-winged Blackbird
- Western Meadowlark
- Brewer's Blackbird
- Brown-headed Cowbird
- Hooded Oriole
- Northern Oriole
- 22 48 House Finch
- Pine Siskin
- 24 Lesser Goldfinch
- Lawrence's Goldfinch
- American Goldfinch
- House Sparrow

Additional Species

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BIRDS OF Santa Clara River System

Upper R Area 4

Locality SC River Pardee + Bouquet Cyn Date 4-24 Time 645 - 830 AM

	Great Blue Heron		Rock Wren
	Green Heron	21	Bewick's Wren
2	Mallard		House Wren
	Cinnamon Teal		Ruby-crowned Kinglet
	Turkey Vulture		Blue-gray Gnatcatcher
	White-tailed Kite		Western Bluebird
	Sharp-shinned Hawk		Swainson's Thrush
	Cooper's Hawk		Hermit Thrush
	Red-shouldered Hawk		American Robin
1	Red-tailed Hawk	2	Wrentit
	Golden Eagle	5	Northern Mockingbird
	American Kestrel	5	California Thrasher
37	California Quail		American Pipit
	American Coot		Cedar Waxwing
18	Killdeer		Phainopepla
	Spotted Sandpiper		Loggerhead Shrike
	Least Sandpiper	4	European Starling
	Common Snipe		**Bell's Vireo**
	Rock Dove		Solitary Vireo
15	Mourning Dove		Warbling Vireo
	Yellow-billed Cuckoo		Orange-crowned Warbler
	Greater Roadrunner		Yellow Warbler
	Barn Owl	1	Yellow-rumped Warbler
	Great Horned Owl		Black-th. Gray Warbler
	White-throated Swift		Townsend's Warbler
	Black-ch. Hummingbird		MacGillivray's Warbler
5	Anna's Hummingbird		Common Yellowthroat
	Costa's Hummingbird	2	Wilson's Warbler
	Belted Kingfisher		Yellow-breasted Chat
	Acorn Woodpecker		**Summer Tananger**
1	Nuttall's Woodpecker		Western Tanager
	Downy Woodpecker		Black-headed Grosbeak
	Hairy Woodpecker		Blue Grosbeak
2	Northern Flicker		Lazuli Bunting
	Western Wood-Pewee	6	Rufous-sided Towhee
	Willow Flycatcher	12	California Towhee
	Hammond's Flycatcher		Lark Sparrow
	Pacific Slope Flycatcher		Savannah Sparrow
1	Black Phoebe		Fox Sparrow
	Say's Phoebe	7	Song Sparrow
1	Ash-throated Flycatcher		Lincoln's Sparrow
	Brown-crested Flycatcher		White-crowned Sparrow
	Cassin's Kingbird	41	Red-winged Blackbird
	Western Kingbird		Western Meadowlark
	Horned Lark	6	Brewer's Blackbird
	Tree Swallow	5	Brown-headed Cowbird
	Violet-green Swallow		Hooded Oriole
1	N. Rough-winged Swallow	7	Northern Oriole
	Bank Swallow	16	House Finch
	Cliff Swallow		Pine Siskin
	Barn Swallow	5	Lesser Goldfinch
17	Scrub Jay		Lawrence's Goldfinch
	American Crow		American Goldfinch
22	Common Raven		House Sparrow
	Plain Titmouse		
10	Bushtit	Additional Species	

Upper R Area 4

BIRDS OF Santa Clara River System

Locality TR Nolan + Bogart Date 6-4 Time 645-815

Count	Species
	Great Blue Heron
	Green Heron
(8) 1	Mallard
	Cinnamon Teal
	Turkey Vulture
	White-tailed Kite
	Sharp-shinned Hawk
	Cooper's Hawk
	Red-shouldered Hawk
11 2	Red-tailed Hawk
	Golden Eagle
2 3	American Kestrel
4 2 222	California Quail
	American Coot
6 2 2 2 2	Killdeer
	Spotted Sandpiper
	Least Sandpiper
	Common Snipe
	Rock Dove
2 6 6 3 2 1 2 2	Mourning Dove
	Yellow-billed Cuckoo
1	Greater Roadrunner
	Barn Owl
	Great Horned Owl
	White-throated Swift
	Black-ch. Hummingbird
11	Anna's Hummingbird
	Costa's Hummingbird
	Belted Kingfisher
	Acorn Woodpecker
111	Nuttall's Woodpecker
	Downy Woodpecker
	Hairy Woodpecker
111	Northern Flicker
	Western Wood-Pewee
	Willow Flycatcher
	Hammond's Flycatcher
	Pacific Slope Flycatcher
1	Black Phoebe
	Say's Phoebe
111	Ash-throated Flycatcher
	Brown-crested Flycatcher
	Cassin's Kingbird
11	Western Kingbird
	Horned Lark
	Tree Swallow
	Violet-green Swallow
	N. Rough-winged Swallow
	Bank Swallow
12	Cliff Swallow
	Barn Swallow
111 1 21	Scrub Jay
	American Crow
2 2 2 1 2	Common Raven
	Plain Titmouse
4 3	Bushtit
	Rock Wren
1111 ~~11~~	Bewick's Wren
	House Wren
	Ruby-crowned Kinglet
	Blue-gray Gnatcatcher
1	Western Bluebird
	Swainson's Thrush
	Hermit Thrush
	American Robin
	Wrentit
1111	Northern Mockingbird
1 3 1	California Thrasher
	American Pipit
	Cedar Waxwing
2 ~~1111~~	Phainopepla
	Loggerhead Shrike
1 11 (15)	European Starling
	Bell's Vireo
	Solitary Vireo
	Warbling Vireo
	Orange-crowned Warbler
	Yellow Warbler
	Yellow-rumped Warbler
	Black-th. Gray Warbler
	Townsend's Warbler
	MacGillivray's Warbler
	Common Yellowthroat
	Wilson's Warbler
	Yellow-breasted Chat
	Summer Tanager
	Western Tanager
2	Black-headed Grosbeak
	Blue Grosbeak
	Lazuli Bunting
111	Rufous-sided Towhee
2 12	California Towhee
	Lark Sparrow
	Savannah Sparrow
	Fox Sparrow
111 ~~1111~~ 1	Song Sparrow
	Lincoln's Sparrow
	White-crowned Sparrow
(15) (23)	Red-winged Blackbird
	Western Meadowlark
6	Brewer's Blackbird
2 1	Brown-headed Cowbird
	Hooded Oriole
1	Northern Oriole
3 1 5 3 5 4	House Finch
	Pine Siskin
4 2 2 1	Lesser Goldfinch
	Lawrence's Goldfinch
	American Goldfinch
	House Sparrow

Additional Species

Small H2O
Flowing

Small flow. Trickle.
1 ft wide
2" deep

Tracks ... along
... ... on BANKS ... willows

Trans... along - No H2O ...
... ... Water

Upper Area 5

BIRDS OF Santa Clara River System

Locality Castaic (lower) Date 4-2-9 Time

	Great Blue Heron
	Green Heron
2	Mallard
	Cinnamon Teal
	Turkey Vulture
	White-tailed Kite
	Sharp-shinned Hawk
	Cooper's Hawk
	Red-shouldered Hawk
1	Red-tailed Hawk
	Golden Eagle
	American Kestrel
21	California Quail
	American Coot
	Killdeer
	Spotted Sandpiper
	Least Sandpiper
	Common Snipe
2	Rock Dove
2	Mourning Dove
	Yellow-billed Cuckoo
	Greater Roadrunner
	Barn Owl
	Great Horned Owl
	White-throated Swift
	Black-ch. Hummingbird
2	Anna's Hummingbird
	Costa's Hummingbird
	Belted Kingfisher
	Acorn Woodpecker
1	Nuttall's Woodpecker
	Downy Woodpecker
	Hairy Woodpecker
	Northern Flicker
	Western Wood-Pewee
	Willow Flycatcher
	Hammond's Flycatcher
	Pacific Slope Flycatcher
	Black Phoebe
	Say's Phoebe
4	Ash-throated Flycatcher
	Brown-crested Flycatcher
	Cassin's Kingbird
4	Western Kingbird
	Horned Lark
	Tree Swallow
	Violet-green Swallow
50	N. Rough-winged Swallow
	Bank Swallow
	Cliff Swallow
	Barn Swallow
2	Scrub Jay
14	American Crow
3	Common Raven
	Plain Titmouse
2	Bushtit

	Rock Wren
7	Bewick's Wren
2	House Wren
	Ruby-crowned Kinglet
	Blue-gray Gnatcatcher
	Western Bluebird
	Swainson's Thrush
	Hermit Thrush
	American Robin
	Wrentit
	Northern Mockingbird
3	California Thrasher
	American Pipit
	Cedar Waxwing
	Phainopepla
	Loggerhead Shrike
5	European Starling
	Bell's Vireo
	Solitary Vireo
	Warbling Vireo
	Orange-crowned Warbler
	Yellow Warbler
2	Yellow-rumped Warbler
	Black-th. Gray Warbler
	Townsend's Warbler
	MacGillivray's Warbler
	Common Yellowthroat
2	Wilson's Warbler
	Yellow-breasted Chat
	Summer Tananger
	Western Tanager
3	Black-headed Grosbeak
	Blue Grosbeak
	Lazuli Bunting
1	Rufous-sided Towhee
6	California Towhee
	Lark Sparrow
	Savannah Sparrow
	Fox Sparrow
	Song Sparrow
	Lincoln's Sparrow
	White-crowned Sparrow
2	Red-winged Blackbird
	Western Meadowlark
	Brewer's Blackbird
2	Brown-headed Cowbird
	Hooded Oriole
4	Northern Oriole
12	House Finch
	Pine Siskin
8	Lesser Goldfinch
	Lawrence's Goldfinch
	American Goldfinch
	House Sparrow

Additional Species

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_____

BIRDS OF Santa Clara River System

Locality Upper Santa Clara Date 4-24 Time 630-830

- Great Blue Heron
- Green Heron
- Mallard
- Cinnamon Teal
- Turkey Vulture
- 1 White-tailed Kite
- Sharp-shinned Hawk
- Cooper's Hawk
- Red-shouldered Hawk
- 2 Red-tailed Hawk
- Golden Eagle
- American Kestrel
- 8 | 23 California Quail
- American Coot
- 4 2 Killdeer
- Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- Rock Dove
- Mourning Dove
- **Yellow-billed Cuckoo**
- Greater Roadrunner
- Barn Owl
- Great Horned Owl
- White-throated Swift
- 3 Black-ch. Hummingbird
- 5 Anna's Hummingbird
- 1 Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- Nuttall's Woodpecker
- Downy Woodpecker
- Hairy Woodpecker
- 1 Northern Flicker
- Western Wood-Pewee
- Willow Flycatcher
- Hammond's Flycatcher
- Pacific Slope Flycatcher
- Black Phoebe
- Say's Phoebe
- 1 Ash-throated Flycatcher
- **Brown-crested Flycatcher**
- Cassin's Kingbird
- Western Kingbird
- Horned Lark
- Tree Swallow
- 3 Violet-green Swallow
- 8 N. Rough-winged Swallow
- Bank Swallow
- 30 Cliff Swallow under Gridge old hyway
- Barn Swallow
- 27 43 Scrub Jay
- American Crow
- 4 Common Raven
- 1 Plain Titmouse
- 22 | 2 Bushtit
- Rock Wren
- 21 4 | 32 Bewick's Wren
- House Wren
- Ruby-crowned Kinglet
- Blue-gray Gnatcatcher
- Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- American Robin
- Wrentit
- Northern Mockingbird
- 2 | 2 California Thrasher
- American Pipit
- Cedar Waxwing
- Phainopepla
- Loggerhead Shrike
- 49 European Starling
- **Bell's Vireo**
- Solitary Vireo
- Warbling Vireo
- 1 Orange-crowned Warbler
- Yellow Warbler
- 1 Yellow-rumped Warbler
- Black-th. Gray Warbler
- Townsend's Warbler
- MacGillivray's Warbler
- Common Yellowthroat
- 1 Wilson's Warbler
- Yellow-breasted Chat
- **Summer Tananger**
- Western Tanager
- 1 Black-headed Grosbeak
- 1 Blue Grosbeak
- Lazuli Bunting
- 4 26 | 2 Rufous-sided Towhee
- 23 California Towhee
- Lark Sparrow
- Savannah Sparrow
- Fox Sparrow
- 4, 10, 15, 18 Song Sparrow
- Lincoln's Sparrow
- White-crowned Sparrow
- 25, 8, 13 Red-winged Blackbird
- Western Meadowlark
- Brewer's Blackbird
- 10, 25, 1 Brown-headed Cowbird
- Hooded Oriole
- Northern Oriole
- 2 House Finch
- Pine Siskin
- Lesser Goldfinch
- Lawrence's Goldfinch
- American Goldfinch
- House Sparrow

Additional Species

_____

BIRDS OF Santa Clara River System

Locality Castaic Creek – South Date 6/8/94 Time

- Great Blue Heron
- 1 Green Heron
- Mallard
- Cinnamon Teal
- Turkey Vulture
- 1 White-tailed Kite
- Sharp-shinned Hawk
- 1 Cooper's Hawk
- Red-shouldered Hawk
- 1 Red-tailed Hawk nest
- Golden Eagle
- American Kestrel
- 2) 2 3 2 || 4 California Quail
- American Coot
- Killdeer
- Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- 8 Rock Dove
- Mourning Dove
- **Yellow-billed Cuckoo**
- Greater Roadrunner
- Barn Owl
- Great Horned Owl
- White-throated Swift
- Black-ch. Hummingbird
- 1 1 2 1 Anna's Hummingbird
- Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- || Nuttall's Woodpecker
- 2 2 | Downy Woodpecker
- 1 Hairy Woodpecker
- Northern Flicker
- Western Wood-Pewee
- Willow Flycatcher
- Hammond's Flycatcher
- Pacific Slope Flycatcher
- 1 2 Black Phoebe
- Say's Phoebe
- 2 || Ash-throated Flycatcher
- **Brown-crested Flycatcher**
- Cassin's Kingbird
- 2 Western Kingbird
- Horned Lark
- Tree Swallow
- Violet-green Swallow
- 4 || N. Rough-winged Swallow
- Bank Swallow
- 30, 6 4 Cliff Swallow – 33 nests under bridge –
- 1 Barn Swallow
- 2 2 | 3 | Scrub Jay
- American Crow
- 4 Common Raven
- 2 | Plain Titmouse
- 4 6 2 Bushtit
- Rock Wren
- || ||| Bewick's Wren
- 2 House Wren
- Ruby-crowned Kinglet
- Blue-gray Gnatcatcher
- Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- American Robin
- Wrentit
- Northern Mockingbird
- ||| California Thrasher
- American Pipit
- Cedar Waxwing
- Phainopepla
- Loggerhead Shrike
- 2 4 European Starling
- **Bell's Vireo**
- Solitary Vireo
- Warbling Vireo
- Orange-crowned Warbler
- 1 Yellow Warbler
- Yellow-rumped Warbler
- Black-th. Gray Warbler
- Townsend's Warbler
- MacGillivray's Warbler
- Common Yellowthroat
- Wilson's Warbler
- Yellow-breasted Chat
- **Summer Tananger**
- Western Tanager
- 2 | Black-headed Grosbeak
- || Blue Grosbeak
- 1 Lazuli Bunting
- 2 2 2 | 2 2 Rufous-sided Towhee
- 2 | 2 2 California Towhee
- Lark Sparrow
- Savannah Sparrow
- Fox Sparrow
- 1 2 Song Sparrow
- Lincoln's Sparrow
- White-crowned Sparrow
- Red-winged Blackbird
- Western Meadowlark
- Brewer's Blackbird
- 4 ||| 3 4 Brown-headed Cowbird
- Hooded Oriole
- Northern Oriole
- 1 2 | 2 | House Finch
- Pine Siskin
- Lesser Goldfinch
- Lawrence's Goldfinch
- American Goldfinch
- House Sparrow

Additional Species

1 Black Cr. Night Heron (im)

BIRDS OF Santa Clara River System

Locality CASTAIC LAKE Date 6-8 Time 6:30 – ~~8:30~~ 9:00

- Great Blue Heron
- Green Heron
- Mallard 1 BCN Hen
- Cinnamon Teal COOT-2
- Turkey Vulture
- White-tailed Kite
- Sharp-shinned Hawk
- Cooper's Hawk
- Red-shouldered Hawk
- Red-tailed Hawk
- Golden Eagle
- American Kestrel
- 8 (12) 3 4 (14) California Quail *
- American Coot
- 22 Killdeer
- Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- 2 Rock Dove
- 2 Mourning Dove
- **Yellow-billed Cuckoo**
- Greater Roadrunner
- Barn Owl
- Great Horned Owl
- White-throated Swift
- Black-ch. Hummingbird
- 1 Anna's Hummingbird
- Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- 11 2 Nuttall's Woodpecker
- Downy Woodpecker
- Hairy Woodpecker
- Northern Flicker
- Western Wood-Pewee
- Willow Flycatcher
- Hammond's Flycatcher
- Pacific Slope Flycatcher
- 1111 Black Phoebe
- Say's Phoebe
- 111 Ash-throated Flycatcher
- **Brown-crested Flycatcher**
- Cassin's Kingbird
- Western Kingbird
- Horned Lark
- Tree Swallow
- Violet-green Swallow
- 8 N. Rough-winged Swallow
- Bank Swallow
- (20) 6,2 Cliff Swallow
- Barn Swallow
- 21 1111 Scrub Jay
- 3 (10) American Crow
- 4 3 4 2 Common Raven
- 2 3 22 Plain Titmouse *
- (10) 8 4 (12) Bushtit
- Rock Wren
- 1111 Bewick's Wren
- House Wren
- Ruby-crowned Kinglet
- Blue-gray Gnatcatcher
- Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- American Robin
- 1 Wrentit
- Northern Mockingbird
- 22 California Thrasher
- American Pipit
- Cedar Waxwing
- Phainopepla
- Loggerhead Shrike
- European Starling
- 1 **Bell's Vireo**
- Solitary Vireo
- Warbling Vireo
- Orange-crowned Warbler
- 1 Yellow Warbler
- Yellow-rumped Warbler
- Black-th. Gray Warbler
- Townsend's Warbler
- MacGillivray's Warbler
- 11 1111 Common Yellowthroat
- Wilson's Warbler
- 111 Yellow-breasted Chat
- **Summer Tananger**
- Western Tanager
- 111 Black-headed Grosbeak
- 1 3 2 1 Blue Grosbeak
- Lazuli Bunting
- 1 1111 Rufous-sided Towhee
- 2 1 2 California Towhee
- Lark Sparrow
- Savannah Sparrow
- Fox Sparrow
- 1111 1111 1111 Song Sparrow
- Lincoln's Sparrow
- White-crowned Sparrow
- 8 2 4 4 Red-winged Blackbird
- Western Meadowlark
- Brewer's Blackbird
- 2 111 Brown-headed Cowbird
- Hooded Oriole
- 2 Northern Oriole
- 2 2 House Finch
- Pine Siskin
- 22 Lesser Goldfinch
- Lawrence's Goldfinch
- American Goldfinch
- House Sparrow

Additional Species

(15) (15) TRICOLORED

BIRDS OF Santa Clara River System

Upper Area 6

Locality SAN FRANCISQUITO Date 4-28 Time 645 – 9 AM

	Great Blue Heron		Rock Wren
	Green Heron	20 M	Bewick's Wren
	Mallard	10 6	House Wren
	Cinnamon Teal		Ruby-crowned Kinglet
	Turkey Vulture		Blue-gray Gnatcatcher
2	White-tailed Kite		Western Bluebird
	Sharp-shinned Hawk		Swainson's Thrush
	Cooper's Hawk		Hermit Thrush
	Red-shouldered Hawk		American Robin
1	Red-tailed Hawk		Wrentit
	Golden Eagle	1	Northern Mockingbird
1	American Kestrel	8 M	California Thrasher
128 M	California Quail		American Pipit
	American Coot		Cedar Waxwing
7 6	Killdeer		Phainopepla
	Spotted Sandpiper		Loggerhead Shrike
	Least Sandpiper	4 2	European Starling
	Common Snipe		**Bell's Vireo**
	Rock Dove		Solitary Vireo
(17) M	Mourning Dove		Warbling Vireo
	Yellow-billed Cuckoo	1	Orange-crowned Warbler
	Greater Roadrunner	6	Yellow Warbler
	Barn Owl		Yellow-rumped Warbler
	Great Horned Owl		Black-th. Gray Warbler
	White-throated Swift		Townsend's Warbler
2	Black-ch. Hummingbird		MacGillivray's Warbler
2	Anna's Hummingbird	6	Common Yellowthroat
2	Costa's Hummingbird	6 2	Wilson's Warbler
	Belted Kingfisher		Yellow-breasted Chat
	Acorn Woodpecker		**Summer Tananger**
10 M	Nuttall's Woodpecker		Western Tanager
2	Downy Woodpecker	6	Black-headed Grosbeak
	Hairy Woodpecker		Blue Grosbeak
1	Northern Flicker		Lazuli Bunting
1	Western Wood-Pewee	8 6	Rufous-sided Towhee
	Willow Flycatcher	(11) M	California Towhee
	Hammond's Flycatcher		Lark Sparrow
1	Pacific Slope Flycatcher		Savannah Sparrow
	Black Phoebe		Fox Sparrow
	Say's Phoebe	42 6	Song Sparrow
9 M	Ash-throated Flycatcher	1	Lincoln's Sparrow
	Brown-crested Flycatcher	4	White-crowned Sparrow
	Cassin's Kingbird	100	Red-winged Blackbird
5 M	Western Kingbird	14	Western Meadowlark
	Horned Lark		Brewer's Blackbird
	Tree Swallow	12 M	Brown-headed Cowbird
	Violet-green Swallow		Hooded Oriole
	N. Rough-winged Swallow	(11) M	Northern Oriole
	Bank Swallow	22 M	House Finch
	Cliff Swallow		Pine Siskin
	Barn Swallow		Lesser Goldfinch
13 M	Scrub Jay		Lawrence's Goldfinch
10 6	American Crow		American Goldfinch
8	Common Raven		House Sparrow
2	Plain Titmouse		
10	Bushtit		Additional Species

_____

_____

Upper R
Area 6

BIRDS OF Santa Clara River System

Locality Lower San Francisito Cr Date 6/6/94 Time ______

Count	Species
	Great Blue Heron
	Green Heron
	Mallard
	Cinnamon Teal
	Turkey Vulture
	White-tailed Kite
	Sharp-shinned Hawk
/	Cooper's Hawk
	Red-shouldered Hawk
	Red-tailed Hawk
	Golden Eagle
	American Kestrel
||||8	California Quail
	American Coot
	Killdeer
	Spotted Sandpiper
	Least Sandpiper
	Common Snipe
	Rock Dove
2|2|	Mourning Dove
	Yellow-billed Cuckoo
	Greater Roadrunner
	Barn Owl
	Great Horned Owl
	White-throated Swift
||	Black-ch. Hummingbird
//	Anna's Hummingbird
	Costa's Hummingbird
	Belted Kingfisher
	Acorn Woodpecker
////	Nuttall's Woodpecker
	Downy Woodpecker
	Hairy Woodpecker
	Northern Flicker
	Western Wood-Pewee
2	Willow Flycatcher
	Hammond's Flycatcher
	Pacific Slope Flycatcher
	Black Phoebe
	Say's Phoebe
|||	Ash-throated Flycatcher
	Brown-crested Flycatcher
	Cassin's Kingbird
	Western Kingbird
	Horned Lark
	Tree Swallow
	Violet-green Swallow
6	N. Rough-winged Swallow
	Bank Swallow
4	Cliff Swallow
	Barn Swallow
2/	Scrub Jay
	American Crow
22	Common Raven
1	Plain Titmouse
2222	Bushtit
	Rock Wren
|||||	Bewick's Wren
2	House Wren
	Ruby-crowned Kinglet
	Blue-gray Gnatcatcher
	Western Bluebird
	Swainson's Thrush
	Hermit Thrush
	American Robin
	Wrentit
2	Northern Mockingbird
	California Thrasher
	American Pipit
	Cedar Waxwing
/	Phainopepla
	Loggerhead Shrike
2	European Starling
	Bell's Vireo
	Solitary Vireo
	Warbling Vireo
	Orange-crowned Warbler
/	Yellow Warbler
	Yellow-rumped Warbler
	Black-th. Gray Warbler
	Townsend's Warbler
	MacGillivray's Warbler
	Common Yellowthroat
	Wilson's Warbler
	Yellow-breasted Chat
	Summer Tananger
	Western Tanager
///	Black-headed Grosbeak
	Blue Grosbeak
	Lazuli Bunting
||22|2/	Rufous-sided Towhee
12//	California Towhee
	Lark Sparrow
	Savannah Sparrow
	Fox Sparrow
546284	Song Sparrow
	Lincoln's Sparrow
	White-crowned Sparrow
/	Red-winged Blackbird
	Western Meadowlark
	Brewer's Blackbird
442///	Brown-headed Cowbird
	Hooded Oriole
//	Northern Oriole
46||	House Finch
	Pine Siskin
112	Lesser Goldfinch
	Lawrence's Goldfinch
	American Goldfinch
	House Sparrow

NO LLOW

MOUTH of San Fran
2♂ 1♀
1 SINGING
FITZ Ben

Additional Species

______

______

BIRDS OF Santa Clara River System

Locality San Francisquito (Upper) Date 6-1-94 Time _____

_____ Great Blue Heron
_____ Green Heron
_____ Mallard
_____ Cinnamon Teal
_____ Turkey Vulture
_____ White-tailed Kite
_____ Sharp-sninned Hawk
_____ Cooper's Hawk
_____ Red-shouldered Hawk
1/1 2 imm Red-tailed Hawk
_____ Golden Eagle
1 American Kestrel
6 California Quail
_____ American Coot
2 Killdeer
_____ Spotted Sandpiper
_____ Least Sandpiper
_____ Common Snipe
2 Rock Dove
19 Mourning Dove
Yellow-billed Cuckoo
1 Greater Roadrunner
_____ Barn Owl
_____ Great Horned Owl
_____ White-throated Swift
2 Black-ch. Hummingbird
2 Anna's Hummingbird
_____ Costa's Hummingbird
_____ Belted Kingfisher
_____ Acorn Woodpecker
6 Nuttall's Woodpecker
_____ Downy Woodpecker
_____ Hairy Woodpecker
_____ Northern Flicker
_____ Western Wood-Pewee
_____ Willow Flycatcher
_____ Hammond's Flycatcher
_____ Pacific Slope Flycatcher
_____ Black Phoebe
_____ Say's Phoebe
6 Ash-throated Flycatcher
Brown-crested Flycatcher
_____ Cassin's Kingbird
2 Western Kingbird
_____ Horned Lark
_____ Tree Swallow
_____ Violet-green Swallow
_____ N. Rough-winged Swallow
_____ Bank Swallow
25 Cliff Swallow
_____ Barn Swallow
19 Scrub Jay
2 American Crow
6 Common Raven
_____ Plain Titmouse
2 Bushtit

persistent song
right side ½ mile below pump just above
cottonwood grove - Thick Baccharis, willow, cane

_____ Rock Wren
9 Bewick's Wren
1 House Wren
_____ Ruby-crowned Kinglet
_____ Blue-gray Gnatcatcher
2 Western Bluebird
_____ Swainson's Thrush
_____ Hermit Thrush
_____ American Robin
_____ Wrentit
4 Northern Mockingbird
3 California Thrasher
_____ American Pipit
_____ Cedar Waxwing
2 Phainopepla
_____ Loggerhead Shrike
4 European Starling
1 **Bell's Vireo**
_____ Solitary Vireo
_____ Warbling Vireo
_____ Orange-crowned Warbler
_____ Yellow Warbler
_____ Yellow-rumped Warbler
_____ Black-th. Gray Warbler
_____ Townsend's Warbler
_____ MacGillivray's Warbler
1 Common Yellowthroat
_____ Wilson's Warbler
_____ Yellow-breasted Chat
Summer Tananger
_____ Western Tanager
_____ Black-headed Grosbeak
_____ Blue Grosbeak
_____ Lazuli Bunting
13 Rufous-sided Towhee
10 California Towhee
_____ Lark Sparrow
_____ Savannah Sparrow
_____ Fox Sparrow
18 Song Sparrow
_____ Lincoln's Sparrow
_____ White-crowned Sparrow
25 Red-winged Blackbird
5 Western Meadowlark
_____ Brewer's Blackbird
5 Brown-headed Cowbird
_____ Hooded Oriole
8 Northern Oriole
30 House Finch
_____ Pine Siskin
_____ Lesser Goldfinch
2 Lawrence's Goldfinch
_____ American Goldfinch
_____ House Sparrow

Additional Species

_____

_____

BIRDS OF Santa Clara River System

Locality 5 Fork Valencia Rd → McBean Date 4-24-91 Time 730 — 815

Upper A Area 7

- ____ Great Blue Heron
- ____ Green Heron
- ____ Mallard
- ____ Cinnamon Teal
- ____ Turkey Vulture
- ____ White-tailed Kite
- ____ Sharp-shinned Hawk
- ____ Cooper's Hawk
- ____ Red-shouldered Hawk
- (1) Red-tailed Hawk
- ____ Golden Eagle
- (1) American Kestrel
- (8) 2 2 2 California Quail
- ____ American Coot
- (4) 2 2 Killdeer
- ____ Spotted Sandpiper
- ____ Least Sandpiper
- ____ Common Snipe
- ____ Rock Dove
- (2) Mourning Dove
- ____ **Yellow-billed Cuckoo**
- ____ Greater Roadrunner
- ____ Barn Owl
- (2) Great Horned Owl NEST ? under bridge
- ____ White-throated Swift
- ____ Black-ch. Hummingbird
- (1) Anna's Hummingbird
- ____ Costa's Hummingbird
- ____ Belted Kingfisher
- ____ Acorn Woodpecker
- (1) Nuttall's Woodpecker
- ____ Downy Woodpecker
- ____ Hairy Woodpecker
- ____ Northern Flicker
- ____ Western Wood-Pewee
- ____ Willow Flycatcher
- ____ Hammond's Flycatcher
- ____ Pacific Slope Flycatcher
- ____ Black Phoebe
- ____ Say's Phoebe
- ____ Ash-throated Flycatcher
- ____ **Brown-crested Flycatcher**
- ____ Cassin's Kingbird
- ____ Western Kingbird
- ____ Horned Lark
- ____ Tree Swallow
- ____ Violet-green Swallow
- ____ N. Rough-winged Swallow
- ____ Bank Swallow
- ____ Cliff Swallow
- ____ Barn Swallow
- (3) 1 1 1 Scrub Jay
- (1) American Crow
- (5) 3 2 Common Raven
- ____ Plain Titmouse
- ____ Bushtit
- ____ Rock Wren
- (5) 1 1 1 Bewick's Wren
- ____ House Wren
- ____ Ruby-crowned Kinglet
- ____ Blue-gray Gnatcatcher
- ____ Western Bluebird
- ____ Swainson's Thrush
- ____ Hermit Thrush
- ____ American Robin
- ____ Wrentit
- (1) Northern Mockingbird
- (1) California Thrasher
- ____ American Pipit
- ____ Cedar Waxwing
- ____ Phainopepla
- ____ Loggerhead Shrike
- ____ European Starling
- ____ **Bell's Vireo**
- ____ Solitary Vireo
- ____ Warbling Vireo
- ____ Orange-crowned Warbler
- ____ Yellow Warbler
- ____ Yellow-rumped Warbler
- ____ Black-th. Gray Warbler
- ____ Townsend's Warbler
- ____ MacGillivray's Warbler
- ____ Common Yellowthroat
- (4) 2 2 Wilson's Warbler
- ____ Yellow-breasted Chat
- ____ **Summer Tananger**
- ____ Western Tanager
- ____ Black-headed Grosbeak
- ____ Blue Grosbeak
- ____ Lazuli Bunting
- ____ Rufous-sided Towhee
- (4) 2 2 California Towhee
- ____ Lark Sparrow
- ____ Savannah Sparrow
- ____ Fox Sparrow
- ____ Song Sparrow
- ____ Lincoln's Sparrow
- ____ White-crowned Sparrow
- ____ Red-winged Blackbird
- ____ Western Meadowlark
- ____ Brewer's Blackbird
- ____ Brown-headed Cowbird
- ____ Hooded Oriole
- ____ Northern Oriole
- (4) 2 2 House Finch
- ____ Pine Siskin
- ____ Lesser Goldfinch
- ____ Lawrence's Goldfinch
- ____ American Goldfinch
- ____ House Sparrow

TOTALS DAY

Additional Species

_____

_____

Upper R Area 7

BIRDS OF Santa Clara River System

Locality 126 — McBean Date 6-6 Time 730-815

- Great Blue Heron
- Green Heron
- Mallard
- Cinnamon Teal
- Turkey Vulture
- White-tailed Kite
- Sharp-shinned Hawk
- Cooper's Hawk
- Red-shouldered Hawk
- Red-tailed Hawk
- Golden Eagle
- American Kestrel
- 4 California Quail
- American Coot
- 11 Killdeer
- Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- Rock Dove
- 3 Mourning Dove
- **Yellow-billed Cuckoo**
- Greater Roadrunner
- Barn Owl
- 1 Great Horned Owl
- White-throated Swift
- Black-ch. Hummingbird
- 1 Anna's Hummingbird
- Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- 1 Nuttall's Woodpecker
- Downy Woodpecker
- Hairy Woodpecker
- 1 Northern Flicker
- Western Wood-Pewee
- Willow Flycatcher
- Hammond's Flycatcher
- Pacific Slope Flycatcher
- 2 Black Phoebe
- Say's Phoebe
- 1 Ash-throated Flycatcher
- **Brown-crested Flycatcher**
- Cassin's Kingbird
- Western Kingbird
- Horned Lark
- Tree Swallow
- Violet-green Swallow
- 2 N. Rough-winged Swallow
- Bank Swallow
- Cliff Swallow
- Barn Swallow
- 1 IIII Scrub Jay
- American Crow
- Common Raven
- Plain Titmouse
- 4 Bushtit

- Rock Wren
- 1 Bewick's Wren
- House Wren
- Ruby-crowned Kinglet
- Blue-gray Gnatcatcher
- Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- American Robin
- Wrentit
- 1 Northern Mockingbird
- 1 California Thrasher
- American Pipit
- Cedar Waxwing
- Phainopepla
- Loggerhead Shrike
- European Starling
- **Bell's Vireo**
- Solitary Vireo
- Warbling Vireo
- Orange-crowned Warbler
- Yellow Warbler
- Yellow-rumped Warbler
- Black-th. Gray Warbler
- Townsend's Warbler
- MacGillivray's Warbler
- Common Yellowthroat
- Wilson's Warbler
- Yellow-breasted Chat
- **Summer Tananger**
- Western Tanager
- Black-headed Grosbeak
- Blue Grosbeak
- Lazuli Bunting
- Rufous-sided Towhee
- California Towhee
- Lark Sparrow
- Savannah Sparrow
- Fox Sparrow
- Song Sparrow
- Lincoln's Sparrow
- White-crowned Sparrow
- Red-winged Blackbird
- Western Meadowlark
- Brewer's Blackbird
- Brown-headed Cowbird
- Hooded Oriole
- Northern Oriole
- 322 House Finch
- Pine Siskin
- Lesser Goldfinch
- Lawrence's Goldfinch
- American Goldfinch
- House Sparrow

Additional Species

side ADD

1 H_2O runoff drain

INC 15 20 clouds ... 0 wind ... H_2O ... no ...

Upper R. Area 8

BIRDS OF Santa Clara River System

Locality S Fork - Fork → [illegible] Velm[illegible] Date 4-2?-94 Time 630-730

- Great Blue Heron
- Green Heron
- Mallard
- Cinnamon Teal
- Turkey Vulture
- White-tailed Kite
- Sharp-shinned Hawk
- Cooper's Hawk
- Red-shouldered Hawk
- Red-tailed Hawk
- Golden Eagle
- American Kestrel
- (2) California Quail
- American Coot
- (4) 2 2 Killdeer
- Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- Rock Dove
- (7) 3 2 2 Mourning Dove
- **Yellow-billed Cuckoo**
- Greater Roadrunner
- Barn Owl
- Great Horned Owl
- White-throated Swift
- Black-ch. Hummingbird
- (5) ||||| Anna's Hummingbird
- Costa's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- Nuttall's Woodpecker
- Downy Woodpecker
- Hairy Woodpecker
- Northern Flicker
- Western Wood-Pewee
- Willow Flycatcher
- Hammond's Flycatcher
- Pacific Slope Flycatcher
- Black Phoebe
- Say's Phoebe
- Ash-throated Flycatcher
- **Brown-crested Flycatcher**
- Cassin's Kingbird
- Western Kingbird
- Horned Lark
- Tree Swallow
- Violet-green Swallow
- (2) N. Rough-winged Swallow
- Bank Swallow
- Cliff Swallow
- Barn Swallow
- (1) Scrub Jay
- American Crow
- (2) Common Raven
- Plain Titmouse
- (2) Bushtit

Water m 4 places - all Runoff

- Rock Wren
- (4) |||| Bewick's Wren
- House Wren
- Ruby-crowned Kinglet
- Blue-gray Gnatcatcher
- Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- (1) American Robin
- Wrentit
- (2) || Northern Mockingbird
- California Thrasher
- American Pipit
- Cedar Waxwing
- (1) Phainopepla
- Loggerhead Shrike
- (2) European Starling
- **Bell's Vireo**
- Solitary Vireo
- Warbling Vireo
- Orange-crowned Warbler
- Yellow Warbler
- (2) || Yellow-rumped Warbler
- Black-th. Gray Warbler
- Townsend's Warbler
- MacGillivray's Warbler
- Common Yellowthroat
- (1) Wilson's Warbler
- Yellow-breasted Chat
- **Summer Tananger**
- Western Tanager
- Black-headed Grosbeak
- Blue Grosbeak
- Lazuli Bunting
- Rufous-sided Towhee
- (1) California Towhee
- Lark Sparrow
- Savannah Sparrow
- Fox Sparrow
- (5) ||||| Song Sparrow
- Lincoln's Sparrow
- White-crowned Sparrow
- Red-winged Blackbird
- Western Meadowlark
- Brewer's Blackbird
- Brown-headed Cowbird
- Hooded Oriole
- (2) || Northern Oriole
- (2) House Finch
- Pine Siskin
- (4) 3,1 Lesser Goldfinch
- Lawrence's Goldfinch
- American Goldfinch
- House Sparrow

Additional Species

Upper R Area 8

BIRDS OF Santa Clara River System

Locality S Fork Y → old 127 Date 6-6 Time 6:30 —

Count	Species
	Great Blue Heron
	Green Heron
	Mallard
	Cinnamon Teal
	Turkey Vulture
	White-tailed Kite
	Sharp-shinned Hawk
	Cooper's Hawk
	Red-shouldered Hawk
I	Red-tailed Hawk
	Golden Eagle
	American Kestrel
	California Quail
	American Coot
2 III	Killdeer
	Spotted Sandpiper
	Least Sandpiper
	Common Snipe
	Rock Dove
I	Mourning Dove
	Yellow-billed Cuckoo
	Greater Roadrunner
	Barn Owl
	Great Horned Owl
	White-throated Swift
	Black-ch. Hummingbird
II	Anna's Hummingbird
	Costa's Hummingbird
	Belted Kingfisher
	Acorn Woodpecker
	Nuttall's Woodpecker
	Downy Woodpecker
	Hairy Woodpecker
	Northern Flicker
	Western Wood-Pewee
	Willow Flycatcher
	Hammond's Flycatcher
	Pacific Slope Flycatcher
	Black Phoebe
	Say's Phoebe
	Ash-throated Flycatcher
	Brown-crested Flycatcher
	Cassin's Kingbird
	Western Kingbird
	Horned Lark
	Tree Swallow
	Violet-green Swallow
	N. Rough-winged Swallow
	Bank Swallow
	Cliff Swallow
	Barn Swallow
~~IIII~~	Scrub Jay ✱
	American Crow
2 I	Common Raven
	Plain Titmouse
2 2	Bushtit
	Rock Wren
I	Bewick's Wren
	House Wren
	Ruby-crowned Kinglet
	Blue-gray Gnatcatcher
	Western Bluebird
	Swainson's Thrush
	Hermit Thrush
	American Robin
	Wrentit
IIII	Northern Mockingbird
	California Thrasher
	American Pipit
	Cedar Waxwing
	Phainopepla
	Loggerhead Shrike
2	European Starling
	Bell's Vireo
	Solitary Vireo
	Warbling Vireo
	Orange-crowned Warbler
	Yellow Warbler
	Yellow-rumped Warbler
	Black-th. Gray Warbler
	Townsend's Warbler
	MacGillivray's Warbler
	Common Yellowthroat
	Wilson's Warbler
	Yellow-breasted Chat
	Summer Tananger
	Western Tanager
	Black-headed Grosbeak
	Blue Grosbeak
	Lazuli Bunting
	Rufous-sided Towhee
	California Towhee
	Lark Sparrow
	Savannah Sparrow
	Fox Sparrow
II ~~IIII~~ I	Song Sparrow
	Lincoln's Sparrow
	White-crowned Sparrow
	Red-winged Blackbird
	Western Meadowlark
	Brewer's Blackbird
I	Brown-headed Cowbird
	Hooded Oriole
I	Northern Oriole
25	House Finch
	Pine Siskin
	Lesser Goldfinch
	Lawrence's Goldfinch
	American Goldfinch
	House Sparrow

Bridge Culvert to Bysself

lots of kids tracks - no unarmed [?] - willows turned [?] but [?]

Additional Species

______

Guthrie, Daniel. *Bird Surveys Along a Portion of the Santa Clara River and Its Tributaries Near Valencia, California.* August 1993.

BIRD SURVEYS ALONG THE SANTA CLARA RIVER AND ITS TRIBUTARIES

NEAR VALENCIA, CALIFORNIA, 1993

Prepared for:

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Prepared by:

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August 3, 1993

Bird Surveys along the Santa Clara River and its Tributaries near Valencia, California, 1993

Prepared by: Daniel A. Guthrie
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Nature and Scope of Surveys

During the spring and early summer of 1993 a survey was conducted of a section of the Santa Clara River and its tributaries in the vicinity of Valencia, California to determine presence or absence of least Bell's vireo and other Species of Concern. Numbers of all species observed were noted, and special attention was placed on locating species considred rare and endangered.

Each survey was conducted on foot by observers well acquainted with both visual and auditory patterns of southern California birds. All surveys occurred between 6 and 10 a.m. After initial surveys, which found no vireos, calls of least Bell's vireo were played during a subsequent census to elicit response from territorial males. Survey routes were designed to cover all areas of each section of the river, with emphasis placed on wetter habitats where least Bell's vireos and other sensitive riparian species are most likely to occur. Personnel for all surveys were Daniel A. Guthrie, Richard F. Clements, Kenyon Corey and Judith A. Sugden.

To facilitate surveys, the area was divided into eight sections (Figure 1). Deliniation of the eight areas and comments on each follow. Surveys of the normally dry sections of the river system (Areas 3 - 8) where least Bell's vireos have not been observed duirng the past 5 years were conducted twice during the nesting season. Surveys of the two sections of the Santa Clara River (Areas 1 and 2) where least Bell's vireos have been observed during the last 5 years were conducted according to the protocol outlined by the Fish and Wildlife Service (Appendix 1), except that surveys were conducted on a biweekly instead of weekly basis.

Area 1. Santa Clara River; Old Highway to the mouth of Castaic Creek and Castiac Creek from this confluence to State Route 126.

Length of section, 4.0 miles. The Santa Clara River flows continuously in this section and is augmented by the Valencia waste water outfall near the upstream end of this section. Vegetation in the stream channel was severely damaged by spring flooding, leaving large areas of bare sand. Several ponds created for cultivation of water cress along this portion of the river were eliminated by flooding, restricting the amount of wet riparian vegetation.

Area 2. Santa Clara River; Old Highway to McBean Parkway.

Length of section, 1.4 miles. The Santa Clara River flows continuously in this section. Spring flooding removed most wet riparian vegetation along this section of the river.

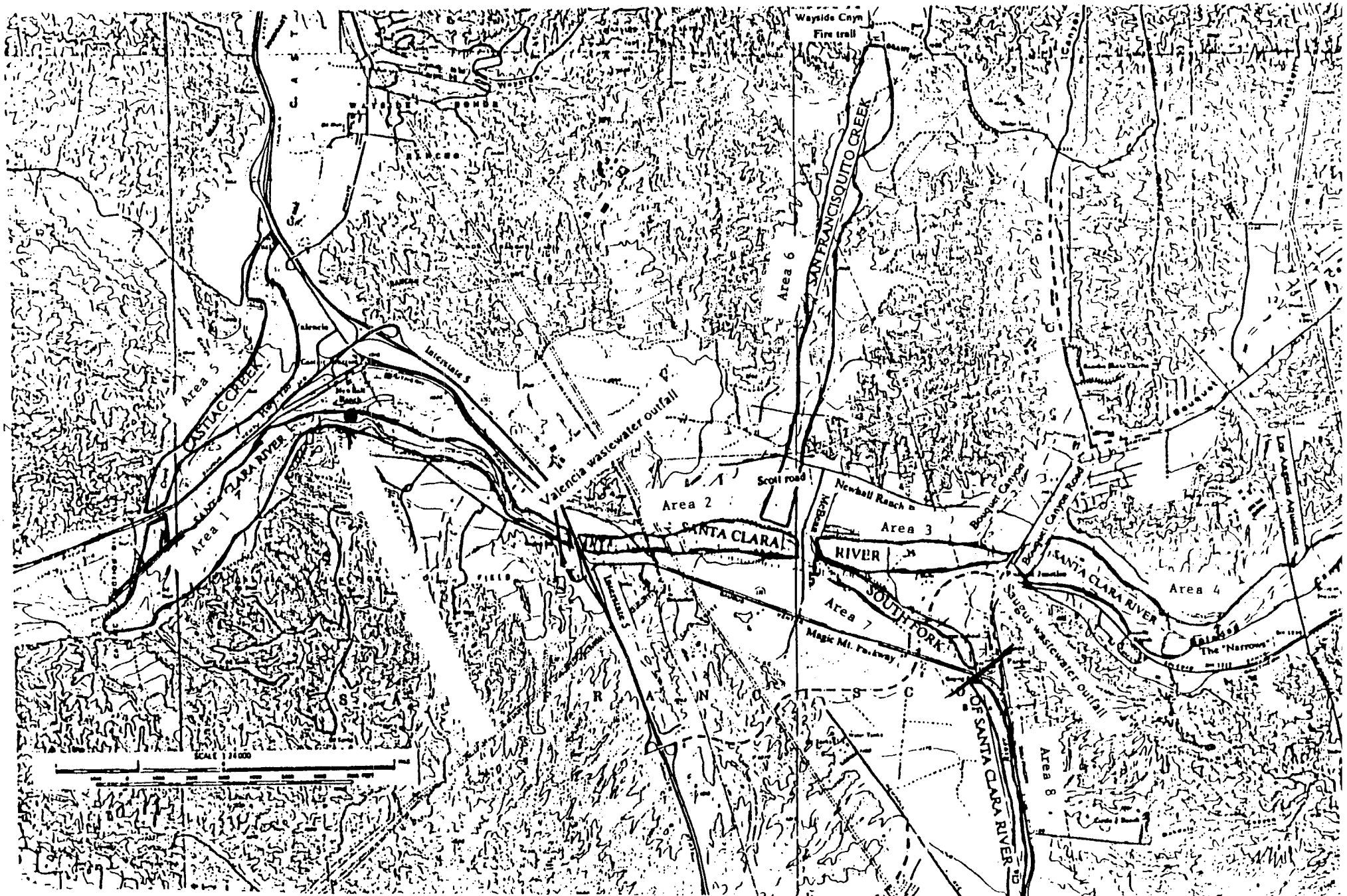

Figure 1. Major placenames and location of study areas.

Area 3. Santa Clara River; McBean Parkway to Boquet Canyon Road.

Length of section, 1.2 miles. Water, supplied by the Saugus wastewater outfall at the Boquet Canyon Bridge, is continuous in this section of the Santa Clara River. Spring flooding removed most wet riparian vegetation and destroyed tracts that were part of a revegetation project along this portion of the river.

Area 4. Santa Clara River; Boquet Canyon Road upstream to DWP transmission lines.

Length of section, 2.3 miles. This section of the Santa Clara River was wet during April and May but was dry by the time of the June census.

Area 5. Castaic Creek; Route 125 to Old Road next to Interstate 5.

Length of section, 2.5 miles. Spring flooding removed about half the vegetation from this section of Castaic Creek. However, there was water flowing throughout the survey period and large stands of willow supported by storm drain runoff from housing projects near the upper portion of this section were not affected by flooding.

Area 6. San Francisquito Creek; Santa Clara River upstream 2.5 miles.

Length of section, 2.5 miles. This section was wet in April and May but dry during June and July. Spring flood removed much low vegetation from this section but did not affect large islands of cottonwoods in the stream channel.

Area 7. South Fork of the Santa Clara River; McBean Parkway to Magic Mountain Parkway (Route 126).

Length of section, 1.0 miles. The channel along this section of the South Fork is narrow and very sandy. Almost all vegetation along the bottom of the channel was removed by spring floods. Some standing water was present near the McBean bridge.

Area 8. South Fork of the Santa Clara River, Route 126 upstream to Newhall Creek.

Length of section, 1.8 miles. This section of the river was dry except for damp areas formed by runoff from culverts along the west side of the creek. Cattails developed in these wet areas supported redwing blackbirds and song sparrows. Most of the rest of this section consists of bare sand wash with a few islands of cottonwoods.

Observations

Bird observations are listed in Tables 1 - 8. Different species breed at different times of the year. In general, the species are most easily observed when they are actively defending territories by song during the establishement of breeding pairs. Once pairs are established and nesting begins song often decreases and the numbers of birds observed, therefore, also decreases. After young leave the nest, numbers observed increase. Thus, for most resident species, numbers of adult birds are most accurately censuses in April, when

territorial activity is at a maximum. A few species such as Anna's hummingbird that nest early in the season may be underestimated. Numbers observed may decrease slightly in May when birds are less active during nesting, and increase in July when young birds leave the nest.

Several species that are not considered riparian species but are common in adjacent coastal sage and chaparral habiats come into the riparian zone in late summer when other vegetaional areas are dry. The increase in numbers of lazuli bunting, lark sparrow, house finch, phainopepla and loggerhead shrike in July follow this trend.

Spring flooding affected several areas by removing wet riparian vegetation along the main stream course and much of the dry riparian willow and Bachharis on low flats adjacent to the main stream channel. Wooded areas along the river that had shown evidence of die off prior to 1992 as the result of extended drought resprouted and were green in 1993.

Table 9 presents census data from the past 4 years on selected species. Song sparrows are dependent upon the narrow band of wet riparian vegetation found along permanent streams. As shown in table 9, they are most common along the sections of stream (areas 1 - 3) where water flow is permanent. The decrease in numbers from 1990 to 1991 is a reflection of the severe drought experience in southern California during this period. Although 1992 was a comparatively wet year, the removal of most wet riprian vegetation by spring floods further reduced the numbers of this species, especially in area 1. In 1993, spring flood further removed wet riprian vegetation and there was little regrowth prior to the nesting season. Low numbers of song sparrows are an indication of this destruction of wet riparian habitat.

Numbers of yellow warblers, another species dependent upon wet riparian vegetation, were down in 1993. This may also be due in part to increases in brown-headed cowbirds. Bewick's wren is a common inhabitant of the drier sections of the riparian zone that were not so heavily impacted by spring flooding. Numbers of this species show an increase in 1992 and 1993, wet years, over the numbers in drier 1991. This is presumably due to increases in insect food.

Flooding during the spring of of 1992 and 1993 eliminated wet riparian vegetation during the period when birds were establisheing territories and thus caused a decrease in numbers of those species dependent upon wet riparian vegetation. Flooding also eliminated many mature areas of willows and creasted openings along the Santa Clara River which should with time result in increased wet riparian habitat.

Sensitive Species

Least Bell's Vireo

No least Bell's vireos were observed in 1993. In 1992 and other years previous to this a singing male was observed in Area 1 at Castaic Junction. This individual was in wet riparian vegetation near a water cress pond. This area was totally eliminated by spring floods in 1993. The only other area where least Bell's vireos have been observed in recent years was in wet riparian growth just

downstream from the McBean Bridge. Wet riparian vegetation in this area has also been totally eliminated by spring flooding.

Yellow Warbler

The yellow warbler is considered a Species of Special Concern by the State of California. Yellow warblers prefer wet riparian habitat but are also found in large cottonwoods in drier riparian areas. Singing yellow warblers were observed along nearly every section of the Santa Clara River and Castaic Creek. A few of the birds observed were probably migrants and this species is known to sing its territorial song during migration. Numbers in 1993 were down from those observed in previous years. This may be due to destruction of vegetation by spring floods or to the increasing effects of parasitism by brown headed cowbirds.

Yellow-breasted Chat

The yellow-breasted chat is considered a Species of Special Concern by the State of California. Chats were observed sparingly along the wet sections of the Santa Clara River. Of those observed in 1993, only one pair was considered to be nesting; the rest were migrants. This number is down from the 5-6 observed in 1992.

Cooper's Hawk

Cooper's Hawk is considered a Species of Special Concern by the State of California. Two pairs of Coopers hawks were observed in 1993, the same number as observed in 1992. This species is a resident that nests and huynts in riprian woodland habitat.

Loggerhead Shrike

This species is a candidate for listing under the Federal Endangered Species Act. Shrikes were observed along San Francisquito Creek and the South Fork of the Santa Clara River.

California Horned Lark

This species is a candidate for listing under the Federal Endangered Species Act. Horned larks were observed near Castaic Junction in plowed fields adjacent to the Santa Clara River.

Black-shouldered Kite

This species is considered "Special" by the State of California. A pair of kites nested in the dry woodland on the north side of the Santa Clara River near the confluence with Castaic Creek.

Summer Tanager

The summer tanager is considered a Species of Special Concern by the State of California. A summer tanager was observed sporadically in the dense cottonwoods just downstream from the Valencia Wastewater plant.

Golden Eagle

This species is considered a Species of Special Concern by the State of California. An eagle was observed flying over the Santa Clara River in the vicinity of Magic Mountain on July 4th. Eagles forage widely over the coastal sage and chaparral hillsides adjacent to the Santa Clara River.

Table 1. Bird Observations along the Santa Clara River System, 1993: Santa Clara River from Old Highway along I-5 to the mouth of Castaic Creek and Castaic Creek from this confluence to State Route 126.

Species date:	4/13	4/27	5/6	5/12	5/30	6/18	7/4	7/18	Status
Green-backed Heron	-	3	3	2	-	3	-	2	R
Bl. cr. Night Heron	-	2	-	-	-	-	-	-	M
Mallard	-	9	15	15	2	-	1	5	R
Turkey Vulture	-	-	-	5	-	-	-	-	S
Black-sh. Kite	-	1	2	4	-	1	2	-	R
Cooper's Hawk	-	1	-	3	2	1	-	2	R
Golden Eagle	-	-	-	-	-	-	1	-	R
Red-shouldered Hawk	5	2	4	4	1	5	4	5	R
Red-tailed Hawk	-	3	2	4	-	1	4	3	R
American Kestrel	-	-	3	2	2	-	-	-	R
California Quail	13	24	26	29	18	8	16	55	R
Sora Rail	-	1	-	-	-	-	-	-	M
Killdeer	5	12	14	6	13	29	14	23	R
Spotted Sandpiper	-	3	5	8	3	10 (3)	16	7	S
Least Sandpiper	1	11	-	-	-	-	-	-	M
Domestic Pigeon	-	1	-	5	17	6	12	6	R
Mourning Dove	5	14	9	11	19	20	14	21	R
Spotted Dove	-	2	-	-	-	-	1	-	R
White-throated Swift	-	-	-	-	-	21	-	-	R
Black-ch. Hummingbird	1	3	1	5	6	3	2	7	S
Anna's Hummingbird	1	10	7	12	11	7	7	20	R
Costa's Hummingbird	-	-	-	2	-	-	-	-	S
Belted Kingfisher	1	1	-	-	-	-	-	-	M
Nuttall's Woodpecker	7	8	10	13	3	21	16	16	R
Downy Woodpecker	-	-	2	3	9	9	8	6	R
Hairy Woodpecker	2	3	2	4	4	5	5	7	R
Northern FLicker	1	3	3	5	2	5	7	9	R
Hammond's Flycatcher	-	1	-	-	-	-	-	-	M
Pac. Slope Flycatcher	-	2	-	-	-	-	-	-	M
Black Phoebe	-	-	-	2	1	3	8	14	R
Ash-thr. Flycatcher	9	14	11	13	12	15	12	15	S
Western Kingbird	2	2	1	-	-	7	3	2	S
Horned Lark	-	-	2	4	-	-	-	-	R
Violet-green Swallow	-	-	-	-	-	2	2	-	S
N. Rough-w. Swallow	4	18	20	24	6	49	16	3	S
Barn Swallow	2	-	-	2	-	-	-	-	S
Cliff Swallow	-	8	-	6	53	2	52	10	S
Scrub Jay	-	18	22	15	21	21	19	23	R
American Crow	9	8	32	19	20	27	39	16	R
Common Raven	19	9	14	20	11	7	8	52	R
Plain Titmouse	1	10	6	-	15	20	13	39	R
Bushtit	4	7	18	28	20	6	3	28	R
Bewick's Wren	28	51	40	51	41	43	21	54	R
House Wren	6	12	13	18	16	24	8	1	R
Marsh Wren	-	1	-	-	-	-	-	-	M
Western Bluebird	6	-	1	2	-	7	8	8	S
Swainson's Thrush	-	1	1	-	-	-	-	-	S
American Robin	-	-	2	-	-	-	-	2	R

Table 1.(cont.). Bird Observations along the Santa Clara River System, 1993: Santa Clara River from Old Highway along I-5 to the mouth of Castaic Creek and Castaic Creek from this confluence to State Route 126.

Species date:	4/13	4/27	5/6	5/12	5/30	6/18	7/4	7/18	Status
Wrentit	4	-	3	-	-	2	-	1	R
N. Mockingbird	1	-	-	-	-	-	-	-	R
Calif. Thrasher	-	5	2	5	8	9	4	7	R
Cedar Waxwing	-	-	25	-	-	-	-	-	W,M
Phainopepla	-	-	-	4	-	2	-	18	R
European Starling	12	15	5	16	20	22	67	53	R
Warbling Vireo	-	4	-	-	-	-	-	-	M
Orange-cr. Warbler	-	5	-	-	1	-	-	-	M
Yellow Warbler	1	11	11	5	2	2	3	1	S,M
Yellow- r. Warbler	21	1	-	-	-	-	-	-	W
Black-th. grey Warbler	1	1	-	-	-	-	-	-	M
MacGillivray's Warbler	2	-	-	-	-	-	-	-	M
Common Yellowthroat	9	7	4	1	3	7	17	15	R
Wilson's Warbler	2	23	9	2	-	-	-	-	M
Yellow-br. Chat	1	1	3	1	-	2	2	1	S
Summer Tanager	-	1	1	-	-	-	-	1	S
Western Tanager	3	2	2	-	-	1	-	-	M
Black-headed Grosbeak	8	22	11	19	20	22	22	16	S
Blue Grosbeak	1	-	2	1	-	3	4	3	S
Lazuli Bunting	-	-	-	-	-	-	11	13	S
Rufous-sided Towhee	7	12	10	24	8	14	16	11	R
California Towhee	6	10	4	10	7	7	13	10	R
Chipping Sparrow	2	1	-	-	-	-	-	-	W
Lark Sparrow	-	-	-	1	-	-	8	41	R
Song Sparrow	44	36	34	63	67	78	54	95	R
Lincoln's Sparrow	-	1	-	-	-	-	-	-	M
White-cr. Sparrow	1	3	-	-	-	-	-	-	W
Red-winged Blackbird	2	16	-	9	11	25	3	59	S
Brewer's Blackbird	-	-	1	-	-	-	-	-	R
Brown-headed Cowbird	8	32	22	23	20	37	31	23	S
Hooded Oriole	3	-	-	-	-	3	-	2	S
Northern Oriole	1	2	5	3	3	1	2	4	S
House Finch	8	4	4	2	-	4	16	46	R
Pine Siskin	2	-	-	-	-	-	-	-	W
Lesser Goldfinch	1	4	7	14	-	5	3	26	R
Lawrence's Goldfinch	-	-	-	8	-	-	-	-	R
American Goldfinch	45	6	2	-	-	-	-	3	W,M
Total Species:	48	61	51	52	38	50	48	52	
Total Individuals:	336	504	458	554	498	637	621	910	

Total Species on all visits: 85

Status: M - Migrant; R - Resident; S - Summer Only; W - Winter Only

() = Young Birds

Table 2. Bird Observations along the Santa Clara River System, 1993: Santa Clara River from Old HIghway along I-5 to McBean Parkway.

Species date:	4/13	4/29	5/7	5/15	6/10	7/7	7/19	Status
Green-backed Heron	-	1	-	-	-	-	-	M
Bl. cr. Night Heron	-	2	-	-	-	-	-	M
Mallard	5	1	2	1	1	1	-	R
Cinnamon Teal	-	-	-	-	-	-	4	M
Cooper's Hawk	-	-	-	1	-	1	-	R
Golden Eagle	-	-	-	-	-	1	-	R
Red-shouldered Hawk	1	-	1	1	2	1	2	R
Red-tailed Hawk	2	1	1	1	1(2)	2	3	R
California Quail	30	8	12	6	8	9	4	R
Killdeer	1	1	3	4	6	16	9	R
Spotted Sandpiper	-	1	-	-	-	2	1	S
Least Sandpiper	3	2	-	-	-	-	-	M
Domestic Pigeon	1	3	-	2	-	3	-	R
Mourning Dove	3	3	2	3	1	15	15	R
Black-ch. Hummingbird	-	1	-	1	-	1	2	S
Anna's Hummingbird	3	-	2	1	-	8	7	R
Belted Kingfisher	1	1	-	-	-	-	-	W
Nuttall's Woodpecker	5	4	3	4	5	9	9	R
Downy Woodpecker	6	2	3	4	6	10	4	R
Hairy Woodpecker	2	-	1	-	2	2	1	R
Northern FLicker	2	-	-	1	2	-	-	R
Black Phoebe	5	-	3	4	5	15	21	R
Ash-thr. Flycatcher	5	5	4	3	1	9	11	S
Cassin's Kingbird	-	-	-	-	-	1	-	S
Western Kingbird	5	-	-	-	-	2	2	S
Violet-green Swallow	6	-	-	-	-	-	-	M
N. Rough-w. Swallow	40	14	20	16	28	-	2	S
Cliff Swallow	-	-	2	-	3	37	6	S
Barn Swallow	-	1	-	-	-	-	-	M
Scrub Jay	2	5	3	6	4	8	15	R
American Crow	2	8	4	5	4	1	2	R
Common Raven	13	2	4	8	6	-	5	R
Plain Titmouse	22	5	3	4	1	11	7	R
Bushtit	24	6	8	15	27	5	15	R
Bewick's Wren	8	21	15	13	11	27	18	R
House Wren	2	3	4	4	6	-	2	R
Western Bluebird	9	1	-	3	2	5	12	R
Swainson's Thrush	-	-	1	-	1	-	-	S
American Robin	-	1	-	-	-	6	1	R
Calif. Thrasher	2	2	-	1	-	3	2	R
Phainopepla	-	-	1	-	-	-	-	R
American Pipit	4	-	-	-	-	-	-	W
Loggerhead Shrike	-	-	-	-	-	-	2	R
European Starling	3	5	10	6	14	90	20	R
Solitary Vireo	1	-	-	-	-	-	-	M
Orange-cr. Warbler	7	-	-	-	-	-	-	W,M
Nashville Warbler	4	-	-	-	-	-	-	M
Yellow Warbler	-	2	1	2	2	2	-	S
Yellow- r. Warbler	45	-	-	-	-	-	-	W

Table 2.(cont.).Bird Observations along the Santa Clara River System, 1993: Santa Clara River from Old Highway along I-5 to McBean Parkway.

Species date:	4/13	4/29	5/7	5/15	6/10	7/7	7/19	Status
Black-th. grey Warbler	2	-	-	-	-	-	-	M
Common Yellowthroat	5	1	1	1	2	3	-	R
Wilson's Warbler	13	5	2	-	-	-	-	M
Yellow-br. Chat	-	-	-	1	-	1	-	S
Western Tanager	1	-	-	-	-	-	-	M
Black-headed Grosbeak	7	6	5	6	7	9	11	S
Blue Grosbeak	-	-	-	-	-	1	2	S
Lazuli Bunting	-	-	-	-	-	4	7	S
Rufous-sided Towhee	7	6	5	4	7	11	4	R
California Towhee	1	1	3	1	2	5	1	R
Lark Sparrow	-	-	-	-	-	13	28	R
Song Sparrow	18	12	16	15	19	26	15	R
Red-winged Blackbird	-	-	2	-	-	-	-	S
Tricolored Blackbird	-	-	-	-	-	5	-	M
Brewer's Blackbird	-	-	-	-	-	8	-	R
Yellow-headed Blackbird	1	1	-	-	-	-	-	M
Brown-headed Cowbird	9	6	7	9	8	10	11	S
Northern Oriole	-	-	1	-	-	2	2	S
Purple Finch	15	-	-	-	-	-	-	W
House Finch	-	10	8	6	5	150	100	R
Lesser Goldfinch	4	2	-	2	-	8	9	R
American Goldfinch	32	3	-	-	-	-	-	W,M
Total Species:	47	40	35	37	33	45	40	
Total Individuals:	389	165	163	168	200	559	394	

Total Species on all visits: 70

Status: M - Migrant; R - Resident; S - Summer Only; W - Winter Only

() = Young Birds

Table 3. Bird Observations along the Santa Clara River System, 1993: Santa Clara River from Boquet Canyon Rd. to McBean parkway.

Species	date: 4/29	6/10	Status
Mallard	2	-	R
California Quail	4	4	R
Killdeer	6	6	R
Mourning Dove	3	2	R
Nuttall's Woodpecker	-	2	R
Downy Woodpecker	-	1	R
Hairy Woodpecker	2	1	R
Black Phoebe	-	4	R
Ash-throated Flycatcher	2	3	S
N. Rough-winged Swallow	3	12	S
Scrub Jay	4	9	R
American Crow	6	2	R
Common Raven	39	26	R
Plain Titmouse	1	2	R
Bushtit	6	4	R
Bewick's Wren	3	4	R
Western Bluebird	1	-	R
California Thrasher	1	1	R
European Starling	-	2	R
Yellow Warbler	1	-	M,S
MacGillivray's Warbler	1	-	M
Wilson's Warbler	3	-	M
Black-headed Grosbeak	4	1	S
Blue Grosbeak	1	-	S
California Towhee	3	1	R
Song Sparrow	5	6	R
Red-winged Blackbird	3	-	S
Brewer's Blackbird	-	1	R
Brown-headed Cowbird	-	1	S
House Finch	-	8	R
Total number of Species:	23	23	
Total number of Individuals:	104	103	

Total Species on all visits: 30

Status: M - Migrant; R - Resident; S - Summer Only; W - Winter Only

Table 4. Bird Observations along the Santa Clara River System, 1993: Santa Clara River from power line 2.5 miles upstream from Boquet Canyon Rd. to Boquet Canyon Road Crossing.

Species	date: 4/29	6/10	Status
Mallard	4	-	R
Red-tailed Hawk	3	4	R
American Kestrel	2	1	R
California Quail	4	18	R
Killdeer	11	16	R
Spotted Sandpiper	2	-	M
Domestic Pigeon	-	2	R
Mourning Dove	32	74	R
Great Horned Owl	1	-	R
Black-ch. Hummingbird	1	5	S
Anna's Hummingbird	6	9	R
Acorn Woodpecker	1	-	R
Nuttall's Woodpecker	4	10	R
Hairy Woodpecker	1	-	R
Northern Flicker	2	-	R
Ash-throated Flycatcher	1	1	S
Western Kingbird	2	10	S,M
Rough-winged Swallow	-	1	S
Cliff Swallow	-	3	S
Scrub Jay	10	21	R
American Crow	2	4	R
Common Raven	32	11	R
Plain Titmouse	3	4	R
Bushtit	11	13	R
Bewick's Wren	12	26	R
Western Bluebird	-	5	R
Northern Mockingbird	2	9	R
California Thrasher	-	6	R
Loggerhead Shrike	-	1	R
European Starling	4	91	R
Warbling Vireo	2	-	M
Orange-crowned Warbler	1	-	M
Yellow Warbler	1	-	M
Black-throated Gray Warbler	1	-	M
Wilson's Warbler	5	-	M
Western Tanager	1	-	M
Black-headed Grosbeak	3	-	R
Blue Grosbeak	-	2	S
Lazuli Bunting	-	2	S
Rufous-sided Towhee	1	3	R
California Towhee	2	2	R
Song Sparrow	2	2	R
Red-winged Blackbird	2	6	S
Brewer's Blackbird	4	8	R
Brown-headed Cowbird	8	6	S

Table 4 (cont.). Bird Observations along the Santa Clara River System, 1993: Santa Clara River from power line 2.5 miles upstream from Boquet Canyon Rd. to Boquet Canyon Road Crossing.

Species	date: 4/29	6/10	Status
Northern Oriole	11	2	S
House Finch	25	22	R
Total number of species:	29	34	
Total number of Individuals:	222	405	

Total Species on all visits: 47

Status: M - Migrant; R - Resident; S - Summer Only; W - Winter Only

Table 5. Bird Observations along the Santa Clara River System, 1993: Castaic Creek from Old Road west to Rte. 126.

Species	date: 4/17	6/9	Status
Snowy Egret	1	-	M
Green-backed Heron	4	-	M
Mallard	1	1	R
Cooper's Hawk	-	1	R
Red-shouldered Hawk	-	1	R
Red-tailed Hawk	1	-	R
American Kestrel	1	-	R
California Quail	26	20	R
American Coot	3	-	M
Sora Rail	1*	-	M
Killdeer	3	8	R
Mourning Dove	3	7	R
Black-ch. Hummingbird	2	-	S
Anna's Hummingbird	6	4	R
Nuttall's Woodpecker	5	6	R
Downy Woodpecker	1	6	R
Northern Flicker	-	3	R
Black Phoebe	-	6	R
Ash-throated Flycatcher	3	6	S
Western Kingbird	3	-	M
N. Rough-winged Swallow	48	37	S
Cliff Swallow	50	1	S
Scrub Jay	16	16	R
American Crow	12	7	R
Common Raven	7	3	R
Plain Titmouse	2	7	R
Bushtit	8	13	R
Bewick's Wren	16	27	R
House Wren	5	-	R
Wrentit	1	-	R
Western Bluebird	-	2	R
California Thrasher	4	3	R
European Starling	6	4	R
Orange-crowned Warbler	2	-	M
Yellow Warbler	2	1	S
Yellow-rumped Warbler	3	-	W
Common Yellowthroat	24	4	R,M
Yellow-breasted Chat	1	-	S
Black-headed Grosbeak	8	10	S
Rufous-sided Towhee	5	7	R
California Towhee	5	6	R
Lark Sparrow	-	1	R
Song Sparrow	20	18	R
Lincoln's Sparrow	1	-	M
Red-winged Blackbird	97	50	S
Brewer's Blackbird	2	4	R
Brown-headed Cowbird	22	10	S

Table 5 (cont.). Bird Observations along the Santa Clara River System, 1993: Castaic Creek from Old Road west to Rte. 126.

Species	date: 4/17	6/9	Status
Northern Oriole	-	5	S
House Finch	4	6	R
Lesser Goldfinch	-	5	R
House Sparrow	2	-	R
Total number of species:	42	36	
Total number of individuals:	437	316	

Total Species on all visits: 51

Status: M - Migrant; R - Resident; S - Summer Only; W - Winter Only

* found dead

Table 6. Bird Observations along the Santa Clara River System, 1993: San Francisquito Creek for 2 Miles above Main Channel.

Species	date: 4/25	6/14	Status
Mallard	3	1	R
Red-tailed Hawk	1*	6	R
California Quail	65	28	R
Killdeer	10	12	R
Greater Yellowlegs	1	-	M
Least Sandpiper	8	-	M
Domestic Pigeon	2	2	R
Mourning Dove	13	20	R
Spotted Dove	2	-	R
Greater Roadrunner	-	1	R
Great Horned Owl	2	1	R
Costa's Hummingbird	4	-	S
Anna's Hummingbird	1	1	R
Nuttall's Woodpecker	5	4	R
Western Wood Pewee	1	-	R
Black Phoebe	4	3	R
Ash-throated Flycatcher	6	4	S
Western Kingbird	14	2	S,M
N. Rough-winged Swallow	2	-	S
Cliff Swallow	1	1	S
Barn Swallow	2	-	M
Scrub Jay	10	11	R
American Crow	2	3	R
Common Raven	36	14	R
Red-breasted Nuthatch	1	-	M
Plain Titmouse	2	3	R
Bushtit	11	4	R
Bewick's Wren	8	9	R
House Wren	1	2	R
Ruby-crowned Kinglet	3	-	W
Wrentit	-	2	R
Northern Mockingbird	5	3	R
California Thrasher	6	5	R
American Pipit	1	-	M
Phainopepla	-	4	R
Loggerhead Shrike	2	2	R
European Starling	5	19	R
Warbling Vireo	2	-	M
Orange-crowned Warbler	10	-	M
Yellow Warbler	7	-	M
Yellow-rumped Warbler	5	-	W
Common Yellowthroat	2	1	R
Wilson's Warbler	19	-	M
Black-headed Grosbeak	5	1	S
Blue Grosbeak	1	-	S
Lazuli Bunting	4	-	S
Rufous-sided Towhee	1	5	R

Table 6 (cont.) . Bird Observations along the Santa Clara River System, 1993: San Francisquito Creek for 2 Miles above Main Channel.

Species	date: 4/25	6/14	Status
California Towhee	6	12	R
Lark Sparrow	-	1	R
Song Sparrow	6	11	R
Lincoln's Sparrow	2	-	M
Red-winged Blackbird	25	6	S
Brown-headed Cowbird	17	4	S
Hooded Oriole	2	-	S
Northern Oriole	7	10	S
House Finch	3	31	R
Pine Siskin	29	-	W,M
Lawrence's Goldfinch	7	-	R
Lesser Goldfinch	2	-	R
American Goldfinch	55	-	W,M
House Sparrow	2	-	R
Total number of species:	57	37	
Total number of individuals:	459	255	

Total Species on all visits: 61

Status: M - Migrant; R - Resident; S - Summer Only; W - Winter Only

* nesting

Table 7. Bird Observations along the Santa Clara River System, 1993: South Fork from Rte. 126 to McBean Parkway.

Species	date: 4/25	6/9	Status
Green-backed Heron	1	-	M
Black-crowned Night Heron	3	-	M
Mallard	2	-	M
Turkey Vulture	1	-	M
Red-tailed Hawk	-	2	R
American Kestrel	1	2	R
California Quail	8	4	R
Killdeer	6(3)	10	R
Greater Yellowlegs	1	-	M
Mourning Dove	-	13	R
Black-chinned Hummingbird	-	2	S
Anna's Hummingbird	2	4	R
Nuttall's Woodpecker	1	2	R
Black Phoebe	-	3	R
Ash-throated Flycatcher	-	4	S
Western Kingbird	2	-	S,M
N. Rough-winged Swallow	1	-	S
Scrub Jay	5	5	R
American Crow	1	-	R
Common Raven	10(2)	3	R
Plain Titmouse	-	4	R
Bushtit	6	6	R
Rock Wren	-	1	R
Bewick's Wren	2	10	R
Northern Mockingbird	-	2	R
California Thrasher	6	-	R
European Starling	2	7	R
Orange-crowned Warbler	3	-	M
Yellow Warbler	4	-	M
Yellow-rumped Warbler	12	-	W
Black-throated Gray Warbler	1	-	M
MacGillivray's Warbler	1	-	M
Wilson's Warbler	9	-	M
Western Tanager	1	-	M
Black-headed Grosbeak	2	1	S
Rufous-sided Towhee	1	-	R
California Towhee	2	3	R
Song Sparrow	1	-	R
Red-winged Blackbird	-	8	S
Hooded Oriole	1	-	S
Northern Oriole	6	2	S
House Finch	11	6	R
Pine Siskin	3	-	W

Table 7 (cont.). Bird Observations along the Santa Clara River System, 1993: South Fork from Rte. 126 to McBean Parkway.

Species	date: 4/25	6/9	Status
Lesser Goldfinch	-	2	R
House Sparrow	-	2	R
Total number of species:	34	25	
Total number of individuals:	119	108	

Total Species on all visits: 45

Status: M - Migrant; R - Resident; S - Summer Only; W - Winter Only

() = Young birds

Table 8. Bird Observations along the Santa Clara River System, 1993: South Fork from Newhall Creek to Rte. 126.

Species	date: 4/25	6/9	Status
Red-tailed Hawk	1	-	R
American Kestrel	-	2	R
California Quail	2	6	R
Killdeer	3	7	R
Mourning Dove	3	6	R
Anna's Hummingbird	3	4	R
Nuttall's Woodpecker	-	2	R
Dusky Flycatcher	1	-	M
Ash-throated Flycatcher	-	1	S
N. Rough-winged Swallow	2	-	S
Scrub Jay	2	3	R
American Crow	-	2	R
Common Raven	5	2	R
Bewick's Wren	-	1	R
Northern Mockingbird	1	5	R
Loggerhead Shrike	-	1	R
European Starling	-	19	R
Warbling Vireo	2	-	M
Orange-crowned Warbler	4	-	M
Yellow Warbler	2	-	M, S
Yellow-rumped Warbler	1	-	W
MacGillivray's Warbler	1	-	M
Common Yellowthroat	2	1	R
Wilson's Warbler	7	-	M
Black-headed Grosbeak	1	-	S
California Towhee	-	1	R
Song Sparrow	5	13	R
White-crowned Sparrow	7	-	W
Red-winged Blackbird	-	6	S
Brewer's Blackbird	-	14	R
Brown-headed Cowbird	-	10	S
Northern Oriole	3	2	S
House Finch	6	9	R
Lesser Goldfinch	-	5	R
House Sparrow	-	8	R
Total number of species:	22	24	
Total number of individuals:	64	130	

Total Species on all visits: 35

Status: M - Migrant; R - Resident; S - Summer Only; W - Winter Only

Appendix 1. Fish and Wildlife Rules for Least Bell's Vireo Censuses.

LEAST BELL'S VIREO SURVEY GUIDELINES

1. All riparian areas should be surveyed once a week from April 1 to July 31. These dates encompass the period during which most vireo nesting activity occurs. If additional information on vireo habitat utilization is needed, these surveys should be extended to August 31. Information typically collected after July 31 will reflect a broader extent of the riparian habitat and other adjacent habitat types that the vireo utilizes during the latter phase of the breeding season, especially when the young become independent of the adults.

2. Surveys must be conducted by qualified biologist(s) familiar with song and plumage characteristics of the vireo.

3. Surveys shall be conducted between dawn and 11:00 a.m. Surveys shall avoid periods of excessive heat, wind, and rain.

4. All vireo detections (e.g., vocalization points, areas used for foraging, etc.) should be used to define individual home range. These data need to be mapped on a large-scale aerial photograph.

5. Data on vireo breeding status (e.g., number and location of paired or unpaired territorial males, nest building efforts, feeding of nestlings, location of vireo nests, etc.) should be noted during each survey.

6. All sightings of cowbirds and their numbers in vireo territories should be noted during each survey.

7. No attempts should be made to locate or examine vireo nests unless authorized by permits issued by California Department of Fish and Game and the U.S. Fish and Wildlife Service.

8. A final report should be prepared which describes survey dates, methods, locations, and information identified in items 4, 5, and 6 above.

If you have any questions regarding these survey guidelines, please contact the U.S. Fish and Wildlife Service at (714) 643-4270.

12-91

Table 9. Comparison of Populations of Selected Species, 1990 - 93.

Species	Year	Census Areas 1	2	3	4	5	6	7	8	Total
Song Sparrow	1993	63	15	6	2	18	11	0	13	128
	1992	63	38	28	2	5	14	7	10	167
	1991	112	30	39	-	9	7	12	24	233
	1990	117	82	36	-	11	16	15	30	307
Yellow Warbler	1993	5	2	-	-	1	-	-	-	8
	1992	9	5	3	1	-	3	-	-	21
	1991	23	8	2	2	17	4	-	4	60
	1990	16	20	2	1	10	-	3	1	53
Bewick's Wren	1993	51	11	4	26	27	9	10	1	139
	1992	35	29	3	10	6	11	8	-	102
	1991	46	5	8	8	3	13	5	3	91
	1990	77	15	14	27	48	17	7	10	215

SCR. 1993 Area 1

Birds of the Santa Clara River System ~~Central~~ East Fork → East Fork

Date 4-13 River Section _____ Time 8:45-8:30

- ___ Great Blue Heron
- ___ Great Egret
- ___ Snowy Egret
- ___ Green-backed Heron
- ___ Green-winged Teal
- ___ Mallard
- ___ Blue-winged Teal
- ___ Cinnamon Teal
- ___ Gadwall
- ___ Ruddy Duck
- ___ Turkey Vulture
- ___ Black-shouldered Kite
- ___ Northern Harrier
- ___ Sharp-shinned Hawk
- ___ Cooper's Hawk
- 22 Red-shouldered Hawk
- ___ Red-tailed Hawk
- ___ American Kestrel
- 222|2 California Quail
- ___ Virginia Rail
- ___ Sora
- ___ Common Moorhen
- ___ American Coot
- 2| Killdeer
- ___ Black-necked Stilt
- ___ American Avocet
- ___ Greater Yellowlegs
- ___ Solitary Sandpiper
- ___ Spotted Sandpiper
- ___ Least Sandpiper
- ___ Common Snipe
- ___ Domestic Pigeon
- ___ Band-tailed Pigeon
- 32 Mourning Dove
- ___ Spotted Dove
- ___ Greater Roadrunner
- ___ Barn Owl
- ___ Western Screech-Owl
- ___ Great Horned Owl
- ___ Lesser Nighthawk
- ___ Common Poorwill
- ___ Vaux's Swift
- ___ White-throated Swift
- | Black-ch. Hummingbird
- | Anna's Hummingbird
- ___ Costa's Hummingbird
- ___ Rufous Hummingbird
- ___ Allen's Hummingbird
- ___ Belted Kingfisher
- ___ Acorn Woodpecker
- ___ Red-breasted Sapsucker
- 12 Nuttall's Woodpecker
- ___ Downy Woodpecker
- ___ Hairy Woodpecker
- | Northern Flicker
- ___ Olive-sided Flycatcher
- ___ Western Wood-Pewee
- ___ Willow Flycatcher
- ___ Hammond's Flycatcher
- ___ Dusky Flycatcher
- ___ Gray Flycatcher
- ___ Pacific Slope Flycatcher
- ___ Black Phoebe
- ___ Say's Phoebe
- |||| Ash-throated Flycatcher
- ___ Cassin's Kingbird
- || Western Kingbird
- ___ Horned Lark
- ___ Purple Martin
- ___ Tree Swallow
- ___ Violet-green Swallow
- 2 N. Rough-winged Swallow
- · Bank Swallow
- ___ Cliff Swallow
- 2 Barn Swallow
- R Scrub Jay
- 2| American Crow
- 642 Common Raven
- ___ Mountain Chickadee
- ___ Plain Titmouse
- ___ Bushtit
- ___ Rock Wren
- ___ Canyon Wren
- 122222122 Bewick's Wren
- 2| House Wren
- ___ Marsh Wren
- ___ Ruby-crowned Kinglet
- ___ Blue-gray Gnatcatcher
- 222 Western Bluebird
- ___ Swainson's Thrush
- ___ Hermit Thrush
- ___ American Robin
- ___ Wrentit
- | Northern Mockingbird
- ___ California Thrasher
- ___ American Pipit
- ___ Cedar Waxwing
- ___ Phainopepla
- ___ Loggerhead Shrike
- 2|228 European Starling
- ___ Bell's Vireo
- ___ Gray Vireo
- ___ Solitary Vireo
- ___ Hutton's Vireo
- ___ Warbling Vireo
- ___ Orange-crowned Warbler
- ___ Nashville Warbler
- | Yellow Warbler
- | Yellow-rumped Warbler
- | Black-th. Gray Warbler
- ___ Townsend's Warbler
- ___ Hermit Warbler
- 2 MacGillivray's Warbler
- 2|2 Common Yellowthroat
- 2 Wilson's Warbler
- ___ Yellow-breasted Chat
- ___ Summer Tanager
- ___ Western Tanager
- 4 Black-headed Grosbeak
- ___ Blue Grosbeak
- ___ Lazuli Bunting
- 2 Rufous-sided Towhee
- 12 California Towhee
- 2 Chipping Sparrow
- ___ Lark Sparrow
- ___ Fox Sparrow
- 22|122222212 Song Sparrow
- ___ Lincoln's Sparrow
- ___ Golden-crowned Sparrow
- ___ White-crowned Sparrow
- ___ Dark-eyed Junco
- ___ Red-winged Blackbird
- ___ Tricolored Blackbird
- ___ Western Meadowlark
- ___ Yellow-headed Blackbird
- ___ Brewer's Blackbird
- ___ Great-tailed Grackle
- ___ Brown-headed Cowbird
- 3 Hooded Oriole
- || Northern Oriole
- ___ Purple Finch
- 8 House Finch
- ___ Pine Siskin
- ___ Lesser Goldfinch
- ___ Lawrence's Goldfinch
- 16,2 American Goldfinch
- ___ House Sparrow

Additional Species

_____

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1993 Qual

Done

DAC

scrubs

LEFT (South)

OCORD → Carl...

Birds of the Santa Clara River System

Date APR 13/93 River Section A Time 645 - 8AM

Great Blue Heron
Great Egret
Snowy Egret
Green-backed Heron
Green-winged Teal
Mallard
Blue-winged Teal
Cinnamon Teal
Gadwall
Ruddy Duck
Turkey Vulture
Black-shouldered Kite
Northern Harrier
Sharp-shinned Hawk
Cooper's Hawk
| Red-shouldered Hawk
Red-tailed Hawk
American Kestrel
California Quail
Virginia Rail
Sora
Common Moorhen
American Coot
| Killdeer
Black-necked Stilt
American Avocet
Greater Yellowlegs
Solitary Sandpiper
Spotted Sandpiper
Least Sandpiper
Common Snipe
Domestic Pigeon
Band-tailed Pigeon
Mourning Dove
Spotted Dove
Greater Roadrunner
Barn Owl
Western Screech-Owl
Great Horned Owl
Lesser Nighthawk
Common Poorwill
Vaux's Swift
White-throated Swift
Black-ch. Hummingbird
Anna's Hummingbird
Costa's Hummingbird
Rufous Hummingbird
Allen's Hummingbird
| Belted Kingfisher

Acorn Woodpecker
Red-breasted Sapsucker
||| Nuttall's Woodpecker
Downy Woodpecker
|| Hairy Woodpecker
Northern Flicker
Olive-sided Flycatcher
Western Wood-Pewee
Willow Flycatcher
Hammond's Flycatcher
Dusky Flycatcher
Gray Flycatcher
Pacific Slope Flycatcher
Black Phoebe
Say's Phoebe
||| Ash-throated Flycatcher
Cassin's Kingbird
Western Kingbird
Horned Lark
Purple Martin
Tree Swallow
Violet-green Swallow
2 N. Rough-winged Swallow
Bank Swallow
Cliff Swallow
Barn Swallow
3 2 Scrub Jay
3 2 American Crow
2 2 2 2 1 Common Raven
Mountain Chickadee
| Plain Titmouse
4 Bushtit
Rock Wren
Canyon Wren
| | 𝍸 Bewick's Wren
||| House Wren
Marsh Wren
Ruby-crowned Kinglet
Blue-gray Gnatcatcher
Western Bluebird
Swainson's Thrush
Hermit Thrush
American Robin
Wrentit
Northern Mockingbird
California Thrasher
American Pipit
Cedar Waxwing
Phainopepla
Loggerhead Shrike
2 | European Starling
Bell's Vireo
Gray Vireo
Solitary Vireo

Hutton's Vireo
Warbling Vireo
Orange-crowned Warbler
Nashville Warbler
Yellow Warbler
3, 4 4, 6, 3 Yellow-rumped Warbler
Black-th. Gray Warbler
Townsend's Warbler
Hermit Warbler
MacGillivray's Warbler
|||| Common Yellowthroat
Wilson's Warbler
| Yellow-breasted Chat
Summer Tanager
3 Western Tanager
𝍸 Black-headed Grosbeak
Blue Grosbeak
Lazuli Bunting
𝍸 Rufous-sided Towhee
|| California Towhee
Chipping Sparrow
Lark Sparrow
Fox Sparrow
|| 𝍸 𝍸 2 2 2 2 Song Sparrow
Lincoln's Sparrow
Golden-crowned Sparrow
| White-crowned Sparrow
Dark-eyed Junco
2 Red-winged Blackbird
Tricolored Blackbird
Western Meadowlark
Yellow-headed Blackbird
Brewer's Blackbird
Great-tailed Grackle
6 2 Brown-headed Cowbird
Hooded Oriole
| Northern Oriole
Purple Finch
House Finch
2 Pine Siskin
| Lesser Goldfinch
Lawrence's Goldfinch
(10) 10 / 2 2 4 American Goldfinch
House Sparrow

Additional Species

1993 Area 1

Birds of the Santa Clara River System

Date 4/27 River Section Old Rd → Castaic Time 630—8-15

- Great Blue Heron
- Great Egret
- Snowy Egret
- 1 Green-backed Heron *
- Green-winged Teal
- 2 Mallard
- Blue-winged Teal
- Cinnamon Teal
- Gadwall
- Ruddy Duck
- Turkey Vulture
- Black-shouldered Kite
- Northern Harrier
- Sharp-shinned Hawk
- Cooper's Hawk
- 1 Red-shouldered Hawk
- 1 Red-tailed Hawk
- American Kestrel
- California Quail
- Virginia Rail
- Sora
- Common Moorhen
- American Coot
- 2 Killdeer
- Black-necked Stilt
- American Avocet
- Greater Yellowlegs
- Solitary Sandpiper
- 11 Spotted Sandpiper
- (12) Least Sandpiper
- Common Snipe
- 1 Domestic Pigeon
- Band-tailed Pigeon
- Mourning Dove
- Spotted Dove
- Greater Roadrunner
- Barn Owl
- Western Screech-Owl
- Great Horned Owl
- Lesser Nighthawk
- Common Poorwill
- Vaux's Swift
- White-throated Swift
- Black-ch. Hummingbird
- 1 Anna's Hummingbird
- Costa's Hummingbird
- Rufous Hummingbird
- Allen's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- Red-breasted Sapsucker
- 11 Nuttall's Woodpecker
- Downy Woodpecker
- 1 Hairy Woodpecker
- Northern Flicker
- Olive-sided Flycatcher
- Western Wood-Pewee
- Willow Flycatcher
- Hammond's Flycatcher
- Dusky Flycatcher
- Gray Flycatcher
- Pacific Slope Flycatcher
- Black Phoebe
- Say's Phoebe
- 711 Ash-throated Flycatcher
- Cassin's Kingbird
- Western Kingbird
- Horned Lark
- Purple Martin
- Tree Swallow
- Violet-green Swallow
- 3 2 3 N. Rough-winged Swallow
- Bank Swallow
- 1 11 Cliff Swallow
- Barn Swallow
- 1 1 1 2 1 1 Scrub Jay
- 2 1 American Crow
- 2 1 2 1 Common Raven
- Mountain Chickadee
- 1 1 1 Plain Titmouse
- 2 9 Bushtit
- Rock Wren
- Canyon Wren
- 1 1 1 1 1 1 1 Bewick's Wren
- 1 1 1 1 House Wren
- Marsh Wren
- Ruby-crowned Kinglet
- Blue-gray Gnatcatcher
- Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- American Robin
- Wrentit
- Northern Mockingbird
- California Thrasher
- American Pipit
- Cedar Waxwing
- Phainopepla
- Loggerhead Shrike
- 1 7 European Starling
- Bell's Vireo
- Gray Vireo
- Solitary Vireo
- Hutton's Vireo
- 1 Warbling Vireo
- Orange-crowned Warbler
- Nashville Warbler
- 1 1 1 1 Yellow Warbler
- 1 Yellow-rumped Warbler
- Black-th. Gray Warbler
- Townsend's Warbler
- Hermit Warbler
- MacGillivray's Warbler
- 1 Common Yellowthroat
- 1 1 1 Wilson's Warbler
- Yellow-breasted Chat
- Summer Tanager
- Western Tanager
- 11 1 1 1 1 1 1 Black-headed Grosbeak
- Blue Grosbeak
- Lazuli Bunting
- Rufous-sided Towhee
- 2 1 California Towhee
- Chipping Sparrow
- Lark Sparrow
- Fox Sparrow
- 2 1 1 1 1 1 1 1 1 Song Sparrow
- 1 Lincoln's Sparrow
- Colden-crowned Sparrow
- White-crowned Sparrow
- Dark-eyed Junco
- 4 4 Red-winged Blackbird
- Tricolored Blackbird
- Western Meadowlark
- Yellow-headed Blackbird
- Brewer's Blackbird
- Great-tailed Grackle
- 3 4 2 2 2 2 Brown-headed Cowbird
- Hooded Oriole
- Northern Oriole
- Purple Finch
- 2 1 House Finch
- Pine Siskin
- Lesser Goldfinch
- Lawrence's Goldfinch
- 3 1 1 2 American Goldfinch
- House Sparrow

Additional Species

2 NIGHT Heron

1 SORA

1993 Count #

Birds of the Santa Clara River System — Sunset → Central Ck

Date 4/27 River Section Lower Time _____

- ___ Great Blue Heron
- ___ Great Egret
- ___ Snowy Egret
- 1 Green-backed Heron
- ___ Green-winged Teal
- 223 Mallard
- ___ Blue-winged Teal
- ___ Cinnamon Teal
- ___ Gadwall
- ___ Ruddy Duck
- ___ Turkey Vulture
- 1 Black-shouldered Kite
- ___ Northern Harrier
- ___ Sharp-shinned Hawk
- 1 Cooper's Hawk
- ___ Red-shouldered Hawk
- 1 Red-tailed Hawk
- ___ American Kestrel
- 5221 California Quail
- ___ Virginia Rail
- ___ Sora
- ___ Common Moorhen
- ___ American Coot
- 2-1 Killdeer
- ___ Black-necked Stilt
- ___ American Avocet
- ___ Greater Yellowlegs
- ___ Solitary Sandpiper
- 1 Spotted Sandpiper
- ___ Least Sandpiper
- ___ Common Snipe
- ___ Domestic Pigeon
- ___ Band-tailed Pigeon
- 2122 Mourning Dove
- 2 Spotted Dove
- ___ Greater Roadrunner
- ___ Barn Owl
- ___ Western Screech-Owl
- ___ Great Horned Owl
- ___ Lesser Nighthawk
- ___ Common Poorwill
- ___ Vaux's Swift
- ___ White-throated Swift
- 3 Black-ch. Hummingbird
- 1111 Anna's Hummingbird
- ___ Costa's Hummingbird
- ___ Rufous Hummingbird
- ___ Allen's Hummingbird
- ___ Belted Kingfisher

- ___ Acorn Woodpecker
- ___ Red-breasted Sapsucker
- 4 Nuttall's Woodpecker
- ___ Downy Woodpecker
- 2 Hairy Woodpecker
- 15 Northern Flicker
- ___ Olive-sided Flycatcher
- ___ Western Wood-Pewee
- ___ Willow Flycatcher
- 1 Hammond's Flycatcher
- ___ Dusky Flycatcher
- ___ Gray Flycatcher
- 2 Pacific Slope Flycatcher
- ___ Black Phoebe
- ___ Say's Phoebe
- 22112 Ash-throated Flycatcher
- ___ Cassin's Kingbird
- 2 Western Kingbird
- ___ Horned Lark
- ___ Purple Martin
- ___ Tree Swallow
- ___ Violet-green Swallow
- 2413 N. Rough-winged Swallow
- 1 Bank Swallow
- 123 Cliff Swallow
- ___ Barn Swallow
- 12211 Scrub Jay
- 113 American Crow
- 11 Common Raven
- ___ Mountain Chickadee
- 1121 Plain Titmouse
- 2122 Bushtit
- ___ Rock Wren
- ___ Canyon Wren
- 2 Bewick's Wren
- 1 House Wren
- ___ Marsh Wren
- 1 Ruby-crowned Kinglet
- ___ Blue-gray Gnatcatcher
- ___ Western Bluebird
- 1 Swainson's Thrush
- ___ Hermit Thrush
- ___ American Robin
- ___ Wrentit
- ___ Northern Mockingbird
- 112 California Thrasher
- ___ American Pipit
- ___ Cedar Waxwing
- ___ Phainopepla
- ___ Loggerhead Shrike
- 2621 European Starling
- ___ Bell's Vireo
- ___ Gray Vireo
- ___ Solitary Vireo

- ___ Hutton's Vireo
- 2 Warbling Vireo
- 112 Orange-crowned Warbler
- ___ Nashville Warbler
- 1 Yellow Warbler
- ___ Yellow-rumped Warbler
- 1 Black-th. Gray Warbler
- ___ Townsend's Warbler
- ___ Hermit Warbler
- ___ MacGillivray's Warbler
- 1 Common Yellowthroat
- 1111 Wilson's Warbler
- 1 Yellow-breasted Chat
- 1 Summer Tanager
- 11 Western Tanager
- 112 Black-headed Grosbeak
- ___ Blue Grosbeak
- ___ Lazuli Bunting
- 11 Rufous-sided Towhee
- 11 California Towhee
- 1 Chipping Sparrow
- ___ Lark Sparrow
- ___ Fox Sparrow
- 1 Song Sparrow
- ___ Lincoln's Sparrow
- ___ Colden-crowned Sparrow
- ___ White-crowned Sparrow
- ___ Dark-eyed Junco
- 8 Red-winged Blackbird
- ___ Tricolored Blackbird
- ___ Western Meadowlark
- ___ Yellow-headed Blackbird
- ___ Brewer's Blackbird
- ___ Great-tailed Grackle
- 124223 Brown-headed Cowbird
- ___ Hooded Oriole
- 1 Northern Oriole
- ___ Purple Finch
- 1 House Finch
- ___ Pine Siskin
- 21 Lesser Goldfinch
- ___ Lawrence's Goldfinch
- ___ American Goldfinch
- ___ House Sparrow

Additional Species

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* = Field 1993 1

Area 1

Birds of the Santa Clara River System

Date May 5 River Section Old Rd to Castaic Junction Time _____

- ____ Great Blue Heron
- ____ Great Egret
- ____ Snowy Egret
- 2 Green-backed Heron
- ____ Green-winged Teal
- 4,2,3 Mallard
- ____ Blue-winged Teal
- ____ Cinnamon Teal
- ____ Gadwall
- ____ Ruddy Duck
- ____ Turkey Vulture
- ____ Black-shouldered Kite
- ____ Northern Harrier
- ____ Sharp-shinned Hawk
- ____ Cooper's Hawk
- III Red-shouldered Hawk
- I Red-tailed Hawk
- I American Kestrel
- 2 California Quail
- ____ Virginia Rail
- ____ Sora
- ____ Common Moorhen
- ____ American Coot
- IIII Killdeer
- ____ Black-necked Stilt
- ____ American Avocet
- ____ Greater Yellowlegs
- ____ Solitary Sandpiper
- 2 Spotted Sandpiper
- ____ Least Sandpiper
- ____ Common Snipe
- ____ Domestic Pigeon
- ____ Band-tailed Pigeon
- 5 Mourning Dove
- ____ Spotted Dove
- ____ Greater Roadrunner
- ____ Barn Owl
- ____ Western Screech-Owl
- ____ Great Horned Owl
- ____ Lesser Nighthawk
- ____ Common Poorwill
- ____ Vaux's Swift
- ____ White-throated Swift
- ____ Black-ch. Hummingbird
- III Anna's Hummingbird
- ____ Costa's Hummingbird
- ____ Rufous Hummingbird
- ____ Allen's Hummingbird
- ____ Belted Kingfisher
- ____ Acorn Woodpecker
- ____ Red-breasted Sapsucker
- III Nuttall's Woodpecker
- II Downy Woodpecker
- I Hairy Woodpecker
- I Northern Flicker
- ____ Olive-sided Flycatcher
- ____ Western Wood-Pewee
- ____ Willow Flycatcher
- ____ Hammond's Flycatcher
- ____ Dusky Flycatcher
- ____ Gray Flycatcher
- ____ Pacific Slope Flycatcher
- ____ Black Phoebe
- ____ Say's Phoebe
- IIII Ash-throated Flycatcher
- ____ Cassin's Kingbird
- ____ Western Kingbird
- * 2 Horned Lark
- ____ Purple Martin
- ____ Tree Swallow
- ____ Violet-green Swallow
- 5, 4 IIII N. Rough-winged Swallow
- ____ Bank Swallow
- ____ Cliff Swallow
- ____ Barn Swallow
- 3, 2 IIII 2 Scrub Jay
- 10,20 American Crow
- 2,5 Common Raven
- ____ Mountain Chickadee
- IIII Plain Titmouse
- 10,5 Bushtit
- ____ Rock Wren
- ____ Canyon Wren
- 5 IIII IIII Bewick's Wren
- I House Wren
- ____ Marsh Wren
- ____ Ruby-crowned Kinglet
- ____ Blue-gray Gnatcatcher
- ____ Western Bluebird
- I Swainson's Thrush
- ____ Hermit Thrush
- ____ American Robin
- ____ Wrentit
- ____ Northern Mockingbird
- I California Thrasher
- ____ American Pipit
- 25 Cedar Waxwing
- ____ Phainopepla
- ____ Loggerhead Shrike
- 2 European Starling
- ____ Bell's Vireo
- ____ Gray Vireo
- ____ Solitary Vireo
- ____ Hutton's Vireo
- ____ Warbling Vireo
- ____ Orange-crowned Warbler
- ____ Nashville Warbler
- IIII I Yellow Warbler
- ____ Yellow-rumped Warbler
- ____ Black-th. Gray Warbler
- ____ Townsend's Warbler
- ____ Hermit Warbler
- ____ MacGillivray's Warbler
- I Common Yellowthroat
- IIII Wilson's Warbler
- ____ Yellow-breasted Chat
- ____ Summer Tanager
- 2 Western Tanager
- III Black-headed Grosbeak
- 2 Blue Grosbeak
- ____ Lazuli Bunting
- 2 Rufous-sided Towhee
- III California Towhee
- ____ Chipping Sparrow
- ____ Lark Sparrow
- ____ Fox Sparrow
- IIII IIII Song Sparrow IIII (20)
- ____ Lincoln's Sparrow
- ____ Golden-crowned Sparrow
- ____ White-crowned Sparrow
- ____ Dark-eyed Junco
- ____ Red-winged Blackbird
- ____ Tricolored Blackbird
- ____ Western Meadowlark
- ____ Yellow-headed Blackbird
- ____ Brewer's Blackbird
- ____ Great-tailed Grackle
- 4, 4, 2, IIII 3, Brown-headed Cowbird
- ____ Hooded Oriole
- 3,1 Northern Oriole
- ____ Purple Finch
- 4 House Finch
- ____ Pine Siskin
- ____ Lesser Goldfinch
- ____ Lawrence's Goldfinch
- 2 American Goldfinch
- ____ House Sparrow

Additional Species

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1993 Area 1

Birds of the Santa Clara River System — East → Central — N SIDE

Date 5-6 River Section _____ Time 630-830

- ____ Great Blue Heron
- ____ Great Egret
- ____ Snowy Egret
- 1 Green-backed Heron
- ____ Green-winged Teal
- 3 Mallard
- ____ Blue-winged Teal
- ____ Cinnamon Teal
- ____ Gadwall
- ____ Ruddy Duck
- ____ Turkey Vulture
- 2 Black-shouldered Kite
- ____ Northern Harrier
- ____ Sharp-shinned Hawk
- ____ Cooper's Hawk
- 1 Red-shouldered Hawk
- 1 Red-tailed Hawk
- 1 American Kestrel
- 32 California Quail 2 2 4 4
- ____ Virginia Rail
- ____ Sora
- ____ Common Moorhen
- ____ American Coot
- 2 Killdeer
- ____ Black-necked Stilt
- ____ American Avocet
- ____ Greater Yellowlegs
- ____ Solitary Sandpiper
- 3 Spotted Sandpiper
- ____ Least Sandpiper
- ____ Common Snipe
- ____ Domestic Pigeon
- ____ Band-tailed Pigeon
- 12 Mourning Dove
- ____ Spotted Dove
- ____ Greater Roadrunner
- ____ Barn Owl
- ____ Western Screech-Owl
- ____ Great Horned Owl
- ____ Lesser Nighthawk
- ____ Common Poorwill
- ____ Vaux's Swift
- ____ White-throated Swift
- 1 Black-ch. Hummingbird
- 4 Anna's Hummingbird
- ____ Costa's Hummingbird
- ____ Rufous Hummingbird
- ____ Allen's Hummingbird
- ____ Belted Kingfisher

- ____ Acorn Woodpecker
- ____ Red-breasted Sapsucker
- 6 Nuttall's Woodpecker
- ____ Downy Woodpecker
- 1 Hairy Woodpecker
- 2 Northern Flicker
- ____ Olive-sided Flycatcher
- ____ Western Wood-Pewee
- ____ Willow Flycatcher
- ____ Hammond's Flycatcher
- ____ Dusky Flycatcher
- ____ Gray Flycatcher
- ____ Pacific Slope Flycatcher
- ____ Black Phoebe
- ____ Say's Phoebe
- 4 Ash-throated Flycatcher
- ____ Cassin's Kingbird
- 1 Western Kingbird
- ____ Horned Lark
- ____ Purple Martin
- ____ Tree Swallow
- ____ Violet-green Swallow
- 3 N. Rough-winged Swallow
- ____ Bank Swallow
- ____ Cliff Swallow
- ____ Barn Swallow
- 22 Scrub Jay
- 2 American Crow
- 2 2 3 Common Raven
- ____ Mountain Chickadee
- 2 Plain Titmouse
- 3 Bushtit
- ____ Rock Wren
- ____ Canyon Wren
- 4 Bewick's Wren
- 1 House Wren
- ____ Marsh Wren
- ____ Ruby-crowned Kinglet
- ____ Blue-gray Gnatcatcher
- 1 Western Bluebird
- ____ Swainson's Thrush
- ____ Hermit Thrush
- 2 American Robin
- 2 Wrentit
- ____ Northern Mockingbird
- 1 California Thrasher
- ____ American Pipit
- ____ Cedar Waxwing
- ____ Phainopepla
- ____ Loggerhead Shrike
- 12 European Starling
- ____ Bell's Vireo
- ____ Gray Vireo
- ____ Solitary Vireo

- ____ Hutton's Vireo
- ____ Warbling Vireo
- ____ Orange-crowned Warbler
- ____ Nashville Warbler
- 4 Yellow Warbler
- ____ Yellow-rumped Warbler
- ____ Black-th. Gray Warbler
- ____ Townsend's Warbler
- ____ Hermit Warbler
- ____ MacGillivray's Warbler
- 2 Common Yellowthroat
- 4 Wilson's Warbler
- 2 Yellow-breasted Chat
- 1 Summer Tanager
- ____ Western Tanager
- 12 Black-headed Grosbeak
- ____ Blue Grosbeak
- ____ Lazuli Bunting
- 13 Rufous-sided Towhee
- 1 California Towhee
- ____ Chipping Sparrow
- ____ Lark Sparrow
- ____ Fox Sparrow
- 14 Song Sparrow
- ____ Lincoln's Sparrow
- ____ Golden-crowned Sparrow
- ____ White-crowned Sparrow
- ____ Dark-eyed Junco
- ____ Red-winged Blackbird
- ____ Tricolored Blackbird
- ____ Western Meadowlark
- ____ Yellow-headed Blackbird
- 1 Brewer's Blackbird
- ____ Great-tailed Grackle
- 3 Brown-headed Cowbird
- 3 Hooded Oriole
- 1 Northern Oriole
- ____ Purple Finch
- ____ House Finch
- ____ Pine Siskin
- 3 Lesser Goldfinch
- ____ Lawrence's Goldfinch
- ____ American Goldfinch
- ____ House Sparrow

Additional Species

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O = Riverside of Section

Less impact / Not influenced / on river side

ir[illegible] of the Santa Clara River System

ate May 30/93 River Section Blue Moon Cafe Time 7:30 Wash out

1993 Area 1

- ___ Great Blue Heron
- ___ Great Egret
- ___ Snowy Egret
- ___ Green-backed Heron
- ___ Green-winged Teal
- 4 Mallard
- 2 Blue-winged Teal
- ___ Cinnamon Teal
- ___ Gadwall
- ___ Ruddy Duck
- ___ Turkey Vulture
- ___ Black-shouldered Kite
- ___ Northern Harrier
- ___ Sharp-shinned Hawk
- 1 Cooper's Hawk
- ___ Red-shouldered Hawk
- ___ Red-tailed Hawk
- 1 American Kestrel
- 3 California Quail
- ___ Virginia Rail
- ___ Sora
- ___ Common Moorhen
- ___ American Coot
- 10 Killdeer
- ___ Black-necked Stilt
- ___ American Avocet
- ___ Greater Yellowlegs
- ___ Solitary Sandpiper
- 1 Spotted Sandpiper
- ___ Least Sandpiper
- ___ Common Snipe
- 4 Domestic Pigeon
- ___ Band-tailed Pigeon
- ___ Mourning Dove
- ___ Spotted Dove
- ___ Greater Roadrunner
- ___ Barn Owl
- ___ Western Screech-Owl
- ___ Great Horned Owl
- ___ Lesser Nighthawk
- ___ Common Poorwill
- ___ Vaux's Swift
- ___ White-throated Swift
- 1 Black-ch. Hummingbird
- 2 Anna's Hummingbird
- ___ Costa's Hummingbird
- ___ Rufous Hummingbird
- ___ Allen's Hummingbird
- ___ Belted Kingfisher
- ___ Acorn Woodpecker
- ___ Red-breasted Sapsucker
- 1 Nuttall's Woodpecker
- 2 Downy Woodpecker
- ___ Hairy Woodpecker
- 1 Northern Flicker
- ___ Olive-sided Flycatcher
- ___ Western Wood-Pewee
- ___ Willow Flycatcher
- ___ Hammond's Flycatcher
- ___ Dusky Flycatcher
- ___ Gray Flycatcher
- ___ Pacific Slope Flycatcher
- 1 Black Phoebe
- ___ Say's Phoebe
- 2 Ash-throated Flycatcher
- ___ Cassin's Kingbird
- ___ Western Kingbird
- ___ Horned Lark
- ___ Purple Martin
- ___ Tree Swallow
- ___ Violet-green Swallow
- 1 N. Rough-winged Swallow
- ___ Bank Swallow
- 4 Cliff Swallow
- ___ Barn Swallow
- 2 Scrub Jay
- 8 American Crow
- 11 Common Raven
- ___ Mountain Chickadee
- 4 Plain Titmouse
- 16 Bushtit
- ___ Rock Wren
- ___ Canyon Wren
- 4 Bewick's Wren
- 3 House Wren
- ___ Marsh Wren
- ___ Ruby-crowned Kinglet
- ___ Blue-gray Gnatcatcher
- ___ Western Bluebird
- ___ Swainson's Thrush
- ___ Hermit Thrush
- ___ American Robin
- ___ Wrentit
- ___ Northern Mockingbird
- 1 California Thrasher
- ___ American Pipit
- ___ Cedar Waxwing
- ___ Phainopepla
- ___ Loggerhead Shrike
- 1 European Starling
- ___ Bell's Vireo
- ___ Gray Vireo
- ___ Hutton's Vireo
- ___ Warbling Vireo
- 1 Orange-crowned Warbler
- ___ Nashville Warbler
- ___ Yellow Warbler
- ___ Yellow-rumped Warbler
- ___ Black-th. Gray Warbler
- ___ Townsend's Warbler
- ___ Hermit Warbler
- ___ MacGillivray's Warbler
- 1 Common Yellowthroat
- ___ Wilson's Warbler
- ___ Yellow-breasted Chat
- ___ Summer Tanager
- ___ Western Tanager
- 4 Black-headed Grosbeak
- ___ Blue Grosbeak
- ___ Lazuli Bunting
- 1 Rufous-sided Towhee
- 1 California Towhee
- ___ Chipping Sparrow
- ___ Lark Sparrow
- ___ Fox Sparrow
- 12 Song Sparrow
- 5 [illegible]
- ___ Lincoln's Sparrow
- ___ Golden-crowned Sparrow
- ___ White-crowned Sparrow
- ___ Dark-eyed Junco
- 26 Red-winged Blackbird
- ___ Tricolored Blackbird
- ___ Western Meadowlark
- ___ Yellow-headed Blackbird
- ___ Brewer's Blackbird
- ___ Great-tailed Grackle
- 1 Brown-headed Cowbird
- ___ Hooded Oriole
- 1 Northern Oriole
- ___ Purple Finch
- ___ House Finch
- ___ Pine Siskin
- ___ Lesser Goldfinch
- ___ Lawrence's Goldfinch
- ___ American Goldfinch
- ___ House Sparrow

Additional Species

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SVGreen

1993 Quan I

Birds of the Santa Clara River System

by Blue Moon

Date 6 Castaic River Section _____ Time 7:45

- Great Blue Heron
- Great Egret
- Snowy Egret
- Green-backed Heron
- Green-winged Teal
- Mallard
- Blue-winged Teal
- Cinnamon Teal
- Gadwall
- Ruddy Duck
- Turkey Vulture
- Black-shouldered Kite
- Northern Harrier
- Sharp-shinned Hawk
- Cooper's Hawk
- Red-shouldered Hawk
- Red-tailed Hawk
- American Kestrel
- California Quail
- Virginia Rail
- Sora
- Common Moorhen
- American Coot
- Killdeer
- Black-necked Stilt
- American Avocet
- Greater Yellowlegs
- Solitary Sandpiper
- Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- Domestic Pigeon
- Band-tailed Pigeon
- Mourning Dove
- Spotted Dove
- Greater Roadrunner
- Barn Owl
- Western Screech-Owl
- Great Horned Owl
- Lesser Nighthawk
- Common Poorwill
- Vaux's Swift
- White-throated Swift
- Black-ch. Hummingbird
- Anna's Hummingbird
- Costa's Hummingbird
- Rufous Hummingbird
- Allen's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- Red-breasted Sapsucker
- Nuttall's Woodpecker
- Downy Woodpecker
- Hairy Woodpecker
- Northern Flicker
- Olive-sided Flycatcher
- Western Wood-Pewee
- Willow Flycatcher
- Hammond's Flycatcher
- Dusky Flycatcher
- Gray Flycatcher
- Pacific Slope Flycatcher
- Black Phoebe
- Say's Phoebe
- Ash-throated Flycatcher
- Cassin's Kingbird
- Western Kingbird
- Horned Lark
- Purple Martin
- Tree Swallow
- Violet-green Swallow
- N. Rough-winged Swallow
- Bank Swallow
- Cliff Swallow
- Barn Swallow
- Scrub Jay
- American Crow
- Common Raven
- Mountain Chickadee
- Plain Titmouse
- Bushtit
- Rock Wren
- Canyon Wren
- Bewick's Wren
- House Wren
- Marsh Wren
- Ruby-crowned Kinglet
- Blue-gray Gnatcatcher
- Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- American Robin
- Wrentit
- Northern Mockingbird
- California Thrasher
- American Pipit
- Cedar Waxwing
- Phainopepla
- Loggerhead Shrike
- European Starling
- Bell's Vireo
- Gray Vireo
- Solitary Vireo
- Hutton's Vireo
- Warbling Vireo
- Orange-crowned Warbler
- Nashville Warbler
- Yellow Warbler
- Yellow-rumped Warbler
- Black-th. Gray Warbler
- Townsend's Warbler
- Hermit Warbler
- MacGillivray's Warbler
- Common Yellowthroat
- Wilson's Warbler
- Yellow-breasted Chat
- Summer Tanager
- Western Tanager
- Black-headed Grosbeak
- Blue Grosbeak
- Lazuli Bunting
- Rufous-sided Towhee
- California Towhee
- Chipping Sparrow
- Lark Sparrow
- Fox Sparrow
- Song Sparrow
- Lincoln's Sparrow
- Golden-crowned Sparrow
- White-crowned Sparrow
- Dark-eyed Junco
- Red-winged Blackbird
- Tricolored Blackbird
- Western Meadowlark
- Yellow-headed Blackbird
- Brewer's Blackbird
- Great-tailed Grackle
- Brown-headed Cowbird
- Hooded Oriole
- Northern Oriole
- Purple Finch
- House Finch
- Pine Siskin
- Lesser Goldfinch
- Lawrence's Goldfinch
- American Goldfinch
- House Sparrow

Additional Species

2 Rock dove

1993

0 = combined upper/lower area 1

of the Santa Clara River System

May 12 93 River Section Castaic/Bouquet Time 6:30-

Great Blue Heron
Great Egret
Snowy Egret
Green-backed Heron
Green-winged Teal
Mallard
Blue-winged Teal
Cinnamon Teal
Gadwall
Ruddy Duck
2 Turkey Vulture
2 Black-shouldered Kite
Northern Harrier
Sharp-shinned Hawk
2 Cooper's Hawk
|| Red-shouldered Hawk
2 | Red-tailed Hawk
| American Kestrel
California Quail
Virginia Rail
Sora
Common Moorhen
American Coot
2 Killdeer
Black-necked Stilt
American Avocet
Greater Yellowlegs
Solitary Sandpiper
2 2 | 2 Spotted Sandpiper
Least Sandpiper
Common Snipe
Domestic Pigeon
Band-tailed Pigeon
(1) 12 | Mourning Dove
Spotted Dove
Greater Roadrunner
Barn Owl
Western Screech-Owl
Great Horned Owl
Lesser Nighthawk
Common Poorwill
Vaux's Swift
White-throated Swift
Black-ch. Hummingbird
4 IIII 2 Anna's Hummingbird
(2) || Costa's Hummingbird
Rufous Hummingbird
Allen's Hummingbird
Belted Kingfisher

Acorn Woodpecker
Red-breasted Sapsucker
(13) IIII 2 | Nuttall's Woodpecker
(3) || Downy Woodpecker
(4) ||| Hairy Woodpecker
(5) IIII Northern Flicker
Olive-sided Flycatcher
Western Wood-Pewee
Willow Flycatcher
Hammond's Flycatcher
Dusky Flycatcher
Gray Flycatcher
Pacific Slope Flycatcher
(2) || Black Phoebe
Say's Phoebe
(13) ||| 2 2 Ash-throated Flycatcher
Cassin's Kingbird
Western Kingbird
(4) Horned Lark
Purple Martin
Tree Swallow
Violet-green Swallow
(24) N. Rough-winged Swallow
Bank Swallow
(6) 6 Cliff Swallow
(2) 2 Barn Swallow
(15) 2 | 2 Scrub Jay
(19) 2 American Crow
(20) 6 Common Raven
Mountain Chickadee
Plain Titmouse
(28) 2 6 2 2 Bushtit
Rock Wren
Canyon Wren
(51) 2 | 2 IIII 2 2 2 | 3 Bewick's Wren
(18) 2 || 2 2 | House Wren
Marsh Wren
Ruby-crowned Kinglet
Blue-gray Gnatcatcher
(3) || Western Bluebird
Swainson's Thrush
Hermit Thrush
American Robin
Wrentit
Northern Mockingbird
(5) ||| California Thrasher
American Pipit
Cedar Waxwing
(4) |||| Phainopepla
Loggerhead Shrike
(16) 2 | 2 6 2 2 European Starling
Bell's Vireo

Hutton's Vireo
Warbling Vireo
Orange-crowned Warbler
Nashville Warbler
(5) ||| Yellow Warbler
Yellow-rumped Warbler
Black-th. Gray Warbler
Townsend's Warbler
Hermit Warbler
MacGillivray's Warbler
(3) | Common Yellowthroat
(2) Wilson's Warbler
(1) | Yellow-breasted Chat
Summer Tanager
Western Tanager
(19) IIII Black-headed Grosbeak
(1) | Blue Grosbeak
Lazuli Bunting
(24) 2 2 | 2 | 2 2 Rufous-sided Towhee
(10) 2 | 2 | 2 California Towhee
Chipping Sparrow
(1) | Lark Sparrow
Fox Sparrow
Song Sparrow
(63) 1 2 IIII 2 2 2 2 | 2 | 2 2 2 Lincoln's Sparrow
Golden-crowned Sparrow
White-crowned Sparrow
Dark-eyed Junco
(9) 6 | Red-winged Blackbird
Tricolored Blackbird
Western Meadowlark
Yellow-headed Blackbird
Brewer's Blackbird
Great-tailed Grackle
(23) || 2 | 2 3 2 2 Brown-headed Cowbird
Hooded Oriole
(3) 1 | Northern Oriole
Purple Finch
(2) 2 House Finch
Pine Siskin
(14) 2 Lesser Goldfinch
(8) Lawrence's Goldfinch
American Goldfinch
House Sparrow

Additional Species
1 big parakeet sp

1993
Area 5

...e Santa Clara River System

May 12 93 River Section Fillmore upper / Castaic Time 6:35-9:45

Great Blue Heron
Great Egret
Snowy Egret
Green-backed Heron
Green-winged Teal
2 Mallard
Blue-winged Teal
Cinnamon Teal
Gadwall
Ruddy Duck
Turkey Vulture 3
Black-shouldered Kite [2
Northern Harrier
Sharp-shinned Hawk
2 Cooper's Hawk [1
1 Red-shouldered Hawk
11 Red-tailed Hawk [1
1 American Kestrel
California Quail [4 4 2
Virginia Rail
Sora
Common Moorhen
American Coot
2 Killdeer
Black-necked Stilt
American Avocet
Greater Yellowlegs
Solitary Sandpiper
2 Spotted Sandpiper
Least Sandpiper
Common Snipe
3 Domestic Pigeon
Band-tailed Pigeon
2 Mourning Dove [2 2 11
Spotted Dove 1111 1111 1111
Greater Roadrunner
Barn Owl
Western Screech-Owl
Great Horned Owl
Lesser Nighthawk
Common Poorwill
Vaux's Swift
White-throated Swift
Black-ch. Hummingbird
1 Anna's Hummingbird [1 1
Costa's Hummingbird
Rufous Hummingbird
Allen's Hummingbird
Belted Kingfisher

Acorn Woodpecker
Red-breasted Sapsucker
1 Nuttall's Woodpecker [1
Downy Woodpecker
1 Hairy Woodpecker
Northern Flicker 1
Olive-sided Flycatcher
Western Wood-Pewee
Willow Flycatcher
Hammond's Flycatcher
Dusky Flycatcher
Gray Flycatcher
Pacific Slope Flycatcher
Black Phoebe
Say's Phoebe [1 1
1111 Ash-throated Flycatcher 1 1 1
Cassin's Kingbird
Western Kingbird
4 Horned Lark
Purple Martin
Tree Swallow
Violet-green Swallow
4 2 6 N. Rough-winged Swallow 1111 1111 1111 [2 2 2 Song Sparrow [1 1
Bank Swallow
Cliff Swallow 1111 1111 1
Barn Swallow
1 1111 Scrub Jay [2 1
6 2 2 2 4 American Crow [1
8 7 2 Common Raven
Mountain Chickadee
Plain Titmouse
2 6 Bushtit [4 4
Rock Wren
Canyon Wren
2 2 2 Bewick's Wren [2 2 11
1111 House Wren [1 1 1 1
Marsh Wren
Ruby-crowned Kinglet
Blue-gray Gnatcatcher
1 Western Bluebird
Swainson's Thrush
Hermit Thrush
American Robin
Wrentit
Northern Mockingbird
1 California Thrasher 1
American Pipit
Cedar Waxwing
Phainopepla
Loggerhead Shrike
2 11 European Starling 2
Bell's Vireo
Gray Vireo
Solitary Vireo

Hutton's Vireo
Warbling Vireo
Orange-crowned Warbler
Nashville Warbler
1 Yellow Warbler
Yellow-rumped Warbler
Black-th. Gray Warbler
Townsend's Warbler
Hermit Warbler
MacGillivray's Warbler
11 Common Yellowthroat
11 Wilson's Warbler
Yellow-breasted Chat
Summer Tanager
Western Tanager
1111 Black-headed Grosbeak [1 1 1
Blue Grosbeak
Lazuli Bunting
1111 Rufous-sided Towhee [1
1 California Towhee
Chipping Sparrow
Lark Sparrow
Fox Sparrow
Song Sparrow [1 1
Lincoln's Sparrow
Golden-crowned Sparrow
White-crowned Sparrow
Dark-eyed Junco
6 Red-winged Blackbird
Tricolored Blackbird
Western Meadowlark
Yellow-headed Blackbird
Brewer's Blackbird
Great-tailed Grackle
2 2 2 1 Brown-headed Cowbird 2
Hooded Oriole
Northern Oriole
Purple Finch
House Finch
Pine Siskin
4 2 Lesser Goldfinch 2 4
Lawrence's Goldfinch [4
American Goldfinch
House Sparrow

Additional Species

MAY 30 BOB BORTON

I5 — CASTAIC

(Washout area at Blue Moon Cafe included.

1993 Area 1

Birds of the Santa Clara River System

Date _____ River Section _____ Time _____

_____ Great Blue Heron
_____ Great Egret
_____ Snowy Egret
_____ Green-backed Heron
_____ Green-winged Teal
_____ Mallard
_____ Blue-winged Teal
_____ Cinnamon Teal
_____ Gadwall
_____ Ruddy Duck
_____ Turkey Vulture
_____ Black-shouldered Kite
_____ Northern Harrier
_____ Sharp-shinned Hawk
11 Cooper's Hawk
_____ Red-shouldered Hawk
_____ Red-tailed Hawk
11 American Kestrel
111 California Quail
_____ Virginia Rail
_____ Sora
_____ Common Moorhen
_____ American Coot
1111 Killdeer
_____ Black-necked Stilt
_____ American Avocet
_____ Greater Yellowlegs
_____ Solitary Sandpiper
1 Spotted Sandpiper
_____ Least Sandpiper
_____ Common Snipe
107 Domestic Pigeon
_____ Band-tailed Pigeon
_____ Mourning Dove
_____ Spotted Dove
_____ Greater Roadrunner
_____ Barn Owl
_____ Western Screech-Owl
_____ Great Horned Owl
_____ Lesser Nighthawk
_____ Common Poorwill
_____ Vaux's Swift
_____ White-throated Swift
1 Black-ch. Hummingbird
3 Anna's Hummingbird
_____ Costa's Hummingbird
_____ Rufous Hummingbird
_____ Allen's Hummingbird
_____ Belted Kingfisher

_____ Acorn Woodpecker
_____ Red-breasted Sapsucker
1 Nuttall's Woodpecker
41 Downy Woodpecker
_____ Hairy Woodpecker
1 Northern Flicker
_____ Olive-sided Flycatcher
_____ Western Wood-Pewee
_____ Willow Flycatcher
_____ Hammond's Flycatcher
_____ Dusky Flycatcher
_____ Gray Flycatcher
_____ Pacific Slope Flycatcher
1 Black Phoebe
_____ Say's Phoebe
11 112 Ash-throated Flycatcher
_____ Cassin's Kingbird
_____ Western Kingbird
_____ Horned Lark
_____ Purple Martin
_____ Tree Swallow
_____ Violet-green Swallow
1 N. Rough-winged Swallow
_____ Bank Swallow
111 Cliff Swallow
_____ Barn Swallow
8,11 1111 3 Scrub Jay
10,11 1111 2 American Crow
4 Common Raven
_____ Mountain Chickadee
13,11,2 2 1 Plain Titmouse
11 Bushtit
_____ Rock Wren
_____ Canyon Wren
6 1111 1111 11 Bewick's Wren
3 11 House Wren
_____ Marsh Wren
_____ Ruby-crowned Kinglet
_____ Blue-gray Gnatcatcher
_____ Western Bluebird
_____ Swainson's Thrush
_____ Hermit Thrush
_____ American Robin
_____ Wrentit
_____ Northern Mockingbird
11 California Thrasher
_____ American Pipit
_____ Cedar Waxwing
_____ Phainopepla
_____ Loggerhead Shrike
1111 2 European Starling
_____ Bell's Vireo
_____ Gray Vireo
_____ Solitary Vireo

_____ Hutton's Vireo
_____ Warbling Vireo
1 Orange-crowned Warbler
_____ Nashville Warbler
_____ Yellow Warbler
_____ Yellow-rumped Warbler
_____ Black-th. Gray Warbler
_____ Townsend's Warbler
_____ Hermit Warbler
_____ MacGillivray's Warbler
1 Common Yellowthroat
_____ Wilson's Warbler
_____ Yellow-breasted Chat
_____ Summer Tanager
_____ Western Tanager
71 Black-headed Grosbeak
_____ Blue Grosbeak
_____ Lazuli Bunting
11 Rufous-sided Towhee
1 California Towhee
_____ Chipping Sparrow
_____ Lark Sparrow
_____ Fox Sparrow
22,111 11 1111 Song Sparrow
_____ Lincoln's Sparrow
_____ Golden-crowned Sparrow
_____ White-crowned Sparrow
_____ Dark-eyed Junco
8 Red-winged Blackbird
_____ Tricolored Blackbird
_____ Western Meadowlark
_____ Yellow-headed Blackbird
_____ Brewer's Blackbird
_____ Great-tailed Grackle
12 Brown-headed Cowbird
_____ Hooded Oriole
1 Northern Oriole
_____ Purple Finch
_____ House Finch
_____ Pine Siskin
_____ Lesser Goldfinch
_____ Lawrence's Goldfinch
_____ American Goldfinch
_____ House Sparrow

Additional Species

_____
_____
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_____

2

1993

irds of the Santa Clara River System

~~at~~ Upper R

at June 18/93 River Section I5 to Castaic Time 630-830

Area 1

- Great Blue Heron
- Great Egret
- Snowy Egret
- Green-backed Heron
- Green-winged Teal
- Mallard
- Blue-winged Teal
- Cinnamon Teal
- Gadwall
- Ruddy Duck
- Turkey Vulture
- Black-shouldered Kite
- Northern Harrier
- Sharp-shinned Hawk
- Cooper's Hawk
- || Red-shouldered Hawk
- Red-tailed Hawk
- American Kestrel
- California Quail
- Virginia Rail
- Sora
- Common Moorhen
- American Coot
- 2 3 Killdeer
- Black-necked Stilt
- American Avocet
- Greater Yellowlegs
- Solitary Sandpiper
- Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- 2 2 Domestic Pigeon
- Band-tailed Pigeon
- ||| Mourning Dove
- Spotted Dove
- Greater Roadrunner 2 2 1 2 2 1 2 2
- Barn Owl
- Western Screech-Owl
- Great Horned Owl
- Lesser Nighthawk
- Common Poorwill
- Vaux's Swift
- White-throated Swift
- Black-ch. Hummingbird
- || Anna's Hummingbird
- Costa's Hummingbird
- Rufous Hummingbird
- Allen's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- Red-breasted Sapsucker
- |||| Nuttall's Woodpecker
- 2 2 2 Downy Woodpecker
- Hairy Woodpecker
- Northern Flicker
- Olive-sided Flycatcher
- Western Wood-Pewee
- Willow Flycatcher
- Hammond's Flycatcher
- Dusky Flycatcher
- Gray Flycatcher
- Pacific Slope Flycatcher
- Black Phoebe
- Say's Phoebe
- |||| Ash-throated Flycatcher
- Cassin's Kingbird
- Western Kingbird
- Horned Lark
- Purple Martin
- Tree Swallow
- Violet-green Swallow
- 8 9 N. Rough-winged Swallow
- Bank Swallow
- Cliff Swallow 3 2 2 3 1 1 2 2 2 1 2
- Barn Swallow 3 2 3 2 5
- 1 2 2 2 1 Scrub Jay
- 3 2 1 2 2 American Crow
- 2 Common Raven
- Mountain Chickadee
- 2 1 3 1 2 1 Plain Titmouse
- Bushtit
- Rock Wren
- Canyon Wren
- |||| Bewick's Wren
- |||| House Wren
- Marsh Wren
- Ruby-crowned Kinglet
- Blue-gray Gnatcatcher
- Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- American Robin
- || Wrentit
- Northern Mockingbird
- || California Thrasher
- American Pipit
- Cedar Waxwing
- Phainopepla
- Loggerhead Shrike
- 2 European Starling
- Bell's Vireo
- Gray Vireo
- Solitary Vireo
- Hutton's Vireo
- Warbling Vireo
- Orange-crowned Warbler
- Nashville Warbler
- 1 Yellow Warbler
- Yellow-rumped Warbler
- Black-th. Gray Warbler
- Townsend's Warbler
- Hermit Warbler
- MacGillivray's Warbler
- |||| Common Yellowthroat
- Wilson's Warbler
- 1 Yellow-breasted Chat
- Summer Tanager
- Western Tanager
- |||| Black-headed Grosbeak
- || Blue Grosbeak
- Lazuli Bunting
- 1 1 |||| Rufous-sided Towhee
- || California Towhee
- Chipping Sparrow
- Lark Sparrow
- Fox Sparrow
- |||| Song Sparrow 2 2 2 1 2 1 1
- Lincoln's Sparrow
- Golden-crowned Sparrow
- White-crowned Sparrow
- Dark-eyed Junco
- 9 3 4 Red-winged Blackbird
- Tricolored Blackbird
- Western Meadowlark
- Yellow-headed Blackbird
- Brewer's Blackbird
- Great-tailed Grackle
- 1 3 2 5 2 2 1 Brown-headed Cowbird
- Hooded Oriole
- Northern Oriole
- Purple Finch
- House Finch
- Pine Siskin
- 4 Lesser Goldfinch
- Lawrence's Goldfinch
- American Goldfinch
- House Sparrow

Additional Species

_____

_____

_____

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_____

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_____

_____

_____

1993

ir[illegible] of the Santa Clara River System

ate June 18/93 River Section Castaic to Clarita Time 6:20

- Great Blue Heron
- Great Egret
- Snowy Egret
- III Green-backed Heron
- Green-winged Teal
- Mallard
- Blue-winged Teal
- Cinnamon Teal
- Gadwall
- Ruddy Duck
- Turkey Vulture
- I Black-shouldered Kite
- Northern Harrier
- Sharp-shinned Hawk
- I Cooper's Hawk
- II Red-shouldered Hawk
- I Red-tailed Hawk
- American Kestrel
- 2 IIII California Quail
- Virginia Rail
- Sora
- Common Moorhen
- American Coot
- 34 31 Killdeer
- Black-necked Stilt
- American Avocet
- Greater Yellowlegs
- Solitary Sandpiper
- 3 20 12 2 Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- 2 Domestic Pigeon
- Band-tailed Pigeon
- 43 IIII Mourning Dove
- Spotted Dove
- Greater Roadrunner
- Barn Owl
- Western Screech-Owl
- Great Horned Owl
- Lesser Nighthawk
- Common Poorwill
- Vaux's Swift
- Scado 2 White-throated Swift
- 12 Black-ch. Hummingbird
- III Anna's Hummingbird
- Costa's Hummingbird
- Rufous Hummingbird
- Allen's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- Red-breasted Sapsucker
- 8 IIII Nuttall's Woodpecker
- II Downy Woodpecker
- II 3 Hairy Woodpecker
- 2 12 Northern Flicker
- Olive-sided Flycatcher
- Western Wood-Pewee
- Willow Flycatcher
- Hammond's Flycatcher
- Dusky Flycatcher
- Gray Flycatcher
- Pacific Slope Flycatcher
- III Black Phoebe
- Say's Phoebe
- 12 III Ash-throated Flycatcher
- Cassin's Kingbird
- 1 2 Western Kingbird
- Horned Lark
- Purple Martin
- Tree Swallow
- 2 Violet-green Swallow
- Scado 30 222 N. Rough-winged Swallow
- Bank Swallow
- Scado 2 Cliff Swallow
- Barn Swallow
- 2 13 Scrub Jay
- 4 29 6 American Crow
- 23 Common Raven
- Mountain Chickadee
- 225 Plain Titmouse
- 42 Bushtit
- Rock Wren
- Canyon Wren
- 82 18 2 Bewick's Wren
- 8 6 2 3 House Wren
- Marsh Wren
- Ruby-crowned Kinglet
- Blue-gray Gnatcatcher
- 1 8 Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- American Robin
- Wrentit
- Northern Mockingbird
- 2 12 California Thrasher
- American Pipit
- Cedar Waxwing
- 2 Phainopepla
- Loggerhead Shrike
- 9 9 1 2 European Starling
- Bell's Vireo
- Gray Vireo
- Solitary Vireo
- Hutton's Vireo
- Warbling Vireo
- Orange-crowned Warbler
- Nashville Warbler
- I Yellow Warbler
- Yellow-rumped Warbler
- Black-th. Gray Warbler
- Townsend's Warbler
- Hermit Warbler
- MacGillivray's Warbler
- III Common Yellowthroat
- Wilson's Warbler
- I Yellow-breasted Chat
- Summer Tanager
- I Western Tanager
- 1 2 3 12 Black-headed Grosbeak
- I Blue Grosbeak
- Lazuli Bunting
- II 11 Rufous-sided Towhee
- 22 California Towhee
- Chipping Sparrow
- Lark Sparrow
- Fox Sparrow
- 20 2 2 2 22 32 226 Song Sparrow
- Lincoln's Sparrow
- Golden-crowned Sparrow
- White-crowned Sparrow
- Dark-eyed Junco
- I 224 Red-winged Blackbird
- Tricolored Blackbird
- Western Meadowlark
- Yellow-headed Blackbird
- Brewer's Blackbird
- Great-tailed Grackle
- 4 15 2 II 23 Brown-headed Cowbird
- III Hooded Oriole
- I Northern Oriole
- Purple Finch
- 22 House Finch
- Pine Siskin
- I Lesser Goldfinch
- Lawrence's Goldfinch
- American Goldfinch
- House Sparrow

Additional Species

2 empidonax

1993 Count

Birds of the Santa Clara River System

Date July 4 River Section Blue Point to Castaic Time _____

- Great Blue Heron
- Great Egret
- Snowy Egret
- Green-backed Heron
- Green-winged Teal
- Mallard
- Blue-winged Teal
- Cinnamon Teal
- Gadwall
- Ruddy Duck
- Turkey Vulture
- 2 Black-shouldered Kite
- Northern Harrier
- Sharp-shinned Hawk
- Cooper's Hawk
- || Red-shouldered Hawk
- 2 Red-tailed Hawk
- American Kestrel
- 22 (4) 2 California Quail
- Virginia Rail
- Sora
- Common Moorhen
- American Coot
- 4 |||| Killdeer
- Black-necked Stilt
- American Avocet
- Greater Yellowlegs
- Solitary Sandpiper
- 3 2 2 3, 4 Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- 12 Domestic Pigeon
- Band-tailed Pigeon
- 12 | |||| Mourning Dove
- 1 Spotted Dove
- Greater Roadrunner
- Barn Owl
- Western Screech-Owl
- Great Horned Owl
- Lesser Nighthawk
- Common Poorwill
- Vaux's Swift
- White-throated Swift
- || Black-ch. Hummingbird
- | |||| Anna's Hummingbird
- Costa's Hummingbird
- Rufous Hummingbird
- Allen's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- Red-breasted Sapsucker
- 3 3 2 || Nuttall's Woodpecker
- 2 || Downy Woodpecker
- || Hairy Woodpecker
- 4 ||| Northern Flicker
- Olive-sided Flycatcher
- Western Wood-Pewee
- Willow Flycatcher
- Hammond's Flycatcher
- Dusky Flycatcher
- Gray Flycatcher
- Pacific Slope Flycatcher
- || Black Phoebe
- Say's Phoebe
- 2 || 2 Ash-throated Flycatcher
- Cassin's Kingbird
- 2 Western Kingbird
- Horned Lark
- Purple Martin
- Tree Swallow
- 2 Violet-green Swallow
- 12 N. Rough-winged Swallow
- Bank Swallow
- 50 Cliff Swallow
- Barn Swallow
- 24 4 22 Scrub Jay
- 2, 4, 2 American Crow
- 1, 3 Common Raven
- Mountain Chickadee
- 12 | Plain Titmouse
- 3 Bushtit
- Rock Wren
- Canyon Wren
- 4 | || 22 || Bewick's Wren
- 12 House Wren
- Marsh Wren
- Ruby-crowned Kinglet
- Blue-gray Gnatcatcher
- 2 2 3 | Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- American Robin
- Wrentit
- Northern Mockingbird
- 2 California Thrasher
- American Pipit
- Cedar Waxwing
- Phainopepla
- Loggerhead Shrike
- 2 4 8 European Starling
- Bell's Vireo
- Gray Vireo
- Solitary Vireo
- Hutton's Vireo
- Warbling Vireo
- Orange-crowned Warbler
- Nashville Warbler
- || Yellow Warbler
- Yellow-rumped Warbler
- Black-th. Gray Warbler
- Townsend's Warbler
- Hermit Warbler
- MacGillivray's Warbler
- 12 || 2 Common Yellowthroat
- Wilson's Warbler
- || Yellow-breasted Chat
- Summer Tanager
- Western Tanager
- 12 4 || 2 3 2 2 Black-headed Grosbeak
- | Blue Grosbeak
- 12 Lazuli Bunting
- | Rufous-sided Towhee
- 12 8, 2 California Towhee
- Chipping Sparrow
- 14 | 2 Lark Sparrow
- Fox Sparrow
- 1 12 [illegible] Song Sparrow
- Lincoln's Sparrow
- Golden-crowned Sparrow
- White-crowned Sparrow
- Dark-eyed Junco
- 3 Red-winged Blackbird
- Tricolored Blackbird
- Western Meadowlark
- Yellow-headed Blackbird
- Brewer's Blackbird
- Great-tailed Grackle
- 21 5 25 Brown-headed Cowbird
- Hooded Oriole
- | Northern Oriole
- Purple Finch
- || 2 House Finch
- Pine Siskin
- | Lesser Goldfinch
- Lawrence's Goldfinch
- American Goldfinch
- House Sparrow

Additional Species

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1993 Count

irds of the Santa Clara River System Blue M

)ate July 4 River Section I-5 - Castaic Time _____

___	Great Blue Heron
___	Great Egret
___	Snowy Egret
___	Green-backed Heron
___	Green-winged Teal
___	Mallard
___	Blue-winged Teal
___	Cinnamon Teal
___	Gadwall
___	Ruddy Duck
___	Turkey Vulture
___	Black-shouldered Kite
___	Northern Harrier
___	Sharp-shinned Hawk
___	Cooper's Hawk
___	Red-shouldered Hawk
___	Red-tailed Hawk
___	American Kestrel
___	California Quail
___	Virginia Rail
___	Sora
___	Common Moorhen
___	American Coot
___	Killdeer
___	Black-necked Stilt
___	American Avocet
___	Greater Yellowlegs
___	Solitary Sandpiper
___	Spotted Sandpiper
___	Least Sandpiper
___	Common Snipe
___	Domestic Pigeon
___	Band-tailed Pigeon
___	Mourning Dove
___	Spotted Dove
___	Greater Roadrunner
___	Barn Owl
___	Western Screech-Owl
___	Great Horned Owl
___	Lesser Nighthawk
___	Common Poorwill
___	Vaux's Swift
___	White-throated Swift
___	Black-ch. Hummingbird
___	Anna's Hummingbird
___	Costa's Hummingbird
___	Rufous Hummingbird
___	Allen's Hummingbird
___	Belted Kingfisher
___	Acorn Woodpecker
___	Red-breasted Sapsucker
6	Nuttall's Woodpecker
4	Downy Woodpecker
3	Hairy Woodpecker
___	Northern Flicker
___	Olive-sided Flycatcher
___	Western Wood-Pewee
___	Willow Flycatcher
___	Hammond's Flycatcher
___	Dusky Flycatcher
___	Gray Flycatcher
___	Pacific Slope Flycatcher
6	Black Phoebe
___	Say's Phoebe
5	Ash-throated Flycatcher
___	Cassin's Kingbird
___	Western Kingbird
___	Horned Lark
___	Purple Martin
___	Tree Swallow
___	Violet-green Swallow
4	N. Rough-winged Swallow
___	Bank Swallow
2	Cliff Swallow
___	Barn Swallow
5	Scrub Jay
21	American Crow
4	Common Raven
___	Mountain Chickadee
8	Plain Titmouse
___	Bushtit
___	Rock Wren
___	Canyon Wren
3	Bewick's Wren
6	House Wren
___	Marsh Wren
___	Ruby-crowned Kinglet
___	Blue-gray Gnatcatcher
___	Western Bluebird
___	Swainson's Thrush
___	Hermit Thrush
___	American Robin
___	Wrentit
___	Northern Mockingbird
2	California Thrasher
___	American Pipit
___	Cedar Waxwing
___	Phainopepla
___	Loggerhead Shrike
53	European Starling
___	Bell's Vireo
___	Gray Vireo
___	Solitary Vireo
___	Hutton's Vireo
___	Warbling Vireo
___	Orange-crowned Warbler
___	Nashville Warbler
___	Yellow Warbler
___	Yellow-rumped Warbler
___	Black-th. Gray Warbler
___	Townsend's Warbler
___	Hermit Warbler
___	MacGillivray's Warbler
7	Common Yellowthroat
___	Wilson's Warbler
___	Yellow-breasted Chat
___	Summer Tanager
___	Western Tanager
4	Black-headed Grosbeak
3	Blue Grosbeak
7	Lazuli Bunting
5	Rufous-sided Towhee
7	California Towhee
___	Chipping Sparrow
___	Lark Sparrow
___	Fox Sparrow
39	Song Sparrow
___	Lincoln's Sparrow
___	Golden-crowned Sparrow
___	White-crowned Sparrow
___	Dark-eyed Junco
___	Red-winged Blackbird
___	Tricolored Blackbird
___	Western Meadowlark
___	Yellow-headed Blackbird
___	Brewer's Blackbird
___	Great-tailed Grackle
13	Brown-headed Cowbird
3	Hooded Oriole
1	Northern Oriole
___	Purple Finch
12	House Finch
___	Pine Siskin
2	Lesser Goldfinch
___	Lawrence's Goldfinch
___	American Goldfinch
___	House Sparrow

Additional Species

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Sugda

1993 Count

Birds of the Santa Clara River System

Date July 19/93 River Section I-5 - Blue Moon Time _____

- Great Blue Heron
- Great Egret
- Snowy Egret
- Green-backed Heron
- Green-winged Teal
- Mallard
- Blue-winged Teal
- Cinnamon Teal
- Gadwall
- Ruddy Duck
- Turkey Vulture
- Black-shouldered Kite
- Northern Harrier
- Sharp-shinned Hawk
- 1 Cooper's Hawk
- 2 Red-shouldered Hawk
- 1 Red-tailed Hawk
- American Kestrel
- 28, 35 California Quail
- Virginia Rail
- Sora
- Common Moorhen
- American Coot
- 32 Killdeer
- Black-necked Stilt
- American Avocet
- Greater Yellowlegs
- Solitary Sandpiper
- 1 Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- 6 Domestic Pigeon
- Band-tailed Pigeon
- 12 Mourning Dove
- Spotted Dove
- Greater Roadrunner
- Barn Owl
- Western Screech-Owl
- Great Horned Owl
- Lesser Nighthawk
- Common Poorwill
- Vaux's Swift
- White-throated Swift
- 2 Black-ch. Hummingbird
- Anna's Hummingbird
- 2 Costa's Hummingbird
- Rufous Hummingbird
- Allen's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- Red-breasted Sapsucker
- Nuttall's Woodpecker
- Downy Woodpecker
- 4 Hairy Woodpecker
- 1 Northern Flicker
- Olive-sided Flycatcher
- Western Wood-Pewee
- Willow Flycatcher
- Hammond's Flycatcher
- Dusky Flycatcher
- Gray Flycatcher
- Pacific Slope Flycatcher
- 1 Black Phoebe
- Say's Phoebe
- Ash-throated Flycatcher
- Cassin's Kingbird
- Western Kingbird
- Horned Lark
- Purple Martin
- Tree Swallow
- Violet-green Swallow
- N. Rough-winged Swallow 5, 25, 29, 5
- Bank Swallow
- Cliff Swallow
- Barn Swallow
- 32 Scrub Jay
- 4 American Crow
- 6, 35, 2 Common Raven
- Mountain Chickadee
- 11 6 4, 13, 2, 4 Plain Titmouse
- 5, 6, 2 Bushtit
- Rock Wren
- Canyon Wren
- 11 5 Bewick's Wren
- House Wren
- Marsh Wren
- Ruby-crowned Kinglet
- Blue-gray Gnatcatcher
- 4 Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- 1 American Robin
- Wrentit
- Northern Mockingbird
- 1 California Thrasher
- American Pipit
- Cedar Waxwing
- Phainopepla
- Loggerhead Shrike
- 10 European Starling
- Bell's Vireo
- Gray Vireo
- Solitary Vireo
- Hutton's Vireo
- Warbling Vireo
- Orange-crowned Warbler
- Nashville Warbler
- 1 Yellow Warbler
- Yellow-rumped Warbler
- Black-th. Gray Warbler
- Townsend's Warbler
- Hermit Warbler
- MacGillivray's Warbler
- 3, 9, 3 Common Yellowthroat
- Wilson's Warbler
- 1 Yellow-breasted Chat
- 1 Summer Tanager
- Western Tanager
- 2 Black-headed Grosbeak
- 1 Blue Grosbeak
- 1 Lazuli Bunting
- Rufous-sided Towhee
- 1 California Towhee
- Chipping Sparrow
- 20, 8, 6 Lark Sparrow
- Fox Sparrow
- Song Sparrow
- Lincoln's Sparrow
- Golden-crowned Sparrow
- White-crowned Sparrow
- Dark-eyed Junco
- 9 Red-winged Blackbird
- Tricolored Blackbird
- Western Meadowlark
- Yellow-headed Blackbird
- Brewer's Blackbird
- Great-tailed Grackle
- 9 Brown-headed Cowbird
- Hooded Oriole
- 1 Northern Oriole
- Purple Finch
- 2 House Finch
- Pine Siskin
- 1, 2, 3 Lesser Goldfinch
- Lawrence's Goldfinch
- American Goldfinch
- House Sparrow

Additional Species

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1993 Area 1

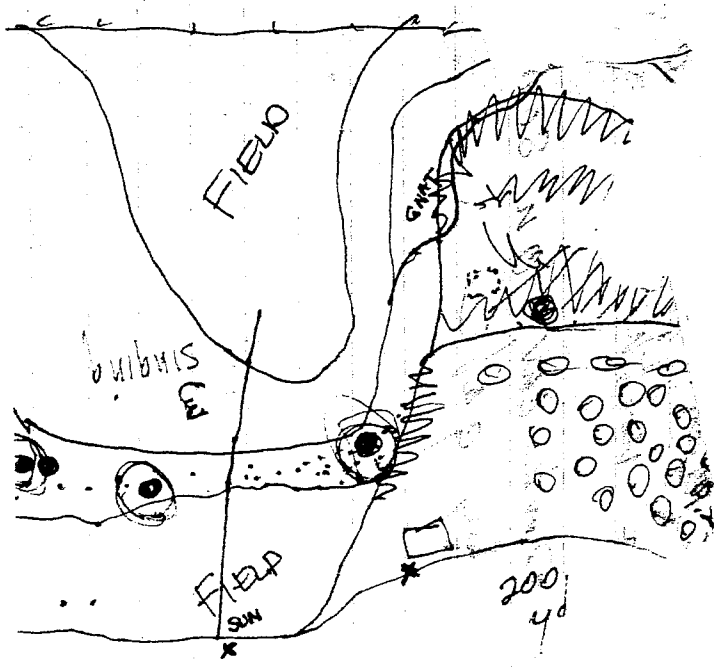
rd of the Santa Clara River System

Date Sunday July 18 93 River Section Blue Moon to Castaic Creek Time _____

- Great Blue Heron
- Great Egret
- Snowy Egret
- Green-backed Heron
- Green-winged Teal
- 2, 3 Mallard
- Blue-winged Teal
- Cinnamon Teal
- Gadwall
- Ruddy Duck
- Turkey Vulture
- Black-shouldered Kite
- Northern Harrier
- Sharp-shinned Hawk
- Cooper's Hawk
- || Red-shouldered Hawk
- 2 Red-tailed Hawk
- American Kestrel
- 12 California Quail
- Virginia Rail
- Sora
- Common Moorhen
- American Coot
- 2 2 4 1 Killdeer
- Black-necked Stilt
- American Avocet
- Greater Yellowlegs
- Solitary Sandpiper
- 1 8 4 Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- Domestic Pigeon
- Band-tailed Pigeon
- 31 3 Mourning Dove
- Spotted Dove
- Greater Roadrunner
- Barn Owl
- Western Screech-Owl
- Great Horned Owl
- Lesser Nighthawk
- Common Poorwill
- Vaux's Swift
- White-throated Swift
- 1 2 Black-ch. Hummingbird
- Anna's Hummingbird
- Costa's Hummingbird
- Rufous Hummingbird
- Allen's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- Red-breasted Sapsucker
- Nuttall's Woodpecker
- Downy Woodpecker
- Hairy Woodpecker
- Northern Flicker
- Olive-sided Flycatcher
- Western Wood-Pewee
- Willow Flycatcher
- Hammond's Flycatcher
- Dusky Flycatcher
- Gray Flycatcher
- Pacific Slope Flycatcher
- 12 Black Phoebe
- Say's Phoebe
- Ash-throated Flycatcher
- Cassin's Kingbird
- Western Kingbird
- Horned Lark
- Purple Martin
- Tree Swallow
- Violet-green Swallow
- 3 N. Rough-winged Swallow
- Bank Swallow
- 9 Cliff Swallow
- Barn Swallow
- 1 1 2 12 2 Scrub Jay
- 12 2 4 American Crow
- 8 6 2, 8, 3, 5 Common Raven
- Mountain Chickadee
- 1 2 1 2 2 4 Plain Titmouse
- 7, 8 Bushtit
- Rock Wren
- Canyon Wren
- Bewick's Wren
- House Wren
- Marsh Wren
- Ruby-crowned Kinglet
- Blue-gray Gnatcatcher
- 2 Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- American Robin
- Wrentit
- Northern Mockingbird
- 2 California Thrasher
- American Pipit
- Cedar Waxwing
- 2 8 6 2 Phainopepla
- Loggerhead Shrike
- 4, 5, 7, 12 European Starling
- Bell's Vireo
- Gray Vireo
- Solitary Vireo
- Hutton's Vireo
- Warbling Vireo
- Orange-crowned Warbler
- Nashville Warbler
- Yellow Warbler
- Yellow-rumped Warbler
- Black-th. Gray Warbler
- Townsend's Warbler
- Hermit Warbler
- MacGillivray's Warbler
- Common Yellowthroat
- Wilson's Warbler
- Yellow-breasted Chat
- Summer Tanager
- Western Tanager
- 1 Black-headed Grosbeak
- 1 Blue Grosbeak
- 3 4 Lazuli Bunting
- 2 2 2 Rufous-sided Towhee
- California Towhee
- Chipping Sparrow
- 2 8 5 Lark Sparrow
- Fox Sparrow
- Song Sparrow
- 2 Lincoln's Sparrow
- Golden-crowned Sparrow
- White-crowned Sparrow
- Dark-eyed Junco
- 20, 30 Red-winged Blackbird
- Tricolored Blackbird
- Western Meadowlark
- Yellow-headed Blackbird
- Brewer's Blackbird
- Great-tailed Grackle
- 2 2 2 5 Brown-headed Cowbird
- 2 Hooded Oriole
- Northern Oriole
- Purple Finch
- 1, 20, 2 2 3 2 2 2 3 House Finch
- Pine Siskin
- 12 6 2 3 3 Lesser Goldfinch
- Lawrence's Goldfinch
- 2 American Goldfinch
- House Sparrow

Additional Species

1. GOLDEN EAGLES



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[illegible]
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1993 Area 2

Birds of the Santa Clara River System

Date 4-13 River Section McB → Oxford Time 7-10

Count	Species
	Great Blue Heron
	Great Egret
	Snowy Egret
	Green-backed Heron
	Green-winged Teal
2,3	Mallard
	Blue-winged Teal
	Cinnamon Teal
	Gadwall
	Ruddy Duck
	Turkey Vulture
	Black-shouldered Kite
	Northern Harrier
	Sharp-shinned Hawk
	Cooper's Hawk
1	Red-shouldered Hawk
1,1	Red-tailed Hawk
	American Kestrel
10,5,5	California Quail
	Virginia Rail
	Sora
	Common Moorhen
	American Coot
1	Killdeer
	Black-necked Stilt
	American Avocet
	Greater Yellowlegs
	Solitary Sandpiper
	Spotted Sandpiper
3	Least Sandpiper
	Common Snipe
1	Domestic Pigeon
	Band-tailed Pigeon
1,2	Mourning Dove
	Spotted Dove
	Greater Roadrunner
	Barn Owl
	Western Screech-Owl
	Great Horned Owl
	Lesser Nighthawk
	Common Poorwill
	Vaux's Swift
	White-throated Swift
	Black-ch. Hummingbird
111	Anna's Hummingbird
	Costa's Hummingbird
	Rufous Hummingbird
	Allen's Hummingbird
	Belted Kingfisher
	Acorn Woodpecker
	Red-breasted Sapsucker
1,1,1,1,1	Nuttall's Woodpecker
2,1,1,1,1	Downy Woodpecker
2	Hairy Woodpecker
1	Northern Flicker
	Olive-sided Flycatcher
	Western Wood-Pewee
	Willow Flycatcher
	Hammond's Flycatcher
	Dusky Flycatcher
	Gray Flycatcher
	Pacific Slope Flycatcher
1,1,1,1,1	Black Phoebe
	Say's Phoebe
2,1,1,1	Ash-throated Flycatcher
	Cassin's Kingbird
2,1,2	Western Kingbird
	Horned Lark
	Purple Martin
	Tree Swallow
6	Violet-green Swallow
20,5,5,10	N. Rough-winged Swallow
	Bank Swallow
	Cliff Swallow
	Barn Swallow
1,1	Scrub Jay
2	American Crow
1,7,5	Common Raven
	Mountain Chickadee
1,4,5,20	Plain Titmouse
2,5,8,2	Bushtit
	Rock Wren
	Canyon Wren
1,1,1,2,1,1	Bewick's Wren
1,1	House Wren
	Marsh Wren
	Ruby-crowned Kinglet
	Blue-gray Gnatcatcher
3,2,4,2	Western Bluebird
	Swainson's Thrush
	Hermit Thrush
	American Robin
	Wrentit
	Northern Mockingbird
1,1	California Thrasher
4	American Pipit
	Cedar Waxwing
	Phainopepla
	Loggerhead Shrike
3	European Starling
	Bell's Vireo
	Gray Vireo
1	Solitary Vireo
	Hutton's Vireo
	Warbling Vireo
2,2,2,1	Orange-crowned Warbler
1,1,1,1	Nashville Warbler
	Yellow Warbler
10,15,20	Yellow-rumped Warbler
1,1	Black-th. Gray Warbler
	Townsend's Warbler
	Hermit Warbler
	MacGillivray's Warbler
1,2,1,1	Common Yellowthroat
1,1,1,1,4,4,1,1,1,1,2,1,1	Wilson's Warbler
	Yellow-breasted Chat
	Summer Tanager
1	Western Tanager
2,2,1,1,1	Black-headed Grosbeak
	Blue Grosbeak
	Lazuli Bunting
1,1,1,4	Rufous-sided Towhee
1	California Towhee
	Chipping Sparrow
	Lark Sparrow
	Fox Sparrow
2,1,1,1,2,1,2,2,2,2,1	Song Sparrow
	Lincoln's Sparrow
	Golden-crowned Sparrow
	White-crowned Sparrow
	Dark-eyed Junco
	Red-winged Blackbird
	Tricolored Blackbird
	Western Meadowlark
1	Yellow-headed Blackbird
	Brewer's Blackbird
	Great-tailed Grackle
IIII 3	Brown-headed Cowbird
	Hooded Oriole
	Northern Oriole
15	Purple Finch
	House Finch
	Pine Siskin
3,2	Lesser Goldfinch
	Lawrence's Goldfinch
15,10,3,2,2	American Goldfinch
	House Sparrow

Additional Species

Area 2 1993

Birds of the Santa Clara River System MCB → old Ld.

Date 4/29 River Section _____ Time _____

- ___ Great Blue Heron
- ___ Great Egret
- ___ Snowy Egret
- 1 Green-backed Heron
- ___ Green-winged Teal
- 1 Mallard
- ___ Blue-winged Teal
- ___ Cinnamon Teal
- ___ Gadwall
- ___ Ruddy Duck
- ___ Turkey Vulture
- ___ Black-shouldered Kite
- ___ Northern Harrier
- ___ Sharp-shinned Hawk
- ___ Cooper's Hawk
- ___ Red-shouldered Hawk
- 1 Red-tailed Hawk
- ___ American Kestrel
- 22 California Quail
- 1 Virginia Rail
- 0 Sora
- ___ Common Moorhen
- ___ American Coot
- 1 Killdeer
- ___ Black-necked Stilt
- ___ American Avocet
- ___ Greater Yellowlegs
- ___ Solitary Sandpiper
- 1 Spotted Sandpiper
- 2 Least Sandpiper
- ___ Common Snipe
- 3 Domestic Pigeon
- ___ Band-tailed Pigeon
- 11 Mourning Dove
- ___ Spotted Dove 22122222
- ___ Greater Roadrunner
- ___ Barn Owl
- ___ Western Screech-Owl
- ___ Great Horned Owl
- ___ Lesser Nighthawk
- ___ Common Poorwill
- ___ Vaux's Swift
- ___ White-throated Swift
- 1 Black-ch. Hummingbird
- ___ Anna's Hummingbird
- ___ Costa's Hummingbird
- ___ Rufous Hummingbird
- ___ Allen's Hummingbird
- 1 Belted Kingfisher
- ___ Acorn Woodpecker
- ___ Red-breasted Sapsucker
- 111 Nuttall's Woodpecker
- 11 Downy Woodpecker
- ___ Hairy Woodpecker
- ___ Northern Flicker
- ___ Olive-sided Flycatcher
- ___ Western Wood-Pewee
- ___ Willow Flycatcher
- ___ Hammond's Flycatcher
- ___ Dusky Flycatcher
- ___ Gray Flycatcher
- ___ Pacific Slope Flycatcher
- ___ Black Phoebe
- ___ Say's Phoebe
- 112 Ash-throated Flycatcher
- ___ Cassin's Kingbird
- ___ Western Kingbird
- ___ Horned Lark
- ___ Purple Martin
- ___ Tree Swallow
- ___ Violet-green Swallow
- 6 62 N. Rough-winged Swallow
- ___ Bank Swallow
- ___ Cliff Swallow
- 1 Barn Swallow
- 111 Scrub Jay
- 22222 American Crow
- 1 Common Raven
- ___ Mountain Chickadee
- 1111 Plain Titmouse
- 222 Bushtit
- ___ Rock Wren
- ___ Canyon Wren
- 1111 Bewick's Wren
- 111 House Wren
- ___ Marsh Wren
- ___ Ruby-crowned Kinglet
- ___ Blue-gray Gnatcatcher
- 1 Western Bluebird
- ___ Swainson's Thrush
- ___ Hermit Thrush
- 1 American Robin
- ___ Wrentit
- ___ Northern Mockingbird
- 11 California Thrasher
- ___ American Pipit
- ___ Cedar Waxwing
- ___ Phainopepla
- ___ Loggerhead Shrike
- 22 European Starling
- ___ Bell's Vireo
- ___ Gray Vireo
- ___ Solitary Vireo
- ___ Hutton's Vireo
- 2 Warbling Vireo
- ___ Orange-crowned Warbler
- ___ Nashville Warbler
- 1 Yellow Warbler
- ___ Yellow-rumped Warbler
- ___ Black-th. Gray Warbler
- ___ Townsend's Warbler
- ___ Hermit Warbler
- ___ MacGillivray's Warbler
- 1 Common Yellowthroat
- 111 Wilson's Warbler
- ___ Yellow-breasted Chat
- ___ Summer Tanager
- ___ Western Tanager
- 1 1111 Black-headed Grosbeak
- ___ Blue Grosbeak
- ___ Lazuli Bunting
- 1111 Rufous-sided Towhee
- 1 California Towhee
- ___ Chipping Sparrow
- ___ Lark Sparrow
- ___ Fox Sparrow
- 11111111 Song Sparrow
- ___ Lincoln's Sparrow
- ___ Golden-crowned Sparrow
- ___ White-crowned Sparrow
- ___ Dark-eyed Junco
- ___ Red-winged Blackbird
- ___ Tricolored Blackbird
- ___ Western Meadowlark
- ___ Yellow-headed Blackbird
- ___ Brewer's Blackbird
- ___ Great-tailed Grackle
- 2211 Brown-headed Cowbird
- ___ Hooded Oriole
- ___ Northern Oriole
- ___ Purple Finch
- 6 22 House Finch
- ___ Pine Siskin
- 2 Lesser Goldfinch
- ___ Lawrence's Goldfinch
- 3 American Goldfinch
- ___ House Sparrow

Additional Species

2 CANYON Creek.

Birds of the Santa Clara River System

1993 Area 2

Date June 10/93 River Section McBean to I5 Time _____

- Great Blue Heron
- Great Egret
- Snowy Egret
- Green-backed Heron
- Green-winged Teal
- 1 Mallard
- Blue-winged Teal
- Cinnamon Teal
- Gadwall
- Ruddy Duck
- Turkey Vulture
- Black-shouldered Kite
- Northern Harrier
- Sharp-shinned Hawk
- Cooper's Hawk
- || Red-shouldered Hawk
- 1 Red-tailed Hawk 2 yng.
- American Kestrel
- 3 3 California Quail
- Virginia Rail
- Sora
- Common Moorhen
- American Coot
- 2 2 2 Killdeer
- Black-necked Stilt
- American Avocet
- Greater Yellowlegs
- Solitary Sandpiper
- Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- Domestic Pigeon
- Band-tailed Pigeon (15) 32 2 2 3
- 1 Mourning Dove
- Spotted Dove
- Greater Roadrunner
- Barn Owl
- Western Screech-Owl
- Great Horned Owl
- Lesser Nighthawk
- Common Poorwill
- Vaux's Swift
- White-throated Swift
- Black-ch. Hummingbird
- Anna's Hummingbird
- Costa's Hummingbird
- Rufous Hummingbird
- Allen's Hummingbird
- Belted Kingfisher

- Acorn Woodpecker
- Red-breasted Sapsucker
- IIII Nuttall's Woodpecker
- 1 IIII Downy Woodpecker
- II Hairy Woodpecker
- II Northern Flicker
- Olive-sided Flycatcher
- Western Wood-Pewee
- Willow Flycatcher
- Hammond's Flycatcher
- Dusky Flycatcher
- Gray Flycatcher
- Pacific Slope Flycatcher
- IIII Black Phoebe
- Say's Phoebe
- Ash-throated Flycatcher
- Cassin's Kingbird
- Western Kingbird
- Horned Lark
- Purple Martin
- Tree Swallow
- Violet-green Swallow
- (10) (10) 4 4 N. Rough-winged Swallow
- Bank Swallow
- 3 Cliff Swallow
- Barn Swallow
- II 2 Scrub Jay
- 2 2 American Crow
- 2 4 Common Raven
- Mountain Chickadee
- 1 Plain Titmouse
- Bushtit
- Rock Wren
- Canyon Wren
- 1 IIII IIII Bewick's Wren
- 1 IIII House Wren
- Marsh Wren
- Ruby-crowned Kinglet
- Blue-gray Gnatcatcher
- II Western Bluebird
- 1 Swainson's Thrush
- Hermit Thrush
- American Robin
- Wrentit
- Northern Mockingbird
- California Thrasher
- American Pipit
- Cedar Waxwing
- Phainopepla
- Loggerhead Shrike
- 2 4 2 4 2 European Starling
- Bell's Vireo
- Gray Vireo
- Solitary Vireo

- Hutton's Vireo
- Warbling Vireo
- Orange-crowned Warbler
- Nashville Warbler
- II Yellow Warbler
- Yellow-rumped Warbler
- Black-th. Gray Warbler
- Townsend's Warbler
- Hermit Warbler
- MacGillivray's Warbler
- Common Yellowthroat
- Wilson's Warbler
- Yellow-breasted Chat
- Summer Tanager
- Western Tanager
- 1 IIII Black-headed Grosbeak
- Blue Grosbeak
- Lazuli Bunting
- 1 IIII Rufous-sided Towhee
- II California Towhee
- Chipping Sparrow
- Lark Sparrow
- Fox Sparrow
- 1 IIII IIII IIII Song Sparrow
- Lincoln's Sparrow
- Golden-crowned Sparrow
- White-crowned Sparrow
- Dark-eyed Junco
- 1 Red-winged Blackbird
- Tricolored Blackbird
- Western Meadowlark
- Yellow-headed Blackbird
- Brewer's Blackbird
- Great-tailed Grackle
- 1 2 1 2 Brown-headed Cowbird
- Hooded Oriole
- Northern Oriole
- Purple Finch
- 2 3 House Finch
- Pine Siskin
- Lesser Goldfinch
- Lawrence's Goldfinch
- American Goldfinch
- House Sparrow

Additional Species

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1993 Area 2

ir[illegible] of the Santa Clara River System

ate July 7/93 River Section McBean to I-5 Time 6:30 - Overcast

- Great Blue Heron
- Great Egret
- Snowy Egret
- Green-backed Heron
- Green-winged Teal
- 1 Mallard
- Blue-winged Teal
- Cinnamon Teal
- Gadwall
- Ruddy Duck
- Turkey Vulture
- Black-shouldered Kite
- Northern Harrier
- Sharp-shinned Hawk
- Cooper's Hawk
- 1 Red-shouldered Hawk
- 2 Red-tailed Hawk
- American Kestrel
- 11214 California Quail
- Virginia Rail
- Sora
- Common Moorhen
- American Coot
- 3634 Killdeer
- Black-necked Stilt
- American Avocet
- Greater Yellowlegs
- Solitary Sandpiper
- 2 Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- 3 Domestic Pigeon
- Band-tailed Pigeon
- 26 IIII Mourning Dove
- Spotted Dove
- Greater Roadrunner
- Barn Owl
- Western Screech-Owl
- Great Horned Owl
- Lesser Nighthawk
- Common Poorwill
- Vaux's Swift
- White-throated Swift
- 1 Black-ch. Hummingbird
- IIIII Anna's Hummingbird
- Costa's Hummingbird
- Rufous Hummingbird
- Allen's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- Red-breasted Sapsucker
- 2 II 2 Nuttall's Woodpecker
- IIII Downy Woodpecker
- 1 Hairy Woodpecker
- Northern Flicker
- Olive-sided Flycatcher
- Western Wood-Pewee
- Willow Flycatcher
- Hammond's Flycatcher
- Dusky Flycatcher
- Gray Flycatcher
- Pacific Slope Flycatcher
- 11 2 2 II 2 Black Phoebe
- Say's Phoebe
- 22 II 2 Ash-throated Flycatcher
- 1 Cassin's Kingbird
- 2 Western Kingbird
- Horned Lark
- Purple Martin
- Tree Swallow
- Violet-green Swallow
- N. Rough-winged Swallow
- Bank Swallow
- 25,12 Cliff Swallow
- Barn Swallow
- 1 II 34 Scrub Jay
- 1 American Crow
- Common Raven
- Mountain Chickadee
- 1 3 4 II 2 Plain Titmouse
- 5 Bushtit
- Rock Wren
- Canyon Wren
- IIII 3 2 2 3 4 II 2 3 Bewick's Wren
- House Wren
- Marsh Wren
- Ruby-crowned Kinglet
- Blue-gray Gnatcatcher 40, 10, 10, 30, 10, 5 5 3
- 2 2 Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- II 21 American Robin
- Wrentit
- Northern Mockingbird
- III California Thrasher
- American Pipit
- Cedar Waxwing
- Phainopepla
- Loggerhead Shrike
- 10, 50, 20, 10 European Starling
- Bell's Vireo
- Gray Vireo
- Solitary Vireo
- Hutton's Vireo
- Warbling Vireo
- Orange-crowned Warbler
- Nashville Warbler
- II Yellow Warbler
- Yellow-rumped Warbler
- Black-th. Gray Warbler
- Townsend's Warbler
- Hermit Warbler
- MacGillivray's Warbler
- 3 Common Yellowthroat
- Wilson's Warbler
- 1 Yellow-breasted Chat
- Summer Tanager
- Western Tanager
- II 2 IIII Black-headed Grosbeak
- 1 Blue Grosbeak
- II 2 Lazuli Bunting
- 1 IIII II 2 Rufous-sided Towhee
- II 2 California Towhee
- Chipping Sparrow
- 4, 5 Lark Sparrow
- Fox Sparrow
- 95 II 2 II 2 Song Sparrow
- Lincoln's Sparrow
- Golden-crowned Sparrow
- White-crowned Sparrow
- Dark-eyed Junco
- Red-winged Blackbird
- 5 Tricolored Blackbird
- Western Meadowlark
- Yellow-headed Blackbird
- 8 Brewer's Blackbird
- Great-tailed Grackle
- 14 II 2 Brown-headed Cowbird
- Hooded Oriole
- 2 Northern Oriole
- Purple Finch
- House Finch
- Pine Siskin
- 5 3 Lesser Goldfinch
- Lawrence's Goldfinch
- American Goldfinch
- House Sparrow

Additional Species

GOLDEN EAGLE (Standing along st

Corey

1993 Area 2

Birds of the Santa Clara River System

Date July 9 '93 River Section McBean to I5 Time _____

- ___ Great Blue Heron
- ___ Great Egret
- ___ Snowy Egret
- ___ Green-backed Heron
- 4 Green-winged Teal
- ___ Mallard
- ___ Blue-winged Teal
- 1 Cinnamon Teal
- ___ Gadwall
- ___ Ruddy Duck
- ___ Turkey Vulture
- ___ Black-shouldered Kite
- ___ Northern Harrier
- ___ Sharp-shinned Hawk
- ___ Cooper's Hawk
- 1 Red-shouldered Hawk
- 11 Red-tailed Hawk
- ___ American Kestrel
- ___ California Quail
- ___ Virginia Rail
- ___ Sora
- ___ Common Moorhen
- ___ American Coot
- 111 Killdeer
- ___ Black-necked Stilt
- ___ American Avocet
- ___ Greater Yellowlegs
- ___ Solitary Sandpiper
- 1 Spotted Sandpiper
- ___ Least Sandpiper
- ___ Common Snipe
- ___ Domestic Pigeon
- ___ Band-tailed Pigeon
- 5,10 Mourning Dove
- ___ Spotted Dove
- ___ Greater Roadrunner
- ___ Barn Owl
- ___ Western Screech-Owl
- ___ Great Horned Owl
- ___ Lesser Nighthawk
- ___ Common Poorwill
- ___ Vaux's Swift
- ___ White-throated Swift
- 11 Black-ch. Hummingbird
- 111 Anna's Hummingbird
- ___ Costa's Hummingbird
- ___ Rufous Hummingbird
- ___ Allen's Hummingbird
- ___ Belted Kingfisher
- ___ Acorn Woodpecker
- ___ Red-breasted Sapsucker
- 111 Nuttall's Woodpecker
- 1111 Downy Woodpecker
- 1 Hairy Woodpecker
- ___ Northern Flicker
- ___ Olive-sided Flycatcher
- ___ Western Wood-Pewee
- ___ Willow Flycatcher
- ___ Hammond's Flycatcher
- ___ Dusky Flycatcher
- ___ Gray Flycatcher
- ___ Pacific Slope Flycatcher
- 5, 1111 Black Phoebe
- ___ Say's Phoebe
- 1 1111 Ash-throated Flycatcher
- ___ Cassin's Kingbird
- 11 Western Kingbird
- ___ Horned Lark
- ___ Purple Martin
- ___ Tree Swallow
- ___ Violet-green Swallow
- 11 N. Rough-winged Swallow
- ___ Bank Swallow
- 1,5 Cliff Swallow
- ___ Barn Swallow
- 1111 Scrub Jay
- 11 American Crow
- 1 Common Raven
- ___ Mountain Chickadee
- 11 Plain Titmouse
- 5,10 Bushtit
- ___ Rock Wren
- ___ Canyon Wren
- 111 Bewick's Wren
- 11 House Wren
- ___ Marsh Wren
- ___ Ruby-crowned Kinglet
- ___ Blue-gray Gnatcatcher
- 11 Western Bluebird
- ___ Swainson's Thrush
- ___ Hermit Thrush
- 1 American Robin
- ___ Wrentit
- ___ Northern Mockingbird
- 11 California Thrasher
- 3 American Pipit
- ___ Cedar Waxwing
- ___ Phainopepla
- 11 Loggerhead Shrike
- 10,5 111 European Starling
- ___ Bell's Vireo
- ___ Gray Vireo
- ___ Solitary Vireo
- ___ Hutton's Vireo
- ___ Warbling Vireo
- 1 Orange-crowned Warbler
- ___ Nashville Warbler
- ___ Yellow Warbler
- ___ Yellow-rumped Warbler
- ___ Black-th. Gray Warbler
- ___ Townsend's Warbler
- ___ Hermit Warbler
- ___ MacGillivray's Warbler
- ___ Common Yellowthroat
- ___ Wilson's Warbler
- ___ Yellow-breasted Chat
- ___ Summer Tanager
- ___ Western Tanager
- 1 111 Black-headed Grosbeak
- 11 Blue Grosbeak
- 1111 Lazuli Bunting
- 1111 Rufous-sided Towhee
- 1 California Towhee
- ___ Chipping Sparrow
- 111,10,5, 111,5 Lark Sparrow
- ___ Fox Sparrow
- 111 1111 Song Sparrow
- ___ Lincoln's Sparrow
- ___ Golden-crowned Sparrow
- ___ White-crowned Sparrow
- ___ Dark-eyed Junco
- ___ Red-winged Blackbird
- ___ Tricolored Blackbird
- ___ Western Meadowlark
- ___ Yellow-headed Blackbird
- ___ Brewer's Blackbird
- ___ Great-tailed Grackle
- 1111 Brown-headed Cowbird
- ___ Hooded Oriole
- 11 Northern Oriole
- ___ Purple Finch
- 30,20,5,20, 5,20 House Finch
- ___ Pine Siskin
- 111 4 Lesser Goldfinch
- ___ Lawrence's Goldfinch
- ___ American Goldfinch
- ___ House Sparrow

Additional Species

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1993 Area 3

rd of the Santa Clara River System Bopart + mcb.

ite 4/29 River Section _____ Time _____

___ Great Blue Heron
___ Great Egret
___ Snowy Egret
___ Green-backed Heron
___ Green-winged Teal
2 Mallard
___ Blue-winged Teal
___ Cinnamon Teal
___ Gadwall
___ Ruddy Duck
___ Turkey Vulture
___ Black-shouldered Kite
___ Northern Harrier
___ Sharp-shinned Hawk
___ Cooper's Hawk
___ Red-shouldered Hawk
___ Red-tailed Hawk
___ American Kestrel
22 California Quail
___ Virginia Rail
___ Sora
___ Common Moorhen
___ American Coot
2 Killdeer
___ Black-necked Stilt
___ American Avocet
___ Greater Yellowlegs
___ Solitary Sandpiper
___ Spotted Sandpiper
___ Least Sandpiper
___ Common Snipe
___ Domestic Pigeon
___ Band-tailed Pigeon
3 Mourning Dove
___ Spotted Dove
___ Greater Roadrunner
___ Barn Owl
___ Western Screech-Owl
___ Great Horned Owl
___ Lesser Nighthawk
___ Common Poorwill
___ Vaux's Swift
___ White-throated Swift
___ Black-ch. Hummingbird
___ Anna's Hummingbird
___ Costa's Hummingbird
___ Rufous Hummingbird
___ Allen's Hummingbird
___ Belted Kingfisher

___ Acorn Woodpecker
___ Red-breasted Sapsucker
1 Nuttall's Woodpecker
___ Downy Woodpecker
2 Hairy Woodpecker
___ Northern Flicker
___ Olive-sided Flycatcher
___ Western Wood-Pewee
___ Willow Flycatcher
___ Hammond's Flycatcher
___ Dusky Flycatcher
___ Gray Flycatcher
___ Pacific Slope Flycatcher
___ Black Phoebe
___ Say's Phoebe
2 Ash-throated Flycatcher
___ Cassin's Kingbird
___ Western Kingbird
___ Horned Lark
___ Purple Martin
___ Tree Swallow
___ Violet-green Swallow
3 N. Rough-winged Swallow
___ Bank Swallow
___ Cliff Swallow
___ Barn Swallow
22 Scrub Jay
32 1 American Crow
(20) (8) (10) 1 Common Raven
___ Mountain Chickadee
1 Plain Titmouse
222 Bushtit
___ Rock Wren
___ Canyon Wren
3 Bewick's Wren
___ House Wren
___ Marsh Wren
___ Ruby-crowned Kinglet
___ Blue-gray Gnatcatcher
1 Western Bluebird
___ Swainson's Thrush
___ Hermit Thrush
___ American Robin
___ Wrentit
___ Northern Mockingbird
1 California Thrasher
___ American Pipit
___ Cedar Waxwing
___ Phainopepla
___ Loggerhead Shrike
___ European Starling
___ Bell's Vireo
___ Gray Vireo
___ Solitary Vireo

___ Hutton's Vireo
___ Warbling Vireo
___ Orange-crowned Warbler
___ Nashville Warbler
1 Yellow Warbler
___ Yellow-rumped Warbler
___ Black-th. Gray Warbler
___ Townsend's Warbler
___ Hermit Warbler
1 MacGillivray's Warbler
___ Common Yellowthroat
3 Wilson's Warbler
___ Yellow-breasted Chat
___ Summer Tanager
___ Western Tanager
4 Black-headed Grosbeak
1 Blue Grosbeak
___ Lazuli Bunting
___ Rufous-sided Towhee
3 California Towhee
___ Chipping Sparrow
___ Lark Sparrow
___ Fox Sparrow
4 Song Sparrow
___ Lincoln's Sparrow
___ Golden-crowned Sparrow
___ White-crowned Sparrow
___ Dark-eyed Junco
2 Red-winged Blackbird
___ Tricolored Blackbird
___ Western Meadowlark
___ Yellow-headed Blackbird
___ Brewer's Blackbird
___ Great-tailed Grackle
___ Brown-headed Cowbird
___ Hooded Oriole
___ Northern Oriole
___ Purple Finch
___ House Finch
___ Pine Siskin
___ Lesser Goldfinch
___ Lawrence's Goldfinch
___ American Goldfinch
___ House Sparrow

Additional Species

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X 1993 Area 3

irds of the Santa Clara River System

ate June 10/93 River Section Bouquet to McBean Time _____

- ___ Great Blue Heron
- ___ Great Egret
- ___ Snowy Egret
- ___ Green-backed Heron
- ___ Green-winged Teal
- ___ Mallard
- ___ Blue-winged Teal
- ___ Cinnamon Teal
- ___ Gadwall
- ___ Ruddy Duck
- ___ Turkey Vulture
- ___ Black-shouldered Kite
- ___ Northern Harrier
- ___ Sharp-shinned Hawk
- ___ Cooper's Hawk
- ___ Red-shouldered Hawk
- ___ Red-tailed Hawk
- ___ American Kestrel
- 2 2 California Quail
- ___ Virginia Rail
- ___ Sora
- ___ Common Moorhen
- ___ American Coot
- 2 – 2 Killdeer
- ___ Black-necked Stilt
- ___ American Avocet
- ___ Greater Yellowlegs
- ___ Solitary Sandpiper
- ___ Spotted Sandpiper
- ___ Least Sandpiper
- ___ Common Snipe
- ___ Domestic Pigeon
- ___ Band-tailed Pigeon
- 2 Mourning Dove
- ___ Spotted Dove
- ___ Greater Roadrunner
- ___ Barn Owl
- ___ Western Screech-Owl
- ___ Great Horned Owl
- ___ Lesser Nighthawk
- ___ Common Poorwill
- ___ Vaux's Swift
- ___ White-throated Swift
- ___ Black-ch. Hummingbird
- ___ Anna's Hummingbird
- ___ Costa's Hummingbird
- ___ Rufous Hummingbird
- ___ Allen's Hummingbird
- ___ Belted Kingfisher
- ___ Acorn Woodpecker
- ___ Red-breasted Sapsucker
- || Nuttall's Woodpecker
- | Downy Woodpecker
- \ Hairy Woodpecker
- ___ Northern Flicker
- ___ Olive-sided Flycatcher
- ___ Western Wood-Pewee
- ___ Willow Flycatcher
- ___ Hammond's Flycatcher
- ___ Dusky Flycatcher
- ___ Gray Flycatcher
- ___ Pacific Slope Flycatcher
- 2 || Black Phoebe
- ___ Say's Phoebe
- ||| Ash-throated Flycatcher
- ___ Cassin's Kingbird
- ___ Western Kingbird
- ___ Horned Lark
- ___ Purple Martin
- ___ Tree Swallow
- ___ Violet-green Swallow
- 3, 5, 4 N. Rough-winged Swallow
- ___ Bank Swallow
- ___ Cliff Swallow
- ___ Barn Swallow
- |||| 7 2 Scrub Jay
- 2 American Crow
- 10 8 4 4 Common Raven
- ___ Mountain Chickadee
- || Plain Titmouse
- 2 2 Bushtit
- ___ Rock Wren
- ___ Canyon Wren
- ||| Bewick's Wren
- ___ House Wren
- ___ Marsh Wren
- ___ Ruby-crowned Kinglet
- ___ Blue-gray Gnatcatcher
- ___ Western Bluebird
- ___ Swainson's Thrush
- ___ Hermit Thrush
- ___ American Robin
- ___ Wrentit
- ___ Northern Mockingbird
- | California Thrasher
- ___ American Pipit
- ___ Cedar Waxwing
- ___ Phainopepla
- ___ Loggerhead Shrike
- || European Starling
- ___ Bell's Vireo
- ___ Gray Vireo
- ___ Solitary Vireo
- ___ Hutton's Vireo
- ___ Warbling Vireo
- ___ Orange-crowned Warbler
- ___ Nashville Warbler
- ___ Yellow Warbler
- ___ Yellow-rumped Warbler
- ___ Black-th. Gray Warbler
- ___ Townsend's Warbler
- ___ Hermit Warbler
- ___ MacGillivray's Warbler
- ___ Common Yellowthroat
- ___ Wilson's Warbler
- ___ Yellow-breasted Chat
- ___ Summer Tanager
- ___ Western Tanager
- | Black-headed Grosbeak
- ___ Blue Grosbeak
- ___ Lazuli Bunting
- ___ Rufous-sided Towhee
- | California Towhee
- ___ Chipping Sparrow
- ___ Lark Sparrow
- ___ Fox Sparrow
- |||| Song Sparrow
- ___ Lincoln's Sparrow
- ___ Golden-crowned Sparrow
- ___ White-crowned Sparrow
- ___ Dark-eyed Junco
- ___ Red-winged Blackbird
- ___ Tricolored Blackbird
- ___ Western Meadowlark
- ___ Yellow-headed Blackbird
- | Brewer's Blackbird
- ___ Great-tailed Grackle
- | Brown-headed Cowbird
- ___ Hooded Oriole
- ___ Northern Oriole
- ___ Purple Finch
- 2 2 3 | House Finch
- ___ Pine Siskin
- ___ Lesser Goldfinch
- ___ Lawrence's Goldfinch
- ___ American Goldfinch
- ___ House Sparrow

Additional Species

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area 4 1993

EC-

...of the Santa Clara River System

...ate April 29 River Section S.C. River above Bouquet Time _____

Great Blue Heron	1 Acorn Woodpecker	Hutton's Vireo
Great Egret	Red-breasted Sapsucker	1,1 Warbling Vireo
Snowy Egret	1,1,1 Nuttall's Woodpecker	1 Orange-crowned Warbler
Green-backed Heron	Downy Woodpecker	Nashville Warbler
Green-winged Teal	1 Hairy Woodpecker	1 Yellow Warbler
3 Mallard	1,1 Northern Flicker	Yellow-rumped Warbler
Blue-winged Teal	Olive-sided Flycatcher	1 Black-th. Gray Warbler
Cinnamon Teal	Western Wood-Pewee	Townsend's Warbler
Gadwall	Willow Flycatcher	Hermit Warbler
Ruddy Duck	Hammond's Flycatcher	MacGillivray's Warbler
Turkey Vulture	Dusky Flycatcher	Common Yellowthroat
Black-shouldered Kite	Gray Flycatcher	1,1,1,4,1 Wilson's Warbler
Northern Harrier	Pacific Slope Flycatcher	Yellow-breasted Chat
Sharp-shinned Hawk	Black Phoebe	Summer Tanager
Cooper's Hawk	Say's Phoebe	1 Western Tanager
Red-shouldered Hawk	1 Ash-throated Flycatcher	1,1,1 Black-headed Grosbeak
1,1,1 Red-tailed Hawk	Cassin's Kingbird	Blue Grosbeak
1 American Kestrel	1,1 Western Kingbird	Lazuli Bunting
2,2 California Quail	Horned Lark	1 Rufous-sided Towhee
Virginia Rail	Purple Martin	1,1 California Towhee
Sora	Tree Swallow	Chipping Sparrow
Common Moorhen	Violet-green Swallow	Lark Sparrow
American Coot	N. Rough-winged Swallow	Fox Sparrow
1,1,1,1 Killdeer 2,2	Bank Swallow	1,1 Song Sparrow
Black-necked Stilt	Cliff Swallow	1,1 Lincoln's Sparrow
American Avocet	Barn Swallow	Colden-crowned Sparrow
Greater Yellowlegs	2,2,1,1,1,1,2,2 Scrub Jay	White-crowned Sparrow
Solitary Sandpiper	2 American Crow	Dark-eyed Junco
Spotted Sandpiper	10,2 5,15 Common Raven	2 Red-winged Blackbird
1 Least Sandpiper	Mountain Chickadee	Tricolored Blackbird
Common Snipe	1 2 Plain Titmouse	Western Meadowlark
Domestic Pigeon	2,4,6 Bushtit	Yellow-headed Blackbird
Band-tailed Pigeon	Rock Wren	4 Brewer's Blackbird
10,10 Mourning Dove	Canyon Wren	Great-tailed Grackle
Spotted Dove	4,3,1,1,2,2 Bewick's Wren	2,3,3 Brown-headed Cowbird
Greater Roadrunner	House Wren	Hooded Oriole
Barn Owl	Marsh Wren	2,2,1,1,4,1 Northern Oriole
Western Screech-Owl	Ruby-crowned Kinglet	Purple Finch
1 Great Horned Owl	Blue-gray Gnatcatcher	10,5,10 House Finch
Lesser Nighthawk	Western Bluebird	Pine Siskin
Common Poorwill	Swainson's Thrush	Lesser Goldfinch
Vaux's Swift	Hermit Thrush	Lawrence's Goldfinch
White-throated Swift	American Robin	American Goldfinch
1 Black-ch. Hummingbird	Wrentit	House Sparrow
1,1,1 Anna's Hummingbird 3	1,1 Northern Mockingbird	Additional Species
Costa's Hummingbird	California Thrasher	
Rufous Hummingbird	American Pipit	
Allen's Hummingbird	Cedar Waxwing	
Belted Kingfisher	Phainopepla	
	Loggerhead Shrike	
	4 European Starling	
	Bell's Vireo	
	Gray Vireo	
	Solitary Vireo	

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1993 Area 4

ird- of the Santa Clara River System

Date June 10 93 River Section above Bonquet Time _____

- ____ Great Blue Heron
- ____ Great Egret
- ____ Snowy Egret
- ____ Green-backed Heron
- ____ Green-winged Teal
- ____ Mallard
- ____ Blue-winged Teal
- ____ Cinnamon Teal
- ____ Gadwall
- ____ Ruddy Duck
- ____ Turkey Vulture
- ____ Black-shouldered Kite
- ____ Northern Harrier
- ____ Sharp-shinned Hawk
- ____ Cooper's Hawk
- 1 Red-shouldered Hawk
- 111 Red-tailed Hawk
- 1 American Kestrel
- 224112 California Quail
- ____ Virginia Rail
- ____ Sora
- ____ Common Moorhen
- ____ American Coot
- 1223227 Killdeer
- ____ Black-necked Stilt
- ____ American Avocet
- ____ Greater Yellowlegs
- ____ Solitary Sandpiper
- ____ Spotted Sandpiper
- ____ Least Sandpiper
- ____ Common Snipe
- 2 Domestic Pigeon
- 422 Band-tailed Pigeon
- 8212294 Mourning Dove
- 8(16) Spotted Dove
- ____ Greater Roadrunner
- ____ Barn Owl
- ____ Western Screech-Owl
- ____ Great Horned Owl
- ____ Lesser Nighthawk
- ____ Common Poorwill
- ____ Vaux's Swift
- ____ White-throated Swift
- 112 Black-ch. Hummingbird
- 2112 Anna's Hummingbird
- ____ Costa's Hummingbird
- ____ Rufous Hummingbird
- ____ Allen's Hummingbird
- ____ Belted Kingfisher
- ____ Acorn Woodpecker
- ____ Red-breasted Sapsucker
- 12312 Nuttall's Woodpecker
- ____ Downy Woodpecker
- ____ Hairy Woodpecker
- ____ Northern Flicker
- ____ Olive-sided Flycatcher
- ____ Western Wood-Pewee
- ____ Willow Flycatcher
- ____ Hammond's Flycatcher
- ____ Dusky Flycatcher
- ____ Gray Flycatcher
- ____ Pacific Slope Flycatcher
- ____ Black Phoebe
- ____ Say's Phoebe
- 1 Ash-throated Flycatcher
- ____ Cassin's Kingbird
- 1232 Western Kingbird
- ____ Horned Lark
- ____ Purple Martin
- ____ Tree Swallow
- ____ Violet-green Swallow
- 1 N. Rough-winged Swallow
- ____ Bank Swallow
- 3 Cliff Swallow
- ____ Barn Swallow
- 1223222121 Scrub Jay
- 22 American Crow
- 6631 Common Raven
- ____ Mountain Chickadee
- 22 Plain Titmouse
- 51225 Bushtit
- ____ Rock Wren
- ____ Canyon Wren
- 2511122112 Bewick's Wren
- 1 House Wren
- ____ Marsh Wren
- ____ Ruby-crowned Kinglet
- ____ Blue-gray Gnatcatcher
- 32 Western Bluebird
- ____ Swainson's Thrush
- ____ Hermit Thrush
- ____ American Robin
- ____ Wrentit
- 12122 Northern Mockingbird
- 1111 California Thrasher
- ____ American Pipit
- ____ Cedar Waxwing
- ____ Phainopepla
- 1 Loggerhead Shrike
- 20, 20, 25, 35, 4, 11, 8 European Starling
- ____ Bell's Vireo
- ____ Gray Vireo
- ____ Solitary Vireo
- ____ Hutton's Vireo
- ____ Warbling Vireo
- ____ Orange-crowned Warbler
- ____ Nashville Warbler
- ____ Yellow Warbler
- ____ Yellow-rumped Warbler
- ____ Black-th. Gray Warbler
- ____ Townsend's Warbler
- ____ Hermit Warbler
- ____ MacGillivray's Warbler
- ____ Common Yellowthroat
- ____ Wilson's Warbler
- ____ Yellow-breasted Chat
- ____ Summer Tanager
- ____ Western Tanager
- ____ Black-headed Grosbeak
- 11 Blue Grosbeak
- 11 Lazuli Bunting
- 12 Rufous-sided Towhee
- 11 California Towhee
- ____ Chipping Sparrow
- ____ Lark Sparrow
- ____ Fox Sparrow
- 11 Song Sparrow
- ____ Lincoln's Sparrow
- ____ Golden-crowned Sparrow
- ____ White-crowned Sparrow
- ____ Dark-eyed Junco
- 4,2 Red-winged Blackbird
- ____ Tricolored Blackbird
- ____ Western Meadowlark
- ____ Yellow-headed Blackbird
- 8 Brewer's Blackbird
- ____ Great-tailed Grackle
- 5 Brown-headed Cowbird
- ____ Hooded Oriole
- 11 Northern Oriole
- ____ Purple Finch
- 1129241112 House Finch
- ____ Pine Siskin
- ____ Lesser Goldfinch
- ____ Lawrence's Goldfinch
- ____ American Goldfinch
- ____ House Sparrow

Additional Species

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1993 Aue 5

CASTAIC Lon. DAG -645- 7:30 Don

Bi[illegible] of the Santa Clara River System

Date 4-~~18~~ 7-93 River Section ______ Time ______

- ___ Great Blue Heron
- ___ Great Egret
- ___ Snowy Egret
- ___ Green-backed Heron
- ___ Green-winged Teal
- ___ Mallard
- ___ Blue-winged Teal
- ___ Cinnamon Teal
- ___ Gadwall
- ___ Ruddy Duck
- ___ Turkey Vulture
- ___ Black-shouldered Kite
- ___ Northern Harrier
- ___ Sharp-shinned Hawk
- ___ Cooper's Hawk
- ___ Red-shouldered Hawk
- ___ Red-tailed Hawk
- | American Kestrel
- 2 2 California Quail
- ___ Virginia Rail
- ___ Sora
- ___ Common Moorhen
- – American Coot
- | Killdeer
- ___ Black-necked Stilt
- ___ American Avocet
- ___ Greater Yellowlegs
- ___ Solitary Sandpiper
- ___ Spotted Sandpiper
- ___ Least Sandpiper
- ___ Common Snipe
- ___ Domestic Pigeon
- ___ Band-tailed Pigeon
- ___ Mourning Dove
- ___ Spotted Dove
- ___ Greater Roadrunner
- ___ Barn Owl
- ___ Western Screech-Owl
- ___ Great Horned Owl
- ___ Lesser Nighthawk
- ___ Common Poorwill
- ___ Vaux's Swift
- ___ White-throated Swift
- ___ Black-ch. Hummingbird
- | Anna's Hummingbird
- ___ Costa's Hummingbird
- ___ Rufous Hummingbird
- ___ Allen's Hummingbird
- – Belted Kingfisher
- ___ Acorn Woodpecker
- ___ Red-breasted Sapsucker
- || Nuttall's Woodpecker
- | Downy Woodpecker
- ___ Hairy Woodpecker
- ___ Northern Flicker
- ___ Olive-sided Flycatcher
- ___ Western Wood-Pewee
- ___ Willow Flycatcher
- ___ Hammond's Flycatcher
- ___ Dusky Flycatcher
- ___ Gray Flycatcher
- ___ Pacific Slope Flycatcher
- ___ Black Phoebe
- ___ Say's Phoebe
- 2 Ash-throated Flycatcher
- ___ Cassin's Kingbird
- ___ Western Kingbird
- ___ Horned Lark
- ___ Purple Martin
- ___ Tree Swallow
- ___ Violet-green Swallow
- 40 N. Rough-winged Swallow (126 BRIDGE)
- ___ Bank Swallow
- 50 Cliff Swallow
- ___ Barn Swallow
- |||| Scrub Jay
- ___ American Crow
- 1 Common Raven
- ___ Mountain Chickadee
- ___ Plain Titmouse
- 2 2 2 Bushtit
- ___ Rock Wren
- ___ Canyon Wren
- N / / |||| Bewick's Wren
- || House Wren
- ___ Marsh Wren
- ___ Ruby-crowned Kinglet
- ___ Blue-gray Gnatcatcher
- ___ Western Bluebird
- ___ Swainson's Thrush
- ___ Hermit Thrush
- ___ American Robin
- ___ Wrentit
- ___ Northern Mockingbird
- | California Thrasher
- ___ American Pipit
- ___ Cedar Waxwing
- ___ Phainopepla
- ___ Loggerhead Shrike
- 2 European Starling
- ___ Bell's Vireo
- ___ Gray Vireo
- ___ Solitary Vireo
- ___ Hutton's Vireo
- ___ Warbling Vireo
- N Orange-crowned Warbler
- ~ 3 Yellow-rumped Warbler
- ___ Nashville Warbler
- ___ Yellow Warbler
- ___ Black-th. Gray Warbler
- ___ Townsend's Warbler
- ___ Hermit Warbler
- ___ MacGillivray's Warbler
- 1 Common Yellowthroat
- ___ Wilson's Warbler
- ___ Yellow-breasted Chat
- ___ Summer Tanager
- ___ Western Tanager
- ||| Black-headed Grosbeak
- ___ Blue Grosbeak
- ___ Lazuli Bunting
- | Rufous-sided Towhee
- || California Towhee
- ___ Chipping Sparrow
- ___ Lark Sparrow
- ___ Fox Sparrow
- 1 |||| Song Sparrow
- ___ Lincoln's Sparrow
- ___ Golden-crowned Sparrow
- ___ White-crowned Sparrow
- ___ Dark-eyed Junco
- (10) (10) (10) 2 Red-winged Blackbird
- ___ Tricolored Blackbird
- ___ Western Meadowlark
- ___ Yellow-headed Blackbird
- ___ Brewer's Blackbird
- ___ Great-tailed Grackle
- 2 2 Brown-headed Cowbird
- ___ Hooded Oriole
- ___ Northern Oriole
- ___ Purple Finch
- 4 House Finch
- ___ Pine Siskin
- ___ Lesser Goldfinch
- ___ Lawrence's Goldfinch
- ___ American Goldfinch
- 2 House Sparrow

Additional Species

1 DEAD BIRD

1993 Area 5
Castaic
big Cattail marsh
1 bobcat

Birds of the Santa Clara River System

Date 4/17/93 River Section Upper Time _____

Great Blue Heron	Acorn Woodpecker	Hutton's Vireo
Great Egret	Red-breasted Sapsucker	Warbling Vireo
Snowy Egret	2 Nuttall's Woodpecker	Orange-crowned Warbler
2 Green-backed Heron	Downy Woodpecker	Nashville Warbler
Green-winged Teal	Hairy Woodpecker	Yellow Warbler
Mallard	Northern Flicker	Yellow-rumped Warbler
Blue-winged Teal	Olive-sided Flycatcher	Black-th. Gray Warbler
Cinnamon Teal	Western Wood-Pewee	Townsend's Warbler
Gadwall	Willow Flycatcher	Hermit Warbler
Ruddy Duck	Hammond's Flycatcher	MacGillivray's Warbler
Turkey Vulture	Dusky Flycatcher	122 Common Yellowthroat
Black-shouldered Kite	Gray Flycatcher	Wilson's Warbler
Northern Harrier	Pacific Slope Flycatcher	Yellow-breasted Chat
Sharp-shinned Hawk	Black Phoebe	Summer Tanager
Cooper's Hawk	Say's Phoebe	Western Tanager
Red-shouldered Hawk	Ash-throated Flycatcher	Black-headed Grosbeak
Red-tailed Hawk	Cassin's Kingbird	Blue Grosbeak
American Kestrel	Western Kingbird	Lazuli Bunting
3229 California Quail	Horned Lark	2 Rufous-sided Towhee
Virginia Rail	Purple Martin	California Towhee
Sora	Tree Swallow	Chipping Sparrow
Common Moorhen	Violet-green Swallow	Lark Sparrow
American Coot	4 N. Rough-winged Swallow	Fox Sparrow
2 Killdeer	Bank Swallow	Song Sparrow
Black-necked Stilt	Cliff Swallow	Lincoln's Sparrow
American Avocet	Barn Swallow	Colden-crowned Sparrow
Greater Yellowlegs	2222 Scrub Jay	White-crowned Sparrow
Solitary Sandpiper	2 American Crow	Dark-eyed Junco
Spotted Sandpiper	24 Common Raven	9 6 30 Red-winged Blackbird
Least Sandpiper	Mountain Chickadee	Tricolored Blackbird
Common Snipe	2 Plain Titmouse	Western Meadowlark
Domestic Pigeon	2 Bushtit	Yellow-headed Blackbird
Band-tailed Pigeon	Rock Wren	Brewer's Blackbird
Mourning Dove	Canyon Wren	Great-tailed Grackle
Spotted Dove	Bewick's Wren	1 4 2 2 4 22 Brown-headed Cowbird
Greater Roadrunner	House Wren	Hooded Oriole
Barn Owl	Marsh Wren	Northern Oriole
Western Screech-Owl	Ruby-crowned Kinglet	Purple Finch
Great Horned Owl	Blue-gray Gnatcatcher	House Finch
Lesser Nighthawk	Western Bluebird	Pine Siskin
Common Poorwill	Swainson's Thrush	Lesser Goldfinch
Vaux's Swift	Hermit Thrush	Lawrence's Goldfinch
White-throated Swift	American Robin	American Goldfinch
Black-ch. Hummingbird	Wrentit	House Sparrow
Anna's Hummingbird	Northern Mockingbird	Additional Species
Costa's Hummingbird	California Thrasher	
Rufous Hummingbird	American Pipit	
Allen's Hummingbird	Cedar Waxwing	
Belted Kingfisher	Phainopepla	
	Loggerhead Shrike	
	4 European Starling	
	Bell's Vireo	
	Gray Vireo	
	Solitary Vireo	

1993 Area 5

Birds of the Santa Clara River System Upper

Date June 9/93 River Section Castaic Creek Time _____

- ___ Great Blue Heron
- ___ Great Egret
- ___ Snowy Egret
- ___ Green-backed Heron
- ___ Green-winged Teal
- ___ Mallard
- ___ Blue-winged Teal
- ___ Cinnamon Teal
- ___ Gadwall
- ___ Ruddy Duck
- ___ Turkey Vulture
- ___ Black-shouldered Kite
- ___ Northern Harrier
- ___ Sharp-shinned Hawk
- 1 Cooper's Hawk
- ___ Red-shouldered Hawk
- ___ Red-tailed Hawk
- ___ American Kestrel
- 4 2 California Quail 4,3
- ___ Virginia Rail
- ___ Sora
- ___ Common Moorhen
- ___ American Coot
- 1 2 Killdeer
- ___ Black-necked Stilt
- ___ American Avocet
- ___ Greater Yellowlegs
- ___ Solitary Sandpiper
- ___ Spotted Sandpiper
- ___ Least Sandpiper
- ___ Common Snipe
- ___ Domestic Pigeon
- ___ Band-tailed Pigeon
- 2 12 Mourning Dove
- ___ Spotted Dove
- ___ Greater Roadrunner
- ___ Barn Owl
- ___ Western Screech-Owl
- ___ Great Horned Owl
- ___ Lesser Nighthawk
- ___ Common Poorwill
- ___ Vaux's Swift
- ___ White-throated Swift
- ___ Black-ch. Hummingbird
- 1 Anna's Hummingbird
- ___ Costa's Hummingbird
- ___ Rufous Hummingbird
- ___ Allen's Hummingbird
- ___ Belted Kingfisher
- ___ Acorn Woodpecker
- ___ Red-breasted Sapsucker
- 1112 Nuttall's Woodpecker
- 3 Downy Woodpecker
- ___ Hairy Woodpecker
- ___ Northern Flicker
- ___ Olive-sided Flycatcher
- ___ Western Wood-Pewee
- ___ Willow Flycatcher
- ___ Hammond's Flycatcher
- ___ Dusky Flycatcher
- ___ Gray Flycatcher
- ___ Pacific Slope Flycatcher
- 111 Black Phoebe
- ___ Say's Phoebe
- 11 Ash-throated Flycatcher
- ___ Cassin's Kingbird
- ___ Western Kingbird
- ___ Horned Lark
- ___ Purple Martin
- ___ Tree Swallow
- ___ Violet-green Swallow
- (25) 10 N. Rough-winged Swallow
- ___ Bank Swallow
- ___ Cliff Swallow
- ___ Barn Swallow
- 1111 1111 Scrub Jay
- 11 American Crow
- 2 Common Raven
- ___ Mountain Chickadee
- 2 Plain Titmouse
- 3 4 Bushtit
- ___ Rock Wren
- ___ Canyon Wren
- 1 1111 1111 Bewick's Wren
- ___ House Wren
- ___ Marsh Wren
- ___ Ruby-crowned Kinglet
- ___ Blue-gray Gnatcatcher
- 2 Western Bluebird
- ___ Swainson's Thrush
- ___ Hermit Thrush
- ___ American Robin
- ___ Wrentit
- ___ Northern Mockingbird
- 1 California Thrasher
- ___ American Pipit
- ___ Cedar Waxwing
- ___ Phainopepla
- ___ Loggerhead Shrike
- 4 European Starling
- ___ Bell's Vireo
- ___ Gray Vireo
- ___ Solitary Vireo
- ___ Hutton's Vireo
- ___ Warbling Vireo
- ___ Orange-crowned Warbler
- ___ Nashville Warbler
- 1 Yellow Warbler
- ___ Yellow-rumped Warbler
- ___ Black-th. Gray Warbler
- ___ Townsend's Warbler
- ___ Hermit Warbler
- ___ MacGillivray's Warbler
- 1111 Common Yellowthroat
- 2 Wilson's Warbler
- ___ Yellow-breasted Chat
- ___ Summer Tanager
- ___ Western Tanager
- 1111 Black-headed Grosbeak
- ___ Blue Grosbeak
- ___ Lazuli Bunting
- 1111 Rufous-sided Towhee
- 11 California Towhee
- ___ Chipping Sparrow
- ___ Lark Sparrow
- ___ Fox Sparrow
- 1111 1111 1111 Song Sparrow
- ___ Lincoln's Sparrow
- ___ Golden-crowned Sparrow
- ___ White-crowned Sparrow
- ___ Dark-eyed Junco
- 10 (20) (10) (10) Red-winged Blackbird
- ___ Tricolored Blackbird
- ___ Western Meadowlark
- ___ Yellow-headed Blackbird
- 4 Brewer's Blackbird
- ___ Great-tailed Grackle
- 2 2 4 Brown-headed Cowbird
- ___ Hooded Oriole
- 2 1 Northern Oriole
- ___ Purple Finch
- 4 House Finch
- ___ Pine Siskin
- 3 2 Lesser Goldfinch
- ___ Lawrence's Goldfinch
- ___ American Goldfinch
- ___ House Sparrow

Additional Species

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X

1 young bobcat

rds of the Santa Clara River System Lower

ate June 9/93 River Section Castaic Creek Time _____

1993 Area 5

- ___ Great Blue Heron
- ___ Great Egret
- ___ Snowy Egret
- ___ Green-backed Heron
- ___ Green-winged Teal
- 1 Mallard
- ___ Blue-winged Teal
- ___ Cinnamon Teal
- ___ Gadwall
- ___ Ruddy Duck
- ___ Turkey Vulture
- ___ Black-shouldered Kite
- ___ Northern Harrier
- ___ Sharp-shinned Hawk
- ___ Cooper's Hawk
- 1 Red-shouldered Hawk
- ___ Red-tailed Hawk
- ___ American Kestrel
- IIII California Quail
- ___ Virginia Rail
- ___ Sora
- ___ Common Moorhen
- ___ American Coot
- 32 Killdeer
- ___ Black-necked Stilt
- ___ American Avocet
- ___ Greater Yellowlegs
- ___ Solitary Sandpiper
- ___ Spotted Sandpiper
- ___ Least Sandpiper
- ___ Common Snipe
- ___ Domestic Pigeon
- ___ Band-tailed Pigeon
- 2 Mourning Dove
- ___ Spotted Dove
- ___ Greater Roadrunner
- ___ Barn Owl
- ___ Western Screech-Owl
- ___ Great Horned Owl
- ___ Lesser Nighthawk
- ___ Common Poorwill
- ___ Vaux's Swift
- ___ White-throated Swift
- ___ Black-ch. Hummingbird
- 2 Anna's Hummingbird
- ___ Costa's Hummingbird
- ___ Rufous Hummingbird
- ___ Allen's Hummingbird
- ___ Belted Kingfisher
- ___ Acorn Woodpecker
- ___ Red-breasted Sapsucker
- 1 Nuttall's Woodpecker
- III Downy Woodpecker
- ___ Hairy Woodpecker
- 3 Northern Flicker
- ___ Olive-sided Flycatcher
- ___ Western Wood-Pewee
- ___ Willow Flycatcher
- ___ Hammond's Flycatcher
- ___ Dusky Flycatcher
- ___ Gray Flycatcher
- ___ Pacific Slope Flycatcher
- 3 Black Phoebe
- ___ Say's Phoebe
- 2 Ash-throated Flycatcher
- ___ Cassin's Kingbird
- ___ Western Kingbird
- ___ Horned Lark
- ___ Purple Martin
- ___ Tree Swallow
- ___ Violet-green Swallow
- II N. Rough-winged Swallow
- ___ Bank Swallow
- 1 Cliff Swallow
- ___ Barn Swallow
- II23 Scrub Jay
- 32 American Crow
- 1 Common Raven
- ___ Mountain Chickadee
- 5 Plain Titmouse
- 6 Bushtit
- ___ Rock Wren
- ___ Canyon Wren
- II IIII232II Bewick's Wren
- ___ House Wren
- ___ Marsh Wren
- ___ Ruby-crowned Kinglet
- ___ Blue-gray Gnatcatcher
- ___ Western Bluebird
- ___ Swainson's Thrush
- ___ Hermit Thrush
- ___ American Robin
- ___ Wrentit
- ___ Northern Mockingbird
- II California Thrasher
- ___ American Pipit
- ___ Cedar Waxwing
- ___ Phainopepla
- ___ Loggerhead Shrike
- ___ European Starling
- ___ Bell's Vireo
- ___ Gray Vireo
- ___ Solitary Vireo
- ___ Hutton's Vireo
- ___ Warbling Vireo
- ___ Orange-crowned Warbler
- ___ Nashville Warbler
- ___ Yellow Warbler
- ___ Yellow-rumped Warbler
- ___ Black-th. Gray Warbler
- ___ Townsend's Warbler
- ___ Hermit Warbler
- ___ MacGillivray's Warbler
- ___ Common Yellowthroat
- ___ Wilson's Warbler
- ___ Yellow-breasted Chat
- ___ Summer Tanager
- ___ Western Tanager
- 1 IIII Black-headed Grosbeak
- ___ Blue Grosbeak
- ___ Lazuli Bunting
- II Rufous-sided Towhee
- III California Towhee
- ___ Chipping Sparrow
- II Lark Sparrow
- ___ Fox Sparrow
- III Song Sparrow
- ___ Lincoln's Sparrow
- ___ Golden-crowned Sparrow
- ___ White-crowned Sparrow
- ___ Dark-eyed Junco
- ___ Red-winged Blackbird
- ___ Tricolored Blackbird
- ___ Western Meadowlark
- ___ Yellow-headed Blackbird
- ___ Brewer's Blackbird
- ___ Great-tailed Grackle
- ___ Brown-headed Cowbird
- ___ Hooded Oriole
- II Northern Oriole
- ___ Purple Finch
- 2 House Finch
- ___ Pine Siskin
- ___ Lesser Goldfinch
- ___ Lawrence's Goldfinch
- ___ American Goldfinch
- ___ House Sparrow

Additional Species

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1993 Area 5

Sngdn

Birds of the Santa Clara River System

Lots of water — damp almost all the way across somewhat stunted but nice climb young 15' willo

Date 4/26/93 River Section Lower C Time 6:30-9:00

- Great Blue Heron
- Great Egret
- Snowy Egret
- Green-backed Heron
- Green-winged Teal
- 2 Mallard
- Blue-winged Teal
- Cinnamon Teal
- Gadwall
- Ruddy Duck
- Turkey Vulture
- Black-shouldered Kite
- Northern Harrier
- Sharp-shinned Hawk
- Cooper's Hawk
- Red-shouldered Hawk
- Red-tailed Hawk
- American Kestrel
- 25, California Quail
- Virginia Rail
- Sora
- Common Moorhen
- American Coot
- 2 2 Killdeer
- Black-necked Stilt
- American Avocet
- 1 Greater Yellowlegs
- Solitary Sandpiper
- Spotted Sandpiper
- 8 Least Sandpiper
- Common Snipe
- 2 Domestic Pigeon
- Band-tailed Pigeon
- 2 2 2 1 Mourning Dove
- 2 Spotted Dove
- Greater Roadrunner
- Barn Owl
- Western Screech-Owl
- 11 Great Horned Owl
- Lesser Nighthawk
- Common Poorwill
- Vaux's Swift
- White-throated Swift
- Black-ch. Hummingbird
- 1 Anna's Hummingbird
- Costa's Hummingbird
- Rufous Hummingbird
- Allen's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- Red-breasted Sapsucker
- Nuttall's Woodpecker
- Downy Woodpecker
- Hairy Woodpecker
- Northern Flicker
- Olive-sided Flycatcher
- Western Wood-Pewee
- Willow Flycatcher
- Hammond's Flycatcher
- Dusky Flycatcher
- Gray Flycatcher
- Pacific Slope Flycatcher
- Black Phoebe
- Say's Phoebe
- 12 Ash-throated Flycatcher
- Cassin's Kingbird
- 22 Western Kingbird
- Horned Lark
- Purple Martin
- Tree Swallow
- Violet-green Swallow
- N. Rough-winged Swallow
- Bank Swallow
- 1 Cliff Swallow
- Barn Swallow
- 11 Scrub Jay
- 1 American Crow
- 111 Common Raven
- Mountain Chickadee
- Plain Titmouse
- 227 Bushtit
- Rock Wren
- Canyon Wren
- 1 2 Bewick's Wren
- House Wren
- Marsh Wren
- Ruby-crowned Kinglet
- Blue-gray Gnatcatcher
- Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- American Robin
- Wrentit
- 11 Northern Mockingbird
- 2 California Thrasher
- American Pipit
- Cedar Waxwing
- Phainopepla
- 11 Loggerhead Shrike
- European Starling
- Bell's Vireo
- Gray Vireo
- Solitary Vireo
- Hutton's Vireo
- Warbling Vireo
- Orange-crowned Warbler
- Nashville Warbler
- 1111 Yellow Warbler
- 111 Yellow-rumped Warbler
- Black-th. Gray Warbler
- Townsend's Warbler
- Hermit Warbler
- MacGillivray's Warbler
- 1 Common Yellowthroat
- 1 2 1 Wilson's Warbler
- Yellow-breasted Chat
- Summer Tanager
- Western Tanager
- 1111 Black-headed Grosbeak
- Blue Grosbeak
- Lazuli Bunting
- Rufous-sided Towhee
- California Towhee
- Chipping Sparrow
- Lark Sparrow
- Fox Sparrow
- 1 1111 Song Sparrow
- Lincoln's Sparrow
- Golden-crowned Sparrow
- White-crowned Sparrow
- Dark-eyed Junco
- 18, 6 Red-winged Blackbird
- Tricolored Blackbird
- Western Meadowlark
- Yellow-headed Blackbird
- Brewer's Blackbird
- Great-tailed Grackle
- 2 1 1 23 Brown-headed Cowbird
- 11 Hooded Oriole
- 11 Northern Oriole
- Purple Finch
- 3 House Finch
- 4 25 Pine Siskin
- 2 Lesser Goldfinch
- Lawrence's Goldfinch
- 26 American Goldfinch
- House Sparrow

Additional Species

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Running water in creek!

Corey

1993 Area 5

...of the Santa Clara River System

Date April 26 River Section Upper C Time _____

Great Blue Heron	Acorn Woodpecker	Hutton's Vireo
Great Egret	Red-breasted Sapsucker	2 Warbling Vireo
Snowy Egret	IIII Nuttall's Woodpecker	4,4,5 Orange-crowned Warbler
Green-backed Heron	Downy Woodpecker	Nashville Warbler
Green-winged Teal	Hairy Woodpecker	1 Yellow Warbler
Mallard	Northern Flicker	1 Yellow-rumped Warbler
Blue-winged Teal	Olive-sided Flycatcher	Black-th. Gray Warbler
Cinnamon Teal	1 Western Wood-Pewee	Townsend's Warbler
Gadwall	Willow Flycatcher	Hermit Warbler
Ruddy Duck	Hammond's Flycatcher	MacGillivray's Warbler
Turkey Vulture	Dusky Flycatcher	1 Common Yellowthroat
Black-shouldered Kite	Gray Flycatcher	1,1,1,1,1 Wilson's Warbler
Northern Harrier	Pacific Slope Flycatcher	Yellow-breasted Chat
Sharp-shinned Hawk	1,1,1 Black Phoebe	Summer Tanager
Cooper's Hawk	Say's Phoebe	Western Tanager
Red-shouldered Hawk	1,1,1 Ash-throated Flycatcher	1 Black-headed Grosbeak
1 Red-tailed Hawk on nest	Cassin's Kingbird	1 Blue Grosbeak
American Kestrel	3,3,4 Western Kingbird	1,1,2 Lazuli Bunting
9,30 California Quail	Horned Lark	1 Rufous-sided Towhee
Virginia Rail	Purple Martin	1,1,3 California Towhee
Sora	Tree Swallow	Chipping Sparrow
Common Moorhen	Violet-green Swallow	Lark Sparrow
American Coot	3 N. Rough-winged Swallow	Fox Sparrow
1,1 Killdeer	Bank Swallow	Song Sparrow
Black-necked Stilt	Cliff Swallow	11 Lincoln's Sparrow
American Avocet	2 Barn Swallow	Colden-crowned Sparrow
Greater Yellowlegs	2,1,1,2,2 Scrub Jay	White-crowned Sparrow
Solitary Sandpiper	American Crow	Dark-eyed Junco
Spotted Sandpiper	11,15,15 Common Raven	3,3,4 Red-winged Blackbird
Least Sandpiper	Mountain Chickadee	Tricolored Blackbird
Common Snipe	2 Plain Titmouse	Western Meadowlark
Domestic Pigeon	5 Bushtit	Yellow-headed Blackbird
Band-tailed Pigeon	Rock Wren	Brewer's Blackbird
2,2 Mourning Dove	Canyon Wren	Great-tailed Grackle
Spotted Dove	IIII Bewick's Wren	3 Brown-headed Cowbird
Greater Roadrunner	1 House Wren	Hooded Oriole
Barn Owl	Marsh Wren	1,1,3 Northern Oriole
Western Screech-Owl	1,1,1 Ruby-crowned Kinglet	Purple Finch
Great Horned Owl	Blue-gray Gnatcatcher	House Finch
Lesser Nighthawk	Western Bluebird	Pine Siskin
Common Poorwill	Swainson's Thrush	Lesser Goldfinch
Vaux's Swift	Hermit Thrush	2,3,1,2 Lawrence's Goldfinch
White-throated Swift	American Robin	15,15 American Goldfinch
Black-ch. Hummingbird	Wrentit	House Sparrow
Anna's Hummingbird	IIII Northern Mockingbird	Additional Species
IIII Costa's Hummingbird	3,1,1 California Thrasher	Rd Breasted Nuthatch
Rufous Hummingbird	1 American Pipit	
Allen's Hummingbird	Cedar Waxwing	
Belted Kingfisher	Phainopepla	
	Loggerhead Shrike	
	5 European Starling	
	Bell's Vireo	
	Gray Vireo	
	Solitary Vireo	

N

Birds of the Santa Clara River System

Date 6-14 River Section San Fernando - Time 6:45-

1993
Area 6

- Great Blue Heron
- Great Egret
- Snowy Egret
- Green-backed Heron
- Green-winged Teal
- 1 Mallard
- Blue-winged Teal
- Cinnamon Teal
- Gadwall
- Ruddy Duck
- Turkey Vulture
- Black-shouldered Kite
- Northern Harrier
- Sharp-shinned Hawk
- Cooper's Hawk
- Red-shouldered Hawk
- 5 Red-tailed Hawk
- American Kestrel
- 22 California Quail 36 43
- Virginia Rail
- Sora
- Common Moorhen
- American Coot
- 2 Killdeer 2 3
- Black-necked Stilt
- American Avocet
- Greater Yellowlegs
- Solitary Sandpiper
- Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- Domestic Pigeon
- Band-tailed Pigeon
- 41 Mourning Dove 5
- Spotted Dove
- 1 Greater Roadrunner
- Barn Owl
- Western Screech-Owl
- Great Horned Owl
- Lesser Nighthawk
- Common Poorwill
- Vaux's Swift
- White-throated Swift
- 1 Black-ch. Hummingbird
- Anna's Hummingbird
- Costa's Hummingbird
- Rufous Hummingbird
- Allen's Hummingbird
- Belted Kingfisher

- Acorn Woodpecker
- Red-breasted Sapsucker
- 4 Nuttall's Woodpecker
- Downy Woodpecker
- Hairy Woodpecker
- Northern Flicker
- Olive-sided Flycatcher
- Western Wood-Pewee
- Willow Flycatcher
- Hammond's Flycatcher
- Dusky Flycatcher
- Gray Flycatcher
- Pacific Slope Flycatcher
- 3 Black Phoebe
- Say's Phoebe
- 4 Ash-throated Flycatcher
- Cassin's Kingbird
- 2 Western Kingbird
- Horned Lark
- Purple Martin
- Tree Swallow
- Violet-green Swallow
- N. Rough-winged Swallow
- Bank Swallow
- 1 Cliff Swallow
- Barn Swallow
- 1 2 1 2 5 Scrub Jay
- 2 1 American Crow
- 2 2 2 2 2 2 Common Raven
- Mountain Chickadee
- 2 1 Plain Titmouse
- 2 2 Bushtit
- Rock Wren
- Canyon Wren
- 1 1 5 Bewick's Wren
- 2 House Wren
- Marsh Wren
- Ruby-crowned Kinglet
- Blue-gray Gnatcatcher
- 2 Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- American Robin
- 8 Wrentit
- 3 Northern Mockingbird
- 5 California Thrasher
- American Pipit
- Cedar Waxwing
- 4 2 Phainopepla
- 2 Loggerhead Shrike
- 6 4 9 European Starling
- Bell's Vireo
- Gray Vireo
- Solitary Vireo

- Hutton's Vireo
- Warbling Vireo
- Orange-crowned Warbler
- Nashville Warbler
- Yellow Warbler
- Yellow-rumped Warbler
- Black-th. Gray Warbler
- Townsend's Warbler
- Hermit Warbler
- MacGillivray's Warbler
- 1 Common Yellowthroat
- Wilson's Warbler
- Yellow-breasted Chat
- Summer Tanager
- Western Tanager
- 1 Black-headed Grosbeak
- Blue Grosbeak
- Lazuli Bunting
- 4 Rufous-sided Towhee
- 11 5 5 California Towhee
- Chipping Sparrow
- 1 Lark Sparrow
- Fox Sparrow
- 11 5 2 Song Sparrow
- Lincoln's Sparrow
- Golden-crowned Sparrow
- White-crowned Sparrow
- Dark-eyed Junco
- 2 3 1 Red-winged Blackbird
- 1 Tricolored Blackbird
- Western Meadowlark
- Yellow-headed Blackbird
- Brewer's Blackbird
- Great-tailed Grackle
- 2 2 Brown-headed Cowbird
- Hooded Oriole
- 13 5 Northern Oriole
- Purple Finch
- 44 7 8 8 House Finch
- Pine Siskin
- Lesser Goldfinch
- Lawrence's Goldfinch
- American Goldfinch
- House Sparrow

Additional Species

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Sugden — Lots of water 1993 ave 7

Birds of the Santa Clara River System

Date 4/26/93 River Section ~~East~~ S/H Time 9:00 a.m - 10:45

- Great Blue Heron
- Great Egret
- Snowy Egret
- Green-backed Heron 1
- Green-winged Teal
- Mallard ~~~~ 2
- Blue-winged Teal
- Cinnamon Teal
- Gadwall Black crowned Night Heron 11
- Ruddy Duck
- Turkey Vulture
- Black-shouldered Kite
- Northern Harrier
- Sharp-shinned Hawk
- Cooper's Hawk
- Red-shouldered Hawk
- Red-tailed Hawk
- 1 American Kestrel
- 222 California Quail 2
- Virginia Rail
- Sora
- Common Moorhen
- American Coot
- Killdeer 222(3)
- Black-necked Stilt
- American Avocet
- Greater Yellowlegs —1
- Solitary Sandpiper
- Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- Domestic Pigeon
- Band-tailed Pigeon
- Mourning Dove
- Spotted Dove
- Greater Roadrunner
- Barn Owl
- Western Screech-Owl
- Great Horned Owl
- Lesser Nighthawk
- Common Poorwill
- Vaux's Swift
- White-throated Swift
- Black-ch. Hummingbird
- 2 Anna's Hummingbird
- Costa's Hummingbird
- Rufous Hummingbird
- Allen's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- Red-breasted Sapsucker
- Nuttall's Woodpecker ~~1
- Downy Woodpecker
- Hairy Woodpecker
- Northern Flicker
- Olive-sided Flycatcher
- Western Wood-Pewee
- Willow Flycatcher
- Hammond's Flycatcher
- Dusky Flycatcher
- Gray Flycatcher
- Pacific Slope Flycatcher
- Black Phoebe
- Say's Phoebe
- Ash-throated Flycatcher
- Cassin's Kingbird
- 4 Western Kingbird ~11
- Horned Lark
- Purple Martin
- Tree Swallow
- Violet-green Swallow
- 6 N. Rough-winged Swallow 1
- Bank Swallow
- Cliff Swallow
- Barn Swallow
- 111 2 Scrub Jay 1
- American Crow 1
- 8 2 5 Common Raven nest under bridge 4
- Mountain Chickadee
- Plain Titmouse
- 22 Bushtit 2
- Rock Wren
- Canyon Wren
- 2 Bewick's Wren
- House Wren
- Marsh Wren
- Ruby-crowned Kinglet
- Blue-gray Gnatcatcher
- Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- American Robin
- Wrentit
- Northern Mockingbird
- 6 2 1 California Thrasher 11
- American Pipit
- Cedar Waxwing
- Phainopepla
- Loggerhead Shrike
- European Starling 2
- Bell's Vireo
- Gray Vireo
- Solitary Vireo
- Hutton's Vireo
- Warbling Vireo
- 2 Orange-crowned Warbler 1
- Nashville Warbler
- 1 Yellow Warbler 11
- 1 Yellow-rumped Warbler 22
- Black-th. Gray Warbler 1
- Townsend's Warbler
- Hermit Warbler
- MacGillivray's Warbler
- Common Yellowthroat
- 1 2 Wilson's Warbler 7 11
- Yellow-breasted Chat
- Summer Tanager
- 1 Western Tanager
- 11 Black-headed Grosbeak 1
- Blue Grosbeak
- Lazuli Bunting
- 1 Rufous-sided Towhee
- 2 California Towhee
- Chipping Sparrow
- Lark Sparrow
- Fox Sparrow
- 1 Song Sparrow
- Lincoln's Sparrow
- Golden-crowned Sparrow
- White-crowned Sparrow
- Dark-eyed Junco
- Red-winged Blackbird
- Tricolored Blackbird
- Western Meadowlark
- Yellow-headed Blackbird
- Brewer's Blackbird
- Great-tailed Grackle
- Brown-headed Cowbird
- 1 Hooded Oriole
- 11 Northern Oriole 1111
- Purple Finch
- 4 House Finch ~~ 6 1
- Pine Siskin ~ 2, 1
- Lesser Goldfinch 1
- Lawrence's Goldfinch
- American Goldfinch
- House Sparrow

Additional Species

T.V.

rds of the Santa Clara River System Lower

Date June 9/93 River Section So Fork Time 8:15-9:15

1993 Area 7

___ Great Blue Heron
___ Great Egret
___ Snowy Egret
___ Green-backed Heron
___ Green-winged Teal
___ Mallard
___ Blue-winged Teal
___ Cinnamon Teal
___ Gadwall
___ Ruddy Duck
___ Turkey Vulture
___ Black-shouldered Kite
___ Northern Harrier
___ Sharp-shinned Hawk
___ Cooper's Hawk
___ Red-shouldered Hawk
2 Red-tailed Hawk
1 American Kestrel
22 California Quail
___ Virginia Rail
___ Sora
___ Common Moorhen
___ American Coot
4 60 Killdeer
___ Black-necked Stilt
___ American Avocet
___ Greater Yellowlegs
___ Solitary Sandpiper
___ Spotted Sandpiper
___ Least Sandpiper
___ Common Snipe
___ Domestic Pigeon
___ Band-tailed Pigeon
222 Mourning Dove
___ Spotted Dove
___ Greater Roadrunner
___ Barn Owl
___ Western Screech-Owl
___ Great Horned Owl
___ Lesser Nighthawk
___ Common Poorwill
___ Vaux's Swift
___ White-throated Swift
11 Black-ch. Hummingbird
12 Anna's Hummingbird
___ Costa's Hummingbird
___ Rufous Hummingbird
___ Allen's Hummingbird
___ Belted Kingfisher

___ Acorn Woodpecker
___ Red-breasted Sapsucker
11 Nuttall's Woodpecker
___ Downy Woodpecker
___ Hairy Woodpecker
___ Northern Flicker
___ Olive-sided Flycatcher
___ Western Wood-Pewee
___ Willow Flycatcher
___ Hammond's Flycatcher
___ Dusky Flycatcher
___ Gray Flycatcher
___ Pacific Slope Flycatcher
11 Black Phoebe
___ Say's Phoebe
21 Ash-throated Flycatcher
___ Cassin's Kingbird
___ Western Kingbird
___ Horned Lark
___ Purple Martin
___ Tree Swallow
___ Violet-green Swallow
___ N. Rough-winged Swallow
___ Bank Swallow
___ Cliff Swallow
___ Barn Swallow
12 Scrub Jay
___ American Crow
2 Common Raven
___ Mountain Chickadee
4 Plain Titmouse
22 Bushtit
1 Rock Wren
___ Canyon Wren
122 Bewick's Wren
___ House Wren
___ Marsh Wren
___ Ruby-crowned Kinglet
___ Blue-gray Gnatcatcher
___ Western Bluebird
___ Swainson's Thrush
___ Hermit Thrush
___ American Robin
___ Wrentit
2 Northern Mockingbird
___ California Thrasher
___ American Pipit
___ Cedar Waxwing
___ Phainopepla
___ Loggerhead Shrike
12 21 European Starling
___ Bell's Vireo
___ Gray Vireo
___ Solitary Vireo

___ Hutton's Vireo
___ Warbling Vireo
___ Orange-crowned Warbler
___ Nashville Warbler
___ Yellow Warbler
___ Yellow-rumped Warbler
___ Black-th. Gray Warbler
___ Townsend's Warbler
___ Hermit Warbler
___ MacGillivray's Warbler
___ Common Yellowthroat
___ Wilson's Warbler
___ Yellow-breasted Chat
___ Summer Tanager
1 Western Tanager
___ Black-headed Grosbeak
___ Blue Grosbeak
___ Lazuli Bunting
___ Rufous-sided Towhee
11 California Towhee
___ Chipping Sparrow
___ Lark Sparrow
___ Fox Sparrow
___ Song Sparrow
___ Lincoln's Sparrow
___ Golden-crowned Sparrow
___ White-crowned Sparrow
___ Dark-eyed Junco
6 2 Red-winged Blackbird
___ Tricolored Blackbird
___ Western Meadowlark
___ Yellow-headed Blackbird
___ Brewer's Blackbird
___ Great-tailed Grackle
___ Brown-headed Cowbird
___ Hooded Oriole
2 Northern Oriole
___ Purple Finch
222 House Finch
___ Pine Siskin
2 Lesser Goldfinch
___ Lawrence's Goldfinch
___ American Goldfinch
2 House Sparrow

Additional Species

___
___
___
___
___
___
___
___
___

Corey

1993 Area 8

Birds of the Santa Clara River System

Date April 26 River Section E Time _____

___ Great Blue Heron
___ Great Egret
___ Snowy Egret
___ Green-backed Heron
___ Green-winged Teal
___ Mallard
___ Blue-winged Teal
___ Cinnamon Teal
___ Gadwall
___ Ruddy Duck
___ Turkey Vulture
___ Black-shouldered Kite
___ Northern Harrier
___ Sharp-shinned Hawk
___ Cooper's Hawk
___ Red-shouldered Hawk
___ Red-tailed Hawk
___ American Kestrel
4,1 California Quail
___ Virginia Rail
___ Sora
___ Common Moorhen
___ American Coot
1,1,1 Killdeer
___ Black-necked Stilt
___ American Avocet
___ Greater Yellowlegs
___ Solitary Sandpiper
___ Spotted Sandpiper
___ Least Sandpiper
___ Common Snipe
___ Domestic Pigeon
___ Band-tailed Pigeon
2,1 Mourning Dove
___ Spotted Dove
___ Greater Roadrunner
___ Barn Owl
___ Western Screech-Owl
___ Great Horned Owl
___ Lesser Nighthawk
___ Common Poorwill
___ Vaux's Swift
___ White-throated Swift
___ Black-ch. Hummingbird
1,1,1 Anna's Hummingbird
___ Costa's Hummingbird
___ Rufous Hummingbird
___ Allen's Hummingbird
___ Belted Kingfisher

___ Acorn Woodpecker
___ Red-breasted Sapsucker
___ Nuttall's Woodpecker
___ Downy Woodpecker
___ Hairy Woodpecker
___ Northern Flicker
___ Olive-sided Flycatcher
___ Western Wood-Pewee
___ Willow Flycatcher
___ Hammond's Flycatcher
1 Dusky Flycatcher
___ Gray Flycatcher
4 Pacific Slope Flycatcher
___ Black Phoebe
___ Say's Phoebe
___ Ash-throated Flycatcher
___ Cassin's Kingbird
___ Western Kingbird
___ Horned Lark
___ Purple Martin
___ Tree Swallow
___ Violet-green Swallow
1,1 N. Rough-winged Swallow
___ Bank Swallow
___ Cliff Swallow
___ Barn Swallow
1,1 Scrub Jay
___ American Crow
1,4 Common Raven
___ Mountain Chickadee
___ Plain Titmouse
___ Bushtit
___ Rock Wren
___ Canyon Wren
___ Bewick's Wren
___ House Wren
___ Marsh Wren
___ Ruby-crowned Kinglet
___ Blue-gray Gnatcatcher
___ Western Bluebird
___ Swainson's Thrush
___ Hermit Thrush
___ American Robin
___ Wrentit
1 Northern Mockingbird
___ California Thrasher
___ American Pipit
___ Cedar Waxwing
___ Phainopepla
___ Loggerhead Shrike
___ European Starling
___ Bell's Vireo
___ Gray Vireo
___ Solitary Vireo

___ Hutton's Vireo
11 Warbling Vireo
111 Orange-crowned Warbler
___ Nashville Warbler
11 Yellow Warbler
1 Yellow-rumped Warbler
___ Black-th. Gray Warbler
___ Townsend's Warbler
___ Hermit Warbler
1 MacGillivray's Warbler
11 Common Yellowthroat
1111 Wilson's Warbler
___ Yellow-breasted Chat
___ Summer Tanager
___ Western Tanager
1 Black-headed Grosbeak
___ Blue Grosbeak
___ Lazuli Bunting
___ Rufous-sided Towhee
___ California Towhee
___ Chipping Sparrow
___ Lark Sparrow
___ Fox Sparrow
117 Song Sparrow
___ Lincoln's Sparrow
___ Colden-crowned Sparrow
2 White-crowned Sparrow
___ Dark-eyed Junco
___ Red-winged Blackbird
___ Tricolored Blackbird
___ Western Meadowlark
___ Yellow-headed Blackbird
___ Brewer's Blackbird
___ Great-tailed Grackle
___ Brown-headed Cowbird
___ Hooded Oriole
___ Northern Oriole
111 Purple Finch
2,1,1 House Finch
___ Pine Siskin
___ Lesser Goldfinch
___ Lawrence's Goldfinch
___ American Goldfinch
___ House Sparrow

Additional Species

Dinner Duck

X

1993 Area 8

Birds of the Santa Clara River System

Date June 9/93 River Section Upper So Fork Time ______

- Great Blue Heron
- Great Egret
- Snowy Egret
- Green-backed Heron
- Green-winged Teal
- Mallard
- Blue-winged Teal
- Cinnamon Teal
- Gadwall
- Ruddy Duck
- Turkey Vulture
- Black-shouldered Kite
- Northern Harrier
- Sharp-shinned Hawk
- Cooper's Hawk
- Red-shouldered Hawk
- Red-tailed Hawk
- 2 American Kestrel
- 2 2 2 California Quail
- Virginia Rail
- Sora
- Common Moorhen
- American Coot
- 2 | 2 Killdeer
- Black-necked Stilt
- American Avocet
- Greater Yellowlegs
- Solitary Sandpiper
- Spotted Sandpiper
- Least Sandpiper
- Common Snipe
- Domestic Pigeon
- Band-tailed Pigeon
- 4 | | Mourning Dove
- Spotted Dove
- Greater Roadrunner
- Barn Owl
- Western Screech-Owl
- Great Horned Owl
- Lesser Nighthawk
- Common Poorwill
- Vaux's Swift
- White-throated Swift
- Black-ch. Hummingbird
- | | | | Anna's Hummingbird
- Costa's Hummingbird
- Rufous Hummingbird
- Allen's Hummingbird
- Belted Kingfisher
- Acorn Woodpecker
- Red-breasted Sapsucker
- | | Nuttall's Woodpecker
- Downy Woodpecker
- Hairy Woodpecker
- Northern Flicker
- Olive-sided Flycatcher
- Western Wood-Pewee
- Willow Flycatcher
- Hammond's Flycatcher
- Dusky Flycatcher
- Gray Flycatcher
- Pacific Slope Flycatcher
- Black Phoebe
- Say's Phoebe
- | Ash-throated Flycatcher
- Cassin's Kingbird
- Western Kingbird
- Horned Lark
- Purple Martin
- Tree Swallow
- Violet-green Swallow
- N. Rough-winged Swallow
- Bank Swallow
- Cliff Swallow
- Barn Swallow
- | | | Scrub Jay
- 2 |||| American Crow
- 2 Common Raven
- Mountain Chickadee
- Plain Titmouse
- Bushtit
- Rock Wren
- Canyon Wren
- | Bewick's Wren
- House Wren
- Marsh Wren
- Ruby-crowned Kinglet
- Blue-gray Gnatcatcher
- Western Bluebird
- Swainson's Thrush
- Hermit Thrush
- American Robin
- Wrentit
- |||| Northern Mockingbird
- California Thrasher
- American Pipit
- Cedar Waxwing
- Phainopepla
- | Loggerhead Shrike
- (15) 2 2 European Starling
- Bell's Vireo
- Gray Vireo
- Solitary Vireo
- Hutton's Vireo
- Warbling Vireo
- Orange-crowned Warbler
- Nashville Warbler
- Yellow Warbler
- Yellow-rumped Warbler
- Black-th. Gray Warbler
- Townsend's Warbler
- Hermit Warbler
- MacGillivray's Warbler
- | Common Yellowthroat
- Wilson's Warbler
- Yellow-breasted Chat
- Summer Tanager
- Western Tanager
- Black-headed Grosbeak
- Blue Grosbeak
- Lazuli Bunting
- Rufous-sided Towhee
- | California Towhee
- Chipping Sparrow
- Lark Sparrow
- Fox Sparrow
- 3 3 | 2 | | | Song Sparrow
- Lincoln's Sparrow
- Golden-crowned Sparrow
- White-crowned Sparrow
- Dark-eyed Junco
- (5) | Red-winged Blackbird
- Tricolored Blackbird
- Western Meadowlark
- Yellow-headed Blackbird
- (10) 3 | Brewer's Blackbird
- Great-tailed Grackle
- 4 2 2 2 Brown-headed Cowbird
- Hooded Oriole
- | | Northern Oriole
- Purple Finch
- 3 4 2 House Finch
- Pine Siskin
- 2 2 | Lesser Goldfinch
- Lawrence's Goldfinch
- American Goldfinch
- 2 4 2 House Sparrow

Additional Species

Sand [illegible]

Some wet spots

Compliance Biology. Letter summarizing the results of Mammal Surveys on the River Park Project Site. June 2003

compliance•biology

June 9, 2003

Mr. Jeff Johnson
Impact Sciences, Inc.
30343 Canwood Street
Suite 210
Agoura Hills, CA 91310

Subject: Results of Mammal Surveys on the River Park Project Site

Dear Mr. Johnson,

The purpose of this letter report is to provide you with the results of updated biological information on the approximately 664-acre River Park project site located in Los Angeles County, California. Previous general and focused wildlife studies have been completed on this site in association with environmental documentation for the proposed project. The focus of the study discussed in this report was to evaluate the diversity of mammalian species on the project site.

The subject property supports a mosaic of habitat types including dry river bed, various series of upland sage scrub and chaparral, holly-leaf cherry scrub, non-native grasslands, agricultural fields, and ruderal/disturbed areas. There are also scattered individual and small patches of mature trees including native oaks and willows, as well as non-native eucalyptus. Topography and aspect also provide variable habitat conditions for wildlife occurring on the subject property.

METHODS

Three methods of surveying the site for mammals were utilized on the River Park site. Pedestrian surveys, nighttime spotlighting, and scent stations.

On the night of May 28, 2003 the entire site was covered with the objective of spot-lighting for larger mammals that may be active after sunset. A 500,000 candle-power spotlight was utilized while driving the existing dirt roads throughout the River Park site. Distances of up to 1000 meters were able to be scanned utilizing the spot-light.

Prior to dark on May 28, 2003, four separate scent stations were set up on the site. Site selection for the stations was based on variability of habitat type and presence of existing wildlife trails. Each station included an approximately 6-foot diameter pad covered with diatomaceous earth at a depth of approximately one to two inches and smoothed to create a clean and relatively even surface such that any tracks left would be easily discernable. A single open can of cat food was placed in the center of each pad to attract passing wildlife. The scent stations were checked on

the next two following days. After the first night, any tracks present at the station were identified and recorded. Then the diatomaceous earth at each station was smoothed to 'erase' all the existing tracks. After the second night of surveys the bait was removed and the stations deconstructed.

During the daytime hours on May 29 and May 30, 2003, the site was walked and all direct observations and detections of mammals were recorded. Detections include tracks, scat, carcasses, and fur.

RESULTS

Only four mammal species were observed during the spotlight effort. These include mule deer (*Odocoileus hemionus*), coyote (*Canis latrans*), common raccoon (*Procyon lotor*), and domestic cat (*Felis cattus*). In addition to the species identified during the spotlighting, striped skunk (*Mephitis mephitis*) and Virgina opossum (*Didelphis virginana*). The walkover surveys also indicated the presence of Botta's pocket gopher (*Thomomys bottae*), deer mouse (*Peromyscus maniculatus*), desert cottontail (*Sylvilagus auduboni*), brush rabbit (*S. bachmani*), San Diego black-tailed jackrabbit (*Lepus californicus*), California ground squirrel (*Spermophilus beecheyi*), woodrat (*Neotoma* sp.) [most likely *N. lepida intermedia* based on the type and location of midden and scat], and bobcat (*Lynx rufus*).

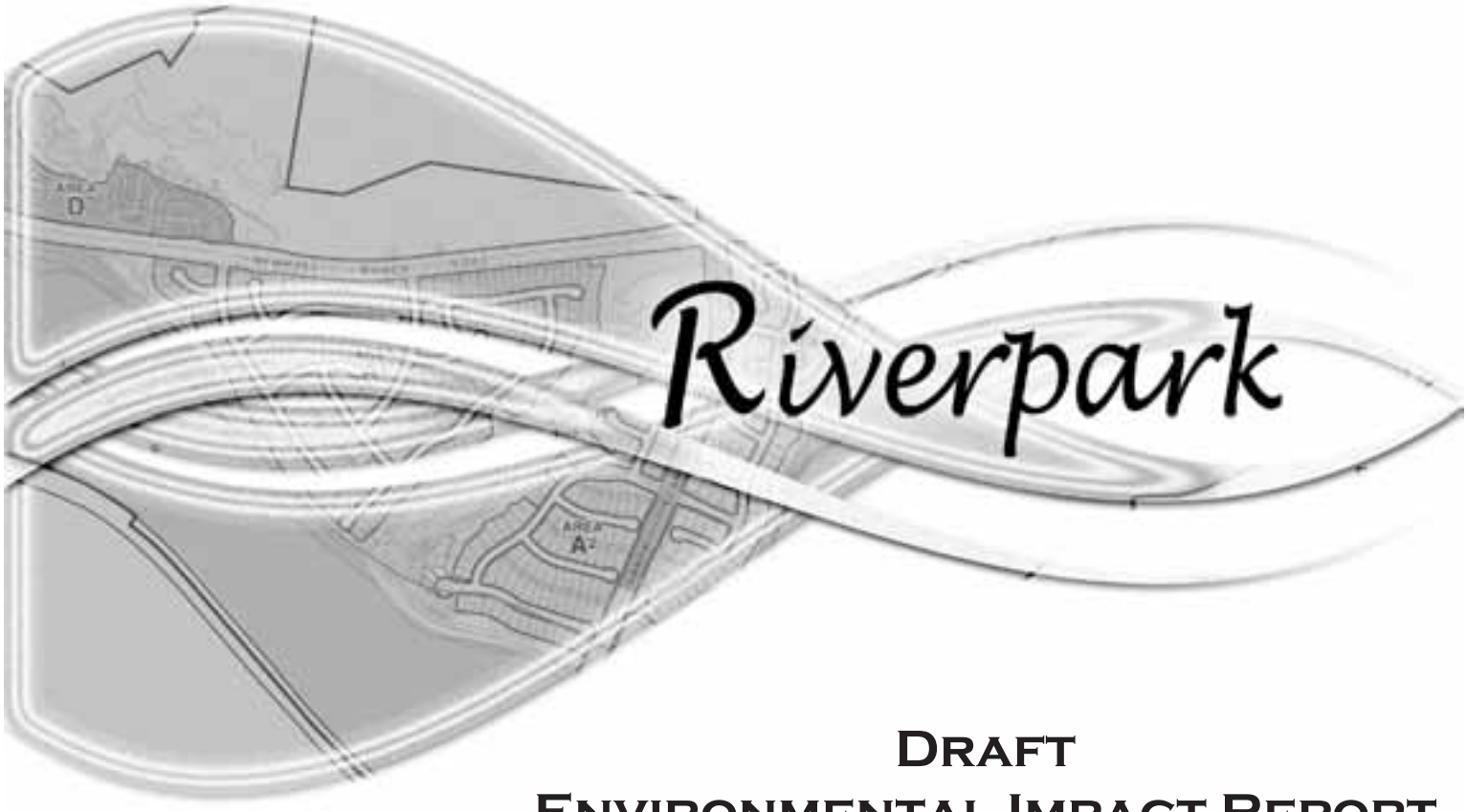
No state- or federally-listed threatened or endangered species were observed or detected during the survey effort. However, the San Diego desert woodrat and the San Diego black-tailed jackrabbit were both detected on the River Park site and are considered California Species of Special Concern. Both species are relatively common in the project region.

In addition to those species observed and detected during the survey effort, there are additional mammalian species that have a potential to occur on the subject property. Attachment A provides a complete list of all species observed, detected, and having a potential to occur on the River Park project site. Potential occurrences are indicated in the table with regard to frequency and/or abundance.

Please feel free to contact me if you have any questions regarding the information provided in this report.

Sincerely,

Dave Crawford
Principal Biologist



Draft
Environmental Impact Report

SCH No. 2002091081

Volume IV – Appendices

Prepared for:

City of Santa Clarita
Department of Planning & Building Services
23920 Valencia Boulevard, Suite 302
Santa Clarita, California 91355

Prepared by:

Impact Sciences, Inc.
30343 Canwood Street, Suite 210
Agoura Hills, California 91301

March 2004

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Water Service Data

SB 610
WATER SUPPLY ASSESSMENT
for
THE RIVER PARK PROJECT

August 7, 2003

Prepared by:
Santa Clarita Water Division of
Castaic Lake Water Agency

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1.0 INTRODUCTION

This report is a Water Supply Assessment (Assessment) prepared at the request of the City of Santa Clarita for the proposed River Park project ("Project"). The Assessment has been drafted pursuant to the requirements of Senate Bill 610 (Costa; Chapter 643, Stats. 2001) ("SB 610") which requires the public water systems which may supply water to certain proposed development projects to prepare a water supply assessment for use by the planning agency in compliance with the California Environmental Quality Act (CEQA).[1]

This Assessment has been prepared by the Santa Clarita Water Division (SCWD)[2] of the Castaic Lake Water Agency (CLWA). SCWD will be the retail water supplier to the Project and is the operator of a "public water system" as defined by SB 610. As the operator of the public water system which may provide water to the proposed River Park development, SCWD is responsible for preparing an SB 610 Water Supply Assessment.[3]

An SB 610 Water Supply Assessment is required for any "project" that is subject to the California Environmental Quality Act (CEQA)[4] and proposes, *inter alia*, residential development of more than 500 dwelling units.[5] The River Park project is a qualifying project under this definition.

This Assessment will provide information to the City of Santa Clarita for its consideration in making a determination as to whether there is a sufficient water supply available to serve the River Park project.[6] The Assessment has been submitted to the city within 90-days of its request to the public water system.[7] The City of Santa Clarita requested this Assessment from SCWD on July 16, 2003.

No Assessment has been previously prepared for the River Park project that complies with the requirements of SB 610.[8]

---

[1] SB 610 amended section 21151.9 of the California Public Resources Code, and amended sections 10631, 10656, 10910, 10911, 10912, and 10915 of, repealed section 10913 of, and added and amended section 10657 of, the California Water Code.

[2] SCWD is the "public water system" for purposes of this Assessment as defined by Water Code § 10912 (b), (c). A public water system has 3,000 or more service connections and provides piped water to the public for human consumption.

[3] Water Code 10910(b).

[4] Public Resources Code § 21080.

[5] Water Code § 10912(a)(1). This section also includes other types of development which are defined as a "project" by this section of the code.

[6] Water Code § 10911(c) states that the lead agency shall determine, based on the entire record, whether projected water supplies will be sufficient to satisfy the demands of the project, in addition to existing and planned future uses.

[7] Water Code § 10910 (g)(1).

[8] Water Code § 10910(h) states that if a project has been the subject of a Water Supply Assessment that complies with the requirements of this part, no additional water supply Assessment shall be required for

1.1 River Park Project

The River Park project is a proposed residential development consisting of single and multi-family housing on a 695 acre site in the City of Santa Clarita. It includes 439 single-family dwellings, 744 apartments, 40,000 square feet of commercial building area, and a 29-acre passive park, of which a maximum of eight (8) acres would be landscaped and irrigated. The Project site is located at the terminus of Newhall Ranch Road, east of Bouquet Canyon Road between CLWA property and the Santa Clara River, north of Soledad Canyon Road. Home construction is anticipated to begin in 2006 and will continue until build-out in 2009. At build-out, total water demand for the project is estimated to be less than 700 acre-feet per year (afy) (Table 1.1).

1.2 Purpose of the Assessment

The purpose of the Assessment is to provide an analysis of whether the SCWD water system has sufficient projected water supplies to meet the projected demands of the Project.[9] Specifically this Assessment evaluates whether the total projected water *supply*, determined to be available for the Project during normal, single dry, and multiple dry water years over the next 20 years, will meet the projected water *demand* associated with the proposed Project, in addition to existing and planned future water uses, including agriculture and manufacturing uses.[10] If the water supply is anticipated to be insufficient, the Assessment must describe measures being taken to obtain an adequate supply.[11]

SB 610 requires this Assessment to be included in the Environmental Impact Report prepared for the River Park project pursuant to the California Environmental Quality Act (CEQA).[12] The relationship between the Assessment and other River Park environmental documents is discussed in more detail in the following paragraphs.

---

subsequent projects that were part of a larger project for which a Water Supply Assessment was completed and that has complied with the requirements of this part and for which the public water system, or the city or county, has concluded that its water supplies are sufficient to meet the projected water demand associated with the proposed project, in addition to the existing and planned future uses, unless there has been substantial changes in the project or circumstances since approval of the Assessment.

[9] Water Code § 10910(c).
[10] Water Code § 10910 (c) (4).
[11] Water Code § 10911(a).
[12] Water Code § 10911(b), (c).

Table 1.1 – Estimated Water Demands

(Using SCWD Water Duty Factors From 2001)

LAND USE CATEGORY	AMOUNT	WATER DUTY FACTOR	WATER DEMAND (AFY)
Single Family Units	439 units	0.55 af/unit	241.45
Apartments	744 units	0.19 af/unit	141.36
Park	8 Acres	3 af per acre	24.0
Other Misc. Landscaping (irrigated common landscaping, pocket parks, etc.)	93 Acres	3 af per acre	279.0
Commercial (40,000 sq. ft.)	3 Acres	0.0289 af/ 100 sq ft	11.56
TOTAL PROJECT:			**697.37**

1.3 Castaic Lake Water Agency

The Castaic Lake Water Agency is a public water agency that serves an area of 195 square miles in Los Angeles and Ventura Counties. CLWA is a water wholesaler that provides about half of the water that Santa Clarita households and businesses use. CLWA, through the SCWD, also provides retail water service to the area previously served by the Santa Clarita Water Company. CLWA operates two potable water treatment plants, storage facilities and over 17 miles of transmission pipelines, and has initiated recycled water service. CLWA supplements local groundwater supplies with State Water Project (SWP) water from Northern California. This water is treated and delivered to the local water retailers, including the SCWD. The other three retail purveyors served by CLWA are: Los Angeles County Water District #36, Newhall County Water District, and Valencia Water Company.

1.4 Santa Clarita Water Division

In September 1999 CLWA acquired the Santa Clarita Water Company, an investor-owned retail water company serving the eastern part of the Santa Clarita Valley.[13] The former Santa Clarita Water Company was incorporated into CLWA's Santa Clarita Water Division, which continues to serve the same area with Santa Clarita Water Company's facilities. SCWD's service area includes portions of the City of Santa Clarita and unincorporated portions of Los Angeles County in the communities of Saugus, Canyon Country, and Newhall. SCWD supplies water from both groundwater wells and CLWA imported water. The SCWD is the retailer that will serve the River Park project. The project is located within the SCWD service area.

1.5 2000 Urban Water Management Plan

The water demand associated with the proposed River Park project is consistent with the projected future water demand figures in the most recent Urban Water Management Plan (UWMP) adopted by CLWA and the Santa Clarita Valley's retail purveyors: Los Angeles

[13] CLWA acquired 100% the capital stock in Santa Clarita Water Company by way of a judgment in eminent domain in Los Angeles County Superior Court case number BC 215065, entered on September 2, 1999. Subsequently, CLWA's authority to own the Santa Clarita Water Company and to provide retail water service through the former assets of the Company has been challenged in *Klajic v. Castaic Lake Water Agency* (California Court of Appeal, 2nd Dist, case number B161069). In addition, the public agency borrowing undertaken by CLWA to finance the acquisition of the Santa Clarita Water Company has been challenged in *Plambeck v. Stone and Youngberg* (LASC case no. BC249168). The cases are currently pending, but neither case seeks relief affecting the availability of water to Santa Clarita Water Company, SCWD or CLWA.

County Waterworks District # 36, Newhall County Water District, the Santa Clarita Water Company and the Valencia Water Company. The timing of the Project places it well within the timeframe for calculating "planned future uses" within the 2020 water supply projection included in the 2000 UWMP. Pertinent information from the UWMP, as well as other reports and analyses of water supply and demand, is considered in this Assessment. The final version of the Urban Water Management Plan was adopted by the CLWA Board of Directors on December 20, 2000 and submitted to the California Department of Water Resources.[14] Since adoption of the UWMP by the CLWA Board of Directors, additional documents, such as the State Water Project Delivery Reliability Report 2003, have been released that contain information and data that may update the UWMP. State law requires a revision of the UWMP by December 31, 2005, and any new information or data will be incorporated into that revision.

1.6 Reliance on the 2000 UWMP to Document Water Supply and Demand

SB 610 requires the Assessment to document the water demand for existing uses, planned future uses and the proposed development. Water Code §10910(c)(2) states that if the projected water demand associated with the proposed project was accounted for in the most recently adopted urban water management plan, the public water system may incorporate and consider the requested information from the urban water management plan in preparing the Assessment. The 2000 UWMP projections were based upon projected development based on the Los Angeles County Assessor's Land Use Codes (and General Plan documents) adopted by the City of Santa Clarita and by the County of Los Angeles, and did anticipate and take into account in its overall projections of demand, a level of development in the CLWA area consistent with that proposed by the River Park project. Pursuant to §10910(c)(2), this Assessment considers the data and findings included in the UWMP document in its determination of whether there is sufficient water supply to serve the River Park project because the Project's water demand is factored into the 20-year projection as a "planned future use."

The UWMP assumed that connections would increase by about 2,240 new connections per year. Connection data compiled and maintained by CLWA since 2000 (the year the UWMP was prepared) shows 2,249 new connections in 2000, 2,822 new connections in 2001 and 2,080 new connections in 2002. These actual numbers track closely with the assumptions from the UWMP.

[14] The validity and sufficiency of the UWMP were challenged in *County of Ventura v. Castaic Lake Water Agency*, (Kern County Superior Court case no. 245365-RJO). The trial court has ruled that UWMP meets the requirements of law. The Friends of the Santa Clara River have filed a notice of appeal from the Superior Court judgment, although the final judgment, including the award of costs, has not been filed. The County of Ventura has determined not to appeal the judgment.

1.7 Information Relied Upon in Preparation of this Assessment

Information from the following documentation has been relied upon in the preparation of this Assessment. The referenced documents are incorporated into this Assessment as if fully set forth herein. Copies of the referenced documents are available for review at the Castaic Lake Water Agency and copies can be obtained upon the payment of a fee to cover the cost of reproduction.

1.7.1 2000 Urban Water Management Plan, Castaic Lake Water Agency, Newhall County Water District, Santa Clarita Water Company and Valencia Water Company.

1.7.2 Santa Clarita Valley Water Report 2002, April 2003, CLWA, Los Angeles County Waterworks District #36, Newhall County Water District, and Valencia Water Company.

1.7.3 2001 Update Report, Hydrogeologic Conditions in the Alluvial and Saugus Formation Aquifer Systems, Richard C. Slade & Associates LLC (July 2002) ("Slade (2002)" herein).

1.7.4 Castaic Lake Water Agency, Capital Improvement Program, Kennedy-Jenks Consultants, 2003

1.7.5 The State Water Project Delivery Reliability Report, California Department of Water Resources, May 2003

1.7.6 Water Supply Contract Between the State of California Department of Water Resources and the Castaic Lake Water Agency, 1963 (plus amendments, including the "Monterey Amendment," 1995, and Amendment No. 18, 1999, the transfer of 41,000 acre-feet of Table A Amount from Kern

County Water Agency to Castaic Lake Water Agency)[15]

1.7.7 2002 Point of Delivery Agreement Among the Department of Water Resources of the State of California, Castaic Lake Water Agency and Kern County Water Agency (Semitropic Groundwater Storage Program).[16]

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[15] CLWA's contract rights to SWP water total 95,200 acre feet per year ("afy"), including a water transfer of 41,000 afy approved in 1999 from two water agencies in Kern County. CLWA's Environmental Impact Report prepared in connection with the 41,000 afy water transfer was challenged in *Friends of the Santa Clara River v. Castaic Lake Water Agency* (Los Angeles Superior Court Case No. PC 018110). The courts have required CLWA to re-certify the EIR but have held that CLWA may continue to utilize the 41,000 afy under the transfer.

[16] Due to availability of SWP water during 2002, CLWA entered into a groundwater banking agreement in 2002. Twenty-four thousand acre feet of SWP water, contracted to CLWA, was stored within the Semitropic Groundwater Storage Program in Kern County so that CLWA may withdraw the water in future years of shortage. The Negative Declaration prepared by CLWA was challenged in *California Water Network v. Castaic Lake Water Agency* (Ventura County Superior Court case no. CIV 215327), which is pending.

2.0 WATER SUPPLY ASSESSMENT

Based on the information contained in the 2000 UWMP and other supporting information relied upon in the preparation of this Assessment SCWD concludes there will be a sufficient water supply available at the time the River Park project is ready for occupancy, to meet the needs of the project in addition to existing and other planned future uses.

CLWA has existing water entitlements, rights and contracts to meet future demand as needed over time, and has committed sufficient capital resources and planned investments in various water programs and facilities to serve all of its existing and planned customers, including SCWD's customers. SCWD water entitlements, rights and contracts for local supplies, in addition to imported supplies provided by CLWA are sufficient to serve all of its existing and planned customers. SCWD has also identified an operational strategy combined with a prudent and flexible management approach to ensuring water reliability.

SCWD's current service area-wide demands are approximately 27,000 afy[17]. As mentioned previously, the River Park project will require less than 700 afy at build-out. The conclusions of the SCWD as stated in the 2000 UWMP related to the requirements of the SB 610 Assessment for River Park are as follows:

2.1 Average/Normal Year Water Assessment

The UWMP indicates that no shortages are anticipated within the Agency's service area in an average/normal water year through 2020 if projected imported and local supplies are developed as estimated.[18] Total projected water demands for the CLWA through the year 2020 are compared with the supplies projected to be available to meet demands in this analysis. The following table summarizes the data from the UWMP.

"Future Planned Water Supply Programs" as listed below, are included in the UWMP to indicate examples of how CLWA would add reliability and flexibility to its water supply portfolio. Programs such as these will be analyzed by CLWA and contracts entered into as need and cost-effectiveness are determined through time. Future Water Supply Assessments will reflect these contractual agreements.

[17] This represents average year demand. Dry year demand is approximately 10% higher.
[18] Castaic Lake Water Agency, 2000 Urban Water Management Plan (December 2000) p.4-2.

Table 2.1 Average/Normal Water Year

SUPPLY AND DEMAND ASSESSMENT[19] (Acre-Feet Per Year)	Year 2005	Year 2010	Year 2015	Year 2020
EXISTING WATER SUPPLY PROGRAMS:				
Local Supplies				
Alluvial Aquifer	35,000	35,000	35,000	35,000
Saugus Formation	11,000	11,000	11,000	11,000
Recycled Water	1,700	1,700	1,700	1,700
Imported Supplies[20]				
SWP Table A Amount	56,073	56,073	56,073	56,073
TOTAL EXISTING SUPPLIES:	**103,773**	**103,773**	**103,773**	**103,773**
Total Estimated Demand	81,700	90,100	100,700	113,100
Difference Surplus/(Deficit)	22,073	13,673	3,073	(9,327)
FUTURE PLANNED WATER SUPPLY PROGRAMS:				
Local Supplies				
Recycled Water		9,000	14,000	17,000
Imported Supplies				
Water Transfers	5,200	5,200	5,200	5,200
TOTAL PLANNED SUPPLIES:	**5,200**	**14,200**	**19,200**	**22,200**

[19] Excerpted from Table 4-1 of the UWMP

[20] 56,073 af represents approximately 58.9% of CLWA's contractual Table A Amount. Normal year supply based on assumptions from the UWMP. The DWR SWP Delivery Reliability Report (2003) indicates greater reliability of Table A deliveries (72 to 76%) than was assumed for the 2000 UWMP

2.2 Single Dry Year Water Assessment

The UWMP evaluated the estimated dry-year demands and projected supplies for the year 2010 for the purpose of assessing a single dry year. This year was selected in order to show the results of local and imported water supply development over the next 10 years. In May 2003 DWR finalized its State Water Project Delivery Reliability Report. For the worst-case scenario single dry year (1977, with a one in 73 year probability of occurrence), DWR estimates that SWP deliveries to contractors would be approximately 20 percent of contract amounts. If projected imported and local supplies are developed as indicated, no shortages are anticipated within the Agency's service area for the extreme-case single dry-year scenario analyzed.

2.3 Multiple Dry Year Water Assessment

The UWMP estimated the minimum water supply available during each of the three water years, 2001, 2002, and 2003.[21] The surface and groundwater supplies included in this analysis are reflective of supplies available during the 1987-92 drought years, and in particular, 1990, 1991, and 1992. The supplies available from recycling projects are assumed to experience no reduction in a dry year but are also assumed not to be fully on-line at this early stage of the 20-year projection. Demand reductions of 10% based on short-term water conservation programs are assumed for these dry-year scenarios (this level of conservation was achieved during the 1987-1992 drought). If projected imported and local supplies are developed as indicated, no shortages are anticipated within the Agency's service area in the dry-year scenarios analyzed.[22] Years 1, 2 and 3 in Table 2.1 represent demand projections for 2003 through 2005. The single and multiple dry year water supply and demand assessments from the UWMP are summarized in the following table[23].

Information concerning "Future Planned Water Supply Programs" as listed below, from the UWMP and other sources was included to indicate examples of how CLWA would add reliability and flexibility to its water supply portfolio. Programs such as these will be analyzed by CLWA and contracts entered into as need and cost-effectiveness are determined through time. Future Water Supply Assessments will reflect these contractual agreements.

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[21] UWMP p. 4-3. Hot, dry weather may generate a 10 % increase above normal in both urban and agricultural water usage. This percentage was used to generate the dry-year demands in Table 2.2.

[22] UWMP p. 4-4.

[23] Excerpted from Table 4-2 of the UWMP

Table 2.2 Dry-Year and Multi-Dry Year Water

SUPPLY AND DEMAND ASSESSMENT (Acre-Feet Per Year)				
	Single Dry Year	Multiple Dry Years Year 1	Year 2	Year 3
EXISTING WATER SUPPLY PROGRAMS				
Local Supplies				
Alluvial Aquifer	35,000	32,500	32,500	32,500
Saugus Formation	13,000	13,000	13,000	13,000
Recycled Water	1,700	1,700	1,700	1,700
Imported Supplies[24]				
SWP Table A Amount	19,040	37,890	37,890	37,890
Semitropic Bank Account	7,200	7,200	7,200	7,200
Flexible Storage Account	4,684	1,561	1,561	1,561
TOTAL EXISTING SUPPLIES	**82,624**	**93,851**	**93,851**	**93,851**
Total Estimated Demand	90,900	82,000	83,300	84,600
Voluntary 10% Conservation	9,090	8,200	8,330	8,460
Difference Surplus/(Deficit)	814	11,851	10,551	9,251
FUTURE PLANNED WATER SUPPLY PROGRAMS (2010)[25]				
Local Supplies				

[24] 19,040 af represents 20% of CLWA's contractual Table A Amount. 37,890 af represents 39.8% of CLWA's contractual Table A Amount. Dry year supply based on assumptions from the UWMP.

[25] The UWMP assumed a total of 100,000 af in available future supplies by 2020. Therefore 50,000 af shown herein is assumed to be available by 2010.

Recycled Water	7,300
Saugus (New Wells)	20,000
Imported Supplies	
Water Transfers	3,500
Water Banking/Conjunctive Use	50,000
TOTAL FUTURE PLANNED SUPPLIES	**80,800**

3.0 IDENTIFICATION OF EXISTING WATER SUPPLY SOURCES

3.1 Annual Existing Water Supply Entitlements, Water Rights, or Water Service Contracts

The first substantive requirement of the SB 610 Assessment is the identification and description of the existing water supply sources in the public water system that will serve the Project. Water Code §10910(d) requires the Assessment to include an identification of any existing water supply entitlements, water rights, or water service contracts relevant to the identified water supply for the proposed project, and a description of the quantities of water received in prior years by the public water system. The identification of existing water supplies shall be demonstrated by providing information related to the following:

- Written contracts or other proof of entitlement to an identified water supply;
- Copies of a capital outlay program for financing the delivery of a water supply that has been adopted by the public water system;
- Federal, state, and local permits for construction of necessary infrastructure associated with delivering the water supply; and,
- Any necessary regulatory approvals that are required in order to be able to convey or deliver the water supply.

The current water supply for the Santa Clarita Valley is derived from four primary sources:

(1) Groundwater from the Alluvial Aquifer
(2) Groundwater from the Saugus Formation
(3) Imported SWP water
(4) Recycled Water

Recycled water is now available and currently being used to irrigate a golf course and several landscaped areas. The recycled water system can deliver 1,700 af, with plans to expand its use over the next 20 years.

Within the SCWD service area, these sources of water supply can be characterized as 1) *local supplies*, consisting of groundwater and recycled water, and 2) *imported supplies*, transported via the SWP, consisting of SWP Table A Amount.

Potential future water sources include additional recycled water, desalination, storm water runoff, increased Saugus pumping, and SWP reliability projects.[26]

Historically, local groundwater extracted from the Alluvial Aquifer and Saugus Formation has been the primary source of water in the SCWD's service area. However, since 1980, local groundwater supplies have been supplemented with imported water from the State Water Project.

3.2 Groundwater

Water Code §10910(f) requires this Assessment to include specific information describing groundwater resources if the water supply for a proposed project includes groundwater. Slade (2002) updates prior reports and includes a detailed review of the groundwater resources available to SCWD to supply the Project, including historic yields, estimated capacity and projected future yield capacity. Groundwater is drawn from two aquifer systems within the Santa Clara River Valley East Sub-basin, one of several sub-basins identified along the Santa Clara River in Los Angeles and Ventura counties by updated Bulletin 118 of the California Department of Water Resources. The shallow aquifer system is denominated the Alluvial Aquifer and the deeper aquifer is denominated the Saugus Formation. In addition to the SCWD, other large municipal and larger scale agriculture producers (including Newhall County Water District, Valencia Water Company, the Newhall Land and Farming Company and Wayside Honor Ranch) produce groundwater from the Alluvial Aquifer and Saugus Formation. Aggregate groundwater production by hundreds of other, small scale, water wells is estimated to account for less than 1% of total production from these aquifer systems.

The following sub-parts respond to specific requirements of Water Code §10910(f):

[26] UWMP p.1-11.

3.2.1 Water Code §10910(f)(1).

Review of relevant information contained in the urban water management plan.

Pages 2-2 through 2-6 of the 2000 UWMP provide an overview description of the local Alluvial and Saugus Formation aquifer systems, as well as historical and projected production.

3.2.2 Water Code §10910(f)(2).

Description of any groundwater basin or basins from which the proposed project will be supplied including information concerning adjudication and overdraft.

Slade (2002) Sections 2 through 5 describe two aquifer systems, the Alluvial Aquifer and the Saugus Formation, within the Santa Clara River Valley East Sub-basin ("Basin") and provides a detailed description of the groundwater basins. Slade (2002) also provides an assessment of the operational yield and other parameters of production capacity of the aquifer systems. The Basin is about 22 miles long east to west and about 13 miles wide. Slade (2002) estimates that about 200,000 acre feet of water is in storage in the Alluvial Aquifer and about 1.6 million acre feet is stored in the Saugus Formation. Neither aquifer system is in overdraft at the present time. The Basin has not been adjudicated and has not been identified as overdrafted or projected to be overdrafted by the Department of Water Resources.

3.2.3 Water Code §10910(f)(3)

Description and analysis of the amount and location of groundwater pumped by the public water system for the past five years from any groundwater basin from which the proposed project will be supplied.

Detailed information about the amount and location of groundwater pumped from both the Alluvial Aquifer and Saugus Formation is provided in Slade (2002) Sections 4 and 5, and in the 2002 Water Report. The most recent five year average production (1998-2002) by all producers from the Alluvial Aquifer is 39,000 afy (2002 Water Report). During the same period, total production from the Saugus Formation averaged 4,500 afy, with a low of 3,700 afy (1999) and a high of 5,555 afy (1998) (2002) Water Report, Table II-7).

3.2.4 Water Code §10910(f)(4)

Description and analysis of the amount and location of groundwater that is *projected* to be pumped by the public water system from any basin from which the proposed project will be supplied.

Slade (2002) does not provide detailed descriptions and analysis of locations or yields of specific new wells that may be constructed in the future. The report, however, anticipates that new capacity and replacement wells can be located, designed and operated within the Basin, both within the Alluvial Aquifer and the Saugus Formation, without creating undesirable conditions. Slade (2002), page 85. Groundwater supplies were reviewed in the UWMP and evaluated as to whether supply projections were realistic for average and dry conditions. The review made the following critical findings:[27]

1. Both the Alluvial Aquifer and the Saugus Formation are reasonable and sustainable sources at the yields represented in the 2000 UWMP.
2. The yields are not overstated and will not deplete or "dry up" the groundwater basin.
3. There is no need to reduce the yields for purposes of planning in the context of the UWMP.

Preliminary analyses and recent studies have concluded that additional pumping can be safely carried out in both aquifers.[28] Neither aquifer is in overdraft condition.

3.2.5 Water Code §10910(f) (5)

Analysis of the sufficiency of the groundwater from the basin or basins from which the proposed project will be supplied to meet the projected water demand associated with the proposed project.

Slade (2002) concludes that Alluvial Aquifer has storage capacity of about 200,000 af, with a sustainable operational yield ranging from 30,000 to 40,000 afy. Slade (2002) concludes that Alluvial Aquifer extractions should be reduced to 30,000 to 35,000 afy during dry periods.

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[27] Luhdorff and Scalmanini, Consulting Engineers, Review of Ground-Water Components 2000 Urban Water Management Plan CLWA, NCWD, SCWC, and VWC (December 15, 2000). The review was based on information provided by Richard Slade & Associates. This review and baseline information is included in the appendices of the UWMP.

[28] UWMP p. 1-13 and Slade, 2001 Update Report Hydrogeologic Conditions in the Alluvial and Saugus Formation Aquifer Systems, (dated July 2002), Volume I, see Executive Summary.

Slade (2002) concludes that the Saugus Formation has storage capacity of 1.6 million acre-feet, with a sustainable operational yield of 7,500 to 15,000 afy. Slade (2002) concludes that Saugus Formation extraction can be increased, on an infrequent basis to the range of from 15,000 to 35,000 afy, without creating undesirable conditions. Recent extractions from the Saugus Formation averaged less than 6,000 afy, but averaged 10,500 afy during the 1989 to 1992 drought.

A small portion of the Saugus Formation is contaminated with ammonium perchlorate and four wells have been unavailable since 1997. In November 2002 one Alluvial well was also found to contain perchlorate. An Environmental Oversight Agreement has been signed by CLWA and the purveyors with the California Department of Toxic Substances Control, which includes a Remedial Action Workplan. Planning and development is underway to install treatment facilities to remove the perchlorate contamination and return the wells to service.

3.3 Recycled Water

Wastewater that has been highly treated and disinfected can be reused for landscape irrigation and other purposes. It is not suitable for use as potable water. In 1993, CLWA completed a *Reclaimed Water System Master Plan* to use recycled water as a reliable water source to meet some non-potable demand within the Santa Clarita Valley. The Master Plan is being updated, and the amount of recycled water expected to be produced in the future reaches approximately 17,000 acre-feet per year in 2020.[29]

CLWA is currently under contract for 1,700 acre-feet per year and that amount is now available.

3.4 State Water Project Water

Since 1980, local supplies in the Santa Clarita Valley have been supplemented with imported water from the State Water Project (SWP). This water obtained from the SWP through CLWA, is and will continue as the largest source of water for the Valley. The SWP contract amounts, depending on annual allocation, currently meet more than half of local demand. The reliability of SWP supplies is subject to both annual hydrology and planned improvements to the system.

CLWA's current SWP Table A Amount of 95,200 AFY is affected by, and can be reduced due to, a number of factors, including hydrologic conditions, the status of SWP facilities'

[29] UWMP p. 1-13.

construction and environmental requirements. Because of these factors, SWP supplies are subject to reduction, particularly during drought periods

In May 2003 the California Department of Water Resources completed its *State Water Project Delivery Reliability Report.* The report provides current information on the ability of the SWP to deliver water under existing and future levels of development, assuming historical levels of precipitation.

According to the report, the SWP will, on average, be able to deliver between 72-76 % of the maximum total contract amount of 4.1 million acre-feet per year, provided that an SWP contractor has the ability to utilize or store all of its Table A Amount made available for allocation. The level of deliveries drops to between 19% and 20% for an extraordinary dry year and approximately 40% for multiple dry years. This information will be used in and more fully analyzed in the discussion of CLWA's SWP supplies during the update of its Urban Water Management Plan in 2005.

Filed 12/1/03 Friends of the Santa Clara River v. Castaic Lake Water Agency CA2/4

NOT TO BE PUBLISHED IN THE OFFICIAL REPORTS

California Rules of Court, rule 977(a), prohibits courts and parties from citing or relying on opinions not certified for publication or ordered published, except as specified by rule 977(b). This opinion has not been certified for publication or ordered published for purposes of rule 977.

IN THE COURT OF APPEAL OF THE STATE OF CALIFORNIA

SECOND APPELLATE DISTRICT

DIVISION FOUR

FRIENDS OF THE SANTA CLARA RIVER, Plaintiff and Appellant, v. CASTAIC LAKE WATER AGENCY, Defendant and Respondent.	B164027 (Los Angeles County Super. Ct. No. BS056954)

APPEAL from a judgment of the Superior Court of Los Angeles County, David P. Yaffe, Judge. Affirmed.

Law Office of Alyse M. Lazar and Alyse M. Lazar for Plaintiff and Appellant.

Rossmann and Moore, Antonio Rossmann and Roger B. Moore for Amici Curiae Planning and Conservation League and Citizens Planning Association of Santa Barbara County, Inc., in support of Plaintiff and Appellant.

Horvitz & Levy, Barry R. Levy, William N. Hancock; R. Bruce Tepper; and McCormick, Kidman & Behrens, Russell G. Behrens, H.L. (Mike) McCormick and David D. Boyer for Defendant and Respondent.

INTRODUCTION

This is the second time this case has been before us. On the first appeal we directed the trial court to issue a writ of mandate to set aside certification of respondent Castaic Lake Water Agency's Environmental Impact Report (EIR) because the EIR had been tiered upon a prior EIR that had been found to be infirm by an intervening appellate decision. Upon remand, respondent and appellant Friends of the Santa Clara River agreed a writ of mandate should issue to decertify the EIR but disagreed about whether the trial court should also enjoin the project pending certification of a new EIR. After consideration of documentary evidence and the presentation of written and oral arguments, the trial court rejected appellant's request for an injunction without prejudice to entertaining a renewed request founded on an adequate showing of entitlement to relief. This appeal follows entry of judgment in October 2002.

Appellant attacks the trial court's denial of its request for an injunction on two separate grounds. Appellant first contends the trial court's denial was in derogation of the directions contained in our earlier decision. The contention lacks merit. The clear and unambiguous dispositional language in our opinion granted the trial court the authority to deny in toto the request for an injunction. Appellant next contends the trial court erred on the merits in denying its request. Based upon the record, we find the trial court did not abuse its discretion in implicitly finding

appellant had failed to carry its burden of establishing the predicates for injunctive relief. We therefore affirm the judgment.

FACTUAL AND PROCEDURAL BACKGROUND

Respondent purchased from the Kern County Water Agency entitlement to 41,000 acre-feet per year of water. The purchase followed consummation of the Monterey Agreement which changed the allocation between agricultural and urban contractors of entitlements to State Water Project (SWP) water. Respondent approved this purchase after first certifying an EIR. This EIR was "tiered" upon an earlier EIR approving the Monterey Agreement.[1] The Legislature favors tiering to streamline the regulatory process and to avoid unnecessary duplication of effort.

Appellant filed a petition for a writ of mandate in the superior court to compel respondent to set aside its certification of the EIR for the purchase of 41,000 acre-feet per year of SWP water. Appellant advanced various grounds in support of its petition. The superior court denied the petition. Appellant appealed the adverse judgment to this court.

While that appeal was pending, our colleagues in the Third Appellate District concluded the EIR prepared for the Monterey Agreement was inadequate and therefore ordered it decertified. (*Planning & Conservation League v. Department of Water Resources* (2000) 83 Cal.App.4th 892, review den. (*PCL*).)

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1 Tiering "means the coverage of general matters and environmental effects in an environmental impact report prepared for a policy, plan, program or ordinance followed by narrower or site-specific environmental impact reports which incorporate by reference the discussion in any prior environmental impact report and which concentrate on the environmental effects which (a) are capable of being mitigated, or (b) were not analyzed as significant effects on the environment in the prior environmental impact report." (Pub. Res. Code, § 21068.5.)

We therefore concluded that in the appeal presented to us *PCL* required decertification of respondent's EIR because it had been tiered on the now-decertified EIR for the Monterey Agreement. (*Friends of the Santa Clara River v. Castaic Lake Water Agency* (2002) 95 Cal.App.4th 1373, 1383-1388, review den. (*Friends I.*) We, however, rejected all of appellant's other challenges to respondent's EIR, finding "them to be *without merit.*" (*Id.* at p. 1387.) We noted: "[R]espondent may be able to cure the *PCL* problem by awaiting action by the [Department of Water Resources] complying with the *PCL* decision, then issuing a subsequent EIR, supplement to EIR, or addendum to EIR [citations] tiering upon a newly certified Monterey Agreement EIR." (*Id.* at pp. 1387-1388.)

In regard to further action in the trial court we wrote: "[W]e leave to the trial court's discretion whether to enjoin all or portions of respondent's project pending completion of an adequate EIR. The trial court is in a better position than this court to determine factually the current status of the *PCL* litigation or of a new Monterey Agreement EIR." (*Id.* at p. 1388.)

The dispositional paragraph of our decision read, in relevant part: "The judgment is reversed. The trial court shall issue a writ of mandate vacating the certification of the EIR, shall retain jurisdiction until respondent certifies an EIR complying with CEQA consistent with the views expressed in this opinion, and shall consider such orders it deems appropriate under [Public Resources Code] section 21168.9." (*Id.* at p. 1388.)

Upon remand, the parties agreed the trial court was required to issue a writ of mandate to decertify respondent's EIR. The bone of contention was whether the trial court should also enjoin respondent from proceeding with the project, e.g., the transferring of the entitlement to the 41,000 acre-feet of water per year, pending completion of the new EIR.

Appellant argued: "To allow [respondent] to use any portion of its unstudied 41,000 afy [acre feet per year] entitlement before the EIR analysis is complete will result in **new permanent water connections** that will not be able to be reversed. Once houses are in and the faucets are on, there is no way to turn back. Without the proven need for this water to serve existing users, there is no equitable justification for allowing the use of any portion of the 41,000 afy entitlement in the face of its clear consistency with CEQA policies against pre-approved projects. A fair EIR process requires that project approval not be up and running as a foregone conclusion."

The evidentiary support for this argument is found in a declaration executed in August 2002 by appellant's counsel. The declaration sought to establish respondent would have sufficient water from other sources to supply its existing customers without use of the entitlement. From these factual allegations, appellant argued any use by respondent of the entitlement would necessarily be for new customers and therefore subject to being enjoined. The declaration referenced several attached documents and included allegations grounded upon information and belief. In pertinent part it averred:

> "I am informed that [respondent] has utilized at most 3674 af [acre feet] of the subject 41,000 afy [acre feet per year] water transfer during the past year. Attached is a true copy of CLWA Production Report for 2000, 2001, and half of 2002, and also a DWR Notice to State Water Project Contractors dated May 2002. The reports speak for themselves, and reflect CLWA's use of State Water Project entitlements to its various purveyors. The allocation of SWP water was 65% in the last year, and *petitioner is informed and believes that CLWA expects an even larger allocation in the coming fiscal year to as much as 90%.* The report shows that water use is measured yearly from June to June. It is undisputed that CLWA has a 54,200 afy entitlement to SWP water that is not under any legal cloud and clearly available for use, aside from the 41,000 afy that is the subject of this litigation. Based on a 65% delivery of SWP water, CLWA's

> allocation of its undisputed 54,200 afy totals 35,230 af. The report reflects use of 38,974 af from June 2001 until June 2002; which appears to be only 3674 af more than can be supplied from the 54,200 afy entitlement. It thus appears that CLWA *may have utilized* 3674 af of its allocation from the subject 41,000 af entitlement in the past year. If the SWP allocations increase to 75% or greater, *as is apparently expected,* by doing the math it appears that the 41,000 af water transfer is not needed for existing customers of the CLWA water purveyors while the supplemental environmental review is pending." (Italics added.)

Appellant therefore sought an order enjoining respondent "from any and all use of the 41,000 afy water transfer under the current approvals."

In addition, appellant's counsel averred she had communicated with counsel in the *PCL* case and that as of August 22, 2002, "the *PCL* case remand has not yet been settled or otherwise resolved, and that the Monterey Agreement Implementation Draft EIR to be prepared by the Department of Water Resources (DWR) as required by the *PCL* decision has not yet been published." As for the status of respondent's EIR, the declaration averred that respondent's attorney had informed her "that the agency has not yet published its Draft Supplemental EIR in response to [the Court of Appeal's decision], but that it intends to prepare the EIR itself rather than await the new DWR Monterey Agreement Implementation EIR."

In opposition, respondent asked the trial court to "**issue an order allowing the Transfer of Entitlement to remain intact pending completion of a new EIR.**" In particular, respondent urged that the entitlement was "necessary to satisfy current existing and projected near-term water demand"; that a "decision to set aside the Transfer of Entitlement would cause immediate irreparable harm to the Agency and the water consumers"; and that the Transfer "has been in effect for more than three years, and there is no evidence that the Transfer has resulted in any new or increased significant adverse environmental effects."

Respondent's opposition was supported by a detailed eight-page declaration from Dan Masnada, respondent's general manager. Masnada averred that respondent had already retained consultants to prepare a new EIR and they planned to complete the process by March 2003. A portion of Masnada's declaration directly refuted the allegations made by appellant's counsel about respondent's projected water supply. In pertinent part, Masnada averred:

> "[Counsel's] declaration states that 'CLWA expects an even larger allocation made by DWR in the coming fiscal year to as much as 90%.' . . . *There is no factual basis for this statement.* There have been no indications that CLWA's SWP allocation made by DWR in the coming year will be anywhere near 90%. To the contrary, based on discussions with DWR Operations Control Office Personnel it is likely that the initial 2003 SWP allocation on December 1, 2002 will be approximately 20%, as it was last year. If dry conditions occur next year, the final SWP allocation for 2003 could remain as low as 20%.
>
> [Counsel's] Declaration also states that the CLWA Production Report 'shows that water use is measured yearly from June to June.' . . . This is incorrect. While annual water use can be measured from July to June, available SWP water supply is characterized on a calendar year basis because DWR allocates it on a calendar year basis. *[Her] accounting of water deliveries i[s] flawed.* She has utilized an approach that understates CLWA's current level of demand and projected deliveries to the retail purveyors during 2002. As discussed above, and shown in Exhibit A, CLWA's Final 2001 SWP allocation was 39%. Without the 41,000 AF in 2001, CLWA would have experienced a shortfall of 14,218 AF."

Appellant's reply to respondent's opposition did not include any additional declaration(s). Instead, its reply asserted respondent's "factual information" was "confusingly presented and misleading" and that a portion of Masnada's opinion about SWP allocations for 2003 was "complete conjecture and speculation."

After a hearing in which the parties presented argument and responded to questions from the bench, the trial court issued a writ of mandate ordering respondent to set aside its certification of the 1999 EIR and to certify a new EIR consistent with our opinion in *Friends I*. The trial court rejected appellant's request to enjoin any use of the water entitlement. It ruled: "Petitioner [appellant herein] requests that the Court also prohibit respondent from using any of the 41,000 acre feet of additional water allotted to it from the subject State Water Project. Petitioner contends that the said water will be used to approve new development that will not be able to be reversed if a Final Environmental Impact Report is not certified. Respondent contends that such a prohibition would prevent it from meeting the existing water needs in the area it services. *Both contentions appear to be speculative at this time. Respondent will not be prohibited from using the water to which it is entitled, but petitioner may renew its application for such prohibition based upon evidence of the actual use of such additional water for purposes it considers improper.*" (Italics added.)

This appeal follows.[2]

DISCUSSION

A. THE DIRECTIVE IN *FRIENDS I*

Appellant first contends the trial court misconstrued our directive in *Friends I*. Appellant's position is that our decision gave the trial court the power

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2 In July 2002, we denied respondent's motion to dismiss the appeal because denial of a *pendente lite* injunction is appealable pursuant to Code of Civil Procedure section 904.1, subdivision (a)(6).

to enjoin either all or part of the project pending certification of a new EIR but that it did not give it the power to decide, as it did in the proceedings it conducted following remand, not to enjoin any part of the project. Appellant relies upon the following language we now italicize from *Friends I*: "Like the court in *PCL, supra,* 83 Cal.App.4th at page 926 and footnote 16, we leave to the trial court's discretion whether to enjoin *all or portions* of respondent's project pending completion of an adequate EIR." (*Friends I, supra,* 95 Cal.App.4th 1373, 1388, italics added.) From that language, appellant argues "the Superior Court was not vested with the discretion to issue no injunction, but only with [the] discretion to issue a full or partial injunction."

Appellant's argument lacks merit because it ignores the clear dispositional language of our opinion which gave the trial court the authority to deny in toto a request for injunctive relief.

"Where a reviewing court has remanded a matter to the trial court with directions '. . . the trial court . . . is bound to specifically carry out the instructions of the reviewing court. . . . [A]ny material variance from the explicit directions of the reviewing court is unauthorized and void.'" (*Coffee-Rich, Inc. v. Fielder* (1975) 48 Cal.App.3d 990, 998.)

The appellate court's directions are determined by "look[ing] first to the dispositional language of the opinion--the language which constitutes the remittitur directions." (*Frankel v. Four Star International, Inc.* (1980) 104 Cal.App.3d 897, 902.) *Only if* the dispositional language is ambiguous and in need of interpretation will that language "be interpreted in light of the reasoning and holdings found in the body of the opinion. [Citations.]" (*Lesny Development Co. v. Kendall* (1985) 164 Cal.App.3d 1010, 1021.)

As set forth earlier, the pertinent portion of the dispositional language in *Friends I* read: "The judgment is reversed. The trial court shall issue a writ of

mandate vacating the certification of the EIR, shall retain jurisdiction until respondent certifies an EIR complying with CEQA consistent with the views expressed in this opinion, *and shall consider such orders it deems appropriate under section 21168.9.*" (*Friends I, supra,* 95 Cal.App.4th 1373, 1388, italics added.) The statutory provision referenced--Public Resources Code section 21168.9--is lengthy and set forth in toto below in footnote 3.[3] The definitive

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[3] The statute provides:

"(a) If a court finds, as a result of a trial, hearing, or remand from an appellate court, that any determination, finding, or decision of a public agency has been made without compliance with this division, the court shall enter an order that includes one or more of the following:

"(1) A mandate that the determination, finding, or decision be voided by the public agency, in whole or in part.

"(2) If the court finds that a specific project activity or activities will prejudice the consideration or implementation of particular mitigation measures or alternatives to the project, a mandate that the public agency and any real parties in interest suspend any or all specific project activity or activities, pursuant to the determination, finding, or decision, that could result in an adverse change or alteration to the physical environment, until the public agency has taken any actions that may be necessary to bring the determination, finding, or decision into compliance with this division.

"(3) A mandate that the public agency take specific action as may be necessary to bring the determination, finding, or decision into compliance with this division.

"(b) Any order pursuant to subdivision (a) shall include only those mandates which are necessary to achieve compliance with this division and only those specific project activities in noncompliance with this division. The order shall be made by the issuance of a peremptory writ of mandate specifying what action by the public agency is necessary to comply with this division. However, the order shall be limited to that portion of a determination, finding, or decision or the specific project activity or activities found to be in noncompliance only if a court finds that (1) the

(Fn. continued.)

construction of that statute is found in our Supreme Court's opinion in *Laurel Heights Improvement Assn. v. Regents of University of California* (1988) 47 Cal.3d 376. It concluded that the statute permits but does not require a court to enjoin a project while a new EIR is prepared. (*Id.* at pp. 423-425.) In deciding whether injunctive relief is appropriate, a court is to rely upon "traditional equitable principles." (*Id.* at p. 423.) Given this long-standing construction of section 21168.9,[4] it is clear our dispositional language granted the trial court the option to decline to grant any injunctive relief after it properly considered the pertinent equities. Appellant's argument that the trial court failed to follow our directions by declining to grant equitable relief is therefore without merit.

In any event, appellant engages in a crabbed interpretation of one phrase in our opinion to argue the trial court had no discretion to deny a request for

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> portion or specific project activity or activities are severable, (2) severance will not prejudice complete and full compliance with this division, and (3) the court has not found the remainder of the project to be in noncompliance with this division. The trial court shall retain jurisdiction over the public agency's proceedings by way of a return to the peremptory writ until the court has determined that the public agency has complied with this division.
>
> "(c) Nothing in this section authorizes a court to direct any public agency to exercise its discretion in any particular way. Except as expressly provided in this section, nothing in this section is intended to limit the equitable powers of the court."

[4] See also *City of Santee v. County of San Diego* (1989) 214 Cal.App.3d 1438, 1456 ["Section 21168.9, as construed by the Supreme Court in *Laurel Heights,* merely grants a reviewing court the authority to stay all activity or use of a project until an agency certifies a proper EIR; it does not require it to do so. [Citation.] The court in *Laurel Heights* relied upon traditional equitable principles in deciding that injunctive relief there was not appropriate."].

injunctive relief. The sentence in which the phrase is found began with a specific reference to the *PCL* opinion: its dispositional language found at page 926, including footnote 16. That language included the same direction found in our dispositional language: the direction the trial court shall make any such orders it deems appropriate under section 21168.9. Footnote 16 read: "We earlier declined to stay implementation of the Monterey amendments and transfer of the Kern Fan Element. Consequently, the project was permitted to proceed pending disposition of this appeal. The record does not reflect the current status of the project and, in the absence of such information, we shall issue no orders concerning further implementation of the project. The trial court, acting under the authority provided by Public Resources Code section 21168.9, is the more appropriate forum to consider and rule upon requests *to enjoin all or portions of the project pending* the completion of administrative and judicial proceedings necessitated by our opinion." (*PCL, supra,* 83 Cal.App.4th 892, fn. 16 at p. 926, italics added.) Just as the *PCL* court did not intend to limit the trial court's authority by requiring it to enjoin at least a portion of the project, neither did we. We, as did the *PCL* court, were simply describing the types of requests that might be made, e.g., requests for a partial or full injunction. We did not intend to divest the trial court of its power to deny a request for injunctive relief if it either concluded that the moving party had failed to establish the predicates for relief or that, given the equities, relief was not required.

B. DENIAL OF INJUNCTIVE RELIEF

Appellant next contends: "The Superior Court's decision regarding injunctive relief was an abuse of discretion, because there is no factual basis to support the decision." (Bold omitted.) We disagree.

A decision to grant or deny a request for injunctive relief rests within the trial court's discretion. Its order will not be reversed on appeal unless an abuse of discretion is shown. It is, of course, the appellant's burden to establish an abuse of discretion. (*Cohen v. Board of Supervisors* (1985) 40 Cal.3d 277, 286.) "A trial court will be found to have abused its discretion only when it has exceeded the bounds of reason or contravened the uncontradicted evidence. [Citation.]" (*Lubavitch Congregation v. City of Long Beach* (1990) 217 Cal.App.3d 1388, 1391.)

It was appellant's burden as moving party in the trial court to establish the predicates for injunctive relief. In particular, Public Resources Code section 21168.9, subdivision (a)(2) requires the court to first find that a "specific project activity . . . will prejudice the consideration or implementation of particular mitigation measures or alternatives to the project" and that such activities "could result in an adverse change or alteration to the physical environment" before an injunction will issue. The trial court found appellant's claim of irreparable harm--new permanent water connections that will not be able to be reversed--to be speculative. In other words, it concluded appellant had failed to discharge its burden of proof.[5] However, it specifically left open the opportunity for appellant

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[5] To a certain extent, appellant relies upon four documents not presented to the trial court to support its contention of abuse of discretion. Three of those documents were prepared after the trial court entered judgment in October 2002. Each document is a portion of a report prepared for respondent. Prior to the submission of briefing, we granted appellant's request to take judicial notice of these documents.

Appellant wants to use this information to show respondent is improperly representing to third parties it is entitled to the 41,000 acre-feet per year of water. Appellant argues this is proof of the irreparable harm it is suffering because the trial court declined to enjoin respondent.

Our prior grant of appellant's motion for judicial notice does not require us to consider these documents. "Although a reviewing court may take judicial notice of

(Fn. continued.)

to renew its claim "based upon evidence of the actual use of such additional water for purposes it considers improper."

Distilled to its essence, appellant's present position is nothing more than an argument the trial court was required to credit the allegations in its counsel's declaration which allegedly supported its request for injunctive relief. That is, appellant would have us find that no reasonable judge could have found its evidentiary showing insufficient. We cannot make that finding.

The evidence on this issue was conflicting. As set forth above, Masnada's declaration directly contradicted some of the allegations made by appellant's counsel. Given the (purported) deficiencies Masnada pointed out in counsel's declaration, the fact that much of counsel's declaration was based upon information and belief, and appellant's failure to file a reply declaration addressing those points with its reply memorandum, the trial court was well within its discretion to conclude that *at that point in time* appellant had failed to make the requisite showing.

Appellant argues such a conclusion is insupportable because the trial court also found respondent's trial court contention to be speculative. Not so. Appellant

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matters not before the trial court, . . . the reviewing court need not give effect to such evidence. 'Having taken judicial notice of such a matter, the reviewing court may or may not apply it in the particular case on appeal. The effect to be given to matters judicially noticed on appeal, where the question has not been raised below, depends on factors that are not evidentiary in character.' [Citation.]" (*Doers v. Golden Gate Bridge etc. Dist.* (1979) 23 Cal.3d 180, 184, fn. 1.)

In this instance, given that (1) these documents essentially constitute "new evidence" in support of appellant's request for injunctive relief and (2) the trial court explicitly anticipated appellant would renew its request before it, we decline to consider the documents on this appeal.

If appellant wishes to renew a request for injunctive relief, it can bring these documents to the trial court's attention.

is conflating two distinct points respondent made in the trial court. First, based upon a claim of irreparable harm, respondent had affirmatively sought an order that the transfer of entitlement remain in effect until the new EIR was completed. Second, respondent refuted the factual allegations about its water sources contained in the declaration executed by appellant's counsel. The trial court's finding of speculation was directed at the first point: respondent's claim it would suffer irreparable harm if the trial court denied its request for an order that the transfer remain in effect until the EIR was completed. The finding of speculation was not directed at the second point: respondent's discrete refutations of appellant's allegations. The trial court could reasonably find respondent had failed to meet its burden to establish the predicate for the relief it sought but could also reasonably find that the portions of Masnada's declaration set forth above were sufficient to show appellant's claim for relief was likewise subject to serious question and therefore grounded in speculation. We therefore reject appellant's claim that "[r]espondent's entire argument that there was no abuse of discretion is incorrectly based on evidence that the lower court determined was mere speculation, not fact."[6] (Fn. omitted.)

Lastly, we address an argument raised in the amici brief jointly filed by the Planning and Conservation League and the Citizens Planning Association of Santa

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6 Appellant cites to various comments the court made as well as questions it posed during the hearing as proof that the court grounded its decision either in facts unsupported by the evidence or on legal principles inapplicable to the case. This approach is in error. A contextual reading of the transcript of the hearing indicates the court's questions and comments were intended to gather information, to focus the parties' arguments, and to test the strength of the parties' respective positions. The "bottom line" is whether the trial court abused its discretion in finding appellant had failed to discharge its burden to establish the predicates for injunctive relief. As explained above, the court did not so abuse its discretion.

Barbara County, Inc. in support of appellant. Amici are two of the environmental organizations that were the prevailing parties in *PCL, supra,* 83 Cal.App.4th 892.

Amici first inform us that in May 2003--seven months after the trial court entered judgment in this matter--the superior court in Sacramento approved a settlement agreement entered into by the parties in the *PCL* case. Pursuant to that agreement, work has commenced on a new EIR in regard to the Monterey Agreement and related issues. The settlement agreement recognizes that the transfer underlying this lawsuit is "'subject to pending litigation in the Los Angeles Superior Court following remand from the Second District Court of Appeal'"; that "'jurisdiction with respect to that litigation should remain in the [Los Angeles Superior Court]'"; and that "'nothing in this settlement agreement is intended to predispose the remedies or other actions that may occur in that pending litigation.'"

Amici argue the trial court abused its discretion in denying appellant's request for injunctive relief because the court ignored "the specific directions of *Friends I*" that its determination on interim relief should be based upon the status of the *PCL* litigation and the new statewide EIR to be prepared for the Monterey Agreement.[7] As support for that proposition, Amici cites us to the last two paragraphs of our opinion in *Friends I.* There, after concluding that other than the *PCL*/tiering issue all of appellant's complaints about the EIR were meritless, we wrote: "This suggests that respondent may be able to cure the *PCL* problem by awaiting action by the DWR complying with the *PCL* decision, then issuing a subsequent EIR, supplement to EIR, or addendum to EIR [citations] tiering upon a newly certified Monterey Agreement EIR. Appellant itself so suggests. [¶] Like the court in *PCL, supra,* 83 Cal.App.4th at page 926 and footnote 16, we leave to

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7 Appellant raised this point in the trial court and its opening brief.

the trial court's discretion whether to enjoin all or portions of respondent's project pending completion of an adequate EIR. The trial court is in a better position than this court to determine factually the current status of the *PCL* litigation or of a new Monterey Agreement EIR." (*Friends I, supra,* 95 Cal.App.4th 1373, 1387-1388.)

Amici misapprehend our directions to the trial court. As explained above, those directions are found in the dispositional language of our opinion. That language directed the trial court, inter alia, to "consider such orders it deems appropriate under [Public Resources Code] section 21168.9." (*Ibid.*) That section grants the trial court broad powers to fashion equitable relief. (See fn. 3, *ante*, and accompanying text at pp. 10-12.) Amici's argument that the exercise of said discretion was to be based upon the status of either the *PCL* litigation or the new EIR for the Monterey Agreement is at odds with the clear dispositional language we employed. The two paragraphs in our opinion upon which amici rely were merely suggestions as to how respondent could proceed and a statement that in exercising its discretion whether to grant equitable relief pending completion of a new EIR for this project, the trial court could ascertain, and if it so chose, rely upon the status of the *PCL* litigation and new Monterey Agreement EIR.

In any event, the parties' papers in the trial court informed it of what was then the current status of both the *PCL* litigation and the new Monterey Agreement EIR and the issue was discussed at the hearing. Nothing in the record suggests the court did not consider those facts in rendering its decision, a decision that was properly framed by the specific prayers for relief each party advanced in the trial court. To a large extent, amici's position is nothing more than an attempt to reargue the motion and to do so based upon events that occurred after judgment was rendered. Because the *PCL* litigation settled *after* the trial court entered its judgment, that settlement and the status of the preparation of the new Monterey Agreement EIR are matters that can be brought to the attention of the trial court if

appellant seeks to renew its request for injunctive relief. Lastly, in order to forestall any unnecessary future litigation, we hasten to add that nothing stated in this opinion is to be construed to be an indication as to how the trial court should rule in any further proceeding(s) on any specific issue(s).

DISPOSITION

The judgment is affirmed.

NOT TO BE PUBLISHED IN THE OFFICIAL REPORTS

VOGEL (C.S.), P.J.

We concur:

HASTINGS, J.

CURRY, J.

Toxicological Benchmarks for Screening of Potential Contaminants of Concern for Effects on Aquatic Biota

ES/ER/TM-96/R2

Toxicological Benchmarks for Screening Potential Contaminants of Concern for Effects on Aquatic Biota:
1996 Revision

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ES/ER/TM-96/R2

Toxicological Benchmarks for Screening Potential Contaminants of Concern for Effects on Aquatic Biota: 1996 Revision

G. W. Suter II
C. L. Tsao

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PREFACE

The purpose of this report is to present and analyze alternate toxicological benchmarks for screening chemicals for aquatic ecological effects. This work was performed under Work Breakdown Structure 1.4.12.2.3.04.05.04 (Activity Data Sheet 8304, "Technical Integration—Risk Assessment"). Publication of this document meets a milestone for the Environmental Restoration (ER) Risk Assessment Program. Since the prior edition of this report (Suter and Mabrey 1994), both the U.S. Environmental Protection Agency Office of Solid Waste and Emergency Response and EPA Region IV have developed sets of screening benchmarks for water. This report includes those values and updates the other benchmarks that were presented in the last edition.

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ACRONYMS

ACRs	acute chronic ratios
ARARs	applicable or relevant and appropriate requirements
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CV	Chronic Value
EC50	median effective concentration
EPA	U.S. Environmental Protection Agency
ETs	Ecotox Thresholds
FACR	Final Acute-Chronic Ratio
FAV	Final Acute Value
FCV	final chronic value
GLWQI	Great Lakes Water Quality Initiative
GMAV	genus mean acute value
LC50	median lethal concentration
LOEC	Lowest Observed Effect Co
MATC	Maximum Acceptable Toxicant Concentration
NAWQC	National Ambient Water Quality Criteria
NOEC	No Observed Effect Concentration
OSWER	Office of Solid Waste and Emergency Response
RI	Remedial Investigation
SACR	secondary acute chronic ratio
SAV	Secondary Acute Values
SCV	Secondary Chronic Value
SS	sensitive species
SVs	screening values

EXECUTIVE SUMMARY

One of the initial stages in ecological risk assessment of hazardous waste sites is the screening of contaminants to determine which, if any, of them are worthy of further consideration; this process is termed contaminant screening. Screening is performed by comparing concentrations in ambient media to benchmark concentrations that are either indicative of a high likelihood of significant effects (upper screening benchmarks) or of a very low likelihood of significant effects (lower screening benchmarks). Exceedance of an upper screening benchmark indicates that the chemical in question is clearly of concern and remedial actions are likely to be needed. Exceedance of a lower screening benchmark indicates that a contaminant is of concern unless other information indicates that the data are unreliable or the comparison is inappropriate. Chemicals with concentrations below the lower benchmark are not of concern if the ambient data are judged to be adequate.

This report presents potential screening benchmarks for protection of aquatic life from contaminants in water. Because there is no guidance for screening benchmarks, a set of alternative benchmarks is presented herein. The alternative benchmarks are based on different conceptual approaches to estimating concentrations causing significant effects. For the upper screening benchmark, there are the acute National Ambient Water Quality Criteria (NAWQC) and the Secondary Acute Values (SAV). The SAV concentrations are values estimated with 80% confidence not to exceed the unknown acute NAWQC for those chemicals with no NAWQC. The alternative chronic benchmarks are the chronic NAWQC, the Secondary Chronic Value (SCV), the lowest chronic values for fish and daphnids, the lowest EC20 for fish and daphnids from chronic toxicity tests, the estimated EC20 for a sensitive species, and the concentration estimated to cause a 20% reduction in the recruit abundance of largemouth bass. It is recommended that ambient chemical concentrations be compared to all of these benchmarks. If NAWQC are exceeded, the chemicals must be contaminants of concern because the NAWQC are applicable or relevant and appropriate requirements (ARARs). If NAWQC are not exceeded, but other benchmarks are, contaminants should be selected on the basis of the number of benchmarks exceeded and the conservatism of the particular benchmark values, as discussed in the text.

To the extent that toxicity data are available, this report presents the alternative benchmarks for chemicals that have been detected on the Oak Ridge Reservation. It also presents the data used to calculate the benchmarks and the sources of the data. It compares the benchmarks and discusses their relative conservatism and utility.

This report supersedes a prior aquatic benchmarks report (Suter and Mabrey 1994). It adds two new types of benchmarks. It also updates the benchmark values where appropriate, adds some new benchmark values, replaces secondary sources with primary sources, and provides more complete documentation of the sources and derivation of all values.

1. INTRODUCTION

An important early step in the assessment of ecological risks posed by a contaminated site is the screening of contaminants. In many cases, concentrations in water will be reported for more than 100 chemicals, most of which will be reported as undetected at some defined limit of detection. The assessor must decide which of the detected chemicals constitute an ecological hazard and which of the undetected chemicals may pose a hazard at concentrations below the reported detection limits. This screening is done by comparing the reported concentrations to toxicological benchmarks. If concentrations of a chemical exceed its benchmark for a particular medium, then it is worthy of further measurement and assessment. If not, it can be ignored (assuming that the analytical data are adequate).

In practice, a series of benchmarks of differing conservatism may be used. Exceedance of an upper screening benchmark would suggest a severe hazard and a need for urgent action. Nonexceedance of all lower screening benchmarks would suggest no hazard. Exceedance of an increasing number of benchmarks would constitute increasing evidence of the need for measurement and assessment. In addition to providing a better indication of the magnitude of the hazard, the use of multiple benchmarks provides information about the nature of the hazard which can be used in development of the conceptual model and in planning the Remedial Investigation (RI). For example, is the chemical at concentrations that are toxic to only daphnids, to daphnids and fish, to fish and aquatic plants, etc.? Are they at concentrations that have been demonstrated to be toxic or do they exceed only benchmarks that include conservative factors?

The purpose of this report is to present and analyze alternate toxicological benchmarks for screening chemicals for aquatic ecological effects. Since the prior edition of this report (Suter and Mabrey 1994), both the U.S. Environmental Protection Agency (EPA) Office of Solid Waste and Emergency Response (OSWER) and EPA Region IV have developed sets of screening benchmarks for water. This report includes those values and updates the other benchmarks that were presented in the last edition.

This compilation is limited to chemicals that have been detected on the Oak Ridge Reservation and to benchmarks derived from studies of toxic effects on fresh water organisms. The list of chemicals detected on the Oak Ridge Reservation includes 45 metals and 105 industrial chemicals. Only four pesticides occur on the list, and those are persistent and wide-spread (chlordane, DDT, heptachlor, and lindane).

2. METHODS FOR DERIVING BENCHMARKS

2.1 TYPES OF BENCHMARKS

The simplest screening benchmarks are toxicity test endpoints. A test endpoint is a statistically derived numeric summary of the results of a toxicity test. Test endpoints can be calculated in two ways. First, a level of effect can be estimated by fitting a function such as the probit or logit to the concentration-response data to derive a concentration-response model. Then by inverse regression, a concentration can be estimated that causes a particular level of effect such as the median lethal concentration (LC50). Second, hypothesis testing statistics can be used to determine whether each of the tested concentrations caused an effect that was statistically significantly different from the controls. The lowest concentration causing such an effect is termed the Lowest Observed Effect Concentration

(LOEC); the highest concentration for which there were no such effects is termed the No Observed Effect Concentration (NOEC). The geometric mean of the LOEC and NOEC is te rmed the Chronic Value (CV) and was formerly termed the Maximum Acceptable Toxicant Concentration (MATC).

Toxicity tests are conventionally divided into acute and chronic tests. Standard acute aquati c toxicity tests are 48 or 96 hours in duration and use juvenile or adult organisms; the test endpoints are the median lethal concentration (LC50) or median effective concentration (EC50) for death or som e equivalent effect (e.g., immobilization). Standard chronic tests include all or most of the lifecycle of the test organisms, and they include observations of growth, deformities, and reproductive success as well as lethality. The standard endpoint for chronic tests is the CV.

Another important distinction is between response-specific and integrative endpoints. Conventionally, NOECs and LOECs are calculated for each response parameter, and the results for the most statistically sensitive parameter are reported. Because effects on populations and ecosystems are a result of the integrated effects of the toxicant on all life stages, it is more sensible to integrate th e responses in the test when calculating the test endpoint. Integrative endpoints may be simple arithmetic combinations of effects such as the proportional mortality across all tested life stages or populatio n parameters derived from simple models such as the intrinsic rate of natural increase, r.

Benchmarks may be combinations of multiple test en dpoints. An example is the chronic NAWQC, which are derived from at least eight LC50s and three CVs.

Finally, benchmarks may be derived by using mathematical models to simulate an assessmen t endpoint, a specific environmental characteristic that is valued and is at risk due to the contamination or disturbance that is being assessed (Suter 198 9). For example, in this study we present concentrations estimated to correspond to a 20% reduction in recruit abundance for largemouth bass (*Micropterus salmoides*) because production of fish, particularly game fish, is an assessment endpoint for Oak Ridge Reservation ecological risk assessments (Suter et al. 1992).

Conventional aquatic benchmarks, which are based o n regulatory criteria or standard test endpoints used to derive criteria, are listed in Table 1. Unconventional aquatic benchmarks, which are based on levels of effects on integrative endpoints, are listed in Table 2.

2.2 WATER QUALITY CRITERIA

The National Ambient Water Quality Criteria (NAWQC) are appl icable or relevant and appropriate requirements (ARARs); therefore, they provide the basis for the screening benchmarks for contaminants in water. The acute NAWQC are calculated by the EPA as half the Final Acute Value (FAV), which is the fifth percentile of the distribution of 48- to 96-hour LC50 values or equivalent median effectiv e concentration (EC50) values for each criterion chemical (Stephan et al. 1985). The acute NAWQC are intended to correspond to concentrations that would cause less than 50% mortality in 5% of expose d populations in a brief exposure. They may be used as a reasonable upper screening benchmark because waste site assessments are concerned with sublethal effects and largely with continuous exposures, rather than the lethal effects and episodic exposures to which the acute NAWQC are applied. The chroni c NAWQC are the FAVs divided by the Final Acute- Chronic Ratio (FACR), which is the geometric mean of quotients of at least three LC50/CV

Table 1. Summary of conventional benchmarks for priority contaminants in fresh water (all values in micrograms per liter)

Chemical	NAWQ Criteria		Tier II Values		Lowest Chronic Value for:				
	Acute	Chronic	Secondary Acute Value	Secondary Chronic Value	Fish	Daphnids	Non-Daphnid Inverte-brates	Aquatic Plants	All Organ-isms
Aluminum	750	87			3,288	1,900		460	460
Ammonia	pH and temperature dependent				1.7	630		2,400	1.7
Antimony			180[i]	30[i]	1,600	5,400		610	610
Arsenic III	360	190			2,962	914.1		2,320	914.1
Arsenic V			66	3.1	892	*450		48	48
Barium			110	4.0					
Beryllium			35	0.66	*57	5.3		100,000	5.3
Boron			30	1.6		8,830			8,830
Cadmium	3.9+	1.1+			1.7	0.15		2	0.15
Calcium						116,000			116,000
Chromium III	1,700+	210+			68.63	<44		397	<44
Chromium VI	16	11			73.18	6.132		2	2
Cobalt			1500	23	290	5.1			5.1
Copper	18+	12+			3.8	0.23	6.066	1	0.23
Cyanide	22	5.2			7.8		18.33	30	7.8
Iron		1,000			1,300	158			158
Lead	82+	3.2+			18.88	12.26	25.46	500	12.26
Lithium			260	14					
Magnesium						82,000			82,000
Manganese			2,300	120	1780	<1,100			<1,100
Mercury, inorganic or total	2.4			1.30[a]	<0.23	0.96		5	<0.23
Mercury, methyl			0.099	0.0028	0.52	<0.04		0.8-4.0	<0.04
Molybdenum			16,000	370		880			880

Table 1. (continued)

Chemical	NAWQ Criteria		Tier II Values		Lowest Chronic Value for:				
	Acute	Chronic	Secondary Acute Value	Secondary Chronic Value	Fish	Daphnids	Non-Daphnid Inverte-brates	Aquatic Plants	All Organ-isms
Nickel	1,400+	160+			<35	<5	128.4	5	<5
Potassium						53,000			53,000
Selenium	20	5			88.32	91.65		100	88.32
Silver	4.1+			0.36	0.12	2.6		30	0.12
Sodium						680,000			680,000
Strontium			15,000	1,500		42,000			42,000
Thallium			110	12	57	130		100	57
Tin			2,700	73		350			350
Uranium			46	2.6	*142				*142
Vanadium			280	20	80	1,900			80
Zinc	120+	110+			36.41	46.73	>5,243	30	30
Zirconium			310	17	*548				*548
Organics									
Acenaphthene	80[e]	23[e]			74	*6,646	227	520	74
Acetone			28,000	1,500	*507,640	1,560			*507,640
Anthracene			13	0.73	*0.09	<2.1			*0.09
Benzene			2,300	130		>98,000		525,000	525,000
Benzidene			70	3.9	*134				*134
Benzo(a)anthracene			0.49	0.027		*0.65			*0.65
Benzo(a)pyrene			0.24	0.014		*0.30			*0.30
Benzoic acid			740	42	*12,976				*12,976
Benzyl alcohol			150	8.6	*589				*589
BHC (lindane)	2	0.08			14.6	14.5	3.3	500	3.3

Table 1. (continued)

Chemical	NAWQ Criteria		Tier II Values		Lowest Chronic Value for:				
	Acute	Chronic	Secondary Acute Value	Secondary Chronic Value	Fish	Daphnids	Non-Daphnid Inverte-brates	Aquatic Plants	All Organ-isms
BHC (other)			39	2.2		*95			*95
Biphenyl				14[f]					
Bis(2-ethylhexyl)phthalate			27	3.0		912			912
4-Bromophenyl phenyl ether				1.5[f]					
Butylbenzyl phthalate				19[f]					
2-Butanone			240,000	14,000	*282,170	*1,394,927			*282,170
Carbon disulfide			17	0.92	*9,538	*244			*244
Carbon tetrachloride			180	9.8	1,970	*5,580			1,970
Chlordane	2.4	0.17[a]			1.6	16	1.09		1.09
Chlorobenzene			1,100	64	*1,203	*15,042		224,000	*1203
Chloroform			490	28	1,240	*4,483			1,240
DDD p,p'			0.19	0.011	*1.69				*1.69
DDT	1.1			0.013[bf]	0.73[c]	*0.016		0.3	0.3
Decane			880	49		*7,874			*7,874
Di-n-butyl phthalate			190	35	717[d]	697			697
Diazinon			0.17[g]	0.043[g]					
Dibenzofuran			66	3.7		*1,003			*1,003
1,2-Dichlorobenzene			260[f]	14[f]					
1,3-Dichlorobenzene			630[f]	71[f]					
1,4-Dichlorobenzene			180[f]	15[f]					
1,1-Dichloroethane			830	47	*14,680				*14,680
1,2-Dichloroethane			8,800	910	41,364	15,200			15,200
1,1-Dichloroethene			450	25	>2,800	*4,720		>798,000	>2,800

Table 1. (continued)

Chemical	NAWQ Criteria		Tier II Values		Lowest Chronic Value for:				
	Acute	Chronic	Secondary Acute Value	Secondary Chronic Value	Fish	Daphnids	Non-Daphnid Inverte-brates	Aquatic Plants	All Organ-isms
1,2-Dichloroethene			1,100	590	*9,538				*9,538
1,3-Dichloropropene			0.99	0.055	244	*805		4,950	244
Dieldrin	**0.18**[e]	**0.062**[e]							
Diethyl phthalate			1,800	210				85,600	85,600
Di-n-octyl phthalate					3,822	708			708
Endosulfan, all isomers				0.051[f]					
Endrin	0.095[e]	0.061[e]							
Ethyl benzene			130	7.3	>440	*12,922		>438,000	>440
Fluoranthene	33.6[e]	6.16[e]			30	15		54400	15
Fluorene			70[f]	3.9[f]					
Heptachlor			0.125[g,h]	0.0069[b,g]	1.26	*3.18		26.7	1.26
Hexachloroethane			210[e]	12[f]					
Hexane			10	0.58	*65,712				*65,712
2-Hexanone			1,800	99	*32,783				*32,783
Methoxychlor				0.019[f]					
1-Methylnaphthalene			37	2.1	*526				*526
4-Methyl-2-pentanone			2,200	170	77,400				77,400
2-Methylphenol			230	13	*489	*1,316			*489
Methylene chloride			26,000	2,200	108,000	*42,667			*42,667
Naphthalene			190	12	620	*1,163		33,000	620
4-Nitrophenol			1,200	300	*481	7,100		4190	*481
N-Nitrosodiphenylamine			3,800	210	*332	*1,042			*332
2-Octanone			150	8.3					

Table 1. (continued)

Chemical	NAWQ Criteria		Tier II Values		Lowest Chronic Value for:				
	Acute	Chronic	Secondary Acute Value	Secondary Chronic Value	Fish	Daphnids	Non-Daphnid Inverte-brates	Aquatic Plants	All Organ-isms
PCBs total	2.0			0.14[b]	0.2	2.1	0.8	0.144	0.1
Aroclor® 1221			5.0	0.28	*60				*60
Aroclor® 1232			10	0.58	*124			—	*124
Aroclor® 1242			1.2	0.053	9.00		4.9	300	4.9
Aroclor® 1248			1.4	0.081				—	
Aroclor® 1254			0.60	0.033		2.9		0.1	0.1
Aroclor® 1260			1,700	94	<1.3			—	2.3
Pentachlorobenzene			8.4[f]	0.47[f]					
1-Pentanol			2,000	110	*30,493				*30,493
Phenanthrene	30[e]	6.3[e]				200			200
Phenol	3,600[g]	110[g]			<200	*2,005		20,000	<200
2-Propanol			130	7.5	*590				*590
1,1,2,2 Tetrachloroethane			2,100	610	2,400	9,900		136,000	2,400
Tetrachloroethene			830	98	840	750		>816,000	750
Tetrachloromethane			4,400[f]	240[f]					
Toluene			120	9.8	*1,269	*25,229		245,000	*1,269
Tribromomethane			2,300[f]	320[f]					
1,2,4-Trichlorobenzene			700[f]	110[f]					
1,1,1-Trichloroethane			200	11	*3,493			>669,000	*3,493
1,1,2-Trichloroethane			5,200	1,200	9,400	18,400			9,400
Trichloroethene			440	47	11,100	*7,257			*7,257
Vinyl acetate			280	16	*810				*810
Xylene			230	13	*62,308				*62,308
m-Xylene			32[f]	1.8[f]					

Table 1. (continued)

Notes:
+ Hardness dependent criterion normalized to 100 mg/L
* Numbers preceded by * are estimates. Methods of estimation are described in the text.
[a] The chronic NAWQC for chlordane (0.0043μg/L) and mercury (0.012 µg/L), are based on the final residue values. FCVs are used as benchmarks to protect aquatic life.
[b] The chronic NAWQC for DDT (0.001μg/L), total PCBs (0.014 µg/L), and heptachlor (0.0038 µg/l) are is based on the final residue values; for benchmarks to protect aquatic life, we use SCVs.
[c] The CV for DDT in Jarvinen et al. 1977 of 0.9 µg/l is the arithmetic mean of the NOEC and LOEC. We used the geometric mean which is 0.73.
[d] For fish di-n-butyl phthalate lowest CV, the geometric mean of the measured concentrations for the NOEC and LOEC rather than the nominal concentrations used by the authors (McCarthy and Whitmore 1985) was used herein.
[e] These numbers are Final Acute Values and Final Chronic Values calculated by the EPA for use in the derivation of sediment quality criteria (EPA 1993b).
[f] Values calculated for OSWER (1996).
[g] Values calculated by the Great Lakes Water Quality Initiative (EPA 1993d).
[h] SAV was calculated by the Great Lakes Water Quality Initiative because some data used to derive FAV were questionable (EPA 1992)
[I] These values are draft FAV and FCV values (EPA 1988b).

Table 2. Summary of alternative benchmarks for priority contaminants in fresh water based on levels of chronic effects (all values in micrograms per liter)

Chemical	Lowest Test EC_{20} for:		Sensitive Species Test EC_{20}	Population EC_{20}
	Fish	Daphnids		
Aluminum	4,700	540	75	
Antimony	2,310	1,900		79
Arsenic III	2,130	633	55	1,995
Arsenic V	1,500	>932		185
Barium				
Beryllium	*148	3.8		21
Boron		7,000		
Cadmium	1.8	0.75	0.013[a]	4.3
Calcium				
Chromium III	89		8.44	126
Chromium VI	51	0.5	0.266	316
Cobalt	810	<4.4		3.98
Copper	5	0.205	0.26	8.6
Cyanide	5.3		1.17	11
Fluorine	*5,336	3,706		1,080
Iron		16		
Lead	22		0.35	71
Magnesium				
Manganese	1,270	<1,100		112
Mercury, inorganic	0.87	0.87	0.18	0.32
Mercury, methyl	<0.03	0.87		0.28
Molybdenum		360		
Nickel	62	45	11[a]	215
Potassium				
Selenium	40	25	2.60	
Silver	0.20	<0.56	0.14[a]	0.32
Sodium				
Strontium				
Thallium	81	64		67

Table 2. (continued)

Chemical	Lowest Test EC_{20} for:		Sensitive Species Test EC_{20}	Population EC_{20}
	Fish	Daphnids		
Tin				
Uranium	*455			27
Vanadium	41	430		32
Zinc	47		21	80
Zirconium	*2,396			251
Organics				
Acenaphthene	<197			
Acetone	*161,867			23,714
Anthracene	*0.35	>8.2		
Benzene	21			229
Benzidene	*158			68
Benzo(a)anthracene				
Benzo(a)pyrene	>2.99			
Benzoic acid	*7,409			1,259
Benzyl alcohol	*550			375
BHC (lindane)	<1.1	11	0.11	
BHC (other)				
Bis(2-ethylhexyl)phthalate	>54	<3		50
2-Butanone	*98,772			17,783
Carbon disulfide	*5719			1,000
Carbon tetrachloride	65			224
Chlordane	<0.25	12.1	0.50	0.71
Chlorobenzene	1,002			165
Chloroethane				
Chloroform	8,400			562
DDD p,p'	*3.99			0.61
DDT	0.35		0.008	
Decane				

Table 2. (continued)

Chemical	Lowest Test EC_{20} for:		Sensitive Species Test EC_{20}	Population EC_{20}
	Fish	Daphnids		
Di-n-butyl phthalate	270	500		251
Dibenzofuran				
1,1-Dichloroethane	*8,219			1,585
1,2-Dichloroethane	29,000	<11,000		1,259
1,1-Dichloroethene				447
1,2-Dichloroethenes	*5,719			
1,3-Dichloropropene	*350			40
Diethyl phthalate				1,000
Di-n-octyl phthalate	<100	310		1,995
Ethyl benzene				398
Fluoranthene				32
Heptachlor	0.86		0.004	0.1
Hexane	*28,995			
2-Hexanone	*16,155			1,259
1-Methylnaphthalene	*500			31.62
4-Methyl-2-pentanone				1,585
2-Methylphenol	*470			74
Methylene chloride	410			1,259
Naphthalene	450	>600		1,000
4-Nitrophenols	*464	5,000		60
N-Nitrosodiphenylamine	*339			40
3-Octanone	*3571			
PCBs total	0.4	1.2		0.63
Aroclor® 1221	*80			10
Aroclor® 1232	*148			16
Aroclor® 1242	<2.9			1.58
Aroclor® 1248	0.4	2.5		1.26
Aroclor® 1254	0.52	1.2		0.63
Aroclor® 1260	2.1			316
1-Pentanol	*15,200			3,548

Table 2. (continued)

Chemical	Lowest Test EC_{20} for:		Sensitive Species Test EC_{20}	Population EC_{20}
	Fish	Daphnids		
Phenanthrene		110		
Phenol	<230			4,467
2-Propanol	*35,381			3,162
1,1,2,2-Tetrachloroethane	1,400	<420		1,585
Tetrachloroethene	500	510		50
Toluene	<26			200
1,1,1-Trichloroethane	*2,457	1,300		251
1,1,2-Trichloroethane	14,800	13,000		15,849
Trichloroethene	5758			232
Vinyl acetate	*718			108
Xylene	2680			

Notes:
* Numbers preceded by * are estimates. Methods of estimation are described in the text.
[a] Study LC50's were used rather than species mean LC50s so water hardness would correspond to EC20 values.

ratios from tests of different families of aquatic organisms (Stephan et al. 1985). It is intended to prevent significant toxic effects in chronic exposures and is used in this assessment as one possible lower screening benchmark. The NAWQC are listed in Table 1.

NAWQC for several metals are functions of water hardness; the criteria are lower for lower hardness levels. The criteria for 100 mg/L hardness as reported by the EPA are presented in this report. That hardness is near the lower end of the range of hardness values reported for the Oak Ridge Reservation, so it is moderately conservative. For sites with different water hardnesses, site-specific criteria should be calculated. The formulas for hardness correction are listed in the discussions of individual chemicals.

Many readers will note that the EPA's compilations of NAWQC contain values for many chemicals that have no NAWQC listed herein (EPA 1986b); the EPA lists lowest CVs for those chemicals for which there is not enough data to calculate a criterion but for which there is at least one CV. Lowest CVs are treated as a separate category of benchmarks in this compilation.

Some chronic NAWQC are based on protection of humans or other piscivorous organisms rather than protection of aquatic organisms. Those criteria are not included herein because screening for risks to wildlife or humans is performed by other methods. However, if sufficient data were available to calculate a final chronic value (FCV) for those chemicals, then the FCV are presented in place of the chronic NAWQC in Table 1, and its derivation is noted.

For particular chemicals, the lower screening benchmark could be lower than the chronic NAWQC for any one of the following reasons. First, the chronic NAWQC are based on a threshold for statistical significance rather than biological significance. In some chronic tests, because of highly variable results, the statistical threshold corresponds to greater than 50% effect on a response

parameter (Stephan and Rogers 1985, Suter et al. 1987). Second, not all important responses are included in the subchronic toxicity tests that are used to calculate many chronic NAWQC. In particular, effects on fecundity, which is the most sensitive response parameter on average in fish toxicity tests (Suter et al. 1987), are often not included. Third, the chronic NAWQC are based on the most statistically sensitive of the measured response parameters in each chronic or subchronic test. Therefore, cumulative effects over the lifecycle of fish and invertebrates are not considered. Fourth, the NAWQC are set at a level that protects "most species most of the time." Finally, many of the NAWQC have not been revised since 1980 so they do not incorporate recent data that are included in the calculation of other benchmarks. These concerns are supported by the recent finding that nickel concentrations (on the Oak Ridge Reservation) that are below chronic NAWQC are nonetheless toxic to daphnids (Kszos et al. 1992).

2.3 TIER II VALUES

If NAWQC were not available for a chemical, the Tier II method described in the EPA's *Proposed Water Quality Guidance for the Great Lakes System* was applied (EPA 1993a). Tier II values were developed so that aquatic benchmarks could be established with fewer data than are required for the NAWQC. The Tier II values are concentrations that would be expected to be higher than NAWQC in no more than 20% of cases. Tier II values calculated by the EPA are listed in Table 1, and the sources are cited. Other Tier II values are derived as described in the following text.

The Tier II values equivalent to the FAV and FCV are the Secondary Acute Values (SAVs) and Secondary Chronic Values (SCVs), respectively. The sources of data for the Tier II values are listed in Appendix A, and the procedure and factors used to calculate the SACs and SCVs are in Appendix B. The methods described herein differ from EPA's (1993a) in one respect. The Great Lakes SAVs require an LC50 for a daphnid, but that requirement would severely restrict the number of benchmarks that could be calculated. The EPA has provided factors for calculating SAVs when no daphnid LC50s are available, and these factors are used herein (Stephan 1991).

Some of the SAVs and SCVs presented in this report differ from those presented in the prior edition (Suter and Mabrey 1994) for three reasons. First, in the previous report we included all data that occurred in EPA water quality criteria documents. However, much of the data included in criteria documents issued prior to 1985 are no longer considered acceptable by the EPA. Second, some data from the EPA's AQUIRE data set were used by Suter and Mabrey (1994) that appeared to be acceptable based on the information provided in the data base and the EPA's rating of the data. It has become clear that much of that data would not be acceptable to the EPA for calculating criteria. Therefore, we obtained all original publications and independently reviewed them against the criteria in Stephan et al. (1985). Those criteria are summarized in Appendix B. Finally, some new data have been found and incorporated.

Only high quality standard data are used in this document if such values are available for a chemical. That is, if even one test that meets the criteria in Stephan et al (1985) was found, all nonconforming tests were excluded. However, when no such values are available, nonstandard or lower quality test results which were judged by the authors to be reliable were used. Values derived using data that did not meet the Stephan et al. (1985) criteria are noted.

2.4 LOWEST CHRONIC VALUES

The lowest chronic values for fish and invertebrates reported in the literature are potential lower benchmarks. Chronic values are used to calculate the chronic NAWQC, but the lowest chronic value may be lower than the chronic NAWQC. Because of the short generation time of algae and the relative lack of standard chronic tests for aquatic plants, EPA guidelines are followed in using any algal test of at least 96-hour duration and any biologically meaningful response for the plant values.

2.5 ESTIMATED LOWEST CHRONIC VALUES

Estimated lowest chronic values for fish and invertebrates are another set of potential lower benchmarks. Estimated chronic values were extrapolated from 96-hour LC50s using equations from Suter et al. (1987) and Suter (1993). The equations are as follows where LC50 equals the lowest species mean 96-hour LC50 for fish and 48-hour EC50 for daphnids, and CV equals the estimated chronic value for that taxon. The 95% prediction interval at the mean is log CV ± the PI value (95% prediction intervals contain 95% of observations versus 95% confidence intervals which contain the mean with 95% confidence).

Fish CV for a metallic contaminant: (1)

$$\log CV = 0.73 \log LC50 - 0.70$$
$$PI = 1.2$$

Fish CV for a nonmetallic contaminant: (2)

$$\log CV = 1.07 \log LC50 - 1.51$$
$$PI = 1.5$$

Daphnid CV for a metallic contaminant: (3)

$$\log CV = 0.96 \log LC50 - 1.08$$
$$PI = 1.56$$

Daphnid CV for a nonmetallic contaminant: (4)

$$\log CV = 1.11 \log LC50 - 1.30$$
$$PI = 1.35$$

2.6 TEST EC20s

Another potential lower benchmark is the test EC20 for fish, which is defined as the highest tested concentration causing less than 20% reduction in (1) the weight of young fish per initial female fish in a lifecycle or partial life-cycle test or (2) the weight of young per egg in an early life-stage test. A similar potential lower benchmark is the test EC20 for daphnids, which is the highest tested concentration causing less than 20% reduction in the product of growth, fecundity, and survivorship in a chronic test with a daphnid species. (Daphnids include members of the genera *Daphnia, Ceriodaphnia,* and *Simocephalus.*) These benchmarks are intended to be indices of population production. They are equivalent to chronic values in that they are simply a summary of the results of chronic toxicity tests, and in most cases the same test supplied the lowest chronic value and the lowest test EC20. However, the test EC20s are based on a level of biological effect rather than a level of statistical significance, and they integrate all of the stages of the toxicity test rather than treating each response independently. The 20% figure was chosen as approximately the mean level of effect on individual response parameters observed

at CVs and as a minimum detectable difference in population characteristics in the field (Suter et al . 1987, 1992). These values are listed in Table 2.

2.7 ESTIMATED TEST EC20s

The estimated test EC20 is another potential benchmark. The estimated values were extrapolated from 96-hour LC50 values using equations from Suter (1992). The equation for the lowest fish tes t EC20 is as follows where LC50 equals the lowest species mean 96-hour LC50 for fish, and the EC25 for weight of juveniles per egg is used as an estimate of the test EC20 value. (The difference between 20% and 25% effect is trivial given the uncertainties in these estimates and the steepness of th e concentration-response curves.) The log-scaled 95% prediction interval at the mean is log EC25 ± the PI value:

$$\log EC25 = 0.90 \log LC50 - 0.86 \qquad (5)$$
$$PI = 1.6$$

These values are listed in Table 2 for those chemicals that have no empirical test EC20.

2.8 SENSITIVE SPECIES TEST EC20s

The sixth potential benchmark is the EC20, adjusted to approximate the fifth percentile of th e species sensitivity distribution. It is calculated in the same way as the chronic NAWQC except that the test EC20s are used in place of CVs, and salt water species were not included. The FAV for each of the criterion chemicals was divided by the geometric m ean of ratios of LC50s to EC20s. These benchmarks are referred to as sensitive species (SS) test EC20s, and are listed in Table 2.

2.9 POPULATION EC25s

The last potential benchmark is an estimate of the continuous concentration that would cause a 20% reduction in the recruit abundance of largemouth bass. The method used was described by Barnthouse et al. (1990) and is briefly summarized herein. The recruit abundance estimates are generated by a matrix model of a reservoir largemouth bass population (Bart ell 1990). The fecundity, hatching success, larval survival, and post-larval survival of the model population are each decremented by a valu e generated from statistical extrapolation models. For each life stage for which a concentration-response relationship could be calculated, that relationship was adjusted for the relative sensitivity of the tes t species and the bass. For those life stages with no concentration-response relationship, the relationship was estimated using life stage to life stage extrapolation models, and the taxonomic adjustment wa s made. However, if the authors of the study reported that life stage was unaffected, the decrement for that life stage was set to zero. If no chronic test data were available, extrapolations from LC50s to chronic responses of each life stage were performed. Uncertainties in a ll of these extrapolations were propagated through the models to generate estimates of uncertainty. For each chemical, each available freshwater fish chronic test was used to parameterize a model run. If no chronic test data were available, eac h available freshwater fish LC50 was used to parameterize a model run. The results are presented i n Appendix C. The geometric mean of all population EC25 estimates for each chemical is reported i n Table 2.

2.10 ECOTOX THRESHOLDS

The EPA's OSWER has published Ecotox Thresholds (ETs) which are intended to be used fo r screening contaminants at Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) sites (OSWER 1996); these values are available for 20 meta ls and 47 organics in fresh water and for 10 metals and 7 organics in marine waters. The fresh water values are presented in Table 3 . Their derivation is briefly explained in the following text.

In general, chronic NAWQC values are preferred as aqueous ETs. However, as with th e benchmarks in Table 1, criteria that are based on fish consumption rather than aquatic toxic effect s (DDT, heptachlor, and toxaphene) are not used. Tier II values are presented in their place. For diazinon, the FCV calculated by the Great Lakes Water Quality Initiative (GLWQI) was used as a criterion value (EPA 1992).

OSWER recommends the use of dissolved concentrations of metals. Therefore, the metho d described in Prothro (1993) is used to correct for dissolved phase concentrations, which causes some of the metals criteria values used as ETs to differ slightly from the criteria listed in Table 1 or in the Region IV values.

SCVs are used when NAWQCs are not avai lable. Four of these SCVs are from the GLWQI (EPA 1992), 34 are from the prior edition of this document (Suter and Mabrey 1994), and 18 were calculated by OSWER (1996). Three chemicals with OSWER-derived SCVs (endosulfan, methoxyclor, an d malathion) had NAWQCs, but the criteria were judged to be old and unreliable. Tier II values were not derived if no daphnia acute values were available.

2.11 REGION IV SCREENING VALUES

EPA Region IV has published acute and chronic ecologica l screening values (SVs) for fresh surface water (Waste Management Division 1995); they are presented in Table 3. The acute SVs consist o f acute NAWQCs or, for chemicals with no acute NAWQC, of low est acute LC50 or EC50 values divided by 10. The chronic SVs consist of chronic NAWQCs or, for chemicals with no chronic NAWQC, o f lowest CVs divided by 10. If there were no CVs, the acute S V is divided by 10 to obtain the chronic SV. These divisions by 10 serve the same purpose as the models used to calculate Tier II values, but without the scientific or statistical basis and without using the full available data set. For some chemicals, the SVs are based on effects on fish eaters or irrigated plants rather than aquatic life. Region I V acknowledges that other values have greater ecological relevance (Waste Management Division 1995). As explained previously, there are separate benchmarks to address effects on plants and wildlife and an entirely separate set of risk assessment methods to protect humans who eat fish. Finally, the hardness dependent criteria are adjusted to 50 mg/L which is unrealistically low for the Oak Ridge Reservation and most other sites.

2.12 BACKGROUND CONCENTRATIONS

Background water concentrations should be used as a check for these benchmarks. That is, because some of these benchmarks are quite conservative and because the measured concentrations in ambient water may include forms that are not bioavailable, benchmark concentrations may be lower tha n background water concentrations. If the background concentrations are valid and represent a n uncontaminated state and if exposed site does not contain forms of the chemicals that are mor e

bioavailable or toxic than the forms at background sites, then screening benchmarks lower than th e background concentration should not be used.

Table 3. Summary of OSWER threshold values for aquatic life (EPA 1996) and Region IV screening values for freshwater surface water (Region IV 1995) (All values are µg/L)

Chemical	OSWER Values		Region IV Values[3]	
	NAWQC or FCV[1]	Tier II[2]	Acute Screening Values	Chronic Screening Values
		Metals		
Aluminum			750	87
Antimony			1300 (2s)	160 (2s)
Arsenic III	190		360	190
Arsenic V		8.1 *		
Barium		3.9 *		
Beryllium		5.1 *	16 (6s)	053 (1s)
Boron			--	750[4]
Cadmium	1.0 h		1.79 h	0.66 h
Chromium III	180 h		984.32 h	117.32 h
Chromium VI	10		16	11
Cobalt		3.0 *		
Copper	11 h		9.22 h	6.54 h
Iron	1000		--	1000
Lead	2.5 h		33.78	1.32
Manganese		80 *		
Mercury			2.40	0.0123
Mercury, inorganic	1.3			
Mercury, methyl		0.003 *		
Molybdenum		240 *		
Nickel	160 h		789.00 h	87.71 h
Selenium	5.0		20.00	5.00
Silver			1.23 h	0.012 (1s)
Thallium			140.00(3s)	4.00 (2s)

Table 3. (continued)

Chemical	OSWER Values		Region IV Values[3]	
	NAWQC or FCV[1]	Tier II[2]	Acute Screening Values	Chronic Screening Values
Vanadium		19 *		
Zinc	100 h		65.04 h	58.91 h
Organic Compounds				
Acenaphthene	23 S		170 (2s)	17
Acrolein			6.8 (3s)	2.1 (1s)
Acrylonitrile			755 (4s)	75.5
Aldrin			3	0.3
Benzene		46 *	530 (7s)	53
Benzidine			250 (4s)	25
Benzo(a)pyrene		0.014 *		
a-BHC			--	500[6]
b-BHC			--	5000[6]
g-BHC (Lindane)	0.08		2	0.08
Biphenyl		14 #		
Bis(2-chloroethyl) ether			23800 (1s)	2380
Bis(2-ethylhexyl)phthalate		32 *	1110 (2s)	<0.3 (2s)
Bromoform			2930 (2s)	293
4-Bromophenylphenyl ether		1.5 #		
4- Bromophenylphenyl phthalate			36 (2s)	12.2 (1s)
Butylbenzyl phthalate		19 #	330 (4s)	22 (2s)
Carbon tetrachloride			3520 (3s)	352
Chlordane			2.4	0.0043[5]
Chlorobenzene		130 *	1950 (5s)	195
2-Chloroethylvinyl ether			35400 (1s)	3540
Chloroform			2890 (3s)	289
2-Chlorophenol			438 (5s)	43.8
Chloropyrifos			0.083	0.041

Table 3. (continued)

Chemical	OSWER Values		Region IV Values[3]	
	NAWQC or FCV[1]	Tier II[2]	Acute Screening Values	Chronic Screening Values
4,4'-DDT		0.013 +	1.1	0.001
4,4'-DDE			105 (1s)	10.5
4,4'-DDD			0.064 (8s)	0.0064
Demeton			--	0.1
Diazinon	0.043 F			
Dibenzofuran		20 *		
1,2-Dichlorobenzene		14 #	158 (4s)	15.8 (3s)
1,3-Dichlorobenzene		71 #	502 (3s)	50.2
1,4-Dichlorobenzene		15 #	112 (5s)	11.2
1,1-Dichloroethane		47 *		
1,2-Dichloroethane			11800 (3s)	2000 (1s)
1,1-Dichloroethylene			3030 (3s)	303
2,4-Dichlorophenol			202 (3s)	36.5 (1s)
1,2-Dichloropropane			5250 (3s)	525
Dichloropropylene (cis and trans)			606 (2s)	24.4 (1s)
Dieldrin	0.062 S		2.5	0.0019[5]
Diethyl phthalate		220 *	5210 (2s)	521
2,4-Dimethylphenol			212 (3s)	21.2
Dimethyl phthalate			3300 (2s)	330
Di-n-butyl phthalate		33 *	94 (6s)	9.4
2,4-Dinitrophenol			62 (3s)	6.2
2,4-Dinitrotoluene			3100 (2s)	310
Dioxin (2,3,7,8-TCDD)			0.1	0.00001[5]
1,2-Diphenylhydrazine			27 (2s)	2.7
Endosulfan, mixed isomers		0.051 #		
Endosulfan, alpha		0.051 #	0.22	0.056
Endosulfan, beta		0.051 #	0.22	0.056

Table 3. (continued)

Chemical	OSWER Values		Region IV Values[3]	
	NAWQC or FCV[1]	Tier II[2]	Acute Screening Values	Chronic Screening Values
Endrin	0.061 S		0.18	0.0023[5]
Ethylbenzene		290 *	4530 (5s)	453
Fluoranthene	8.1 S		398 (2s)	39.8
Fluorene		3.9 #		
Guthion			--	0.01
Heptachlor		0.0069 +	0.52	0.0038[5]
Heptachlor epoxide			0.52	0.0038[5]
Hexachlorobutadiene			9 (5s)	0.93 (1s)
Hexachlorocyclopentadiene			0.7 (4s)	0.07
Hexachloroethane		12 #	98 (5s)	9.8
Isophorone			11700 (2s)	1170
Lindane (see g-BHC)				
Malathion		0.097	--	0.01
Methoxychlor		0.019 #	--	0.03
Methyl bromide			1100 (1s)	110
Methyl chloride			55000 (1s)	5500
3-Methyl-4-chlorophenol (p-Chloro-m-cresol)			3 (1s)	0.3
2-Methyl-4, 6-dinitrophenol (4,6- Dinitro-o-cresol)			23 (4s)	2.3
Methylene chloride			19300 (3s)	1930
Mirex			--	0.001
Naphthalene		24 *	230 (4s)	62 (1s)
Nitrobenzene			2700 (2s)	270
2-Nitrophenol			--	3500
4-Nitrophenol			828 (3s)	82.8
n-Nitrosodiphenylamine			585 (2s)	58.5
Parathion			0.065	0.013

Table 3. (continued)

Chemical	OSWER Values		Region IV Values[3]	
	NAWQC or FCV[1]	Tier II[2]	Acute Screening Values	Chronic Screening Values
PCB (total polychlorinated biphenyls)		0.19 *		
PCB-1242			0.2 (7s)	0.014
PCB-1254			0.2 (7s)	0.014
PCB-1221			0.2 (7s)	0.014
PCB-1232			0.2 (7s)	0.014
PCB-1248			0.2 (7s)	0.014
PCB-1260			0.2 (7s)	0.014
PCB-1016			0.2 (7s)	0.014
Pentachlorobenzene		0.47 #	250	50
Pentachlorophenol	13 pH		20 pH	13 pH
Phenol			1020 (16s)	256 (1s)
Polynuclear aromatic hydrocarbons				
Phenanthrene	6.3 S			
1,2,4,5-Tetrachlorobenzene			250	50
1,1,2,2-Tetrachloroethane		420 *	932 (3s)	240 (1s)
Tetrachloroethylene		120 *	528 (5s)	84 (1s)
Tetrachloromethane		240 #		
Toluene		130 *	1750 (5s)	175
Toxaphene		0.011 #	0.73	0.00025
1,2-Trans-Dichloroethylene,			13500 (1s)	1350
Tribromomethane		320 #		
Tributyltin			--	0.026
1,2,4-Trichlorobenzene		110 #	150 (4s)	44.9 (1s)
1,1,1-Trichloroethane		62 *	5280 (2s)	528
1,1,2-Trichloroethane			3600 (3s)	940 (1s)
Trichloroethylene		350 *		

Table 3. (continued)

Chemical	OSWER Values		Region IV Values[3]	
	NAWQC or FCV[1]	Tier II[2]	Acute Screening Values	Chronic Screening Values
2,4,6-Trichlorophenol			32 (3s)	3.2
m-Xylene		1.8 #		
Other				
Chloride			860,000	230,000
Chlorine (total residual - TRC)			19	11
Cyanide	5.2		22	5.2
pH				-2.5
Oil and Grease			--	0.01 (Low LC_{50})
Sulfide (S_2-, HS-)			--	2

Notes:
[1] EPA derived NAWQC or final chronic values (FCVs).
[2] Values calculated using the GLWQI Tier II methodology.
[3] Based on EPA Region IV Water Management Division, Water Quality Standards Unit's Screening List. Those followed by (*n*s) are derived by Region IV using safety factors.
[4] For long-term irrigation of sensitive crops (minimum standard).
[5] Based on the marketability of fish. The use of other values which may have greater ecological significance may be considered.
[6] Lowest plant value reported.
(*n*s) = number of species
h = hardness-dependent ambient water quality criterion (100 mg/L as $CaCO_3$ used for OSWER thresholds and 50 mg/L for Region IV values).
pH = pH-dependent ambient water quality criterion (7.8 pH used for OSWER thresholds and 6.0 for Region IV values).
S = FCV derived for EPA Sediment Quality Criteria documents.
F = FCV calculated using GLWQI Tier 1 methodology.
t = value is for total of all chemical forms.
* = value as calculated in Suter and Mabrey (1994).
+ = Value with EPA support documents.
# = value calculated by OSWER.

3. CHEMICAL-SPECIFIC INFORMATION

This section describes the sources of information and procedures that are specific to individua l elements. Except where noted, the sourc es of data for estimating chronic values and test EC20s for fish are the same. All data used to calculate Tier II values and estimated chronic values and EC20s ar e presented in Appendix A.

3.1 INORGANICS

Aluminum. There are NAWQC for aluminum. The toxicity of aluminum has been shown to vary widely with water hardness and pH (Ingersoll et al., 1990a 1990b; Woodward et al., 1989; Sadler and Lynam, 1988; and Cleveland et al. 1986; and others). The benchmarks were calculated using only tests in circumneutral water. Lowest chronic and test EC20 values for fish are from 28-day embryo-larval tests with *Pimephales promelas*. Kimball (n.d.) presented a CV of 5800 µg/L, however, after further analysis of Kimball's data, the EPA (1988a) offered another value of 3288 µg/L as the CV for aluminum. Lowest chronic and test EC20 values for daphnids are from McCauley et al. (1986). The EPA (1988a) gives a 4-day test EC50 for *Selenastrum capricornutum* which is used as the plant chronic value.

Ammonia. The test EC20 value for fish is from an embryo-larval test with fathead minnows (Thurston et al. 1986). The chronic value for fish is from an early life stage test with pink salmon, *Oncorhynchus gorbuscha* (Rice and Bailey 1980). The chronic value for daphnids is from EPA (1985a). Chronic values were determined using *Daphnia magna* in life-cycle tests. EPA (1985a) provided the chronic value for aquatic plants, in which *Chlorella vulgaris* experienced growth inhibition (EC50). The NAWQC for ammonia are functions of temperature (T) and pH. The acute NAWQC for ammonia is 0.52/FT/FPH/2, and the chronic NAWQC for ammonia is 0.80/FT/FPH/Ratio, where:

$$FT = \begin{cases} 10^{0.03(20-TCAP)}; & TCAP \le T \le 30 \\ 10^{0.03(20-T)}; & 0 \le T \le TCAP \end{cases}$$

$$FPH = \begin{cases} 1; & 8 \le pH \le 9 \\ \dfrac{1 + 10^{7.4-pH}}{1.25}; & 6.5 \le pH \le 8 \end{cases}$$

$$Ratio = \begin{cases} 16; & 7.7 \le pH \le 9 \\ (24)\dfrac{10^{7.7-pH}}{1 + 10^{7.4-pH}}; & 6.5 \le pH \le 7.7 \end{cases}$$

TCAP = 20° C for acute criteria and 15° C for chronic criteria when Salmonids or other sensitive cold water species are present
= 25° C for acute criteria and 20° C for chronic criteria when Salmonids and other sensitive coldwater species are absent

These criteria are presented in greater detail in EPA (1985a and 1986b).

Antimony. Chronic and test EC20 values for antimony are from Kimball (n.d.). The chronic tests of *Pimephales promelas* were embryo-larval, and 28-day life-cycle tests were used for *Daphnia magna*. The EPA (1978) gives a 4-day EC50 for chlorophyll A inhibition in *Selenastrum capricornutum* which is used as the plant value. The SAV and SCV listed in this report are draft FAV and FCV values (EPA 1988b).

Arsenic III. NAWQC are listed for arsenic III. The lowest chronic values for fish and daphnids are given by Call et al. (1983) and Lima et al. (1984). Early life stage tests were used on *Pimephales promelas* and life-cycle tests were used on *Daphnia magna*. Cowell (1965) provides the lowest chronic value for the algae *Spirogyra*, *Cladophora*, and *Zygnema* which is a concentration that produced a

100% kill in 2 weeks. The test EC20 value is derived from Lima et al. (1984) for fish and from Call et al. (1983) and Lima et al. (1984) for daphnids.

Arsenic V. The chronic and test EC20 values for fish are from an early life stage test with *Pimephales promelas* (DeFoe 1982), and the test EC20 for daphnids is from Spehar et al. (1980). The estimated chronic value for daphnids was calculated with a *Daphnia magna* LC50 from EPA (1985b) using Equation (3). Vocke (1980) provides the plant value from a 14-day EC50 test with *Scenedesmus obliquus*. The SAV and SCV listed in this report are lower than the acute and chronic LOEL values listed in the Water Quality Criteria Summary (EPA 1986b).

Barium. The chronic value for daphnids is from a 21-day test on *Daphnia magna* by Biesinger and Christensen (1972) which resulted in 16% reproductive impairment.

Beryllium. The chronic and test EC20 values for *Daphnia magna* are from a life-cycle test in Kimball (n.d.). Karlander and Krauss (1972) provide the plant value for *Chlorella vannieli*, a 10 to 20% reduction in autotrophic growth rates. The estimated chronic and test EC20 values for fish were derived using data for *Pimephales promelas* from EPA (1980f) in Equations (1) and (5). The derived SAV and SCV listed in this report are lower than the lowest CV listed in the Water Quality Criteria Summary (EPA 1986b) and the acute and chronic LOEL values listed in the Water Quality Criteria Summary (EPA 1986b).

Boron. The EC20 value for daphnids was based on a 21-day test on *Daphnia magna* by Gerisch (1984). A 21-day test of *Daphnia magna* by Lewis and Valentine (1981) provided the lowest daphnid chronic value.

Cadmium. The NAWQC for cadmium are functions of water hardness. The equations for these are $e^{(0.7852[\ln(\text{hardness})]-3.490}$ for the chronic value and $e^{(1.128[\ln(\text{hardness})]-3.828)}$ for the acute value (EPA 1986b). The lowest chronic value for fish is from Sauter et al. (1976) and Chapman et al. (n.d.) for daphnids. Early life stage tests were performed on brook trout, and life-cycle tests were performed on *Daphnia magna*. The test EC20 value is from Carlson et al. (1982) for fish and Elnabarawy et al. (1986) for daphnids. The value for aquatic plants is from Conway (1977). A relatively low cadmium concentration reduced the population growth rate of *Asterionella formosa* by an order of magnitude.

Calcium. The chronic value for daphnids is a concentration causing a 16% reduction in reproduction of *Daphnia magna* exposed to $CaCl_2 \cdot 2H_2O$ (Biesinger and Christensen 1972). Because the highly conservative secondary values were below commonly occurring ambient concentrations of this macronutrient, they were judged to be inappropriate and are not presented.

Chromium III. The NAWQC for chromium III are functions of water hardness. The equations are $e^{(0.8190[\ln(\text{hardness})]+1.5161)}$ for the chronic value and $e^{(0.8190[\ln(\text{hardness})]+3.688)}$ for the acute value. The lowest chronic value for fish is from an early life stage test by Stevens and Chapman (1984) on rainbow trout. Chapman et al. (n.d.) provide a chronic value from a life-cycle test of *Daphnia magna*. The plant value for chromium III is from a 4-day chronic test in which there was a 50% inhibition of growth of *Selenastrum capricornutum* (EPA 1985c). Stevens and Chapman (1984) also provided data for the test EC20 value for fish.

Chromium VI. There are NAWQC for chromium VI. The chronic and test EC20 values for fish are from Sauter et al. (1976). An early life stage test produced the chronic value for rainbow trout. For daphnids, a life-cycle chronic test was run by Mount (1982) on *Daphnia magna*, and the test EC20 is from Elnabarawy et al. (1986). *Microcystis aeruginosa*, used for the aquatic plant value, showed incipient inhibition in tests reported by the EPA (1985c).

Cobalt. The chronic and test EC20 values for cobalt are from Kimball (n.d.). *Daphnia magna* were used in 28-day life-cycle tests, and *Pimephales promelas* were used in embryo-larval tests.

Copper. The NAWQC for copper are functions of water hardness. The equations are $e^{(0.8545[\ln(\text{hardness})]-1.465)}$ for the chronic value and $e^{(0.9422[\ln(\text{hardness})]-1.464)}$ for the acute value. The chronic and test EC20 values for fish are from an early life stage test with brook trout by Sauter et al. (1976). The daphnid chronic value is from Chapman (n.d.). The test EC20 value for daphnids is derived from Dave (1984a). A 21-day test LC50 on *Daphnia magna* provided the chronic value for daphnids. Arthur and Leonard (1970) provided a chronic value through 6-week tests on the amphipod, *Gammarus pseudolimnaeus*. Steeman-Nielsen and Wium-Anderson (1970) provide a plant value based on a lag in growth of the alga, *Chlorella pyrenoidosa*.

Cyanide. There are NAWQC for cyanide. The chronic and test EC20 values for fish were both from a brook trout life-cycle test by Koenst et al. (1977). Oseid and Smith (1979) provide full life-cycle test on *Gammarus pseudolimnaeus*, an amphipod. The alga, *Scenedesmus quadricauda*, showed incipient inhibition in chronic tests by the EPA (1985e).

Iron. The NAWQC for iron is based on a field study at a site receiving acid mine drainage and is not consistent with the current method for deriving criteria. The lowest chronic value for daphnids (158 µg/L) is a threshold for reproductive effects from a 21-day test of $FeCl_2$ with *Daphnia magna* (Dave 1984c). It is considerably lower than the 4380 µg/L concentration causing 16% reproductive decrement in another test of $FeCl_2$ with *D. magna* (Biesinger and Christensen 1972). Dave (1984c) argued that his result was more applicable to a situation in which "an acidic iron-containing waste water is discharged into a lake or a river" where it is neutralized, but Biesinger and Christensen's (1972) result "is probably more close to the steady-state situation in natural freshwater without any point source of iron." The lowest chronic value for fish is a concentration that caused 100% larval mortality in an embryo-larval test with rainbow trout exposed to dissolved iron salts (Amelung 1981).

Lead. The NAWQC for lead are functions of water hardness. The equations are $e^{(1.273[\ln(\text{hardness})]-4.705)}$ for the chronic value and $e^{(1.273[\ln(\text{hardness})]-1.460)}$ for the acute value. The lowest chronic value for fish was provided by an early life stage test on rainbow trout by Davies et al. (1976). *Daphnia magna* were used in 21-day tests to determine lowest chronic toxicity by Chapman et al. (manuscript). Borgmann et al. (1978) provided a chronic value for a life-cycle test on *Lymnaea palastris*, a snail. *Chlorella vulgaris*, *Scenedesmus quadricauda*, and *Selenastrum capricornutum* experienced 53%, 35%, and 52% growth inhibition, respectively, at the plant chronic value (EPA 1985f). The test EC20 value for fish is from Sauter et al. (1976). The acute-EC20 ratio from which the SS test EC20 was calculated had to be obtained using a species mean acute value for *Salmo gairdneri* (EPA 1985f) since no acute value was reported by Sauter et al. (1976).

Magnesium. The chronic value for daphnids is a concentration causing a 16% reduction in reproduction of *Daphnia magna* exposed to $MgCl_2 \cdot 6H_2O$ (Biesinger and Christensen 1972). Because the highly conservative secondary values were below commonly occurring ambient concentrations of this nutrient element, they were judged to be inappropriate and are not presented.

Manganese. All chronic and test EC20 values for manganese are from Kimball (n.d.). The fish chronic value is from a 28-day early life-stage test with *Pimephales promelas*.

Mercury, inorganic, or total. Mercury has NAWQC. However, the chronic criterion for mercury is based on the final residue value derived from a methyl mercury bioconcentration factor. To protect aquatic life, the secondary values were derived from the EPA's (1985f) final acute and chronic values.

The chronic and test EC20 values for fish are from Call et al. (1983), and those for daphnids are from Biesinger et al. (1982). The chronic tests for fish were run on *Pimephales promeles* throughout their embryo-larval stage. *Daphnia magna* were used in flow through life-cycle tests. The plant value is for incipient inhibition of *Microcystis aeruginosa* in an 8-day test (EPA 1985f). The acute-EC20 ratio used to calculate the SS test EC_{20} value had to be derived using a species mean acute value (EPA 1985g) since no acute value was reported in Biesinger et al. (1982).

Mercury, methyl. The chronic and test EC20 values for fish are from McKim et al. (1976). Brook trout were used in three generation life-cycle tests. The test EC20 value for daphnids is from Biesinger et al. (1982). The alga, *Chlorella vulgaris*, was used in 15-day EC50 (growth) tests by Rai et al. (1981) to determine chronic toxicity values for aquatic plants.

Molybdenum. The chronic and test EC20 values for daphnids are from Kimball (n.d.). *Daphnia magna* were used in a 28-day life-cycle test to determine the chronic value.

Nickel. The NAWQC for nickel are functions of water hardness. The equation for these are $e^{(0.8460[\ln(\text{hardness})]+1.1645)}$ for the chronic value and $e^{(0.8460[\ln(\text{hardness})]+3.3612)}$ for the acute value. However, nickel concentrations of 10 µg/L in Oak Ridge Reservation stream water (considerably below the chronic NAWQC for nickel but similar to the lowest of the alternate benchmarks) reduced 7-day *Ceriodaphnia dubia* survivorship to 60% (Kszos et al. 1992). The chronic and test EC20 values for fish are from Nebeker et al. (1985). The chronic value for fish was determined through an early life stage test on rainbow trout. For daphnids, the chronic value was from Lazareva (1985) and the test EC20 was from Münzinger (1990). *Daphnia magna* were used in a life-cycle test to determine the chronic value. The caddisfly, *Clistoronia magnifica*, was used in life-cycle tests by Nebeker et al. (1984) to determine the chronic value. The plant chronic toxicity values were provided by the EPA (1986a) for *Microcystis aeruginosa*, which showed incipient inhibition.

Potassium. The chronic value for daphnids is a concentration causing a 16% reduction in reproduction of *Daphnia magna* exposed to KCl (Biesinger and Christensen 1972). Because the highly conservative secondary values were below commonly occurring ambient concentrations of this macronutrient, they were judged to be inappropriate and are not presented.

Selenium. NAWQC are listed for selenium. The chronic and test EC20 values for fish are from Goettl and Davies (1976). Their tests were during the early life stage of rainbow trout. The chronic value for daphnids is from Kimball (n.d.), and the test EC20 is from Johnston (1987). These tests were run for 28 days on *Daphnia magna*. The green alga, *Scenedesmus obliquus*, exhibited reduced growth in the 14-day chronic toxicity tests (Vocke et al. 1980). The acute-EC20 ratio used in calculation of the SS EC20 value had to be derived using a species mean acute value for *Daphnia magna* (EPA 1987a) because no acute value was reported by Johnston.

Silver. The acute NAWQC for silver, which is a function of water hardness, is given by the equation $e^{(1.72[\ln(\text{hardness})]-6.52)}$. The SCV was estimated from the FAV and acute-chronic ratios for three species. Although questions about two of these ratios prompted the EPA to refrain from calculating a final chronic value, we judged them to be better than the default value. The lowest chronic value for fish is based on an early life stage test on rainbow trout by Davies et al. (1978). The lowest chronic value for daphnids and the test EC20 for fish are from Nebeker et al. (1983). The daphnid CV is from a test with *Daphnia magna*. The test EC20 for daphnids is from Elnabarawy et al. (1986). The plant value is for growth inhibition in *Chlorella vulgaris* (EPA 1980y).

Sodium. The chronic value for daphnids is a concentration causing a 16% reduction in reproduction of *Daphnia magna* exposed to NaCl (Biesinger and Christensen 1 972). Because the highly conservative secondary values were below commonly occurring ambient concentrations of this macronutrient, they were judged to be inappropriate and are not presented.

Strontium. The chronic value for daphnids is from 21-day tests on *Daphnia magna* by Biesinger and Christensen (1972) which resulted in 16% reproductive impairment.

Thallium. Chronic and test EC20 values are from Kimball (n.d.). Embryo-larval tests were run on *Pimephales promelas*, and 28-day chronic tests were run on *Daphnia magna*. The aquatic plant value is a 4-day EC50 which reduced the cell numbers of the alga, *Selenastrum capricornutum* (EPA 1978).

Tin. The chronic value is from Biesinger and Christensen (1972). It caused 16% reproductiv e impairment in *Daphnia magna* in 21 days.

Uranium. The chronic value for fish is an estimate based on a fathead minnow LC50 fro m Cushman et al. (1977) used in Equation (1). The test EC20 is an estimate based on the same data ; however, Equation (5) was used.

Vanadium. The lowest chronic and test EC20 values for fish are from Holdway and Spragu e (1979) and for daphnids from Kimball (n.d.).

Zinc. The NAWQC for zinc are functions of water hardness. The equations ar e $e^{(0.8473[\ln(\text{hardness})]+0.7614)}$ for the chronic value and $e^{(0.8473[\ln(\text{hardness})]+0.8604)}$ for the acute value. The chronic and test EC20 values for fish are from Spehar (1976), and the chronic value for daphnids is from Chapman et al. (n.d.). Life-cycle tests were run on *Jordanella floridae* and *Daphnia magna*. Nebeker et al. (1984) provided chronic values from life-cycle tests on the caddisfly, *Clistoronia magnifica*. Bartlett et al. (1974) ran 7-day tests on *Selenastrum capricornutum*. These aquatic plants showed incipien t inhibition of growth.

Zirconium. The chronic and test EC20 values for fish are estimates based on an LC50 fo r *Pimephales promelas* from Cushman et al. (1977). These values were calculated using Equations (1) and (5).

3.2 ORGANICS

Acenaphthene. Although the full data requirements are not met for acenaphthene, the EPA has presented final acute and chronic values for derivation of sediment quality criteria which are presented in the criteria columns (EPA 1993b). The fish chronic value is from an early life-stage test wit h *Pimephales promelas*, and the non-daphnid chronic value is from a life-cycle test with a midg e *Paratanytarsus sp.* (EPA 1993b). The plant value is from EPA (1978). *Selenastrum capricornutum* were used in 96-hour EC50 (50% reduction in cell numbers).

Acetone. The test EC20 value for fish is an estimate based on an LC50 for rainbow trout. Th e chronic value for Daphnia magna is a 28-day life-cycle test from LeBlanc and Surprenant (1983).

Anthracene. The chronic value for daphnids (*Daphnia magna*) was estimated using an EC50 from Holst and Giesy (1989). The chronic and test EC20 values for fish are an estimate based on an LC50 for bluegill from Oris and Giesy (1985). Calculations were performed using Equations (2), (4), and (5).

Benzene. The lowest chronic value for daphnids is given by EPA (1978). *Daphnia magna* were used in life-cycle tests. The lowest chronic value for aquatic plants is given by Kauss and Hutchinson (1975), which was a 48-hour test EC50 on *Chlorella vulgaris*. The chronic value for fish is an estimate based on data for the rainbow trout from EPA (1980d) and Equation (2). The test EC20 value for fish is derived from Black and Birge (1982). The reader should note that Black and Birge conducted a series of screening tests for a large number of chemicals on several freshwater organisms. Larval fish survival was recorded to only 4 days post-hatch, and LOECs and NOECs were not determined. These tests, then, did not generate standard chronic values and are not equivalent to the other chronic tests cited in this report. The test EC20 values based on tests by Black and Birge may be high relative to those from conventional chronic tests.

Benzidene. The chronic and EC20 value for fish are an estimate based on data for red shiner from EPA (1980c). Calculations were performed using Equations (2) and (5).

Benzo(a)anthracene. The chronic value for daphnids is an estimate based on data for *Daphnia magna* from Trucco et al. (1983) used in Equation (4).

Benzo(a)pyrene. The test EC20 for fish is derived from Hannah et al. (1982). The chronic value for daphnids is an estimate based on data for *Daphnia magna* from Trucco et al. (1985) used in Equation (4).

Benzoic Acid. The chronic value for fish is an estimate based on data for the mosquitofish from AQUIRE used in Equation (2). The estimated test EC20 for fish is based on the same data, but Equation (5) was used.

Benzyl Alcohol. The chronic and test EC20 values for fish are estimates based on data for bluegill from Dawson et al. (1977). The calculations were performed using Equations (2) and (5).

BHC (lindane). There are NAWQC for lindane. The chronic values for daphnids, fish, and non-daphnid invertebrates are all from Macek et al. (1976a). The test EC20 values for daphnids and fish are also from Macek et al. (1976a). The chronic values were derived from life-cycle tests run on *Pimephales promelas*, *Daphnia magna*, and the midge *Chironimus tentans*. The chronic value for aquatic plants is from Krishnakumari (1977); *Scenedesmus acutus* exhibited 20% growth inhibition in 5 days. The acute-EC20 ratio from which the SS EC20 was calculated was derived using a species mean acute value for *Salvelinus fontinalis* (EPA 1980s) since no acute data were reported by Macek et al. (1976a).

BHC (other). The chronic value for daphnids was estimated using a *Daphnia magna* EC50 from AQUIRE in Equation (4).

Bis(2-ethylhexyl)phthalate. The chronic and test EC20 values for fish are from a rainbow trout early life-stage test (Mehrle and Mayer 1976). A much lower value was reported in the previous edition of this report, but the results of that study are now believed to be incorrect (Knowles et al. 1987). The new value is supported by a CV of 912 µg/L from Adams and Heidolph (1985). That study is used in the derivation of the SCV because, unlike the Knowles et al. (1987) study, it has an accompanying acute value (48-hr EC50). No test EC20 for daphnids was calculated because insufficient detail was presented by Adams and Heidolph (1985) and Knowles et al. (1987).

2-Butanone. The chronic values for fish and daphnids are estimates based on data from Veith et al. (1983) and Randall and Knopp (1980), respectively. Equation (4) was applied to the data for *Daphnia magna*, and Equation (2) was applied to the data for *Pimephales promelas*. The test EC20 value for fish is also an estimate using Equation (5) and an LC50 from Veith et al. (1983).

Carbon disulfide. The chronic and test EC20 values for fish are estimates based on data for mosquitofish from AQUIRE using equations (2) and (5). The chronic value for daphnids is an estimate for *Daphnia magna* using data from Van Leeuwen (1985) in Equation (4).

Carbon tetrachloride. The chronic value for fish is a rainbow trout embryo-larval LC50 (Black and Birge 1982); therefore, it may be too high. However, it is lower than values presented by Kimball et al. (n.d.) and EPA (1980h) for fathead minnows. The same test was used to derive the test EC20 for fish (see the comments on benzene). The chronic value for daphnids is from a 7-day reproduction test with *Daphnia magna* (Kimball et al. n.d.). None of the subchronic tests could be used in the calculation of the SCV.

Chlordane. The chronic NAWQC for chlordane is based on the final residue value. For a criterion to protect aquatic life rather than its use, the FCV is reported. The lowest chronic and test EC20 values are derived from *Daphnia magna*, bluegill, and *Chironomus tentans* life-cycle tests (Cardwell et al. 1977).

Chlorobenzene. The chronic values for fish and daphnids are estimates based on data for bluegill and *Daphnia magna* from EPA (1980j). The values were calculated using Equations (2) and (4). The plant value is a 96-hour EC50 for cell number with *Selenastrum capricornutum* (EPA 1980j).

Chloroform. The test EC20 value for fish is from Black and Birge (1982). (Refer to the section on benzene). The chronic value is a 27-day LC50 for rainbow trout (embryo-larval) from EPA (1980l). The EPA (1986b) gives this value as a lowest observed effect value in lieu of a NAWQC. The chronic value for daphnids is an estimate based on data for *Daphnia magna* from EPA (1980l) and calculated from Equation (4).

DDD. The chronic and EC20 values for fish are estimates based on data for largemouth bass from Mayer and Ellersieck (1986) and are calculated using Equations (2) and (5).

DDT. The acute NAWQC for DDT is used. The chronic NAWQC, however, is not used because it is based on the final residue value. To protect aquatic life, an SCV is presented. The test EC20 value for fish is derived from Jarvinen et al. (1977). The fish chronic value is from a *Pimephales promelas* life-cycle test (EPA 1980m). The chronic value for daphnids is an estimate based on data for *Daphnia pulex* from EPA (1980m) and calculated with Equation (4). The aquatic plant chronic value is from Sodergreen (1968). *Chlorella vulgaris* was affected in growth and morphology.

Decane. The chronic value for daphnids is an estimate based on data for *Daphnia magna* from LeBlanc (1980) used in Equation (4).

Di-n-butyl phthalate. All chronic and test EC20 values are from McCarthy and Whitmore (1985). The chronic value for daphnids is based on the geometric means of the observed concentration of fresh solutions and aged solutions. *Daphnia magna* were used in life-cycle tests, and *Pimephales promelas* were used in early life stage tests.

Dibenzofuran. The chronic value for daphnids is an estimate based on data for *Daphnia magna* from LeBlanc (1980) and used in Equation (4).

1,1-Dichloroethane. The chronic and test EC20 values for fish are estimates based on an LC50 for guppy from Koneman (1981) and calculated using Equations (2) and (5).

1,2-Dichloroethane. The chronic value for fish is from Ahmad et al. (1984). Early life stage tests were conducted on *Pimephales promelas*. The test EC20 value for fish is from Benoit et al. (1982). The chronic and test EC20 values for daphnids are from *Daphnia magna* 28-day life-cycle tests (Richter et al. 1983).

1,1-Dichloroethene. The chronic values for fish and aquatic plants are from EPA (1978). *Pimephales promelas* were used in embryo-larval tests. The alga, *Selenastrum capricornutum*, was used in a 96-hour EC50 where it exhibited loss of chlorophyll A and cell numbers. The chronic value for daphnids is an estimate based on data for *Daphnia magna* from EPA (1980n) used in Equation (4).

1,2-Dichloroethene. The chronic and test EC20 values for fish are estimates based on data for bluegill from EPA (1980n). These values were derived using Equations (2) and (5).

1,3-Dichloropropene. The test EC20 for fish was estimated using an LC50 for bluegill from EPA (1980o) in Equation (5). The chronic values for fish and aquatic plants are from EPA (1978). *Pimephales promelas* were used in an embryo-larval test, and *Selenastrum capricornutum* were used in a 96-hour EC50. The alga showed chlorophyll A and cell loss. The chronic value for daphnids was estimated using an EC50 for *Daphnia magna* from EPA (1980o) in Equation (4).

Diethyl phthalate. The plant value is a 96-hour EC50 for *Selenastrum capricornutum* (EPA 1978).

Di-n-octyl phthalate. All chronic and test EC20 values are from McCarthy and Whitmore (1985). Chronic values were based on *Pimephales promelas* in early life stage tests and *Daphnia magna* in life-cycle tests. There are no Tier II values for di-n-octyl phthalate because LC50s were not available.

Ethyl benzene. The chronic value for aquatic plants is from EPA (1978). *Selenastrum capricornutum* displayed chlorophyll A inhibition in 96-hour EC50. The chronic value for daphnids was estimated using an EC50 for *Daphnia magna* from EPA (1980p) in Equation (4).

Fluoranthene. Although the full data requirements are not met for fluoranthene, the EPA (1993c) has derived an FAV and FCV as a part of the derivation of sediment quality criteria which are presented in Table 1. The fish CV is from an early life-stage test with *Pimephales promelas*, and the daphnid CV is from a life-cycle test with *Daphnia magna* EPA (1993c).

Heptachlor. The acute NAWQC for heptachlor is used. Because the chronic NAWQC is based on the final residue value, an SCV is reported herein. The chronic and test EC20 values for fish are from Macek et al. (1976b). *Pimephales promelas* were used in life-cycle tests to determine the chronic value for fish. The SS test EC20 value was calculated using an acute-EC20 ratio that was derived from a species mean acute value for *Pimephales promelas* (EPA 1980r) because no acute data are available from Macek et al. (1976b). The chronic value for aquatic plants is from EPA (1980r). Growth inhibition was exhibited by *Selenastrum capricornutum* in 96-hour EC50. The chronic value for daphnids is an estimate based on data for *Daphnia pulex* from EPA (1980r) using Equation (4).

Hexane. The chronic value and test EC20 value for fish are estimates based on LC50s for golden orfe from AQUIRE and calculated using Equations (2) and (5).

2-Hexanone. The chronic value and test EC20 value are estimates based on an LC50 for *Pimephales promelas* from Geiger et al. (1986) and calculated using Equations (2) and (5).

1-Methylnaphthalene. The chronic and test EC20 values for fish are estimates based on data for *Pimephales promelas* from Mattson (1976). The values were calculated with Equations (2) and (5).

4-Methyl-2-pentanone. The chronic value for fish is from Call et al. (1985). *Pimephales promelas* embryos, larva, and juveniles were exposed for 31 to 33 days.

2-Methylphenol. The chronic value for daphnids is an estimate based on data for *Daphnia magna* from Adema (1978) and Canton and Adema (1978). The value was calculated using Equation (4). The chronic and test EC20 values for fish were estimated using an LC50 for rainbow trout from DeGraeve et al. (1980) in Equations (2) and (5).

Methylene chloride. The chronic value for fish is from Dill et al. (1987). *Pimephales promelas* were used in 32-day embryo-larval tests. The chronic value for daphnids is an estimate based on data for *Daphnia magna* from LeBlanc (1980) used in Equation (4). The test EC20 value for fish is from Black and Birge (1982). (Refer to the section on benzene concerning data from this source.)

Naphthalene. The chronic and test EC20 values for fish are from DeGraeve et al. (1982), and the test EC20 value for daphnids is from Geiger and Buikema (1982). *Pimphales promelas* were used in embryo-larval tests to determine chronic toxicity. The chronic value for aquatic plants is from EPA (1980t). The alga, *Chlorella vulgaris*, exhibited inhibited cell numbers in 48-hour EC50. The chronic value for daphnids is an estimate based on data for *Daphnia magna* from EPA (1980t) used in Equation (4).

4-Nitrophenol. The chronic and test EC20 values for daphnids are from Francis et al. (1986). The chronic and test EC20 values for fish are estimates based on data for bluegill from Buccafusco et al. (1981) and used with Equations (2) and (5). The EPA (1978) is the source for the chronic value for aquatic plants. *Selenastrum capricornutum* exhibited chlorophyll A reduction in 96-hour EC50.

N-nitrosodiphenylamine. The source for the estimated fish and daphnid chronic values are Buccafusco et al. (1981) and LeBlanc (1980), respectively. Equation (2) was used to calculate the estimated fish (bluegill) value, and Equation (4) was used for the estimated daphnid (*Daphnia magna*) value. The test EC20 value for fish is also an estimate. Buccafusco et al. (1981) provided the LC50 for bluegill used with Equation (5) to estimate the EC20.

PCBs: Total. There are NAWQC for PCBs, but the chronic criterion is based on the final residue value. Since that value is intended to protect the use of aquatic life, an SCV is calculated to protect the aquatic life itself. The fish lowest chronic value and test EC20 are from a full life-cycle test of fathead minnows by DeFoe (1978). The lowest chronic value and test EC20 for daphnids are from a 2-week continuous flow test with *Daphnia magna* (Nebeker and Puglisi 1974). The lowest chronic value for non-daphnid invertebrates is from a 3-week LC50 for *Tanytarsis dissimilis* by Nedeker and Puglisi (1974). The lowest plant value is for reduction in carbon fixation by *Scenedesmus quadricaudata* in a 24-hour test (Laird 1973).

PCBs: Aroclor® 1221. The chronic and test EC20 fish values are estimates based on data for cutthroat trout by Stalling and Mayer (1972). Equations (2) and (5) were used to determine the EC20 value for fish. The chronic value for aquatic plants is a 48-hour LC50 for *Euglena gracilis* (Ewald et al. 1976).

PCBs: Aroclor® 1232. The chronic and test EC20 fish values are estimates based on data for cutthroat trout by Stalling and Mayer (1972) and AQUIRE. The geometric mean was derived from these two values and then placed into Equations (2) and (5).

PCBs: Aroclor® 1242. The chronic and test EC20 values for fish are from Nebeker et al. (1974). *Pimephales promelas* were used in full life-cycle tests. The chronic values for non-daphnid invertebrates are from Nebeker and Puglisi (1974). *Gammarus pseudolimnaeus* were exposed to PCBs for 2 months in a continuous-flow system. The chronic value for aquatic plants is a 24-hour test in which *Scenedesmus obtusiusculus* showed growth inhibition (Larsson and Tillberg 1975).

PCBs: Aroclor® 1248. The chronic and test EC20 values for fish are from DeFoe et al. (1978), and the chronic and test EC20 values for daphnids are from Nebeker and Puglisi (1974). The chronic values for fish were full life-cycle tests carried out on *Pimephales promelas*. The chronic value for daphnids was determined through 3-week exposures that created a 16% reproductive impairment in *Daphnia magna*. The chronic value for a non-daphnid invertebrate is from Nebeker and Puglisi (1974). *Gammarus pseudolimnaeus* was exposed for 2 months.

PCBs: Aroclor® 1254. The chronic value for fish is from a brook trout life-cycle test (Mauck et al. 1978), and the test EC20 value is from a fathead minnow life-cycle test (Nebeker et al. 1974). The chronic and test EC20 values for daphnids are from Nebeker and Puglisi (1974). *Daphnia magna* were exposed for 2 weeks in a continuous-flow environment. The lowest chronic value for nondaphnid invertebrates is from a 3-week LC50 for *Tanytarsis dissimilis* by Nedeker and Puglisi (1974). The lowest plant value is for reduction in carbon fixation by *Scenedesmus quadricaudata* in a 24-hour test (Laird 1973).

PCBs: Aroclor® 1260. The chronic and test EC20 values for fish are from DeFoe et al. (1978). The chronic value is ambiguous because significant effects occurred at the lowest concentration tested in a 30-day fathead minnow larval test at the lowest concentrations tested (1.3 µg/L) but not in a 240-day lifecycle at the highest concentration tested (2.1 µg/L).

1-Pentanol. The chronic and test EC20 values for fish are estimates based on data for rainbow trout from AQUIRE and calculated using Equations (2) and (5).

Phenanthrene. The chronic and test EC20 values for daphnids are from Geiger and Buikema (1982). The chronic value was determined using *Daphnia pulex* in full life-cycle tests.

Phenol. The chronic and test EC20 values for fish are from fathead minnow embryo-larval tests (DeGraeve et al. 1980). The chronic value for daphnids is an estimate based on data for *Daphnia longispina* from EPA (1980v) and calculated using Equation (4). The chronic value for aquatic plants is from Reynolds (1975). *Selenastrum capricornutum* exhibited 60% reduction in cell numbers and 12% growth inhibition.

2-Propanol. The chronic and test EC20 values for fish are estimates based on data for *Pimephales promelas* from AQUIRE and Veith et al. (1983). The geometric mean of these LC50s was used in Equations (2) and (4).

1,1,2,2-Tetrachloroethane. The chronic and test EC20 values for fish are from Ahmad et al. (1984), and the values for daphnids are from Richter et al. (1983). The chronic values for fish were derived from embryo-larval tests on *Pimephales promelas*. The chronic values for daphnids were derived from 28-day tests run on *Daphnia magna*. The chronic value for aquatic plants is from EPA (1978). *Selenastrum capricornutum* exhibited chlorophyll A inhibition in 96-hour EC50.

Tetrachloroethene. The chronic value for fish is an embryo-larval test on fathead minnows (EPA 1980aa). The test EC20 value for fish is from Ahmad et al. (1984). The chronic and test EC20 values for daphnids are from Richter et al. (1983). These were 28-day tests on *Daphnia magna*. The plant value is from EPA (1978). *Selenastrum capricornutum* decreased in cell number and chlorophyll A during the 96-hour EC50.

Toluene. The chronic value is an estimate based on data for *Daphnia magna* from EPA (1980cc) and calculated using Equation (4). The chronic value from *Pimephales promelas* is from Devlin et al. (1982). The test EC20 value for fish is from Black and Birge (1982). (Refer to the section on benzene.) *Chlorella vulgaris* was used in 10-day tests by Kauss and Hutchinson (1975) to determine the chronic value for aquatic plants.

1,1,1-Trichloroethane. The chronic value and test EC20 value for daphnids are from Thompson and Carmichael (1989). *Daphnia magna* were used in 17-day chronic tests. The chronic value and test EC20 for fish were estimated based on data for *Pimephales promelas* from Alexander et al. (1978) and calculated using Equation (2). The chronic value for aquatic plants is from EPA (1978). *Selenastrum capricornutum* decreased in chlorophyll A and cell numbers in the 96-hour EC50.

1,1,2-Trichloroethane. The chronic value and test EC20 values for fish are from Ahmad et al. (1984) and the chronic and test EC20 values for daphnids are from Richter et al. (1983). The chronic value for fish is based on 32-day embryo-larval tests on *Pimephales promelas*, while the chronic value for daphnids is based on 28-day tests on *Daphnia magna*.

Trichloroethene. The chronic and test EC20 values for fish are from Smith et al. (1991). *Jordanella floridae*, the flagfish, was used in 28-day embryo-larval tests. The chronic value for daphnids is an estimate based on data for *Daphnia pulex* from EPA (1980dd) and calculated using Equation (4).

Vinyl acetate. The chronic and test EC20 values for fish are estimates based on an LC50 for *Pimephales promelas* from AQUIRE calculated using Equations (2) and (5).

Xylene. The chronic value for fish is an estimate based on an LC50 for common carp from AQUIRE and calculated using Equation (2). The test EC20 value for fish is from Black and Birge (1982). (Refer to the section on benzene.)

4. APPLICATION OF BENCHMARKS

Use of these aquatic screening benchmarks requires that the assessor choose which benchmarks to employ and which water concentrations to apply them to. The choice of benchmarks depends on th e interpretation of the benchmarks, their regulatory standing, and their degree of conservatism.

Each of the alternative benchmarks has a different interpretation. Exceedances of NAWQC create a regulatory imperative for action under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) because they are ARARS. Exceedance of a Tier II value implies a greater than 20% chance that the NAWQC, if their value wer e known, would be exceeded. Exceedance of a CV indicates that the field concentration is greater than a concentration dividing statistically insignificant from significant effects in a chronic toxicity test. Exceedance of a test EC20 indicates that biologically significant effects levels were exceeded in a chronic toxicity test. Exceedance of the SS test EC2 0 indicates that a biologically significant effect level may be exceeded in a sensitive species. Exceedance of a population EC20 indicates that a significant reduction in a largemouth bass population could occur. Therefore, exceedance of either the acute or chronic NAWQC indicates a need for action. Exceedance of an SCV implies a low risk. Exceedance of any of the other benchmarks indicates a risk of real effects that should lead to additional data collection and assessment. However, these inferences all depend on comparison of the benchmarks to appropriate water concentrations.

Contaminant screening is not a regulatory process, but managers at some sites prefer to use only values that have regulatory standing. The NAWQC are clearly regula tory values in that they are ARARS and have been adopted by Tennessee and most other states as water quality standards. Lowest chronic values (the last column in Table 1) hav e been presented by the EPA in place of NAWQC (EPA 1986b), but they are not criteria. They merely indicate that the EPA believes toxic effects may occur at tha t concentration. The Tier II values (SAV and SCV) are proposed by the EPA as values that could be used for regulatory enforcement in the Great Lakes (EPA 1993a). Th ey are more conceptually consistent with the NAWQC than lowest chronic values and may come to have the same standing as NAWQC, bu t currently they are only proposed by the EPA.

OSWER's Ecotox Thresholds and Region IV's screening values (or values proposed by othe r regions) are alternative benchmark sets derived by the EPA. Both are based on NAWQC values ; however, Region IV uses values adjusted to 50 ppm hardness which is unrealistically conservative for most sites, while OSWER adjusts to dissolved-phase concentrations which are not available for most screening assessments. In addition, Region IV uses NAWQCs based on fish marketability which is not relevant to protecting aquatic life. Therefore, the standard EPA Office of Water NAWQC values and FCVs in Table 1 will be more useful in most cases. When NAWQCs are not available, the ET s correspond to SCVs, but some of the SCVs hav e been superseded by values presented in Table 1 of this document. When NAWQCs are not available, the SVs are based on divisions of lowest toxic values by 10 or 100 which is equivalent to derivation of SAVs and SCVs but is not as scientifically defensible. Therefore, for the Oak Ridge Reservation and many other sites, the NAWQCs and Tier II values listed in Table 1 are generally preferable to either the ETs or SVs.

As discussed in the introduction, the chronic benchmarks are to be used as lower screenin g benchmarks. The acute NAWQC and SAVs are to be used as upper screening benchmarks. However, because of their conservatism, exceedance of the SAV cannot be taken to indicate that severe effects are likely to be occurring. If an SAV is exceeded, the assessor should examine the acute values used t o generate the Tier II values (Appendix A) and judge whether in fact severe effects are likely.

All of these benchmarks are based on toxicity tests conducted in the laboratory. Therefore, the y should be compared to water concentrations that are as equivalent as possible to concentrations in test water which is nearly all dissolved. The EPA Office of Water has decided that for metals the appropriate comparison is to concentrations in 0.1 to 0.45 μm filtered ambient water (HECD 1992, Prothro 1993). Acid soluble or even total recoverable concentrations, rather than dissolved concentrations, are ofte n reported because they are requi red for human health risk assessments. In addition, Region IV and most other EPA regional offices require use of acid soluble concentrations in ecological risk assessments for the sake of conservatism. However, acid soluble concentrations of metals typically include 30 to 95% particle bound material (HECD 1992). Therefore, acid soluble c oncentrations should be used for aquatic ecological risk assessments to satisfy the regional regulators, but dissolved concentrations should also be used if possible for a realistic screening of the chemicals and to make realistic estimates of risk.

The NAWQC for hardness dependent metals are based on a hardness of 100 mg/L, which i s appropriately conservative for ambient waters on the Oak Ridge Reservation. If these benchmarks are applied to a site with hard or soft water, the NAWQC for those metals should be recalculated a s recommended by the EPA.

5. REFERENCES

Adams, W. J. and B. B. Heidolph. 1985. Short-cut chroni c toxicity estimates using *Daphnia magna*. pp. 87–102. in R. D. Cardwell, R. Purdy, and R. C. Bahner (eds.), *Aquatic Toxicity and Hazard Assessment*, Seventh Symposium. ASTM, Philadelphia, PA.

Adams, W. J., G. R. Biddinger, K. A. Robillard. 1995. A summary of the acute toxicity of 14 phthalate esters to representative aquatic organisms. *Environ. Toxicol. Chem.* 14:1569–1574.

Adelman, I. R., L. L. Smith, and G. D. Siesennop. 1976. Chronic toxicity of Guthion to the fathea d minnow (*Pimephales promelas* Rafinesque). *Bull. Environ. Contam. Toxicol.* 15:726–733.

Adema, D. M. M. 1978. *Daphnia magna* as a test animal in acute and chronic toxicity tests. *Hydrobiologia*. 59:125–134.

Adema, D. M. M. and I. G. J. Vink. 1981. A comparative study of the toxicity of 1,1,2-trichloroethane, dieldrin, pentachlorophenol and 3,4 dichloroaniline for marine and fresh water organisms. *Chemosphere*. 10:533–554.

Adema, D. M. M., J. H. Canton, W. Slooff, and A. O. Hanstveit. 1981. *Research for a useful combination of test methods to determine the aquatic toxicity of environmentally dangerous chemicals*. Rep. No. CL81/100, Natl. Inst. Public Health Environ. Hyg., the Netherlands.

Ahmad, N. et al. 1984. *Aquatic toxicity tests to characterize the hazard of volatile organic chemicals in water: A toxicity data summary—Parts I and II.* EPA-600/3-84-009. U.S. Environmenta l Protection Agency, Duluth, Minn.

Alexander, H. C., W. M. McCarthy, and E. A. Bartlett. 1978. Toxicity of perchloroethylene , trichloroethylene, 1,1,1-trichloroethane, and m ethylene chloride to fathead minnows. *Bull. Environ. Contam. Toxicol.* 20:344–352.

Allison, D. T. and R. O. Hermanutz. 1977. *Toxicity of diazinon to brook trout and fathead minnows*. EPA-600/3-77-060. U.S. Environmental Protection Agency, Duluth, Minn.

Amelung, M. 1981. Auswirkungen gelöster Eisenverbindungen auf die Ei- und Larvalentwicklung von *Salmo gairdneri* (Richardson). *Arch. Fisch Wiss.* 32:77–87.

Anderson, D. R. and E. B. Lusty. 1980. *Acute toxicity and bioaccumulation of chloroform to four species of freshwater fish.* PNL-3046. NUREG/CR-0893. Report No. CR-0893, U.S. Nuclear Reg. Comm., Washington, D. C.

Arthur, J. W. and E. N. Leonard. 1970. Effects of copper on *Gammarus pseudolimnaeus*, *Physa integra*, and *Campeloma decisum* in soft water. *J. Fish. Res. Bd. Canada.* 27:1277–1283.

Arthur, J. W. and J. G. Eaton. 1970. Effects of copper on *Gammarus pseudolimnaeus* and the fathead minnow (*Pimephales promelas*). *J. Fish. Res. Board Canada.* 28:1841–1845.

Bailey, H. C., D. H. W. Liu, and H. A. Javitz. 1985. Time/toxicity relationships in short-term static, dynamic, and plug-flow bioassays. in R. C. Bahner and D. J. Hansen (eds.), *Aquatic Toxicology and Hazard Assessment*, Eighth Symposium, ASTM STP 891, Philadelphia, PA.

Barnthouse, L. W., G. W. Suter II, and A. E. Rosen. 1990. Risks of toxic contaminants to exploited fish populations: influence of life history, data uncertainty and exploitation intensity. *Environ. Toxicol. Chem.* 9:297–311.

Bartell, S. M. 1990. Ecosystem context for estimating stress-induced reductions in fish populations, pp. 167–182, in *American Fisheries Society Special Symposium 8*. Bethesda, MD.

Bartlett, L. and F. W. Rabe. 1974. Effects of copper, zinc, and cadmium on *Selenastrum capricornutum*. *Water Res.* 8:179–185.

Benoit, D. A. 1975. Chronic effects of copper on survival, growth, and reproduction of the bluegill (*Lepomis macrochirus*). *Trans. Am. Fish. Soc.* 104:353–358.

Benoit, D. A., and G. W. Holcombe. 1978. Toxic effects of zinc on fathead minnows *Pimephales promelas* in soft water. *J. Fish Biol.* 13:701–708.

Benoit, D. A., F. A. Puglisi, and D. L. Olson. 1982. A fathead minnow *Pimephales promelas* early life stage toxicity test method evaluation and exposure to four organic chemicals. *Environ. Pollut. Ser. A Ecol. Biol.* 28:189–197.

Biesinger, K. E., L. E. Anderson, and J. G. Eaton. 1982. Chronic effects of inorganic and organic mercury on *Daphnia magna*: toxicity, accumulation, and loss. *Arch. Environm. Contam. Toxicol.* 11:769–774.

Biesinger, K. E. and G. M. Christensen. 1972. Effects of various metals on survival, growth, reproduction, and metabolism of *Daphnia magna*. *J. Fish. Res. Bd. Canada.* 29:1691–1700.

Birge, W. J., J. A. Black, and A. G. Westerman. 1978. *Effects of polychlorinated biphenyl compounds and proposed PCB-replacement products on embryo-larval stages of fish and amphibians*. Res. Rep. No. 118, University of Kentucky, Water Resour. Res. Inst., Lexington, KY.

Black, J. A. and W. J. Birge. 1982. *The aquatic toxicity of organic compounds to embryo-larval stages of fish and amphibians*. University of Kentucky, Water Resources Research Institute, Lexington, Kentucky.

Bluzat, R., O. Junot, G. Lespinasse, and J. Seuge. 1979. Chronic toxicity of acetone in the fresh water snail *Lymnea stagnalis*. *Toxicology*. 14:179–190.

Borgmann, U., O. Kramar, and C. Loveridge. 1978. Rates of mortality, growth, and biomass production of *Lymnaia palustris* during chronic exposure to lead. *J. Fish. Res. Board Can.* 35:1109–1115.

Brooke, L. T., D. J. Call, D. L. Geiger, and C. E. Northcott. 1984. *Acute toxicities of organic chemicals to fathead minnows (Pimephales promelas)*, Vol. 1. Center for Lake Superior Environmental Studies, University of Wisconsin, Superior, WI.

Brungs, W. A. 1969. Chronic toxicity of zinc to the fathead minnow *Pimephales promelas* Rafinesque. *Trans. Am. Fish. Soc.* 98:272–279.

Buccafusco, R. J., S. J. Ells, and G. A. LeBlanc. 1981. Acute toxicity of priority pollutants to bluegill (*Lepomis macrochirus*). *Bull. environ. Contam. Toxicol.* 26:446–452.

Buhl, K. J. and S. J. Hamilton. 1990. Comparative toxicity of inorganic contaminants released by placer mining to early life stages of Salmonids. *Ecotoxicol. Enviorn. Saf.* 20:325–342.

Buikema, A. L. Jr., J. Cairns, Jr., and G. W. Sullivan. 1974. Evaluation of *Philodina acuticornis* (Rotifera) as bioassay organisms for heavy metals. Water Resour. Bull. Am. Water Res. Assoc. 10:648–661.

Cairns, J. Jr and A. Scheier. 1968. A comparison of the toxicity of some common industrial waste components tested individually and combined. *Prog. Fish-Cult.* 30:3–8

Call, D. J., L. T. Brook, N. Ahmad, and J. E. Richter. 1983. *Toxicity and metabolism studies with EPA priority pollutants and related chemicals in freshwater organisms*. EPA-600/3-83-095. U.S. Environmental Protection Agency, Duluth, Minn.

Call, D. J., L. T. Brook, M.L. Knuth, S. H. Poirer, and M.D. Hoglund. 1985. Fish subchronic toxicity prediction model for industrial organic chemicals that produce narcosis. *Environ. Toxic. and Chem.* 4:335–341.

Call, D. J., L. T. Brooke, S. L. Harting, S. H. Poirier and D. J. McCauley. 1986. *Toxicity of phenanthrene to several freshwater species.* Report to Battelle Memorial Research Institute, Columbus, OH, Subcontract No. F-4114 (8834)-411, Work Assignment No. 45. Center for Lake Superior Environmental Studies, University of Wisconsin-Superior, Superior, WI.

Canton, J. H. and D. M. M. Adema. 1978. Reproducibility of short-term and reproduction toxicity experiments with *Daphnia magna* and comparison of the sensitivity of *Daphnia magna* with *Daphnia pulex* and *Daphnia cucullata* in short-term experiments. *Hydrobiologia* 59:135–140.

Canton, J. H., P. A. Greve, W. Slooff, and G. J. Van Esch. 1975. Toxicity, accumulation and elimination studies of alpha-hexachlorocyclohexane (alpha-HCH) with freshwater organisms of different trophic levels. *Water Res.* 9:1163–1169.

Cardwell, R. D., D. G. Foreman, T. R. Payne, and D. J. Wilbur. 1976. *Acute toxicity of selected toxicants to six species of fish*. EPA-600/3-76-008, U.S. EPA, Duluth, MN.

Cardwell, R. D., D. G. Foreman, T. R. Payne, and D. J. Wilbur. 1977. *Acute and chronic toxicity of chlordane to fish and invertebrates*, EPA-600/3-77-019. U.S. Environmental Protection Agency, Duluth, Minn.

Carlson, A. R. and P. A. Kosian. 1987. Toxicity of chlorinated benzenes to fathead minnow s (*Pimephales promelas*). *Arch. Environ. Contam. Toxicol.* 16:129–135.

Carlson, A. R. et al. 1982. *Cadmium and endrin toxicity to fish in waters containing mineral fibers*, EPA-600/3-82-053. U.S. Environmental Protection Agency, Duluth, Minn.

Chandler, J. H. Jr., and L. L. Marking. 1979. Toxicity of fishery chemicals to the Asiatic clam , *Corbicula manilensis*. *Prog. Fish-Cult.* 41:148–151.

Chapman, G. A., S. Ota, and F. Recht. n.d. *Effects of water hardness on the toxicity of metals to Daphnia magna*. U.S. Environmental Protection Agency, Corvallis, Oregon.

Cleveland, L., E. E. Little, S. J. Hamilton, D. R. Buckler, and J. B. Hunn. 1986. Interactive toxicity of aluminum and acidity to early life stages of brook trout. *Trans. Amer. Fish. Soc.* 115:610–620.

Conway, H. L. 1977. Sorption of arsenic and cadmium and their effects on growth, micronutrien t utilization, and photosynthetic pigment composition of *Asterionella formosa*. *J. Fish. Res. Board Can.* 35:26–294.

Couture, P., C. Blaise, D. Cluis, and C. Bastien. 1989. Zirconium toxicity assessment using bacteria, algae and fish assays. *Water Air Soil Pollut.* 47:87–100.

Cowell, B. C. 1965. The effects of sodium arsenite and sile x on the plankton populations in farm ponds. *Trans. Am. Fish. Soc.* 94:371–377.

Cowgill, U. M., I. T. Takahashi, and S. L. Applegath. 1985. A comparison of the effect of fou r benchmark chemicals on *Daphnia magna* and *Ceriodaphnia dubia affinis* tested at two different temperatures. *Environ. Toxicol. Chem.* 4:415–422.

Cowgill, U. M. and D. P. Milazzo. 1991. The sensitivity of *Ceriodaphnia dubia* and *Daphnia magna* to seven chemicals utilizing the three-bood test. *Arch. Environ. Contam. Toxicol.* 20:211–217.

Cushman, R. M., S. G. Hildebrand, R. H. Strand, and R. M. Anderson. 1977. *The toxicity of 35 trace elements in coal to freshwater biota: a data base with automated retrieval capabilities*. ORNL/TM-5793. Oak Ridge National Laboratory.

Dave, G. 1984a. Effects of copper on growth, reproduction, survival and haemoglobin in *Daphnia magna*. *Comp. Biochem. Physiol.* 78**C**:439–443.

Dave, G. 1984b. Effects of fluorid e on growth, reproduction, and survival in *Daphnia magna*. *Comp. Biochem. Physiol.* 78**C**:425–431.

Dave, G. 1984c. Effects of waterborne iron on growth, reproduction, survival and haemoglobin i n *Daphnia magna*. *Comp. Biochem. Physiol.* 78C:433–438.

Davies, P. H., J. P. Goettl, Jr., and J. R. Sinley. 1978. Toxicity of silver to rainbow trout (*Salmo gairdneri*). *Water Res.* 12:113–117.

Davies, P. H., J. P. Goettl, Jr., J. R. Sinley, and Smith. 1976. Acute and chronic toxicity of lead t o rainbow trout *Salmo gairdneri*, in hard and soft water. *Water Res.* 10:199–206.

Dawson, G. W., A. L. Jennings, D. Drozdowski, and E. Rider. 1977. The Acute toxicity of 47 Indistrial chemicals to fresh and saltwater fishes. *J. Hazard. Mater.* 1:303–318.

DeFoe, D. L., G. D. Veith, and R. L. Carlson. 1978. Effects of Aroclor 1248 and 1260 on the fathead minnow (*Pimephales promelas*). *J. Fish. Res. Board Can.* 7:997–1002.

DeFoe, D. L. 1982. *Arsenic (V) Test Results.* U.S. EPA, Duluth, MN (Memo to R. L. Spehar, U.S . EPA, Duluth, MN).

DeGraeve, G. M., D. L. Geiger, J. S. Meyer, and H. L. Bergman. 1980. Acute and embryo-larva l toxicity of phenolic compounds to aquatic biota. *Arch. Environ. Contam. Toxicol.* 9:557–568.

DeGraeve, G. M., R. G.Elder, D. C.Woods, and H.L.Bergman. 1982. Effects of naphthalene an d benzene on fathead minnows and rainbow trout. *Arch. Environ. Contam. Toxicol.* 11:487–490.

Devlin, E. W., J. D. Brammer, and R. L. Puyear. 1982. Acute toxicity of toluene to three age groups of fathead minnows (*Pimephales promelas*). *Bull. Enviorn. Contam. Toxicol.* 29:12–17.

Dill, D. C., W. M. McCarthy, H. C. Alexander, and E. A. Bartlett. 1980. *Toxicity of 1,1-Dichloroethylene (Vinylidene chloride) to aquatic organisms.* Ecol. Res. Ser., EPA-600/3-80-057, Environ. Res. Lab., U.S. EPA, Duluth, MN.

Dill, D. C., P. G. Murphy, and M. A. Mayes. 1987. Toxicity of methylene chloride to life stages of the fathead minnow, *Pimephales promelas* Rafinesque. *Bull. Environ. Contam. Toxicol.* 39:869–876.

Ding, S. R. 1980. Acute Toxicities of vanadium, nickel, and cobalt to several species of aquati c organisms. *Environ. Qual.* 1:17–21.

Dominguez, S. E. and G. A. Chapman. 1984. Effect of pentachlorophenol on the growth and mortality of embryonic and juvenile steelhead trout. *Arch. Environ. Contam. Toxicol.* 13:739–743.

Dwyer, W. P., F. L. Mayer, J. L. Allen, and D. R. Buckler. 1978. Chronic and simulated use-patter n exposures of brook trout (*Salvelinus fontinalis*) to 3-trifluoromethyl-4-nitrophenol (TFM). *Investigations in Fish Control.* 84:1–6.

Eaton, J. G. 1974. Chronic cadmium toxicity to the bluegill (*Lepomis macrochirus* Rafinesque). *Trans. Am. Fish. Soc.* 103:729–735.

Elnabarawy, M. T., A. N. Welter, and R. R. Robideau. 1986. Relative sensitivity of three daphni d species to selected organic and inorganic chemicals. *Environ. Toxicol. Chem.* 5:393–398.

EPA. (n.d.). AQUIRE: Aquatic Information Retrieval Toxicity Data Base. National Technical Information Service, Springfield, Va.

EPA. 1978. *In-depth studies on health and environmental impacts of selected water pollutants.* Contract No. 68-01-4646, U. S. EPA, Duluth, MN (also known as C. E. Stephan's Table of Data).

EPA. 1980a. *Ambient water quality criteria for acenaphthene.* EPA 440/5-80-015. U.S. Environmental Protection Agency, Washington, D.C.

EPA. 1980b. *Ambient water quality criteria for antimony.* EPA 440/5-80-020. U.S. Environmental Protection Agency, Washington, D.C.

EPA. 1980c. *Ambient water quality criteria for benzidene.* EPA 440/5-80-023. U.S. Environmental Protection Agency, Washington, D.C.

EPA. 1980d. *Ambient water quality criteria for benzene.* EPA 440/5-80-018. U.S. Environmental Protection Agency, Washington, D.C.

EPA. 1980e. *Ambient water quality criteria for benzidene.* EPA 440/5-80-023. U.S. Environmental Protection Agency, Washington, D.C.

EPA. 1980f. *Ambient water quality criteria for beryllium.* EPA 440/5-80-024. U.S. Environmental Protection Agency, Washington, D.C.

EPA. 1980g. *Ambient water quality criteria for cadmium.* EPA 440/5-80-025. U.S. Environmental Protection Agency, Washington, D.C.

EPA. 1980h. *Ambient water quality criteria for carbon tetrachloride.* EPA 440/5-80-026. U.S. Environmental Protection Agency, Washington, D.C.

EPA. 1980i. *Ambient water quality criteria for chlordane.* EPA 440/5-80-027. U.S. Environmental Protection Agency, Washington, D.C.

EPA. 1980j. *Ambient water quality criteria for chlorinated benzenes.* EPA 440/5-80-028. U.S. Environmental Protection Agency, Washington, D.C.

EPA. 1980k. *Ambient water quality criteria for chlorinated ethanes.* EPA 440/5-80-029. U.S. Environmental Protection Agency, Washington, D.C.

EPA. 1980l. *Ambient water quality criteria for chloroform.* EPA 440/5-80-033. U.S. Environmental Protection Agency, Washington, D.C.

EPA. 1980m. *Ambient water quality criteria for DDT.* EPA 440/5-80-038. U.S. Environmental Protection Agency, Washington, D.C.

EPA. 1980n. *Ambient water quality criteria for dichloroethylenes.* EPA 440/5-80-041. U.S. Environmental Protection Agency, Washington, D.C.

EPA. 1980o. *Ambient water quality criteria for dichloropropane and dichloropropene.* EPA 440/5-80-043. U.S. Environmental Protection Agency, Washington, D.C.

EPA. 1980p. *Ambient water quality criteria for ethylbenzene.* EPA 440/5-80-048. U.S. Environmental Protection Agency, Washington, D.C.

EPA. 1980q. *Ambient water quality criteria for fluoranthene.* EPA 440/5-80-049. U.S. Environmental Protection Agency, Washington, D.C.

EPA. 1980r. *Ambient water quality criteria for heptachlor.* EPA 440/5-80-052. U.S. Environmental Protection Agency, Washington, D.C.

EPA. 1980s. *Ambient water quality criteria for hexachlorocyclohexane.* EPA 440/5-80-054. U.S. Environmental Protection Agency, Washington, D.C.

EPA. 1980t. *Ambient water quality criteria for naphthalene.* EPA 440/5-80-059. U.S. Environmental Protection Agency, Washington, D.C.

EPA. 1980u. *Ambient water quality criteria for nitrophenols.* EPA 440/5-80-063. U.S. Environmental Protection Agency, Washington, D.C.

EPA. 1980v. *Ambient water quality criteria for phenol.* EPA 440/5-80-066. U.S. Environmental Protection Agency, Washington, D.C.

EPA. 1980w. *Ambient water quality criteria for phthalate esters.* EPA 440/5-80-067. U.S. Environmental Protection Agency, Washington, D.C.

EPA. 1980x. *Ambient water quality criteria for polychlorinated biphenyls.* EPA 440/5-80-068. U.S. Environmental Protection Agency, Washington, D.C.

EPA. 1980y. *Ambient water quality criteria for silver.* EPA 440/5-80-071. U.S. Environmental Protection Agency, Washington, D.C.

EPA. 1980z. *Ambient water quality criteria for beryllium.* NTIS, Springfield, Virginia.

EPA. 1980aa. *Ambient water quality criteria for tetrachloroethylene.* EPA 440/5-80-073. U.S. Environmental Protection Agency, Washington, D.C.

EPA. 1980bb. *Ambient water quality criteria for thallium.* EPA 440/5-80-074. U.S. Environmental Protection Agency, Washington, D.C.

EPA. 1980cc. *Ambient water quality criteria for toluene.* EPA 440/5-80-075. U.S. Environmental Protection Agency, Washington, D.C.

EPA. 1980dd. *Ambient water quality criteria for trichloroethylene.* EPA 440/5-80-077. U.S. Environmental Protection Agency, Washington, D.C.

EPA. 1980ee. *Ambient water quality criteria for nitrosamines.* EPA 440/5-80-064. U.S. Environmental Protection Agency, Washington, D.C.

EPA. 1984a. *Ambient water quality criteria for cadmium - 1984.* EPA 440/5-84-032. U.S. Environmental Protection Agency, Washington , D. C.

EPA. 1985a. *Ambient water quality criteria for ammonia - 1984.* EPA 440/5-85-001. U.S. Environmental Protection Agency, Washington, D.C.

EPA. 1985b. *Ambient water quality criteria for arsenic - 1984.* EPA 440/5-84-033. U.S. Environmental Protection Agency, Washington, D.C.

EPA. 1985c. *Ambient water quality criteria for chromium - 1984.* EPA 440/5-84-029. U.S. Environmental Protection Agency, Washington, D.C.

EPA. 1985d. *Ambient water quality criteria for copper - 1984.* EPA 440/5-84-031. U.S. Environmental Protection Agency, Washington, D.C.

EPA. 1985e. *Ambient water quality criteria for cyanide - 1984.* EPA 440/5-84-030. U.S. Environmental Protection Agency, Washington, D.C.

EPA. 1985f. *Ambient water quality criteria for lead - 1984.* EPA 440/5-84-027. U.S. Environmental Protection Agency, Washington, D.C.

EPA. 1985g. *Ambient water quality criteria for mercury - 1984.* EPA 440/5-84-026. U.S. Environmental Protection Agency, Washington, D.C.

EPA. 1986a. *Ambient water quality criteria for nickel - 1986.* EPA 440/5-86-004. U.S. Environmental Protection Agency, Washington, D.C.

EPA. 1986b. *Quality criteria for water.* EPA 440/5-86-001. U.S. Environmental Protection Agency, Washington, D.C.

EPA. 1987a. *Ambient water quality criteria for selenium, 1987.* EPA 440/5-87-006. U.S. Environmental Protection Agency, Washington, D.C.

EPA. 1987b. *Ambient water quality criteria for zinc, 1987.* EPA 440/5-87-003. U.S. Environmental Protection Agency, Washington, D.C.

EPA. 1988a. *Ambient water quality criteria for aluminum - 1988.* EPA 440/5-86-008. U.S. Environmental Protection Agency, Washington, D.C.

EPA. 1988b. *Ambient water quality criteria for antimony(III).* Draft. August 30th, 1988. U.S. Environmental Protection Agency, Washington, D.C.

EPA. 1992. *Great Lakes Water Quality Initiative Tier II water quality values for protection of aquatic life in ambient water. Support documents.* November 23, 1992.

EPA. 1993a. Water quality guidance for the Great Lakes System and correction; Proposed rules . *Federal Register.* 58(72):20802-21047.

EPA. 1993b. *Sediment quality criteria for the protection of benthic organisms - acenaphthene.* EPA-822-R-93-013. U.S. Environmental Protection Agency, Washington, D.C.

EPA. 1993c. *Sediment quality criteria for the protection of benthic organisms - fluoranthene.* EPA-822-R-93-012. U.S. Environmental Protection Agency, Washington, D.C.

EPA. 1993d. *Great Lakes Water Quality Initiative Criteria documents for the protection of aquatic life in ambient water (February 1993 Draft).* PB93-154656. National Technical Information Service. Springfield, VA.

Erben, R. and Z. Pisl. 1993. Acute toxicity for some evaporating aromatic hydrocarbons for freshwater snails and crustacenas. *Int. Rev. Gesamten Hydrobiol.* 78:161–167.

Ernst, W. R. and E. T. Garside. 1987. Lethal effects of vanadium to two life stages of brook trout *Salvelinus fontinalis*. *Can. J. Zool.* 65:628–634.

Ewald, W. G., J. E. French, and M. A. Champ. 1976. Toxicity of Polychlorinated Biphenyls (PCBs) to *Euglena gracilis*: Cell Population Growth, Carbon Fixation, Chlorophyll Level, Oxygen Consumption, and Protein and Nucleic Acid Synthesis. *Bull. Environ. Contam. Toxicol.* 16:71–80.

Ewell, W. S., J. W. Gorsuch, R. O. kringle, K. A. Robillard, and R. C. Spiegel. 1986. Simultaneous evaluation of the acute effects of chemicals on seven aquatic speices. *Environ. Toxicol. Chem.* 5:831–840.

Fargasova, A. 1994. Toxicity of metals on *Daphnia magna* and *Tubifex tubifex*. *Ecotoxicol. Environ. Saf.* 27:210–213.

Finlayson, B. J., and K. M. Verrue. 1985. Toxicities of butoxyethanol ester and propylene glycol butyl ether ester formulations of 2,4-dichlorophenoxy acetic acid (2,4-D) to juvenile salmonids. *Arch. Environ. Contam. Toxicol.* 14:153–160.

Francis, P. C., D. W. Grothe, and J. C. Scheuring. 1986. Chronic toxicity of 4-nitrophenol to *Daphnia magna Straus* under static-renewal and flow-through conditions. *Bull. Environ. Contam. Toxicol.* 36:730–737.

Geiger, J. G. and A. I. Buikema, Jr. 1982. Hydrocarbons depress growth and reproduction of *Daphnia pulex* (Cladocera). *Can. J. Fish. Aquati. Sci.* 39:830–836.

Geiger, D. L., C. E. Northcott, D. J. Call, and L. T. Brooke. 1985. *Acute toxicities of organic chemicals to fathead minnows (Pimephales promelas)*, Vol. 2. Center for Lake Superior Environmental Studies, University of Wisconsin, Superior, WI.

Geiger, D. L., D. J. Call, and L. T. Brooke. 1988. *Acute toxicities of organic chemicals to fathead minnows (Pimephales promelas)*, Vol. 4. Center for Lake Superior Environmental Studies, University of Wisconsin, Superior, WI.

Geiger, D. L., L. T. Brooke, and D. J. Call. 1990. *Acute toxicities of organic chemicals to fathead minnows (Pimephales promelas)*, Vol. 5. Center for Lake Superior Environmental Studies, University of Wisconsin, Superior, WI.

Geiger, D. L., S. H. Poirier, L. T. Brooke, and D. J. Call. 1986. *Acute toxicities of organic chemicals to fathead minnows (Pimephales promelas)*, Vol. 3. Center for Lake Superior Environmental Studies, University of Wisconsin, Superior, WI.

Gersich, F. M. 1984. Evaluation of a static renewal chronic toxicity test method for *Daphnia magna* straus using boric acid. *Environ. Toxicol. Chem.* 3:89–94.

Glassi, S., M. Mingazzini, L. Vigano, D. Cesareo, and M. L. Tosato. 1988. Approaches to modelin g toxic responses of aquatic organisms to aromatic hydrocarbond. *Ecotoxicol. Enviornn. Saf.* 16:158–169.

Goettl, J. P., Jr. and P. H. Davies. 1976. Water pollution studies. Federal Aid Project F-33-R-11 . Department of Natural Resources, Colorado Division of Wildlife.

Hamelink, J. L., D. R. Buckler, f. L. Mayer, D. U. Palawski, and H. O. Sanders. 1986. Toxicity o f fluoridone to aquatic invertebrates and fish. *Environ. Toxicol. Chem.* 5:97–94.

Hamilton, S. J. 1995. Hazard assessment of inorganics to three endangered fish in the Green River , Utah. *Ecotoxicol. Environ. Saf.* 30:134–142.

Hamilton. S. J. and K. J. Buhl. 1990. Safe ty assessment of selected inorganic elements to fry of chinook salmon (*Oncorhynchus tshawytscha*). *Ecotoxicol. Enviorn. Saf.* 20:307–324.

Hannah, J. B., J. E. Hose, M. L. Landolt, B. S. Miller, S. P. Felton, and W. T. Iwaoko. 1982 . Benzo(a)pyrene-induced morphologic and developmental abnormalities in rainbow trout. *Arch. Environ. Contam. Toxicol.* 11:727–734.

Hazel, C. R. and S. J. Meith. 1970. Bioass ay of king salmon eggs and sac fry in copper solutions. *Calif. Fish Game.* 2:121–124.

HECD (Health and Criteria Division). 1992. *Interim guidance on interpretation and implementation of aquatic life criteria for metals.* U.S. Environmental Protection Agency, Washington, D.C.

Hermanutz, R. O., R. H. Mueller, and K. D. Kempfer. 1973. Captan toxicity to fathead minnow s (*Pimephales promelas*), bluegills (*Lepomis macrochirus*), and brook trout (*Salvelinus fontinalis*). *J. Fish. Res. Board Can.* 30:1811–1817.

Hodson, P. V., R. Parisella, B. Blunt, B. Gray, K. L. E. Kaiser. 1991. *Quantitative structure-activity relationships for chronic toxicity of phneol, p-chlorophenol, 2,4-dichlorophenol, pentachlorophenol, p-nitrophenol, and 1,2,4-trichlorobenzene to early life stages of rainbow trout* (*Oncorhynchus mykiss*). Can. Tech. Rep. Fish. Aquat. Sci. 1784.

Hodson, P. V., D. G. Dixon, and K. L. E. Kaiser. 1984. Measurement of median lethal dose as a rapid indication of contaminant toxicity to fish. *Environ. Toxicol. Chem.* 3:243–254.

Holcombe, G. W., D. A. Benoit, E. N. Leonard, and J. M. McKim. 1976. Long term effects of lea d exposure on three generations of brook trout (*Salvelinus fontinalis*). *J. Fish. Res. Board Can.* 33:1731–1741.

Holcombe, G. W., G. L. Phipps, and J. T. Fiandt. 1982. Effects of phenol, 2,4-dimethylphenol,2,4 - dichlorophenol, and pentachlorophenol on embryo, larval, and early-juvenile fathead minnow s (*Pimephales promelas*). *Arch. Environ. Contam. Toxicol.* 11(1):73–78.

Holcombe, G. W., G. L. Phipps, and J. T. Fiandt. 1983. Toxicity of selected priority pollutants t o various aquatic organisms. *Ecotoxicol. Environ. Saf.* 7400–7409.

Holcombe, G. W., G. L. Phipps, M. L. Knuth, and T. Felhaber. 1984. The acute toxicity of selecte d substituted phenols, benzenes and benzoic acid esters to fathead minnows *Pimephales promelas. Environ. Pollut. Ser. A Ecol. Biol.* 35:367–381.

Holdway, D. A. and J. B. Sprague. 1979. Chronic toxicity of vanadium to flagfish. *Water Res.* 13:905–910.

Holman, W. F., and K. J. Macek. 1980. An aquatic safety assessment of linear alkylbenzsulfonat e (LAS): chronic effects on fathead minnows. *Trans. Am. Fish. Soc.* 109:122–131.

Holst, L. L. and J. P. Giesy. 1989. Chronic effects of the photoenhanced toxicity of anthracene o n *Daphnia magna* reproduction. *Environ. Toxicol. Chem.* 8:933–942.

Howe, G. E., L. L. marking, T. D. Bills, J. J. Rach, and F. L. Mayer, Jr. 1994. Effects of wate r temperature and pH on toxicity of terbufos, trichlorfon, 4-nitrophenol and 2,4-dinitrophenol to the amphipod *Gammarus pseudolimnaeus* and rainbow trout (*Onchorhynchus mykiss*). *Environ. Toxicol. Chem.* 13:51–56.

Ingersoll, C. G. et al. 1990a. Aluminum and acid toxicity to two strains of brook trout (*Salvelinus fontinalis*). *Can. J. Fish. Aquat. Sci.* 47:1641–1648.

Ingersoll, C. G. et al. 1990b. Effects of pH, alum inum, and calcium on survival and growth of eggs and fry of brook trout (*Salvelinus fontinalis*). *Can. J. Fish. Aquat. Sci.* 47:1580–1592.

Jarvinen, A. W., M. J. Hoffman, and T. W. Thorslund. 1977. Long-term toxic effects of DDT food and water exposure on fathead minnows (*Pimephales promelas*). *J. Fish. Res. Board Can.* 34:2089–2103.

Jarvinen, A. W., B. R. Nordling, and M. E. Henry. 1983. Chronic toxicity of dursban (chlorpyrifos) to the fathead minnow (*Pimephales promelas*) and the resultant acetylcholinesterase inhibition. *Ecotoxicol. Environ. Safety.* 7:423–434.

Johnson, W. W. and M. T. Finley. 1980. *Handbook of acute toxicity of chemicals to fish and aquatic invertebrates.* Resour. Publ. 137, Fish Wildl. Serv., U.S. D.I., Washington, D.C.

Johnston, P. A. 1987. Acute toxicity of inorganic selenium to *Daphnia magna* (Straus) and the effect of sub-acute exposure upon growth and reproduction. *Aquat. Toxicol.* 10:335–352.

Karlander, E. P. and R. W. Krauss. 1972. Ab sorption and toxicity of beryllium and lithium in *Chlorella vannielii* Shihira and Krauss. *Chesapeake Science.* 13:245–253.

Kauss, P. B. and T. C. Hutchinson. 1975. The effects of water-soluble petroleum components on th e growth of *Chlorella vulgaris* Beijerinck. *Environ. Pollut.* 9:157–174.

Keen, R., and C. R. Baillod. 1985. Toxicity to *Daphnia* of the end products of wet oxidation of phenol and substituted phenol. *Water Res.* 19:767–772.

Khangarot, B. S. 1991. Toxicity of metals to a freshwater tubificid worm, *Tubifex tubifex. Bull. Environ. Contam. Toxicol.* 46:906–912.

Khangarot, B. S., A. Sehgal, and M. K. Bhasin. 1985. Man and biosphere--Studies on the Sikki m Himalayas. Part 5: Acute toxicity of selected heavy metals on the tadpoles of *Rana hexadactyla*. *Acta Hydrochim. Hydrobiol.* 13:259–263.

Kimball, G. n.d. The effects of lesser known metals and one organic to fathead minnows [*Pimephales promelas*] and *Daphnia magna*. U.S. Environmental Protection Agency, Duluth, MN.

Kleiner, C. F., R. L. Anderson, and D. K. Tanner. 1984. Toxicity of fenitrothion to fathead minnow s (*Pimephales promelas*) and alternate exposure duration studies with fenitrothion and endosulfan. *Arch. Environ. Contam. Toxicol.* 13:573–578.

Koenst, W. M., L. L. Smith, Jr., and S. J. Broderius. 1977. Effect of chronic exposure of brook trout to sublethal concentrations of hydrogen cyanide. *Environmental Science and Technology* 11:883–886.

Könemann, H. 1981. Quantitative structure-activity relationships in fish toxicity studies. Part 1 : Relationship for 50 industrial pollutants. *Toxicology.* 19:209–221.

Kouyoumjian, H. H. and R. F. Uglow. 1974. Some aspects of the toxicity of p,p'-DDT, p,p'-DDE and p,p'-DDD to the freshwater planarian *Polycelis felina* (Tricladida). *Environ. Pollut.* 7:103–109.

Krishnakumari, M. K. 1977. Sensitivity of the alga *Scenedesmus acutus* to some pesticides. *Life Sciences*. 20:1525–1532.

Kszos, L. A., A. J. Stewart, and P. A. Taylor. 1992. An evaluation of nickel toxicity to *Ceriodaphnia dubia* and *Daphnia magna* in a contaminated stream and in laboratory tests. *Environ. Toxicol. Chem.* 11:1001–1012.

Kühn, R., M. Pattard, K. Pernak, and A. winter. 1989. Results of the harmful effects of selected water pollutants (anilines, phenol, aliphatic compounds) to *Daphnia magna*. *Water Res.* 23:495–499.

Kühn, R., M. Pattard, K. Pernak, and A. Winter. 1989 . Results of the harmful effects of water pollutants to *Daphnia magna* in the 21 day reproduction test. *Water Res.* 23:501–510.

Larsson, L. and J. Tillberg. 1975. Effects of the Commercia l Polychlorinated Biphenyl Mixture Aroclor 1242 on Growth, Viability, Phosphate Uptake, Res piration and Oxygen Evolution in *Scenedesmus*. *Physiol. Plant* 33:256–260.

Lazareva, L. P. 1985. Changes in biological characteristics of *Daphnia magna* from chronic action of copper and nickel at low concentrations. *Hydrobiol. J.* 21(5):59–62.

LeBlanc, G. A. 1980. Acute toxicity of priority pollutants to water flea (*Daphnia magna*). *Bull. Environ. Contam. Toxicol.* 24:684–691.

LeBlanc, G. A. and D. C. Surprenant. 1983. The acute and chronic toxicity of acetone, dimethy l formamide, and triethylene glycol to *Daphnia magna* (Straus). *Arch. Environ. Contam. Toxicol.* 12:305–310.

LeBlanc, G. A., J. D. Mastone, A. P. Paradice, B. F. Wilson, H. B. Lockhart, Jr., and K. A. Robillard. 1984. The influence of speciation on the toxicity of silver to fathead minnow (*Pimephales promelas*). *Environ. Toxicol. Chem.* 3:37–46.

Leduc, G. 1978. Deleterious effects of cyanide on early life stages of atlantic salmon (*Salmo salar*). *J. Fish. Res. Board Can.* 35:166–174.

Lewis, M. A. and L. C. Valentine. 1981. Acute and chronic toxicities of boric acid to *Daphnia magna* Straus. *Bull. Environ. Contam. Toxicol.* 27:309–315.

Lima, A. R. et al. 1984. Acute and chronic toxicities of arsenic (III) to fathead minnows, flagfish , daphnids, and an amphipod. *Arch. Environ. Contam. Toxicol.* 13:595–601.

Lind, D., K. Alto, and S. Chatterton. 1978. *Regional copper-nickel study; aquatic toxicology study.* Minnesota Environmental Quality Board.

Lock, R. A. C. and A. P. van Overbeeke. 1981. Effects of me rcuric chloride and methylmercuric chloride on mucus secretion in rainbow trout, *Salmo gairdneri* Richardson. *Comp. Biochem. Physiol.* 69C:67–74.

Luard, E. J. 1973. Sensitivity of *Dunaliella* and *Scenedesmus* (*Chlorphyceae*) to Chlorinated hydrocarbons. *Phycologia* 12:29–33.

Macek, K. J., K. S. Buxton, S. K. Derr, J. W. Dean, and S. Sauter. 1976a. *Chronic toxicity of lindane to selected aquatic invertebrates and fish.* EPA-600/3-76-046. U.S. Environmental Protectio n Agency, Duluth, Minn.

Macek, K. J., M. A. Lindberg, S. Sauter, K. Buxton, and P. A. Costa. 1976b. *Toxicity of four pesticides to water fleas and fathead minnows.* EPA-600/3-76-099. U.S. Environmenta l Protection Agency, Duluth, Minn.

McCarthy, J. F. and D. K. Whitmore. 1985. Chronic toxicity of di-n-butyl and di-n-octyl phthalate to *Daphnia magna* and the fathead minnow. *Environ. Toxicol. Chem.* 4:167–179.

McCauley, D. J., L. T. Brooke, D. J. Call, and C. A. Lindberg. 1986. *Acute and chronic toxicity of aluminum to Ceriodaphnia dubia at various pH's.* Center for Lake Superior Environmenta l Studies, University of Wisconsin-Superior, Superior, Wis.

McKim, J. M., and D. A. Benoit. 1971. Effects of long-term exposures to copper on survival, growth, and reproduction of brook trout (*Salvelinus fontinalis*). *J. Fish. Res. Board Can.* 28:655–662.

McKim, J. M., G. F. Olson, G. W. Holcombe, and E. P. Hunt. 1976. Long-term effects o f methylmercuric chloride on three generations of brook trout (*Salvelinus fontinalis*): toxicity, accumulation, distribution, and elimination. *J. Fish. Res. Board Can.* 33:2726–2739.

Martin, T. R. and D. M. Holdich. 1986. The Acute lethal toxicity of heavy metals to peracari d crustaceans (with particular reference to fresh-water Asellids and Gammarids). *Water Res.* 20:1137–1147.

Mattson, V. R., J. W. Arthur, and C. T. Walbridge. 1976. *Acute toxicity of selected organic compounds to fathead minnows*. Ecol. Res. Ser. EPA-600/3-76-097, Environ. Res. Lab., U.S. EPA, Duluth, MN.

Mauck, W. L., P. M. Mehrle, and F. L. Mayer. 1978. Effects of the polychlorinated biphenyl Aroclor® 1254 on growth, survival, and bone development in brook trout (*Salvelinus fontinalis*). *J. Fish. Res. Board Can.* 35:1084–1088.

Mayer, F. L., Jr., P. M. Mehrle, Jr., and W. P. Dwyer. 1975. *Toxaphene effects on reproduction, growth and mortality of brook trout.* EPA-600/3-75-013. U. S. Environmental Protection Agency, Duluth, Minn.

Mayer, F. L., Jr., P. M. Mehrle, H. O. Sanders. 1977. Residue dynamics and biological effects o f polychlorinated biphenyls in aquatic organisms. *Arch. Environ. Contam. Toxicol.* 5:501–511.

Mayer, F. L., Jr., and H. O. Sanders. 1973. Toxicology of phthalic acid esters in aquatic organisms. *Environmental Health Perspectives* 5:153–157.

Mayer, F. L., Jr. and M. R. Ellersieck. 1986. *Manual of acute toxicity: interpretation and data base for 410 chemicals and 66 species of freshwater organisms*. Resource Publication 160. U.S. Fish and Wildlife Service, Washington, D.C.

Mayes, M. A., H. C. Alexander, D. L. Hopkins, P. B. Latvaitis. 1986. Acute and chronic toxicity o f ammonia to freshwater fish: a site-specific study. *Environ. Toxicol. Chem.* 5:437–442.

Mehrle, P. M., and F. L. Mayer. 1976. Di-2-ethylhexyl phthalate: residue dynamics and biologica l effects in rainbow trout and fathead minnows. *Trace Subst. Env. Health* 10:519–524.

Millemann, R. E., W. J. birge, J. A. Black, R. M. Cushman, K. L. Daniels, P. J. Franco, J. M. Giddings, J. F. McCarthy, and A. J. Stewart. 1984. Comparative acute toxicity to aquatic organisms o f components of coal-derived synthetic fuels. *Trans. Am. Fish. Soc.* 113:74–85.

Moles, A., S. D. Rice, and S. Korn. 1979. Sensitivity of Alaskan freshwater and anadromous fishes to Prudhoe Bay crude oil and benzene. *Trans. Am. Fish. Soc.* 108:408–414.

Mount, D. I. 1968. Chronic toxicity of copper to fathead minnows (*Pimephales promelas* Rafinesque). *Water Res.* 2:215–223.

Mount, D. I. 1982. Memorandum to Charles E. Spehar. U.S. Environmental Protection Agency , Duluth, Minn. June 7.

Mount, D. I., and C. E. Stephan. 1969. Chronic toxicity of copper to the fathead minnow (*Pimephales promelas*) in soft water. *J. Fish. Res. Board Can.* 26:2449–2457.

Munoz, M. J. and J. V. Tarazona. 1993. Synergistic effect of two- and four-component combinations of the polycyclic aromatic hydrocarbons: Phenanthrene, anthracene, naphthalene and acenapthene on *Daphnia magna. Bull. Enviorn. Contam. Toxicol.* 50:363–368.

Münzinger, A. 1990. Effects of nickel on *Daphnia magna* during chronic exposure and alterations in the toxicity to generations pre-exposed to nickel. *Wat. Res.* 24:845–852.

Nebeker, A. V., C. K. McAuliffe, R. Mshar, and D. G. Stevens. 1983. Toxicity of silver to steelhead and rainbow trout, fathead minnows, and *Daphnia magna*. *Environ. Toxicol. Chem.* 2:95–104.

Nebeker, A. V., C. Savonen, R. J. Baker, J. K. McCrady. 1984. Effects of copper, nickel, and zinc on the life cycle of the caddisfly *Clistoronia magnifica* (Limnephilidae). *Environ. Toxicol. Chem.* 3:645–649.

Nebeker, A. V., C. Savonen, and D. G. Stevens. 1985. Sensitivity of rainbow trout early life stages to nickel chloride. *Environ. Toxicol. Chem.* 4:233–239.

Nebeker, A. V., and F. A. Puglisi. 1974. Effect of polychlorinated biphenyls (PCBs) on survival and reproduction of *Daphnia*, *Gammarus*, and *Tanytarsus*. *Trans. Am. Fish. Soc.* 103:722–728.

Nebeker, A. V., F. A. Puglisi, and D. L. DeFoe. 1974. Effect of polychlorinated biphenyl compounds on survival and reproduction of the fathead minnow and flagfish. *Trans. Am. Fish. Soc.* 103:562–568.

Oris, J. T., J. P. Giesy Jr. 1985. The photoenhanced toxicity of anthracene to juvenile sunfish (*Lepomis* sp.). *Aquat. Toxicol.* 6:133–146.

Oseid, D. M., L. L. Smith Jr. 1979. The effects of hydrogen cyanide on *Asellus communis* and *Gammarus pseudolimnaeus* and changes in their competitive response when exposed simultaneously. *Bull. Environ. Contam. Toxicol.* 21:439–447.

OSWER (Office of Solid Waste and Emergency Response). 1996. Ecotox thresholds. *ECO Update* 3 (2):1–12.

Palawski, D., J. B. Hunn, and F. J. Dwyer. 1985. Sensitivity of young striped bass to organic and inorganic contaminants in fresh and saline waters. *Trans. Am. Fish. Soc.* 114:748–753.

Parkhurst, B. R., R. G. Elder, J. S. Meyer, D. A. Sanchez, R. W. Pennak, and W. T. Waller. 1984. An environmental hazard evaluation of uranium in a Rocky Mountain stream. *Environ. Toxicol. Chem.* 3:113–124.

Passino, D. R. M. and A. J. Novak. 1984. Toxicity of Arsenate and DDT to the Cladoceran *Bosmina logirostris*. *Bull. Environ. contam. Toxicol.* 33:325–329.

Passino, D. R. M. and J. M. Kramer. 1980. Toxicity of arsenic and PCBs to fry of deepwater ciscoes (Coregonus). *Bull. Environ. Contam. Toxicol.* 24:527–534.

Passino, D. R. M and S. B. Smith. 1987. Acute bioassays and hazard evaluation of representative contaminants detected in Great Lakes fish. *Enviorn. Toxicol. Chem.* 6:901–907.

Phipps, G. L., G. W. Holcombe, and J. T. Fiandt. 1981. Acute toxicity of phenol and substituted phenols to the fathead minnow. *Bull. Environ. Contam. Toxicol.* 26:585–593.

Pickering, Q. H. 1974. Chronic toxicity of nickel to the fathead minnow and flagfish. *Trans. Am. Fish. Soc.* 103:562–568.

Pickering, Q. H. 1980. Chronic toxicity of hexavalent chromium to the fathead minnow (*Pimephales promelas*). *Arch. Environ. Contam. Toxicol.* 9:405–413.

Pickering, Q. H. and C. Henderson. 1966. Acute toxicity of some important petrochemicals to fish. *J. Water Pollut. Control Fed.* 38:1419–1429.

Pickering, Q. H. and M. H. Gast. 1972. Acute and chronic toxicity of cadmium to the fathead minnow (*Pimephales promelas*). *J. Fish. Res. Board Can.* 29:1099–1106.

Pickering, Q. H. and W. T. Gilliam. 1982. Toxicity of aldicarb and fonofos to the early life-stage of the fathead minnow. *Arch. Environ. Contam. Toxicol.* 11:699–702.

Pickering, Q. H., and T. O. Thatcher. 1970. The chronic toxicity of linear allcylate sulfonate (LAS) to *Pimephales promelas*, Rafinesque. *J. Water Pollut. Control Fed.* 42:243–254.

Prothro, M. G. 1993. Office of Water Policy and Technical Guidance on Interpretation and Implementation of Aquatic Life Metals Criteria. Memorandum to Water Management Division Directors and Environmental Services Division Directors, Regions I-X, October 1, 1993.

Rai, L. C., J. P. Gaur, H. D. Kumar. 1981. Protective effects of certain environmental factors on the toxicity of zinc, mercury, and methylmercury to *Chlorella vulgaris*. *Environ. Res.* 25:250–259.

Randall, T. L. and P. V. Knopp. 1980. Detoxification of specific organic substances by wet oxidation. *J. Water Pollut. Control Fed.* 52:2117–2130.

Region IV. 1995. Ecological screening values. Ecological Risk Assessment Bulletin No. 2. Waste Management Division, U.S. Environmental Protection Agency Region IV, Atlanta, GA.

Reynolds, J. H., E. J. Middlebrooks, D. B. Porcella, W. J. Grenney. 1975. Effects of temperature on oil refinery waste toxicity. *J. Water Poll. Control Fed.* 47:2674–2693.

Rhodes, J. E, W. J. Adams, G. R. Biddinger. 1995. Chronic toxicity of 14 phthalate esters to *Daphnia magna* and rainbow trout (*Oncorhynchus mykiss*). *Environ. Toxicol. Chem.* 14:1967–1976.

Richter, J. E., S. F. Peterson, and C. F. Kleiner. 1983. Acute and chronic toxicity of some chlorinated benzenes, chlorinated ethanes, and tetrachloroethylene to *Daphnia magna*. *Arch. Environ. Contam. Toxicol.* 12:679–684.

Roghair, C. J., A. Buijze, E. S. E. Yedema, and J. L. M. hermens. 1994. A QSAR for base-line toxicity to the midge *Chironomus riparius*. *Chemosphere* 28:989–997.

Sanders, H. O., 1970. Pesticide toxicities to tadpoles of the western chorus frog *Peseudacris triseriata* and flowler's toad *Bufo woodhousii fowleri*. *Copeia* 2:246–251.

Sanders, H. O. 1969. *Toxicity of pesticides to the crustacean Gammarus lacustris.* Tech. Paper No. 25, Bur. Sports Fish. Wildl., Fish Wildl. Serv., U.S.D.I.

Sanders, H. O. 1972. *Toxicity of some insecticides to four species of malacostracan crustaceans.* Tech. Paper No. 66, Bur. Sports Fish. Wildl., Fish Wildl. Serv., U.S.D.I.

Sanders, H. O., F. L. Mayer, Jr., and D. F. Walsh. 1973. Toxicity, residue dynamics, and reproductive effects of phthalate esters in aquatic invertebrates. *Environ. Res.* 6:84–90.

Sanders, H. O. and O. B. Cope. 1968. The relative toxicities of several pesticides to naiads of three species of stoneflies. *Limnol. Oceanogr.* 13:112–117.

Sadler, K. and S. Lynam. 1988. The influence of calcium on aluminum-induced changes in the growth rate and mortality of brown trout, *Salmo trutta L. J. Fish Biol.* 33:171–179.

Sauter, S., K. S. Buxton, K. J. Macek, and S. R. Petrocelli. 1976. *Effects exposure to heavy metals on selected freshwater fish.* EPA-600/3-76-105. U.S. Environmental Protection Agency, Duluth, Minn.

Seim, W. K., L. R. Curtis, S. W. Blenn, and G. A. Chapman. 1984. Growth and survival of developing steelhead trout (*Salmo gairdneri*) continuously or intermittently exposed to copper. *Can. J. Fish. Aquat. Sci.* 41:433–438.

Shubat, P. J., S. H. Poirier, M. L. knuth, and L. T. Brooke. 1982. Acute toxicity of tetrachloroethylene and tetrachloroethylene with dimethylformamide to rainbow tro ut (*Salmo gairdneri*). *Bull. Environ. Contam. Toxicol.* 28:7–10.

Sinley, J. R., J. P. Goettl, Jr., and P. H. Davies. 1974. The effects of zinc on rainbow trout (*Salmo gairdneri*) in hard and soft water. *Bull. Environ. Contam. Toxicol.* 12:193–201.

Sloff, W. 1983. Benthic macroinvertebrates and water quality assessment: Some toxicologica l considerations. *Aquat. Toxicol.* 4:73–82.

Slonim, A. R. and E. E. Ray. 1975. Acute toxicity of berylliu m sulfate to salamander larvae (*Ambystoma* sp.). *Bull. Enviorn. Contam. Toxicol.* 13:307–312.

Slonim, C. B. and A. R. Slonim. 1973. Effect of water hardness on the tolerance of the guppy t o beryllium sulfate. *Bull. Environ. Contam. Toxicol.* 10:295–301.

Smith, A. D., A. Bharath, C. Mallard, D. Orr, K. Smith, J. A. S utton, J. Vukmanich, L. S. McCarthy, and G. W. Ozburn. 1991. The acute and chronic toxicity of ten chlorinated organic compounds to the American flagfish (*Jordanella floridae*). *Arch. Enviorn. Contam. Toxicol.* 20:94–102.

Smith, L. L., S. J. Broderius, D. M. Oseid, G. L. Kimball, W. M. Koenst, and D. T. Lind. 1979. *Acute and chronic toxicity of HCN to fish and invertebrates.* EPA-600/3-79-009. U.S. Environmental Protection Agency.

Smith, L. R., T. M. Holsen, N. C. Ibay, R. M. Block, and A. B. de Leon. 1985. Studies on the acute toxicity of fluoride ion to stickleback, fathead minnow, and rainbow trout. *Chemosphere* 14(9):1383–1389.

Smith, S. B., J. F. Savino, and M. A. Blouin. 1988. Acute toxicity to *Daphnia pulex* of six classes of chemical compounds potentially hazardous to Great Lakes aquatic biota. *J. Great Lakes Res.* 14:394–404.

Snarski, V. M., and G. F. Olson, 1982. Chronic tox icity and bioaccumulation of mercuric chloride in the fathead minnow (*Pimephales promelas*). *Aquat. Toxicol.* 2:143–156.

Spehar, R. L. 1976. Cadmium and zinc toxicity to flagfish, *Jordanella floridae*. *J. Fish. Res. Board Can.* 33:1939–1945.

Spehar, R. L., J. T. Fiandt, R. L. Anderson, and D. L. DeFoe. 1980. Comparative toxicity of arsenic compounds and their accumulation in invertebrates and fish. *Arch. Environ. Contam. Toxicol.* 9:53–63.

Spehar, R. L., D. K. Tanner, and B. R. Nordling. 1983. Toxici ty of the synthetic pyrethroids, permethrin, and AC 222,705 and their accumulation in early life stages of fathead minnows and snails. *Aquat. Toxicol.* 3:171–182.

Stalling, D. L. and F. L. Mayer, Jr. 1972. Toxicities of PCBs to fish and environmental residues . *Environ. Health Perspect.* 1:159–164.

Steeman-Nielsen, E. and S. Wium-Andersen. 1970. Copper ions as poison in the sea and freshwater . *Marine Biology.* 6:93–97.

Stephan, C. E. 1991. Letter to Mr. Jim Grant. Michigan Department of Natural Resources.

Stephan, C. E., D. I. Mount, D. J. Hansen, J. H. Gentile, G. A. Chapman, and W. A. Brungs. 1985 . *Guidelines for deriving numerical national water quality criteria for the protection of aquatic organisms and their uses.* PB85-227049. National Technical Information Service, Springfield, Va.

Stephan, C. E., and J. R. Rogers. 1985. Advantages of using regression analysis to calculate results of chronic toxicity tests, pp. 328-339 in *Aquatic Toxicology and Hazard Assessment: Eighth Symposium*, R. C. Bahner and D. J. Hansen (eds.), American Society for Testing and Materials , Philadelphia.

Stephan, E. E. and R. J. Erickson. n.d. *Guidelines for deriving an aquatic life pesticide concentration.* U.S. Environmental Protection Agency, Environmental Research Laboratory, Duluth, MN , unpublished document.

Stevens, D. G. and G. A. Chapman. 1984. Toxicity of trivalent chromium to early life stages o f steelhead trout. *Environ. Toxicol. Chem.* 3:125–133.

Streufert, J. M., J. R. Jones, and H. O. Sanders. 1980. Toxicity and biological effects of phthalate esters on midges (*Chironomus plumosus*). *Trans. Mo. Acad. Sci.* 14:33–40.

Suter, G. W. II. 1989. Ecological endpoints, pp. 2-1–2-28, in *Ecological Assessment of Hazardous Waste Sites: A Field and Laboratory Reference Document.* EPA 600/3-89/013. W. Warren-Hicks, B. R. Parkhurst, and S. S. Baker, Jr. (eds.). Corvallis Environmental Research Laboratory, Oregon.

Suter, G. W., II, M. A. Futrell, G. A. Kerchner. 1992. *Toxicological benchmarks for screening of potential contaminants of concern for effects on aquatic biota on the Oak Ridge Reservation, Oak Ridge, Tennessee.* ORNL/ER-139. Oak Ridge National Laboratory.

Suter, G. W., II, A. E. Rosen, E. Linder, and D. F. Parkhurst. 1987. End points for responses of fish to chronic toxic exposures. *Environ. Toxicol. Chem.* 6:793–809.

Suter, G. W., II. 1992. *Ecological Risk Assessment.* Lewis Publishers, Chelsea, MI.

Suter, G. W., II, A. Redfearn, R. K. White, and R. A. Shaw. 1992. *Approach and strategy for performing ecological risk assessments for the Department of Energy Oak Ridge Field Office Environmental Restoration Program.* ES/ER/TM-33. Environmental Restoration Division, Oak Ridge National Laboratory, Oak Ridge, TN.

Thompson, R. S., and N. G. Carmichael. 1989. 1,1,1-Trichloroethane: medium-term toxicity to carp, daphnids, and higher plants. *Ecotox. Environ. Safety* 17:172–182.

Thurston, R.V., R. C. Russo, E. L. Meyn, and R. K. Zajdel. 1986. Chronic toxicity of ammonia t o fathead minnows. *Trans. Amer. Fish. Soc.* 115:196–207.

Trucco, R. G., F. R. Engelhardt, and B. Stacey. 1983. Toxicity, accumulation and clearance of aromatic hydrocarbons in *Daphnia pulex. Environ. Pollut. Ser. A. Ecol. Biol.* 31:191–202.

van den Dikkenberg, R. P., H. H. Canton, L. A. M. Mathijssen-Spiekman, and C. J. Roghair. 1989. *The usefulness of gasterosteus aculeatus-the three-spined stickleback-as a test organism in routine toxicity testing.* Rep. No. 718625003, Natl. Inst. Public Health Environ. Protection, Bilthoven, the Netherlands.

Van der Schalie, W. H. 1983. *The acute and chronic toxicity of 3,5-dinitroaniline, 1,3-dinitrobenzene, and 1,3,5-trinitrobenzene to freshwater aquatic organisms.* Technical Report 8305. U.S. Army Medical Bioengineering Research and Development Laboratory, Fort Detrick, Frederick, MD.

Van Leeuwen, C. J. and H. Maas. 1985. The aquatic toxicity of 2,6-dichlorobenzamide (BAM), a degradation product of the herbicide dichlobenil. *Environ. Pollut. Ser. A.* 37:105–115.

Van Leeuwen, C. J., J. L. Maas-Diepeveen, G. Niebeek, W. H A. Vergouw, P. S. Griffioen, and M. W. Luijken. 1985. Aquatic toxicological aspects of dithiocarbamates and related compounds. I. Short-term toxicity tests. *Aquat. Toxicol.* 7:145–164.

Vareille-Morel, C. and J. Debord. 1990. Sensibilité du Mollusque prosobranche *Potamopyrgus jenkinsi* Smith à l'action de chlorures métalliques ($ZnCl_2$, $BaCl_2$, $CuCl_2$)et d'un molluscicide de synthèse, la N-tributyl-morpholine. *Ann Rech. Vét.* 21:111-118.

Veith, G. D., D. J. Call, L. T. Brooke. 1983. Estimating the acute toxicity of narcotic industria l chemicals to fathead minnows, pp. 90-97, in *Aquatic Toxicol. and Hazard Assessment: Sixth Symposium.* W. E. Bishop, R. D. Cardwell, and B. B. Heidolph (eds.), ASTM STP 802 , Philadelphia.

Veith, G. D., D. J. Call, and L. T. Brooke. 1983. Structur e-toxicity relationships for the fathead minnow, *Pimephales promelas*: narcotic industrial chemicals. *Can. J. Fish. Aquat. Sci.* 40:743–748.

Villar, D., M. H. Li, and D. J. Schaeffer. 1993. Toxicity of organophosphorus pesticides to *Dugesia dorotocephala. Bull. Environ. Contam. Toxicol.* 51:80–87.

Vincent, M., J. Debord, and B. Penicaut. 1986. Comparative studies on the toxicity of metal chlorides and of a synthetic organic molluscicide, N-trityl-Morpholine, upon two aquatic amphipods: *Gammarus pulex* and *Echinogammarus berilloni*. *Ann. Rech. Vét.* 17:441–446.

Vocke, R. W., K. L. Sears, J. J. O'Toole, R. B. Wildham. 1980. Growth responses of selected freshwater algae to trace elements and scrubber ash slurry generated by coal-fired power plants. *Water Res.* 14:141–150.

Walbridge, C. T., J. T. Fiandt, G. L. Phipps, and G. W. Holcombe. 1983. Acute toxicity of ten chlorinated aliphatic hydrocarbons to the fathead minnow (*Pimephales promelas*). *Arch. Environ. Contam. Toxicol.* 12:661–666.

Wallen, I. E., W. C. Greer, and R. Lasater. 1957. Toxicity to *Gambusia affinis* of certain pure chemicals in trubid waters. *Sewage Ind. Wastes* 29:695–711.

Ward, T. J., and R. L. Boeri. 1991a. *Early Life Stage Toxicity of Di-n-Butyl Phthalate (DnBP) to the rainbow Trout (Oncorhynchus mykiss) Under Flow-Through Conditions*. 9102-CMA. Chemical Manufacturers Association, Washington, D.C.

Waste Management Division. 1995. Ecological screening values, Ecological Risk Assessment Bulletin No. 2. U.S. Environmental Protection Agency Region IV. Atlanta, Georgia.

Williams, P.L. and D.B.Dusenbery. 1990. Aquatic toxicity testing using the nematode, *Caenorhabditis elegans*. *Environ. Toxicol. Chem.* 9:1285–1290

Woodward, D. F., A. M. Farag, M. E. Mueller, E. E. Little, F. A. Vertucci. 1989. *Sensitivity of endemic Snake River cutthroat trout to acidity and elevated aluminum. Trans. Amer. Fish. Soc.* 118:630–643.

Ziegenfuss, P. S., W. J. Renaudette, and W. J. Adams. 1986. Methodology for assessing the acute toxicity of chemicals sorbed to sediments: Testing the equilibrium partitioning theory. in T. M. Poston and R. Purdy (eds.), *Aquatic Toxicology and Environmental Fate, Ninth Volume.* ASTM, Philadelphia, PA.

Appendix A

DATA USED FOR TIER II CALCULATIONS

Table A.1. Data and calculated results for derivation of Tier II values (all values in µg/l). Requirements are listed in App. B.2; other terms are defined in the text

Compound	Genus/species	Requirement	Endpoint	Concentration	GMAV[b]	A-C Ratio[c]	Reference
			INORGANICS				
Arsenic V							
	Bosmina longirostris	4	EC50	850	850		Passino and Novak, 1984
	Daphnia pulex	4	LC50	3,600	3,600		Jurewicz and Buikema, 1980
	Gambusia affinis	2,3	LC50	49,000	49,000		Jurewicz and Buikema, 1980
	Morone saxatilis	2,3	LC50	40,500			Palawski et al., 1985
	Morone saxatilis	2,3	LC50	30,500	35,150		Palawski et al., 1985
	Oncorhynchus kisutch	1	LC50	43,600			Buhl and Hamilton, 1990
	Oncorhynchus kisutch	1	LC50	58,500			Buhl and Hamilton, 1990
	Oncorhynchus mykiss	1	LC50	28,000			Palawski et al., 1985
	Oncorhynchus mykiss	1	LC50	67,500	46,860		Buhl and Hamilton, 1990
	Pimephales promelas	2,3	LC50	42,000			Palawski et al., 1985
	Pimephales promelas	2,3	LC50	25,600	32,790		DeFoe, 1982
	Pimephales promelas		CV	892		28.7	DeFoe, 1982
	Thymallus arcticus	1	LC50	5,020			Buhl and Hamilton, 1990
	Thymallus arcticus	1	LC50	5,500	5,255		Buhl and Hamilton, 1990
	Tubifex tubifex	7,8	LC50	127,360	127,360		Fargasova, 1994

Tier II Parameters	Tier II Values
FAVF	12.9
SAV	65.89
SACR	20.95
SCV	3.1

[a] The eight acute data requirements.
[b] Genus Mean Acute Value.
[c] Acute-Chronic Ratio.

Table A.1. (continued)

Compound	Genus/species	Requirement	Endpoint	Concentration	GMAV	A-C Ratio	Reference
Barium							
	Daphnia magna	4	LC50	410,000	410,000		LeBlanc, 1980
	Daphnia magna		EC16	5,800		70.69[a]	Biesinger and Christensen, 1972
	Echinogammarus berilloni	5	LC50	122,000	122,000		Vincent et al., 1986
	Gammarus pulex	5	LC50	238,000	238,000		Vincent et al., 1986
	Potamopyrgus jenkinsi	7,8	LC50	1,700			Vareille-Morel, 1990
	Potamopyrgus jenkinsi	7,8	LC50	930			Vareille-Morel, 1990
	Potamopyrgus jenkinsi	7,8	LC50	1,800			Vareille-Morel, 1990
	Potamopyrgus jenkinsi	7,8	LC50	1,400			Vareille-Morel, 1990
	Potamopyrgus jenkinsi	7,8	LC50	1,100			Vareille-Morel, 1990
	Potamopyrgus jenkinsi	7,8	LC50	440			Vareille-Morel, 1990
	Potamopyrgus jenkinsi	7,8	LC50	330			Vareille-Morel, 1990
	Potamopyrgus jenkinsi	7,8	LC50	1,300	976.6		Vareille-Morel, 1990

Tier II Parameters	Tier II Values
FAVF	8.6
SAV	113.6
SACR	28.29
SCV	4.0

[a] In the absence of any experimental value, EC16 is used to calculate an A-C ratio.

Table A.1. (continued)

Compound	Genus/species	Requirement	Endpoint	Concentration	GMAV	A-C Ratio	Reference
Beryllium							
	Asellus intermedius	5	LC50	10,000	10,000		Ewell et al., 1986
	Dugesia tigrina	7,8	LC50	10,000	10,000		Ewell et al., 1986
	Gammarus fasciatus	5	LC50	700	700		Ewell et al., 1986
	Helisoma trivolvis	7,8	LC50	10,000	10,000		Ewell et al., 1986
	Lumbriculus variegatus	7,8	LC50	10,000	10,000		Ewell et al., 1986
	Pimephales promelas	2,3	LC50	10,000	10,000		Ewell et al., 1986
	Ambystoma maculatum	2,3	LC50	3,150			Slonim and Ray, 1975
	Ambystoma maculatum	2,3	LC50	18,200			Slonim and Ray, 1975
	Ambystoma maculatum	2,3	LC50	8,020			Slonim and Ray, 1975
	Ambystoma maculatum	2,3	LC50	8,320			Slonim and Ray, 1975
	Ambystoma opacum	2,3	LC50	3,150	4,977		Slonim and Ray, 1975
	Caenorhabditis elegans	7,8	LC50	140	140		Williams and Dunsenbery, 1990
	Carassius auratus	2,3	LC50	55,900	55,900		Cardwell et al., 1976
	Daphnia magna	4	EC50	2,410			Kimball n.d.
	Daphnia magna	4	EC50	2,450	2,430		Kimball n.d.
	Daphnia magna		CV	5.267		461.4	Kimball n.d.
	Jordanella floridae	2,3	LC50	46,300			Cardwell et al., 1976
	Jordanella floridae	2,3	LC50	41,100			Cardwell et al., 1976
	Jordanella floridae	2,3	LC50	41,100	42,760		Cardwell et al., 1976
	Pimephales promelas	2,3	LC50	37,900			Cardwell et al., 1976
	Pimephales promelas	2,3	LC50	17,900			Kimball n.d.
	Pimephales promelas	2,3	LC50	17,500	22,810		Kimball n.d.
	Poecilia reticulata	2,3	LC50	1,330			Slonim and Slonim, 1973
	Poecilia reticulata	2,3	LC50	160			Slonim and Slonim, 1973
	Poecilia reticulata	2,3	LC50	190			Slonim and Slonim, 1973

Table A.1. (continued)

Compound	Genus/species	Requirement	Endpoint	Concentration	GMAV	A-C Ratio	Reference
	Poecilia reticulata	2,3	LC50	1,330	343.2		Slonim and Slonim, 1973
	Tubifex tubifex	7,8	EC50	10,250	10,250		Khangarot, 1991

Tier II Parameters	Tier II Values
FAVF	4.0
SAV	35
SACR	52.88
SCV	0.66

Table A.1. (continued)

Compound	Genus/species	Requirement	Endpoint	Concentration	GMAV	A-C Ratio	Reference
Boron							
	Daphnia magna	4	LC50	133,000			Gersich, 1984
	Daphnia magna		CV	9,330			Gersich, 1984
	Daphnia magna	4	LC50	226,000	173,400		Lewis and Valentine, 1981
	Daphnia magna		CV	8,832		19.10[a]	Lewis and Valentine, 1981
	Ptychocheilus lucius	2,3	LC50	279			Hamilton, 1995
	Ptychocheilus lucius	2,3	LC50	>100			Hamilton, 1995
	Ptychocheilus lucius	2,3	LC50	527	383.4		Hamilton, 1995
	Xyrauchen texanus	2,3	LC50	>100			Hamilton, 1995
	Xyrauchen texanus	2,3	LC50	233			Hamilton, 1995
	Xyrauchen texanus	2,3	LC50	279	255.0		Hamilton, 1995
	Gila elegans	2,3	LC50	>100			Hamilton, 1995
	Gila elegans	2,3	LC50	280			Hamilton, 1995
	Gila elegans	2,3	LC50	552	393.1		Hamilton, 1995

Tier II Parameters	Tier II Values
FAVF	8.6
SAV	29.65
SACR	18.29
SCV	1.6

[a] The A-C Ratio for *D. magna* is the geometric mean of A-C Ratios from Gersich, 1987 and Lewis and Valentine, 1981.

Table A.1. (continued)

Compound	Genus/species	Requirement	Endpoint	Concentration	GMAV	A-C Ratio	Reference
Cobalt[a]							
	Asellus intermedius	5	LC50	>100,000			Ewell et al., 1986
	Carassius auratus	2,3	LC50	66,800	66,800		Ding, 1980
	Cyprinus carpio	2,3	LC50	82,700	82,700		Ding, 1980
	Daphnia magna	4	EC50	6,830			Kimball, 1978
	Daphnia magna	4	EC50	5,150	5,931		Kimball, 1978
	Daphnia magna		CV	5.103		1,162	Kimball, 1978
	Dugesia tigrina	7,8	LC50	25,000	25,000		Ewell et al., 1986
	Gammarus fasciatus	5	LC50	>100,000			Ewell et al., 1986
	Helisoma trivolvis	7,8	LC50	>100,000			Ewell et al., 1986
	Lumbriculus variegatus	7,8	LC50	>100,000			Ewell et al., 1986
	Philodina acuticornis	7,8	EC50	59,000	59,000		Buikema et al., 1974
	Pimephales promelas	2,3	LC50	22,000			Ewell et al., 1986
	Pimephales promelas	2,3	LC50	3,750			Kimball, 1978
	Pimephales promelas	2,3	LC50	3,460	6,584		Kimball, 1978
	Pimephales promelas		CV	286.2		12.59	Kimball, 1978
	Rana hexadactyla	3	LC50	17,590	17,590		Khangarot et al., 1985
	Tubifex tubifex	7,8	EC50	139,320	139,320		Khangarot, 1991

Tier II Parameters	Tier II Values
FAVF	4.0
SAV	1,483
SACR	63.98
SCV	23

[a] All data are for cobalt II.

Table A.1. (continued)

Compound	Genus/species	Requirement	Endpoint	Concentration	GMAV	A-C Ratio	Reference
Lithium							
	Ptychocheilus lucius	2,3	LC50	28,000			Hamilton, 1995
	Ptychocheilus lucius	2,3	LC50	41,000	33,880		Hamilton, 1995
	Xyrauchen texanus	2,3	LC50	53,000			Hamilton, 1995
	Xyrauchen texanus	2,3	LC50	186,000	99,290		Hamilton, 1995
	Gila elegans	2,3	LC50	62,000			Hamilton, 1995
	Gila elegans	2,3	LC50	65,000	63,480		Hamilton, 1995
	Tubifex tufifex	7,8	EC50	9,340	9,340		Khangarto, 1991

Tier II Parameters	Tier II Values
FAVF	36.2
SAV	258.0
SACR	17.9
SCV	14

Table A.1. (continued)

Compound	Genus/species	Requirement	Endpoint	Concentration	GMAV	A-C Ratio	Reference
Manganese[a]							
	Asellus aquaticus	5	EC50	333,000	333,000		Martin and Holdich, 1986
	Crangonyx pseudogracilis	5	EC50	694,000	694,000		Martin and Holdich, 1986
	Daphnia magna	4	EC50	19,500			Kimball n.d.
	Daphnia magna	4	EC50	19,200	19,350		Kimball n.d.
	Pimephales promelas	2,3	LC50	30,600			Kimball n.d.
	Pimephales promelas	2,3	LC50	36,900	33,600		Kimball n.d.
	Pimephales promelas		CV	1,775		18.93	Kimball n.d.

Tier II Parameters	Tier II Values
FAVF	8.6
SAV	2,250
SACR	18.24
SCV	120

[a] All data are for manganese II.

Table A.1. (continued)

Compound	Genus/species	Requirement	Endpoint	Concentration	GMAV	A-C Ratio	Reference
Mercury, methyl							
	Oncorhynchus mykiss	1	LC50	24	24		Lock and van Overbeeke, 1981
	Salvelinus fontinalis	1	LC50	65			McKim et al., 1976
	Salvelinus fontinalis	1	LC50	84	74		McKim et al., 1976
	Salvelinus fontinalis		CV	0.5193		142.3	McKim et al., 1976

Tier II Parameters	Tier II Values
FAVF	242
SAV	0.09917
SACR	35.72
SCV	0.0028

Table A.1. (continued)

Compound	Genus/species	Requirement	Endpoint	Concentration	GMAV	A-C Ratio	Reference
Molybdenum*							
	Daphnia magna	4	LC50	203,200			Kimball n.d.
	Daphnia magna	4	LC50	210,300	206,700		Kimball n.d.
	Daphnia magna		CV	877.8		235.5	Kimball n.d.
	Pimephales promelas	2,3	LC50	628,000	628,000		Kimball n.d.

Tier II Parameters	Tier II Values
FAVF	13.2
SAV	15,660
SACR	42.26
SCV	370

* All tests are for molybdenum VI.

Table A.1. (continued)

Compound	Genus/species	Requirement	Endpoint	Concentration	GMAV	A-C Ratio	Reference
Strontium							
	Daphnia magna	4	LC50	125,000	125,000		Biesinger and Christensen, 1972
	Daphnia magna		EC16	42,000		2.98[a]	Biesinger and Christensen, 1972
	Tubifex tubifex	7,8	EC50	240,800	240,800		Khangarot, 1991
	Caenorhabditis elegans	7,8	LC50	465,000	465,000		Williams and Dusenbery, 1990

Tier II Parameters	Tier II Values
FAVF	8.6
SAV	14,530
SACR	9.85
SCV	1,500

[a] In the absence of any experimental chronic values, EC16 is used to calculate an A-C Ratio.

Table A.1. (continued)

Compound	Genus/species	Requirement	Endpoint	Concentration	GMAV	A-C Ratio	Reference
Thallium[a]							
	Daphnia magna	4	EC50	880			Kimball, n.d.
	Daphnia magna	4	EC50	930	905.0		Kimball, n.d.
	Daphnia magna		CV	134.5		6.724	Kimball, n.d.
	Cyprinodon variegatus		LC50	20,900[b]			EPA, 1978
	Cyprinodon variegatus		CV	6,010		3.478	EPA, 1978
	Lepomis macrochirus	2,3	LC50	120,000			Buccafusco et al., 1981
	Lepomis macrochirus	2,3	LC50	132,000	125,900		Dawson et al., 1977
	Pimephales promelas	2,3	LC50	1,810			Kimball, n.d.
	Pimephales promelas	2,3	LC50	1,780	1,795		Kimball, n.d.
	Pimephales promelas		CV	56.92		31.53	Kimball, n.d.

Tier II Parameters	Tier II Values
FAVF	8.6
SAV	105.2
SACR	9.034
SCV	12

[a] All data are for thallium I.

[b] Acute value of *C. variegatus*, a saltwater species, is used for SACR calculation only.

Table A.1. (continued)

Compound	Genus/species	Requirement	Endpoint	Concentration	GMAV	A-C Ratio	Reference
Tin[a]							
	Daphnia magna	4	LC50	55,000	55,000		Biesinger and Christensen, 1972
	Daphnia magna		EC16[b]	350		157.1	Biesinger and Christensen, 1972

Tier II Parameters	Tier II Values
FAVF	20.5
SAV	2,683
SACR	36.93
SCV	73

[a] All data are for tin II.

[b] In the absence of any experimental chronic values, EC16 is used to calculate an A-C Ratio.

Table A.1. (continued)

Compound	Genus/species	Requirement	Endpoint	Concentration	GMAV	A-C Ratio	Reference
Uranium							
	Salvelinus fontinalis	1	LC50	5,500			Parkhurst et al., 1984
	Salvelinus fontinalis	1	LC50	23,000	11,250		Parkhurst et al., 1984

Tier II Parameters	Tier II Values
FAVF	242
SAV	46.48
SACR	17.9
SCV	2.6

Table A.1. (continued)

Compound	Genus/species	Requirement	Endpoint	Concentration	GMAV	A-C Ratio	Reference
Vanadium[a]							
	Daphnia magna	4	EC50	1,580			Kimball, n.d.
	Daphnia magna	4	EC50	1,460			Kimball, n.d.
	Daphnia magna	4	EC50	3,800			Bensen &Neven, 1987
	Daphnia magna	4	EC50	2,900			Bensen &Neven, 1987
	Daphnia magna	4	EC50	3,900			Bensen &Neven, 1987
	Daphnia magna	4	EC50	3,600			Bensen &Neven, 1987
	Daphnia magna	4	EC50	3,300	2,746		Bensen &Neven, 1987
	Daphnia magna		CV	1900		2[b]	Bensen &Neven, 1987
	Gala elegans	2,3	LC50	8,800			Hamilton, 1995
	Gala elegans	2,3	LC50	4,000			Hamilton, 1995
	Gala elegans	2,3	LC50	3,000	4,727		Hamilton, 1995
	Jordanella floridae	2,3	LC50	11,200	11,200		Holdway and Sprague, 1979
	Jordanella floridae		CV	83.49		134.1	Holdway and Sprague, 1979
	Oncorhynchus tshawytscha	1	LC50	16,500	16,500		Hamilton and Buhl, 1990
	Pimephales promelas	2,3	LC50	1,800			Kimball, n.d.
	Pimephales promelas	2,3	LC50	1,900	1,850		Kimball, n.d.
	Pimephales promelas		CV	169.7		10.90	Kimball, n.d.
	Ptychocheilus lucius	2,3	LC50	7,800			Hamilton, 1995
	Ptychocheilus lucius	2,3	LC50	3,800			Hamilton, 1995
	Ptychocheilus lucius	2,3	LC50	4,300	5,032		Hamilton, 1995
	Salvelinus fontinalis	1	LC50	7,000			Ernst and Garside, 1987
	Salvelinus fontinalis	1	LC50	15,000	10,250		Ernst and Garside, 1987
	Xyrauchen texanus	2,3	LC50	5,300			Hamilton, 1995

Table A.1. (continued)

Compound	Genus/species	Requirement	Endpoint	Concentration	GMAV	A-C Ratio	Reference
	Xyrauchen texanus	2,3	LC50	2,200			Hamilton, 1995
	Xyrauchen texanus	2,3	LC50	4,600	3,770		Hamilton, 1995

Tier II Parameters	Tier II Values
FAVF	6.5
SAV	284.6
SACR	14.29
SCV	20

[a] All data are for vanadium V.

[b] Since the experimental A-C Ratio is less than 2, the A-C Ratio of *D. magna* is et to 2 (Stephan et al., 1985).

Table A.1. (continued)

Compound	Genus/species	Requirement	Endpoint	Concentration	GMAV	A-C Ratio	Reference
Zirconium							
	Oncorhynchus mykiss	1	LC50	20,000	20,000		Couture et al., 1989
	Tubifex tubifex	7,8	EC50	221,180	221,180		Khangarot, 1991

Tier II Parameters	Tier II Values
FAVF	64.8
SAV	308.6
SACR	17.9
SCV	17

Table A.1. (continued)

Compound	Genus/species	Requirement	Endpoint	Concentration	GMAV	A-C Ratio	Reference
			ORGANICS				
Acetone							
	Asellus intermedius	5	LC50	>100,000	>100,000		Ewell et al., 1986
	Ceriodaphnia dubia	4	LC50	8,098,000	8,098,000		Cowgill and Milazzo, 1991
	Chironomus tentans	6	LC50	46,900,000	46,900,000		Ziegenfuss et al., 1986
	Corbicula manilensis	7,8	LC50	20,000,000	20,000,000		Chandler and Marking, 1979
	Daphnia magna	4	EC50	13,500,000	13,500,000		Randall and Knopp, 1980
	Daphnia magna	4	LC50	30,640[a]			LeBlanc and Surprenant, 1983
	Daphnia magna		CV	1,556		19.69	LeBlanc and Surprenant, 1983
	Dugesia tigrina	7,8	LC50	>100,000	>100,000		Ewell et al., 1986
	Gammarus fasciatus	5	LC50	>100,000	>100,000		Ewell et al., 1986
	Helisoma trivolvis	7,8	LC50	>100,000	>100,000		Ewell et al., 1986
	Lepomis macrochirus	2,3	LC50	8,300,000	8,300,000		Cairns and Scheier, 1968
	Lumbriculus variegatus	7,8	LC50	>100,000	>100,000		Ewell et al., 1986
	Oncorhynchus mykiss	1	LC50	5,540,000	5,540,000		Johnson and Finley, 1980
	Pimephales promelas	2,3	EC50	7,280,000			Brooke et al., 1984
	Pimephales promelas	2,3	EC50	8,120,000			Brooke et al., 1984
	Pimephales promelas	2,3	EC50	6,210,000	7,160,000		Brooke et al., 1984

Tier II Parameters	Tier II Values
FAVF	3.6
SAV	27,780
SACR	18.48
SCV	1500

[a] Since the acute test was part of the same study as the chronic test, the acute value was used to derive an ACR for *D. magna*. The LC50 value was not used as part of GMAV because EC50 for immobilization is available.

Table A.1. (continued)

Compound	Genus/species	Requirement	Endpoint	Concentration	GMAV	A-C Ratio	Reference
Anthracene							
	Daphnia magna	4	EC50	95			Munoz and Tarazona, 1993
	Daphnia pulex	4	EC50	754	267.6		Smith et al., 1988

Tier II Parameters	Tier II Values
FAVF	20.5
SAV	13.06
SACR	17.9
SCV	0.73

Table A.1. (continued)

Compound	Genus/species	Requirement	Endpoint	Concentration	GMAV	A-C Ratio	Reference
Benzene							
	Asellus aquaticus	5	LC50	254,000	254,000		Erben and Pisl, 1993
	Carassius auratus	2,3	LC50	34,420	34,420		Pickering and Henderson, 1966
	Chironomus thummi	6	LC50	100,000	100,000		Sloff, 1983
	Cottus cognatus	2,3	LC50	13,500	13,500		Moles et al., 1979
	Daphnia magna	4	LC50	200,000			LeBlanc, 1980
	Daphnia magna	4	LC50	400,000			Canton and Adema, 1978
	Daphnia magna	4	LC50	620,000			Canton and Adema, 1978
	Daphnia magna	4	LC50	412,000			Canton and Adema, 1978
	Daphnia magna	4	LC50	356,000			Canton and Adema, 1978
	Daphnia magna	4	LC50	412,000			Canton and Adema, 1978
	Daphnia magna	4	LC50	356,000	376,200		Canton and Adema, 1978
	Daphnia pulex	4	LC50	345,000			Canton and Adema, 1978
	Daphnia pulex	4	LC50	265,000	302,400		Canton and Adema, 1978
	Gasterosteus aculeatus	2,3	LC50	21,800	21,800		Moles et al., 1979
	Ictalurus punctatus	2,3	LC50	425,000	425,000		Johnson and Finley, 1980
	Lepomis macrochirus	2,3	LC50	22,490	22,490		Pickering and Henderson, 1966
	Oncorhynchus gorbuscha	1	LC50	4,630			Moles et al., 1979
	Oncorhynchus kisutch	1	LC50	12,350			Moles et al., 1979
	Oncorhynchus mykiss	2,3	LC50	5,300			DeGraeve et al., 1982
	Oncorhynchus mykiss	1	LC50	21,600			Hodson et al., 1984
	Oncorhynchus nerka	1	LC50	9,430			Moles et al., 1979
	Oncorhynchus tshawytscha	1	LC50	10,280	9,008		Moles et al., 1979
	Pimephales promelas	2,3	LC50	24,600			Geiger et al, 1990

Table A.1. (continued)

Compound	Genus/species	Requirement	Endpoint	Concentration	GMAV	A-C Ratio	Reference
	Pimephales promelas	2,3	LC50	12,600	17,600		Geiger et al, 1990
	Poecilia reticulata	2,3	LC50	36,600			Pickering and Henderson, 1966
	Poecilia reticulata	2,3	LC50	28,600	32,350		Galassi et al., 1988
	Salvelinus malma	2,3	LC50	10,430			Moles et al., 1979
	Salvelinus malma	2,3	LC50	10,480	10,450		Moles et al., 1979
	Thymallus arcticus	2,3	LC50	12,890	12,890		Moles et al., 1979

Tier II Parameters	Tier II Values
FAVF	4.0
SAV	2,252
SACR	17.9
SCV	130

Table A.1. (continued)

Compound	Genus/species	Requirement	Endpoint	Concentration	GMAV	A-C Ratio	Reference
Benzidine							
	Daphnia magna	4	EC50	600	600		Kuhn et al., 1989
	Oncorhynchus mykiss	1	LC50	7,400	7,400*		EPA, 1980c
	Salmo trutta lacustris	1	LC50	4,350	4,350*		EPA, 1980c
	Notropis lutrensis	2,3	LC50	2,500	2,500*		EPA, 1980c

Tier II Parameters	Tier II Values
FAVF	8.6
SAV	69.77
SACR	17.9
SCV	3.9

* The EPA criteria document was cited because the data come from an EPA internal investigation, which was not available.

Table A.1. (continued)

Compound	Genus/species	Requirement	Endpoint	Concentration	GMAV	A-C Ratio	Reference
Benzo(a)anthracene							
	Daphnia pulex	4	LC50 MOR	10*	10		Trucco et al., 1983

Tier II Parameters	Tier II Values
FAVF	20.5
SAV	0.4878
SACR	17.9
SCV	0.027

* The test was based on a non-standard, but conservative, exposure of 96 hours. The standard exposure is 48 hr for daphnids. The length of the Daphnid is 1.9-2.1 mm; the age of the Daphnid species is not available.

Table A.1. (continued)

Compound	Genus/species	Requirement	Endpoint	Concentration	GMAV	A-C Ratio	Reference
Benzo(a)pyrene							
	Daphnia pulex	4	LC50 MOR	5*	5		Trucco et al., 1983

Tier II Parameters	Tier II Values
FAVF	20.5
SAV	0.2439
SACR	17.9
SCV	0.014

*The test was based on a non-standard, but conservative, exposure of 96 hours. The standard exposure is 48 hr for daphnids. The length of the Daphnid is 1.9-2.1 mm; the age of the Daphnid species is not available.

Table A.1. (continued)

Compound	Genus/species	Requirement	Endpoint	Concentration	GMAV	A-C Ratio	Reference
Benzoic acid							
	Gambusia affinis	2,3	LC50	180,000[a]	180,000		Wallen et al., 1957

Tier II Parameters	Tier II Values
FAVF	242
SAV	743.8
SACR	17.9
SCV	42

[a] Done in turbid water.

Table A.1. (continued)

Compound	Genus/species	Requirement	Endpoint	Concentration	GMAV	A-C Ratio	Reference
Benzyl alcohol							
	Lepomis macrochirus	2,3	LC50	10,000	10,000		Dawson et al., 1977
	Pimephales promelas	2,3	LC50	460,000	460,000		Mattson et al., 1976

Tier II Parameters	Tier II Values
FAVF	64.8
SAV	154.3
SACR	17.9
SCV	8.6

Table A.1. (continued)

Compound	Genus/species	Requirement	Endpoint	Concentration	GMAV	A-C Ratio	Reference
BHC (other than Lindane)							
	Daphnia magna	4	EC50	800	800		Canton et al., 1975

Tier II Parameters	Tier II Values
FAVF	20.5
SAV	39.02
SACR	17.9
SCV	2.2

Table A.1. (continued)

Compound	Genus/species	Requirement	Endpoint	Concentration	GMAV	A-C Ratio	Reference
Bis(2-ethylhexyl) phthalate							
	Chironomus plumosus	6	EC50	>18,000			Streufert et al., 1980
	Daphnia pulex	4	EC50	133	133		LeBlanc, 1980
	Daphnia magna	4	LC50	2,000[a]			Adams & Heidolph, 1985
	Daphnia magna		CV	912		2.193	Adams & Heidolph, 1985
	Gammarus pseudolimnaeus	4	LC50	>32,000			Sanders et al., 1973
	Gasterosteus aculeatus	2,3	LC50	>300			van den Dikkenberg et al., 1989
	Ictalurus punctatus	2,3	LC50	>100,000			Johnson and Finley, 1980
	Jordanella floridae	2,3	LC50	>320			Adema et al., 1981
	Lepomis macrochirus	2,3	LC50	>770,000			Buccafusco et al., 1981
	Lepomis macrochirus	2,3	LC50	>100,000			Johnson and Finley, 1980
	Oncorhynchus kisutch	1	LC50	>100,000			Johnson and Finley, 1980
	Oncorhynchus mykiss	1	LC50	> 320			Adams et al., 1995
	Pimephales promelas	2,3	LC50	>670			Adams et al., 1995
	Pimephales promelas	2,3	LC50	>160			Adams et al., 1995
	Rana pipiens	3	LC50	4,440	4,440		Birge et al., 1978

Tier II Parameters	Tier II Values
FAVF	5.0
SAV	26.60
SACR	8.890
SCV	3.0

[a] This LC50 was used to calculate the A-C ratio, but not the GMAV because an EC50 was available.

Table A.1. (continued)

Compound	Genus/species	Requirement	Endpoint	Concentration	GMAV	A-C Ratio	Reference
2-Butanone							
	Daphnia magna	4	EC50	5,091,000	5,091,000		Randall and Knopp, 1980
	Pimephales promelas	2,3	LC50	3,200,000	3,200,000		Veith et al, 1983

Tier II Parameters	Tier II Values
FAVF	13.2
SAV	242,400
SACR	17.9
SCV	14,000

Table A.1. (continued)

Compound	Genus/species	Requirement	Endpoint	Concentration	GMAV	A-C Ratio	Reference
Carbon disfulfide[a]							
	Poecilia reticulata	2,3	LC50 MOR	4,000	4,000		Van Leeuwen et al., 1985

Tier II Parameters	Tier II Values
FAVF	242
SAV	16.53
SACR	17.9
SCV	0.92

[a] Although carbon disfulide is a volatile compound, static test was used because flow-through, measured tests are not available.

Table A.1. (continued)

Compound	Genus/species	Requirement	Endpoint	Concentration	GMAV	A-C Ratio	Reference
Carbon tetrachloride[a]							
	Pimephales promelas	2,3	LC50	41,400			Geiger et al., 1990
	Pimephales promelas	2,3	LC50	43,300			Kimball, n.d.
	Pimephales promelas	2,3	LC50	42,900	42,530		Kimball, n.d.

Tier II Parameters	Tier II Values
FAVF	242
SAV	175.7
SACR	17.9
SCV	9.8

[a] Because carbon tetrachloride is a volatile compound, only flow-through, measured tests were used.

Table A.1. (continued)

Compound	Genus/species	Requirement	Endpoint	Concentration	GMAV	A-C ratio	Reference
Chlorobenzene							
	Carassius auratus	2,3	LC50	51,620	51,620		Pickering and Henderson, 1966
	Ceriodaphnia dubia	4	LC50	7,900[a]			Cowgill et al., 1985
	Ceriodaphnia dubia	4	LC50	7,900[a]			Cowgill et al., 1985
	Ceriodaphnia dubia	4	LC50	11,400[a]	8,927		Cowgill et al., 1985
	Daphnia magna	4	LC50	86,000			LeBlanc, 1980
	Daphnia magna	4	LC50	13,000[a]			Cowgill et al., 1985
	Daphnia magna	4	LC50	10,700[a]			Cowgill et al., 1985
	Daphnia magna	4	LC50	15,400[a]	116,500		Cowgill et al., 1985
	Lepomis macrochirus	2,3	LC50	7,400	7,400		Bailey et al., 1985
	Oncorhynchus mykiss	1	LC50	7,460	7,460		Hodson et al., 1984
	Pimephales promelas	2,3	LC50	16,900	16,900		Geiger et al., 1990
	Poecilia reticulata	2,3	LC50	45,530	45,530		Pickering and Henderson, 1966

Tier II Parameters	Tier II Values
FAVF	6.5
SAV	1,138
SACR	17.9
SCV	64

[a] Author indicated both *D. magna* and *C. dubia/affinis* are less sensitive to chlorobenzene at 24°C than at 20°C; thus, tests with 20°C were used to established a conservative estimate of the effect of chlorobenzene.

Table A.1. (continued)

Compound	Genus/species	Requirement	Endpoint	Concentration	GMAV	A-C Ratio	Reference
Chloroform[a]							
	Ictalurus punctatus	2,3	LC50	75,000	75,000		Anderson and Lusty, 1980
	Lepomis macrochirus	2,3	LC50	16,200			Anderson and Lusty, 1980
	Lepomis macrochirus	2,3	LC50	22,300			Anderson and Lusty, 1980
	Lepomis macrochirus	2,3	LC50	13,300			Anderson and Lusty, 1980
	Lepomis macrochirus	2,3	LC50	18,300			Anderson and Lusty, 1980
	Lepomis macrochirus	2,3	LC50	20,800	17,880		Anderson and Lusty, 1980
	Micropterus salmoides	2,3	LC50	55,800			Anderson and Lusty, 1980
	Micropterus salmoides	2,3	LC50	52,500			Anderson and Lusty, 1980
	Micropterus salmoides	2,3	LC50	45,400	51,040		Anderson and Lusty, 1980
	Oncorhynchus mykiss	1	LC50	18,200			Anderson and Lusty, 1980
	Oncorhynchus mykiss	1	LC50	18,400			Anderson and Lusty, 1980
	Oncorhynchus mykiss	1	LC50	22,100			Anderson and Lusty, 1980
	Oncorhynchus mykiss	1	LC50	15,100			Anderson and Lusty, 1980
	Oncorhynchus mykiss	1	LC50	17,100	18,040		Anderson and Lusty, 1980
	Pimephales promelas	2,3	EC50	70,700	70,700		Geiger et al., 1990

Tier II Parameters	Tier II Values
FAVF	36.2
SAV	493.9
SACR	17.9
SCV	28

[a] Because chloroform is a volatile compound, only flow-through, measured tests were used.

Table A.1. (continued)

Compound	Genus/species	Requirement	Endpoint	Concentration	GMAV	A-C Ratio	Reference
p,p'DDD							
	Asellus brevicaudus	5	LC50	10			Sanders, 1972
	Asellus brevicaudus	5	LC50	16	12.65		Mayer and Ellersieck, 1986
	Bufo woodhousei	3	LC50	140	140		Sanders, 1970
	Cypridopsis vidua	5	EC50	45	45		Mayer and Ellersieck, 1986
	Daphnia pulex	4	EC50	3.2	3.2		Mayer and Ellersieck, 1986
	Gammarus fasciatus	5	LC50	0.6			Sanders, 1972
	Gammarus fasciatus	5	LC50	0.86			Sanders, 1972
	Gammarus lacustris	5	LC50	0.64	0.68		Sanders, 1969
	Ictalurus punctatus	2,3	LC50	1,500	15,000		Mayer and Ellersieck, 1986
	Ischnura verticalis	6	LC50	34	34		Mayer and Ellersieck, 1986
	Micropterus salmoides	2,3	LC50	42	42		Mayer and Ellersieck, 1986
	Oncorhynchus mykiss	1	LC50	70	72		Mayer and Ellersieck, 1986
	Palaemonetes kadiakensis	5	LC50	0.68			Sanders, 1972
	Palaemonetes kadiakensis	5	LC50	2.4	1.3		Mayer and Ellersieck, 1986
	Pimephales promelas	2,3	LC50	4,400	4,400		Mayer and Ellersieck, 1986
	Polycelis felina	7,8	LC50	740	740		Kouyoumjian and Uglow, 1974
	Pseudacris triseriata	3	LC50	400	400		Sanders, 1970
	Pteronarcys californica	6	LC50	380	380		Sanders and Cope, 1968
	Simocephalus serrulatus	4	EC50	4.5	4.5		Mayer and Ellersieck, 1986
	Stizostedion vitreum	2,3	LC50	14	14		Mayer and Ellersieck, 1986

Tier II Parameters	Tier II Values
FAVF	3.6
SAV	0.1889
SACR	17.9
SCV	0.011

Table A.1. (continued)

Compound	Genus/species	Requirement	Endpoint	Concentration	GMAV	A-C Ratio	Reference
Decane[a]							
	Daphnia magna	4	LC50	18,000	18,000		LeBlanc, 1980

Tier II Parameters	Tier II Values
FAVF	20.5
SAV	878.0
SACR	17.9
SCV	49

[a] Although decane is a volatile compound, static test was used because flow-through tests were not available.

Table A.1. (continued)

Compound	Genus/species	Requirement	Endpoint	Concentration	GMAV	A-C ratio	Reference
Di-n-butyl phthalate							
	Chironomus plumosus	6	EC50	760	760		Streufert et al., 1980
	Daphnia magna	4	EC50	5200	5200		McCarthy and Whitmore, 1985
	Daphnia magna		CV	1004		5.179	McCarthy and Whitmore, 1985
	Gammarus pseudolimnaeus	5	LC50	2100	2100		Johnson and Finley, 1980
	Ictalurus punctatus	2,3	LC50	2900	2900		Johnson and Finley, 1980
	Lepomis macrochirus	2,3	LC50	1200			Buccafusco et al., 1981
	Lepomis macrochirus	2,3	LC50	700	916.5		Johnson and Finley, 1980
	Oncorhynchus mykiss	1	LC50	1600	1600		Adams et al., 1995
	Oncorhynchus mykiss		CV	137.8[a]		11.61	Rodes et al., 1995
	Orconectes nais	5	LC50	10000[b]	10000		Johnson and Finley, 1980
	Pimephales promelas	2,3	LC50	1100			Geiger et al., 1985
	Pimephales promelas	2,3	LC50	850			Geiger et al., 1985
	Pimephales promelas	2,3	LC50	2020[c,d]			McCarthy and Whitmore, 1985
	Pimephales promelas	2,3	LC50	920	1148		Adams et al., 1995
	Pimephales promelas		CV	748.3		2.699	McCarthy and Whitmore, 1985

Tier II Parameters	Tier II Values
FAVF	4.0
SAV	190.0
SACR	5.455
SCV	35

[a] Length of the test is 60 d post-hatch (99 d exposure); the National Guidelines recommend 90 d post-hatch for salmonids.

Table A.1. (continued)

[b] Authors note toxicity is hardness(44-272 ppm) and pH(6.5-9.0) independent; no further data are available.
[c] Derived from range-finding test.
[d] ACR derived from acute test of larval fathead minnows is the only test available as part of the same study as the chronic test. The National Guidelines recommend using juvenile fish for deriving ACR.
[e] Because of an accident during the experiment, length of the test is 20 d post-hatch; the National Guidelines recommend 28-32 d post-hatch for fish other than salmonids. However, the authors note since a larger number of fish died at 1.0 mg/L, "no evidence that additional exposure time would have produced any meaningful result".

Table A.1. (continued)

Compound	Genus/species	Requirement	Endpoint	Concentration	GMAV	A-C Ratio	Reference
Dibenzofuran							
	Daphnia magna	4	LC50	1,700	1,700		LeBlanc, 1980
	Pimephales promelas	2,3	EC50	780			Geiger et al., 1988
	Pimephales promelas	2,3	EC50	980	874.3		Geiger et al., 1988

Tier II Parameters	Tier II Values
FAVF	13.2
SAV	66.23
SACR	17.9
SCV	3.7

Table A.1. (continued)

Compound	Genus/species	Requirement	Endpoint	Concentration	GMAV	A-C Ratio	Reference
1,1-Dichloroethane[a]							
	Poecilia reticulata	2,3	LC50	202,000	202,000		Köneman, 1981

Tier II Parameters	Tier II Values
FAVF	242
SAV	834.7
SACR	17.9
SCV	47

[a] Although 1,1-dichloroethane is a volatile compound, static test was used because flow-through test is not available.

Table A.1. (continued)

Compound	Genus/species	Requirement	Endpoint	Concentration	GMAV	A-C ratio	Reference
1,2-Dichloroethane[a]							
	Daphnia magna	4	EC50	160,000	160,000		Richter et al., 1983
	Pimephales promelas	2,3	LC50	116,000	116,000		Walbridge et al., 1983
	Pimephales promelas		CV	41,360		2.804	Benoit et al, 1985

Tier II Parameters	Tier II Values
FAVF	13.2
SAV	8,788
SACR	9.649
SCV	910

[a] Because 1,2-Dichloroethane is a volatile compound, only flow-through, measured tests were used (static, measured tests for Daphnids).

Table A.1. (continued)

Compound	Genus/species	Requirement	Endpoint	Concentration	GMAV	A-C Ratio	Reference
1,1-Dichlorolethene[a]							
	Pimephales promelas	2,3	LC50 MOR	108,000	108,000		Dill et al., 1980

Tier II Parameters	Tier II Values
FAVF	242
SAV	446.3
SACR	17.9
SCV	25

[a] Although 1,1-dichloroethene is a volatile compound, static test is used because flow-through, measured tests are not available.

Table A.1. (continued)

Compound	Genus/species	Requirement	Endpoint	Concentration	GMAV	A-C Ratio	Reference
1,2-Dichloroethene[a]							
	Lepomis macrochirus	2,3	LC50	140,000	140,000		Buccafusco, 1981
	Daphnia magna	4	LC50	220,000	220,000		LeBlanc, 1980

Tier II Parameters	Tier II Values
FAVF	13.2
SAV	10,610
SACR	17.9
SCV	590

[a] Although 1,2-dichloroethene is a volatile compound, static tests were used because flow-through, measured tests are not available.

Table A.1. (continued)

Compound	Genus/species	Requirement	Endpoint	Concentration	GMAV	A-C Ratio	Reference
1,3-Dichloropropene[a]							
	Pimephales promelas	2,3	EC50	239	239		Geiger et al., 1990

Tier II Parameters	Tier II Values
FAVF	242
SAV	0.9876
SACR	17.9
SCV	0.055

a Because 1,3-dichloropropene is a volatile compound, only flow-through measured test was used.

Table A.1. (continued)

Compound	Genus/species	Requirement	Endpoint	Concentration	GMAV	A-C Ratio	Reference
Diethyl phthalate							
	Daphnia magna	4	EC50	86,000	86,000		Adams et al., 1995
	Daphnia magna		CV	38,410		2.239	Rhodes et al., 1995
	Lepomis macrochirus	2,3	LC50	16,700	16,700		Adams et al., 1995
	Pimephales promelas	2,3	LC50	31,800			Geiger et al., 1985
	Pimephales promelas	2,3	LC50	17,000	23,250		Adams et al., 1995
	Oncorhynchus mykiss	1	LC50	12,000	12,000		Adams et al., 1995

Tier II Parameters	Tier II Values
FAVF	6.5
SAV	1,846
SACR	8.952
SCV	210

Table A.1. (continued)

Compound	Genus/species	Requirement	Endpoint	Concentration	GMAV	A-C Ratio	Reference
Ethyl benzene*							
	Pimephales promelas	2,3	EC50	8,450	8,450		Geiger et al., 1990
	Poecilia reticulata	2,3	LC50	9,600	9,600		Galassi et al., 1988

Tier II Parameters	Tier II Values
FAVF	64.8
SAV	130.4
SACR	17.9
SCV	7.3

* Because ethyl benzene is a volatile compound, only flow-through, measured tests were used.

Table A.1. (continued)

Compound	Genus/species	Requirement	Endpoint	Concentration	GMAV	A-C Ratio	Reference
Hexane							
	Pimephales promelas	2,3	EC50	2,500	2,500		Geiger et al., 1990

Tier II Parameters	Tier II Values
FAVF	242
SAV	10.33
SACR	17.9
SCV	0.58

Table A.1. (continued)

Compound	Genus/species	Requirement	Endpoint	Concentration	GMAV	A-C Ratio	Reference
2-Hexanone							
	Pimephales promelas	2,3	LC50	428,000	428,000		Geiger et al., 1986

Tier II Parameters	Tier II Values
FAVF	242
SAV	1,769
SACR	17.9
SCV	99

Table A.1. (continued)

Compound	Genus/species	Requirement	Endpoint	Concentration	GMAV	A-C Ratio	Reference
1-Methylnaphthalene							
	Pimephales promelas	2,3	EC50	9,000	9,000		Mattson et al., 1976

Tier II Parameters	Tier II Values
FAVF	242
SAV	37.19
SACR	17.9
SCV	2.1

Table A.1. (continued)

Compound	Genus/species	Requirement	Endpoint	Concentration	GMAV	A-C Ratio	Reference
4-Methyl-2-pentanone							
	Pimephales promelas	2,3	LC50	540,000			Brooke et al., 1984
	Pimephales promelas	2,3	LC50	505,000	522,200		Veith et al., 1983a
	Pimephales promelas		CV	77,360		6.750	Call et al., 1985

Tier II Parameters	Tier II Values
FAVF	242
SAV	2,158
SACR	12.93
SCV	170

Table A.1. (continued)

Compound	Genus/species	Requirement	Endpoint	Concentration	GMAV	A-C Ratio	Reference
2-Methylphenol							
	Carassius auratus	2,3	LC50 MOR	23,250	23,250		Pickering and Henderson, 1966
	Lepomis macrochirus	2,3	LC50 MOR	20,780	20,780		Pickering and Henderson, 1966
	Oncorhynchus mykiss	1	LC50 MOR	8,400	8,400		DeGraeve et al., 1980
	Pimephales promelas	2,3	LC50	14,000			Geiger et al., 1990
	Pimephales promelas	2,3	LC50	18,200	15,960		DeGraeve et al., 1980
	Poecilia reticulata	2,3	LC50	18,850	18,850		Pickering and Henderson, 1966

Tier II Parameters	Tier II Values
FAVF	36.2
SAV	232.0
SACR	17.9
SCV	13

Table A.1. (continued)

Compound	Genus/species	Requirement	Endpoint	Concentration	GMAV	A-C Ratio	Reference
Methylene chloride							
	Daphnia magna	4	LC50 MOR	220,000	220,000		LeBlanc, 1980
	Lepomis macrochirus	2,3	LC50 MOR	220,000	220,000		Buccafusco et al., 1981
	Pimephales promelas	2,3	EC50	330,000	330,000		Geiger, 1986
	Pimephales promelas		LC50 MOR	502,000[a]			Dill et al., 1987
	Pimephales promelas		CV	108,540		4.625	Dill et al., 1987

Tier II Parameters	Tier II Values
FAVF	8.6
SAV	25,580
SACR	11.40
SCV	2,200

[a] The LC50 value is used to calculate the ACR because it is part of the same study as the chronic test; but it is not used to determine the GMAV of *Pimephales* sp. because an EC50 is available.

Table A.1. (continued)

Compound	Genus/species	Requirement	Endpoint	Concentration	GMAV	A-C ratio	Reference
Napthalene							
	Daphnia magna	4	EC50	2,194			Munoz and Tarazona, 1993
	Daphnia pulex	4	EC50	4,663	3,199		Smith et al., 1988
	Oncorhynchus mykiss	1	LC50	1,600	1,600		DeGraeve et al., 1982
	Pimephales promelas	2,3	LC50	6,140			Geiger et al., 1985
	Pimephales promelas	2,3	LC50	7,900	6,965		DeGraeve et al., 1982
	Pimephales promelas		CV	619		12.77	DeGraeve et al., 1982

Tier II Parameters	Tier II Values
FAVF	8.6
SAV	186.0
SACR	15.96
SCV	12

Table A.1. (continued)

Compound	Genus/species	Requirement	Endpoint	Concentration	GMAV	A-C Ratio	Reference
4-Nitrophenol							
	Daphnia magna	4	EC50	7,680			Keen and Baillod, 1985
	Daphnia magna	4	EC50	4,700	6,008		Kuhn et al., 1989
	Daphnia magna		CV	7,071		2*	Kuhn et al., 1989
	Gammarus pseudolimnaeus	5	LC50	6,550	6,550		Howe et al., 1994
	Ictalurus punctatus	2,3	LC50	15,000	15,000		Holcombe et al., 1984
	Lepomis macrochirus	2,3	LC50	8,300	8,300		Buccafusco et al., 1981
	Oncorhynchus mykiss	1	LC50	7,900	7,900		Hodson et al., 1984
	Oncorhynchus mykiss		CV	989.1		7.987	Hodson et al., 1991
	Pimephales promelas	2,3	LC50	59,000			Phipps et al., 1981
	Pimephales promelas	2,3	LC50	62,000			Phipps et al., 1981
	Pimephales promelas	2,3	LC50	41,000			Holcombe et al., 1984
	Pimephales promelas	2,3	LC50	37,300			Geiger et al., 1985
	Pimephales promelas	2,3	LC50	41,000			Geiger et al., 1985
	Pimephales promelas	2,3	LC50	58,600	48,760		Geiger et al., 1985

Tier II Parameters	Tier II Values
FAVF	5.0
SAV	1,202
SACR	3.997
SCV	300

* Since the experimental A-C Ratio was less than 2, the A-C Ratio of *D. magna* is set to 2 (Stephan et al, 1985).

Table A.1. (continued)

Compound	Genus/species	Requirement	Endpoint	Concentration	GMAV	A-C Ratio	Reference
N-Nitrosodiphenylamine							
	Daphnia magna	4	LC50	7,800	7,800		LeBlanc, 1980

Tier II Parameters	Tier II Values
FAVF	20.5
SAV	3,805
SACR	17.9
SCV	210

Table A.1. (continued)

Compound	Genus/species	Requirement	Endpoint	Concentration	GMAV	A-C Ratio	Reference
2-Octanone[a]							
	Pimephales promelas	2,3	EC50	36,000	36,000		Brooke, 1984

Tier II Parameters	Tier II Values
FAVF	242
SAV	148.8
SACR	17.9
SCV	8.3

[a]Because 3-Octanone tests do not have standardard exposure, 2-Octanone tests, which have the standard exposure, were used.

Table A.1. (continued)

Compound	Genus/species	Requirement	Endpoint	Concentration	GMAV	A-C Ratio	Reference
PCBs: total							
	Pimephales promelas					9.443	Nebeker et al., 1974

Tier I Parameters	Tier I Values	
FAV	2.0	EPA, 1980x

Tier II Parameters	Tier II Values
SACR	14.64
SCV	0.14

Table A.1. (continued)

Compound	Genus/species	Requirement	Endpoint	Concentration	GMAV	A-C Ratio	Reference
PCBs: Aroclor® 1221							
	Oncorhynchus clarki	1	LC50	1,200			Mayer et al., 1977

Tier II Parameters	Tier II Values
FAVF	242
SAV	4.959
SACR	17.9
SCV	0.28

Table A.1. (continued)

Compound	Genus/species	Requirement	Endpoint	Concentration	GMAV	A-C Ratio	Reference
PCBs: Aroclor® 1232							
	Oncorhynchus clarki	1	LC50	2,500			Johnson and Finley, 1980

Tier II Parameters	Tier II Values
FAVF	242
SAV	10.33
SACR	17.9
SCV	0.58

Table A.1. (continued)

Compound	Genus/species	Requirement	Endpoint	Concentration	GMAV	A-C Ratio	Reference
PCBs: Aroclor® 1242							
	Gammarus pseudolimnaeus	5	LC50	72			Nebeker and Puglisi, 1974
	Gammarus pseudolimnaeus	5	LC50	74	72.99		Nebeker and Puglisi, 1974
	Ictalurus punctatus	2,3	LC50	>100			Johnson and Finley, 1980
	Ischnura verticalis	7,8	LC50	400	400		Mayer et al., 1977
	Oncorhynchus clarki	1	LC50	5,400	5,400		Mayer et al., 1977
	Perca flavescens	2,3	LC50	>150			Johnson and Finley, 1980
	Pimephales promelas	2,3	LC50	15	15		Nebeker et al., 1974
	Pimephales promelas		LC50	300[a]			Nebeker et al., 1974
	Pimephales promelas		CV	9.000		33.33	Nebeker et al., 1974

Tier II Parameters	Tier II Values
FAVF	12.9
SAV	1.163
SACR	22.02
SCV	0.053

a Because this value is more than ten times of another life stage, it is not used in the GMAV calculation. However, since the preferred life stage in deriving the A-C Ratio is juvenile, it is used in A-C Ratio derivation.

Table A.1. (continued)

Compound	Genus/species	Requirement	Endpoint	Concentration	GMAV	A-C Ratio	Reference
PCBs: Aroclor® 1248							
	Gammarus pseudolimnaeus	5	LC50 MOR	29	29		Nebeker and Puglisi, 1974
	Ictalurus punctatus	2,3	LC50 MOR	>100			Johnson and Finley, 1980
	Lepomis macrochirus	2,3	LC50 MOR	278			Stalling and Mayer, 1972
	Lepomis macrochirus	2,3	LC50	690	438.0		Johnson and Finley, 1980
	Oncorhynchus clarki	1	LC50	5,750	5,750		Johnson and Finley, 1980
	Perca flavescens	2,3	LC50	>100			Johnson and Finley, 1980

Tier II Parameters	Tier II Values
FAVF	20.1
SAV	1.443
SACR	17.9
SCV	0.081

Table A.1. (continued)

Compound	Genus/species	Requirement	Endpoint	Concentration	GMAV	A-C Ratio	Reference
PCBs: Aroclor® 1254							
	Coregonus hoyi	1	LC50	>10,000			Passino and Kramer, 1980
	Gammarus fasciatus	5	LC50	2,400	2,400		Johnson and Finley, 1980
	Ictalurus punctatus	2,3	LC50	>200			Johnson and Finley, 1980
	Ischnura verticalis	6	LC50	200	200		Mayer et al., 1977
	Lepomis macrochirus	2,3	LC50	2,740	2,740		Johnson and Finley, 1980
	Oncorhynchus clarki	1	LC50	42,500	42,500		Johnson and Finley, 1980
	Orconectes nais	5	LC50	100	100		Johnson and Finley, 1980
	Perca flavescens	2,3	LC50	>150			Johnson and Finley, 1980
	Pimephales promelas	2,3	LC50	7.7	7.7		Nebeker et al., 1974
	Pimephales promelas		CV	2.878		2.676	Nebeker et al., 1974

Tier II Parameters	Tier II Values
FAVF	12.9
SAV	0.5969
SACR	17.9
SCV	0.033

Table A.1. (continued)

Compound	Genus/species	Requirement	Endpoint	Concentration	GMAV	A-C Ratio	Reference
PCBs: Aroclor® 1260							
	Ictalurus punctatus	2,3	LC50	>400			Johnson and Finley, 1980
	Lepomis macrochirus	2,3	LC50	>400			Johnson and Finley, 1980
	Oncorhynchus clarki	1	LC50	61,000	61,000		Mayer et al., 1977
	Perca flavescens	2,3	LC50	>200			Johnson and Finley, 1980

Tier II Parameters	Tier II Values
FAVF	36.2
SAV	1,685
SACR	17.9
SCV	94

Table A.1. (continued)

Compound	Genus/species	Requirement	Endpoint	Concentration	GMAV	A-C ratio	Reference
1-Pentanol[a]							
	Pimephales promelas	2,3	LC50	472,000	472,000		Geiger et al., 1986

Tier II Parameters	Tier II Values
FAVF	242
SAV	1950
SACR	17.9
SCV	110

[a]Because 1-pentanol is a volatile compound, only flow-through, measured test was used.

Table A.1. (continued)

Compound	Genus/species	Requirement	Endpoint	Concentration	GMAV	A-C Ratio	Reference
2-Propanol							
	Chironomus riparius	7	LC50	12,500,000	12,500,000		Roghair et al., 1994
	Pimephales promelas	2,3	LC50	10,400			Veith et al., 1983
	Pimephales promelas	2,3	LC50	9,640			Veith et al., 1983
	Pimephales promelas	2,3	LC50	6,550	8,692		Brooke et al., 1984

Tier II Parameters	Tier II Values
FAVF	64.8
SAV	134.1
SACR	17.9
SCV	7.5

Table A.1. (continued)

Compound	Genus/species	Requirement	Endpoint	Concentration	GMAV	A-C Ratio	Reference
1,1,2,2-Tetrachloroethane[a]							
	Daphnia magna	4	EC50	23,000	23,000		Richter et al., 1983
	Daphnia magna		CV	9,829		2.34	Richter et al., 1983
	Jordanella floridae	2,3	LC50	18,480	18,480		Smith et al., 1991
	Jordanella floridae		CV	8,467		2.183	Smith et al., 1991
	Pimephales promelas	2,3	LC50	20,400			Walbridge et al., 1983
	Pimephales promelas	2,3	LC50	20,300	20,350		Geiger et al., 1985
	Pimephales promelas		CV	2,366		8.601	Ahmad et al., 1984

Tier II Parameters	Tier II Values
FAVF	8.6
SAV	2,149
SACR	3.529
SCV	610

[a] Because 1,1,2,2-tetrachloroethane is a volatile compound, only flow-through, measured tests were used.

Table A.1. (continued)

Compound	Genus/species	Requirement	Endpoint	Concentration	GMAV	A-C Ratio	Reference
Tetrachloroethene[a]							
	Daphnia magna	4	EC50	8,500	8,500		Richter et al., 1983
	Daphnia magna		CV	750.0		11.33	Richter et al., 1983
	Jordanella floridae	2,3	LC50	8,430	8,430		Smith et al., 1991
	Jordanella floridae		CV	3,107		2.714	Smith et al., 1991
	Oncorhynchus mykiss	1	LC50	5,840			Shubat et al., 1982
	Oncorhynchus mykiss	1	LC50	4,990	5,398		Shubat et al., 1982
	Pimephales promelas	2,3	LC50	13,400			Walbridge et al., 1983
	Pimephales promelas	2,3	LC50	20,300	16,490		Geiger et al., 1985
	Pimephales promelas		CV	836.7		19.71	Geiger et al., 1985

Tier II Parameters	Tier II Values
FAVF	6.5
SAV	830.5
SACR	8.463
SCV	98

[a] Because tetrachloroethene is a volatile compound, only flow-through, measured tests were used.

Table A.1. (continued)

Compound	Genus/species	Requirement	Endpoint	Concentration	GMAV	A-C Ratio	Reference
Toluene[a]							
	Pimephales promelas	23	LC50	31,700			Geiger et al., 1990
	Pimephales promelas	2,3	LC50	36,200			Geiger et al., 1986
	Pimephales promelas	2,3	LC50	30,000			Devlin et al., 1982
	Pimephales promelas	2,3	LC50	31,000			Devlin et al., 1982
	Pimephales promelas	2,3	LC50	26,000			Devlin et al., 1982
	Pimephales promelas	2,3	LC50	18,000	28,170		Devlin et al., 1982
	Pimephales promelas		CV	4,899		5.243	Devlin et al., 1982

Tier II Parameters	Tier II Values
FAVF	242
SAV	116.4
SACR	11.89
SCV	9.8

[a] Because toluene is a volatile compound, only flow-through, measured tests were used.

Table A.1. (continued)

Compound	Genus/species	Requirement	Endpoint	Concentration	GMAV	A-C Ratio	Reference
1,1,1-Trichloroethane*							
	Pimephales promelas	2,3	LC50	52,900			Geiger et al., 1986
	Pimephales promelas	2,3	LC50	42,300	47,300		Geiger et al., 1986

Tier II Parameters	Tier II Values
FAVF	242
SAV	195.5
SACR	17.9
SCV	11

* Because 1,1,1-trichloroethane is a volatile compound, only flow-through, measured tests were used.

Table A.1. (continued)

Compound	Genus/species	Requirement	Endpoint	Concentration	GMAV	A-C Ratio	Reference
1,1,2-Trichloroethane[a]							
	Daphnia magna	4	EC50	81,000	81,000		Richter et al., 1983
	Daphnia magna		CV	18,385		4.406	Richter et al., 1983
	Jordanella floridae	2,3	LC50	45,117	45,117		Smith et al., 1991
	Jordanella floridae		CV	46,609		2[b]	Smith et al., 1991
	Pimephales promelas	2,3	LC50	81,600	81,600		Ahmad et al., 1984
	Pimephales promelas		CV	9,423		8.659	Ahmad et al., 1984

Tier II Parameters	Tier II Values
FAVF	8.6
SAV	5,246
SACR	4.241
SCV	1200

[a] Because 1,1,2-trichloroethane is a volatile compound, only flow-through, measured tests were used.

[b] Since the experimental A-C Ratio is less than 2, the A-C Ratio of *J. floridae* is set to 2 (Stephan et al., 1985).

Table A.1. (continued)

Compound	Genus/species	Requirement	Endpoint	Concentration	GMAV	A-C Ratio	Reference
Trichloroethene[a]							
	Jordanella floridae	2,3	LC50	28,280	28,280		Smith et al., 1991
	Jordanella floridae		CV	11,057		2.558	Smith et al., 1991
	Pimephales promelas	2,3	LC50	40,700			Alexander et al., 1978
	Pimephales promelas	2,3	LC50	45,000			Walbridge et al., 1983
	Pimephales promelas	2,3	LC50	44,100	43,230		Geiger et al., 1985

Tier II Parameters	Tier II Values
FAVF	64.8
SAV	436.4
SACR	9.358
SCV	47

[a] Because trichloroethene is a volatile compound, only flow-through, measured tests were used.

Table A.1. (continued)

Compound	Genus/species	Requirement	Endpoint	Concentration	GMAV	A-C Ratio	Reference
Vinyl acetate[a]							
	Carassius auratus	2,3	LC50	42,330	42,330		Pickering and Henderson, 1966
	Lepomis macrochirus	2,3	LC50	18,000	18,000		Pickering and Henderson, 1966
	Pimephales promelas	2,3	LC50	14,000			Pickering and Henderson, 1966
	Pimephales promelas	2,3	LC50	15,000			Pickering and Henderson, 1966
	Pimephales promelas	2,3	LC50	14,000			Pickering and Henderson, 1966
	Pimephales promelas	2,3	LC50	15,000			Pickering and Henderson, 1966
	Pimephales promelas	2,3	LC50	15,000			Pickering and Henderson, 1966
	Pimephales promelas	2,3	LC50	23,000			Pickering and Henderson, 1966
	Pimephales promelas	2,3	LC50	26,000			Pickering and Henderson, 1966
	Pimephales promelas	2,3	LC50	20,000			Pickering and Henderson, 1966
	Pimephales promelas	2,3	LC50	24,000[b]			Pickering and Henderson, 1966
	Pimephales promelas	2,3	LC50	19,730[b]	18,090		Pickering and Henderson, 1966
	Poecilia reticulata	2,3	LC50	31,080	31,080		Pickering and Henderson, 1966

Tier II Parameters	Tier II Values
FAVF	64.8
SAV	277.8
SACR	17.9
SCV	16

[a] Although vinyl acetate is a volatile compound, static tests were used because flow-through, measured tests are not available.
[b] Auther notes hardness influences toxicity; vinyl acetate is more toxic in soft water than hard water.

Table A.1. (continued)

Compound	Genus/species	Requirement	Endpoint	Concentration	GMAV	A-C ratio	Reference
Xylene[a]							
	Lepomis macrochirus	2,3	LC50	15,700	15,700		Bailey et al., 1985
	Pimephales promelas	2,3	EC50	15,300[b,d]			Geiger et al., 1990
	Pimephales promelas	2,3	EC50	14,800[c,d]	15,050		Geiger et al., 1990

Tier II Parameters	Tier II Values
FAVF	64.8
SAV	232.3
SACR	17.9
SCV	13

[a] Because xylene is a volatile compound, only flow-through, measured tests were used.
[b] o-xylene (99+% purity) was used.
[c] m-xylene (99% purity) was used.
[d] Because analytical procedures used at waste sites do not discriminate isomers, toxicity tests on individual and mixture of isomers are considered equivalent.

Appendix B

METHODS FOR DERIVATION OF TIER II VALUES

METHODS FOR DERIVATION OF TIER II VALUES

B.1 Method for data selection

The procedure used to select and aggregate test data was adopted from the guidelines for deriving National Ambient Water Quality Criteria (NAWQC) (Stephan et al. 1985). The selection criteria are summarized in the following text.

B.1.1 Chemical Considerations

Not all forms of inorganic chemicals require unique Tier II values. Metal salts with the sam e oxidation state at ambient conditions (e.g., $BeCl_2$ and $BeSO_4$) are expected to exhibit similar toxicity and are given a common Tier II value. Nonionizable, covalently bonded compounds of metals or metals of different oxidation states were considered different chemicals, for which separate Tier II values wer e derived.

For volatile compounds, only results of flow-through tests with measured chemical concentrations were used, if available. However, if flow-through measured tests were not available, the genus mea n acute value (GMAV) was based on static and flow-through unmeasured tests.

Pesticides were screened for commercial formul ations; wettable powder, emulsifiable concentrates, and formulated mixtures were eliminated. Only pesticides of technical grades or better were considered.

B.1.2 Dilution water considerations

Test results were rejected if unusual dilution water was used (e.g., TOC > 5 ppm, lack o f appropriate salts, low dissolved oxygen), unless toxicity has been demonstrated to be independent o f these factors. Tests in which dissolved oxygen fell below 40% saturation for static or 60% saturation for flow-through were eliminated.

B.1.3 Biological parameters

Tests of certain organisms were excluded from the Tier II value derivation. Single-celled organisms and brine shrimp (*Artemia* sp.) were not used. Fish were generally limited to species with wild North American populations. However, if none of the tests with North American fish were acceptable an d values for other organisms were not available, non-resident fish were used.

Tests which did not refer to a standard procedure or indicate use of a control group were excluded. Acute tests in which organisms were fed were eliminated, unless feeding was demonstrated to b e independent of toxicity.

For the acute tests, only daphnids and midges (*Chironomus* sp.) have a specified starting age. Daphnids must be less than 24 hours of age at the start of the test. Midges in second or third insta r larvae were preferred, but midge tests starting at fourth instar were accepted. Although the starting age for all other organisms has not been specified, juvenile stages were preferred whenever they wer e available (unless another life stage is more sensitive to the chemical). All organisms should receive a 96-hour exposure period, except daphnids and midges, where 48 hours is the standard exposure period. The endpoint for daphnids and midges is the EC50 for immobilization. If this is not available, LC50

is used. For fish, the preferred endpoint is the EC50 for loss of equilibrium, immobilization, and/o r mortality. If those are not available, LC50 is used.

In chronic tests, the starting age, exposure duration, and endpoints may be different for daphnids and fish and for salmonids and non-salmonids. Daphnids must be less than 24 hours old at the start of the test, and the test should last at least 21 days. Endpoints are based on mortality and number of young per female.

For a given fish species, preference is given to the following types of chronic tests in the order as follows: full life cycle, partial life cycle, and early life stage. The less desirable chronic test is no t included in the calculation if a more desirable type is available.

B.1.4 Variation of Acute Values within the same genus

If the acute values within a species or among species in a genus differ by a factor of 10 or more, the higher values were excluded, and those that are within the factor of 10 range were used to attain a conservative estimate. If the acute concentrations of a given species differ by a factor of two or more among different life stages, the more sensitive life stage is used to protect the organisms in all life stages.

B.1.5 ACR Considerations

If the acute chronic ratios (ACRs) for a chemical differ by more than a factor of 10, the tests were carefully examined to determine whether outliers should be rejected. ACRs from saltwater specie s should be used along with the fresh water ACRs when less than three ACRs from freshwater species are available. If the lowest GMAV is from larvae of barnacles, bivalves, lobsters, crabs, shrimp, o r abalones, the secondary acute chronic ratio (SACR) is assumed to be 2. If an ACR is less than 2 , acclimation may have occurred. The ACR is then set to 2.

Preference was given to acute and chronic tests done in the same study. If these are not available, an acute value with water characteristics similar to the chronic value was used. If values from similar water are not available, the GMAV of the species is used with the chronic value to derive an ACR. If multiple chronic values for a species are available but none are part of the same study as an acute test, the geometric mean of the chronic values was cal culated and used with the GMAV to derive an ACR for that species.

B.1.6 Acceptable exposure types and life stage used to derive ACR

For daphnids, renewal is required for chronic tests; while for acute tests, static exposure i s acceptable. All chronic test concentrations should be measured. The life stage of daphnids has to be 24 hours or younger at the start of both acute and chronic tests.

For fish, both acute and chronic tests requi re flow-through measured tests. For acute fish tests, the life stage of the organism should be juvenile.

B.1.7 Other considerations

Concentrations above the solubility of chemicals and "greater than" values were used only when at least one definitive concentration was available.

B.2 Calculation method

Tier II values are derived if fewer than eight of the acute data requirements or three chronic data requirements presented in EPA (1993a) are met. The eight acute data requirements include:

1. The family *Salmonidae* in the class *Osteichthyes*
2. One other family (preferably a commercially, or recreationally important, warmwater species) in the class *Osteichthyes* (e.g., bluegill, channel catfish, etc.)
3. A third family in the phylum *Chordata* (e.g., fish, amphibian, etc.)
4. A planktonic crustacean (e.g., a cladocceran, copepod, etc.)
5. A benthic crustacean (e.g., ostracod, isopod, amphipod, crayfish, etc.)
6. An insect (e.g., mayfly, dragonfly, damselfly, stonefly, caddisfly, mosquito, midge, etc.)
7. A family in a phylum other than *Arthropoda* or *Chordata* (e.g., *Rotifera*, *Annelida*, *Mollusca*, etc.)
8. A family in any order of insect or any phylum not already represented

If all of these data requirements are not met, then an FAV is calculated. The FAV is a Tier I criterion, and its derivation is documented in Stephan et al. (1985) and in Appendix A of EPA (1993a). The FAV, however, is used in the derivation of the SCV if the chronic data requirements are not met.

Tier II values, as mentioned previously, are calculated when the data requirements are not met. The first calculation of the Tier II criteria is the SAV. The SAV is derived by taking the lowest genus mean acute value (GMAV) for any of the genera present and dividing it by a Final Acute Value Factor (FAVF). The FAVF is selected from Table B.1 where n is the number of the eight acute data requirements that are satisfied. FAVFs are selected from the two columns depending on whether an acute value (LC50 or EC50) for a daphnid is included in the data set.

Once the SAV is calculated, the Secondary Acute-Chronic Ratio (SACR) is derived. If three or more Acute-Chronic Ratios (ACRs) are present, then the SACR is determined by finding the geometric mean of the ACRs. There must be at least three ACRs. If there are not three chronic values from the literature, then a default value of 17.9 (EPA 1991) is used until the total number of ACRs is three. If multiple ACRs are given for the same genus, then the geometric mean of those ACRs must be calculated. This genus mean ACR can then be used in the derivation of the SACR. Therefore, several members of the same genus can only present one value towards the mandatory three. If no ACRs are given, then the SACR is 17.9.

The final calculation for Tier II values is the derivation of an SCV. The SCV is calculated by dividing the FAV or SAV by the SACR.

Table B.1. Factors for estimation of the Tier II values (EPA 1993 and Stephan 1991)

Number of GMAVs[a]	Factor for data sets that include an acute value for a daphnid[b]	Factors for data sets that do not include an acute value for a daphnid[b]
1	20.5	242
2	13.2	64.8
3	8.6	36.2
4	6.5	20.1
5	5.0	12.9
6	4.0	9.2
7	3.6	7.2

[a] GMAV is Genus Mean Acute Value
[b] Daphnids includes members of the genera *Daphnia, Ceriodaphnia,* and *Simocephalus.*

Appendix C

TABLE SHOWING CONCENTRATIONS ESTIMATED TO CAUSE A 20% REDUCTION IN THE RECRUIT ABUNDANCE OF LARGEMOUTH BASS, WITH UPPER AND LOWER 95% CONFIDENCE BOUNDS

Table C.1. Concentrations estimated to cause a 20% reduction in the recruit abundance of largemouth bass, with upper and lower 95% confidence bounds. All units are ug/L

Chemical	Test Species	Test Type	Lower 95% CL	Median	Upper 95%CL	Source
Ammonia	Fathead minnow	Chronic	3.98	100	1585	Mayes et al. 1986
	Fathead minnow	Chronic	3.98	32	200	Thurston et al. 1986
Antimony	Fathead minnow	Acute	5.01	79	501	EPA 1980b
Arsenic III	Fathead minnow	Chronic	100	1995	31623	Call et al. 1983
Arsenic V	Fathead minnow	Acute	20	159	1000	EPA 1985a
	Rainbow trout	Acute	10	100	501	EPA 1985a
	Mosquitofish	Acute	32	398	2512	EPA 1985a
Beryllium	Fathead minnow	Acute	0.35	7.08	40	EPA 1980f
	Bluegill	Acute	2.00	32	126	EPA 1980f
	Flagfish	Acute	2.00	32	126	EPA 1980f
	Guppy	Acute	1.58	25	126	EPA 1980f
Cadmium	Fathead minnow	Chronic	1	10	79	Pickering and Gast 1972
	Bluegill	Chronic	1.99	13	50	Eaton 1974
	Brook trout	Chronic	0.13	1.26	6.31	Benoit et al. 1976
	Brook trout	Chronic	0.32	3.16	25	Sauter et al. 1976
	Flagfish	Chronic	0.63	3.98	50	Carlson et al. 1982
	Flagfish	Chronic	0.79	3.16	7.94	Spehar 1976
Chromium III	Rainbow trout	Chronic	13	126	1000	Stevens and Chapman 1984
Chromium VI	Fathead minnow	Chronic	25	158	1260	Pickering 1980
	Rainbow trout	Chronic	100	631	5010	Sauter et al. 1976
Cobalt	Fathead minnow	Acute	0.16	3.98	32	Lind et al. 1978
Copper	Fathead minnow	Chronic	0.40	3.98	40	Mount 1968
	Fathead minnow	Chronic	0.32	3.16	16	Mount and Stephan 1969
	Bluegill	Chronic	1.995	13	50	Benoit 1975
	Brook trout	Chronic	1	3.98	16	McKim and Benoit 1971
	Brook trout	Chronic	1	5.01	40	Sauter et al. 1976
	Coho salmon	Chronic	3.16	32	316	Hazel and Meith 1970

Table C.1. (continued)

Chemical	Test Species	Test Type	Lower 95% CL	Median	Upper 95%CL	Source
	Rainbow trout	Chronic	3.98	32	200	Seim et al. 1984
Cyanide	Fathead minnow	Chronic	0.20	2.51	16	Smith et al. 1979
	Atlantic Salmon	Chronic	1.99	16	200	Leduc 1978
	Bluegill	Chronic	5.01	25	158	Smith et al. 1979
	Brook trout	Chronic	1.58	13	79	Smith et al. 1979
Lead	Brook trout	Chronic	13	50	316	Holcombe et al. 1976
	Rainbow trout	Chronic	13	100	631	Sauter et al. 1976
Manganese	Fathead minnow	Acute	11	112	794	Kimball n.d.
Mercury, inorganic	Fathead minnow	Chronic	0.04	0.79	13	Call et al. 1983
	Fathead minnow	Chronic	0.01	0.13	3.16	Snarski and Olson 1982
Mercury, methyl	Rainbow trout	Acute	0.004	0.16	1.26	EPA 1985e
	Brook trout	Acute	0.02	0.50	3.98	EPA 1985e
Nickel	Fathead minnow	Chronic	32	126	501	Pickering 1974
	Rainbow trout	Chronic	13	63	398	Nebeker et al. 1985
	Rainbow trout	Chronic	126	1260	15800	Nebeker et al. 1985
Silver	Fathead minnow	Chronic	0.01	0.1	1	Holcombe et al. 1983
	Rainbow trout	Chronic	0.1	1	7.94	Nebeker et al. 1983
Thallium	Fathead minnow	Acute	0.25	4.47	40	EPA 1980bb
	Bluegill	Acute	73	1000	6310	EPA 1980bb
Uranium	Fathead minnow	Acute	0.398	10	50	Cushman et al. 1977
	Fathead minnow	Acute	0.501	10	50	Cushman et al. 1977
	Fathead minnow	Acute	0.631	13	79	Cushman et al. 1977
	Fathead minnow	Acute	32	398	3980	Cushman et al. 1977
Vanadium	Fathead minnow	Acute	0.28	5.01	40	Kimball n.d.
	Brook trout	Acute	5.01	63	398	Ernst and Garside 1987
	Flagfish	Acute	10	100	501	Holdway and Sprague 1979
Zinc	Fathead minnow	Chronic	3.98	40	316	Benoit and Holcombe 1978

Table C.1. (continued)

Chemical	Test Species	Test Type	Lower 95% CL	Median	Upper 95%CL	Source
	Fathead minnow	Chronic	3.16	40	316	Brungs 1969
	Coho salmon	Chronic	16	126	794	Finlayson and Verrue 1980
	Flagfish	Chronic	6.31	32	126	Spehar 1976
	Rainbow trout	Chronic	40	501	5010	Sinley et al. 1974
Zirconium	Fathead minnow	Acute	3.16	50	316	Cushman et al. 1977
	Fathead minnow	Acute	3.16	50	398	Cushman et al. 1977
	Fathead minnow	Acute	32	398	3160	Cushman et al. 1977
	Fathead minnow	Acute	63	794	6310	Cushman et al. 1977
	Bluegill	Acute	10	126	501	Cushman et al. 1977
	Bluegill	Acute	200	2510	15800	Cushman et al. 1977
Organics						
AC 222,705	Fathead minnow	Chronic	0.0006	0.01	0.063	Spehar et al. 1983
Acetone	Fathead minnow	Acute	1780	19900	25100	AQUIRE[a]
	Bluegill	Acute	3160	50100	501000	AQUIRE[a]
	Rainbow trout	Acute	1260	31600	316000	AQUIRE[a]
	Mosquitofish	Acute	631	10000	100000	AQUIRE[a]
AG thiosulfate complex	Fathead minnow	Chronic	1000	10000	79400	LeBlanc et al. 1984
Aldicarb	Fathead minnow	Chronic	3.16	50	631	Pickering and Giliam 1982
Atrazine	Brook trout	Chronic	100	1000	12600	Macek et al. 1976b
Benzene	Fathead minnow	Acute	10	100	794	EPA 1980d
	Bluegill	Acute	13	158	1000	EPA 1980d
	Rainbow trout	Acute	3.16	40	316	EPA 1980d
	Mosquitofish	Acute	200	3160	25100	EPA 1980d
	Guppy	Acute	32	316	1580	EPA 1980d
Benzidene	Rainbow trout	Acute	5.01	63	398	EPA 1980c
	Lake trout	Acute	3.16	40	251	EPA 1980c
	Flagfish	Acute	10	126	794	EPA 1980c
Benzoic acid	Mosquitofish	Acute	126	1260	10000	AQUIRE[a]
Benzyl alcohol	Fathead minnow	Acute	16	1780	12600	AQUIRE[a]
	Bluegill	Acute	6.31	79	398	AQUIRE[a]
Bis(2-ethylhexyl)phthalate Rainbow trout		Acute	100	1000	7940	AQUIRE[a]
	Largemouth bass	Acute	25	316	1580	AQUIRE[a]

Table C.1. (continued)

Chemical	Test Species	Test Type	Lower 95% CL	Median	Upper 95%CL	Source
	Channel catfish	Acute	0.006	0.40	6.31	AQUIRE[a]
2-Butanone	Fathead minnow	Acute	501	10000	100000	AQUIRE[a]
	Mosquitofish	Acute	1990	31600	398000	AQUIRE[a]
Captan	Fathead minnow	Chronic	0.32	3.16	20	Hermanutz et al. 1973
Carbaryl	Fathead minnow	Chronic	3.16	32	1000	Carlson 1971
Carbon disulfide	Mosquitofish	Acute	100	1000	7940	AQUIRE[a]
Carbon tetrachloride	Fathead minnow	Acute	11	126	1260	EPA 1980h
	Bluegill	Acute	40	398	3160	EPA 1980h
Chloramine	Fathead minnow	Chronic	0.32	3.16	13	Arthur and Eaton 1971
Chlordane	Bluegill	Chronic	0.13	0.40	2.51	Cardwell et al. 1977
	Brook trout	Chronic	0.20	1.26	7.94	Cardwell et al. 1977
Chlorobenzene	Fathead minnow	Acute	11	112	794	EPA 1980j
	Bluegill	Acute	10	126	1000	EPA 1980j
	Guppy	Acute	32	316	2510	EPA 1980j
Chloroform	Bluegill	Acute	79	794	5010	EPA 1980l
	Rainbow trout	Acute	40	398	3160	EPA 1980l
p,p'DDD	Fathead minnow	Acute	0.79	13	100	AQUIRE[a]
	Bluegill	Acute	0.002	0.1	1	AQUIRE[a]
	Rainbow trout	Acute	0.02	0.40	3.16	AQUIRE[a]
	Largemouth bass	Acute	0.003	0.13	1	AQUIRE[a]
	Channel catfish	Acute	0.025	1.26	16	AQUIRE[a]
2,4-D Butoxyethanol ester	Coho salmon	Chronic	10	100	1260	Finlayson and Verrue 1985
Diazinon	Fathead minnow	Chronic	0.32	3.16	25	Allison and Hermanutz 1977
	Flagfish	Chronic	10	50	316	Allison and Hermanutz 1977
Di-n-butyl phthalate	Fathead minnow	Chronic	13	251	3980	McCarthy and Whitmore 1985
2,6-Dichlorobenzamide	Rainbow trout	Chronic	1260	12600	50100	Van Leeuwen and Maas 1985
1,3-Dichlorobenzene	Fathead minnow	Chronic	316	1585	15849	Ahmad et al. 1984

Table C.1. (continued)

Chemical	Test Species	Test Type	Lower 95% CL	Median	Upper 95%CL	Source
1,4-Dichlorobenzene	Fathead minnow	Chronic	32	398	6310	Ahmad et al. 1984
1,1-Dichloroethane	Guppy	Acute	158	1580	12600	AQUIRE[a]
1,2-Dichloroethane	Fathead minnow	Acute	40	398	3160	EPA 1980k
	Bluegill	Acute	316	3980	31600	EPA 1980k
1,1-Dichloroethene	Fathead minnow	Acute	40	398	3160	EPA 1980n
	Bluegill	Acute	50	501	3980	EPA 1980n
2,4-Dichlorophenol	Fathead minnow	Chronic	32	200	1580	Holcombe et al. 1982
1,2-Dichloropropane	Fathead minnow	Chronic	398	3980	39800	Benoit et al. 1982
1,3-Dichloropropane	Fathead minnow	Chronic	501	5010	50100	Benoit et al. 1982
1,3-Dichloropropene	Bluegill	Acute	3.16	40	251	EPA 1980o
Diethyl phthalate	Bluegill	Acute	79	1000	6310	AQUIRE[a]
2,4-Dimethylphenol	Fathead minnow	Chronic	100	1260	19900	Holcombe et al. 1982
Dimethyl phthalate	Rainbow trout	Chronic	0.004	0.04	0.40	Ward and Boeri 1991b
1,3-Dinitrobenzene	Rainbow trout	Chronic	100	1000	7940	Van Der Schalie 1983
	Rainbow trout	Chronic	63	794	6310	Van Der Schalie 1983
Dinoseb	Fathead minnow	Chronic	0.13	3.16	40	Call et al. 1983
Di-n-octyl phthalate	Fathead minnow	Chronic	200	1990	39800	McCarthy and Whitmore 1985
Diuron	Fathead minnow	Chronic	1	16	158	Call et al. 1983
Dursban	Fathead minnow	Chronic	0.002	0.032	0.20	Jarvinen et al. 1983
DNBP	Rainbow trout	Chronic	0.00004	0.0004	0.005	Ward and Boeri 1991a
Endrin	Fathead minnow	Chronic	0.005	0.13	1.58	Carlson et al. 1982
Endosulfan	Fathead minnow	Chronic	0.002	0.016	0.13	Macek et al. 1976b
Ethyl benzene	Fathead minnow	Acute	10	158	1000	EPA 1980p
	Bluegill	Acute	50	501	3980	EPA 1980p
	Guppy	Acute	79	794	5010	EPA 1980p
Fenitrothion	Fathead minnow	Chronic	0.1	126	1990	Kleiner et al. 1984

Table C.1. (continued)

Chemical	Test Species	Test Type	Lower 95% CL	Median	Upper 95%CL	Source
Fluoranthene	Bluegill	Acute	2.00	32	126	EPA 1980q
Fluridone	Fathead minnow	Chronic	32	398	10000	Hamelink et al. 1986
Fonofos	Fathead minnow	Chronic	3.16	20	158	Pickering and Giliam 1982
Guthion	Fathead minnow	Chronic	0.013	0.13	3.98	Adelman et al. 1976
Heptachlor	Fathead minnow	Chronic	0.01	0.1	0.63	Macek et al. 1976b
Hexachlorobutadiene	Fathead minnow	Chronic	0.32	3.98	63	Benoit et al. 1982
Hexachlorocyclohexane (lindane)	Bluegill Macek et al. 1976a	Chronic	0.16	1	6.31	
Hexachloroethane	Fathead minnow	Chronic	3.98	100	1580	Ahmad et al. 1984
2-Hexanone	Fathead minnow	Acute	100	1260	12600	AQUIRE[a]
Kelthane	Fathead minnow	Chronic	0.32	7.94	100	Spehar et al. 1982
LAS 11.2	Fathead minnow	Chronic	126	1580	25100	Holman et al. 1980
LAS 11.7	Fathead minnow	Chronic	13	200	2510	Holman et al. 1980
LAS Mixture	Fathead minnow	Chronic	20	316	1580	Pickering and Thatcher 1970
Malathion	Flagfish	Chronic	3.162	20	126	Hermanutz 1978
1-Methylnaphthalene	Fathead minnow	Acute	1.78	31.62	200	AQUIRE[a]
4-Methyl-2-pentanone	Fathead minnow	Acute	141	1580	15800	AQUIRE[a]
2-Methylphenol	Fathead minnow	Acute	3.98	40	398	AQUIRE[a]
	Bluegill	Acute	13	126	1000	AQUIRE[a]
	Rainbow trout	Acute	6.31	79	398	AQUIRE[a]
Methylene chloride	Fathead minnow	Acute	63.10	1000	10000	AQUIRE[a]
	Bluegill	Acute	158	1580	12600	AQUIRE[a]
Naphthalene	Fathead minnow	Chronic	73	1000	12600	DeGraeve et al. 1982
4-Nitrophenol	Fathead minnow	Acute	13	159	1260	AQUIRE[a]
	Bluegill	Acute	3.98	50	316	AQUIRE[a]
	Rainbow trout	Acute	6.31	79	398	AQUIRE[a]

Table C.1. (continued)

Chemical	Test Species	Test Type	Lower 95% CL	Median	Upper 95%CL	Source
	Channel catfish	Acute	0.79	20	200	AQUIRE[a]
N-nitrosodiphenylamine	Bluegill	Acute	3.16	40	251	AQUIRE[a]
PCBs: Aroclor 1221	Cutthroat trout	Acute	0.63	10	50	AQUIRE[a]
PCBs: Aroclor 1232	Cutthroat trout	Acute	1.26	16	126	AQUIRE[a]
PCBs: Aroclor 1242	Fathead minnow	Chronic	0.13	1.58	40	Nebeker et al. 1974
PCBs: Aroclor 1248	Flagfish	Chronic	0.13	1.26	7.94	Nebeker et al. 1974
PCBs: Aroclor 1254	Fathead minnow	Chronic	0.1	0.63	7.94	Nebeker et al. 1974
PCBs: Aroclor 1260	Cutthroat trout	Acute	32	316	2510	AQUIRE[a]
Pentachloroethane	Fathead minnow	Chronic	100	1260	19900	Ahmad et al. 1984
Pentachlorophenol	Fathead minnow	Chronic	1.58	32	501	Holcombe et al. 1982
	Fathead minnow	Chronic	0.32	1.99	20	Spehar et al. 1985
	Fathead minnow	Chronic	0.63	6.31	63	Spehar et al. 1985
	Fathead minnow	Chronic	1.26	13	126	Spehar et al. 1985
	Fathead minnow	Chronic	1.99	16	158	Spehar et al. 1985
	Rainbow trout	Chronic	1.58	10	50	DominguezandChapman 1984
1-Pentanol	Bluegill	Acute	398	5010	39800	AQUIRE[a]
	Rainbow trout	Acute	200	2510	19900	AQUIRE[a]
Permethrin	Fathead minnow	Chronic	0.02	0.40	5.01	Spehar et al. 1983
Phenol	Fathead minnow	Chronic	1000	12600	199000	Degraeve et al. 1980
	Rainbow trout	Chronic	126	1580	15800	Degraeve et al. 1980
Propanil	Fathead minnow	Chronic	0.01	0.1	0.63	Call et al. 1983
2-Propanol	Fathead minnow	Acute	200	3160	31600	AQUIRE[a]
Pydrin	Fathead minnow	Chronic	0.006	0.13	1.58	Spehar et al. 1982
1,1,2,2-Tetrachloroethane	Fathead minnow	Chronic	251	1580	50100	Ahmad et al. 1984
Tetrachloroethene	Fathead minnow	Acute	3.16	50	398	EPA 1980aa
	Bluegill	Acute	10	100	501	EPA 1980aa
	Rainbow trout	Acute	3.16	40	316	EPA 1980aa

Table C.1. (continued)

Chemical	Test Species	Test Type	Lower 95% CL	Median	Upper 95%CL	Source
Tetrachloroethylene	Fathead minnow	Chronic	40	1000	12600	Ahmad et al. 1984
Toluene	Fathead minnow	Acute	10	126	1000	EPA 1980cc
	Bluegill	Acute	13	126	1000	EPA 1980cc
	Guppy	Acute	50	501	3160	EPA 1980cc
Toxaphene	Brook trout	Chronic	0.01	0.063	0.40	Mayer et al. 1975
1,1,1-Trichloroethane	Fathead minnow	Acute	18	200	1580	AQUIRE[a]
	Bluegill	Acute	32	316	1580	AQUIRE[a]
1,1,2-Trichloroethane	Fathead minnow	Chronic	1000	15800	251000	Ahmad et al. 1984
Trichloroethene	Fathead minnow	Acute	13	158	1260	EPA 1980dd
	Flagfish	Acute	20	251	1260	Smith et al. 1991
	Bluegill	Acute	32	316	1990	EPA 1980dd
2-Trifluoromethyl-4-phenol	Brook trout	Chronic	100	501	3160	Dwyer et al. 1978
Trifluralin	Fathead minnow	Chronic	0.063	0.63	7.94	Macek et al. 1976b
1,3,5-Trinitrobenzene	Fathead minnow	Chronic	3.16	50	631	Van der Schalie 1983
	Rainbow trout	Chronic	13	158	1580	Van der Schalie 1983
	Rainbow trout	Chronic	13	158	1580	Van der Schalie 1983
Vinyl acetate	Fathead minnow	Acute	3.16	40	398	AQUIRE[a]
	Bluegill	Acute	10	126	794	AQUIRE[a]
	Guppy	Acute	25	251	1580	AQUIRE[a]

[a] EPA (n.d.)

Letter From Dan Flory, Chief, State Water Project Analysis Office

STATE OF CALIFORNIA -- THE RESOURCES AGENCY

DEPARTMENT OF WATER RESOURCES
1416 NINTH STREET, P.O. BOX 942836
SACRAMENTO, CA 94236-0001
(916) 653-5791

GRAY DAVIS, *Governor*

RECEIVED
JUL 18 2003
By

JUL 16 2003

Mr. Dan Masnada
General Manager
Castaic Lake Water Agency
27234 Bouquet Canyon Road
Santa Clarita, California 91350

Dear Mr. Masnada:

Enclosed for your records are the following fully executed documents:

1. A copy of the Settlement Agreement dated May 5, 2003 that settled Planning and Conservation League, et al. v. Department of Water Resources. Your agency's original signature is inserted within your copy.

2. An original of the Attachment A Amendment to your State Water Project water supply contract.

3. An original of the Cost Allocation Agreement which provides that the litigation costs will be allocated as incurred based on each contractor's proportion of total maximum Table A Amounts as of January 1, 2003.

If you need additional information or would like to discuss this further, please call me at (916) 653-4313.

Sincerely,

Robert B. Cooke

for Dan Flory, Chief
State Water Project Analysis Office

Enclosures

SETTLEMENT AGREEMENT

by and among

Planning and Conservation League, Plumas County Flood Control and Water Conservation District, Citizens Planning Association of Santa Barbara County, Inc.

and

The State of California Department of Water Resources, Central Coast Water Authority, Kern Water Bank Authority and those State Water Project Contractors identified herein.

MAY 0 5 2003
_____, 2003

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Exhibit 3-B	Proposed Writ of Mandate
Exhibit 4	Section VI Trust Account Agreement

SETTLEMENT AGREEMENT

This SETTLEMENT AGREEMENT is entered into as of MAY 0 5 2003, 2003, by and among Planning and Conservation League, Plumas County Flood Control and Water Conservation District, Citizens Planning Association of Santa Barbara County, Inc., The State of California Department of Water Resources, Central Coast Water Authority, Kern Water Bank Authority and those SWP Contractors who have executed this Settlement Agreement. Certain terms used herein are defined in Section I.

RECITALS

WHEREAS, in 1951, the State of California Legislature authorized the construction of the State Water Project ("SWP");

WHEREAS, eight years later, the Legislature authorized the submission for voter approval of a general obligation bond issue to build the SWP, which voters subsequently approved (California Water Code, Section 12930 et seq.);

WHEREAS, commencing in the early 1960's, DWR, as operator of the SWP, entered into certain SWP Contracts with various water districts throughout California;

WHEREAS, in 1994, as a result of disputes arising from water shortages experienced during an extended drought period, DWR and certain of the SWP Contractors entered into an agreement known as the Monterey Agreement and thereafter implemented the terms of the Monterey Agreement by execution of the so-called Monterey Amendments;

WHEREAS, pursuant to CEQA, the environmental impact report for the Monterey Amendments was prepared in 1995 by CCWA as "lead agency," and adopted by DWR as "responsible agency" (as those terms are defined in CEQA) (the **"1995 EIR"**);

WHEREAS, on December 27, 1995, PCL filed the PCL Complaint against DWR and CCWA challenging the sufficiency of the 1995 EIR;

WHEREAS, on February 12, 1996, Plaintiffs filed a First Amended Complaint adding the Validation Cause of Action;

WHEREAS, the trial court ultimately determined that although CCWA was not the appropriate lead agency for the 1995 EIR, such designation of CCWA was not fatal to the EIR, and ruled against Plaintiffs with respect to their challenge to the sufficiency of the 1995 EIR. The trial court also granted summary adjudication in favor of DWR and CCWA on the Validation Cause of Action. Plaintiffs appealed the trial court's rulings;

WHEREAS, in Planning and Conservation League v. Department of Water Resources, 83 Cal. App. 4th 892 (2000), the Court of Appeal held that (i) DWR, not CCWA, had the statutory duty to serve as lead agency, (ii) the trial court erred by finding CCWA's EIR sufficient despite its failure to discuss implementation of Article 18, subdivision (b) of the SWP Contracts, as a no-project alternative, (iii) said errors mandate preparation of a new EIR under the direction of DWR, and (iv) the trial court erroneously dismissed the challenge to DWR's transfer of title to the KWB Lands (the Validation Cause of Action) and execution of amended SWP Contracts for failure to name and serve indispensable parties. The Court of Appeal remanded the case to the trial court, ordering it to take the following five actions: (1) vacate the trial court's grant of the motion for summary adjudication of the Validation Cause

of Action; (2) issue a writ of mandate vacating the certification of the 1995 EIR; (3) determine the amount of attorney fees to be awarded Plaintiffs; (4) consider such orders it deems appropriate under Public Resources Code Section 21168.9(a) consistent with the views expressed in the Appellate Court's opinion; and (5) retain jurisdiction over the action until DWR, as lead agency, certifies an environmental impact report in accordance with CEQA standards and procedures, and the Superior Court determines that such environmental impact report meets the substantive requirements of CEQA;

WHEREAS, since the Court of Appeal ruling, representatives of the Parties to this Settlement Agreement have engaged in extensive settlement negotiations, mediated by retired Judge Daniel Weinstein, with the intent of avoiding further litigation and associated fees and providing for an effective way to cooperate in the preparation of a new environmental impact report and make such other improvements in the operation and responsiveness of the SWP as set forth in this Settlement Agreement;

WHEREAS, on July 22, 2002, an agreement was reached regarding the principles for a settlement; and

WHEREAS, the Parties now desire to formally enter into this Settlement Agreement.

AGREEMENT

NOW, THEREFORE, in exchange for the following covenants and agreements and other valuable and sufficient consideration, the receipt of which is acknowledged, the Parties agree as follows:

I. **Definitions**. Certain terms, as used in this Settlement Agreement, are defined as follows.

A. **"Attachment A Amendments"** means those amendments in the substantive form of Attachment A hereto (conformed to the format of each individual SWP Contract and the parties thereto), to be executed by DWR and the SWP Contractors who are signatories to this Settlement Agreement pursuant to and in accordance with the terms and conditions of this Settlement Agreement.

B. **"Attachment B Principles"** means those principles set forth in Attachment B hereto regarding SWP reliability.

C. **"Attachment C Guidelines"** means the guidelines set forth in Attachment C hereto regarding review of proposed permanent transfers of Annual Table A Amounts (as such latter term is used in the SWP Contracts).

D. **"Attachment D Principles"** means those principles set forth in Attachment D hereto regarding public participation in SWP Contract negotiations.

E. **"Attachment E Transfers"** means those water transfers identified on Attachment E hereto.

F. **"CEQA"** means the California Environmental Quality Act, California Public Resources Code Section 21000 et seq.

G. **"Citizens Planning Association"** means Citizens Planning Association of Santa Barbara County, Inc.

H. **"CCWA"** means Central Coast Water Authority.

I. **"Consent to Entry of Order Discharging Writ"** has the meaning given in Section VII(H)(1).

J. **"DWR"** means The State of California Department of Water Resources.

K. **"EIR Committee"** means a committee of no more than four (4) SWP Contractor representatives, and no more than four (4) Plaintiff representatives, chaired by a DWR representative, which has been formed for the purposes set forth in Section III(B).

L. **"HCP"** means the Habitat Conservation Plan/Natural Community Conservation Plan prepared for the Kern Water Bank Authority and approved through an Implementation Agreement dated October 2, 1997, with the United States Fish and Wildlife Service and California Department of Fish and Game.

M. **"Interim Implementation Order"** has the meaning given in Section VII(C).

N. **"JAMS Trust Account"** means the account established by DWR with, and maintained by, the Mediator for the purpose set forth in Section VI.

O. **"Kern-Castaic Transfer"** means the transfer of 41,000 acre-feet of water from Kern County Water Agency to the Castaic Lake Water Agency approved by DWR on March 31, 1999.

P. **"Kern Environmental Permits"** means the HCP and certain other permits, approvals and agreements relating to the Kern Water Bank, as set forth in and contemplated by the Addendum to the 1995 EIR, including those specified in Exhibit 2 hereto and similar, related permits, approvals and agreements.

Q. **"Kern Fan Element Transaction"** means DWR's transfer of the KWB Lands to Kern County Water Agency, as described in Article 52 of the Monterey

Amendments. Kern County Water Agency subsequently conveyed the KWB Lands to KWBA. Each of the stated conveyances occurred on August 9, 1996, based upon separate agreements dated December 13, 1995.

R. **"KWB Lands"** means the property known as the Kern Fan Element, as more specifically described in that certain Deed, executed by the Kern County Water Agency in favor of KWBA, dated August 9, 1996, and recorded in the Official Records of Kern County as Instrument No. 0196101606.

S. **"KWBA"** means Kern Water Bank Authority.

T. **"Mediator"** means retired Judge Daniel Weinstein, unless Judge Weinstein is unavailable, in which case the Mediator shall be another retired jurist mutually agreed to by DWR and the other members of the EIR Committee with respect to matters referred to the Mediator under Section III(H), and for all other matters another retired jurist approved by agreement of the Parties.

U. **"Mediation Issue"** means any issue relating exclusively to the compliance of the New EIR with any of the following requirements: (a) the requirements of CEQA; (b) the direction of the courts in the underlying litigation; or (c) the terms and conditions of this Settlement Agreement.

V. **"Monterey Agreement"** means the formal agreement, dated as of December 1, 1994, by and among DWR and certain SWP Contractors that memorializes fourteen principles to address the distribution of water during shortages and various other issues under the SWP Contracts.

W. **"Monterey Amendment"** means the amendment to the SWP Contracts entered into by DWR and certain SWP Contractors for purposes of implementing the Monterey Agreement.

X. **"New EIR"** has the meaning given in Section III.

Y. **"Party"** and **"Parties"** mean the signatories, individually and collectively, to this Settlement Agreement.

Z. **"PCL"** means Planning and Conservation League.

AA. **"PCL Complaint"** means the Complaint for Declaratory and Injunctive Relief and Petition for Writ of Mandate filed December 27, 1995, by PCL in the Superior Court, as amended and supplemented by the First Amended Complaint filed February 12, 1996.

BB. **"Plaintiffs"** means PCL, Citizens Planning Association and Plumas.

CC. **"Plaintiffs' Expenses Trust Account"** means the account maintained by JAMS for the purposes set forth in Section III(G).

DD. **"Plumas"** means Plumas County Flood Control and Water Conservation District.

EE. **"Plumas Amendment"** means an amendment to the Plumas SWP Contract to be entered into by DWR and Plumas pursuant to Section IV(C).

FF. **"Plumas Arrearages"** means any amount owed by Plumas to DWR under its SWP Contract that accrued prior to the resumption of payments by Plumas under Section IV(F).

GG. **"Return to Writ"** has the meaning given in Section VII(G).

HH. **"Rossmann"** means the Law Offices of Antonio Rossmann.

II. "**Section VI Trust Account Agreement**" means a trust account agreement regarding the disbursement by JAMS to Plaintiffs of those funds delivered by DWR pursuant to Section VI of this Settlement Agreement, the form of which agreement is attached hereto as Exhibit 4.

JJ. **"Superior Court"** means the Superior Court of the State of California, County of Sacramento.

KK. **"SWP"** means the State Water Project, officially called the State Water Resources Development System, as defined in Water Code Section 12931.

LL. **"SWP Contracts"** means those long-term contracts entered into by and between DWR, as the operator of the SWP, and individual SWP Contractors for the delivery of water from the SWP.

MM. **"SWP Contractors"** for purposes of this Settlement Agreement, means those contracting agencies identified in Table 1-6 of the DWR Bulletin 132-00, dated December 2001. All references to "SWP Contractors who are parties to this Settlement Agreement" are meant to exclude Plumas. Specific issues relating to Plumas are addressed in Section IV.

NN. **"Validation Cause of Action"** means the fifth cause of action of the PCL Complaint.

OO. **"Watershed Forum"** means a newly formed stakeholder group consisting of one or more representatives from each of Plumas, local community-based groups, DWR and the SWP Contractors who are parties to this Settlement Agreement, established for the purposes set forth in Section IV(B).

PP. **"Watershed Programs"** means programs, studies or projects approved by the Watershed Forum and implemented in pursuit of the goals set forth in Section IV, and other such activities approved by the Watershed Forum that are consistent with such purposes and goals.

QQ. **"1995 EIR"** means the Final Programmatic Environmental Impact Report for the Implementation of the Monterey Agreement Statement of Principles by State Water Project Contractors and the State of California Department of Water Resources for Potential Amendments to State Water Supply Contracts, prepared in October, 1995 by CCWA, as lead agency, and reviewed and considered in December 1995, by DWR, as a responsible agency, as each of those terms is defined in CEQA.

II. Administration of the State Water Project Pending New Environmental Impact Report and Discharge of Writ of Mandate.

Pending the Superior Court's issuance of an order discharging the writ of mandate in the underlying litigation, the Parties will jointly request that the Superior Court enter an order approving this Settlement Agreement, and an order, pursuant to California Public Resources Code Section 21168.9, authorizing on an interim basis the administration and operation of the SWP and the Kern Water Bank in accordance with the Monterey Amendments, the terms of this Settlement Agreement and the Attachment A Amendments, as more specifically set forth in Section VII of this Settlement Agreement.

III. New Environmental Impact Report

A. Preparation. As lead agency (as defined in CEQA), DWR shall cause a new environmental impact report to be prepared with respect to the proposed "project" (as that term is defined in Public Resources Code Section 21065 and Section

15378 of the CEQA Guidelines), in accordance with and as further described in Section III(C) below (the "**New EIR**").

B. EIR Committee. To effectuate the desire of the Parties that the New EIR be the product of a cooperative effort and comply with the requirements of CEQA and the direction of the courts in the underlying litigation, the EIR Committee has been formed to provide advice and recommendations to DWR in connection with the preparation of the draft and final versions of the New EIR.

C. New EIR Content. The proposed project to be analyzed in the New EIR will be specifically defined during the scoping process. Under all circumstances, in order to provide DWR, the responsible agencies, and the public with adequate disclosure to consider the potential environmental impacts of the Monterey Amendments, and the additional actions set forth in this Settlement Agreement, the environmental analysis in the New EIR shall evaluate, as components of the proposed project, the Monterey Amendments (including the provisions relating to the transfer of the KWB Lands) and the Attachment A Amendments. DWR shall ensure that the New EIR evaluates all proposed actions that are necessary to implement this Settlement Agreement. The New EIR shall include the following:

1. Information on water deliveries of the SWP over the relevant historical period (at least 1991 -2002), as well as data regarding the deliveries in the last extended drought (1987-1992), to be included in the description of the setting and the background for the proposed project;

2. As part of the CEQA-mandated "no-project" alternative analysis, and in light of the Court of Appeal's opinion, an analysis of the effect of pre-

Monterey Amendment SWP Contracts, including implementation of Article 18 therein. This analysis shall address, at a minimum, (a) the impacts that might result from application of the provisions of Article 18(b) of the SWP Contracts, as such provision existed prior to the Monterey Amendments, and (b) the related water delivery effects that might follow from any other provisions of the SWP Contracts;

3. Analysis of the potential environmental impacts of changes in SWP operations and deliveries resulting from implementation of the proposed project. If the proposed project results in modifications to the water sources relied upon for the SWP, those sources will be identified and the resulting environmental effects will be assessed;

4. Analysis of the potential environmental effects relating to (a) the Attachment E Transfers and (b) the Kern-Castaic Transfer, in each case as actions that relate to the potential environmental impacts of approving the Monterey Amendments; and

5. Analysis of the potential environmental effects relating to the implementation of this Settlement Agreement, including:

   a. Evaluation of the potential environmental impacts arising from the payments to Plumas as described in Section IV; and

   b. Analysis of the potential environmental effects relating to implementation of the provisions of this Settlement Agreement relating to the Kern Water Bank as discussed in Section V.

D. Acknowledgement and Agreement Regarding Attachment E Transfers. With respect to Section III(C)(4)(a), notwithstanding the analysis of the potential impacts of the Attachment E Transfers in the New EIR and without specifically endorsing or opposing those transfers or any prior environmental assessments of them, the Parties recognize that such water transfers are final. Each of the Parties agrees not to, and it shall be a condition to the initial and continuing effectiveness of this Settlement Agreement that Plaintiffs do not, hereafter challenge the effectiveness or validity of such water transfers.

E. Acknowledgement and Agreement Regarding Kern-Castaic Transfer. With respect to Section III(C)(4)(b) regarding the Kern-Castaic Transfer, the Parties recognize that such water transfer is subject to pending litigation in the Los Angeles County Superior Court following remand from the Second District Court of Appeal (*See* Friends of the Santa Clara River v. Castaic Lake Water Agency, 95 Cal. App. 4th 1373, 116 Cal. Rptr. 2d 54 (2002); *review denied* April 17, 2002). The Parties agree that jurisdiction with respect to that litigation should remain in that court and that nothing in this Settlement Agreement is intended to predispose the remedies or other actions that may occur in that pending litigation.

F. Acknowledgement and Agreement Regarding Kern Water Bank. With respect to Section III(C)(5)(b) relating to the Kern Water Bank, the Parties acknowledge that the Kern Water Bank is currently operating under the Kern Environmental Permits, which were entered into based on an Addendum to the 1995 EIR. The Parties recognize that the Addendum has been completed and agree not to challenge it in any manner. KWBA agrees that it will not rely on the Addendum

to the 1995 EIR for any new KWBA project to the extent that such reliance is based on data or analysis incorporated into the Addendum from the 1995 EIR. In addition, the New EIR shall include an independent study by DWR, as the lead agency, and the exercise of its judgment regarding the impacts related to the transfer, development, and operation of the Kern Water Bank in light of the Kern Environmental Permits. Such study shall identify SWP and any non-SWP sources of water deliveries to the Kern Water Bank. The views of the trustee agencies, as evidenced by the requirements of the HCP, will be used to provide guidance to DWR. Finally, the Parties agree that this Settlement Agreement is not intended to and shall not affect the continuing effectiveness of the Kern Environmental Permits.

G. Reimbursement of Plaintiffs' Expenses for Participation in the Preparation of New EIR.

1. *DWR Obligation to Reimburse Plaintiffs.* Subject to and in accordance with clauses (2) and (3), DWR will provide up to $300,000 to Plaintiffs for expenses actually incurred as needed to support Plaintiffs' participation in DWR's preparation of the New EIR, including service on the EIR Committee.

2. *Deposit into Trust Account.* The Parties acknowledge that in accordance with the principles of settlement, DWR caused to be deposited $300,000 into the Plaintiffs' Expenses Trust Account at JAMS on August 22, 2002.

3. *Disbursement of Funds to Plaintiffs.* Funds provided by DWR under this Section III(G) are available for disbursement and will be disbursed to

Plaintiffs by JAMS from the Plaintiffs' Expenses Trust Account in accordance with that certain Plaintiff's Expenses Trust Account Agreement dated August 15, 2002, attached hereto as Exhibit 1 and incorporated herein by this reference.

H. Disputes Regarding Mediation Issues.

1. *Referral to Director of DWR.* If the Plaintiffs' or SWP Contractors' representatives on the EIR Committee, or both, disagree with DWR's proposed approach with respect to a Mediation Issue, such representatives may refer the issue in writing to the Director of DWR.

2. *Referral to Mediator.* If (a) two-thirds of Plaintiffs' representatives or (b) three-fourths of the SWP Contractors' representatives, or both, disagree with the DWR Director's written decision with respect to a Mediation Issue (which issue shall have first been referred to the Director pursuant to Section III(H)(1)), such representative(s) may refer the issue in writing for consideration to the Mediator.

3. *Notices to Other Parties.* DWR shall inform the Parties to this Settlement Agreement of any referrals made pursuant to this Section III(H).

4. *Advisory Opinion by Mediator.* In the event of a referral as described above, the Mediator will consider the views of the representatives of the EIR Committee and the DWR Director, and will provide a written advisory opinion on the issue to the EIR Committee and DWR Director.

5. *Final Decision by DWR.* After receipt of an advisory opinion from the Mediator, the DWR Director shall make a final decision on the issue.

6. *Mediator's Costs and Expenses.*

a. *Referrals by Plaintiffs' Representatives*. On any matter referred to the Mediator by Plaintiffs' representatives on the EIR Committee, the costs of the Mediator's services will be borne one-third (1/3) by the Plaintiffs and two-thirds (2/3) by DWR.

b. *Referrals by SWP Contractors' Representatives*. For any referral by the SWP Contractors who are representatives on the EIR Committee, the SWP Contractors who are signatory to this Settlement Agreement will compensate the Mediator for his services.

c. *Frivolous or Harassing Referrals*. In the event of frivolous or harassing matters referred to him/her, the Mediator shall have the authority to award costs to the prevailing party, as well as reasonable attorney fees in accordance with Section IX of this Settlement Agreement.

I. Filing of New EIR upon Completion. Upon completion of the New EIR, in accordance with the procedure set forth in CEQA, and after final consideration by and good faith consultation with the EIR Committee, DWR shall cause the New EIR to be filed with the Superior Court as a return to the writ of mandate issued by such court in connection with this case.

IV. **Plumas Matters.**

A. Monetary Settlement.

1. *Agreement to Pay.* In accordance with the procedures and subject to the conditions described herein, DWR shall pay to Plumas the sum of $8,000,000.

2. *Schedule of Payments.*

a. *Annual Payments.* A total sum of Four Million Dollars ($4,000,000) shall be paid in accordance with this Section IV(A)(2)(a). DWR shall pay to Plumas One Million Dollars ($1,000,000) within 30 days after approval of this Settlement Agreement by the Superior Court (or the first business day after said 30th day if the 30th day is not a business day).

On each anniversary date of the first $1,000,000 payment until (and inclusive of) the third (3rd) anniversary, DWR shall pay to Plumas One Million Dollars ($1,000,000).

b. *Post Notice-of-Determination Payments.* Subject to Section IV(A)(2)(c), the remaining Four Million Dollars ($4,000,000) shall be paid in four annual installments of $1,000,000 each, beginning on the later to occur of: (1) the date that is seventy days after the Notice of Determination (as defined in CEQA) has been filed for the New EIR (or the first business day after said 70th day if the 70th day is not a business day); or (2) the date that is one year after the last payment made under Section IV(A)(2)(a).

c. *Effects of Litigation on Payment Obligation.*

(1) Suspension of Payment Obligation. If litigation is commenced by anyone challenging CEQA compliance for, or the validity of, any Monterey Amendment (or any portion thereof), including matters pertaining to the Kern Fan Element Transaction, the monetary obligations of DWR under Section IV(A)(2)(b) shall be suspended until the date that is forty-five (45) days after final conclusion of that litigation (without further right of appeal) in a manner that does not invalidate any Monterey Amendment (or any portion thereof) or the Kern Fan Element Transaction. Within thirty (30) days after final conclusion of any such litigation in said manner, DWR shall pay to Plumas any amounts then owed by DWR under this Section IV.

(2) Termination of Payment Obligation. If any such litigation results in a final judgment (without further right of appeal) that invalidates any Monterey Amendment (or any portion thereof) or the Kern Fan Element Transaction, the obligation for payments under Section IV(A)(2)(b) shall automatically terminate.

3. *Use of Funds.*

a. *Funding of Watershed Programs*. Plumas shall apply a majority of all funds received each year pursuant to Section IV(A) to Watershed Programs.

b. *Balance of Funds to General Purposes*. Plumas may apply the balance of funds received each year to other district-related purposes, as determined by Plumas with due consideration for the needs of the Watershed Forum.

c. *Annual Carry-Over*. Funds received but not spent in any given year may be carried over to the succeeding year(s), provided, however, that any such funds shall continue to be subject to the restrictions under Sections IV(A)(3)(a) and (b).

B. Watershed Forum and Programs.

1. *Formation of Watershed Forum.* Prior to the date hereof, the Watershed Forum was formed. The Watershed Forum is locally driven but includes the active and committed participation of the SWP Contractor and DWR members of the Forum.

2. *Purpose and Goals*

a. *Generally*. The Watershed Forum's purpose is to implement watershed management and restoration activities for the mutual benefit of Plumas and the SWP. Forum activities include design of, participation in, implementation of, and review of studies and demonstration projects related to watershed restoration.

b. *Specific Goals*. The specific focus of the Watershed Forum's activities is to implement programs designed to achieve the following benefits:

(1) Improved retention (storage) of water for augmented base-flow in streams;

(2) Improved water quality (specifically, reduced sedimentation), and stream bank protection;

(3) Improved upland vegetative management; and

(4) Improved groundwater retention/storage in major aquifers.

c. *Emphasis on Feather River Watershed*. The Watershed Forum specifically promotes and encourages restoration of the Feather River watershed, with particular focus on the drainages of the three SWP Upper Feather River reservoirs. The Watershed Forum seeks to obtain funding and investments in the Feather River watershed in order to facilitate programs that will generate significant local environmental and water supply benefits.

d. *Technical Advisors*. The Watershed Forum will retain a committee of technical advisors to assist the Watershed Forum in identifying activities that can provide timely and practical benefits based on the best scientific and technical information.

3. *General Watershed Forum Issues*

a. *Cooperation*. The Watershed Forum shall seek to foster mutual cooperation and support among Plumas, DWR and other SWP Contractors in achieving local and state-wide goals.

b. *Dispute Resolution*. Any disputes between members of the Watershed Forum, or between Plumas and the Watershed Forum, with respect to Watershed Forum activities and funding will be resolved by retention of a third party neutral expert reasonably acceptable to all members of the Watershed Forum.

c. *Interruption in Funding*. If payments by DWR are interrupted due to litigation challenging any Monterey Amendment (or any portion thereof) or the Kern Fan Element Transaction, as set forth in Section IV(A)(2)(c), the Parties shall, depending on the success of the watershed work and the litigation situation, give due consideration to the importance of funding watershed work in consecutive years without interruption.

d. *No Limitation on DWR Obligations*. DWR's participation in the Watershed Forum shall not compromise DWR's obligation to be impartial in the distribution of matching funds from public funding sources under its jurisdiction.

C. Plumas Amendment. Upon completion of any necessary environmental review(s), DWR shall offer to Plumas the Plumas Amendment which shall include (1) DWR's agreement that water supplied to Plumas shall be determined

based on availability of water supply from Lake Davis, and (2) DWR's agreement that water deliveries to Plumas will not be reduced during SWP shortages so long as sufficient water is available from Lake Davis. The Plumas Amendment shall apply only to the maximum Table A amount in Plumas' SWP Contract on the date that this Settlement Agreement is executed. The Plumas Amendment shall also contain assurances that Plumas' claim to area-of-origin rights will not be affected by the Amendment. The Plumas Amendment may also contain the Monterey Amendment, as modified to reflect current conditions relating to Plumas, and the Attachment A Amendments.

D. Dialogue between Plumas and DWR. Subject to Plumas' execution of this Settlement Agreement and compliance with the terms herein, DWR agrees to confer with Plumas to develop strategies and actions for the management, operation, and control of SWP facilities in Plumas County in order to increase water supply, recreational, and environmental benefits to Plumas from such facilities. In furtherance thereof, DWR and Plumas agree to evaluate and give due consideration to:

1. the potential re-operation of SWP facilities in Plumas County to increase the water supply available to Plumas;
2. the potential release of water from reservoirs, as part of planned operations, for Plumas' benefit; and
3. the appropriateness of certain charges in Plumas' SWP Contract in light of current circumstances and whether amendments thereto are warranted.

E. Future Relations. Upon the Superior Court's approval of this Settlement Agreement, Plumas agrees to maintain a positive relationship with the SWP Contractors and DWR, and to support the Monterey Amendments and the Attachment A Amendments. Plumas reserves the right to review critically the New EIR.

F. Contract Payments. Plumas shall resume and maintain timely payments under its SWP Contract. Such payments shall begin upon the earlier of (1) the first payment under Section IV(A)(2)(a) or (2) the date that Plumas or its member unit resumes taking water from Lake Davis, and shall cover the period beginning January 1 of that same year. DWR will not seek to collect the amount of any Plumas Arrearages.

V. **Kern Water Bank.**

A. Title. KWBA shall retain title to the KWB Lands. KWBA may continue to operate and administer the KWB Lands including the water bank, subject to the restrictions herein.

B. Restrictions on Use of KWB Lands.

1. *Continued Use as Water Bank.* As noted in Section III(F), the KWB Lands are subject to the HCP, which documents a plan to accomplish, among other things, certain water conservation and environmental objectives. Except as provided in Sections V(B)(2) and (3), the KWB Lands shall continue to be used for the operation of a water bank and other uses authorized by the HCP, so long as such use remains legally and economically feasible.

2. *Use of KWB Lands for other SWP Purposes.* If (a) the use of the KWB Lands as a water bank is determined by KWBA to no longer be economically and/or legally feasible, (b) DWR concurs with such determination, (c) the KWB Lands can be feasibly used for any of the SWP purposes provided in California Water Code §12930 et seq., and (d) DWR and KWBA agree on terms and conditions for such use, then the KWB Lands may be so used.

3. *Use of KWB Lands for other than SWP Purposes.* If (a) the KWB Lands can not feasibly be used for any of the SWP purposes provided in California Water Code §12930 et seq., or (b) KWBA and DWR are unable to agree on terms and conditions for such use, or (c) DWR determines not to use the KWB Lands for such purposes, then KWBA may transfer or develop all or a portion of the KWB Lands for alternative use(s), provided that any alternate use will not result in unmitigated environmental impacts. A finding by KWBA that such impacts will not occur will be subject to DWR's concurrence.

4. *The 490 Acres.* The approximately 490 acres currently subject to restrictions in the HCP, permitting use thereof as Conservation Bank Lands (as defined in the HCP), but which may be developed under the HCP, will continue to be subject to the restrictions in the HCP but may not be developed.

5. *Application of HCP Restrictions.* All of the KWB Lands, including the 490 acres, will remain subject to the restrictions contained in the HCP.

The restrictions will remain in effect regardless of amendment to, or termination of, the HCP, unless, in the event of such amendment or termination, DWR, after consultation with Plaintiffs, finds that such amendment or termination will not result in unmitigated environmental impacts. The provisions of this clause shall not apply to "Minor Amendments" to the HCP as that term is utilized in the HCP.

6. *Land Use Changes Subject to CEQA*. Changes to the allowable uses of the KWB Lands shall be subject to appropriate environmental review under CEQA.

C. Transfer/Development Proceeds. If all of the KWB Lands are transferred or developed by KWBA, the proceeds of such transfer or development (net of transaction or development costs) will be used for water management purposes identified by KWBA, subject to concurrence by DWR that such use is for bona fide water management purposes; provided, however, so long as the KWB Lands continue to be used for operation of a water bank, the proceeds (net of transaction or development costs) resulting from the transfer or development of a portion of the KWB Lands (which must be consistent with Section V(B)(5)) will be used for water management purposes identified by KWBA, subject to concurrence by DWR that the expenditure is consistent with such purposes.

D. Consultation with Plaintiffs.

1. Except as provided in Section V(D)(2), with respect to any matter that requires DWR's concurrence pursuant to Section V(B) and (C), DWR

shall consult with Plaintiffs prior to making any decision with respect thereto.

2. In lieu of consulting with Plaintiffs, following the conclusion of all litigation challenging CEQA compliance for, or the validity of, the Monterey Amendments, DWR may first provide notice and opportunity to comment to Plaintiffs and the public, and then, at Plaintiffs' request, shall consult with Plaintiffs.

E. Scope of Restrictions. The foregoing restrictions shall only apply to the KWB Lands and shall not affect the use or disposition of water stored under or withdrawn from the KWB Lands.

F. Effective Date of Restrictions. The foregoing restrictions in this Section V shall not be effective unless and until the court in the above-referenced litigation issues an order approving this Settlement Agreement and the Interim Implementation Order (as defined in Section VII(c)). The restrictions in this Section V shall become final only upon (1) filing of the Notice of Determination following the completion of New EIR, (2) discharge of the writ of mandate in the underlying litigation as provided below, and (3) conclusion of all litigation in a manner that does not invalidate any Monterey Amendment (or any portion thereof) or the Kern Fan Element Transaction. The continuing effectiveness of the restrictions in this Section V, and the obligations under this Settlement Agreement to comply with these restrictions, are subject to the terms of Section VII(K) below.

VI. Funding To Plaintiffs

A. Agreement to Pay. In accordance with the procedures and subject to the conditions described herein, DWR shall pay to Plaintiffs, collectively, the sum of $5,500,000 (in addition to the $300,000 paid pursuant to Section III(G)).

B. Schedule of Payments.

1. On or before the date that is thirty (30) days after approval of this Settlement Agreement by the Superior Court and issuance of the Interim Implementation Order under Section VII, DWR shall pay to Plaintiffs One Million Eight Hundred Seventy-Five Thousand Dollars ($1,875,000).

2. On or before the first anniversary after the date upon which delivery of funds are made by DWR pursuant to Section VI(B)(1), DWR shall pay to Plaintiffs One Million Eight Hundred Seventy-Five Thousand Dollars ($1,875,000).

3. Subject to Section VI(C), on or before the seventieth (70th) day after the Notice of Determination has been filed for the New EIR (or the first business day after said 70th day if the 70th day is not a business day), DWR shall pay to Plaintiffs One Million Seven Hundred Fifty Thousand Dollars ($1,750,000).

4. All amounts to be paid by DWR under this Section VI(B) shall be paid by wire transfer, in immediately available funds, to a JAMS Trust Account from which funds are to be disbursed therefrom to Plaintiffs in accordance with the Section VI Trust Account Agreement.

C. Effects of Litigation on Payment Obligations.

1. *Suspension of Payment Obligation.* If litigation is commenced by anyone challenging CEQA compliance for, or the validity of, any Monterey Amendment (or any portion thereof), including matters pertaining to the Kern Fan Element Transaction, the monetary obligations of DWR under Section VI(B)(3) shall be suspended until the date that is forty-five (45) days after conclusion of such litigation (without further right of appeal) in a manner that does not invalidate any Monterey Amendment (or any portion thereof) or the Kern Fan Element Transaction. Within thirty (30) days after final conclusion of any such litigation in said manner, DWR shall pay to Plaintiffs any amounts then owing under this Section VI.

2. *Termination of Payment Obligation.* If any such litigation results in a final judgment that invalidates any Monterey Amendment (or any portion thereof) or the Kern Fan Element Transaction, the obligation for payments under Section VI(B)(3) shall automatically terminate.

D. Use of Funds. The funds paid to Plaintiffs under this Section VI shall be used to implement this settlement, as determined by Plaintiffs in their reasonable judgment, including watershed restoration projects, follow-up actions arising from this settlement, and technical studies.

E. Unrelated to Attorney Fees. The payments under this Section VI are exclusive of, and in addition to, any amounts owing by DWR with respect to Plaintiffs' attorney fees, the latter of which are addressed by Section VIII.

VII. Sequence and Process for Implementation of Settlement

This Section VII addresses the process of implementing the terms of this Settlement Agreement to the extent not already addressed in this Settlement Agreement. All issues relating to the implementation of this Settlement Agreement not addressed by this Section VII or elsewhere herein shall be resolved through good faith discussions and mutual agreement among the Parties. If the Parties are unable to agree, the disputed matter shall be referred to and resolved by the Mediator.

A. Non-Reliance on 1995 EIR. DWR and the SWP Contractors who are signatories to this Settlement Agreement agree that they will not approve any new project or activity in reliance on the 1995 EIR, that was not approved, initiated or implemented prior to March 26, 2001, and the approval, initiation or implementation of which would require a separate environmental impact report or negative declaration under CEQA (other than, or in addition to, the 1995 EIR).

B. Attachment A Amendments. Within sixty (60) days after this Settlement Agreement is executed by all of the Parties, each of the SWP Contractors who are parties to this Settlement Agreement shall cause a duly authorized representative to execute an Attachment A Amendment, and deliver the executed Amendment to DWR. Upon approval of this Settlement Agreement by the Superior Court and issuance of the Interim Implementation Order, as discussed in Section VII(C), DWR shall execute the Attachment A Amendments. Thereupon, the Attachment A Amendments shall be deemed effective on an interim basis, and will not thereafter be modified without the written consent of the Plaintiffs, prior to the discharge of the writ of mandate. The Attachment A Amendments shall become

final upon (1) the filing of the Notice of Determination following the completion of the New EIR, (2) discharge of the writ of mandate in the underlying litigation as provided below, and (3) conclusion of all litigation in a manner that does not invalidate any Monterey Amendment (or any portion thereof) or the Kern Fan Element Transaction.

C. Motion for Order Approving Settlement Agreement and Interim Implementation Order. As soon as practical after the execution of this Settlement Agreement, the Parties shall jointly file with the Superior Court a motion for (1) an order approving this Settlement Agreement, and (2) an order (the "**Interim Implementation Order**") specifically authorizing on an interim basis, pursuant to Public Resources Code Section 21168.9, the administration and operation of the SWP and the KWB Lands, pending discharge of the writ of mandate in the underlying litigation, in accordance with the Monterey Amendments (as limited by Section VII(A) above), as supplemented by the Attachment A Amendments and the other terms and conditions of this Settlement Agreement, including the provisions in Section V(B) regarding the KWB Lands. Said motion shall include the proposed Section 21168.9 order attached hereto as Exhibit 3-A, and the proposed writ of mandate referenced therein and attached hereto as Exhibit 3-B. The parties shall jointly move the Superior Court for approval of said order and writ. Subject to Section VII(J), and except as provided in Section VII(I), Plaintiffs shall not seek any further order or writ concerning the Monterey Amendments or the New EIR.

D. Implementation of New Policies, Procedures and Guidelines. DWR has issued a [draft] Report of State Water Project Supply Reliability in response to paragraph 1 of the Attachment B Principles. Upon the Superior Court's approval of this Settlement Agreement, DWR shall issue Contractors' Memos on (1) the Attachment C Guidelines and (2) the Attachment D Principles. After the Superior Court's approval of this Settlement Agreement, and in no event later than January 1, 2004, DWR shall issue Contractors' Memos on the remainder of the Attachment B Principles (i.e., paragraphs 2 and 3). DWR may rely on DWR publications previously issued to comply with paragraph 2 of the Attachment B Principles, if appropriate.

E. Dismissal of Validation Cause of Action. Upon the execution of this Settlement Agreement by all the Parties and execution of the Attachment A Amendments as set forth in Section VII(B) and issuance by DWR of the Contractor Memos referenced in the second sentence of Section VII(D), Plaintiffs shall file a request for dismissal without prejudice of the Validation Cause of Action. So long as such conditions are timely met, Plaintiffs covenant and agree not to refile the Validation Cause of Action, nor any new cause of action relating thereto, nor a new claim challenging the validity of any Monterey Amendment (or any portion thereof) or the Kern Fan Element Transaction.

F. Tolling of Statute of Limitations. As between Plaintiffs, DWR and the SWP Contractors who are signatories to this Settlement Agreement, it is agreed that the statute of limitations relating to the Validation Cause of Action shall be tolled as

to Plaintiffs until the date that is forty-five (45) days after the filing of the Notice of Determination for the New EIR.

G. Notice of Determination, Return to Writ and Motion for Order Discharging Writ. Upon completion of the New EIR, DWR will file with the Superior Court (1) a Notice of Determination including a copy of the New EIR, (2) a return to writ of mandate (the "**Return to Writ**"), (3) a request for an order discharging the writ of mandate previously issued by the Superior Court in the underlying case and (4) any other information required by the Superior Court for a discharge of writ.

H. Consent to Entry of Order Discharging Writ.

1. *Obligation to File.* Concurrent with DWR's filings referenced in Section VII(G), subject only to Sections VII(H)(2) and (3), and provided Plaintiffs have not challenged the Return to Writ (under the procedures set forth in Section VII(I)), Plaintiffs shall file with the Superior Court a pleading consenting to entry of an order discharging the writ of mandate (the "**Consent to Entry of Order Discharging Writ**").

2. *Conditions Precedent to Filing.* Plaintiffs' obligation to file the Consent to Entry of Order Discharging Writ shall be subject to, and conditioned upon, satisfaction of the requirement set forth in Section VII(B).

3. *Earliest Effective Date of Discharge of Writ.* The discharge of the writ of mandate shall not be effective until at least forty-five (45) days after the filing of the Notice of Determination for the New EIR.

I. Subsequent CEQA Challenge.

1. *Limited Basis for Challenge.* Plaintiffs may only challenge the Return to Writ if, during the preparation and review of the New EIR, (a) Plaintiffs

objected to the Mediator based on one or more Mediation Issues, (b) the Mediator upheld that objection in a written advisory opinion as described in Section III(H), (c) DWR rejected such written advisory opinion in its final decision, either expressly or as evidenced by the contents of the final New EIR, and (d) the challenge that Plaintiffs file to the Return to Writ is on the same ground(s) as the objection upheld by Mediator in the advisory opinion. Where such an objection was made to the Mediator and Plaintiffs file such a challenge to the Return to Writ, DWR shall maintain the advisory opinion as a public record. With respect to clause (c) of this subsection (I)(1), if the Parties dispute whether DWR has rejected the Mediator's advisory opinion, such matter shall be referred to the Mediator and (s)he shall make a final determination with respect thereto in accordance with Article IX.

2. *Stipulation to Continued Operations.* In the event of such a challenge, the challenging party will stipulate that, pending compliance with such writ as the court may issue, administration and operation of the SWP may continue in accordance with the Interim Implementation Order.

3. *Order for New EIR.* If such a challenge results in an order that DWR must prepare a new or supplemental environmental impact report, the provisions set out in Section III (regarding preparation of New EIR) shall be followed, and at the conclusion of the process, the provisions of Section VII(H) (filing of a Consent to Entry of Order Discharging Writ) and this Section VII(I) shall apply.

J. No Future Challenges. Except as specifically authorized herein, and as a condition to the initial and continuing effectiveness of this Settlement Agreement, Plaintiffs agree not to initiate any future litigation challenging the validity of any Monterey Amendment (or any portion thereof) or the Kern Fan Element Transaction.

K. Mutual Interdependency. On an interim and final basis, the Attachment A Amendments, the Plumas Amendment, the provisions regarding the KWB Lands described in Section V(B), and the continued operations of the SWP based on the Monterey Amendments are mutually interdependent.

L. Implementation Dispute Resolution. Disputes arising in the implementation of this Settlement Agreement shall be addressed in accordance with Section IX.

VIII. **Attorney Fees**

Within forty-five (45) days after the execution of this Settlement Agreement by all Parties, the Parties shall engage in arbitration to determine the amount of attorney fees and costs to be paid to Rossmann as Plaintiffs' counsel. Such arbitration shall be conducted pursuant to the following terms and conditions:

A. The arbitrator will be selected by mutual agreement of the Parties. If the Parties cannot agree on the arbitrator, the Mediator will designate the arbitrator. JAMS arbitration rules will apply, providing for limited and focused discovery, but the arbitrator may be anyone the Parties select regardless of his/her professional affiliation.

B. Within five (5) business days after commencement of the arbitration, Rossmann shall file with the arbitrator a petition for fees. The petition for fees shall identify, in sufficient detail acceptable to the arbitrator, all fees for: (1) past service in the underlying litigation; (2) fees for participation in the settlement mediation to the

date thereof; and (3) projected fees for services to be rendered in implementing the Settlement Agreement, including fees incurred in advising Plaintiffs in connection with their participation in, and service on, the EIR Committee.

C. Rossmann may apply for a multiplier on fees earned in the underlying litigation. The award for fees relating to mediation and settlement implementation shall be subject to the lodestar amount and shall not include a multiplier.

D. The costs of the arbitration will be borne one-third (1/3) by Plaintiffs and two-thirds (2/3) by DWR.

E. DWR and CCWA reserve all rights and defenses, except the right to challenge Rossmann's entitlement to fees relating to the mediation and settlement implementation stages.

F. The arbitrator shall determine the amount of the award within thirty (30) days after submission of the fee petition to the arbitrator. The arbitrator's determination shall be binding upon the Parties.

G. DWR shall pay the fee award to Rossmann in accordance with the following schedule:

1. Sixty percent (60%) within thirty (30) days after the award;
2. Thirty percent (30%) within thirty (30) days after the filing of the Return to Writ with the Superior Court; and
3. Ten percent (10%) within thirty (30) days after the Plaintiffs' filing of the Consent to Entry of Order Discharging Writ with the Superior Court.

H. The amount of $100,000 previously paid as attorney fees to Rossmann by DWR will be credited toward the amount owed by DWR hereunder as determined by the arbitrator.

IX. Dispute Resolution

The Parties agree to cooperate in implementing this Settlement Agreement and to try in good faith to resolve any disputes. In addition, until the conclusion of the underlying litigation, as evidenced by the issuance of an order discharging the writ of mandate, the Mediator will decide all unresolved issues involving the interpretation and implementation of this Settlement Agreement and, to the extent permitted by law, will be authorized to enforce its terms, except for those matters properly reserved to the jurisdiction of the Superior Court. Any party may request a conference before the Mediator on seventy-two (72) hours' advance written notice to the Mediator and the other Parties. The Mediator will have the power to award reasonable attorney fees to the prevailing party in the event of frivolous, harassing or untimely motions. The party who initiates a dispute resolution proceeding with the Mediator pursuant to this Section IX shall be solely responsible for the payment of the Mediator's costs and expenses, except as otherwise provided herein.

X. Miscellaneous

A. No Admission. By entering into this Settlement Agreement, the Plaintiffs do not endorse or admit the validity of the Monterey Amendments, and neither DWR, KWBA, nor any of the SWP Contractors who are signatories hereto admit any of the Plaintiffs' allegations in the pending litigation including those concerning the Monterey Amendments and/or the Kern Fan Element Transaction.

B. Compliance with Laws. The Parties agree that nothing in this Settlement Agreement is intended to limit the discretion granted by law, including CEQA, to DWR, as lead agency and as the State agency responsible for administration and operation of the SWP, or the duty of DWR to comply with applicable requirements of law, including those of CEQA and the California Water Code.

C. Authority. Each of the Parties represents that: (1) it has the authority to execute and enter into this Settlement Agreement; (2) the individual executing this Settlement Agreement on behalf of the Party has the authority and has been specifically authorized to execute and deliver this Settlement Agreement on behalf of such Party; (3) upon execution by such person on behalf of the Party, this Settlement Agreement shall be valid and enforceable against such Party in accordance with the terms hereof; (4) the Party is authorized to implement this Settlement Agreement, without further action by the Party or its governing body, board of directors, or any other person or entity, as the case may be; and (5) the execution and entry into this Settlement Agreement and the implementation of its terms by the Party is not in violation of any applicable law or any other contract or agreement by which it is bound or to which it is a party. The Parties acknowledge that although DWR plans to make payments required under this Agreement pursuant to its authority under the State Water Resources Development System (Water Code Sections 12930 et seq.), and that under such authority accruals are continuously appropriated without regard to fiscal years (Water Code Section 12938), any such payments may nevertheless be contingent on the annual Budget Act and, under certain circumstances, payments may be

delayed or halted by non-party government authorities. If any payment under this Settlement Agreement is delayed beyond the date it is due, the amount due shall accrue interest at the rate of the State Pooled Money Investment Fund for the first forty-five (45) days after it is due and at eight percent (8%) per annum thereafter. The foregoing does not limit Plaintiff's rights to seek legal or equitable relief in the event of a breach of this Settlement Agreement.

D. Not a General Appearance or Concession to Jurisdiction. The execution of this Settlement Agreement by the SWP Contractors and KWBA does not constitute a general appearance in the underlying litigation, nor does it constitute a concession to jurisdiction of the Superior Court over the SWP Contractors or KWBA other than for the purpose of enforcing the terms of this settlement.

E. Successors and Assigns. This Settlement Agreement shall be binding upon and inure to the benefit of the Parties and their respective heirs, legal representatives, successors and assigns. No Party may assign their rights under this Settlement Agreement without the prior written consent of the other Parties.

F. Governance. This Agreement shall be construed under and enforced in accordance with the substantive laws of the State of California.

G. Entirety of Agreement; No Amendment. This Settlement Agreement sets forth the entire agreement among the Parties and supersedes all prior oral or written agreements, negotiations, discussions, or understandings concerning the subject matter hereof. The terms of this Settlement Agreement may not be altered, amended, waived or modified, except by a further written agreement signed by all Parties.

H. Mutual Preparation. The Parties each cooperated in the drafting and preparation of this Settlement Agreement. Thus, the language of all parts of this Settlement Agreement shall in all cases be construed as a whole, according to its fair meaning, and not strictly for or against any Party as the drafter thereof.

I. Further Acts. Each Party agrees to make, execute and deliver such other instruments or documents, and to do or cause to be done such further or additional acts, as reasonably may be necessary in order to effectuate the purposes or to implement the terms of this Settlement Agreement.

J. No Waiver. No waiver of any breach of any term or provision of this Settlement Agreement shall be construed to be, nor shall be, a waiver of any other breach of this Settlement Agreement. No waiver shall be binding unless in writing and signed by the Party waiving the breach. With respect to any breach of this Settlement Agreement by Plaintiffs, such breach may only be waived in writing by DWR, KCWA and The Metropolitan Water District of Southern California. With respect to any breach of this Settlement Agreement by the non-Plaintiffs, such breach may only be waived in writing by the Plaintiffs.

K. No Representations or Warranties. Each of Parties represents and declares that in executing this Settlement Agreement, it has relied solely upon its own judgment, belief and knowledge, and on the advice and recommendations of its independently selected counsel, concerning the nature, extent and duration of its rights and claims and that it has not been influenced to any extent whatsoever in executing the same by any representations or statements covering any matters made by any of the Parties or by any person representing them or any of them.

Each Party acknowledges that no other Party nor any of their representatives has made any promise, representation or warranty whatsoever, written or oral, as any inducement to enter into this Settlement Agreement, except as expressly set forth in this Settlement Agreement.

L. Independent Investigations. Each Party has made such investigation of the facts pertaining to this settlement and this Settlement Agreement and of all matters pertaining thereto as it deems necessary.

M. Survival. The representations, warranties and covenants contained in this Settlement Agreement are deemed to and shall survive the execution and delivery of this Settlement Agreement by all of the Parties.

N. Headings. All headings in this Settlement Agreement are included for convenience and reference only and shall not constitute a part of this Settlement Agreement for any purpose.

O. Not Binding on Others. This Settlement Agreement is not intended to, nor shall it (1) bind any non-Party persons or entities as to any claims or defenses they may otherwise now or in the future hold, or (2) waive any claims or defenses any Party hereto may have now or in the future against such non-Party persons or entities.

P. Counterparts. This Settlement Agreement may be executed in counterparts, each of which shall constitute an original, but all of which shall constitute one and the same agreement, provided each signing Party shall have received a copy of the signature page signed by every other Party.

Q. Voluntary and Knowing Execution. EACH PARTY REPRESENTS AND WARRANTS THAT IT HAS THOROUGHLY READ AND CONSIDERED

ALL ASPECTS OF THIS SETTLEMENT AGREEMENT, THAT IT UNDERSTANDS ALL PROVISIONS OF THIS SETTLEMENT AGREEMENT, THAT IT HAS HAD THE OPPORTUNITY TO CONSULT WITH COUNSEL THROUGHOUT THIS PROCESS AND THAT IT IS VOLUNTARILY ENTERING INTO THIS SETTLEMENT AGREEMENT OF ITS OWN FREE WILL, WITHOUT DURESS OR COERCION OF ANY KIND.

R. Obligations Dependent on Validity of Monterey Amendments. With respect to any obligation in this Settlement Agreement that terminates or is suspended upon a challenge to or final judgment that invalidates any portion of any Monterey Amendment, such termination or suspension of such obligation may be avoided if such invalidity is explicitly and irrevocably waived in accordance with the procedures set forth in Paragraph 29 of the Monterey Amendments.

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{SIGNATURES CONSOLIDATED BY THE STATE WATER PROJECT ANALYSIS OFFICE OF THE DEPARTMENT OF WATER RESOURCES}

IN WITNESS WHEREOF, the Parties have executed this Settlement Agreement as of the date first set forth above.

PLANNING AND CONSERVATION LEAGUE

By: Sage Sweetwood
Name: Sage Sweetwood
Title: President

PLUMAS COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

By: B J Pearson
Name: B.J. Pearson
Title: Chair, Board of Supervisors
Ex-officio Chair, District Board of Directors

CITIZENS PLANNING ASSOCIATION OF SANTA BARBARA COUNTY, INC.

By: Louise Boucher
Name: Louise Boucher
Title: President,
Citizens Planning association of Santa Barbara, Inc.

[Remainder of Page Intentionally Blank – Additional Signatures Follow]

{SIGNATURES CONSOLIDATED BY THE STATE WATER PROJECT ANALYSIS OFFICE OF THE DEPARTMENT OF WATER RESOURCES}

STATE OF CALIFORNIA

DEPARTMENT OF WATER RESOURCES

By: _____

Name: Thomas M. Hannigan

Title: Director

Approved as to legal form and sufficiency:

By: _____

Name: Peggy Bernardy

Title: Chief Counsel

ALAMEDA COUNTY FLOOD CONTROL & WATER CONSERVATION DISTRICT, ZONE 7

By: _____

Name: William R. Stevens

Title: President, Board of Directors

Approved as to Form
RICHARD E. WINNIE, County Counsel

By _____

ALAMEDA COUNTY WATER DISTRICT

By: _____

Name: John H. Weed

Title: President

ANTELOPE VALLEY-EAST KERN WATER AGENCY

By: _____

Name: _____

Title: _____

CASTAIC LAKE WATER AGENCY

By: _____

Name: DAN MASNADA

Title: GENERAL MANAGER

CITY OF YUBA

By: _____

Name: _____

Title: _____

{SIGNATURES CONSOLIDATED BY THE STATE WATER PROJECT ANALYSIS OFFICE OF THE DEPARTMENT OF WATER RESOURCES}

ANTELOPE VALLEY-EAST KERN WATER AGENCY

By: Andy D. Rutledge

Name: Andy D. Rutledge

Title: Board President

CASTAIC LAKE WATER AGENCY

By:

Name: DAN MASNADA

Title: ~~GENERAL~~ MANAGER

CITY OF YUBA

By: William P. Lewis

Name: WILLIAM P. LEWIS

Title: UTILITIES DIRECTOR

{SIGNATURES CONSOLIDATED BY THE STATE WATER PROJECT ANALYSIS OFFICE OF THE DEPARTMENT OF WATER RESOURCES}

COACHELLA VALLEY WATER DISTRICT

By: John W. McFadden

Name: John W. McFadden

Title: President of the Board of Directors

COUNTY OF BUTTE

By: R. J. Beeler

Name: R. J. BEELER

Title: Chairman, Board of Supervisors

COUNTY OF KINGS 3-25-03

By: Joe Neves

Name: JOE NEVES

Title: CHAIRMAN

CRESTLINE-LAKE ARROWHEAD WATER AGENCY

By: James J. McCrory

Name: James J. McCrory

Title: President, Board of Directors

{SIGNATURES CONSOLIDATED BY THE STATE WATER PROJECT ANALYSIS OFFICE OF THE DEPARTMENT OF WATER RESOURCES}

DESERT WATER AGENCY

By: _____

Name: Dan M. Ainsworth

Title: General Manager

DUDLEY RIDGE WATER DISTRICT

By: _____

Name: Joe MacIlvaine

Title: President

KERN COUNTY WATER AGENCY

By: _____

Name: Terry Rogers

Title: President

{SIGNATURES CONSOLIDATED BY THE STATE WATER PROJECT ANALYSIS OFFICE OF THE DEPARTMENT OF WATER RESOURCES}

LITTLEROCK CREEK IRRIGATION DISTRICT

By: Frances Young

Name: _____

Title: President

METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA

By: Ronald R Gastelum

Name: Ronald R Gastelum

Title: CEO

MOJAVE WATER AGENCY

By: K Brill

Name: Kirby Brill

Title: General Manager

NAPA COUNTY FLOOD CONTROL & WATER CONSERVATION DISTRICT

By: Mike Ripley

Name: Mike Ripley

Title: Vice-Chair

APPROVED 3/18/03
FLOOD CONTROL & WATER CONSERVATION DISTRICT

~~MARY JEAN MCLAUGHLIN~~
SECRETARY OF THE DISTRICT
BY S. Vattuone Deputy

{SIGNATURES CONSOLIDATED BY THE STATE WATER PROJECT ANALYSIS OFFICE OF THE DEPARTMENT OF WATER RESOURCES}

OAK FLAT WATER DISTRICT

By: William D. Harrison

Name: WILLIAM D. HARRISON

Title: MANAGER / SECRETARY

PALMDALE WATER DISTRICT

By: Leslie O. Carter

Name: Leslie O. Carter

Title: President, Board of Directors

SAN BERNARDINO VALLEY MUNICIPAL WATER DISTRICT

By:

Name: C. Patrick Milligan

Title: President

SAN GABRIEL VALLEY MUNICIPAL WATER DISTRICT

By:

Name: J. C. Reichenberger

Title: President

{SIGNATURES CONSOLIDATED BY THE STATE WATER PROJECT ANALYSIS OFFICE OF THE DEPARTMENT OF WATER RESOURCES}

SAN GORGONIO PASS WATER AGENCY

By: _____

Name: Stephen P. Stockton

Title: General Manager/Chief Engineer

SAN LUIS OBISPO COUNTY FLOOD CONTROL & WATER CONSERVATION DISTRICT

By: _____

Name: MICHAEL P. RYAN

Title: Chairman of the Board of Supervisors

SANTA BARBARA COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

By: _____

Name: _____

Title: _____

APPROVE AS TO ACCOUNTING:
ROBERT W. GEIS, CPA
AUDITOR-CONTROLLER

BY: _____
Deputy

ATTEST:
MICHAEL F. BROWN
CLERK OF THE BOARD

BY: _____
Deputy

APPROVED AS TO FORM:
STEPHEN SHANE STARK
COUNTY COUNSEL

BY: _____
Deputy

{SIGNATURES CONSOLIDATED BY THE STATE WATER PROJECT ANALYSIS OFFICE OF THE DEPARTMENT OF WATER RESOURCES}

SANTA CLARA VALLEY WATER DISTRICT

By: _____

Name: Stanley M. Williams

Title: Chief Executive Officer

SOLANO COUNTY WATER AGENCY

By: _____

Name: Don Holdener

Title: Chairman, Board of Directors

TULARE LAKE BASIN WATER STORAGE DISTRICT

By: _____

Name: THOMAS R. HURLBUTT

Title: PRESIDENT

VENTURA COUNTY FLOOD CONTROL DISTRICT

By: _____

Name: Jeff Pratt

Title: Director - Watershed Protection

{SIGNATURES CONSOLIDATED BY THE STATE WATER PROJECT ANALYSIS OFFICE OF THE DEPARTMENT OF WATER RESOURCES}

CENTRAL COAST WATER AUTHORITY

By: _____

Name: William J. Brennan

Title: Executive Director

KERN WATER BANK AUTHORITY

By: _____

Name: William D. Phillimore, Chairman

Title: Chairman

ATTACHMENT A

AMENDMENT TO STATE WATER PROJECT CONTRACT

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

AMENDMENT NO. ____ TO THE WATER SUPPLY CONTRACT BETWEEN THE STATE OF CALIFORNIA DEPARTMENT OF WATER RESOURCES AND _____

This amendment is made this ____ day of _____, 2003, pursuant to the provisions of the California Water Resources Development Bond Act, the Central Valley Project Act, and other applicable laws of the State of California, between the State of California, acting by and through its Department of Water Resources, hereinafter referred to as the "State", and _____, hereinafter referred to as the "District" [or "Agency"].

RECITALS

WHEREAS, the State and the District entered into and subsequently amended a water supply contract (the "contract") providing that the State shall supply certain quantities of water to the District and providing that the District shall make certain payments to the State, and setting forth the terms and conditions of such supply and such payments; and

WHEREAS, on December 1, 1994, the State and representatives of certain State Water Project contractors executed a document entitled "Monterey Agreement – Statement of Principles – By The State Water Contractors And The State Of California Department Of Water Resources For Potential Amendments To The State Water Supply Contracts" (the "Monterey Agreement"); and

WHEREAS, the State, the Central Coast Water Authority ("CCWA") and those contractors intending to be subject to the Monterey Agreement subsequently negotiated an amendment to their contracts to implement provisions of the Monterey Agreement, and such amendment was named the "Monterey Amendment"; and

WHEREAS, in October 1995, an environmental impact report ("EIR") for the Monterey Amendment was completed and certified by CCWA as the lead agency, and thereafter the District and the State executed the Monterey Amendment; and

WHEREAS, the EIR certified by the CCWA was challenged by several parties (the "Plaintiffs") in the Sacramento County Superior Court and thereafter in the Third District Court of Appeal, resulting in a decision in *Planning and Conservation League, et al. v. Department of*

Water Resources, 83 Cal.App.4th 892 (2000), which case is hereinafter referred to as "PCL v. DWR"; and

WHEREAS, in its decision, the Court of Appeal held that (i) the Department of Water Resources ("DWR"), not CCWA, had the statutory duty to serve as lead agency, (ii) the trial court erred by finding CCWA's EIR sufficient despite its failure to discuss implementation of Article 18, subdivision (b) of the State Water Project contracts, as a no-project alternative, (iii) said errors mandate preparation of a new EIR under the direction of DWR, and (iv) the trial court erroneously dismissed the challenge to DWR's transfer of title to certain lands to Kern County Water Agency (the "Validation Cause of Action") and execution of amended State Water Project contracts for failure to name and serve indispensable parties. The Court of Appeal remanded the case to the trial court, ordering it to take the following five actions: (1) vacate the trial court's grant of the motion for summary adjudication of the Validation Cause of Action; (2) issue a writ of mandate vacating the certification of the EIR; (3) determine the amount of attorney fees to be awarded Plaintiffs; (4) consider such orders it deems appropriate under Public Resources Code Section 21168.9(a) consistent with the views expressed in the Appellate Court's opinion; and (5) retain jurisdiction over the action until DWR, as lead agency, certifies an environmental impact report in accordance with CEQA standards and procedures, and the Superior Court determines that such environmental impact report meets the substantive requirements of CEQA; and

WHEREAS, the State, the contractors, and the Plaintiffs in *PCL v. DWR* reached an agreement to settle *PCL v. DWR*, as documented by that certain Settlement Agreement dated _____, 2003 (the "Settlement Agreement"), and in such Settlement Agreement have agreed that the contracts should be amended, for clarification purposes, to delete terms such as "annual entitlement" and "maximum annual entitlement" so that the public, and particularly land use planning agencies, will better understand the contracts; and

WHEREAS, pursuant to the Settlement Agreement, the State and the District desire to so amend the District's contract, with the understanding and intent that the amendments herein with respect to subsections (m), (n), and (o) of Article 1, subsection (b) of Article 6, and subsection (a) of Article 16, and to Table A of the District's contract are solely for clarification purposes and that such amendments are not intended to and do not in any way change the rights, obligations or limitations on liability of the State or the District established by or set forth in the contract; and

WHEREAS, pursuant to the Settlement Agreement, the State, the contractors and the Plaintiffs in *PCL v. DWR* also agreed that the contracts should be amended to include a new Article 58 addressing the determination of dependable annual supply of State Water Project water to be made available by existing Project facilities, and the State and District desire to so amend the District's contract.

NOW THEREFORE, IT IS MUTUALLY AGREED, as follows:

1. Article 1(n) is amended to read:[1]

(n) **Annual Table A Amount**

"Annual Table A Amount" shall mean the amount of project water set forth in Table A of this contract that the State, pursuant to the obligations of this contract and applicable law, makes available for delivery to the District at the delivery structures provided for the District. The term Annual Table A Amount shall not be interpreted to mean that in each year the State will be able to make that quantity of project water available to the District. The Annual Table A Amounts and the terms of this contract reflect an expectation that under certain conditions the District will receive its full Annual Table A Amount; but that under other conditions only a lesser amount, allocated in accordance with this contract, may be made available to the District. This recognition that full Annual Table A Amounts will not be deliverable under all conditions does not change the obligations of the State under this contract, including but not limited to, the obligations to make all reasonable efforts to complete the project facilities, to perfect and protect water rights, and to allocate among contractors the supply available in any year, as set forth in Articles 6(b), 6(c), 16(b) and 18, in the manner and subject to the terms and conditions of those articles and this contract. Where the term "annual entitlement" appears elsewhere in this contract, it shall mean "Annual Table A Amount." The State agrees that in future amendments to this and other contractor's contracts, in lieu of the term "annual entitlement," the term "Annual Table A Amount" will be used and will have the same meaning as "annual entitlement" wherever that term is used.

2. Article 1(o) is amended to read:

(o) Maximum Annual Table A Amount

"Maximum annual entitlement" shall mean the maximum annual amounts set forth in Table A of this contract, and where the term "maximum annual entitlement" appears elsewhere in this contract it shall mean "Maximum Annual Table A Amounts."

3. Article 1(m) is amended to read:

(m) Minimum Project Yield

"Minimum project yield" shall mean the dependable annual supply of project water to be made available assuming completion of the initial project conservation facilities and additional project conservation facilities. The project's capability of providing the minimum project yield shall be determined by the State on the basis of coordinated operations studies of initial project conservation facilities and additional project conservation facilities, which studies shall be based upon factors including but not limited to: (1) the estimated relative proportion of deliveries for agricultural use to deliveries for municipal use assuming Maximum Annual Table A Amounts

[1] The number of the articles is not the same for all the Water Supply Contractors. Article 1(n) is intended to be the article presently entitled "Annual Entitlement", whatever its number may be in each District's contract. The article numbers may have to be changed for each contractor to reflect the numbers in its contract.

for all contractors and the characteristic distributions of demands for these two uses throughout the year; and (2) agreements now in effect or as hereafter amended or supplemented between the State and the United States and others regarding the division of utilization of waters of the Delta or streams tributary thereto.

4. Article 6(b) is amended to read:

(b) District's Annual Table A Amounts

Commencing with the year of initial water delivery to the District, the State each year shall make available for delivery to the District the amounts of project water designated in Table A of this contract, which amounts shall be subject to change as provided for in Article 7(a) and are referred to in this contract as the District's Annual Table A Amounts.

5. Article 16(a) is amended to read:

(a) Limit on Total of all Maximum Annual Table A Amounts

The District's Maximum Annual Table A Amount hereunder, together with the maximum Table A amounts of all other contractors, shall aggregate no more than 4,185,000 acre-feet of project water.

6 Article 58 is added to read:

58. **Determination of Dependable Annual Supply of Project Water to be Made Available by Existing Project Facilities.**

In order to provide current information regarding the delivery capability of existing project conservation facilities, commencing in 2003 and every two years thereafter the State shall prepare and mail a report to all contractors, and all California city, county, and regional planning departments and agencies within the contractors' project service areas. This report will set forth, under a range of hydrologic conditions, estimates of overall delivery capability of the existing project facilities and of supply availability to each contractor in accordance with other provisions of the contractors' contracts. The range of hydrologic conditions shall include the delivery capability in the driest year of record, the average over the historic extended dry cycle and the average over the long-term. The biennial report will also include, for each of the ten years immediately preceding the report, the total amount of project water delivered to all contractors and the amount of project water delivered to each contractor.

7. Add the following language at the bottom of Table A:

In any year, the amounts designated in this Table A shall not be interpreted to mean that the State is able to deliver those amounts in all years. Article 58 describes the State's process for providing current information for project delivery capability.

8. Except for Article 58, the changes made by this amendment are solely for clarification purposes, and are not intended to nor do they in any way change the rights, obligations or

limitations on liability of the State or the District established by or set forth in the contract, and this amendment shall be interpreted in accordance with this intent.

9. At the time of execution of this Agreement and thereafter, the effectiveness of this Amendment is dependent upon the effectiveness of the District's Monterey Amendment (all provisions therein) and the Kern Fan Element Transaction.

IN WITNESS WHEREOF, the parties hereto have executed this amendment on the date first above written.

STATE OF CALIFORNIA DEPARTMENT OF WATER RESOURCES

By: _____
Name: _____
Title: Director

Approved as to legal form and sufficiency:

By: _____
Name: _____
Title: Chief Counsel

Attest:

_____ **DISTRICT**

By: _____
Name: _____
Title: _____

ATTACHMENT B

PRINCIPLES REGARDING STATE WATER PROJECT AVAILABILITY

Note: These principles are prepared in connection with the settlement agreement between PCL and DWR and are only effective pursuant to the terms therein.

1. Commencing in 2003, and every two years thereafter, the Department of Water Resources (DWR) shall prepare and deliver to all State Water Project (SWP) contractors, all city and county planning departments, and all regional and metropolitan planning departments within the project service area a report which accurately sets forth, under a range of hydrologic conditions, the then existing overall delivery capability of the project facilities and the allocation of that capacity to each contractor. The range of hydrologic conditions shall include the historic extended dry cycle and long-term average. The biennial report shall also disclose, for each of the ten years immediately preceding the report, the total amount of project water delivered and the amount of project water delivered to each contractor. The information presented in each report shall be presented in a manner readily understandable by the public.

2. DWR shall develop and, by January 1, 2004, publish guidelines to assist Municipal and Industrial Contractors in providing accurate information to land-use planning agencies with jurisdiction within the Contractors' respective service areas regarding local and regional programs to manage or supplement SWP supplies. DWR shall consult with the plaintiffs and contractors in developing the guidelines.

3. DWR shall provide assistance to enable all Municipal and Industrial Contractors to provide complete and accurate information to relevant land-use planning agencies to assure that local land-use decisions reflect accurate information on the availability of water from state, local, and other sources.

ATTACHMENT C

DWR GUIDELINES FOR REVIEW OF PROPOSED PERMANENT TRANSFERS OF STATE WATER PROJECT ANNUAL TABLE A AMOUNTS

Note: These guidelines are prepared in connection with the settlement agreement between PCL and DWR and are only effective pursuant to the terms therein.

1. Purpose: The purpose of these guidelines is to describe the process for DWR's review of proposed permanent transfers of SWP Annual Table A Amounts and by so doing, provide disclosure to SWP Contractors and to the public of DWR's process and policy on approving permanent transfer of SWP Annual Table A Amounts. Such disclosure should assist contractors in developing their transfer proposals and obtaining DWR review expeditiously, and assist the public in participating in that review.

2. Coverage: These guidelines will apply to DWR's approval of permanent transfers of water among existing SWP Contractors and, if and when appropriate, to permanent transfers of water from an existing SWP Contractor to a new SWP Contractor.

3. Interpretation: These guidelines are in furtherance of the state policy in favor of voluntary water transfers and shall be interpreted consistent with the law, including but not limited to Water Code Section 109, the Burns-Porter Act, the Central Valley Project Act, the California Environmental Quality Act, area of origin laws, the public trust doctrine, and with existing contracts and bond covenants. These guidelines are not intended to change or augment existing law.

4. Format: The guidelines shall be issued by DWR as a "Notice to State Water Contractors."

5. Revisions: Revisions may be made to these guidelines as necessary to meet changed circumstances, changes in the law or long-term water supply contracts, or to address conditions unanticipated when the guidelines are adopted. Revisions shall be in accordance with the settlement agreement reached in *Planning and Conservation League vs. Department of Water Resources.*

6. Distribution: The transfer guidelines shall be published by DWR in the next available edition of Bulletin 132, and also as part of the biennial disclosure of SWP reliability as described in the PCL v. DWR Settlement Agreement.

7. Contract Amendment: Permanent transfers of SWP water are accomplished by amendment of each participating contractor's long-term water supply contract. The amendment consists of amending the Table A upwards for a buying contractor and downwards for a selling contractor. The amendment shall be in conformity with all provisions of the long-term water supply contracts, applicable laws, and bond covenants. Other issues to be addressed in the contract amendment will be subject to negotiation among DWR and the two participating contractors. The negotiations will be conducted in public, pursuant to the settlement agreement in PCL vs. DWR.

8. Financial issues: The purchasing contractor must demonstrate to the DWR's satisfaction that it has the financial ability to assume payments associated with the transferred water. If the purchasing entity was not a SWP Contractor as of 2001, special financial requirements pertain as described below, as well as additional qualifications.

9. Compliance with CEQA: Consistent with CEQA, the State's policy to preserve and enhance environmental quality will guide DWR's consideration of transfer proposals (Public Resources Code Section 21000). Identification of the appropriate lead agency will be based on CEQA, the CEQA Guidelines, and applicable caselaw, including *Planning and Conservation League vs. Department of Water Resources, 83 Cal. App. 4th 892 (2000).* CEQA requires the lead agency at a minimum to address the feasible alternatives to the proposed transfer and its potentially significant environmental impacts (1) in the selling contractor's service area; (2) in the buying contractor's service area; (3) on SWP facilities and operations; and (4) on the Delta and areas of origin and other regions as appropriate. Impacts that may occur outside of the transferring SWP Contractors' service areas and on fish and wildlife shall be included in the environmental analysis. DWR will not approve a transfer proposal until CEQA compliance is completed. The lead agency shall consult with responsible and trustee agencies and affected cities and counties; and when DWR is not the lead agency, shall provide an administrative draft of the draft EIR or Initial Study/Negative Declaration to DWR prior to the public review period. A descriptive narrative must accompany a checklist, if a checklist is used. The lead agency shall conduct a public hearing on the EIR during the public comment period and notify DWR's State Water Project Analysis Office of the time and place of such hearing in addition to other notice required by law.

10. Place of Use: The purchasing contractor must identify the place and purpose of use of the purchased water, including the reasonable and beneficial use of the water. Typically this information would be included in the environmental documentation. If a specific transfer proposal does not fit precisely into any of the alternatives listed below, DWR will use the principles described in these Guidelines to define the process to be followed. The information to be provided under this paragraph is in addition to the CEQA information described in paragraph 9 of these guidelines.

a) If the place of use is within the contractor's service area, the contractor should disclose the purpose of the transferred water, such as whether the water is being acquired for a specific development project, to enhance overall water supply reliability in the contractor's service area, or some other purpose. If the transferred water is for a municipal purpose, the contractor should state whether the transfer is consistent with its own Urban Water Management Plan or that of its member unit(s) receiving the water.

b) If the place of use is outside the contractor's service area, but within the SWP authorized place of use, and service is to be provided by an existing SWP Contractor: In addition to Paragraph 10(a) above, the contractor should provide DWR with copies of LAFCO approval and consent of the water agency with authority to serve that area, if any. In some instances, DWR's separate consent is required for annexations in addition to the approval for the transfer.

c) If the place of use is outside the SWP authorized place of use and service is to be provided by an existing SWP Contractor, the contractor should provide information in Paragraph 10(a) and 10(b). Prior to approving the transfer, DWR will consider project delivery capability, demands for water supply from the SWP, and the impact, if any, of the proposed transfer on such demand. If DWR approves the transfer, DWR will petition State Water Resources Control Board for approval of expansion of authorized place of use. Water will not be delivered until the place of use has been approved by the SWRCB and will be delivered in compliance with any terms imposed by the SWRCB.

d) If the place of use is outside the SWP authorized place of use and service is not to be provided by an existing SWP contractor, DWR will consider the transfer proposal as a proposal to become a new state water contractor. Prior to adding a new SWP Contractor, DWR will consider project delivery capability, demands for water supply from the SWP, and the impact, if any, of the proposed transfer on such demand. DWR will consult with existing SWP Contractors regarding their water supply needs and the proposed transfer. In addition to the information in Paragraph 10(a), 10(b), and 10(c), the new contractor should provide information similar to that provided by the original SWP contractors in the 1960's Bulletin 119 feasibility report addressing hydrology, demand for water supply, population growth, financial feasibility, etc. DWR will evaluate these issues independently and ordinarily will act as lead agency for CEQA purposes. In addition, issues such as area of origin claims, priorities, environmental impacts and use of water will be addressed. The selling contractor may not be released from financial obligations. The contract will be subject to a CCP 860 validation action initiated by the new contractor. If DWR approves the transfer, DWR will petition State Water Resources Control Board for approval of expansion of authorized place of use. Water will not be delivered until the place of use has been approved by the SWRCB and will be delivered in compliance with any terms imposed by the SWRCB.

11, DWR Discretion. Consistent with the long-term water supply contract provisions, CEQA, and other provisions of law, DWR has discretion to approve or deny transfers. DWR's exercise of discretion will incorporate the following principles:

(a) As required by CEQA, DWR as an agency with statewide authority will implement feasible mitigation measures for any significant environmental impacts resulting from a transfer, if such impacts and their mitigation are not addressed by other public agencies and are within DWR's jurisdiction.

(b) DWR will invoke "overriding considerations" in approving a transfer only as authorized by law, including but not limited to CEQA, and, to the extent applicable, the public trust doctrine and area of origin laws.

ATTACHMENT D

PRINCIPLES REGARDING PUBLIC PARTICIPATION PROCESS IN SWP CONTRACT NEGOTIATIONS

Note: These principles are prepared in connection with the settlement agreement between PCL and DWR and are only effective pursuant to the terms therein.

1. **Policy:** Given the importance of the State Water Project to the State of California, and the key role that the long-term water supply contracts play in the administration of the State Water Project, DWR agrees that public review of significant changes to these contracts is beneficial and in the public interest.

2. **Types of activities to be covered:** Project-wide contract amendments (i.e., contracts with substantially similar terms intended to be offered to all long-term SWP Contractors) and contract amendments to transfer entitlements between existing SWP Contractors will not be offered to the contractors for execution unless DWR has first complied with the public participation process as described in paragraphs (3), (4), (5) and (6).

3. **The Public Participation Process.**

   1) Negotiations will be conducted in public;

   2) The public will be provided with advance notice of the time and place of the negotiations; and

   3) The public will be provided the opportunity to observe negotiations and comment in each negotiating session

4. **Timing of Public Participation:** Public participation ordinarily will precede the formulation of the project description in the CEQA process in order to assure that the public participation is meaningful. When DWR is a responsible agency, (e.g., when existing SWP Contractors agree to transfer entitlement between themselves), the public participation will be scheduled to facilitate coordination with the lead agency's CEQA process.

5. **Activities that will not be subject to public participation:** Informal discussions prior to exchange of formal drafts and discussion of topics that are authorized to be kept confidential by law will not be subject to the public participation process.

6. **Contract amendments resulting from litigation:** If litigation has been formally initiated, and settlement negotiations result in a proposal to adopt project-wide amendments to settle the litigation, all proposed contract amendments shall be subject to the public participation process before they are approved by DWR.

ATTACHMENT E

FINAL PERMANENT TABLE A AMOUNT TRANSFERS FROM KERN COUNTY WATER AGENCY SUBSEQUENT TO MONTEREY AMENDMENTS (January 1, 2003)

Note: This Exhibit is prepared in connection with the settlement agreement between PCL and DWR.

From (Kern County Water Agency Member Unit)	To	Amount (afy)	Year Effective
Berrenda Mesa Water District	Mojave Water Agency	25,000	1998
Belridge Water Storage District	Palmdale Water Agency	4,000	2000
Berrenda Mesa Water District	Alameda County Flood Control and Water Conservation District Zone 7	7,000	2000
Lost Hills Water District	Alameda County Flood Control and Water Conservation District Zone 7	15,000	2000
Belridge Water Storage District	Alameda County Flood Control and Water Conservation District Zone 7	10,000	2001
Belridge Water Storage District and Berrenda Mesa Water District	Solano County Water Agency	5,756	2001
Belridge Water Storage District and Berrenda Mesa Water District	Napa County Flood Control and Water Conservation District	4,025	2001

EXHIBIT 1

PLAINTIFFS' EXPENSES TRUST ACCOUNT AGREEMENT

This Agreement is entered into this fifteenth day of August 2002, by JAMS and DWR, for the purpose of transferring $300,000 in trust to JAMS for use in accordance with Principles of Settlement in PCL vs. DWR.

WHEREAS, JAMS has acted as mediator between the Department and other parties to the litigation in PCL v. DWR (Superior Court No. 95CS03216).

WHEREAS, the Principles of Settlement as agreed to by the parties on July 22, 2002, provides for the placement of $300,000 in trust with JAMS.

WHEREAS, the money placed in the trust is to be provided to plaintiffs for expenses actually incurred as needed to support plaintiffs' participation in developing the new EIR to be filed as a return to the writ.

WHEREAS, the Principles of Settlement also provides that the funds will be provided based on a budget and participation plan to be submitted by plaintiffs to the mediator specifying the purposes for which the funds will be expended.

The parties agree as follows:

1. JAMS agrees to accept $300,000 in trust in accordance with the Principles of Settlement.

2. JAMS agrees to maintain the monies in trust, and following receipt of a budget and participation plan from plaintiffs, to disburse funds to plaintiffs for actual expenditures incurred for such purpose and pursuant to such schedule, budget, and participation plan, all in conformance with the Principles of Settlement. The funds will be disbursed to the plaintiffs' attorney, Antonio Rossmann, Law Offices of Antonio Rossmann.

3. Costs incurred by JAMS in providing this service will be paid as part of the mediator services as part of the existing contract between JAMS and the California Department of Justice, Office of the Attorney General.

4. This agreement may be amended in writing by agreement of both parties.

5. Funds not disbursed upon termination of the trust shall be returned to DWR.

6. The trust shall terminate upon notice to JAMS by DWR of termination based on the earlier of (a) failure of the parties to the mediation to execute a settlement agreement by January 1, 2003; (b) notice of termination given by the Director of DWR to JAMS and plaintiffs that this trust is terminated, which notice shall not be given without

defendants' consultation with plaintiffs and the mediator; or c) filing of the Notice of Determination on the new EIR.

7. JAMS will incur no liability to DWR arising from any disbursement made pursuant to this agreement.

8. This agreement is not intended to and shall not create any rights in any third party.

APPROVED:

/s/ Steve Macaulay for	8/10/02	/s/ Julie Sager	8/15/02
Thomas M. Hannigan Director	Date	Vice President & CFO JAMS	Date

EXHIBIT 1

AMENDMENT NO. 1

PLAINTIFFS' EXPENSES TRUST ACCOUNT AGREEMENT

Paragraph 6 of this Agreement is amended to read as follows:

6. The trust shall terminate upon notice to JAMS by DWR of termination based on the earlier of (a) failure of the parties to the mediation to execute a settlement agreement by May 1, 2003, (b) notice of termination given by the Director of DWR to JAMS and plaintiffs that this trust is terminated, which notice shall not be given without defendants' consultation with plaintiffs and the mediator; or (c) filing of the Notice of Determination on the new EIR.

APPROVED:

Thomas M. Hannigan Director	Date	JAMS	Date

EXHIBIT 2

KERN WATER BANK AUTHORITY
AGREEMENTS AND PERMITS
WHICH MAY HAVE RELIED ON THE KWBA ADDENDUM

AGREEMENT/PERMIT	DATE	OTHER PARTIES
Incidental Take Permit - PRT-828086	2-Oct-97	Department of Interior, U.S. Fish & Wildlife Service
Approval/Management Authorization pursuant to California Endangered Species Act for Implementation of Kern Water Bank Habitat Conservation Plan/Natural Community Conservation Plan	2-Oct-97	Calif. Department of Fish & Game
Natural Community Conservation Plan/Habitat Conservation Plan Implementation Agreement	2-Oct-97	U.S. Fish & Wildlife Service; Calif Dept of Fish & Game; Kern Water Bank Authority
Approval, Cultural Resources Assessment and Plan for the KWBA Project	January, 1997	N/A
Memorandum of Understanding Regarding Operation and Monitoring of the Kern Water Bank Groundwater Banking Program	26-Oct-95	Numerous
Approval of Kern Water Bank Authority Mosquito Abatement Program	26-Oct-95	Mosquito Abatement Districts
Service Contracts for Operations and Maintenance	1996 - current	Numerous Vendors
Grazing Leases (Sheep and Cattle)	1997- current	Various Stockmen
Minor Amendment No. 1: Hunting/Research to the KWBA HCP/NCCP and Implementation Agreement	6/30/1998	California Department of Fish and Game and U.S. Fish and Wildlife Service
State of California Standard Agreement for "Improving Wildlife Habitat for Doves" (annual contract)	1998 - current	Calif. Department of Fish and Game
Conservation Credit Certificates	1998 - current	Conservation Credit Buyers
Construction and Service Contracts for Master Plan Construction Project - KWB Canal, Head-works, Aqueduct Turnout, New Wells, Well Rehabilitation, Pipelines	7/1999 - 8/2002	Numerous Contractors and Vendors
KWB Canal and Buena Vista Main Canal Joint Use Agreement	7/20/1999	Buena Vista Water Storage District

AGREEMENT/PERMIT	DATE	OTHER PARTIES
Business Loan Agreement ($21,000,000)	7/23/1999	Bank of America, N.A.
Agreement for Grant of Easement	September 1999	State of California Acting Through the Department of Parks and Recreation
Agreement for Construction, Operation, and Maintenance of the Kern Water Bank Turnout, a Permanent Turnout Within the California Aqueduct Right of Way	11/9/1999	Department of Water Resources
License Agreement for Kern River Canal Crossing	11/17/1999	City of Bakersfield
Loan Contract No. E75002 Under the "Safe, Clean, Reliable Water Supply Act Water Conservation and Ground Water Recharge Sub account ($5,000,000)	March 2000	State of California, Department of Water Resources, Division of Planning and Local Assistance
Reclamation Board Permit No. 17147-A GM Authorizing Construction of Pedestrian Bridge Across the Outlet Canal within the Kern River Designated Floodway	10/16/2000	State of California - The Resources Agency, Department of Water Resources
Reclamation Board Permit No. 16821 GM (Revised) Authorizing Construction of a 20-foot Wide Unlined Canal and Reinforced Concrete Gated Turnout Structure on the Right (North) Bank of the Designated Floodway and Install a 108-Inch Diameter, 700-foot long, Reinforced Concrete Pipe Across (Under the Kern River	2/26/2001	State of California - The Resources Agency, Department of Water Resources
Grant Awarded Under the "Safe Drinking Water, Clean Water, Watershed Protection and Flood Protection Act (Proposition 13) - Groundwater Storage Program ($3,375,000)	Jun-02	State of California, Department of Water Resources, Division of Planning and Local Assistance
Service Contracts for Well Testing and Rehabilitation Under the SB5X Program	2002	Various Vendors

EXHIBIT 3-A

PROPOSED 21168.9 ORDER

IN THE SUPERIOR COURT OF THE STATE OF CALIFORNIA

FOR THE COUNTY OF SACRAMENTO

PLANNING AND CONSERVATION LEAGUE, a California not for profit corporation, PLUMAS COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT, a California public agency; CITIZENS PLANNING ASSOCIATION OF SANTA BARBARA COUNTY, INC., a California not for profit corporation, Plaintiffs and Petitioners, v. DEPARTMENT OF WATER RESOURCES, a California State Agency, et al., Defendants and Respondents,	Case No: 95CS03216 [PROPOSED] ORDER PURSUANT TO PUBLIC RESOURCES CODE SECTION 21168.9

On remand from the Third District Court of Appeal on January ___, 2003, in Department 53 of the Sacramento Superior Court, the Honorable Loren E. McMaster, presiding, this proceeding came on for a status report and joint motion. Petitioners and Plaintiffs, Planning and Conservation League, Plumas County Flood Control and Water Conservation District, and Citizens Planning Association of Santa Barbara County ("Petitioners"), appeared through Antonio Rossmann and Roger B. Moore. Respondent and Defendant, Central Coast Water Authority (CCWA), appeared through Susan F. Petrovich of the Law Firm of Hatch & Parent. Respondent and Defendant, Department of Water Resources (DWR), appeared through Deputy Attorney General Marian E. Moe. Robert S. Draper of O'Melveny and Myers, LLP and Clifford W. Schulz appeared, respectively, on behalf of the Metropolitan Water District of Southern California and Dudley Ridge Water District, entities that submitted answers to the First

Amended Complaint subsequent to the Court of Appeal's final determination in this action and prior to any further order of this Court on remand.

In light of the direction from the Third District Court of Appeal on remand in Planning and Conservation League v. Department of Water Resources (2000) 83 Cal.App.4th 892, this Court hereby makes the following findings:

1. The parties to this lawsuit and other public agencies have engaged in extensive settlement negotiations, mediated by retired Judge Daniel Weinstein of JAMS Dispute Resolution, with the intent to avoid further litigation and associated expenses, to provide for an effective way to cooperate in the preparation of a new environmental impact report (EIR), and to make other specified improvements in the administration and operation of the State Water Project.

2. The mediation has resulted in an executed Settlement Agreement for approval by this Court, attached to this Order as Exhibit A.

3. DWR as lead agency has commenced the preparation of the new EIR.

4. As part of the Settlement Agreement, DWR and the State Water Project (SWP) contractors who are signatories to the Settlement Agreement have agreed that, pending DWR's filing of a return in satisfaction of the Writ of Mandate and this Court's dismissal of the Writ of Mandate, they will not approve any new project or activity (as defined in section VII.A of the Settlement Agreement) in reliance on the 1995 Environmental Impact Report for the Implementation of the Monterey Agreement.

5. This Order is made pursuant to the provisions of Public Resources Code section 21168.9 and pursuant to this Court's equitable powers. This Court finds that the actions described in this Order, including actions taken in compliance with the Writ of Mandate, comprise the actions necessary to assure DWR's compliance with Division 13 of the Public Resources Code. This Court further finds that this Order includes only those mandates necessary to achieve compliance with Division 13.

THEREFORE, IT IS HEREBY ORDERED as follows:

1. This Court's Final Judgment denying the petition for writ of mandate, entered August 15, 1996, is reversed in accordance with the directive of the Third District Court of Appeal's decision in Planning and Conservation League v. Department of Water Resources (2000) 83 Cal.App.4th 892.

2. This Court's order granting the summary adjudication on the fifth cause of action, entered June 10, 1996, is vacated.

3. The Settlement Agreement attached as Exhibit A is hereby approved.

4. A Peremptory Writ of Mandate directed to Respondents Central Coast Water Authority and DWR shall issue under seal of this Court in the form attached hereto as Exhibit B.

5. In accordance with the Settlement Agreement and this Order, pending DWR's filing of the return in compliance with the Peremptory Writ of Mandate and this Court's Order discharging the Writ of Mandate, DWR and CCWA shall not approve any new project or activity (as defined section VII.A of the Settlement Agreement) in reliance on the 1995 EIR for the Implementation of the Monterey Agreement.

6. In the interim, until DWR files its return in compliance with the Peremptory Writ of Mandate and this Court orders discharge of the Writ of Mandate, the administration and operation of the State Water Project and Kern Water Bank Lands shall be conducted pursuant to the Monterey Amendments to the State Water Contracts, as supplemented by the Attachment A Amendments to the State Water Contracts (as defined in the Settlement Agreement) and the other terms and conditions of the Settlement Agreement.

7. Plaintiffs and petitioners shall recover such costs and attorney's fees as provided in prior court orders and in an amount as determined in the arbitration procedures agreed to in the Settlement Agreement, or as otherwise agreed to by the parties.

8. Except as provided, the Peremptory Writ of Mandate shall not limit or constrain the lawful jurisdiction and discretion of DWR. This Court retains jurisdiction until DWR files a

return that complies with the terms of the Writ of Mandate, and this Court issues an order discharging the Writ of Mandate.

IT IS SO ORDERED.

Dated: _____, 2003 _____ _____

Judge of the Superior Court

EXHIBIT 3-B

PROPOSED WRIT OF MANDATE

IN THE SUPERIOR COURT OF THE STATE OF CALIFORNIA

FOR THE COUNTY OF SACRAMENTO

PLANNING AND CONSERVATION LEAGUE, a California not for profit corporation, PLUMAS COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT, a California public agency; CITIZENS PLANNING ASSOCIATION OF SANTA BARBARA COUNTY, INC., a California not for profit corporation, Petitioners, v. DEPARTMENT OF WATER RESOURCES, a California State Agency, and CENTRAL COAST WATER AUTHORITY, A Joint Powers Agency Respondents.	Case No: 95CS03216 PROPOSED PEREMPTORY WRIT OF MANDATE (Public Resources Code § 21168.9)

TO: Respondents California Department of Water Resources and Central Coast Water Authority:

The Third District Court of Appeal, in its decision in Planning and Conservation League v. Department of Water Resources (2000) 83 Cal.App.4th 892, having directed this Court to issue a Peremptory Writ of Mandate,

YOU ARE HEREBY COMMANDED to comply with the following:

1. Respondent Central Coast Water Authority shall set aside its October 26, 1995 certification that the Final Programmatic Environmental Impact Report for Implementation of

the Monterey Agreement (the 1995 Monterey Agreement EIR) was completed in compliance with the California Environmental Quality Act [AR 2183].

2. Respondent Department of Water Resources (DWR) shall:

(a) set aside its December 13, 1995 certification, as responsible agency, that the 1995 Monterey Amendment EIR is adequate under the California Environmental Quality Act [AR 1875]; and

(b) as lead agency, prepare and certify a new EIR. in compliance with the Court of Appeal's decision, the California Environmental Quality Act, and the Settlement Agreement.

3. Upon completion and certification of the new EIR, Respondent DWR shall make written findings and decisions and file a notice of determination identifying the components of the project analyzed in the new EIR, all in the manner prescribed by sections 15091 – 15094 of the CEQA Guidelines.

4. Respondent DWR shall, upon the filing of a Notice of Determination, submit the new EIR, the written findings, the Notice of Determination, and such additional documents as this Court may order by way of return to this writ of mandate.

5. This Court shall retain jurisdiction over this proceeding until DWR files a return that complies with this Writ of Mandate, and this Court issues an order discharging this Writ of Mandate. Except as provided, this Writ of Mandate shall not limit or constrain the lawful jurisdiction and discretion of the Department of Water Resources.

Dated: _____, 2003

_____

_____

_____
Clerk of the Superior Court

Let the foregoing writ issue:

_____
Judge of the Superior Court

EXHIBIT 4

SECTION VI TRUST ACCOUNT AGREEMENT

This Section VI Trust Account Agreement (this "Trust Agreement") is entered into this _____ day of _____ 2003, by JAMS and the State of California Department of Water Resources (the "Department"), for the purposes of establishing and describing the trust account in accordance with that certain Settlement Agreement entered into in *Planning & Conservation League v. Department of Water Resources* ("PCL v. DWR").

WHEREAS, Judge Daniel Weinstein (ret.) of JAMS has acted as mediator between the Department and other parties to the litigation in *PCL v. DWR* (Sacramento Superior Court No. 95CS03216).

WHEREAS, the Settlement Agreement provides for the placement over time of $5,500,000 in trust with JAMS at the specific times and under the conditions in the Settlement Agreement.

The parties agree as follows:

1. JAMS will establish a trust account for receipt and disbursal of funds received from the Department for payment pursuant to the Settlement Agreement.

2. All funds deposited with JAMS pursuant to this agreement shall be placed into a trust account and shall be disbursed only in accordance with this Trust Agreement and the Settlement Agreement. Section VI of the Settlement Agreement provides that the funds shall be used to implement the Settlement Agreement, as determined by Plaintiffs in their reasonable judgment, including watershed restoration projects, follow-up actions arising from the Settlement Agreement, and technical studies.

3. JAMS agrees to maintain the monies in trust, and after receipt of a written statement executed by all Plaintiffs (as defined in the Settlement Agreement), to disburse funds to Plaintiffs in conformance with such statement. JAMS will provide a copy of the written statement to: Chief Counsel, The Office of the Chief Counsel, Department of Water Resources, P.O. Box 942836, Sacramento, CA 95814.

4. Costs incurred by JAMS in providing this service will be paid as part of the mediator services as part of the existing contract between JAMS and the California Department of Justice, Office of the Attorney General, or any successor contract.

5. This agreement may be amended only in writing by agreement of both parties.

6. Funds not disbursed before termination of this Trust Agreement shall be returned to DWR immediately upon termination of this Trust Agreement.

7. This Trust Agreement shall terminate if and when DWR notifies JAMS that the agreement is terminated, which notice shall not be given without DWR's consultation with Plaintiffs and the mediator.

8. JAMS will incur no liability to DWR arising from any disbursement made pursuant to this agreement.

9. This Trust Agreement is intended solely for the purposes of establishing and describing the trust account at JAMS and is not intended to and shall not create any rights in any third party.

APPROVED:

Thomas M. Hannigan Director	Date	JAMS	Date

State of California
The Resources Agency
DEPARTMENT OF WATER RESOURCES

AMENDMENT NO. 19 TO THE WATER SUPPLY CONTRACT
BETWEEN
THE STATE OF CALIFORNIA
DEPARTMENT OF WATER RESOURCES
AND
CASTAIC LAKE WATER AGENCY

This Amendment is made this 28th day of May, 2003, pursuant to the provisions of the California Water Resources Development Bond Act, the Central Valley Project Act, and other applicable laws of the State of California, between the State of California, acting by and through its Department of Water Resources, hereinafter referred to as the "State," and Castaic Lake Water Agency, hereinafter referred to as the "Agency."

RECITALS

A. The State and the Agency entered into and subsequently amended a water supply contract (the "contract") providing that the State shall supply certain quantities of water to the Agency and providing that the Agency shall make certain payments to the State, and setting forth the terms and conditions of such supply and such payments.

B. On December 1, 1994, the State and representatives of certain State Water Project contractors executed a document entitled "Monterey Agreement – Statement of Principles – By The State Water Contractors And The State Of

California Department Of Water Resources For Potential Amendments To The State Water Supply Contracts" (the "Monterey Agreement").

C. The State, the Central Coast Water Authority ("CCWA") and those contractors intending to be subject to the Monterey Agreement subsequently negotiated an amendment to their contracts to implement provisions of the Monterey Agreement, and such amendment was named the "Monterey Amendment."

D. In October 1995, an environmental impact report ("EIR") for the Monterey Amendment was completed and certified by CCWA as the lead agency, and thereafter the Agency and the State executed the Monterey Amendment.

E. The EIR certified by the CCWA was challenged by several parties (the "Plaintiffs") in the Sacramento County Superior Court and thereafter in the Third District Court of Appeal, resulting in a decision in Planning and Conservation League, et al. v. Department of Water Resources, 83 Cal.App.4th 892 (2000), which case is hereinafter referred to as "PCL v. DWR."

F. In its decision, the Court of Appeal held that (i) the Department of Water Resources ("DWR"), not CCWA, had the statutory duty to serve as lead agency, (ii) the trial court erred by finding CCWA's EIR sufficient despite its failure to discuss implementation of Article 18, subdivision (b) of the State Water Project contracts, as a no-project alternative, (iii) said errors mandate preparation of a new EIR under the direction of DWR, and (iv) the trial court erroneously dismissed the challenge to DWR's transfer of title to certain lands to Kern County Water Agency (the "Validation Cause of Action") and execution of amended State Water Project contracts for failure to name and serve indispensable parties. The

Court of Appeal remanded the case to the trial court, ordering it to take the following five actions: (1) vacate the trial court's grant of the motion for summary adjudication of the Validation Cause of Action; (2) issue a writ of mandate vacating the certification of the EIR; (3) determine the amount of attorney fees to be awarded Plaintiffs; (4) consider such orders it deems appropriate under Public Resources Code Section 21168.9(a) consistent with the views expressed in the Appellate Court's opinion; and (5) retain jurisdiction over the action until DWR, as lead agency, certifies an environmental impact report in accordance with CEQA standards and procedures, and the Superior Court determines that such environmental impact report meets the substantive requirements of CEQA.

G. The State, the contractors, and the Plaintiffs in PCL v. DWR reached an agreement to settle PCL v. DWR, as documented by that certain Settlement Agreement dated MAY 05 2003, 2003 (the "Settlement Agreement"), and in such Settlement Agreement have agreed that the contracts should be amended, for clarification purposes, to delete terms such as "annual entitlement" and "maximum annual entitlement" so that the public, and particularly land use planning agencies, will better understand the contracts.

H. Pursuant to the Settlement Agreement, the State and the Agency desire to so amend the Agency's contract, with the understanding and intent that the amendments herein with respect to subsections (k), (l), and (m) of Article 1, subsection (b) of Article 6, and subsection (a) of Article 16, and to Table A of the Agency's contract are solely for clarification purposes and that such amendments

are not intended to and do not in any way change the rights, obligations or limitations on liability of the State or the Agency established by or set forth in the contract.

I. Pursuant to the Settlement Agreement, the State, the contractors and the Plaintiffs in PCL v. DWR also agreed that the contracts should be amended to include a new Article 58 addressing the determination of dependable annual supply of State Water Project water to be made available by existing Project facilities, and the State and Agency desire to so amend the Agency's contract.

NOW THEREFORE, IT IS MUTUALLY AGREED, as follows:

1. Article 1(l) is amended to read:

(l) Annual Table A Amount

"Annual Table A Amount" shall mean the amount of project water set forth in Table A of this contract that the State, pursuant to the obligations of this contract and applicable law, makes available for delivery to the Agency at the delivery structures provided for the Agency. The term Annual Table A Amount shall not be interpreted to mean that in each year the State will be able to make that quantity of project water available to the Agency. The Annual Table A Amounts and the terms of this contract reflect an expectation that under certain conditions the Agency will receive its full Annual Table A Amount; but that under other conditions only a lesser amount, allocated in accordance with this contract, may be made available to the Agency. This recognition that full Annual Table A Amounts will not be deliverable under all conditions does not change the

obligations of the State under this contract, including but not limited to, the obligations to make all reasonable efforts to complete the project facilities, to perfect and protect water rights, and to allocate among contractors the supply available in any year, as set forth in Articles 6(b), 6(c), 16(b) and 18, in the manner and subject to the terms and conditions of those articles and this contract. Where the term "annual entitlement" appears elsewhere in this contract, it shall mean "Annual Table A Amount." The State agrees that in future amendments to this and other contractor's contracts, in lieu of the term "annual entitlement," the term "Annual Table A Amount" will be used and will have the same meaning as "annual entitlement" wherever that term is used.

2. Article 1(m) is amended to read:

(m) Maximum Annual Table A Amount

"Maximum annual entitlement" shall mean the maximum annual amounts set forth in Table A of this contract, and where the term "maximum annual entitlement" appears elsewhere in this contract it shall mean "Maximum Annual Table A Amounts."

3. Article 1(k) is amended to read:

(k) Minimum Project Yield

"Minimum project yield" shall mean the dependable annual supply of project water to be made available assuming completion of the initial project conservation facilities and additional project conservation facilities. The project's capability of providing the minimum project yield shall be determined by the State

on the basis of coordinated operations studies of initial project conservation facilities and additional project conservation facilities, which studies shall be based upon factors including but not limited to: (1) the estimated relative proportion of deliveries for agricultural use to deliveries for municipal use assuming Maximum Annual Table A Amounts for all contractors and the characteristic distributions of demands for these two uses throughout the year; and (2) agreements now in effect or as hereafter amended or supplemented between the State and the United States and others regarding the division of utilization of waters of the Delta or streams tributary thereto.

4. Article 6(b) is amended to read:

(b) Agency's Annual Table A Amounts

Commencing with the year of initial water delivery to the Agency, the State each year shall make available for delivery to the Agency the amounts of project water designated in Table A of this contract, which amounts shall be subject to change as provided for in Article 7(a) and are referred to in this contract as the Agency's Annual Table A Amounts.

5. Article 16(a) is amended to read:

(a) Limit on Total of all Maximum Annual Table A Amounts

The Agency's Maximum Annual Table A Amount hereunder, together with the maximum Table A amounts of all other contractors, shall aggregate no more than 4,185,000 acre-feet of project water.

6. Article 57 is intentionally left blank for future use.

7. Article 58 is added to read:

58. Determination of Dependable Annual Supply of Project Water to be Made Available by Existing Project Facilities.

In order to provide current information regarding the delivery capability of existing project conservation facilities, commencing in 2003 and every two years thereafter the State shall prepare and mail a report to all contractors, and all California city, county, and regional planning departments and agencies within the contractors' project service areas. This report will set forth, under a range of hydrologic conditions, estimates of overall delivery capability of the existing project facilities and of supply availability to each contractor in accordance with other provisions of the contractors' contracts. The range of hydrologic conditions shall include the delivery capability in the driest year of record, the average over the historic extended dry cycle and the average over the long-term. The biennial report will also include, for each of the ten years immediately preceding the report, the total amount of project water delivered to all contractors and the amount of project water delivered to each contractor.

8. Add the following language at the bottom of Table A:

In any year, the amounts designated in this Table A shall not be interpreted to mean that the State is able to deliver those amounts in all years. Article 58 describes the State's process for providing current information for project delivery capability.

9. Except for Article 58, the changes made by this amendment are solely for clarification purposes, and are not intended to nor do they in any way change the rights, obligations or limitations on liability of the State or the Agency established by or set forth in the contract, and this amendment shall be interpreted in accordance with this intent.

10. At the time of execution of this Agreement and thereafter, the effectiveness of this Amendment is dependent upon the effectiveness of the Agency's Monterey Amendment (all provisions therein) and the Kern Fan Element Transaction.

IN WITNESS WHEREOF, the parties hereto have executed this amendment on the date first above written.

Approved as to legal form
and sufficiency:

Chief Counsel
Department of Water Resources

STATE OF CALIFORNIA
DEPARTMENT OF WATER
RESOURCES

Director

CASTAIC LAKE WATER AGENCY

Name

GENERAL MANAGER

Title

State of California
The Resources Agency
DEPARTMENT OF WATER RESOURCES

AGREEMENT BETWEEN THE STATE OF CALIFORNIA DEPARTMENT OF WATER RESOURCES AND CASTAIC LAKE WATER AGENCY REGARDING PAYMENT OF COSTS OF MONTEREY AMENDMENT LITIGATION

This Agreement is made this 28th day of May, 2003, pursuant to the provisions of the California Water Resources Development Bond Act, the Central Valley Project Act, and other applicable laws of the State of California, between the State of California, acting by and through its Department of Water Resources, hereinafter referred to as the "Department," and Castaic Lake Water Agency, hereinafter referred to as the "Agency."

RECITALS

A. The Department and the Agency entered into and subsequently amended a water supply contract (the "contract") providing that the Department shall supply certain quantities of water to the Agency and providing that the Agency shall make certain payments to the Department, and setting forth the terms and conditions of such supply and such payments.

B. On December 1, 1994, the Department and representatives of certain State Water Project contractors executed a document entitled "Monterey Agreement –

Statement of Principles – By The State Water Contractors And The State Of California Department Of Water Resources For Potential Amendments To The State Water Supply Contracts" (the "Monterey Agreement").

C. The Department, the Central Coast Water Authority ("CCWA") and certain other State Water Project contractors subsequently negotiated an amendment to their contracts to implement provisions of the Monterey Agreement, and such amendment was named the "Monterey Amendment."

D. In October 1995, an environmental impact report ("EIR") for the Monterey Amendment was completed and certified by CCWA as the lead agency, and thereafter the Agency and the Department executed the Monterey Amendment.

E. The EIR certified by the CCWA was challenged by several parties (the "Plaintiffs") in the Sacramento County Superior Court and thereafter in the Third District Court of Appeal, resulting in a decision in Planning and Conservation League, et al. v. Department of Water Resources, 83 Cal.App.4th 892 (2000), which case is hereinafter referred to as "PCL v. DWR."

F. The Department, the contractors, and the Plaintiffs in PCL v. DWR reached an agreement to settle PCL v. DWR, as documented by that certain Settlement Agreement dated MAY 05 2003, 2003 (the "Settlement Agreement"),

and in such Settlement Agreement the Department has agreed to undertake various financial obligations and make certain payments to the various plaintiffs and their attorneys.

G. The purpose of this agreement is to establish the terms for the Department's allocation and reimbursement of costs of the Monterey Amendment litigation.

NOW THEREFORE, IT IS MUTUALLY AGREED, as follows:

1. All costs of the Monterey Amendment litigation (hereinafter "costs") incurred by the Department shall be allocated among all State Water Project contractors who have signed the Monterey Amendment as of January 1, 2003 proportionally based upon their maximum Table A Amounts as of January 1, 2003.
2. Costs of the Monterey Amendment litigation shall be included in the annual Statement of Charges for the year in which they are incurred by the Department, or in the next subsequent annual Statement of Charges, and shall not be amortized.
3. After the costs of the Monterey Amendment litigation are allocated as described in paragraph 2, such costs shall be billed and repaid to the Department annually as part of the Minimum OMP&R Component of the Transportation charge in the annual Statement of Charges, in accordance with the terms of the contract.
4. Payment of the costs of the Monterey Amendment litigation shall be subject to the payment, adjustment, and collection provisions of Articles 29 through 34 of the contract.

5. This agreement is being entered into solely for purposes of providing for payment of the costs of the Monterey Amendment litigation, and shall be effective for those purposes notwithstanding any contrary provision in the contract. It is not intended to nor does it change in any way any substantive rights, obligations or limitations on liability of the Department or the Agency established by or set forth in the contract, and this agreement shall be interpreted in accordance with this intent.

6. This agreement shall become effective on the date of approval of the Settlement Agreement by the Superior Court in PCL v. DWR and shall remain in effect until all costs of the Monterey Amendment litigation incurred by the Department have been paid in full.

IN WITNESS WHEREOF, the parties hereto have executed this agreement on the date first above written.

Approved as to legal form
and sufficiency:

Chief Counsel
Department of Water Resources

STATE OF CALIFORNIA
DEPARTMENT OF WATER
RESOURCES

Director

CASTAIC LAKE WATER AGENCY

Name

GENERAL MANAGER
Title

United States Environmental Protection Agency

Prevention, Pesticides And Toxic Substances (7506C)

Revised January 2001

Diazinon Revised Risk Assessment and Agreement with Registrants

Action and Rationale

EPA is releasing its revised risk assessment and announcing an agreement with registrants to remove and phase out certain uses of the organophosphate pesticide diazinon. Also known as Spectracide and other trade names, diazinon is one of the most widely-used insecticides in the U.S., especially for household lawn and garden pest control.

The Food Quality Protection Act, enacted in 1996, sets a more stringent safety standard for most pesticides and offers special protection for children. EPA has accepted a voluntary agreement from the manufacturers of diazinon to modify the uses of this pesticide to address the tough new safety standard of FQPA.

The Agency accepted the termination of all indoor residential and indoor non-residential uses of diazinon. EPA and the registrants also have agreed to phase out and cancel outdoor residential lawn and garden uses (i.e., all outdoor non-agricultural uses) over the next few years. Together, these actions will end about 75% of the current use of diazinon. EPA and the registrants have further agreed to remove about one third of the agricultural crop uses of diazinon. This action will also help mitigate risks to workers, birds and other wildlife, drinking water resources, and the environment.

Risk Mitigation

EPA and the registrants of diazinon have agreed to the following modifications:

Reducing Residential Risks... About 75% of diazinon currently is used in and around the home. Diazinon accounts for about 30% of the homeowner use insecticide market. The agreement will result in termination of all retail sale of diazinon for residential crack and crevice treatments and all other indoor uses by the end of 2002.

The agreement also virtually ends sales of the residential lawn care use of diazinon in 2003, and provides for orderly transition to a new product line. The home lawn care use accounts for most residential exposure but less risk than the indoor use of diazinon. Under the agreement, production of diazinon for home lawn care and all other outdoor non-agricultural uses must phase down at least 50% by 2003. Production, formulation, and sales to retailers are scheduled to phase out and end completely during 2003. Registrants will buy back any products from retailers that remain at the end of 2004. However, few retail products for home lawn care uses are expected to remain in the market by that time.

Reducing Ecological Risks... Broadcast application of diazinon to turf poses one of the greatest pesticide risks to birds. Just one granule or seed treated with diazinon is enough to kill a small bird. Diazinon had the highest number of reported bird kill incidents of any registered pesticide during 1994-1998. Birds of many species have been killed, including ducks, geese, hawks, songbirds, woodpeckers, and others. Since residential use of diazinon accounted for over half of these incidents, phasing out and canceling the outdoor residential

uses is expected to further mitigate risks to birds and other wildlife.

Diazinon is one of the most commonly found pesticides in air, rain, and fog. Monitoring data indicate that while it is widespread in surface water nationally, diazinon is most commonly found in surface water in urban areas as a result of runoff from residential use. Phasing out and eventually canceling the outdoor residential uses of diazinon, as well as some current agricultural uses, will help reduce residues of diazinon in surface water and throughout the environment.

Reducing Drinking Water Risks... The agreement to phase out and cancel all outdoor residential uses of diazinon is expected to reduce human exposure to diazinon through drinking water, since residential applications are potentially a major source of drinking water contamination.

Reducing Worker Risks... Risks to agricultural workers who mix, load, and apply diazinon or harvest treated crops also are of concern to EPA. The agreement will help mitigate worker risks by canceling about 30% of the current agricultural uses of diazinon. The agreement also will maintain the Restricted Use Pesticide classification for remaining diazinon crop uses so they will continue to be limited to trained, certified applicators. These and other measures to reduce both worker and ecological risks will be discussed further in consultation with stakeholders as EPA develops an interim reregistration eligibility decision for diazinon.

Supporting Low-Risk Uses... The agreement allows about 70% of current diazinon agricultural uses to continue. The continuing diazinon uses are important to the production of many minor crops, and do not exceed the "risk cup" for diazinon. EPA will further consider worker and ecological risks in developing risk management options, considering public comments received during the next 60 days, and in completing an interim reregistration eligibility decision for diazinon.

Phased In Approach

The diazinon agreement phases in various restrictions and cancellations to address higher risk, indoor residential uses first. Because much pesticide risk reduction involves increasing margins of safety, it is reasonable to focus first on uses that achieve the greatest risk reduction for children. Allowing other uses to continue for specific periods of time will help ensure that appropriate alternatives are available for a reasonable and orderly transition.

Reregistration of Diazinon

The risk mitigation measures in this agreement represent an important step in EPA's review of diazinon. As the Agency continues its review of diazinon through the reregistration process, we will continue to look at both occupational and ecological risks to ensure that diazinon meets current safety standards. If EPA determines that unreasonable risks remain for workers or the environment, the Agency will incorporate additional risk mitigation measures as part of the interim reregistration eligibility decision.

Provisions of the Agreement and Associated EPA Actions

Home Uses		
Site	**Mitigation Measures**	**Effective Dates**
Indoor Uses All uses inside any structure, vehicle, vessel, aircraft, or enclosed area and/or on any contents therein (except mushroom houses), including residences, food/feed handling establishments, schools, museums, stores, hospitals, sports facilities, warehouses, and greenhouses. All indoor pet uses including pet collars.	Product registrations are being canceled or amended to delete indoor uses from end use product labels (except use in mushroom houses). EPA's Federal Register notice of January 10, 2001, proposed to delete these uses.	Cancellations become effective after the 30-day public comment period, upon issuance of a cancellation order in February 2001. As of March 1, 2001, manufacturing use products may no longer be used to formulate end use products for indoor uses. Retailers stop sale December 31, 2002
Outdoor Non-Agricultural Uses Home lawn, garden, and any other outdoor residential or outdoor non-agricultural uses	Production will phase down Uses will be phased out Technical registrants will buy back existing products from retailers Product registrations will (expire) be canceled, with no provision for existing stocks	Technical registrants reduce amount of diazinon produced by 50% or more by 2003. Stop formulation of products June 30, 2003 Stop sale to retailers August 31, 2003 Commencing December 31, 2004 December 31, 2004

Agricultural Uses Proposed for Cancellation		
Crop	**Action**	**Effective Dates**
Alfalfa Bananas Beans (dried) Bermudagrass Celery Red Chicory (radicchio) Citrus Clover Coffee Cotton Cowpeas Cucumbers Dandelions Kiwi Lespedeza Parsley Parsnips Pastures Peppers Irish Potatoes Sweet Potatoes Rangeland Sheep Sorghum Spinach Squash (summer and winter) Strawberries Swiss chard Tobacco Tomatoes Turnips	EPA published a Federal Register notice on January 10, 2001, proposing to delete these uses from product labels.	The proposed cancellations may become effective after the 30-day public comment period, upon issuance of a cancellation order in February 2001.

For Additional Information

For additional information on the diazinon agreement or other aspects of the Agency's pesticide regulatory program, contact EPA's Office of Pesticide Programs at (703) 305-5017, or visit our web site, www.epa.gov/pesticides.

For information on pesticides and their toxicity, contact the National Pesticide Telecommunications Network at 1-800-858-7378.

WATER QUALITY TECHNICAL REPORT

For: Riverpark

Prepared for:
Impact Sciences, Inc.
30343 Canwood Street
Suite 210
Agoura Hills, CA 91301

Prepared by:
PSOMAS
11444 W. Olympic Blvd
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1 INTRODUCTION

Storm water discharges consist of surface runoff generated from various land uses in hydrologic drainage basins that discharge into water bodies of the State and Waters of the United States. The quality of these discharges varies considerably and is affected by the hydrology, geology, land use, season, and sequence and duration of hydrologic events. Pollutants in storm water can have damaging effects on both human health and aquatic ecosystems. Absent special measures, development and urbanization typically increase pollutant loads for certain pollutants, volume and discharge velocity of storm water runoff. First, natural vegetated pervious ground cover is converted to impervious surfaces such as paved highways, streets, rooftops and parking lots. Second, urban development can create new storm water pollution sources as the increased density of human population brings proportionately higher levels of vehicle emissions, vehicle maintenance wastes, pesticides, household hazardous wastes, pet wastes, trash and other anthropogenic pollutants.

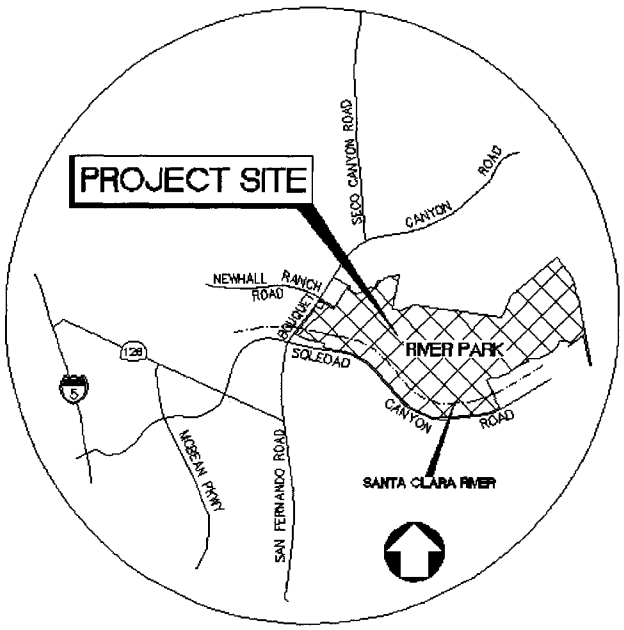
This report addresses storm water quality for the Riverpark project. It provides a technical discussion on water quality for existing, proposed, and cumulative project conditions.

1.1 PROJECT DESCRIPTION

1.1.1 Project Site

The Riverpark project lies in the center of the City of Santa Clarita, and within the watershed of an unnamed and roughly 835-acre tributary of the 1,634 square-mile Santa Clara River Basin Watershed (see Vicinity Map). The Santa Clara River flows through and adjacent to the project. The project site is located north of Soledad Canyon Road, east of Bouquet Canyon Road, and west of Golden Valley Road.

The site is currently vacant except for a small portion that is being used by a contractor as a temporary storage yard with several temporary buildings. The proposed Riverpark project lies within the Valley Center Concept ("VCC") area of the City's General Plan, which specifically outlines the type and intensity of development in the core of the City of Santa Clarita. The proposed project consists of 744 apartment units, 439 single-family detached units, and a maximum of 40,000 square feet of retail commercial. Site preparation will include a cut and fill grading operation totaling 5.2 million cubic yards for both project development and construction of master-planned roadways (Newhall Ranch Road and Santa Clarita Parkway) within the project boundaries. Additional remedial



VICINITY MAP

NOT TO SCALE

grading is proposed. Earthwork is proposed to be balanced onsite. The project also includes buried bank stabilization, erosion protection, and the construction of the Newhall Ranch Road/Golden Valley Road Bridge over the Santa Clara River. The bridge would include abutments and bank stabilization on the north and south side of the bridge, as well as piers within the River. The project does not include the Santa Clarita Parkway Bridge, which is part of the City's General Plan and is expected to be constructed in the future; however, this latter bridge is included in the cumulative analysis because it is a City-planned improvement and much of its construction would occur within the project site boundaries.

The site lies within that portion of the Santa Clara River designated as Reach 7 by the RWQCBLAR and as Reach 9 by the EPA (for convenience, this reach of the river will generally be referred to as Reach 7); this reach extends from the Lang Gauging Station (to the east of the project, downstream of Agua Dulce Canyon Creek) to Bouquet Canyon Road Bridge (located directly west of the project). Reach 7 contains relatively little water when compared to other reaches of the river during non flood conditions. Its intermittent flows occur generally only during the "rainy" season during and immediately after storm events of sufficient size to cause flows. Therefore, under dry-weather (i.e., non-storm flow, excluding storm events) conditions, Reach 7 does not impact downstream reaches of the river. When water is present in this reach, it is almost always during the rainy winter months and typically lasts only for a few days after a storm event large enough to create flow.

The project lies upstream from two sewage treatment plants. The Saugus Treatment Plant is located immediately downstream from the project, across Bouquet Canyon Road at Soledad Canyon Road, and the Valencia Treatment Plant is located further downstream. Both treatment plants discharge treated water into reaches of the river lying downstream from the project.

1.1.2 Project Description

The project is proposed for development into primarily residential uses. The project would result in conversion of approximately 40 percent of the mostly vacant site into commercial, residential, recreational and transportation land uses with associated infrastructure.

The proposed project incorporates a 29-acre active/passive park. This park will have direct access to the regional river trail.
With project development, concentrations of existing pollutants could increase and new pollutants could be introduced on the site. Where constituent levels increase, post-construction structural (treatment) best management practices (BMPs) are required. These BMPs must comply with local regulations (SUSMPs). Furthermore, by definition, implementation of BMPs must utilize Best Available Technologies (BATs) to the Maximum Extent Practicable (MEP).

Project Design Features can be grouped into 3 categories: site planning, source control, and treatment.

(a) Site Planning BMPs

Site planning BMPs are practices designed to minimize runoff and the introduction of pollutants in storm water runoff. Site planning principles that will be taken into account in preparing the SUSMP for the project are listed by design principal.

Minimize Impervious Area and Directly Connected Impervious Areas

- Minimize impervious areas by incorporating landscaped areas over substantial portions of the project area. Pervious areas are currently predicted to comprise approximately 74% of the site, with approximately 150 acres to be landscaped and irrigated.

- Minimize directly connected impervious area by draining parking lots to landscaped areas or bioretention facilities to promote filtration and infiltration of storm water, if landscaping slopes are less than 2 percent and the project is not adjacent to steep slopes; or treat with catch basin inserts.

- Utilize vegetated areas, e.g., setbacks, end islands, and median strips, for biofiltration and bioretention of nuisance and storm runoff flows from parking lots;

- Increase building density (number of stories above or below ground; build up rather than out).

Selection of Construction Materials and Design Practices

- Select building materials for roofs, roof gutters and downspouts that do not include exposed copper or zinc.

- Construct streets, sidewalks, and parking lot aisles to the minimum widths specified in by the City's requirements and in compliance with regulations for the Americans with Disabilities Act and safety requirements for fire and emergency vehicle access. Incorporate landscaped buffer areas between sidewalks and streets.

- Construct onsite detention facilities. Water quality basins will be incorporated into the development.

- Prohibit septic tanks.

Conserve Natural Areas

- Concentrate or cluster development on the least environmentally sensitive portions of the Project site while leaving the remaining land in a natural, undisturbed condition. For example, 330.8 acres consisting of the Santa Clara River and surrounding areas are being preserved.

- Use natural drainage systems to the maximum extent practicable or create drainages (e.g. vegetated swales) that mimic natural conveyances and allow for storm water infiltration as well as pollutant removal.

- Maximize canopy interception and water conservation by preserving existing native trees and shrubs (e.g. riparian area) and planting additional native or drought tolerant trees and large shrubs. The open space areas will help protect sensitive areas such as wildlife corridors and habitat of sensitive plant and animal species. A landscaping plan for the project will conform to County of Los Angeles/City of Santa Clarita requirements for use of drought resistant plants. Over one-half of the site would be preserved as open space, and the vegetation in these areas will remain.

Protect Slopes and Channels

- Protect slopes: minimize erosion potential (predominantly sandy soils) with vegetative cover, route flows safely from or away from steep and or sensitive slopes, stabilize disturbed slopes. All slopes within the project will be designed and constructed to minimize erosion.

- Protect channels: control and treat flows in landscaping and/or other controls prior to reaching existing natural drainage systems; stabilize channel crossings; ensure that increases in runoff velocity and frequency caused by the project do not erode the channel; install energy dissipaters, such as riprap, at the outlets of storm drains or conveyances.

(b) Source Controls

Effective management of wet and dry weather water quality begins with limiting pollutant sources and by retaining pollutants at their point of origin. The following source control management practices will be incorporated into the storm water management and treatment system for the project in order to help limit the change in runoff and the amount of pollutants in storm water runoff and dry weather (nuisance) flows.

- Drain Inlet Stenciling or Signage. Stenciling (or signage) is intended to raise public awareness and limit illegal dumping of trash, debris, oil, and other pollutants into storm drains. "Stenciling" will either be accomplished via a traditional stencil or via the use of grates with text or another equivalent method.

- Irrigation Controls and Management. Irrigation controls will help ensure that irrigation is conducted efficiently. Where feasible, plants with similar watering requirements will be grouped in order to reduce excess irrigation runoff and promote surface filtration. Efficient irrigation systems reduce irrigation runoff and conserve water resources; such systems may include computerized and/or radio telemetry that controls the amount of irrigation based on soil moisture or other indicators. Considering that irrigation in semi-arid areas substantially exceeds mean annual precipitation, irrigation control is clearly one of the most effective traditional controls for low flow runoff.

- Proper Application of Fertilizers and Pesticides. Best management practices will be implemented for minimizing the application of fertilizers, pesticides, and other

landscape management products on slopes and landscaped areas maintained by either the homeowner's association (HOA) or apartment property owners. Examples of these management practices include, but are not to limited to: the use of slow release fertilizers, applying fungicides only to greens to limit the use of pesticides, and closely monitoring weather forecast to ensure appropriate timing (during dry periods) for the application of landscape management products.

- Community Education Program. Public education will be used to reduce the potential for hazardous materials entering the storm drain system. This will be accomplished through distribution of brochures or other materials to property managers, owners and occupants, and employees at the time of initial sale or lease of property or hiring of employees and periodically thereafter. These brochures will discuss, among other topics and as appropriate for the audience: 1) the importance of downstream water bodies, the storm water system, management of fertilizers, pesticides, and other harmful chemicals, 2) the impacts of dumping oil, antifreeze, pesticides, paints, and other pollutants into storm drains and proper handling and disposal of these materials, 3) effective cleaning practices such as the cleaning of vehicles only in maintenance areas where the water will be recycled or routed to the sanitary sewer system to prevent nuisance flows, 4) the benefits of the prevention of excessive erosion and sedimentation, 5) the benefits of proper landscaping practices, 6) pavement clean-up practices, 7) the impacts of over-irrigation, 8) swimming pool draining practices, and 9) other relevant issues.

- Prevention of all nuisance flows. Grease traps will be included for restaurants. Draining swimming pools into the storm drains will be prohibited.

- Pavement Sweeping Program. The majority of the roads in the project are proposed to be dedicated to the public, and would thus be maintained by the City of Santa Clarita. The City has street sweeping programs that will help control trash, vegetation debris and sediment that may accumulate on roadways. The parking areas in the proposed commercial area would be maintained by a private service.

- Litter Control Program & Design of Trash Storage Areas. The litter control program will focus on litter control for common areas. A program of this type typically consists of the placement and emptying of trash receptacles, ensuring that trash bins are maintained in the closed position. Removing trash from parking areas and landscaping is also a component of this program. In conjunction with the litter control program, trash storage areas will be designed to prevent introduction of this pollutant into runoff. The design principles to prevent this pollution from occurring are using impervious surfaces for storage areas which prevent run-on from adjacent areas, ensuring that there is no connection of trash drains to the storm drain system, and keeping lids on all trash receptacles in addition to the use of roofs or awnings to minimize direct precipitation.

- Centralized Car Washing Facilities: Centralized car washing facilities will be provided for the multi-family complexes with 100 units or more. The runoff from these facilities will be directed into the sewers, not the storm drains.

- Proper Connection and Maintenance of Sewer Lines: Sewer lines will be properly connected and adequately maintained.

- Activity restrictions (Conditions, Covenants, and Restrictions): City maintenance and implementation of BMPs or Conditions, Covenants, and Restrictions (CC&Rs) will be prepared requiring maintenance and implementation of BMPs by the HOA for the purpose of surface water quality protection, or use restrictions will be developed through lease terms.

- BMP maintenance: City or Home Owners Associations (HOAs) will be responsible for the inspection and maintenance of structural BMPs within their boundaries.

- Common Area Drainage Facility Inspection - Privately-owned common area drainage facilities will be inspected each year and, if necessary, cleaned and maintained prior to the storm season, no later than October 1st of each year. Drainage facilities include catch basins and inlets, water quality basins, detention basins, and open drainage channels. In conjunction with the litter control program trash storage areas will be designed prevent introduction of this pollutant into runoff. The design principles to prevent this from occurring are impervious surfaces for storage areas which prevent run-on from adjacent areas, no connection of trash drains to the storm drain system, and lids on all trash receptacles in addition to roofs or awnings to minimize direct precipitation.

(c) Structural and Treatment Control BMPs

Structural and Treatment Control BMPs are described below as part of the proposed project improvements.

1.1.3 Proposed Project Improvements

The following section discusses proposed improvements on the project site that would provide drainage and water quality measures (project design features, or PDFs), as well as flood and erosion control, and which would occur in and adjacent to the Santa Clara River.

(a) Drainage and Flood Control Project Improvements

At project buildout, runoff from nine drainage areas would continue to flow through the site, but would be channeled through a storm system that would be constructed from the developed upland areas of the site down to the Santa Clara River. Runoff through the site would be controlled through a combination of grading, storm drainpipes, channels, catch basins, outlet structures, and bank stabilization along the river. The proposed drainage and flood control project facilities are described below and their locations are illustrated in the Flood Technical

Report (Psomas 2004), which also illustrates the post-development drainage patterns for the project site.

- *Storm Drains*
- *Open Channels*
- *Low Flow Pipes and Outlet*
- *Catch Basins*
- *Debris Basins*
- *Energy Dissipaters*
- *Bank Stabilization*

Flood plain project features and project impact analyses are presented in the Flood Technical Report (Psomas 2004).

(b) Water Quality Project Improvements

Water quality measures include both Structural and Source Control Best Management Practices (BMPs or PDFs). The project Drainage Concept (as illustrated in Figure 1 **Drainage Concept Map,** map pocket) shows proposed structural BMPs that will address potential storm water quality impacts from the project. These structural BMPs generally include water quality detention basins, a grassy swale, and Hydrodynamic Separator Systems (HSS) and/or Gross Solids Removal Devices (GSRDs), such as Continuous Deflective Separator (CDS) units. Additional equivalent structural BMPs that could alternatively be implemented at the project site include catch basin inserts, storm water filters, and storm water clarifiers.

Parties typically responsible for the proposed BMPs post construction include public agencies, landscape maintenance districts, or homeowners' associations. Responsible parties for the proposed water quality improvements will be identified prior to final map approval.

In addition, trash areas for commercial areas will be paved, designed not to allow run-on, screened or walled to prevent off-site transport of trash; and covered to minimize direct precipitation. Connection of trash area drains to the municipal storm drain system will be prohibited. Storm water BMPs will be included to decrease the potential for erosion of slopes and/or channels, and may include appropriate conveyance structures, landscaping, etc. Hillside areas that are disturbed by project development shall be landscaped with deep-rooted, drought tolerant plant species selected for erosion control. In multi-family complexes larger than 100 dwelling units where car washing is allowed, a designated car wash area that does not drain to a storm drain system shall be provided for common usage. Wash waters from this area may be directed to the sanitary sewer (with the prior approval of the sewering agency); to an engineered infiltration system; or to an equally effective alternative. Pre-treatment may also be required.

Water Quality Detention Basins

To reduce pollutants in the "first flush" runoff, a series of pipes and outlets would intercept first flush runoff from paved developed areas and discharge it to water quality control detention basins.

As shown in the Drainage Concept Map, water quality control detention basins are proposed at the discharge points from hydrologic sub-area 200, including portions of sub-area 400 (Water Quality Basin A) and hydrologic sub-areas 300 and 350, including portions of sub-area 400 (Water Quality Basin B). Detention basins are proposed at these discharge points because they would effectively treat the majority of constituents generated at the site once developed and there is an availability of land at these locations. Specifically, Water Quality Basin A is located in sub-area 205 and is proposed for treating runoff from the 200 series drainage area. Water Quality Basin B is located in sub-area 308 and is proposed for treating runoff from the 300 and 400 series drainage areas.

The proposed water quality control detention basins are preliminarily sized to meet the minimum Los Angeles County SUSMP criteria, based on a 0.75 inch runoff event; however, the final capacity of the basins will be determined for project runoff, as well as runoff from undeveloped upstream areas, and would be designed to capture 80% of annual runoff, which could be more than the 0.75 inch event The size of the facilities will be finalized during the design stage by the project engineer with the final hydrology study, which is prepared and approved at the final engineering stage and prior to issuance of a grading permit. This report will be reviewed by both the City of Santa Clarita and the County of Los Angeles as both agencies will be accepting maintenance of different parts of the storm drain system. The water quality control detention basins would be designed to empty within 24 to 40 hours. The 24-hour limit would allow the minimum adequate settling time for the settable solids. Under no circumstances should residence time approach 72 hours, for human health and vector (e.g., mosquito) control reasons. Figures 2A, Schematic Detention Basin, and 2B, Water Quality Outlet, provide a conceptual schematic of a water quality outlet design used as a part of the detention basin design.

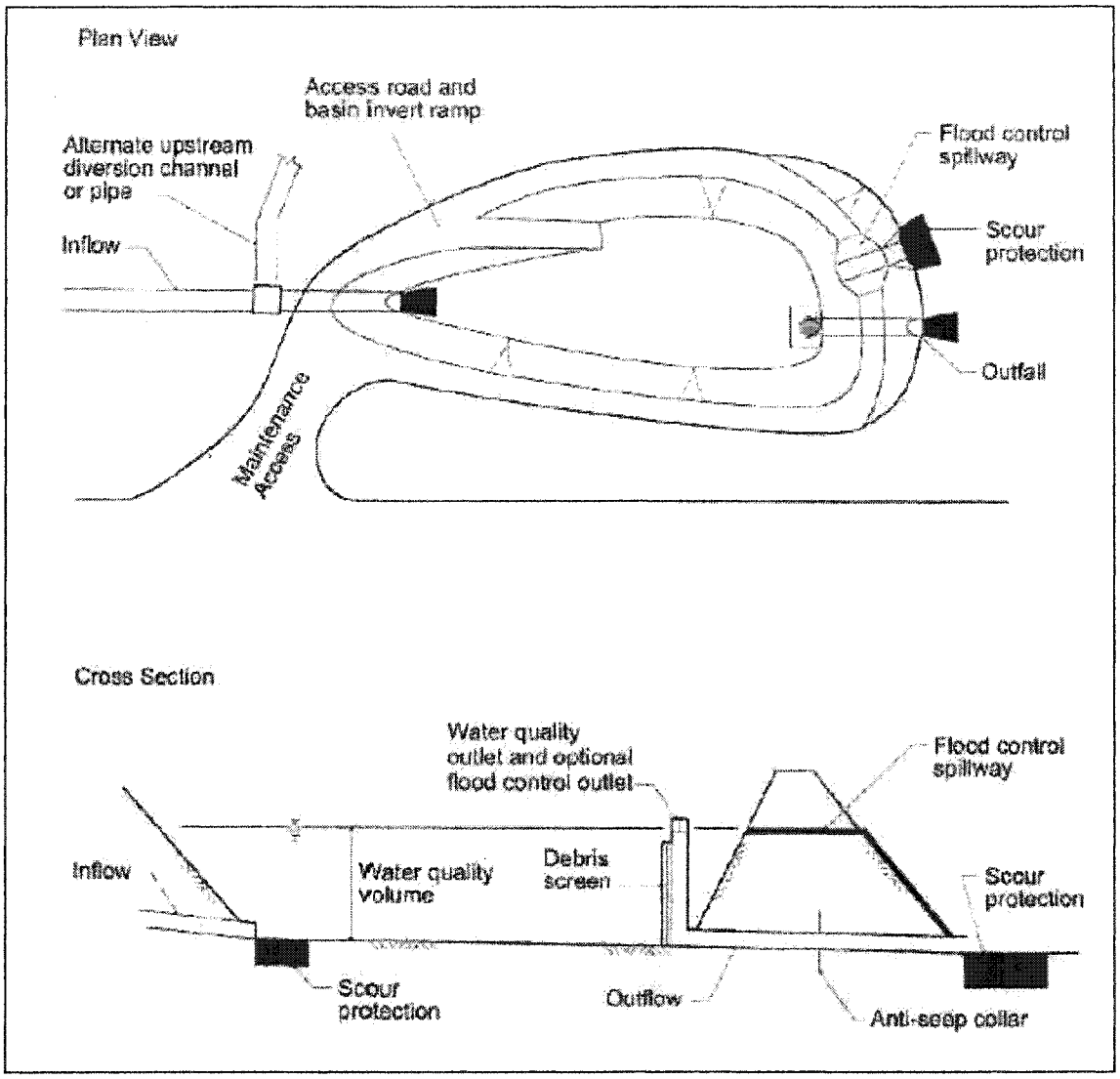


FIGURE 2A SCHEMATIC EDB

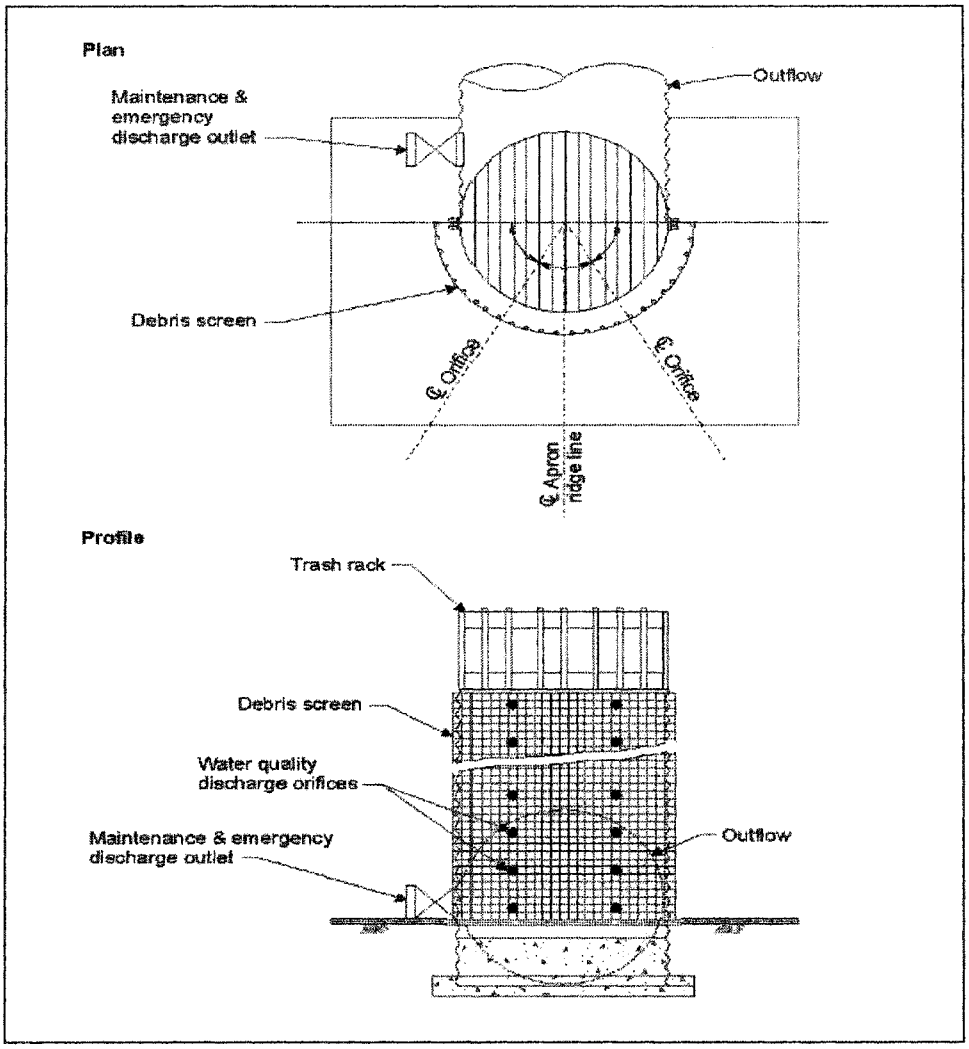


FIGURE 2B SCHEMATIC WQ OUTLET

Detention Basins have low to moderate maintenance requirements; however, maintenance is necessary to assure their performance, enhance aesthetics, and protect structural integrity. Typical operational and maintenance requirements for detention basins include:

- Dispersion of alluvial sediment deposition at inlet structures, thus limiting the extended localized ponding of water.
- Periodic sediment removal to ensure adequate storage and treatment volume.
- Monitoring of the basin to ensure it is completely and properly drained.
- Outlet riser cleaning.
- Vegetation management to prevent marsh vegetation from taking hold.
- Removal of graffiti, litter, vegetative and other debris.
- Preventative maintenance on monitoring equipment.
- Vegetative stabilization of eroding banks.

Biofiltration Swales

A biofiltration swale is a flow-based BMP proposed in sub-area 308 to convey runoff from developed areas in the canyon to proposed Water Quality Basin B. Biofiltration swales are vegetated channels specifically designed to remove particulates and to reduce the velocity of runoff through the storm system. Swales typically provide low to moderate treatment efficiencies and are mainly effective at removing debris and solid particles. Vegetated swales also help minimize overland and concentrated flow depths and velocities. Figure 3 shows a conceptual schematic of a biofiltration swale.

Typical maintenance and monitoring requirements for swales include:

- Vegetation management to maintain adequate hydraulic functioning.
- Animal and vector control.
- Periodic sediment removal to optimize performance.
- Trash, debris, grass trimmings, tree prunings, and leaf collection and removal to prevent obstruction.
- Removal of standing water, which may contribute to the development of aquatic plant communities or mosquito breeding areas.
- Erosion and structural maintenance to prevent the loss of soil and maintain the performance of the swale.

Hydrodynamic Separator Systems and Gross Solids Removal Devices

Hydrodynamic separation systems (HSS) and Gross Solids Removal Devices (GSRDs) are flow-based, flow-through BMPs that are installed within a storm drain line in order to remove large sediment particles and associated storm water pollutants, as well as trash, oils, and grease. They are typically designed to allow particulate matter to fall out of suspension and settle in a collection chamber, while floatable materials are collected above the water surface.

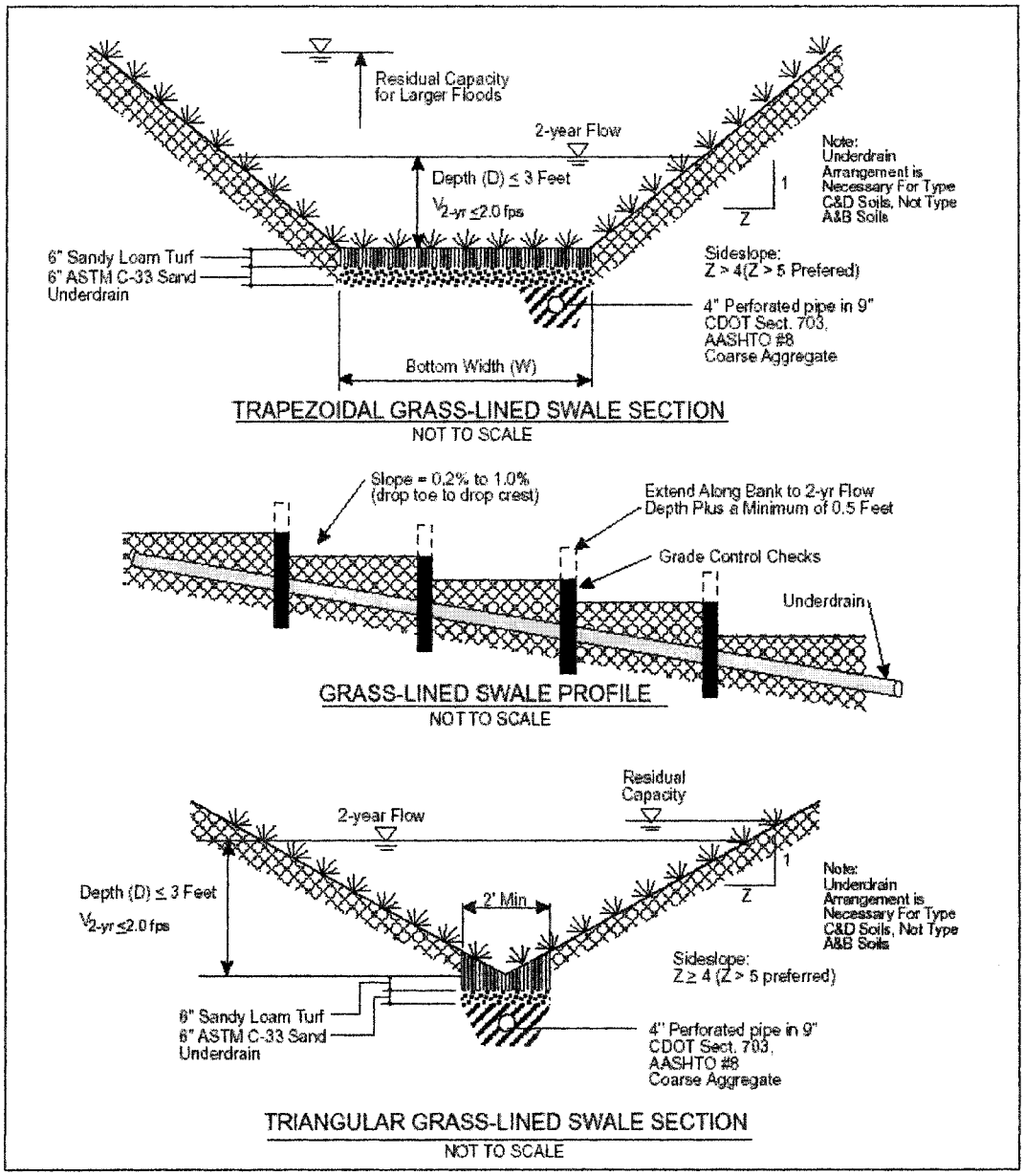


FIGURE 3 SCHEMATIC BIOFILTRATION SWALE

For the proposed Riverpark development, HSS and/or GSRDs, such as a Continuous Deflective Separator (CDS) unit with oil absorbent materials (such as pellets), are recommended for use at various locations in the proposed storm drain systems. These units are used based upon pollutants of concern and land availability. A CDS unit is recommended for treating runoff from sub-area 900. A CDS unit is proposed at this location because the land use is commercial, which will yield pollutants best treated by a CDS unit given the land area available. CDS units are also proposed to treat road runoff at collection point in subareas 100, 300 and 500. The systems typically provide low to moderate treatment efficiencies and are recommended for in-line treatment of storm water

runoff from drainage areas where construction of larger BMPs may be infeasible; treatment efficiencies for hydrocarbons can be increased by the addition of oil absorbent materials. **Figure 4** shows a conceptual schematic of an HSS. **Figure 5** shows a conceptual schematic of an inclined screen GSRD, and **Figure 6** shows a conceptual schematic of a linear radial GSRD. Although maintenance requirements vary greatly depending on the particular model and manufacturer, they are typically maintained quarterly to yearly for clean-outs. Cleaning after a storm event may also be required. Inspection will be required to make certain that the unit is operating correctly and to make any repairs.

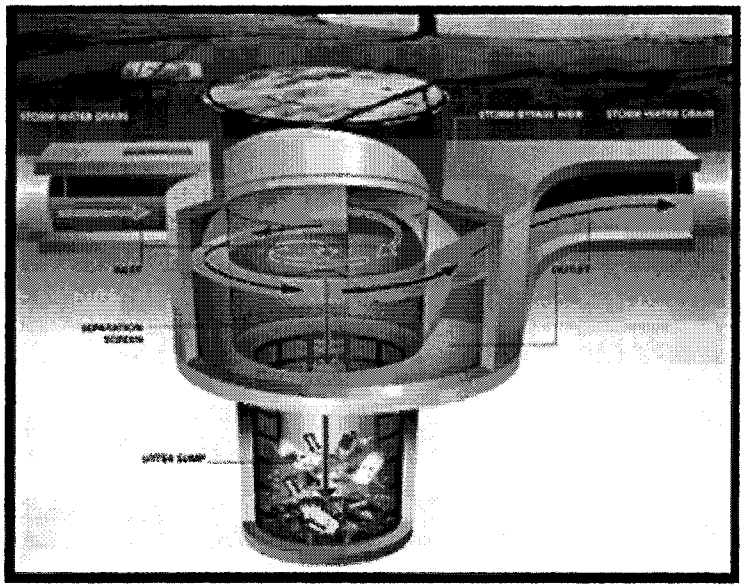


FIGURE 4 SCHEMATIC HSS

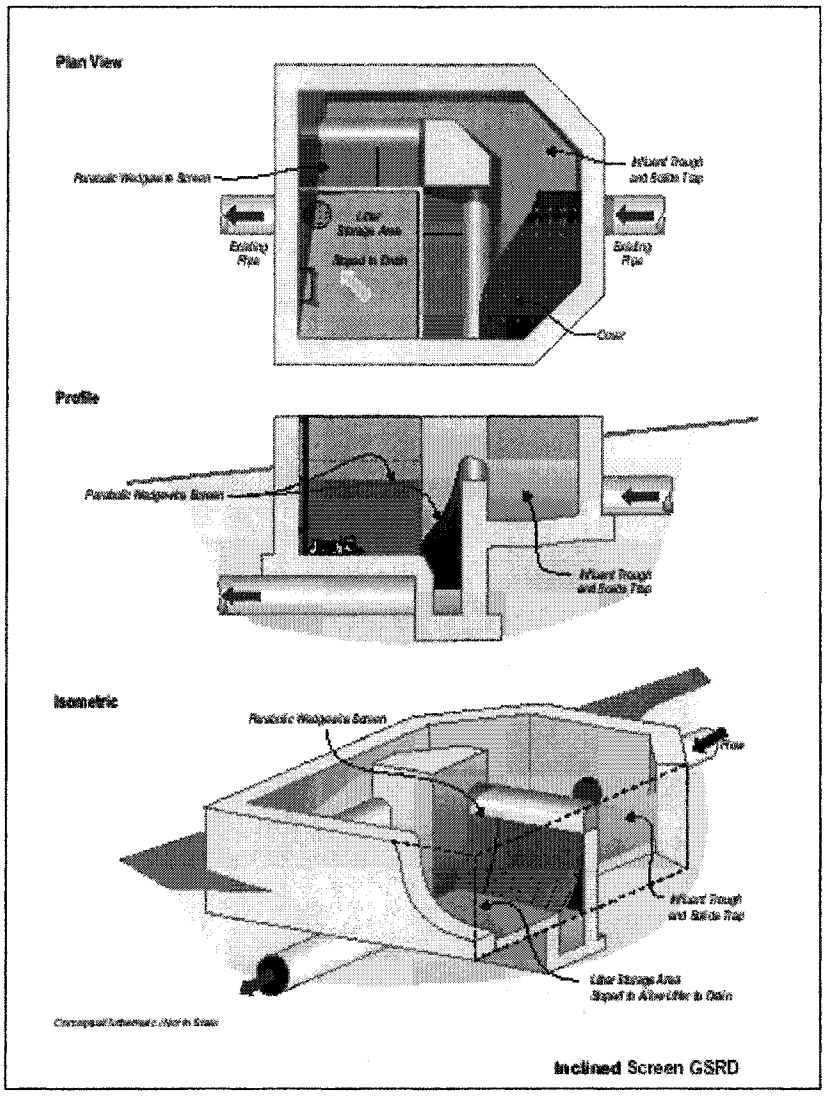


FIGURE 5 INCLINED SCREEN GSRD

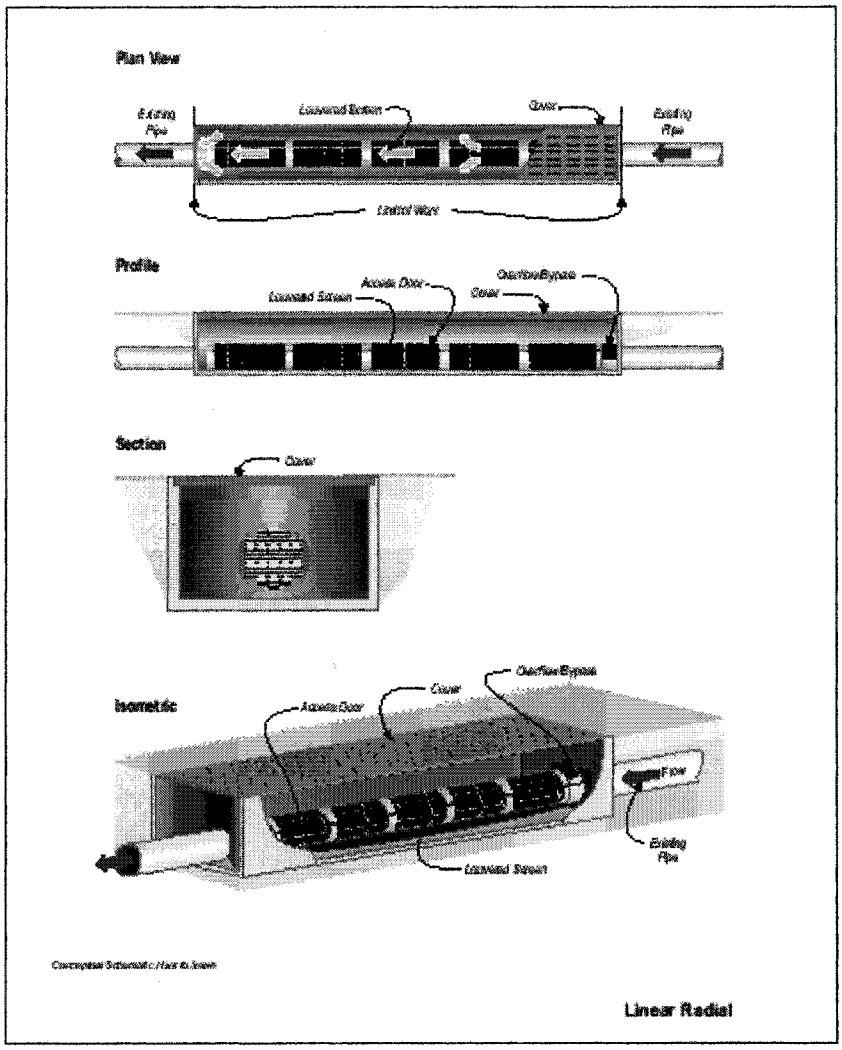


FIGURE 6 RADIAL SCREEN GSRD

Catch Basin Inserts

Catch basin inserts are flow-based BMP options for consideration at various locations to treat runoff before it enters the storm drain system by filtering or screening out sediments and associated storm water pollutants during dry weather and low flow events. Catch basin inserts (**Figure 7**) are one of the few BMPs that the County of Los Angeles will currently accept for maintenance (along with CDS units). During large flow events, they are typically designed to allow storm water runoff to bypass the inlet device and continue directly into the storm drain system. Although treatment levels are generally low for the pollutants of concern for this project, the inserts would provide pre-treatment of storm water runoff prior to further treatment at downstream BMPs. Drainage inserts could be replaced with HSS or GSRDs that perform similar functions and are interchangeable. For example, if for some reason the implementation of a CDS should be deemed infeasible at the final engineering

stage, a catch basin insert would be used in its place.[1] Although maintenance requirements vary greatly depending on the particular model and manufacturer, they are typically maintained quarterly to yearly for clean-outs. Cleaning after a storm event and in anticipation of storm events after extended dry periods or periods of typical debris removal will also likely be required and is recommended. Inspection will be required to make certain that the unit is operating correctly and to make any repairs.

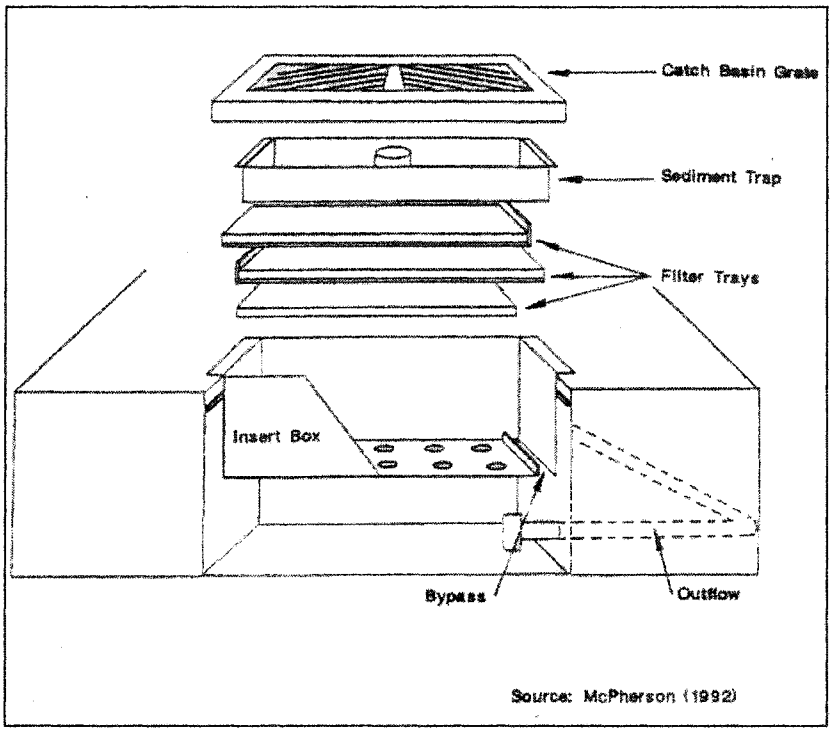


FIGURE 7 CATCH BASIN INSERTS

Storm Water Filters

Storm water filters are potential equivalent replacement BMPs that are effective in removing several common pollutants from storm water runoff and typically have high removal efficiencies for sediment, biochemical oxygen demand (BOD), and fecal coliform bacteria.

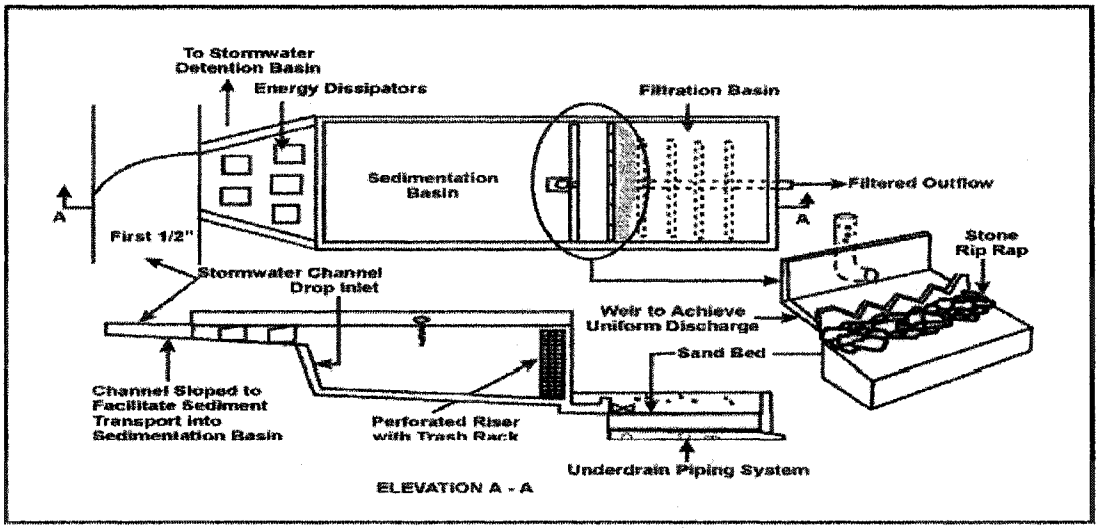
One of the many examples of a stormwater filter is the sand filter, which consists of two or three chambers or basins. The first is the sedimentation chamber, which removes floatables and heavy sediments. The second is the filtration chamber, which removes additional pollutants by filtering the runoff through a sand bed. Finally, the third is the discharge

[1] Drainage concept stipulates CDS or equivalent (as established by the approving agency), with final BMP selection to be established during development of construction documents.

chamber from which the treated filtrate is normally discharged through an underdrain system that could contain cartridges with various filter media alternatives. **Figure 8** shows an example of a stormwater filter.

Typical operational and maintenance requirements for sand filters include:

- Providing adequate access for inspection and maintenance,
- Removal of accumulated trash, paper and debris,
- Corrective maintenance including removal and replacement of top layers of media,
- Complete replacement of filter media every 3 to 5 years, and
- Periodic removal of vegetative growth.



Source: Schueler, 1992.

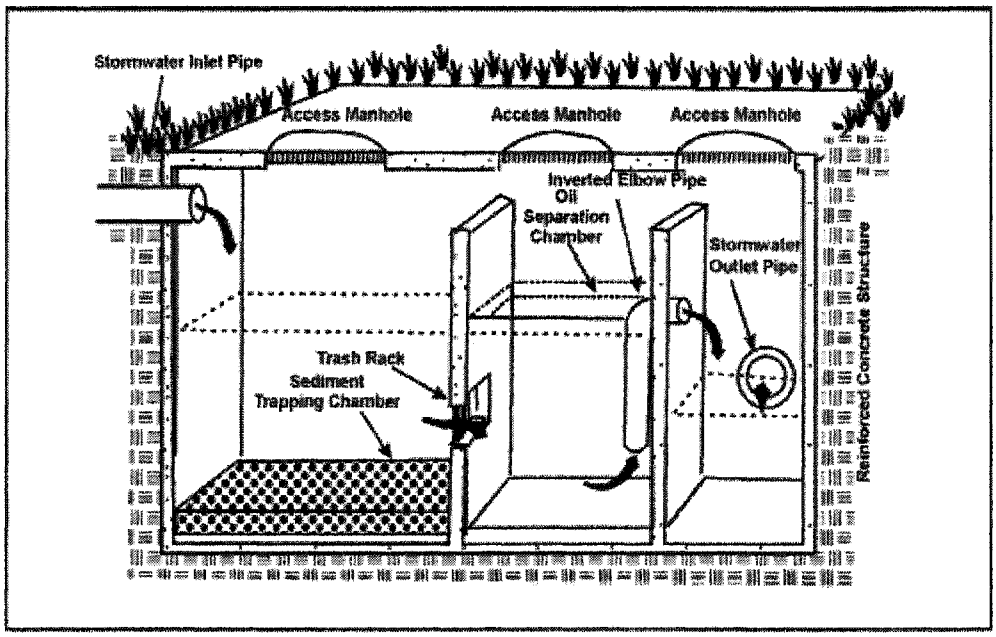
FIGURE 8 EXAMPLE STORMWATER FILTER

Storm Water Clarifiers

A storm water clarifier or equivalent is an option for treating storm runoff from the 500 series drainage area. Storm water clarifiers consist of water quality inlet devices (also commonly called oil/grit separators or oil/water separators) and a series of chambers that promote sedimentation of coarse materials and separation of free oil from runoff. The basic design of a storm water clarifier's series of chambers generally includes a sedimentation chamber, an oil separation chamber, and a discharge chamber. Additional screens may also be used to help retain larger or floating debris. A typical schematic of water quality inlet is shown as **Figure 9**.

Although maintenance requirements vary greatly depending on the particular model and manufacturer, they are typically maintained quarterly to yearly for clean-outs.

Cleaning after a storm event may also be required. Inspection will be required to make certain that the unit is operating correctly and to make any repairs.



Source: Berg, 1991.

FIGURE 9 STORM WATER CLARIFIER

1.2 DEFINITIONS

The following are definitions to several acronyms and terms, which will be frequently used in this Water Quality Technical Report.

Acute Toxicity	A toxic effect which occurs immediately or shortly after a single exposure.
Basin Plan	California Regional Water Quality Control Board, Los Angeles Region, Water Quality Control Plan (Basin Plan) for the Los Angeles Region
Beneficial Uses	The existing or potential uses of receiving waters in the permit area as designated by the Regional Board in the Basin Plan.[2]
Best Available Technology Economically Achievable (BAT)	A point source best management practice that reduces toxic (include heavy metals and man-made organics) and non-conventional (such as chloride, toxicity and nitrogen) pollutants in discharges.
Best Conventional Pollutant Control Technology (BCT)	A best management practice that reduces conventional pollutants (including TSS, oil and grease, fecal coliform, pH, and other pollutants) in discharges from construction sites.
Best Management Practices (BMPs)	In water pollution control, the best means available to control pollution of waterways from non-point sources, as opposed to best available technology, which applies to pollution control for point sources. Includes methods, measures, or practices designed and selected to reduce or eliminate the discharge of pollutants to surface waters from point and nonpoint source discharges including storm water. BMPs include site planning, structural and nonstructural controls, and operation and maintenance procedures, which can be applied before, during, and/or after pollution producing activities.[3]
Capital Flood	Theoretical 50-year design storm assumed to occur over a drainage area that has been burned and that contributes debris to runoff. Use in design is required by Los Angeles County for major systems and sump conditions.

[2] RWQCBLAR Order No. 01-182, NPDES Permit No. CAS004001, Glossary section.
[3] RWQCBLAR Order No. 01-182, NPDES Permit No. CAS004001, Glossary section.

CDFG	California Department of Fish and Game
Chronic Toxicity	A toxic effect that occurs after repeated or prolonged exposure.
CTR	California Toxics Rule (40 CFR 131.38).
CWA	The federal Clean Water Act (33 U.S.C. §§ 1251 et seq.).
ESA	Endangered Species Act (7 U.S.C. Section 136; 16 U.S.C. Sections 460 et seq.).
EMC	Event Mean Concentration, which is the average concentration of a pollutant in the runoff from a storm event, equal to the total mass of pollutant divided by the total volume of storm runoff.
First Flush	The first storm events typically have higher concentrations of pollutants due to accumulation during the dry months. Pollutants deposited onto exposed areas can be dislodged and entrained by runoff; therefore, the storm water that initially runs off an area will be more polluted than the storm water that runs off after the initial rainfall. The storm water containing this high initial pollutant load is called the "first flush." Storm events occurring later in the wet season will typically have lower concentrations as less time elapses between storm events and less accumulation occurs. In general terms, the water quality design storms defined by SUSMP approximate the first flush event (see SUSMP).
General MS4 Permit	Regional Water Quality Control Board, Los Angeles Region Order No. 01-182, NPDES Permit No. CAS004001 (December 13, 2001).
LACDPW	Los Angeles County Department of Public Works
MEP	Maximum Extent Practicable, the standard established by Section 402(p) of the federal Clean Water Act (33 U.S.C. § 1342(p)) for the implementation of storm water management programs to reduce pollutants in storm water. CWA § 402(p)(3)(B)(iii) requires that municipal permits "shall require controls to reduce the discharge of pollutants to the maximum extent practicable, including management practices, control techniques and system, design and engineering methods, and such other provisions as the Administrator or the State determines appropriate for the control of such pollutants."[4] Extent to which an MS4 permit must require controls to reduce the discharge of pollutants. This standard has been defined to include technical feasibility, cost, and benefit derived, with the burden being on the

[4] RWQCBLAR Order No. 01-182, NPDES Permit No. CAS004001, Glossary section.

	municipality to demonstrate compliance with MEP by showing that a BMP is not technically feasible in the locality or that BMP costs would exceed any benefit to be derived[5].
MS4	Municipal Separate Storm Sewer System, a conveyance or system of conveyances (including roads with drainage systems, municipal streets, alleys, catch basins, curbs, gutters, ditches, manmade channels, or storm drains) owned by a State, city, county town or other public body, that is designed or used for collecting or conveying storm water, which is not a combined sewer, and which is not part of a publicly owned treatment works, and which discharges to "Waters of the United States" (see definition, below).[6]
Non-Storm Water Discharge	Any discharge to a storm drain that is not composed entirely of storm water.[7]
NPDES	National Pollutant Discharge Elimination System, the national program for issuing, modifying, revoking and reissuing, terminating, monitoring and enforcing permits and imposing and enforcing pretreatment requirements, under CWA §§ 307, 402, 318 and 405. [8]
Planning Management BMPs	In water pollution control, advanced planning for installation of the best means available to control pollution of waterways to minimize run-off from new development and to aid in siting infrastructure so as to discourage development in environmentally sensitive areas that are critical to maintaining water quality. Also referred to as "site design BMPs."
Receiving Waters	All surface water bodies in the Los Angeles Region that are identified in the Basin Plan and to which the proposed project discharges.[9]
RWQCB	Regional Water Quality Control Board
RWQCBLAR	Regional Water Quality Control Board, Los Angeles Region

[5] February 11, 1993 memorandum issued by the Office of Chief Counsel of the State Water Resources Control Board.

[6] RWQCBLAR Order No. 01-182, NPDES Permit No. CAS004001, Glossary section.

[7] Id.

[8] Id.

[9] Id.

Source Control BMP	Any schedule of activities, prohibition of practices, maintenance procedures, managerial practices or operational practices that aim to prevent storm water pollution by reducing the potential for contamination at the source of pollution.[10]
SUSMP	The Los Angeles Countywide Standard Urban Storm Water Mitigation Plan, which addresses conditions and requirements of new development.[11]
SWRCB	State Water Resources Control Board
SQMP	The Los Angeles Countywide Stormwater Quality Management Plan, which includes descriptions of programs, collectively developed by the permittees under the General MS4 Permit in accordance with provisions of the NPDES Permit, to comply with applicable federal and State law, as the same is amended from time to time.[12]
SWPPP	Storm Water Pollution Prevention Plan, a plan, as required by a State General Construction Activity Storm Water Permit, identifying potential pollutant sources and describing the design, placement and implementation of BMPs, to effectively prevent non-storm water discharges and reduce pollutants in storm water discharges during activities covered by the General Permit.[13]
Structural BMP	Any structural facility designed and constructed to mitigate the adverse impacts of storm water and urban runoff pollution.[14]
Total Maximum Daily Load (TMDL)	The sum of the individual waste load allocations for point sources and load allocations for nonpoint sources and natural sources that a water body may receive without compromising the designated beneficial use.[15] TMDLs are designated only for impaired (i.e., Section 303(d) listed) water bodies and then only as necessary to address the impairment.
Treatment Control BMP	Any engineered system designed to remove pollutants by simple gravity settling of particulate pollutants, filtration, biological uptake,

[10] Id.
[11] See, id.
[12] Id.
[13] Id.
[14] Id.
[15] Id.

	media absorption or any other physical, biological, or chemical process.[16] (See Structural BMP.)
U.S. ACOE	United States Army Corps of Engineers.
U.S. EPA	United States Environmental Protection Agency.
U.S. FWS	United States Fish and Wildlife Service.
Waters of the U.S.	All waters which are currently used, or were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide; all interstate waters including interstate wetlands; all other waters, such as interstate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds, the use, degradation, or destruction of which could affect interstate or foreign commerce including any such waters: (1) which are or could be used by interstate or foreign travelers for recreational or other purposes; or (2) from which fish or shellfish are or could be taken and sold in interstate or foreign commerce; or (3) which are used or could be used for industrial purposes by industries in interstate commerce. Also included are all impoundments of waters otherwise defined as waters of the United States under the definition; tributaries of water identified above; the territorial seas; and wetlands adjacent to waters (other than the waters that are themselves wetlands) identified above.[17] By United States Army Corps of Engineers definition, "Waters of the United States" are defined by the "ordinary high water mark," which can be identified by physical characteristics, such as channel scouring, bank "shelving," areas cleared of terrestrial vegetation, litter and debris, or other indications that may be appropriate.
Wetlands	Those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas. [18]

[16] Id.

[17] 33 CFR Part 328.3a.

[18] 33 CFR Part 328.3b.

1.3 REFERENCE MATERIALS AND DOCUMENTS

Portions of the following documents were used in connection with the preparation of this Section.

- American Society of Civil Engineers. 2001. A Guide for Best Management Practice (BMP) Selection in Urban Developed Areas.
- *California Regional Water Quality Control Board, Los Angeles Region Order No. 01-182 NPDES Permit No. CAS004001 Waste Discharge Requirements for Municipal Storm Water and Urban Runoff Discharges within the County of Los Angeles, and the Incorporated Cities Therein, Except the City of Long Beach (adopted 13 December 2001)*
- *California Regional Water Quality Control Board, Los Angeles Region, Water Quality Control Plan (Basin Plan) for the Los Angeles Region (dated 13 June 1994 and approved 23 February 1995)*
- *California Stormwater Quality Task Force, Construction Storm Water Sampling and Analysis Guidance Document to Assist Dischargers in Complying with California State Water Resources Control Board Resolution No. 2001-046 (October 2001)*
- *California Water Resources Control Board Fact Sheet for Water Quality Order 99-08-DWQ: National Pollutant Discharge Elimination System (NPDES) General Permit for Storm Water Discharges Associated With Construction Activity (General Permit).*
- *California Water Resources Control Board Resolution No. 2001-046: Modification of Water Quality Order 99-08-DWQ State Water Resources Control Board (SWRCB) National Pollutant Discharge Elimination System (NPDES) General Permit for Storm Water Discharges Associated with Construction Activity (adopted by the SWRCB on 26 April 2001)*
- Caltrans, 2001. Gross Solids Removal Device Informational Guide. State of California Department of Transportation. June.
- Caltrans, 2001. Storm Water Quality Practice Guidelines. State of California, Department of Transportation. November.
- Center for Watershed Protection, 2000. The Practice of Watershed Protection.
- Currier B., et al. January 7-11, 2001. California Department of Transportation BMP Retrofit Pilot Program, Transportation Research Board 8th Annual Meeting, Washington, D.C.
- Environmental Protection Agency. 1993. Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters.
- Environmental Protection Agency. 1999. Sand Filters. EPA 832-F-99-007.
- Environmental Protection Agency. 1999. Water Quality Inlets. EPA 832-F-99-012.
- *Federal Emergency Management Agency (FEMA) Flood Insurance Map 060729 0345C, September 9, 1989*
- *GeoSyntec Consultants. September 24, 2002. Draft Storm Water Quality Assessment and Water Quality Management Plan for Newhall Ranch Development.*
- Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters, EPA 840-B-92-002, January 1993
- John M. Tettemer & Associates, Natural River Management Plan for Santa Clara River from Castaic Creek to One-Half Mile Above the Los Angeles Aqueduct and Portions of

the San Francisquito Creek and the Santa Clara River, South Fork [of the Santa Clara River], May 1997.

- Larry Walker Associates, Inc. November 1999. Investigation of Structural Control Measures for New Development. Prepared for Sacramento Stormwater Management Program.
- *Los Angeles County Department of Public Works Hydrology Manual (December 1991) and Sedimentation Manual (June 1993)*
- *Los Angeles County Department of Public Works, Hydrology Manual & Appendix, 1991*
- Los Angeles County of Public Works, Development Planning for Storm Water Management, a Manual for the Standard Urban Storm Water Mitigation Plan (SUSMP). September 2002.
- Los Angeles County of Public Works, Level of Flood Protection and Drainage Protection Standards, 1986
- Los Angeles County, Environmental Document Reporting Procedures and Guidelines. Adopted November 17, 1987.
- Psomas. Flood Technical Report for Riverpark Project. February 2004
- State Water Resources Control Board, General Construction Activity Storm Water Permit (NPDES No. CAS000002, Order No. 99-08-DWQ), adopted August 19, 1999.
- State Water Resources Control Board, Modifications to the State Construction Activity Permit, Resolution Number 2001.046, adopted on April 26, 2001.
- *SWQTF, 1993. California Storm Water Best Management Practice Municipal Handbook. Prepared by CDM for the Storm Water Quality Task Force. March.*
- *United States, Federal Register, Volume 51, Number 219, Thursday, November 13, 1986.*
- Urban Runoff Quality Management, WEF Manual of Practice No. 23/ASCE Manual of Practice No. 87, (1998)
- United States Army Corps of Engineers & California Department of Fish and Game. Final Environmental Impact Statement/Environmental Impact Report. 404 1603 Streambed Alteration Agreement for Portions of the Santa Clara River and its Tributaries Los Angeles County, Natural River Management Plan. Applicant, Valencia Company. August 1998.
- United States Army Corps of Engineers, Santa Clara River Adopted Discharge Frequency Values. Adopted May 3, 1994 by the United States Army Corps of Engineers, the Ventura County Flood Control Department and the Los Angeles County Department of Public Works.
- Valencia Company, Natural River Management Plan (Permitted Projects and Activities under the United States Corps of Engineers 404 Permit, California Department of Fish and Game 1603 Agreement and 2081 Permit. November 1998.
- *WEF, 1998. Urban Runoff Quality Management, WEF Manual of Practice No. 23/ASCE Manual of Practice No. 87.*
- Winer, R. 2000. National Pollutant Removal Performance Database for Stormwater Treatment Practices: 2nd Edition. Center for Watershed Protection. Ellicott City, MD.

1.4 SUMMARY

Potential changes in water quality are addressed for each pollutant/constituent of concern based on runoff water quality modeling, literature information, and/or a qualitative assessment, depending on the data available for assessing each constituent. Impacts take into account the proposed project design features which have been designed to be consistent with or exceed federal, State and local requirements.

The Event Mean Conditions (EMCs; defined below) used to characterize the existing and post-development storm water quality at the proposed project site are based on the regional data (Geosyntec 2002), as well as on the Integrated Receiving Water Impacts Report (1994-2000), published by LACDPW as part of the Los Angeles Storm Water Monitoring Program. Existing conditions for the project development were modeled based primarily on vacant land use for on-site and off-site areas, with a small fraction of agricultural land use located in contributing undeveloped upstream areas and a small fraction of commercial (storage yard) land uses located on-site. Constituents modeled include total suspended solids (TSS), total phosphorus (TP), total nitrogen (TN), nitrate, total copper (Cu), total lead (Pb), total zinc (Zn), and chloride (Cl).

Three development scenarios are addressed in this report:

1. Existing,
2. Existing With Project, and
3. Cumulative Buildout.

Brief summaries of the water quality methodology are presented to provide the reader with background information and understanding of the methodology used to evaluate water quality impacts

2 EXISTING CONDITIONS

2.1 PHYSICAL CONDITIONS AND SETTING

The project site consists primarily of vacant, open space land located adjacent to the center of the City of Santa Clarita and surrounded by urban uses. The site lies within an approximately 835-acre tributary drainage area within the Santa Clara River Watershed, which includes many uses and conditions that contribute sediment and pollutants to the river and the tributary streams that feed the river. The site lies within that portion of the Santa Clara River designated as Reach 9 by the U.S. EPA and as Reach 7 by the RWQCBLAR; that reach extends from the Lang Gauging Station (to the east of the project, downstream of Agua Dulce Canyon Creek) to Bouquet Canyon Road Bridge (located directly west of the project). The project site is located adjacent to the western border of the reach (as discussed previously, for convenience, this reach of the river will generally be referred to as Reach 7).[19]

[19] As defined in the Water Quality Control Plan (Basin Plan) for the Los Angeles Region, the project area falls within the Santa Clara-Calleguas Hydrologic Unit (HU 403.00) and runoff from the

Reach 7 contains relatively little water when compared to other reaches of the river during non flood conditions. Its intermittent flows occur generally only during the "rainy" season during and immediately after storm events of sufficient size to cause flows. Therefore, under dry-weather (i.e., non-storm flow, excluding storm events) conditions, Reach 7 does not impact downstream reaches of the river. When water is present in this reach, it is almost always during the rainy winter months and typically lasts only for a few days after a storm event large enough to create flow.

The project lies upstream from two sewage treatment plants. The Saugus Treatment Plant is located immediately downstream from the project, across Bouquet Canyon Road at Soledad Canyon Road, and the Valencia Treatment Plant is located further downstream. Both treatment plants discharge treated water into reaches of the river lying downstream from the project.

The project site currently consists primarily of vacant/open space land with a small portion that is being used by a contractor as a temporary storage yard. There are no existing drainage or water quality control improvements located within the project site. A portion of the site has historically been used for agricultural operations on which pesticides and fertilizers may have been applied. Based on a review of 1947 aerial photographs, a portion of the Riverpark project site north of the Santa Clara River was planted with row crops and three areas of the terrace east of the small unnamed valley were plowed, apparently for hay. Row crops were also present on the flat land north of the site. Portions of the site have been used for dry farming since 1985. Because of the recent history of agricultural use of a portion of the site, existing storm water runoff at the site may still contain constituents common to agricultural uses. For instance, current high erosion rates from the disturbed soils at the site may result in elevated metal concentrations in the runoff.[20] Nitrates and pesticides may also be expected. Since no known grazing has occurred on the land, pathogens found on the site would be generated from sources typical of open space uses, such as rodents and other wild animal wastes.

2.2 Current Regulatory Setting

Storm runoff from the project site, and discharges of runoff into and/or encroachment upon natural drainages, wetlands, and/or flood plains are subject to the requirements of the federal Clean Water Act (33 U.S.C. §§ 1251 et seq.; CWA) and associated regulations, the State Porter-Cologne Water Quality Control Act (Cal. Water Code §§ 13000 et seq.) and associated regulations, and to requirements established by the U.S. EPA, CDFG, SWRCB, RWQCBLAR, and the Flood Control and Watershed Management Divisions of the Los Angeles County Department of Public Works (LACDPW). In addition, intrusions into jurisdictional areas are subject to the requirements of the CWA, Sections 1600–1607 of the State Fish and Game

Riverpark site discharges to the Santa Clara River, in the Upper Santa Clara River Hydrologic Area (HA 403.50) Eastern Hydrologic Sub-Area (HSA 403.51).

20 High erosion rates contribute to higher sediment transport rates which may, in turn, result in elevated metal concentrations in surface runoff, as metals both adsorb to solids particulate matter (total suspended solids) and get washed off in dissolved forms.

Code, and to requirements established by the U.S. ACOE and CDFG. Each of these requirements and agencies is discussed below.

2.2.1 Water Quality

(a) Clean Water Act

The project would be subject to federal permit requirements under the Clean Water Act.

In 1972, the Federal Water Pollution Control Act (later referred to as the CWA) was amended to require that the discharge of pollutants to waters of the United States from any point source be effectively prohibited, unless the discharge is in compliance with a National Pollutant Discharge Elimination System (NPDES) permit. In 1987, the CWA was again amended to add Section 402(p), requiring that the U.S. EPA establish regulations for permitting of storm water discharges by municipal and industrial facilities and construction activities under the NPDES permit program. The U.S. EPA published final regulations directed at MS4s serving a population of 100,000 or more, and storm water discharges associated with industrial activities, including construction activities, on November 16, 1990. The regulations require that municipal separate storm sewer system (MS4) discharges to surface waters be regulated by a NPDES permit (Phase I Final Rule, 55 Fed. Reg. 47990). The U.S. EPA published final regulations directed at storm water discharges not covered in the Phase I Final Rule, including, as applicable here, small construction projects of one to five acres, on December 8, 1999 (Phase II Final Rule, 64 Fed. Reg. 68722).

Section 402(p) of the CWA provides that MS4 permits must "require controls to reduce the discharge of pollutants to the maximum extent practicable, including management practices, control techniques and system, design and engineering methods and such other provisions as the [U.S. EPA] Administrator or the State determines appropriate for the control of such pollutants." The Office of Chief Counsel of the State Water Resources Control Board (SWRCB) has issued a memorandum interpreting the meaning of MEP to include technical feasibility, cost, and benefit derived with the burden being on the municipality to demonstrate compliance with MEP by showing that a BMP is not technically feasible in the locality or that BMP costs would exceed any benefit to be derived (dated February 11, 1993).

The CWA authorizes the U.S. EPA to permit a state to serve as the NPDES permitting authority in lieu of the U.S. EPA. The State of California has in-lieu authority for an NPDES program. The Porter-Cologne Water Quality Control Act (Cal. Water Code §§ 13000 et seq.) authorizes the SWRCB, through (as applicable here) the RWQCBLAR, to regulate and control the discharge of pollutants into waters of the State. The SWRCB entered into a memorandum of agreement with the U.S. EPA, on September 22, 1989, to administer the NPDES Program governing discharges to waters of the U.S.

In addition, the CWA requires the States to adopt water quality standards for water bodies and have those standards approved by the EPA. Water quality standards consist of designated beneficial uses for a particular water body (e.g. wildlife habitat, agricultural supply, fishing

etc.), along with water quality objectives necessary to support those uses. Water quality objectives can be numerical concentrations or levels of constituents, such as lead, and suspended sediment, or narrative statements that represent the quality of water needed to support a particular use. Because California had not established a complete list of acceptable water quality objectives to the U.S. EPA, the U.S. EPA, EPA Region IX (in which California lies) has established numeric water quality criteria applicable to all receiving waters for certain toxic constituents in the form of the California Toxics Rule ("CTR") (40 CFR 131.38).

When designated beneficial uses of a particular water body are being compromised and fail to meet water quality objectives, Section 303(d) of the CWA requires identifying and listing that water body as "impaired." Once a water body has been deemed impaired, a Total Maximum Daily Load ("TMDL") must be developed for each water quality constituent that compromises a beneficial use. A TMDL is an estimate of the total load of pollutants, from point, non-point, and natural sources that a water body may receive without exceeding applicable water quality standards (often with a "factor of safety" included). Once established, the TMDL is allocated among current and future dischargers into the water body.

Pursuant to Section 303(d) of the CWA, the reach of the river in which the project lies has been listed as being impaired for high coliform count. Although the RWQCBLAR has stated that it will be developing TMDLs for the Santa Clara watershed, it has not yet done so, and the project is expected to proceed before applicable TMDLs are adopted. The project site lies within U.S. EPA Reach 9, which has been listed as being impaired pursuant to Section 303(d) of the CWA. (**Table 1, 2002 CWA Section 303(d) Listing and TMDL Priority Scheduling for RWQCBLAR Reach 7- U.S. EPA Reach 9.**)

TABLE 1
2002 CWA SECTION 303(D) LISTING
AND TMDL PRIORITY SCHEDULING[1] FOR RWQCB LAR REACH 7 (U.S. EPA REACH 9)

Receiving Waters	Pollutant/Stressor	Source	TMDL Priority	Estimated Size Affected
Santa Clara River Bouquet Canyon Rd to Above Lang Gauging Station (Reach 9)	High Coliform Count	Nonpoint Source Nonpoint Source	Medium	21 miles
Notes: 1) 2002 CWA Section 303(d) List of Water Quality Limited Segment, Approved by SWRCB: 2/4/03				

Impairments listed in reaches downstream from the project site (but not in LARWQCB Reach 7/U.S. EPA Reach 9) include nutrients and their effects, salts, coliform bacteria, and historic pesticides. (See **Table 2 2002 CWA Section 303(d) Listing and TMDL Priority Scheduling for U.S. EPA Reaches 7 and 8.**)

TABLE 2
2002 CWA SECTION 303(D) LISTING
AND TMDL PRIORITY SCHEDULING[1] FOR U.S. EPA REACHES 7 AND 8

Receiving Waters	Pollutant/Stressor	Source	TMDL Priority	Estimated Size Affected
Santa Clara River W Pier Hwy 99 to Bouquet Canyon Rd (Reach 8)	Chloride High Coliform Count	Nonpoint/Point Source Nonpoint/Point Source	High Medium	5.2 miles 5.2 miles
Santa Clara River Blue Cut to West Pier Hwy 99 Bridge (Reach 7)	Chloride High Coliform Count Nitrate and Nitrite	Nonpoint/Point Source Nonpoint/Point Source Nonpoint/Point Source	High Medium Low	9.4 miles 9.4 miles 9.4 miles

Notes:
1) 2002 CWA Section 303(d) List of Water Quality Limited Segment, Approved by SWRCB: 2/4/03

(b) Statewide General NPDES Permits

To facilitate compliance with federal regulations, the SWRCB has issued two statewide general NPDES permits for storm water discharges: one for storm water from industrial sites (not applicable to the project), and the other for storm water from construction sites (NPDES No. CAS000002, General Construction Activity Storm Water Permit, reissued on April 17, 1997, updated 2001). Under the General Construction Activity Storm Water Permit as reissued and updated, facilities discharging storm water associated with construction projects with a disturbed area of one or more acres (March 2003) are required either to obtain individual NPDES permits for storm water discharges, or to be covered by a statewide general permit by completing and filing a Notice of Intent with the SWRCB. The General Construction Activity Storm Water Permit addresses both storm water and non-storm water discharges from construction sites.

The applicant under the General Construction Activity Storm Water Permit must ensure that a Storm Water Pollution Prevention Plan (SWPPP) is prepared, and a Notice of Intent (NOI) is filed with the SWRCB to comply with the State Permit prior to issuance of a grading permit. The General Construction Activity Storm Water Permit relies upon BMPs to control pollutants.

The RWQCBLAR is the enforcement authority in the Los Angeles Region for the two statewide general permits, and all NPDES storm water and non-storm water permits issued by the RWQCBLAR. These construction sites and discharges are also regulated under local laws and regulations.

(c) Water Quality Control Basin Plan

All of the activities under the NPDES program are aimed at meeting water quality objectives of receiving waters, which eventually discharge into receiving waters that often traverse multiple counties and cities.[21] The RWQCBLAR adopted the Water Quality Control Plan (Basin Plan) for the Los Angeles Region on June 13, 1994. The Basin Plan designates the beneficial uses of receiving waters, including, (Basin Plan) Reach 7 of the Santa Clara River to which the project site currently discharges and the project would discharge, and specifies both narrative and numerical water quality objectives for these receiving waters in Los Angeles County. Because these standards are applicable to receiving waters, they are not a direct measure of storm water quality from the project site. However, water quality criteria from the Basin Plan are useful as benchmarks and are compared to modeled results where possible in the analysis of potential impacts, below.

Again, the project site is located along Reach 7 of the Santa Clara River between Lang Gauging Station (to the east of the project, downstream of Agua Dulce Canyon Creek) and Bouquet Canyon Road Bridge (located directly west of the project). Under the Basin Plan, beneficial uses[22] for Reach 7 include Municipal and Domestic Supply; Industrial Supply; Industrial Process Supply; Agriculture; Groundwater; Contact Water Recreation; Non-Contact Water Recreation; Warm Freshwater Habitat; Wildlife Habitat; Rare, Threatened or Endangered Species; and Wetland Habitat. Downstream reaches of the Santa Clara River (to the west of the project) have additional beneficial uses, including Cold Freshwater Habitat and Migration of Aquatic Organisms.

Basin Plan Water Quality Objectives

Water quality objectives, as defined by the California Water Code Section 13050(h), are the "limits or levels of water quality constituents or characteristics which are established for the reasonable protection of beneficial uses or the prevention of nuisance within a specific area." Beneficial uses are designated under CWA Section 303 in accordance with regulations. The Basin Plan defines existing and potential beneficial uses for identified water bodies receiving discharges. The project is located along Reach 7 of the Santa Clara River. Beneficial uses identified for Reach 7 include those listed above.

Water quality objectives are the water quality standards used to assess the potential impact of project discharges on the water quality of receiving waters (not end-of-pipe discharges). **Table 4, Water Quality Objectives**, summarizes the numerical water quality objectives for the Santa Clara River reach (Reach 7) in which the project lies.

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[21] Receiving waters are designated bodies of water that receive discharge from developed areas at specific discharge points.

[22] As designated under CWA Section 303 in accordance with regulations contained in 40 CFR 131.

(d) California Toxics Rule (CTR)

The California Toxics Rule (CTR) is a federal regulation issued by the U.S. EPA providing water quality criteria for protection of surface waters of the State of California with designated uses protective of human health or aquatic life. CTR criteria are applicable to the receiving water body and therefore should be applied based upon the probable hardness[23] values of the receiving waters for evaluation of discrete-duration acute[24] criteria. At higher hardness values for the receiving water copper, lead, and zinc are more likely to be complexed (bound with) components in the water column. This in turn reduces the bioavailability and resulting toxicity of these metals.

Available storm water monitoring data indicates that hardness values for the receiving waters in this reach of the river range between 280 and 320 mg/L. To assure assessment of the greatest reasonable level of potential impacts, hardness values of both 200 and 400 mg/L have been used in this assessment.

Chronic CTR Criteria apply when aquatic life is exposed for a period of four days or longer. Because of the shorter, discrete-duration episodic nature of storm water flows, acute criteria are the more appropriate criteria for assessing project impacts due to storm water runoff.

CTR water quality criteria and water quality objectives and beneficial uses do not apply directly to discharges of storm water runoff. Nonetheless, these standards can provide a useful benchmark to assess the potential for project discharges to affect the water quality of receiving waters. In this analysis, the CTR and other water quality standards have been used as benchmarks to evaluate the potential ecological impacts of storm water runoff to the receiving waters of the proposed project.

Table 3, CRT Criteria and Associated Trace Metal Water Quality Parameters, shows the applied freshwater CTR criteria for two hardness values 200 mg/L and 400 mg/L.

[23] Hardness is defined as the sum of calcium and magnesium concentrations, both expressed as calcium carbonate.

[24] Acute toxicity means a toxic effect, which occurs immediately or shortly after a single exposure; as compared to chronic toxicity, which indicates that a toxic effect that occurs after repeated or prolonged exposure.

TABLE 3
CTR CRITERIA AND ASSOCIATED TRACE METAL WATER QUALITY PARAMETERS

Parameter	Units	California Toxics Rule – Freshwater Criteria Dissolved Metal Concentrations	
		Hardness: 400 mg/L	Hardness: 200 mg/L
		Acute	Acute
Copper (Cu)	µg/L[1]	52	27
Lead (Pb)	µg/L	480	200
Zinc (Zn)	µg/L	390	220

Notes:
1) µg/L stands for micrograms per liter.

(e) General MS4 Permit

As stated above, on November 16, 1990, pursuant to Section 402(p) of the CWA, the U.S.EPA promulgated federal regulations (40 Code of Federal Regulations [CFR] Part 122.26) establishing requirements for storm water discharges under the NPDES program. In California, the NPDES permit program is administered by the State Water Resources Control Board (SWRCB) through the RWQCBs as established by the State Porter-Cologne Water Quality Control Act.[25]

The project site, located within the City of Santa Clarita, falls within the jurisdiction of the RWQCBLAR (Region 4), and the project is subject to the waste discharge requirements of the RWQCBLAR Municipal Permit (General MS4 Permit) Order No. 01-182, NPDES No. CAS004001 (adopted December 13, 2001) (Appendix A). The City of Santa Clarita is a Permittee under the General MS4 permit and therefore has legal authority for enforcing the terms of the permit in its jurisdiction. The General MS4 Permit is intended to ensure that combinations of site planning, source control and treatment control BMPs are implemented to protect the quality of receiving waters. To do so, the General MS4 Permit requires that new development employ BMPs to the MEP (maximum extent practicable), including management practices, control and treatment techniques and systems, and site design planning to control the level of pollutants entering receiving waters.[26] Further, the Permittees under the MS4 Permit (the County of Los Angeles [Principal Permittee], and 84 incorporated cities, including the City of Santa Clarita) must ensure that storm water discharges from the MS4 shall neither cause nor contribute to the exceedence of water quality standards and objectives nor create conditions of nuisance in the receiving waters, and that the discharge of non-storm water to the

25 Division 7 of the California Water Code, also known as the Porter-Cologne Water Quality Control Act, establishes the SWRCB and the nine Regional Water Quality Control Boards (RWQCBs) as the principle state agencies responsible for the protection and, where possible, the enhancement of the quality of California's waters. The SWRCB sets statewide policy, and together with the RWQCBs, implements state and federal laws and regulations.

26 General MS4 Permit, Order No. 01-182, NPDES Permit No. CAS004001 (Appendix A), Finding Par. F.

MS4 has been effectively addressed.[27] The General MS4 Permit notes, by reference to the U.S. EPA's "Interim Permitting Approach for Water Quality-Based Effluent Limitations in Storm Water Permits" (August 26, 1996), that because of the nature of storm water discharges and the lack of detailed, documented, and accepted information on which to base numeric water quality-based effluent limitations (expressed as concentration and mass) for many pollutants of concern, the permitting approach utilizing BMPs does, indeed, provide for the attainment of water quality standards and negates the need for numerical effluent criteria as a standard.

Among other things, the General MS4 Permit requires the Permittees to prepare a SQMP (Stormwater Quality Management Plan) specifying the BMPs that will be implemented to reduce the discharge of pollutants in storm water to the MEP. The various components of the SQMP, taken together, are expected to reduce pollutants in storm water and urban runoff to the MEP. The emphasis of the SQMP is pollution prevention through education, public outreach, planning, and implementation as source control BMPs first, and then structural and treatment control BMPs.[28]

Permittees must comply with these requirements by timely implementation of control measures and other actions to reduce pollutants in the discharges in accordance with the SQMP and its components and other requirements of the General MS4 Permit including any modifications.[29] The General MS4 Permit has identified special provisions for proper and effective implementation of storm water pollution prevention programs. As part of the SQMP, the co-permittees are required to implement a Development Planning Program that would require control of post-development peak storm water runoff discharge rates, velocities, and duration in natural drainage systems to prevent accelerated stream erosion and to protect stream habitat.[30]

The U.S. EPA recommends that, for NPDES-regulated municipal storm water discharges, effluent limitations should be expressed as BMPs or other similar requirements, rather than as numeric effluent limits.[31] This approach involves implementing site design, source control and treatment control BMPs that reduce the discharge of pollutants in storm water to the maximum extent practicable (MEP). Under the General MS4 Permit, Permittees are to publish guidelines for creating SUSMPs. The Los Angeles County Department of Public Works, Flood Control Division has published its SUSMP manual, the "Manual for the Standard Urban Storm Water Mitigation Plan" adopted by the County in September of 2002 and subsequently approved by the RWQCBLAR (County SUSMP Manual). The EIR sets out the project's conceptual SUSMP which complies with both those County SUSMP guidelines and the General MS4 Permit.

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27 Id.

28 Id.; see also, id. Part 4.

29 Id.

30 General MS4 Permit, Part 4.

31 United States Federal Register, Vol. 61, No. 216, Wednesday, November 6, 1966. http://yosemite.epa.gov/R10/water.nsf/95537302e2c56cea8825688200708c9a/a57d8d905leee66488256c7200800a62/$FILE/FR61%2057425.pdf

(f) Los Angeles County Department of Public Works (LACDPW)

The Flood Control and Watershed Management Divisions of the LACDPW also regulate storm runoff and water quality as the Principal Permittee under the General MS4 Permit and under independent County ordinances. As previously mentioned, the City of Santa Clarita is a co-permittee under the General MS4 Permit and has legal authority for enforcing the terms of the permit in its jurisdiction.

Applicants for development projects have two major responsibilities under the General MS4 permit:

- The first responsibility is to submit and then implement a Standard Urban Storm Water Mitigation Plan (SUSMP) that contains design features and BMPs appropriate and applicable to the project. The RWQCBLAR approved Los Angeles County's SUSMP ordinance on March 8, 2000 which requires new construction and development projects to implement BMPs pursuant to the General MS4 Permit.

- The second responsibility, applicable to all construction projects with disturbed areas greater than one acre, is to prepare a Storm Water Pollution Prevention Plan (SWPPP).

For the Riverpark project, these plans must be submitted and approved by the City of Santa Clarita prior to issuance of a grading permit.

Design standards for post-construction structural or treatment control BMPs were established in the General MS4 Permit and the County and City SUSMP ordinances, and are explained in the County SUSMP Manual. The General MS4 Permit and the County SUSMP Manual require that new developments and re-development projects employ a variety of general and land use measures to reduce post-development discharges of pollutants from storm water conveyance systems to the "maximum extent practicable."

In addition, the General MS4 Permit requires that the co-permittees control post-development peak storm water runoff discharge rates, velocities, and duration in natural drainage systems, including the Santa Clara River, to prevent accelerated stream erosion and to protect stream habitat. This impact is addressed in the Flood Technical Report (Psomas 2004) and below in **Table 4**.

TABLE 4
WATER QUALITY OBJECTIVES

Issue	Objective
HYDROLOGY	
Hydrology	Control post-development peak storm water runoff discharge rate, velocities and duration in Natural Drainage Systems (mimic pre-development hydrology) to prevent accelerated stream erosion and to protect stream habitat (General MS4 Permit p. 34; see also SUSMP requirements).
Storm water runoff numeric sizing criteria	Design standards for post-construction structural or treatment control BMPs employ a variety of measures to reduce the post-project discharge of pollutants to the MEP level. The numeric sizing requirements are either volume-based or based on local flow design criteria. The volume-based criteria require that storm water runoff be infiltrated (or treated) and peak flows be controlled based on flow design criteria. There are four options for determining volume of runoff that needs to be treated (1) the 85th percentile 24-hour runoff, 2) unit basin volume to achieve 80% or more volume treatment, 3) volume produced from a 0.75 inch storm, or 4) volume based on historical 24-hour rainfall) (See SUSMP pp. 18-19 for complete description).
SURFACE WATER QUALITY	
MINERALS	
TDS	800 (mg/L) (Reach 7 of Santa Clara River Basin Plan p. 3-12)
Sulfate	150 mg/L (Reach 7 of Santa Clara River Basin Plan p. 3-12)
Chloride	100 mg/L (Reach 7 of Santa Clara River Basin Plan p. 3-12)
Boron	1.0 mg/L (Reach 7 of Santa Clara River Basin Plan p. 3-12)
Sodium absorption ratio (SAR)	5 mg/L (Reach 7 of Santa Clara River Basin Plan p. 3-12)
NUTRIENTS	
In General	
Nitrogen	5 mg/L ((Reach 7 of Santa Clara River Basin Plan p. 3-12)
Nitrogen (Nitrate, Nitrite)	Waters shall not exceed 10 mg/L nitrogen as nitrate-nitrogen plus nitrite-nitrogen, 45 mg/L as nitrate, 10 mg/L as nitrate-nitrogen, or 1 mg/L as nitrite-nitrogen.
Ammonia	See Reach 7 of Santa Clara River Basin Plan table 3-2 (WARM) for one-hour average concentrations for a range of pH and temperatures (as an example at 10 degrees C and pH of 7, total ammonia concentrations should be 25 mg/L).
Phosphorous	No criteria
Dissolved oxygen (DO)	As a minimum, the mean annual DO concentration greater than 7 mg/L; no single determination less than 5.0 mg/L. For WARM designations, the DO concentrations shall not be depressed below 5 mg/L as a result of waste discharge (Basin Plan p.3-11).

TABLE 4
WATER QUALITY OBJECTIVES

Issue	Objective
BOD (Biochemical oxygen demand)	Waters shall be free of substances that result in increase in BOD which adversely affects designated beneficial uses (Basin Plan)
Biostimulatory substances	Biostimulatory substances include excess nutrients and other compounds that stimulate aquatic growth. Waters shall not contain biostimulatory substances in concentrations that promote aquatic growth to the extent that such growth causes nuisance of adversely affects designated beneficial uses (Basin Plan)
TOXICS	
Toxicity	Waters maintained free of toxic substances in concentrations toxic to human, plant, animal, or aquatic life; survival of aquatic life in surface waters subject to waste discharge or other uncontrollable water quality factors shall not be less than for the same waterbody in areas unaffected by waste discharge; no acute toxicity in ambient waters including mixing zones; no chronic toxicity in ambient waters outside mixing zones (Basin Plan p.3-16)
Copper (acute)	27 µg/L (hardness value 200 mg/L) 52 µg/L (hardness value 400 mg/L) (CTR objectives)
Lead (acute)	200 µg/L (hardness value 200 mg/L) 480 µg/L (hardness value 400 mg/L) (CTR objectives)
Zinc (acute)	220 µg/L (hardness value 200 mg/L) 390 µg/L (hardness value 400 mg/L) (CTR objectives)
Chemical Constituents	MUN designated waters shall not contain concentrations of chemicals in excess of the limits specified in the Title 22 CCR (for inorganic and organic chemicals and fluoride) (Basin Plan p.3-8).
Bioaccumulation	Toxic pollutants shall not be present at levels that will bioaccumulate in aquatic life to levels which are harmful to aquatic life or human health (Basin Plan p.3-8).
Pesticides	Waters shall not contain concentrations of pesticides in excess of limiting concentrations in 22 CCR § 64444 (organics) (MUN) (Basin Plan p.3-15 and Table 3-7).
Turbidity	Waters shall be free of changes in turbidity that cause nuisance or adversely affect designated beneficial uses; increased in natural turbidity attributable to controllable water quality factors are limited as follows: 20% increase or less where natural turbidity is between 0 and 50 NTU; 10% increase or less where natural turbidity over 50 NTU (Basin Plan p.3-17).
Solid, suspended, or	Waters shall not contain suspended or settleable material in concentrations

TABLE 4
WATER QUALITY OBJECTIVES

Issue	Objective
settleable materials (including TSS)	that cause nuisance or adversely affect designated beneficial uses (Basin Plan p.3-16).
PATHOGENS/ BACTERIA	
E. coli density	Less than 126/100 ML (geometric mean limit) (REC-1) (Basin Plan amendment)
E. coli density	Less than 235/100 ML (single sample limit) (REC-1) (Basin Plan amendment)
Fecal coliform density	Less than 200/100mL (geometric mean limit) (REC-1) (Basin Plan amendment)
Fecal coliform density	Less than 400/100mL (single sample limit) (REC-1) (Basin Plan amendment)
QUALITATIVE BMP-BASED	
Chlorine, total residual	Shall not be present in surface water discharges at concentrations exceeding 0.1 mg/L; shall not persist in receiving waters at any concentration that causes impairment of designated beneficial uses (Basin Plan p.3-9).
MBAS (methylene blue activated substances), such as detergents and other anionic surfactants	Less than or equal to 0.5 mg/L (MUN) (Basin Plan p.3-11)
Floating materials	Waters shall not contain floating materials in concentrations that cause nuisance or adversely affect designated beneficial uses (Basin Plan p.3-9).
Oil & grease	Waters shall not contain oils, greases, waxes or other materials in concentrations that result in a visible film or coating on the surface of the water or on objects in the water, that cause nuisance, or that otherwise adversely affect designated beneficial uses (Basin Plan p. 3-11).
pH	Shall not be depressed below 6.5 or raised above 8.5 as a result of waste discharges; ambient pH levels shall not be changed more than 0.5 units from natural conditions as a result of waste discharge (Basin Plan p.3-15).
PCBs	Pass-through or uncontrollable discharge limited to 70 pg/L 30-day average (human health) and 14 mg/L daily average (aquatic life); purposeful discharge prohibited (Basin Plan p.3-15).
Temperature	Water temperature shall not be altered by greater than 5 degrees F above natural temperature; natural receiving water temperature shall not be altered unless it can be demonstrated that designated beneficial uses not adversely affected (Basin Plan p.3-16).
Taste and Odor	Waters shall not contain taste or odor-producing substances in concentrations that impart undesirable tastes or odors to fish/edible aquatic

TABLE 4
WATER QUALITY OBJECTIVES

Issue	Objective
	flesh, to adversely affect beneficial uses and cause nuisance (Basin Plan, p.3-16).
Radioactive Substances	Waters designated as MUN shall not contain concentrations of radionuclides in excess of Title 22 CCR (Basin Plan p.3-15).
RIVER PLAN CONSTITUENTS	
Exotic vegetation	Exotic vegetation shall not be introduced around stream courses to the extent that such growth causes nuisance or adversely affects designated beneficial uses (Basin Plan p.3-9).
Wetlands hydrology	Natural hydrologic conditions necessary to support physical, chemical and biological characteristics present in wetlands shall be protected to prevent significant adverse effects on a variety of parameters (Basin Plan p.3-17).
Wetlands habitat	Existing habitats and associated populations of wetlands fauna and flora shall be maintained (Basin Plan p.3-17).

(g) Water Quality Best Management Practices

This section describes the state of water quality best management practices and outlines current efforts and requirements for MS4 Permittees (City of Santa Clarita and County of Los Angeles).

In water pollution control, best management practices (BMPs) refer to the best means available to control pollution of waterways from non-point sources. For storm water runoff, Section 402(p) of the CWA provides that MS4 permits must require controls to reduce the discharge of pollutants to the MEP. The MEP standard was clarified by the federal courts, which held that MEP did not require that municipal storm water discharges strictly comply with numeric water quality standards (*Defenders of Wildlife v. Browner*, 191 F.3d 1159 (9th Cir. 1999)). The MEP standard is attained by the use of BMPs. For a particular permit, the U.S. EPA generally bases the MEP standard on technological feasibility, water quality objectives, and other site specific considerations.

BMPs are actions and procedures established to reduce the pollutant loadings in storm drain systems. The three main categories of BMPs are (1) site design (or planning and management), (2) source control and (3) treatment and structural control.

Site Planning BMPs
Site design or planning management BMPs are used to conserve natural areas and minimize impervious cover, especially in those areas directly connected to receiving waters. Site planning BMP strategies include:

- Minimizing Impervious Areas and Directly Connected Impervious Areas
- Selection of Construction Materials and Design Practices
- Conservation of Natural Areas
- Protection of Slopes and Channels with Vegetative Cover

Source Control BMPs

- Source control BMPs are usually the most effective and economical in preventing pollutants from entering storm and non-storm runoff. Examples of source control BMPs that are relevant to the project include:
    - Public Education/Participation activities which make information available to homeowner groups, associations, and municipalities for further distribution to homeowners and businesses.
    - Drain Inlet Stenciling This includes community and resort education and litter control program

  Materials Management activities, such as:

    - Materials Use Controls, which include good housekeeping practices (storage, use and cleanup) when handling potentially harmful materials, such as cleaning materials, fertilizers, paint, pool chemicals and, where possible, using safer alternative products;
    - Material Exposure Controls, which prevent and reduce pollutant discharge to storm water by minimizing the storage of hazardous materials (such as pesticides) on site, storing materials in a designated area, installing secondary containment, conducting regular inspections, and training employees and subcontractors; and
    - Material Disposal and Recycling, which includes storm drain system signs and stenciling with language to discourage illegal dumping of unwanted materials. Household hazardous waste and used oil recycling at collection centers and round-up activities are very productive BMPs.
    - Spill Prevention and Cleanup activities, which are directed toward reducing the risk of spills during the outdoor handling and transport of chemicals, and toward developing plans and programs to contain and rapidly clean up spills before they get into a storm drain system. This BMP also deals with the prevention and reduction of pollution from vehicle leaks and spills from vehicles during transport, as well as aboveground storage tanks. This BMP would be relevant to the construction of a gasoline station on the proposed commercial site, should one occur.
    - Illegal Dumping Controls, which consist of laws, ordinances and public education programs intended to prevent the dumping of waste products (solid waste/liquid waste and yard trash) into storm drain systems and water courses.
    - Street and Storm Drain Maintenance activities that control the movement of pollutants and remove them from pavement through catch basin cleaning, storm drain flushing, street sweeping, and by regularly removing illegally dumped

material from storm channels and creeks. Modification of channel/creek characteristics to improve hydraulics and increase pollutant removals also enhances aesthetic and habitat value.

- Good Housekeeping practices including such activities as sweeping down driveways as opposed to washing them down.
- Irrigation Controls and Management, Proper Storage and Application of Fertilizers and Pesticides.
- Capture and re-use of storm water runoff and nuisance flows.

Treatment and Structural BMPs

Treatment and structural control BMPs involve physical treatment of the runoff, usually through structural means. Treatment control BMPs are also referred to as structural BMPs throughout this report. A variety of treatment control measures have been utilized throughout the country for storm water quality; however, the effectiveness of these controls is highly dependent on local conditions, such as climate, hydrology, soils, groundwater conditions, and extent of urbanization.

Some of the more common Treatment Controls are:

- Oil/water separators, which are designed to remove one specific group of contaminants: petroleum compounds and grease. However, separators will also remove floating debris and settable solids.
- Infiltration, which refers to a family of systems in which the majority of the runoff from small storms is infiltrated into the ground rather than discharged to a surface water body. Infiltration systems include: ponds, vaults, trenches, dry wells, porous pavement, and concrete grids.
- Biofilters, which are of two types: swale and strip. A swale is a vegetated channel that treats concentrated flow. A strip treats sheet flow and is placed parallel to the contributing surface.
- Extended water quality detention basins that are dry between storms. During a storm, the basin fills and a bottom outlet releases the storm water slowly to provide time for sediments to settle.
- Media filtration consists of a settling basin followed by a filter. Common filter are sands, peat/sand mixtures, and other filter media.
- Hydrodynamic Separator Systems such as Gross Solids Removal Devices (GSRDs) and Continuous Deflector Separation (CDS) Units
- Multiple systems which are a combination of two or more of the preceding controls in a series; also referred to as a "treatment train."

2.1.2 Intrusions into Jurisdictional Waters

(a) United States Army Corps of Engineers

The project would also be subject to federal permit requirements under Section 404 of the CWA. Section 404 of the CWA regulates activities that result in the location of a structure, excavation, or discharge of dredged or fill material into "Waters of the United States," which include wetlands along with non-wetland habitats, such as streams (including intermittent streams), rivers, lakes, ponds, etc., over which the U.S. ACOE has jurisdiction The Santa Clara River, including that portion of the river that flows through the site, is designated by the United State Geological Survey as "waters of the United States." Two other drainages within the site are also considered "waters of the United States" and fall under U.S. ACOE jurisdiction. Therefore, certain proposed activities in the river and drainages, such as the construction of the bank stabilization, toe protection and outlet structures (discussed later in this EIR section) and the Newhall Ranch Road/Golden Valley Road Bridge, may come under the jurisdiction of the U.S. ACOE pursuant to Section 404 of the CWA. These improvements were also analyzed and are permitted under the already approved Natural River Management Plan (ACOE Individual Permit No. 94-00-504-BAH)[32] (See discussion of the Natural River Management Plan, below).

(b) California Department of Fish and Game

The Santa Clara River and associated vegetation on the site are also potentially subject to regulation by the CDFG under Sections 1601-1603 of the California Fish and Game Code. Under Sections 1600-1607 of the Code, the CDFG regulates activities that would alter the flows, beds, channels or banks of streams and lakes. The term "stream" can include intermittent and ephemeral streams, rivers, creeks, dry washes, sloughs, blueline streams and watercourses with subsurface flows. In addition to the Santa Clara River, the site contains other drainages that site that fall under CDFG jurisdiction (see other related technical reports).

2.1.3 Natural River Management Plan (NRMP)

On November 30, 1998, the U.S. ACOE, CDFG and the RWQCBLAR approved the Natural River Management Plan (NRMP) for the Santa Clara River. The NRMP is a long-term, master plan that provides for the construction of various infrastructure improvements on lands adjacent to the Santa Clara River and portions of two of its tributaries. More specifically, the NRMP governs a portion of the main-stem of the Santa Clara River from Castaic Creek to one-half mile east of the Los Angeles Department of Water and Power Aqueduct and portions of San Francisquito Creek and the Santa Clara River South Fork, in Los Angeles County,

32 The permit to construct improvements under the Natural River Management Plan comes from an Army Corps Section 404 Permit, Fish and Game Incidental Take and 1603 Permit. The Santa Clara Natural River Management Plan consists of new bank protection, new or widened bridges, inlet structures, storm drain outlets and utility line crossings associated with the infrastructure and land developments near the Santa Clara River and its tributaries in the Santa Clarita Valley.

California. The project site is located within the portion of the river now governed by the NRMP.

In connection with this approval, the following permits were issued by the following agencies:

- United States Army Corps of Engineers (USACOE) – Permit No. 94-00504-BAH under Section 404 of the federal Clean Water Act. Section 404 of the federal Clean Water Act allows for certain activities that result in the discharge of fill or dredged materials into "Waters of the United States" or in this case the Santa Clara River. Prior to issuing this permit, the Army Corps had completed an endangered species consultation (pursuant to Section 7 of the federal Endangered Species Act) with the United States Fish and Wildlife Service.

- California Department of Fish and Game (CDFG) - 1603 Streambed Alteration Agreement No. 5-502-97 and Incidental Take Permit No. 2081-1998-49-5. In summary, the Streambed Alteration Agreement allows for activities that alter the ".... natural flow or change the bed, channel or bank of the river...." The Incidental Take Permit applies to all state listed species pursuant to Fish and Game Code Section 2081(b).

- California Regional Water Quality Control Board (Los Angeles Region) (RWQCBLAR) – Order No. 99-104 related to waste discharge associated with the improvements included in the NRMP.

The NRMP was prepared in response to a U.S. Army Corps of Engineers request to prepare a long-range management plan for projects and activities potentially affecting the Santa Clara River and San Francisquito Creek. More specifically, the NRMP, and its certified EIS/EIR (NRMP EIS/EIR), analyze impacts associated with the implementation of various infrastructure improvements (bank stabilization, bridges, utility crossings, storm drain outlets, etc.) along and within portions of the Santa Clara River adjacent to Newhall Land properties, including the Riverpark project site.

The permits issued by the affected agencies (ACOE, CDFG, RWQCB) allow Newhall Land or its designee to engage in construction and maintenance activities for the various infrastructure improvements included within the NRMP. Within the project site, those improvements include the bank stabilization, toe or erosion protection, various outlet structures, and the Newhall Ranch Road/Golden Valley Road Bridge. The NRMP, through its permits and EIR/EIS, includes certain requirements, conditions and mitigation measures associated with the implementation of the approved improvements.

As indicated above, various infrastructure improvements and subsequent maintenance activities are governed by and permitted through the approved NRMP and accessory Agency permits. Those improvements addressed by the NRMP, and its EIS/EIR, that are located on the project site include the bridge and bank stabilization elements.

2.2 WATER QUALITY EVALUATION METHODOLOGY

The water quality evaluation methodology presented herein was developed with the following considerations:

1. The current regulatory and jurisdictional framework related to project development, and the basis of this framework,
2. Potential project impacts to water quality discharging from the project site,
3. Existing water quality as it relates to receiving waters and beneficial uses, and
4. Current technology and the state of reliable, defensible data and analysis approaches that are sufficient to serve as a sound basis for action.

The first three items were discussed previously; this section specifically addresses item 4. To address potential storm water quality impacts of the project, an assessment of existing conditions is necessary.[33]

Currently, however, there are limited monitored water quality data available for Reach 7 of the Santa Clara River. As discussed in Section 1.1.1, relative to downstream reaches, Reach 7 (as defined by RWQCBLAR) is not subject to many of the non-storm water discharges experienced downstream of Bouquet Canyon Road Bridge. When water is present in this reach, it is reportedly almost always during the rainy winter months and typically lasts only for a few days after a storm event large enough to create flow. Therefore, for this analysis, existing water quality for this reach of the river (i.e., the reach for which a basis for comparison is valid, and the reach to which the project site ultimately discharges) is based on published pollutant generation rates for various land uses.[34]

The area proposed for development was modeled for three land-use/scenarios: 1) existing conditions assuming open space is vacant land, 2) developed conditions without BMPs, and 3) developed conditions with BMPs.

Consistent with the state of the practice and available data and methodologies, a statistically-derived model based on relatively simple expressions describing rainfall/runoff relationships and estimated concentrations in storm water runoff was used to estimate project impacts. The volume of runoff is estimated from the Rational Equation, an empirical expression that relates runoff volume to the rainfall depth and the broad basin runoff response characteristics. The analysis methodology is described in more detail in Section 2.2.2.

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[33] Quantitative analysis of effectiveness will be limited to treatment and structural BMPs, since site specific data quantifying the effectiveness of planning and source control BMP measures are not available and subject to significant variability.

[34] Los Angeles County 1994-2000 Integrated Receiving water Impacts Report, Los Angeles County Department of Public Works (July 2000).

2.2.1 Pollutants of Concern

The applicable narrative and numerical standards, beneficial uses and CTR criteria for this reach of the river are set forth in **Table 4**. Reach 7 (U.S. EPA Reach 9) has been listed in CWA Section 303(d) as impaired for high coliform count (**Table 2**).

Pollutants of concern consist of any pollutants that exhibit one or more of the following characteristics: current loadings or historic deposits of the pollutant are impacting the beneficial uses of a receiving water, elevated levels of the pollutant are found in sediments of a receiving water and/or have the potential to bioaccumulate in organisms therein, or the detectable inputs of the pollutant are at concentrations or loads considered potentially toxic to humans and/or flora and fauna.[35] Pollutants of concern for the proposed project were chosen for discussion and analysis based upon typical pollutants found in urban runoff (EPA 1993), as well as pollutants that are impacting beneficial uses as evidenced by the CWA section 303(d) listing for designated reaches of the Santa Clara River (discussed below).[36] These include:

- Total Suspended Solids
- Nutrients (Phosphorus, Nitrogen)
- Trace Metals (Copper, Lead, Zinc)
- Pathogens
- Hydrocarbons
- Pesticides
- Chloride

The following constituents were chosen for the water quality modeling analysis:

- Total Suspended Solids (TSS)
- Total Phosphorous (TP)
- Total Nitrogen (TN)
- Nitrate
- Total Copper (Cu)
- Total Lead (Pb)
- Total Zinc (Zn)
- Chloride (Cl)

The analytical model used to estimate concentrations and loads uses EMCs (statistical measures of the concentrations of the modeled constituents based on storm water monitoring data) as model input. The above constituents were selected for modeling in this water quality analysis because statistically significant, suitable and high confidence monitoring data is available to estimate potential project effects (GeoSyntec 2002). These measures are more robust as the data for these parameters have been collected over a range of storm events using flow composite sampling methods at similar land uses, and the data for these constituents are consistently measured at levels above the method detection levels.

[35] County SUSMP Manual, p. 24.

[36] 2002 CWA Section 303(d) List of Water Quality Limited Segment, Approved by SWRCB (4 February 2003).

To the extent that there are reliable data on the effectiveness of structural BMPs, that data was used in the modeling; however, source controls were not included in the analysis, since it is difficult to model their impacts. Due to the absence of substantial research, BMP removal effectiveness data for nitrate and chloride are limited and therefore accurate modeling of the BMP effectiveness for these constituents with respect to ultimate effluent concentrations is not possible. The analysis for nitrate and chloride is therefore limited to assessing potential changes to water quality from existing to proposed conditions. The water quality model does not include analysis of loads following application of storm water treatment (or structural) BMPs (mitigated conditions). As a result, the comparison between existing and proposed conditions overestimates potential impacts.

The following constituents of concern are analyzed qualitatively in this analysis, but were not modeled due to limited storm water monitoring data and because the constituents are more difficult to accurately measure, and consequently are not amenable to developing reliable quantitative data.

- TDS (Total Dissolved Solids) – Water quality parameter defining the concentration of dissolved organic and inorganic chemicals in water. After suspended solids are filtered from water and water is evaporated, dissolved solids are the remaining residue. Due to lack of BMP removal data for TDS, chloride levels may be used for evaluations and as an indicator of behavior of minerals in general.

- Sulfate – A salt or ester of sulfuric acid, originating from the oxidation of sulfite ores, the presence of shales, and the existence of industrial wastes. Sulfate is one of the major dissolved constituents in rain. As with TDS, lack of BMP removal data for this constituent requires the evaluation of indicator pollutants, such as chloride.

- Boron – A trace mineral found mainly in sea water. As with TDS, lack of BMP removal data for this constituent requires the evaluation of indicator pollutants, such as chloride.

- SAR, or sodium absorption ratio – Ratio for irrigation waters, used to express the relative activity of sodium ions in exchange reactions with soil. As with TDS, lack of BMP removal data for this constituent requires the evaluation of indicator pollutants, such as chloride.

- Various forms of *hydrocarbons* are common constituents associated with urban runoff; however, these constituents are difficult to measure because of laboratory interference effects, sample collection challenges (hydrocarbons tend to coat sample bottles), and they are typically measured with single grab samples, making it difficult to develop reliable modeling data (e.g. storm water event mean concentrations [EMCs] which are used to represent probable concentrations in storm water runoff). Because it was not possible to represent conditions with confidence, this constituent could not be satisfactorily modeled.

- *Pesticides* in urban runoff are often at concentrations that are below detection limits for most commercial laboratories; and therefore there are limited statistically reliable data on pesticide concentrations in urban runoff. Furthermore, since the most effective BMPs are source control measures, it is not possible to accurately represent a quantification of pollutant removals.

- *Human pathogens* typically are not directly measured in storm water monitoring programs because of the difficulty and expense involved. Indicator bacteria such as fecal coliform or E. Coli are measured, however even these indicator are not very reliable for storm water conditions, in part because storm water tends to mobilize these bacteria from many other non-human sources, many of which include non-pathogenic bacteria. For this reason, and because holding times for bacterial samples are necessarily short, most storm water programs do not collect flow-weighted composite samples that potentially could produce reliable statistical estimates of pathogen concentrations.

An effective approach for addressing potential storm water impacts of urban development is to identify and impose project-specific BMPs to complement regional BMPs addressing water quality issues on a watershed or regional basis. Construction impacts are addressed, primarily through a SWPPP consistent with the requirements for coverage under the State's General Construction Activity Storm Water Permit (discussed below), and longer-term post-construction impacts are addressed, primarily, under a SUSMP. The SWPPP contains certain additional elements related to post-construction impacts, requiring, for example, descriptions of post-construction BMPs, but is not as comprehensive as the SUSMP. The BMPs specified in this document provide a framework for future preparation of the SUSMP.

2.2.2 Pollutant loading

(a) Runoff Estimation

Runoff must first be estimated before quantifying loading. Runoff is estimated using the Rational Equation (Novotny and Olem, 1994):

$$Q = Rv * I * A$$

where:

Q = runoff (volume or flow rate)
Rv = mean annual runoff coefficient
I = rainfall depth or rainfall intensity
A = drainage area

The runoff coefficient is a unit-less value that is a function of the imperviousness of the watershed and is approximated in the water quality model using the following equation:

$$Rv = 0.007 * (\% \text{ Imperviousness}) + 0.1$$

Percent imperviousness for each sub-area in the proposed development was estimated based on the distribution of land uses and land use specific percent impervious values presented in the Los Angeles Hydrology Manual (LACDPW, 1991).

Table 5 shows the percent impervious applied by land use for the proposed Riverpark project existing (and developed) conditions.

TABLE 5
PERCENT IMPERVIOUSNESS FOR SELECTED LAND USES

Land Use	Percent Imperviousness (%)
Agricultural[3]	10[2]
Transportation	100[2]
Single Family Residential	42[1]
Multi Family Residential	68[1]
Commercial	92[1]
Open Space	10[2]

Notes:
1) Source: Los Angeles County Hydrology Manual, Appendix F.
2) Source: GeoSyntec, 2002.
3) Source: Values are presented for non-irrigated and grassland agricultural use.

The application of percent imperviousness per land use was based on evaluation of dominant land uses in identified hydrologic sub-areas for both existing (and developed) conditions. Refer to the Flood Technical Report for delineation of the hydrologic sub-areas.

Table 6 presents results from rainfall analyses used for estimating pollutant loads (GeoSyntec 2002). The rainfall analysis for the Newhall Ranch Development based on data collected from the National Climatic Data Center (NCDC) for the Newhall Weather Station #046162. Hourly rainfall data collected from 1968 to 1998 was analyzed using the SYNOP statistical rainfall analysis program (EPA, 1989) to develop descriptive statistics for individual storm events.

TABLE 6
RESULTS OF THE RAINFALL ANALYSIS
(NEWHALL RANCH WEATHER STATION #046162[1])

Average annual rainfall from events larger than 0.1 inches in total depth	16.9 inches
Average number of events per year greater than 0.1 inches in total depth	15 events
Average duration of events larger than 0.1 inches in total depth	11 hours
Average depth of events larger than 0.1 inches in total depth	1.12 inches
Average intensity of events larger than 0.1 inches in total depth	0.102 in/hr
Notes: 1) Information presented based on rainfall analysis results for the Newhall Ranch Development (Geosyntec, 2002).	

(b) Water Quality Model Analysis

The water quality modeling analysis was based on a modified version of the Simple Method (Schueler, 1987). The constituent concentration is represented by an expected average constituent concentration, the Event Mean Concentration (EMC), and a measure of the variability. The EMCs and variability are estimated from available monitoring data and are strongly dependent on land-use type. This information is used in a model to estimate runoff volumes, and pollutant concentrations and loadings for the four scenarios. Annual pollutant loads were calculated using estimated runoff volumes and EMC values based on existing or project land uses as shown in the following equation:

Runoff Volume	X	EMC	X	Conversion Factor	=	Pollutant Load
(ft^3/year)		(mg/L)		(6.2428×10^{-5})		(lbs/year)

The EMCs summarized in **Table 7** were used to predict the storm water pollutant loads at the points of discharge from the project area into the Santa Clara River. As indicated above, the LA County data were used in modeling of total suspended solids (TSS), total phosphorous (P), total nitrogen (N), nitrate, total copper (Cu), total lead (Pb), total Zinc (Zn), and chloride (Cl).

As indicated previously, current land use within the project site and its adjacent upstream tributary areas are mostly open space and agricultural uses. The results of the pollutant load model for existing conditions are presented in Section 4 as part of the discussion for project impacts.

The effects of BMPs are accounted for via the estimation of the amount of runoff "captured" and treated by the BMP and estimates of the resulting effluent quality achieved based upon BMP performance information.

As described above, the existing site land uses consist of a mixture of open space, agriculture and a small percentage of commercial uses. Because there are multiple existing land uses, the water quality impacts of the project (with and without BMPs) could be compared to both open space uses and agriculture uses. To be conservative, the existing conditions were modeled based on the assumption that open space is vacant. However, it should be noted that this assumption likely overstates the impact of project development because the concentrations for all constituents of concern for vacant land use are lower than for agriculture use

(c) Event Mean Concentrations (EMCs)

Storm water runoff water quality will vary within a storm event depending on the rainfall pattern and storm duration (intra-event variability). Because of this variability, water quality concentrations are often expressed in the form of EMCs, which are the concentrations that would be measured if the entire runoff from an event were captured and mixed before sampling. The extensive use of EMCs to characterize storm water quality was initiated in the U.S. EPA's Nationwide Urban Runoff Program (NURP) (U.S. EPA, *Nationwide Urban Runoff Program*, Executive Summary, 1983).

Storm water runoff quality will also vary from storm to storm (inter-event variability) depending on a variety of conditions, including the characteristics of the storm event, the time between storms, conditions in the watershed, and time of year. This latter effect is particularly important in semi-arid environments where there is a dry and wet season, and where soil saturation and runoff vary greatly depending on the season and changes in long-term climate cycles. Because of this intra- and inter-event variability, storm water quality is often expressed and evaluated statistically.

The Ventura County Flood Control District conducts storm water monitoring from areas with specific land uses. Results from agricultural storm water monitoring efforts during the years 1997, 1998, and 1999 were used to develop model input concentrations for agricultural land use event mean concentrations (EMCs).[37] The Los Angeles County Storm Water Monitoring Program also conducts comprehensive wet weather monitoring and publishes EMCs for several different constituents and a variety of land uses (LARWQCB, 2001). This data was used to provide EMCs for the existing and proposed land uses because of the relatively close location of the Los Angeles County monitoring stations to the project site, because the monitored land uses were representative of the proposed development land uses, and because the data evaluates storm water quality unique to specific land uses.

The EMCs used to characterize the existing (and developed) storm water quality at the proposed project site are shown below in **Table 7**.

[37] An EMC is the average concentration of a pollutant in the runoff from a storm event, equal to the total mass of pollutant divided by the total volume of storm runoff.

TABLE 7
LAND USE REPRESENTATIVE EVENT MEAN CONCENTRATIONS (EMCS) USED TO CHARACTERIZE STORM WATER QUALITY CONDITIONS

Land Use[1]	Pollutant EMCs							
	TSS (mg/L)	TP (mg/L)	TN[3] (mg/L)	Nitrate (mg/L)	Cu (mg/L)	Pb (mg/L)	Zn (mg/L)	Chloride (mg/L)
Agriculture[2]	1176	2.7	18.83	11.1	0.132	0.047	0.324	24.2
Transportation	78	0.44	2.65	0.7	0.056	0.0103	0.29	5.6
Single Family Residential	95	0.39	3.84	0.86	0.015	0.0097	0.08	5
Multi Family Residential	46	0.19	3.16	1.1	0.012	0.0058	0.15	12.7
Commercial	66	0.39	4.04	0.48	0.039	0.018	0.24	49.8
Open Space[4]	186	0.16	1.89	1.05	0.015	0.0025	0.05	6.6

Notes:
1) EMCs for each land use are based on LA County Storm Water Monitoring Data (1994-2000), unless noted.
2) Calculated mean concentrations for agricultural land uses are based on analysis of Ventura County Agricultural Monitoring Data (Geosyntec, 2002).
3) Total nitrogen estimated from sum of Total Kjeldahl Nitrogen (TKN) and nitrates.
4) Includes park uses.

Based on monitoring data from Ventura County, EMC values for many pollutants of concern from agricultural uses are typically about 4 to 19 times higher than they are from open space/vacant land uses. Because a small portion of the Riverpark site has historically been under agricultural production the expected existing storm water pollutant loads at the site should be in the range between those expected from open space and those expected from agricultural uses. Loads within this range will vary since the various pollutants have different survival rates and behavior over time and under various conditions.

(d) Land Uses under Existing Conditions

The land use assumptions used for the pre- and post-development conditions are shown in **Table 8 Dominant Land Uses under Existing Conditions**. Pre-development conditions were modeled based primarily on open space land use, with a small fraction of agricultural and commercial (storage yard) land uses (existing scenario). Post-development conditions at the site would include open space, commercial, transportation, single family residential and multi family residential land uses. Land uses for off-site tributary areas consist primarily of open space land uses with a small fraction of agricultural uses.

TABLE 8
DOMINANT LAND USES UNDER EXISTING CONDITIONS

Land Use		Total Watershed Area		Percent Total
		(ac)	(ft^2)	(%)
Existing Conditions in Tributary Watershed	Open Space	784.57	34,175,602	93.2%
	Agriculture	38.5	1,677,047	4.6%
	Commercial	18.4	801,498	2.2%
	Total[1]	841.47	36,654,147	100%

Again, the assumption that the existing condition of the site is primarily open space and vacant results in understating the site's actual condition. Even though the site is primarily open space now, portions have historically been put to agricultural use, and the effects of that use (i.e., the use of pesticides) may still affect the quality of the runoff from the site. Consequently, the assumption that the site is primarily open space and vacant is conservative, and the actual level of the modeled constituents is likely higher than shown below.

2.2.3 Existing Surface Water Quality

As stated above, analysis of pollutants of concern for the project were analyzed quantitatively where there was sufficient reliable data on which to base the analysis, and qualitatively where such data was not available.

(a) Assessment of Quantitatively Addressed Pollutants

To help address potential storm water quality for the proposed Riverpark development, a pollutant load model was developed for analysis of existing, proposed and mitigated conditions.

Under existing conditions the project site is currently vacant and there are no water quality control improvements located within the project site. The water quality parameters that were incorporated in the pollutant load computation methodology for the pre-development, as well as post- and mitigated- development, conditions were presented above. The pollutant load computation methodology was also discussed above. The following summary includes discussion of pollutants of concern, event mean concentrations, rainfall and runoff estimation methods, a brief description of the calculations used in the pollutant load model for the Riverpark development and the applied CTR criteria. Pre-developed conditions were modeled based primarily on open space land use, with a small fraction of agricultural and commercial (storage yard) land uses.

TABLE 9
POLLUTANT CONCENTRATION RESULTS FOR RIVERPARK DEVELOPMENT BASED ON ASSUMPTION OF EXISTING VACANT LAND USES

Total Area		Runoff Volume	Modeled Constituents							
			TSS	TP	TN[2]	Nitrate[1]	Cu	Pb	Zn	Chloride[1]
(ac)	(ft^2)	(ft^3/yr)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)
841.5	36,654,147	9,423,531	217	0.29	2.8	1.43	0.02	0.0058	0.08	11.2
(ac)	(ft^2)	(ft^3/yr)	(lbs/yr)	(lbs/yr)	(lbs/yr)	(lbs/yr)	(lbs/yr)	(lbs/yr)	(lbs/yr)	(lbs/yr)
			127,946	170	1,648	840	13	3	46	6,589

Notes:
1) Mitigated Pollutant Removal not Included in Water Quality Model
2) Total nitrogen estimated from sum of Total Kjeldahl Nitrogen (TKN) and nitrates.

(b) Assessment of Qualitatively Addressed Constituents

Many constituents of concern, including sulfates, boron, SAR, ammonia, pathogens, pesticides, and hydrocarbons, as discussed below, are not easily modeled due to limited or non-existent monitoring data, difficulty in measuring pollutant concentrations, or due to pollutant concentrations that are below reporting limits.

- Sulfates, Boron and SAR (Salts)

  These constituents are most often associated with marine soils and coastal environments, so are not likely to appear in project site runoff.

- *Ammonia (Nutrient)*
  Ammonia is typically found in low concentrations in runoff, as it is easily diluted and oxidized to nitrate. Consequently, its presence in runoff is measured by the nitrate concentrations in runoff.

- *Pathogens*
  Pathogens in the Santa Clara River may adversely affect the potential and existing designated beneficial uses of the river, particularly water contact recreation. Typical sources of pathogens in urban storm water runoff include pet wastes, improperly functioning septic tanks, and illicit sewer connections to the storm drain system. Other sources of pathogens are primarily due to non-domestic animal wastes, particularly waterfowl.

  The concentrations of pathogens associated the existing open space use are difficult to evaluate for a number of reasons. Measurements of indicator organisms are not necessarily reliable indicators of viable pathogenic viruses, bacteria, or protozoa. Moreover, there are numerous sources of pathogens including birds and other wildlife, as well as domesticated animals and pets. Open space areas can potentially have high levels of coliform associated with this type of land use due to wildlife sources, but are typically lower in pathogen concentration than urban land uses.

- *Pesticides*
  While pesticides are subject to degradation, they vary in how long they maintain their ability to eradicate pests. Some break down almost immediately into nontoxic by-products, while others can remain active for longer periods of time. Currently, pesticide sampling data is unavailable for the soils of the planned construction areas of the proposed project site. The open space areas proposed for residential development are in a natural condition and are not known to been maintained with pesticides. However, pesticides were likely used on the portion of the site historically devoted to agricultural use, and on the off-site agricultural areas that drain onto the site.

- *Hydrocarbons*
  Various forms of hydrocarbons (oil and grease) are common in urban runoff; however, these constituents are difficult to measure and are typically measured with grab samples, making it difficult to develop reliable EMCs for modeling. Based on this consideration, hydrocarbons were not modeled but are addressed qualitatively.

  Hydrocarbons are a broad class of compounds, most of which are non-toxic. Hydrocarbons are hydrophobic (low solubility in water), have the potential to volatilize, and most forms are biodegradable. A subset of hydrocarbons, Polynuclear Aromatic Hydrocarbons (PAHs), can be toxic depending on the concentration levels, exposure history and sensitivity of the receptor organisms. Of particular concern are those PAHs compounds associated with transportation related combustion products.

  The current concentration of hydrocarbons in the runoff is likely to be relatively small, as the project site is generally vacant open space land. However, there may be some hydrocarbon-containing runoff from the construction storage yard located in the valley in the central portion of the site.

- *Runoff Volume, Velocity and Duration*
  The existing project site is not subject to hydraulic control structures (except facilities associated with transportation uses) that would alter the natural hydrologic and hydraulic responses to rainfall (volume, velocities, and durations). Based on relative watershed size and characteristics of the Santa Clara River, runoff from the project site will not have any appreciable impact on potentially erosive flows in the River. Locally (e.g., at storm drain outlets), energy dissipation is provided to reduce potential for erosion. Furthermore, water quality basins will reduce the frequency, volume, and duration of potentially erosive flows. Additional discussion is provided in the Flood Technical Report.

3 PROJECT CONDITIONS

The Riverpark project conditions as they relate to water quality are discussed in this section. Both construction and post-construction/development phases (including the effectiveness of mitigation) of the project are addressed here.

3.1 WATER QUALITY IMPACTS DURING CONSTRUCTION

The following discussion addresses anticipated construction-related BMPs. It should be noted that the project will be required to prepare and receive approval of a Storm Water Pollution and Prevention Plan (SWPP), which will detail the final construction BMP's for the project.

During construction, pollutants from the site could increase substantially as a result of soil disturbance and construction operations. As discussed above, runoff from land with a history of agricultural production typically contain total suspended solids (sediments), pesticides, trace metals (associated with sediment), nutrients, and pathogens. Initial clearing and grading operations during construction would expose much of the surface soils and release these pollutants into site runoff. Unless adequate erosion controls are installed and maintained at the site during construction, sediment may be delivered to the downstream receiving waters, along with attached soil nutrients and organic matter, resulting in an adverse water quality impact.

Other pollutants that could be generated on the site during construction include nutrients, trace metals, pesticides, construction chemicals, and miscellaneous wastes. Each of these is discussed below:

- *Nutrients:* Nitrogen, phosphorous, and potassium are the major nutrients used for fertilizing new landscape at construction sites. Heavy use of commercial fertilizers can result in discharge of nutrients to water bodies where they may cause excessive algae growth.

- *Trace Metals:* Over half of the metal load carried in storm water is associated with sediments as metals both adsorb[38] to solids particulate matter (total suspended solids) and get washed off in dissolved forms. Galvanized metals, paint, or preserved wood may contain metals which may, if uncontrolled, enter the storm water and impact downstream receiving waters.

- *Pesticides:* Unnecessary or improper application of pesticides may directly or indirectly contaminate surface water bodies.

- *Other Toxic Chemicals:* If improperly stored and/or disposed of, synthetic organic compounds that may be used at construction sites (such as adhesives, cleaners, sealants, and solvents) may have an adverse impact on receiving waters.

- *Miscellaneous Wastes:* Miscellaneous wastes may include wash water from concrete mixers, paints and painting equipment cleaning activities, solid wastes from land clearing activities, wood and paper material from packaging of building material, and sanitary wastes. Improper disposal of construction wastes may directly or indirectly pollute runoff and receiving water bodies.

38 Adsorption refers to the process of one material attracting and holding molecules of another substance to the surface of its molecules.

However, as discussed above, the project must comply with the State's General Construction Activity Storm Water Permit and the General MS4 Permit. To do so, the project construction sites must ensure, as a minimum, that: (1) sediments generated on the project site are retained using adequate treatment control or structural control BMPs; (2) construction-related materials, wastes, spills, or residues are retained at the project site to avoid discharge to streets, drainage facilities, receiving waters, or adjacent properties by wind or runoff; (3) non-storm water runoff from equipment and vehicle washing and any other activity are contained at the project site; and (4) erosion from slopes and channels are controlled by implementing an effective combination of BMPs (as approved in RWQCBLAR Resolution No. 99-03), such as, for example, limiting of grading scheduled during the wet season; inspecting graded areas during rain events; planting and maintenance of vegetation on slopes; and covering erosion susceptible slopes.[39]

In addition, a local SWPPP must be prepared and submitted for approval prior to issuance of a grading permit for the construction of the project.[40] The SWPPP would be designed and implemented to address site-specific conditions related to project construction. The SWPPP would identify the sources of sediment and other pollutants that may affect the quality of storm water discharges, and would identify appropriate construction site BMPs and maintenance schedules, and the rationale for selecting or rejecting BMPs.[41] The following BMPs are typical construction site BMPs and are recommended for the project. The recommended BMP categories include measures for temporary sediment control, temporary soil stabilization, scheduling, preservation of existing vegetation, conveyance controls, wind control, temporary stream crossings, and waste management, silt fencing and sand bags, as well as many other measures which may be implemented during the construction of the project (See General Construction Activity Storm Water Permit). These measures are consistent with requirements set forth in the General Construction Activity Storm Water Permit. The following is a brief overview of the main BMPs directed at reducing storm runoff pollutants and eliminating non-storm water discharges.

1. Erosion Control.

During construction, erosion control techniques to retain soil and sediment on the site must be implemented. Particular attention must be paid to large mass-graded sites where the potential for soil exposure to the erosive effects of rainfall and wind is great. Typical measures that may be considered include appropriate vegetation of exposed areas, minimizing disturbed areas, diversion of runoff (such as earth dikes, temporary drains, slope drains), and velocity reduction (outlet protection, check dams, and slope roughening/terracing), as well as dust control measures (such as sand fences, watering, etc.).

39 General MS4 Permit, Part 4, E.

40 Id.

41 Id.

2. Stabilization.

Disturbed and exposed areas of the construction site must be stabilized during the project. Example measures may include: blankets, reinforced channel liners, soil cement, fiber matrices, geotextiles, or other erosion resistant soil coverings or treatments. The construction entrance/exit will also likely require stabilization (e.g., aggregate underdrain with filter cloth).

3. Sediment Control.

These measures include BMPs that will prevent a net increase of sediment load in storm water discharge relative to pre-construction levels. Sediment control BMPs are recommended at appropriate locations along the site perimeter and at all operational internal inlets to the storm drain system at all times during the rainy season. Sediment control practices may include filtration devices and barriers (such as fiber rolls, silt fence, straw bale barriers, and gravel inlet filters) and/or settling devices (such as temporary sediment traps or basins).

4. Non-Storm Water Management

Possible non-storm water discharges from the construction site to receiving waters must be properly controlled. Examples of non-storm water discharges include: watering for dust control purposes and vehicle and equipment wash down wastes. Non-storm discharges (e.g., irrigation or equipment cleaning) should be eliminated or reduced to avoid impacts. Appropriate measures generally focus on good housekeeping activities, including: designating and lining concrete washout areas, removing construction debris in a timely manner, providing enclosures and, if appropriate, secondary containment for fuels and lubricants, and avoiding over-applying fertilizers and pesticides as part of soil stabilization and landscaping. . Receptacles for trash and other smaller debris will be required. Wash-out areas for concrete trucks and equipment, paint and stucco equipment, and other construction materials shall be designated, and containment measures employed, to prevent discharges of construction materials. Construction vehicle wash areas shall be designated and containment measures employed to prevent discharges of wash water. Construction street and pavement washing shall be controlled to preclude discharges of wash water. Discharging super-chlorinated water pipe and sprinkler system flushing and test water to storm drain system shall be prohibited.

In addition to the construction related, non-storm water discharges discussed above, additional types of discharges in this category would include discharges from activities such as dewatering, water line testing and sprinkler system testing. It is typically not feasible to contain these sorts of construction-related discharges onsite. The General Construction Activity Storm Water Permit authorizes these types of activities, so long as associated discharges (a) comply with Section A.9 of the General Construction Activity Storm Water Permit, (b) do not cause or contribute to a violation of any water quality standard, and (c) do not violate any other provisions of the General

Construction Activity Permit, and (d) are not prohibited by the Basin Plan. The SWPPP will contain BMPs designed to control pollutants in these types of discharges, including a prohibition against discharging super-chlorinated water associated with line flushing and testing into storm drains, and control mechanisms for discharges related to dewatering activities for grading.

3.2 POST-DEVELOPMENT WATER QUALITY IMPACTS

For the constituents of concern discussed above for which sufficient measured data exist, post-development water quality impacts are estimated using a statistically-based model. The model is used to estimate the impact of the project both with and without the BMPs that have been incorporated into the project as project design features (PDFs). For the constituents that cannot be modeled (because of insufficient data), a qualitative assessment of the project's potential impacts is provided.

3.2.1 Compliance with the General MS4 Permit

The Los Angeles MS4 Permit was developed to protect the beneficial uses of receiving waters in Los Angeles County. To meet the objective, the permit requires Permittees to reduce or prevent pollutants in storm water discharges through the development and implementation of BMPs to the Maximum Extent Practicable (MEP) for municipal storm water activities. The Permittees, including the County of Los Angeles and City of Santa Clarita, required Standard Urban Stormwater Mitigation Plans (SUSMPs) as prescriptive minimum project design criteria that when properly implemented, are presumed to protect water quality.

The permit also notes, by reference to EPA's "Interim Permitting Approach for Water Quality-Based Effluent Limitations in Storm Water Permits (August 26, 1996), that because of the nature of storm water discharges and the lack of detailed, documented, and accepted information on which to base numeric water quality-based effluent limitations (expressed as concentration and mass) for many pollutants of concern, the permitting approach utilizing BMPs does, indeed, provide for the attainment of water quality standards and negates the need for numerical effluent criteria as a standard.

3.2.2 Assessment of Modeled Constituents

As previously discussed, a water quality model was developed to estimate storm water constituent loads and concentrations. The model results for the developed conditions include predicted loads and concentrations from the modeled project areas before and after treatment in the modeled treatment BMPs.

(a) Runoff Volumes – Water Quality Modeling

As with existing conditions, estimates of pollutant loads require estimates of runoff volumes. Relevant equations, rainfall estimates and typical land use characteristics were presented in Section 2. **Table 10** lists both existing (for reference) and proposed land use distributions that are the basis for water quality modeling.

TABLE 10
DOMINANT LAND USES UNDER EXISTING AND PROPOSED CONDITIONS

Land Use		Total Watershed Area (ac)	Total Watershed Area (ft^2)	Percent Total (%)
Existing Conditions in Tributary Watershed	Open Space	784.57	34,175,602	93.2%
	Agriculture	38.5	1,677,047	4.6%
	Commercial	18.4	801,498	2.2%
	Total[1]	841.47	36,654,147	100%
Proposed Conditions in Tributary Watershed	Open Space	547.1	23,831,490	65.2%
	Agriculture	38.5	1,677,047	4.6%
	Commercial	22.2	967,024	2.6%
	Transportation	34.07	1,484,078	4.1%
	Single Family	152.1	6,625,424	18.1%
	Multi Family	45.6	1,986,320	5.4%
	Total[1]	839.57	36,571,384	100%

Note:
1) Slight reduction in the proposed condition total area (2 acres) is due to on-site grading and rounding of numbers.

TABLE 11
AVERAGE STORM RUNOFF VOLUMES FOR WATER QUALITY MODELING

Site Conditions	Average Annual Runoff Volume (acre-feet)
Existing	216.3
Developed	316.8
Developed w/ BMPs	316.8
% Change[1]	46%

Notes:
1) % Change from Existing to Developed with BMPs (negative sign indicates decrease)
Percent computations are correct and based on the results generated with more decimal places (than the ones presented here).

(b) Constituents of Concern-Quantitative

The runoff volume estimates by the water quality model are used in combination with storm water event mean concentrations (EMCs) to estimate the average annual pollutant loads and concentrations contained in the following sections.

(b.1) TSS, Nutrients and Minerals: Concentrations and Loads

Table 12, Annual Average Storm Water TSS, Nutrient and Mineral Loads Comparison to Existing Land Uses, shows the predicted average annual TSS, TP, TN (nitrogen), nitrate and chloride loads for existing and developed conditions. Loads of TSS, TP, TN (nitrogen), nitrate and chloride are predicted to increase for the developed conditions without treatment by BMPs; however, after treatment in the storm water management system, TSS loads are predicted to decrease below unmitigated levels.

TABLE 12
AVERAGE ANNUAL STORM WATER TSS, NUTRIENT AND MINERAL LOADS COMPARISON TO EXISTING LAND USES

Site Conditions	Modeled Constituent – Loads				
	TSS (lbs/yr)	TP (lbs/yr)	TN[1] (lbs/yr)	Nitrate[2] (lbs/yr)	Chloride[2] (lbs/yr)
Existing (OS)	127,946	170	1648	840	6,589
Developed	135,523	308	2,846	1,035	8,605
Dev w/ BMPs	108,031	236	2,612	N/A	N/A
% Change[3]	-16%	39%	58%	23%[2]	31%[2]

Notes:
1) Total nitrogen estimated from sum of Total Kjeldahl Nitrogen (TKN) and nitrates.
2) Because the BMP effectiveness for nitrates and chloride are not well established, the percent change for nitrate and chloride are based on load without BMPs, presenting a worst-case scenario.
3) % Change from Existing to Developed with BMPs (negative sign indicates decrease)
4) Percent computations are based on the results generated with more decimal places (than the ones presented here).

The comparison of the existing land use model pre- and post-development concentration results are shown in **Table 13, Average Annual Storm Water TSS, Nutrient & Mineral Concentrations Comparison to Existing Land Uses**. Small reductions in TSS, nitrate and chloride concentrations are predicted with development without the BMPs due to the change from open space to urban land uses, while total phosphorus (TP) and total nitrogen (TN) concentrations are predicted to increase prior to treatment. With treatment, the concentration of TSS is predicted to decrease by about 42%. However, the concentrations of TN in both the developed and the developed with PDF conditions are expected to increase slightly over existing conditions.

TABLE 13
AVERAGE ANNUAL STORM WATER TSS, NUTRIENT AND MINERAL CONCENTRATIONS
COMPARISON TO EXISTING LAND USES

Site Conditions	Modeled Constituent – Concentrations				
	TSS (mg/L)	TP (mg/L)	TN[1] (mg/L)	Nitrate[2] (mg/L)	Chloride[2] (mg/L)
Existing (OS)	217	0.29	2.85	1.43	11.2
Developed	157	0.36	3.3	1.20	10.0
Dev w/ BMPs	125	0.27	3.0	N/A	N/A
% Change[3]	-42%	-5%	8%	-16%[2]	-11%[2]

Notes:
1) Total nitrogen estimated from sum of Total Kjeldahl Nitrogen (TKN) and nitrates.
2) Because the BMP effectiveness for nitrates and chloride are not well established, the percent change for nitrate and chloride are based on concentrations without BMPs, presenting a worst-case scenario.
3) % Change from Existing to Developed with BMPs (negative sign indicates decrease)
Percent computations are correct and based on the results generated with more decimal places (than the ones presented here).

Even though the concentrations of TN in both the developed and the developed with BMP conditions are expected to increase slightly over existing conditions, with proper implementation of all the recommended BMPs (structural and nonstructural), impacts are expected to be lessened.

(b.2) Copper, Lead and Zinc: Constituent Loads and Concentrations

Due to consistently low concentrations of dissolved lead in the available storm water runoff data (most reported dissolved lead values are below detection levels in urban runoff), it was not possible to develop reliable EMC parameters for most land uses in order to model dissolved lead. This constituent was therefore modeled as total lead. The results for total lead are compared to the dissolved metal criteria in order to assess the likelihood of exceeding applicable water quality criteria. This renders the lead comparisons to criteria values very conservative, as lead is highly associated with particulates in urban runoff (80 to 95% is typically in the particulate form) and is therefore readily removed from runoff through sedimentation.

Table 14, Average Annual Storm Water Trace Metal Loads Comparison to Existing Land Uses, shows that loads of trace metals are predicted to increase with development before treatment by the BMPs. With treatment, however, only a modest increase in developed loads of dissolved copper, zinc and lead is predicted. **Table 15, Average Annual Storm Water Trace Metal Concentrations Comparison to Existing Land Uses**, shows that, with the implementation of the BMPs, decreases in the concentration of dissolved copper and lead are

predicted with BMPs as compared to the existing condition, while moderate increases in the concentration of zinc would remain.

TABLE 14
AVERAGE ANNUAL STORM WATER TRACE METAL LOADS
COMPARISON TO EXISTING LAND USES

Site Conditions	Modeled Constituent – Loads		
	Dissolved[1] Copper (lbs/yr)	Total Lead (lbs/yr)	Dissolved[1] Zinc (lbs/yr)
Existing (OS)	13	3	46
Developed	22	7	100
Dev w/ BMPs	17	5	89
% Change[2]	31%	67%	93%

Notes:
1) Dissolved fractions are assumed to equal total loads in order to yield a more conservative estimate.
2) % Change from Existing to Developed with BMPs (negative sign indicates decrease)
Percent computations are correct and based on the results generated with more decimal places (than the ones presented here).

TABLE 15
AVERAGE ANNUAL STORM WATER TRACE METAL CONCENTRATIONS
COMPARISON TO EXISTING LAND USES

Site Conditions	Modeled Constituent – Concentrations		
	Dissolved[1] Copper (mg/L)	Total Lead (mg/L)	Dissolved[1] Zinc (mg/L)
Existing (OS)	.02	.0058	.08
Developed	.02	.0083	.12
Dev w/ BMPs	.02	.0056	.10
% Change[2]	-10%	-3%	31%

Notes:
1) Dissolved fractions are assumed to equal total loads in order to yield a more conservative estimate.
2) % Change from Existing to Mitigated Conditions (negative sign indicates decrease)
Percent computations are correct and based on the results generated with more decimal places (than the ones presented here).

However, even though the concentrations of dissolved zinc in both the developed and the developed with PDF conditions are expected to increase moderately over existing conditions, those concentrations would be considerably lower than the benchmark CTR criteria. Converting the **Table 15** concentrations to µg/L (micrograms per liter), the concentrations of dissolved zinc in the development (no PDF) condition would be 120 µg/L and in the developed with BMPs would be 100 µg/L. Both concentrations are substantially lower than the receiving water criteria for zinc of 220 µg/L (hardness of 200 mg/L) and 390 µg/L (hardness of 400 mg/L) that are used as benchmarks. As such, the concentration of dissolved zinc in the project's runoff would not jeopardize the river's water quality.

(b.3) Project vs. Existing Water Quality

Prior to treatment in the proposed storm water management system, loads of all modeled constituents are predicted to increase for the project under developed conditions as compared to the existing open space scenario. The increases in pollutant loads are the result of the predicted increases in storm water runoff volumes after development due to the increased amount of impervious areas as well as changes in pollutant concentrations. After implementation of the BMPs, loads of TSS are predicted to decrease to below existing levels, but the increases in all other analyzed constituents are expected to remain.

In contrast, storm water pollutant concentrations are predicted to decrease prior to consideration of BMPs for TSS, nitrate, chloride and dissolved copper. Increased concentrations are predicted for TP, TN, lead, and dissolved zinc with development prior to treatment in the BMPs. With BMPs, however, concentrations of TP, dissolved copper and total lead are predicted to decrease, while TN and dissolved zinc concentrations are still predicted to increase slightly, but to remain well below the benchmarks.

In converting the **Table 15** concentrations to µg/L (micrograms per liter), the concentrations of dissolved zinc in the development condition would be 120 µg/L and in the developed with BMPs would be 100 µg/L; both concentrations are substantially lower than the receiving water criteria for zinc of 220 µg/L (hardness of 200 mg/L) and 390 µg/L (hardness of 400 mg/L).

The first storm events typically have higher concentrations of pollutants due to accumulation during the dry months. Storm events occurring later in the wet season will typically have lower concentrations as less time elapses between storm events and less accumulation occurs. Given the low pollutant concentrations in site runoff expected with BMP treatment, the conservative nature of the approach used for the water quality analysis, and the predicted low concentrations relative to the CTR criteria, it is not expected that there would be detrimental effects to the receiving waters from dissolved metal concentrations.

(b.4) Comparison with Water Quality Criteria

Model results are compared below to Basin Plan surface water quality objectives and CTR acute criteria for metals and inland surface water designated MUN[42] for TSS and nutrients and

[42] In 1988, the State Board adopted the Sources of Drinking Water Policy (SWRCB Resolution No. 88- 63) which

salts in order to assess the potential for post-development pollutant loads or concentrations to exceed the receiving waters standards. For results of comparison to Basin Plan surface water quality objectives, see **Table 16, Analysis of Project Development Against Basin Plan Surface Water Quality Objectives for Reach 7 of the Santa Clara River**, immediately below. Numeric water quality objectives provided in the Basin Plan that were modeled in the pollutant loading analysis include watershed specific objectives for nitrogen and chloride.

TABLE 16
ANALYSIS OF PROJECT DEVELOPMENT AGAINST BASIN PLAN SURFACE WATER QUALITY OBJECTIVES FOR REACH 7 OF THE SANTA CLARA RIVER

Parameter	Units	Existing Conditions	Proposed Conditions	Mitigated Conditions	Basin Plan Objectives[1]
Chloride	mg/L	11.2	10.0	10.0	100
Nitrogen	mg/L	2.8	3.3	3.03	5

Notes:
1) Source: Los Angeles Region Basin Plan, June 1994. Provided for informational purposes and not used in determination of "thresholds of significance".

(b.5) Total Suspended Solids and Salts

The Basin Plan requires that "Inland surface waters shall not contain suspended or settleable solids in amounts which cause a nuisance or adversely affect beneficial uses as a result of controllable water quality factors" and that "Waters shall be free of changes in turbidity that cause nuisance or adversely affect designated beneficial uses; increased in natural turbidity attributable to controllable water quality factors are limited as follows: 20% increase or less where natural turbidity is between 0 and 50 NTU; 10% increase or less where natural turbidity over 50 NTU (Basin Plan)." TSS (total suspended solids) was modeled as an indicator of turbidity, solid, suspended or settleable materials. Based on the open space scenario results, the mean annual TSS concentration in storm water runoff from the project area to receiving waters would be about 125 mg/L after implementation of the PDFs (BMPs). This concentration is well below the numerical Basin Plan Water Quality Objectives for Reach 7 of 800 mg/L.

The Basin Plan also requires that receiving waters not exceed the following concentrations of salts: 100 mg/L of chloride, 1.0 mg/L of boron, 150 mg/L of sulfates, and 5 mg/L of SAR (sodium absorption ratio). As explained above, chloride was modeled as an indicator of salts. As shown above, the mean annual chloride concentration in storm water runoff from the project area tributary to receiving waters would be about 10 mg/L without implementation of the BMPs. Again, the applicable BMPs would be expected to reduce these concentrations further, but by an amount that cannot currently be quantified. Even without quantifying the

directed the Regional Boards to add the Municipal and Domestic Supply (MUN) Beneficial Use for all water bodies not already so designated, unless they met certain exception criteria." (SARWQCB, 1995). The receiving waters in the area are not specifically designated MUN, the MU criteria are used for comparison purposes in this instance.

effectiveness of the BMPs for chloride, the expected concentration is already well below the numerical Basin Plan Water Quality objective of 100 mg/L. Moreover, during wet weather, discharge of salts is expected to decrease because the project's increase in areas of imperviousness results in less flow through soils (which add salts to runoff). Discharge of salts could increase during dry weather flows because dry weather flows often contain irrigation runoff; in that event, however, low flow would be treated in the proposed storm water BMPs.

The Basin Plan sets forth water quality objectives for organic and inorganic chemicals based on Maximum Contaminant Levels for municipal beneficial use specified in 22 CCR § 64444. These criteria apply only to receiving water bodies designated for use as domestic or municipal supply.

For these reasons, the predicted levels of TSS and salt concentrations would not likely cause a nuisance or adversely affect beneficial uses of the receiving waters or water quality.

(b.6) Nutrients

The Basin Plan includes within this category of constituents nitrogen, nitrogen as nitrate and nitrite, ammonia, phosphorous, dissolved oxygen, biochemical oxygen demand, and biostimulatory substances. The Basin Plan's narrative objectives for ammonia, dissolved oxygen, biochemical oxygen demand and biostimulatory substances are shown in **Table 17**, below. The Basin Plan does not contain numeric or narrative objectives for total phosphorus or TN. The criteria for nitrate-nitrogen and nitrite-nitrogen are 10 mg/L for nitrogen as nitrate-nitrogen plus nitrite-nitrogen, 45 mg/L as nitrate, 10 mg/L as nitrate-nitrogen, or 1 mg/L as nitrite-nitrogen, and that for nitrogen is 5 mg/L. As **Table 17** shows, the objective for ammonia is based on its oxidizing to nitrate.

The existing scenario model results predict nitrate concentrations on the order of 1.20 mg/L before implementation of BMPs, which is a reduction from existing conditions and which is well below the Basin Plan's numeric objective. The model results further predict TN concentrations of 3.3 before, and 3.0 after BMPs, which is a slight increase over existing conditions, but well below the applicable water quality criteria. Due to lack of sufficiently accurate and defensible BMP and pollutant removal data, further extrapolations and interpretations of results would have high uncertainty, and are therefore not presented.

While the Basin Plan does not contain objectives for TP for comparison with model results, model results show that, with the implementation of the BMPs, concentrations of TP would be expected to decrease as compared to existing conditions. The decreases in TP and nitrate concentrations indicate that the project would result in reducing nutrients and, correspondingly, reducing the conditions that create dissolved oxygen; further, source control BMPs would control the chemical sources that contribute to dissolved oxygen, such as anti-freeze. Finally, source control BMPs, including covering sources of food waste (such as restaurant trash, if restaurants locate at the project) and directing flows away from the sources of such waste to Continuous Deflective Separator units (CDS) or other filtering mechanisms, will control wastes that contribute to increased biochemical oxygen demand and biostimulatory substances.

(b.7) Metals

As stated above, the existing scenario results for lead are given as total lead loads and concentrations due to the limited storm water monitoring data above the laboratory detection limit available for dissolved lead from developed land uses. Sufficient data was available to model dissolved concentrations of copper and zinc.

Mean storm concentrations for the metal results are shown in **Table 17** along with CTR criteria based on hardness values of 400 mg/L and 200 mg/L. Metal results are substantially lower than the acute criteria for copper, lead, and zinc. This indicates that it is highly unlikely that metal concentrations will result in toxic effects to biota in the receiving waters, and, therefore, these concentrations will likely not impair water quality.

Table 17 presents a comprehensive discussion of all constituents of concern.

TABLE 17
ANALYSIS OF PROJECT DEVELOPMENT AGAINST HYDROLOGIC AND SURFACE WATER QUALITY OBJECTIVES (BASIN PLAN AND CTR OBJECTIVES)

Issue	Objective	Project Development
HYDROLOGY	Control post-development peak storm water runoff discharge rate, velocities and duration in Natural Drainage Systems (mimic pre-development hydrology) to prevent accelerated stream erosion and to protect stream habitat (General MS4 Permit p. 34; see also SUSMP requirements).	At project discharge locations (to the Santa Clara River) mitigation measures address downstream impacts that would potentially accelerate erosion and stream habitat. Typically, in smaller natural riverine systems, frequent discharges (on the order of the average annual and 2-year flows) dictate stream geomorphology. Extended and frequent discharges at these critical flow rates would potentially impact stream health. The project proposes water quality basins, which will capture small, frequent storms and release flows at non-erosive rates. To reduce storm flow velocities during smaller, more frequent flows (i.e., 2-year storm events) and to prevent erosion at storm water discharge points into the river, the project has incorporated energy dissipaters consisting of either rip-rap or larger standard impact type energy dissipaters would be constructed at affected storm system outlets in the River. These energy dissipaters would slow the rate of flow of runoff into the river in order to prevent erosion of the stream channel. Impacts associated with erosion and sediment deposition and streambed modification within the Santa Clara River are evaluated as a function of in-stream velocities, which are indicators for potential riverbed scouring. There would be no substantial increases in velocity during the 5- and 10-year storm events, and decreases in river velocity for the 20- to 100-year storm events. Increases in areas of the floodplain that would be subject to velocities over 4 feet/second, an indicator velocity for erosion potential, during a 2-year storm event would be minimal, localized, and would be caused only by the smallest event scenario.

TABLE 17
ANALYSIS OF PROJECT DEVELOPMENT AGAINST HYDROLOGIC AND SURFACE WATER QUALITY OBJECTIVES (BASIN PLAN AND CTR OBJECTIVES)

Issue	Objective	Project Development
Storm water runoff numeric sizing criteria	Design standards for post-construction structural or treatment control BMPs employ a variety of measures to reduce the post-project discharge of pollutants to the MEP level. The numeric sizing requirements are either volume-based or based on local flow design criteria. The volume-based criteria require that storm water runoff be infiltrated (or treated) and peak flows be controlled based on flow design criteria. There are four options for determining volume of runoff that needs to be treated (1) the 85th percentile 24-hour runoff, 2) unit basin volume to achieve 80% or more volume treatment, 3) volume produced from a 0.75 inch storm, or 4) volume based on historical 24-hour rainfall) (See SUSMP pp. 18-19 for complete description).	The proposed water quality control extended detention basins (EDBs) are preliminarily sized to meet the minimum County SUSMP criteria, based on a 0.75 inch runoff event; however, the final capacity of the basins will be determined for project runoff and would be designed to capture 80% of annual runoff, which could be more than the 0.75 inch event. The size of the facilities will be finalized during the design stage by the project engineer with the final hydrology study, which is prepared and approved at the final engineering stage and prior to issuance of a grading permit.
SURFACE WATER QUALITY		
MINERALS		
TDS	800 (mg/L) (Reach 7 of Santa Clara River Basin Plan p. 3-12)	Post project development, wet weather TDS levels are expected to decrease because of the increased area of imperviousness (less exposed soil). Due to lack of BMP removal data for this constituent, chloride levels may be used for evaluations and as an indicator of relative behavior of minerals in general. Even without taking into consideration the BMPs, post-project storm water levels of chloride were found to be lower than existing conditions. With proper implementation of the recommended structural BMPs (e.g. basins and swales), as well as source control BMPs the mitigated levels are expected to be further lowered and in compliance with the water quality objectives. Post development, minerals in dry weather flows may increase because dry weather flows often consist of irrigation runoff. However, dry weather flows will be treated in the proposed structural BMPs and are not likely to discharge untreated. Furthermore, with implementation of other recommended source control BMPs (such as education programs for proper irrigation of landscaped areas, swales and basins), no adverse

TABLE 17
ANALYSIS OF PROJECT DEVELOPMENT AGAINST HYDROLOGIC AND SURFACE WATER QUALITY OBJECTIVES (BASIN PLAN AND CTR OBJECTIVES)

Issue	Objective	Project Development
		impact on TDS would occur.
Sulfate	150 mg/L (Reach 7 of Santa Clara River Basin Plan p. 3-12)	See TDS, Chloride.
Chloride	100 mg/L (Reach 7 of Santa Clara River Basin Plan p. 3-12)	This objective would not be exceeded, as project development would be expected to generate 10.0 mg/L without the application of any BMP. With the proper application of the recommended measures, chloride levels are expected to be further lowered. See TDS.
Boron	1.0 mg/L (Reach 7 of Santa Clara River Basin Plan p. 3-12)	See TDS.
Sodium absorption ratio	5 mg/L (Reach 7 of Santa Clara River Basin Plan p. 3-12)	See TDS.
NUTRIENTS		
In General		Implementation of construction and post-construction BMPs would control chemicals (antifreeze), fertilizers and other possible sources of nutrients per General Construction Activity Storm Water Permit and General MS4 Permit Requirements. Potential source control BMPs include containment for vehicle maintenance areas during construction, chemical source control education guidelines for residents, containment BMPs for post-development vehicle maintenance land uses (such as gas stations), efficient irrigation, and an integrated fertilizer and pesticide management program for common areas. The recommended structural BMPs (detention basin, swale, and CDS units) are also expected to lower the nutrient concentrations and loads post project development because dry weather flows would not likely leave the site untreated. Quantitative assessment of pre- and post-development levels of Total Phosphorous (TP), show a reduction in concentrations post-development (mitigated conditions). Post-development nitrate levels are expected to decrease without any BMP and remain below the water quality objective (see below). While Total Nitrogen (TN) concentration is predicted to increase post-development (but lowered with the proposed BMPs), it also remains below the water quality objective (see below).
Nitrogen	5 mg/L (Reach 7 of Santa Clara River Basin Plan p. 3-12)	This objective would not be exceeded, as project development (with BMPs) would be expected to generate a Total Nitrogen (TN) concentration of 3.0 mg/L
Nitrogen (Nitrate, Nitrite)	Waters shall not exceed 10 mg/L nitrogen as nitrate-nitrogen plus nitrite-nitrogen, 45 mg/L as nitrate, 10 mg/L as nitrate-nitrogen, or 1 mg/L as nitrite-nitrogen.	In the nitrogen cycle, nitrogen forms in the order of decreasing oxidation state are: nitrate, nitrite, ammonia, and organic nitrogen. Nitrates are the most common form of nitrogen in water and are the necessary nutrients for algae and phytoplankton growth. Discharge of nitrates to surface water bodies greatly accelerates the natural process of eutrophication, causing algal blooms which ultimately lead to depleted oxygen levels and generally poor water quality.

TABLE 17
ANALYSIS OF PROJECT DEVELOPMENT AGAINST HYDROLOGIC AND SURFACE WATER QUALITY OBJECTIVES (BASIN PLAN AND CTR OBJECTIVES)

Issue	Objective	Project Development
		This objective would not be exceeded, as project development (without BMPs) would be expected to generate a Nitrate level of 1.2 mg/L, well below the standards of the objective. With proper implementation of the recommended BMPs, this level would be further reduced. Also, the expected post-development (with BMPs) total nitrogen level of 3.0 mg/L, is again well below the standard.
Ammonia	See Reach 7 of Santa Clara River Basin Plan table 3-2 (WARM) for one-hour average concentrations for a range of pH and temperatures (as an example at 10 degrees C and pH of 7, total ammonia concentrations should be 25 mg/L).	Ammonia is not a pollutant typically associated with urban development of the type proposed, but rather is more often associated with discharges from point sources such a treatment plants. Ammonia is easily diluted and converted to nitrate. Both existing and post-project Nitrate levels are well below water quality objectives, making it unlikely that any ammonia present in storm water could form nitrate sufficient to exceed the applicable water quality objectives. See Nutrients, In General.
Phosphorous	No criteria	Based on modeling, the post-development (with BMPs) TP concentrations and loads are expected to be lower than existing conditions.
Dissolved oxygen (DO)	As a minimum, the mean annual DO concentration greater than 7 mg/L; no single determination less than 5.0 mg/L. For WARM designations, the DO concentrations shall not be depressed below 5 mg/L as a result of waste discharge (Basin Plan p.3-11).	Adequate DO levels are required to support aquatic life. Depressed levels may lead to anaerobic conditions. Source control BMPs would control chemical sources contributing to DO depressions (e.g., antifreeze and fertilizer) (See Nutrients, In General). Modeling shows TP and Nitrate will be reduced from existing conditions. TN will be well under water quality objectives. Therefore, it is expected that the project (with BMPs) will not adversely impact water quality DO levels and will be in compliance with the regulatory standards. See Nutrients, In General.
BOD (Biochemical oxygen demand)	Waters shall be free of substances that result in increase in BOD which adversely affects designated beneficial uses (Basin Plan).	Source control BMPs, including covering sources of food waste such as restaurant trash and commercial loading areas and directing flows from restaurants and commercial loading areas to CDS units or other filtering mechanisms, will control wastes that contribute to increased BOD. See, also anticipated post-development nutrient reductions and compliance with the regulatory objectives. See also, General, DO.

TABLE 17
ANALYSIS OF PROJECT DEVELOPMENT AGAINST HYDROLOGIC AND SURFACE WATER QUALITY OBJECTIVES (BASIN PLAN AND CTR OBJECTIVES)

Issue	Objective	Project Development
Biostimulatory substances	Biostimulatory substances include excess nutrients and other compounds that stimulate aquatic growth. Waters shall not contain biostimulatory substances in concentrations that promote aquatic growth to the extent that such growth causes nuisance of adversely affects designated beneficial uses (Basin Plan).	With proper application of the recommended BMPs (source control and structural) the expected nutrients levels are expected to be below the water quality objectives. No adverse effect relating to these substances is expected.
TOXICS		
Toxicity	Waters maintained free of toxic substances in concentrations toxic to human, plant, animal, or aquatic life; survival of aquatic life in surface waters subject to waste discharge or other uncontrollable water quality factors shall not be less than for the same waterbody in areas unaffected by waste discharge; no acute toxicity in ambient waters including mixing zones; no chronic toxicity in ambient waters outside mixing zones (Basin Plan p.3-16).	Toxics typically associated with urban development of the type proposed may include heavy metals, including copper, lead and zinc, associated with the design elements and car operations, as well as pesticides used in landscaping applications. During construction of the project, synthetic organic compounds (such as adhesives, cleaners, sealants ad solvents), pesticides, trace metals as well as other waste products (e.g. paint, concrete mix, solid/sanitary wastes) could have the potential to create to adverse toxic conditions. However, with proper implementation of the recommended source-control and structural BMPs, these adverse impacts will likely be prevented. Quantitative analysis indicates that post-development metals concentrations should be well below CTR criteria. Construction and post-construction BMPs (both structural and source control) would be implemented to control heavy metals and pesticides in storm water runoff per the requirements of the General Construction Activity Storm Water Permit and the General MS4 Permit. Pesticides, and other applied chemicals would be controlled through source control BMPs, including efficient irrigation, integrated fertilizer and pesticide application and management plan, restrictions on residential design elements (such as copper downspouts), as well as structural measures (detention basin, swale and CDS units) which will provide treatment of both wet weather and dry weather flows. Recent bans on most urban use of chlorpyrifos and diazinon will also reduce toxics (pesticides). Furthermore, A SWPPP will be developed prior to the construction project and implemented to control construction related impacts from the project. The key elements of the SWPPP will address: source identification, erosion control, stabilization, sediment control, post-construction BMPs and non-storm water management, as well as "good housekeeping"/waste management and control, maintenance, repair training and inspection issues. With the proper implementation of the SWPPP's recommended source control and structural BMPs, toxics are not expected to be

TABLE 17
ANALYSIS OF PROJECT DEVELOPMENT AGAINST HYDROLOGIC AND SURFACE WATER QUALITY OBJECTIVES (BASIN PLAN AND CTR OBJECTIVES)

Issue	Objective	Project Development
		discharged from the construction site.
Copper (acute)	27 µg/L (hardness value 200 mg/L) 52 µg/L (hardness value 400 mg/L)	Post development dissolved copper is predicted to be 20 µg/L, below the acute CTR criteria (at both hardness levels). In comparisons with the CTR objectives, the acute levels were considered due to the episodic nature of storm events. Heavy metal toxicity is usually much lower in hard water than in soft water. The CTR criteria at a 200 mg/L hardness was primarily used for comparison with model results. The 200 mg/L hardness is somewhat larger than the mean land use specific runoff range reported by LA County (25 to 185 mg/L), but much lower than the monitored average value of 408 mg/L for the area (Geosyntec, 2002). Therefore, the 200 mg/L assumption is believed to be conservative as the CTR criteria are applicable to receiving waters only (not storm water runoff). See Toxicity.
Lead (acute)	200 µg/L (hardness value 200 mg/L) 480 µg/L (hardness value 400 mg/L)	Post development dissolved lead is predicted to be 5.6 µg/L, well below the acute CTR criteria (at both hardness levels). In comparisons with the CTR objectives, the acute levels are considered due to the episodic nature of storm events. Heavy metal toxicity is usually much lower in hard water than in soft water. The CTR criteria at a 200 mg/L hardness was primarily used for comparison with model results. The 200 mg/L hardness is somewhat larger than the mean land use specific runoff range reported by LA County (25 to 185 mg/L), but much lower than the monitored average value of 408 mg/L for the area (Geosyntec, 2002). Therefore, the 200 mg/L assumption is believed to be conservative as the CTR criteria are applicable to receiving waters only (not storm water runoff). See Toxicity.
Zinc (acute)	220 µg/L (hardness value 200 mg/L) 390 µg/L (hardness value 400 mg/L)	Post development dissolved lead is predicted to be 103 µg/L, well below the acute CTR criteria (at both hardness levels). In comparisons with the CTR objectives, the acute levels are considered due to the episodic nature of storm events. Heavy metal toxicity is usually much lower in hard water than in soft water. The CTR criteria at a 200 mg/L hardness was primarily used for comparison with model results. The 200 mg/L hardness is somewhat larger than the mean land use specific runoff range reported by LA County (25 to 185 mg/L), but much lower than the monitored average value of 408 mg/L for the area (Geosyntec, 2002). Therefore, the 200 mg/L assumption is believed to be conservative as the CTR criteria are applicable to receiving waters only (not storm water runoff). See Toxicity.
Chemical Constituents	MUN designated waters shall not contain concentrations of chemicals in excess of the limits specified in the Title 22 CCR	With proper implementation of the recommended BMPs (both source control and structural) the chemical constituents in storm water discharged from the site will be controlled per General MS4 and General Construction Activity Storm Water Permit requirements. The heavy metals

TABLE 17
ANALYSIS OF PROJECT DEVELOPMENT AGAINST HYDROLOGIC AND SURFACE WATER QUALITY OBJECTIVES (BASIN PLAN AND CTR OBJECTIVES)

Issue	Objective	Project Development
	(for inorganic and organic chemicals and fluoride) (Basin Plan p.3-8).	compounds are anticipated to be well below CTR criteria and the nitrogen compounds well below the Basin Plan standards. As a result, no adverse effect from these chemical constituents is anticipated as a result of the project. See Toxicity
Bioaccumulation	Toxic pollutants shall not be present at levels that will bioaccumulate in aquatic life to levels which are harmful to aquatic life or human health (Basin Plan p.3-8).	With proper implementation of the recommended BMPs (both source control and structural) toxics in storm water discharged from the site will be controlled per General MS4 and General Construction Activity Storm Water Permit requirements. Heavy metals are anticipated to be well below CTR criteria. As a result, no adverse effect on bioaccumulation is anticipated as a result of the project. See Toxicity.
Pesticides	Waters shall not contain concentrations of pesticides in excess of limiting concentrations in 22 CCR § 64444 (organics) (MUN) (Basin Plan p.3-15 and Table 3-7).	When properly implemented and designed, the recommended source control and structural BMPs will control pesticides and other toxics in storm water per General MS4 and General Construction Activity Storm Water Permit requirements. Heavy metals are anticipated to be well below CTR criteria. With the proper implementation of the recommended BMPs (both source control and structural BMPs, no adverse effect on bioaccumulation is anticipated as a result of the project. Recent bans on most urban use of chlorpyrifos and diazinon will also reduce toxics (pesticides). See Toxicity.
SOLID, SUSPENDED OR SETTLEABLE MATERIALS		
Turbidity	Waters shall be free of changes in turbidity that cause nuisance or adversely affect designated beneficial uses; increased in natural turbidity attributable to controllable water quality factors are limited as follows: 20% increase or less where natural turbidity is between 0 and 50 NTU; 10% increase or less where natural turbidity over 50 NTU (Basin Plan p.3-17).	Insoluble particles of soil, as well as other materials impede the passage of light through water by scattering and absorbing the rays (reference: Hammer M, 1931, "Water and Waste-Water Technology"). Reduction in TSS, which is primarily reduction of sediment in storm water, will result in a reduction in turbidity. Therefore, the 42 % reduction in TSS levels (see Solids, below) will contribute to lower turbidity in the post-developed conditions. With project development no adverse impacts are expected. However, during the construction project, the grading and other soil disturbance activities have the potential to cause erosion and sedimentation and therefore release of solids (suspended or settleable). Without any controls, this could contribute to adverse turbidities. However, with the proper implementation of the SWPPP and the recommended erosion and sediment control practices, these potential impacts are not expected to occur.
Solid, suspended, or settleable materials (including TSS)	Waters shall not contain suspended or settleable material in concentrations that cause nuisance or adversely affect	With project development (without BMPs), less TSS may be expected from the site (157 v. 217 mg/L). With the proper implementation of the BMPs, an even further reduction (about 42%) is expected as compared to existing conditions (125 v. 217 mg/L). However, during the

TABLE 17
ANALYSIS OF PROJECT DEVELOPMENT AGAINST HYDROLOGIC AND SURFACE WATER QUALITY OBJECTIVES (BASIN PLAN AND CTR OBJECTIVES)

Issue	Objective	Project Development
	designated beneficial uses (Basin Plan p.3-16).	construction project, the grading and other soil disturbance activities may cause erosion and sedimentation and therefore release of solids (suspended or settleable). Without any controls, this may attribute cause adverse conditions. However, with the proper implementation of the SWPPP and the recommended erosion and sediment control practices, these impacts are not expected to be appreciable.
PATHOGENS/BACTERIA		Changes in concentrations of pathogens associated with urban development are difficult to evaluate for a number of reasons. Because holding times for bacterial samples are necessarily short, most storm water programs do not collect flow-weighted composite samples that potentially could produce reliable statistical estimates of pathogen concentrations. Measurements of indicator organisms are not necessarily reliable indicators of viable pathogenic viruses, bacteria or protozoa. Moreover, there are numerous sources of pathogens, including birds and other wildlife, as well as domesticated animals and pets. Open space areas can have high levels of coliform associated with wildlife sources, but are typically lower in pathogen concentrations than urban land uses. Development of the project site would reduce the natural sources of pathogens, but without source control BMPs would increase pet waste sources. Septic tanks would not be used in the project and illicit sewer connections would not be expected, eliminating a major urban source of pathogens in runoff. The project will require source control and structural BMPs in compliance with the General MS4 and General Construction Activity Storm Water Permits, including pet waste collection bags, pet waste educational materials, adequate connection and maintenance of sewer lines, and sediment removal BMPs, such as WQBs. With proper implementation of the recommended BMPs, the post-development bacteria concentrations are anticipated to be lowered. However, due to lack of reliable data for modeling, it is not possible to reliably quantify the expected EMCs (and loads) for bacteria.
E. coli density	Less than 126/100 ML (geometric mean limit) (REC-1) (Basin Plan amendment)	See pathogens/bacteria general
E. coli density	Less than 235/100 ML (single sample limit) (REC-1) (Basin Plan amendment)	See pathogens/bacteria general
Fecal coliform density	Less than 200/100mL (geometric mean limit) (REC-1) (Basin Plan amendment)	See pathogens/bacteria general
Fecal coliform density	Less than 400/100mL (single sample limit) (REC-1) (Basin Plan amendment)	See pathogens/bacteria general
QUALITATIVE BMP-BASED		

TABLE 17
ANALYSIS OF PROJECT DEVELOPMENT AGAINST HYDROLOGIC AND SURFACE WATER QUALITY OBJECTIVES (BASIN PLAN AND CTR OBJECTIVES)

Issue	Objective	Project Development
Chlorine, total residual	Shall not be present in surface water discharges at concentrations exceeding 0.1 mg/L; shall not persist in receiving waters at any concentration that causes impairment of designated beneficial uses (Basin Plan p.3-9).	The main typical source of chlorine is the disinfection of wastewaters with chlorine. The proposed land uses are not expected to produce chlorine-type wastes. However, construction and post-development source control BMPs would be employed in compliance with the General MS4 and General Construction Activity Storm Water Permits to address possible sources of chlorine discharge. BMPs will include educational materials for residents prohibiting draining of pools to storm drains as well as prohibitions for building contractors precluding any discharge of test water for water pipes and sprinkler systems to storm drain systems. Non-storm water management measures will be implemented during the construction project.
MBAS (methylene blue activated substances), such as detergents and other anionic surfactants	Less than or equal to 0.5 mg/L (MUN) (Basin Plan p.3-11)	MBAS, related to presence of detergents in runoff, may be incidentally associated with new urban development, but more commonly with point sources such as treatment plants. The project will have no planned illicit sewer connections or septic tanks, eliminating domestic sources from contributing to this pollution problem. Further, the project would employ source control and structural BMPs consistent with the General MS4 and General Construction Activity Storm Water Permit to control wash water from various sources (e.g., educational materials for homeowners regarding elimination of discharges from car washing to the storm drain system, control of construction vehicle wash water, control of construction street and pavement washing activities).
Floating materials	Waters shall not contain floating materials in concentrations that cause nuisance or adversely affect designated beneficial uses (Basin Plan p.3-9).	Floating materials including trash and debris controlled through source control BMPs (education and outreach programs, street sweeping) as well as structural BMPs (CDS, detention basins, drainage inlet screens; as well possible use of catch basin inserts).
Oil & grease	Waters shall not contain oils, greases, waxes or other materials in concentrations that result in a visible film or coating on the surface of the water or on objects in the water, that cause nuisance, or that otherwise adversely affect designated beneficial uses (Basin Plan p. 3-11).	The structural control measures proposed for this project (detention basin, swale and CDS units with oil-absorbent materials), when properly designed and maintained have a high potential for removing oil and grease. Additional measures may include storm water filters and clarifiers which also have very good removal capabilities. In addition, source control measures are proposed to control excessive concentrations during and post-construction of the project. With the proper implementation of these measures, no adverse impacts are expected.
CONSTITUENTS NOT TYPICALLY ASSOCIATED WITH URBAN DEVELOPMENT-BMP CONTROLLED		

TABLE 17
ANALYSIS OF PROJECT DEVELOPMENT AGAINST HYDROLOGIC AND SURFACE WATER QUALITY OBJECTIVES (BASIN PLAN AND CTR OBJECTIVES)

Issue	Objective	Project Development
pH	Shall not be depressed below 6.5 or raised above 8.5 as a result of waste discharges; ambient pH levels shall not be changed more than 0.5 units from natural conditions as a result of waste discharge (Basin Plan p.3-15).	BMPs in accordance with General MS4 and General Construction Activity Storm Water Permits will control discharge of the few constituents associated with urban development that could that be associated with changes in pH. For example, construction BMPs to control applications involving fresh concrete and lime would be included in the SWPPP as well as non-visible pollutant monitoring in cases where discharge might be expected. Post-development BMPs include restrictions on residential design features (metal roofs, copper features). Post development features, such as cured concrete storm drains and WQBs can be expected to provide substantial buffering for any post-development high pH storm water flows.
PCBs	Pass-through or uncontrollable discharge limited to 70 pg/L 30-day average (human health) and 14 mg/L daily average (aquatic life); purposeful discharge prohibited (Basin Plan p.3-15).	The project would not include PCB-producing uses. Paving would stabilize soils that may contain pre-existing PCBs (from historical uses); structural BMPs such as detention basins and swales trap particulate matter. On this basis, no adverse impacts are expected.
Temperature	Water temperature shall not be altered by greater than 5 degrees F above natural temperature; natural receiving water temperature shall not be altered unless it can be demonstrated that designated beneficial uses not adversely affected (Basin Plan p.3-16).	The Santa Clara River has only episodic flows primarily during the "rainy" season during and immediately after storm events of sufficient magnitude to cause flows. With BMPs, the proposed project land uses would likely not substantially increase temperature of storm water runoff.
Taste and Odor	Waters shall not contain taste or odor-producing substances in concentrations that impart undesirable tastes or odors to fish/edible aquatic flesh, to adversely affect beneficial uses and cause nuisance (Basin Plan, p.3-16).	There are no known taste- or odor-producing substances expected from the proposed land uses at the project site and/or during the construction project. Even so, the recommended source control and structural BMPs would likely control substances that may substantially change taste and odor.
Radioactive Substances	Waters designated as MUN shall not contain concentrations of radionuclides in excess of Title 22 CCR (Basin Plan	In addition to natural sources, radioactive substances are typically generated from mining and/or industrial activities. Based on the proposed land uses, radioactive substances are not expected from the project site.

TABLE 17
ANALYSIS OF PROJECT DEVELOPMENT AGAINST HYDROLOGIC AND SURFACE WATER QUALITY OBJECTIVES (BASIN PLAN AND CTR OBJECTIVES)

Issue	Objective	Project Development
	p.3-15).	
RIVER PLAN CONSTITUENTS		
Exotic vegetation	Exotic vegetation shall not be introduced around stream courses to the extent that such growth causes nuisance or adversely affects designated beneficial uses (Basin Plan p.3-9).	Meets Natural River Management Plan requirements.
Wetlands hydrology	Natural hydrologic conditions necessary to support physical, chemical and biological characteristics present in wetlands shall be protected to prevent significant adverse effects on a variety of parameters (Basin Plan p.3-17).	Meets Natural River Management Plan requirements
Wetlands habitat	Existing habitats and associated populations of wetlands fauna and flora shall be maintained (Basin Plan p.3-17).	Meets Natural River Management Plan requirements

3.2.3 Qualitative Assessment of Constituents of Concern

(a) Constituents of Concern-Qualitative

Many constituents of concern, including sulfates, boron, SAR, pathogens, pesticides, and hydrocarbons, as discussed below, are not easily modeled due to limited or non-existent monitoring data, difficulty in measuring pollutant concentrations, or due to pollutant concentrations that are below reporting limits.

(a.1) Sulfates, Boron and SAR (Salts)

As stated previously, during wet weather, discharge of salts would be expected to decrease under post-development conditions because the project would increase the percent imperviousness of the site, resulting in less flow through soils. Although discharge of salts could increase during dry weather flows, because dry weather flows often contain irrigation runoff, low flow will be treated in the proposed storm water structural BMPs and would not, therefore, discharge to the receiving waters. For these reasons, the concentrations of these constituents would likely not cause a nuisance or adversely affect beneficial uses of the receiving waters or water quality.

(a.2) Ammonia (Nutrient)

Ammonia is typically found in low concentrations in runoff, as it is easily diluted and oxidized to nitrate. As shown by the modeling, the nitrate concentration in project runoff is expected to decrease even before the effect of BMPs is taken into consideration. Therefore, concentrations of ammonia in project runoff would likely not cause a nuisance or adversely affect beneficial uses of the receiving waters or water quality.

(a.3) Pathogens

Pathogens in the Santa Clara River may adversely affect the potential and existing designated beneficial uses of the river, particularly water contact recreation. Typical sources of pathogens in urban storm water runoff include pet wastes, improperly functioning septic tanks, and illicit sewer connections to the storm drain system. Other sources of pathogens are primarily due to non-domestic animal wastes, particularly waterfowl.

The change in concentrations of pathogens associated with development of the site compared to the existing open space or agriculture uses is difficult to evaluate for a number of reasons. Measurements of indicator organisms are not necessarily reliable indicators of viable pathogenic viruses, bacteria, or protozoa. Moreover, there are numerous sources of pathogens including birds and other wildlife, as well as domesticated animals and pets. Open space and agriculture areas can potentially have high levels of coliform associated with this type of land use due to wildlife sources, but are typically lower in pathogen concentration than urban land uses. Also, because holding times for bacterial samples are necessarily short, most storm water programs do not collect flow-weighted composite samples that potentially could produce reliable statistical estimates of pathogen concentrations. The development of the project site

would reduce the natural sources of pathogens by reducing use of these areas by wildlife. Septic tanks would not be used in the project, eliminating a potential source of pathogens in runoff. In addition, illicit sewer connections would not be permitted in the new development areas.

While the conversion of open spaces or agriculture to urban development may result in some increase in pathogens levels, source and treatment control BMPs would help control coliform levels. Additional BMPs that contribute to control of pathogens to be employed in the project include: availability of pet waste collection bags ("mutt mitts"), distribution of pet waste educational material, and adequate connection and maintenance of sanitary sewer lines, as well as maintenance of BMPs for removal of bacteria and all pollutants associated with sediment in the water quality basins. This occurs through periodic removal and proper disposal of accumulated sediments in the water quality basins.

(a.4) Pesticides and Other Toxics

Toxics typically associated with urban development of the type proposed may include heavy metals, including copper, lead and zinc (discussed above), pesticides used in landscaping applications, and other chemical constituents.

Pesticide sampling data are unavailable for the soils of the planned construction areas of the proposed project site. The open space areas proposed for residential development are in a natural condition and there is no knowledge of maintenance with pesticides in recent years. For the post-development condition, pesticides would be used to maintain landscaping. Any pesticide use in the project areas would be required to comply with the BMPs relevant to chemical application.

The U.S. EPA has recently banned the pesticides diazinon and chlorpyrifos (commonly used urban pesticides) for most urban applications (U.S. EPA, June, 2002)[43]. These pesticides will not be used for landscape maintenance in the post-development conditions of the project. Source control measures such as education programs for owners, occupants, and employees in the proper application, storage, and disposal of pesticides are the most promising strategies for

[43] Changes to the use of chlorpyrifos include reductions in the residue tolerances for agricultural use, phases out nearly all indoor and outdoor residential uses, and also stops non-residential uses where children may be exposed. In Orange County, residential use accounts for around 90% of total chlorpyrifos (USEPA, June 2002). Retail sales of chlorpyrifos were stopped by December 31, 2001, and structural (e.g. construction) uses will be phased out by December 31, 2005. Some continued uses will be allowed, for example public health use for fire ant eradication and mosquito control will be permitted by professionals.

Permissible uses of diazinon will also be restricted. All indoor uses are prohibited (as of 12/2002) and retailers were required to end sales for indoor use on December, 2002. All outdoor non-agricultural uses will be phased out by December 31, 2004. Therefore it is likely that the EPA agreement will eliminate most of the use of diazinon within the area. The use of diazinon for many agricultural crops has been eliminated (U.S. EPA 2001), while some use of this chemical will continue to be permitted for some agricultural activities.

controlling the pesticides that will be used post-development and are recommended for both the residential and commercial portions of the project. Structural controls are typically not as effective due to the persistent nature of many pesticides; also these compounds generally exhibit varied potential for biodegradation. Some pesticides are relatively insoluble in water and therefore tend to adsorb to the surfaces of sediment, which may settle out of the water column in the water quality basins. Sedimentation should achieve some removal of these pesticides from storm water in the BMPs.

While pesticides are subject to degradation, they vary in how long they maintain their ability to eradicate pests. Some break down almost immediately into nontoxic by-products, while others can remain active for longer periods of time. While pesticides that degrade rapidly are less likely to adversely affect non-targeted organisms, in some instances it may be more advantageous to apply longer lasting pesticides if it results in fewer applications or smaller amounts of pesticide use. While some increase in pesticide use is likely to occur as the result of development due to maintenance of landscaped areas particularly in the residential portions of the development, careful selection, storage and application of these chemicals will help prevent water quality impacts from occurring. With appropriate management and storage of pesticides, no adverse impacts are expected to occur with development.

Pesticides from the historical agricultural use of the site would decrease in site runoff with site development. Any residual agricultural pesticides on the site would not enter site runoff because the soils containing them would be overcovered with impervious surfaces or landscaping that would cover or stabilize sediments.

With proper implementation of the recommended BMPs (both source control and structural), the chemical constituents in storm water discharged from the site will be controlled as required pursuant to the General MS4 and General Construction Activity Storm Water Permits. As a result, no adverse effect from chemical constituents or from bioaccumulation is anticipated as a result of the project.

With such controls over the use of pesticides, with the metals below CTR criteria, and with the proper implementation of BMPs, including efficient irrigation, an integrated fertilizer and pesticide management plan, restrictions on residential design features (such as copper downspouts), BMPs to treat dry weather flows, and bans on substances such as chlorpyrifos and diazinon, water quality would likely not be adversely impacted by toxic substances.

(a.5) Hydrocarbons

Various forms of hydrocarbons (oil and grease) are common in urban runoff; however, these constituents are difficult to measure and are typically measured with grab samples, making it difficult to develop reliable EMCs for modeling. Based on this consideration, hydrocarbons were not modeled but are addressed qualitatively.

Hydrocarbons are a broad class of compounds, most of which are non-toxic. Hydrocarbons are hydrophobic (low solubility in water), have the potential to volatilize, and most forms are biodegradable. A subset of hydrocarbons, Polynuclear Aromatic Hydrocarbons (PAHs), can

be toxic depending on the concentration levels, exposure history and sensitivity of the receptor organisms. Of particular concern are those PAHs compounds associated with transportation related combustion products.

The concentration of hydrocarbons is expected to increase slightly under post-development project conditions with treatment of storm water runoff in the BMPs. Because of the nature of the development (primarily residential and limited commercial), the major source of oil and grease would be from roads, driveways and parking areas.

The BMPs are expected to prevent hydrocarbons from reaching levels of concern in storm water runoff discharged from the project site. The proposed structural BMPs (PDFs) are expected to remove considerable amounts of these pollutants from site runoff prior to its discharge into the river. CDS units with oil absorbent pellets placed in the solids containment chamber to promote higher removals of free oil and grease are recommended for the site. Biofiltration swales and water quality basins would also reduce oil and grease concentrations in the runoff and are included in the project description. Although vehicle emissions and leaks are the primary source of hydrocarbons in urban areas, it is anticipated that the majority of vehicles in the proposed development will in general be well maintained and newer models which will also help to limit emissions and leaks.

One source of information on PAH levels in urban runoff is the Los Angeles County Monitoring Program. Los Angeles County conducted PAH analyses on 27 storm water samples from a variety of land uses in the period 1994-2000. For those land uses where sufficient samples were taken and were above detection levels to estimate statistics, the mean concentrations of individual PAH compounds ranged from 0.04 to 0.83 µg/L. The reported means were less than acute toxicity criteria available from the literature (Suter and Tsao, 1996). Moreover, the Los Angeles County data do not account for any treatment, whereas the treatment in the project BMPs should result in a reduction in hydrocarbon concentrations. This makes it very unlikely that impacts will occur to the receiving water due to hydrocarbon loads or concentrations.

(a.6) Constituents Addressed Through BMP-Based Objectives and the Natural River Management Plan

The Basin Plan also contains a category of constituents with BMP-based objectives, also listed in **Table 17**.

The project does not include any known chlorine-producing sources, and the project SUSMP would prohibit draining swimming pools or test pipes to storm drains. Methylene blue activated substances, such as detergents and other anionic surfactants would be controlled through source control BMPs; the project would not include septic tanks. The ambient pH of the receiving waters would likely not be altered by the project's implementation of SWPPP BMPs controlling runoff from fresh concrete and lime, and through source controls including restrictions on residential design features (banning metal roofs and exposed copper). The project would not include PCB-producing uses; and paving would stabilize soils that may currently contain PCBs. Ambient temperature levels in the receiving waters would likely not

be appreciably affected by the project, as project use is not expected to increase water temperature; floating materials would be controlled through source control BMPs and structural BMPs, including HSS/GSRDs (CDS units), and by covering public trash areas. Additionally, the project is not expected to generate taste/odor altering or radioactive substances. Finally, the project will protect the Santa Clara River environment as required by the River Plan, including removal of exotic vegetation and preservation of natural hydrologic conditions and existing habitats.

(b) Volume, Velocity and Discharge Duration

The Los Angeles MS4 Permit notes that increased volume, velocity, and discharge duration of storm water runoff from developed areas potentially accelerate downstream erosion and impair stream habitat. As a result, the Permit stipulates that "Permittees shall control post-peak storm water runoff in Natural Drainage Systems to prevent accelerated stream erosion and protect stream habitat" and that Permittees must implement numerical criteria though a Hydromodification Control Plan. Because this plan has not yet been developed, the following discussion supports the conclusion that there are no adverse downstream impacts potentially accelerating erosion and stream habitat.

Noticeable declines in biological integrity occur where approximately 10 percent of the natural watershed is converted from natural to impervious surfaces. (Center for Watershed Protection, 2000) Riverpark project represents less than 0.1% of the Santa Clara River Watershed, and therefore is not a major contributor to potential downstream impacts.

In smaller natural riverine systems, frequent discharges (on the order of the average annual and 2-year flows) dictate stream geomorphology. Extended and frequent discharges at these critical flow rates would potentially impact stream health. The proposed water quality mitigation measures include water quality basins, which capture small, frequent storms and release flows at non-erosive rates. Furthermore, the Santa Clara River is too large to be greatly impacted by discharges from the Riverpark project; at 1.28 square miles, the Riverpark project impacts less than 0.1% of the 1,634-sq. mile Santa Clara River watershed.

Without the PDFs, there would have been the potential for highly localized erosion at flow outlets. However, energy dissipation facilities are included as BMPs in the project design to reduce any potential impacts.

(c) Non-Storm Flows (Dry Weather Flows)

In urban areas with land uses similar to River Park's proposed development plan, dry weather (or nuisance) flows are typically due to activities such as irrigation of landscaped areas and/or car and street washing. The land uses proposed for the River Park development are mostly single family and apartment type residential uses, streets, open space/park areas, and small areas of commercial uses. Of the overall 695.4 acre development, approximately 445.8 acres are dedicated to the City of Santa Clarita and the remaining 249.6 acres represent the actual River Park development (which includes open spaces).

Sediment mobilization in urban areas is generally associated with storm water events and associated rainfall intensity. Dry weather flows are typically low in sediment because the flows are relatively slow, which causes sediment to settle out or to be filtered out by algae and other plants growing in the receiving waters. As a result, pollutants associated with suspended solids (e.g., phosphorous, some trace metals, and some pesticides) are typically found in very low concentrations in dry weather flows.

Geosyntec (2002) has estimated that dry weather flow contributions from urbanized areas are about 2.93×10^{-4} cfs/acre. Using this rough estimate, it could be expected that as much as 0.15 acre-feet of dry weather flow could be generated on a daily basis from the River Park urbanized areas. The proposed structural BMPs are also proposed to be designed to accommodate for the treatment of dry weather flows for the River Park development. Source control BMPs (irrigation practices, pool draining, etc.) are also important for mitigation of dry weather flows.

(d) Groundwater Quality

The concern for groundwater quality impacts arises largely from the potential for the infiltration of water contaminated with pollutants associated with urban runoff. Of particular concern is the infiltration of storm water collected and treated in water quality basins and in other types of water quality controls (e.g., landscaped areas used for bioretention). Research conducted on the effects on groundwater from storm water infiltration is cited in the MS4 permit and indicates that the potential for contamination is strongly dependent on a number of factors including the local hydrogeology and the chemical characteristics of the pollutants of concern.

4 CUMULATIVE PROJECT CONDITIONS

Without mitigation, the cumulative effects on water quality from future development within the Santa Clara River watershed could be adverse. The nature of the land uses involved, the manner in which runoff is controlled prior to discharge pursuant to the requirements of the controlling jurisdiction (i.e., LACDPW and Ventura County Flood Control District), and the manner in which urban wastes are managed and prevented from becoming part of the storm water runoff would all serve to lessen any such cumulative water quality impacts.

It has been estimated that approximately 4 percent of that portion of the Santa Clara River watershed found in Los Angeles County would be developed and approximately 2.5 percent of the portion of the watershed found in Ventura County would be developed.[44] Each development project in the Santa Clara River watershed (1,634 sq. miles) will be of varying character and size, will have its own unique topographic and geologic characteristics, will have flood impacts that will be unique to the geologic/soil conditions of the site and the tributary

[44] Alex Sheydayi, Deputy Director, Ventura County Public Works Agency, Flood Control Department, statement made at the Santa Clara River Enhancement and Management Plan Steering Committee Meeting, May 30, 1995.

watershed in which it is located, and will be subject to the development criteria of the jurisdiction in which it is located.

All development within the portion of the watershed of the Santa Clara River located in Los Angeles County, including that within the City of Santa Clarita, is required to comply with the LACFWD SUSMP requirements to protect water quality and the beneficial uses of receiving waters. As MS4 Permittees, the County and City are required through their project approval processes to ensure that water quality mitigation measures are implemented to the MEP and do not exceed water quality objectives. Therefore, as a result of compliance, overall storm runoff discharge quantities from the watershed under post-development runoff conditions would likely not result in adverse impacts to the river environment.

The project would increase storm water runoff volumes in the watershed by increasing impervious surfaces at the site; however, as discussed in **Flood Technical Report**, potentially erosive flows, volumes, and durations are not expected to increase substantially. Moreover, as discussed above, water quality of the runoff from the site could be expected generally to improve over the existing conditions, given the historical conditions in the agricultural areas.

Those constituents whose concentrations and/or loading in runoff may increase with the proposed development are not expected to be substantial and are anticipated to be controlled effectively through the use of project-specific BMPs (PDFs). With source control and treatment control measures in place, dry weather flows are expected to remain similar to current conditions.

Regional plans and programs, including, without limitation, the Basin Plan and the General MS4 Permit are designed to preserve and enhance water quality and protect the beneficial uses of all regional waters within Region 4. The Basin Plan and the General MS4 Permit include narrative and numerical water quality objectives for several constituents and parameters that must be attained or maintained to protect the designated beneficial uses of the river and its tributaries. Through such means, the RWQCBLAR regulates water quality in Los Angeles and Ventura Counties, including the Santa Clara River watershed, and as previously stated, it is the responsibility of the local jurisdictions (i.e., the City of Santa Clarita, LACDPW Watershed Management Division and the Ventura County Flood Control District) to ensure that future development within the watershed would comply with the same or similar types of water quality requirements as the proposed project. Therefore, with these requirements in place, no cumulative water quality impacts are anticipated.

Conclusion

In conclusion, all cumulative projects within the Santa Clara River watershed are required to meet the same or similar general water quality requirements as the proposed project, and other site-specific requirements that the LACDPW Flood Control Division, Watershed Management Division, and the RWQCBLAR would specifically identify for those projects. These requirements serve to avoid the potential for water quality impacts in the Santa Clara River and its tributaries.

APPENDIX

APPENDIX A MS4 PERMIT

ATTACHMENT A
LIST OF PERMITTEES
BY
WATERSHED MANAGEMENT AREAS

Santa Monica Bay

Malibu Creek and Other Rural
Agoura Hills
*Calabasas
Los Angeles County Flood Control
Los Angeles County
Malibu
Westlake Village

Ballona Creek and Other Urban
Beverly Hills
Culver City
El Segundo
Hermosa Beach
Los Angeles (City of)
Los Angeles County Flood Control
Los Angeles (County of)
Manhattan Beach
Palos Verdes Estates
Rancho Palos Verdes
Redondo Beach
Rolling Hills
Rolling Hills Estates

*Santa Monica
West Hollywood

Dominguez Channel/ Los Angeles Harbor Drainage

Carson
Gardena
Hawthorne
Inglewood
Lawndale
Lomita
Los Angeles (City of)
Los Angeles County Flood Control

Los Angeles (County of)
*Torrance

Los Angeles River

Alhambra
Arcadia
Bell
Bell Gardens
Burbank
Commerce
Compton
Cudahy
El Monte
*Glendale
Hidden Hills
Huntington Park
La Canada Flintridge
Los Angeles (City of)
Los Angeles County Flood Control
Los Angeles (County of)
Lynwood
Maywood
Monrovia
Montebello
Monterey Park
Paramount

Pasadena
Rosemead
San Fernando
San Gabriel
San Marino
Sierra Madre
Signal Hill
South El Monte
South Gate
South Pasadena
Temple City
Vernon

San Gabriel River

Artesia
Azusa
Baldwin Park
Bellflower
Bradbury
Cerritos
Claremont
Covina
Diamond Bar
Downey
Duarte
Glendora
Hawaiian Gardens
Industry
Irwindale
La Habra Heights
La Mirada
La Puente
La Verne
Lakewood
*Long Beach[1]
Los Angeles County Flood Control
Los Angeles (County of)
Norwalk
Pomona
Pico Rivera
San Dimas
Santa Fe Springs
Walnut
West Covina
Whittier

Santa Clara River

*Santa Clarita
Los Angeles County Flood Control
Los Angeles (County of)

*Italicized agencies are present in more than one Watershed Management Area. *Indicates City with the largest watershed population other than County of Los Angeles and the City of Los Angeles.*

[1] *The City of Long Beach is covered under order No. 99-060*

ATTACHMENT B
Critical Sources Categories[1]

Tier 1 Categories

Municipal Landfills (SIC 4953)

Hazardous Waste Treatment, Disposal and Recovery Facilities[2]

Facilities Subject to SARA Title III (also known as EPCRA)[2]

Restaurants[3]

Wholesale trade (scrap, auto dismantling) (SIC 50)

Automotive service facilities[3]

Fabricated metal products (SIC 34)

Motor freight (SIC 42)

Chemical/allied products (SIC 28)

Automotive Dealers/Gas Stations (SIC 55)

Primary Metals Products (SIC 33)

Tier 2 Categories

Electric/Gas/Sanitary (SIC 49)

Air Transportation (SIC 45)

Rubbers/Miscellaneous Plastics (SIC 30)

Local/Suburban Transit (SIC 41)

Railroad Transportation (SIC 40)

Oil & Gas Extraction (SIC 13)

Lumber/Wood Products (SIC 24)

Machinery Manufacturing (SIC 35)

Transportation Equipment (SIC 37)

Stone, Clay, Glass, Concrete (SIC 32)

Leather/Leather Products (SIC 31)

Miscellaneous Manufacturing (SIC 39)

Food and kindred Products (SIC 20)

Mining of Nonmetallic Minerals (SIC 14)

Printing and Publishing (SIC 27)

Electric/Electronic (SIC 36)

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[1] Italicized categories belong to Phase 1 facilities
[2] Various categories subject to these requirements
[3] See Definition in Part 5. of the permit

STATE OF CALIFORNIA

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
LOS ANGELES REGION

ORDER NO. 01-182
NPDES PERMIT NO. CAS004001
WASTE DISCHARGE REQUIREMENTS
FOR
MUNICIPAL STORM WATER AND URBAN RUNOFF DISCHARGES WITHIN THE COUNTY OF LOS ANGELES, AND THE INCORPORATED CITIES THEREIN, EXCEPT THE CITY OF LONG BEACH

December 13, 2001

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STATE OF CALIFORNIA

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
LOS ANGELES REGION

ORDER NO. 01-182
NPDES PERMIT NO. CAS004001
WASTE DISCHARGE REQUIREMENTS
FOR
MUNICIPAL STORM WATER AND URBAN RUNOFF DISCHARGES WITHIN THE COUNTY OF LOS ANGELES, AND THE INCORPORATED CITIES THEREIN, EXCEPT THE CITY OF LONG BEACH

The California Regional Water Quality Control Board, Los Angeles Region (hereinafter referred to as the Regional Board) finds:

A. Existing Permit

The Los Angeles County Flood Control District, the County of Los Angeles, and 84 incorporated cities within the Los Angeles County Flood Control District (see Attachment A, List of Permittees), hereinafter referred to separately as Permittees and jointly as the Discharger, discharge or contribute to discharges of storm water and urban runoff from municipal separate storm sewer systems (MS4s), also called storm drain systems. The discharges flow to water courses within the Los Angeles County Flood Control District and into receiving waters of the Los Angeles Region. These discharges are covered under countywide waste discharge requirements contained in Order No. 96-054 adopted by this Regional Board on July 15, 1996, which replaced Order No. 90-079 adopted by this Regional Board on June 18, 1990. Order No. 96-054 also serves as a National Pollutant Discharge Elimination System (NPDES) permit for the discharge of municipal storm water.

B. Nature of Discharges and Sources of Pollutant

1. Storm water discharges consist of surface runoff generated from various land uses in all the hydrologic drainage basins that discharge into water bodies of the State. The quality of these discharges varies considerably and is affected by the hydrology, geology, land use, season, and sequence and duration of hydrologic events. The primary constituents of concern currently identified by the Los Angeles County Flood Control District Integrated Receiving Water Impacts Report (1994-2000) are cyanide, indicator bacteria, total dissolved solids, turbidity, total suspended solids, nutrients, total aluminum, dissolved cadmium, copper, lead, total mercury, nickel, zinc, bis(2-ethylhexyl)phthalate, polycyclic aromatic hydrocarbons (PAHs), diazinon, and chlorpyrifos.

2. Certain pollutants present in storm water and/or urban runoff may be derived from extraneous sources that Permittees have no or limited jurisdiction over. Examples of such pollutants and their respective sources are: PAHs which are products of internal combustion engine

operation, nitrates, bis (2-ethylhexyl) phthalate and mercury from atmospheric deposition, lead from fuels, copper from brake pad wear, zinc from tire wear, dioxins as products of combustion, and natural-occurring minerals from local geology. However, the implementation of the measures set forth in this Order is intended to reduce the entry of these pollutants into storm water and their discharge to receiving waters.

3. Water quality assessments conducted by the Regional Board identified impairment, or threatened impairment, of beneficial uses of water bodies in the Los Angeles Region. The causes of impairments include pollutants of concern identified in municipal storm water discharges by the County of Los Angeles in the Integrated Receiving Water Impacts Report (1994-2000). Pollutants in storm water can have damaging effects on both human health and aquatic ecosystems.

4. The Los Angeles County Grand Jury, September 2000, completed an investigation into the health risks of swimming near beaches in Los Angeles County and made several recommendations to reduce public health risks (Final Report, Grand Jury, Los Angeles County, 1999-2000). The Grand Jury recommended that the Regional Board consider among other actions, (i) a focus on setting contaminant limits rather than programmatic evaluations, (ii) audit of MS4 Permittee programs; and (iii) clarifying enforcement responsibilities between the State and local governments.

5. Studies and research conducted by other Regional agencies, academic institutions, and universities have also identified storm water and urban runoff as significant sources of pollutants to surface waters in Southern California. See, e.g., [*Surface Runoff to the Southern California Bight*, Southern California Coastal Water Research Project, (1992); *Impacts of Urban Runoff on Santa Monica Bay and Surrounding Ocean Waters* (Gersberg, R.M., 1995); *State of the Bay 1998*, Santa Monica Bay Restoration Project; *Storm Water Impact*, In, Southern California Environmental Report Card 1999, Institute of the Environment, University of California, Los Angeles (Stenstrom, M.S., 1999); *Distribution of Anthropogenic and Natural Debris on the Mainland Shelf of Southern California Bight,* Shelly L. Moore and M. James Allen (1999); *The Health Effects of Swimming in Ocean Water Contaminated by Storm Drain Runoff*, Haile, R.W. et al. (1999); *Huntington Beach Closure Investigation: Technical Review* (University of Southern California, 2000); *A Regional Survey of the Microbiological Water Quality Along the Shoreline of the Southern California Bight,* Rachel T. Noble *et al.* (2001*); Integrated Receiving Water Impacts Report (1994-2000)*, County of Los Angeles (2001)].

6. Development and urbanization increase pollutant load, volume, and discharge velocity. First, natural vegetated pervious ground cover is converted to impervious surfaces such as paved highways, streets, rooftops and parking lots. Natural vegetated soil can both absorb rainwater and remove pollutants providing an effective natural purification process. In contrast, pavement and concrete can neither absorb water nor remove pollutants, and thus the natural purification characteristics are

lost. Second, urban development creates new pollution sources as the increased density of human population brings proportionately higher levels of vehicle emissions, vehicle maintenance wastes, municipal sewage waste, pesticides, household hazardous wastes, pet wastes, trash, and other anthropogenic pollutants. Development and urbanization especially threaten environmentally sensitive areas. Such areas have a much lower capacity to withstand pollutant shocks than might be acceptable in the general circumstance. In essence, development that is ordinarily insignificant in its impact on the environment may in a particular sensitive environment become significant. These environmentally sensitive areas designated by the State and/or the County of Los Angeles include Areas of Special Biological Significance (ASBS), water bodies designated as supporting a RARE beneficial use, Significant Natural Areas (SNAs), and Significant Ecological Areas (SEAs).

7. The increased volume, increased velocity, and discharge duration of storm water runoff from developed areas has the potential to greatly accelerate downstream erosion and impair stream habitat in natural drainages. Studies have demonstrated a direct correlation between the degree of imperviousness of an area and the degradation of its receiving waters. Significant declines in the biological integrity and physical habitat of streams and other receiving waters have been found to occur with as little as 10 percent conversion from natural to impervious surfaces. Percentage impervious cover is a reliable indicator and predictor of potential water quality degradation expected from new development. (*Impervious Cover as An Urban Stream Indicator and a Watershed Management Tool*, Schueler, T. and R. Claytor, In, Effects of Water Development and Management on Aquatic Ecosystems (1995), ASCE, New York; Leopold, L. B., (1973), *River Channel Change with Time: An Example*, Geological Society of America Bulletin, v. 84, p. 1845-1860; Hammer, T. R., (1972), *Stream Channel Enlargement Due to Urbanization: Water Resources Research*, v. 8, p. 1530-1540; Booth, D. B., (1991), *Urbanization and the Natural Drainage System--Impacts, Solutions and Prognoses*: The Northwest Environmental Journal, v. 7, p. 93-118; Klein, R. D., (1979), *Urbanization and Stream Quality Impairment*: Water Resources Bulletin, v. 15, p. 948-963; May, C. W., Horner, R. R., Karr, J. R., Mar, B. W., and Welch, E. B., (1997), *Effects of Urbanization on Small Streams in the Puget Sound Lowland Ecoregion*: Watershed Protection Techniques, v. 2, p. 483-494; Morisawa, M. and LaFlure, E. *Hydraulic Geometry, Stream Equilibrium and Urbanization* In Rhodes, D. P. and Williams, G. P. *Adjustments to the Fluvial System* p.333-350. (1979); Dubuque, Iowa, Kendall/Hunt. Tenth Annual Geomorphology Symposia Series; and *The Importance of Imperviousness*: Watershed Protection Techniques, 1(3), Schueler, T. (1994).)

8. The County of Los Angeles has identified as the seven highest priority industrial and commercial critical source types, (i) wholesale trade (scrap recycling, auto dismantling); (ii) automotive repair/parking; (iii) fabricated metal products; (iv) motor freight; (v) chemical and allied products; (vi) automotive dealers/gas stations; (vii) primary metal products (*Critical*

Source Selection and Monitoring Report, Los Angeles County Department of Public Works -Sept 1996). Monitoring conducted by Los Angeles County and the Regional Board demonstrates that the priority industrial sectors and auto repair facilities (one of the commercial sectors) on the list, contribute significant concentrations of heavy metals to storm water (*Los Angeles County 1999-2000 Storm Water Monitoring Report*, Los Angeles County Department of Public Works -July 2000; *Compliance Assessment of the Auto Dismantling Industry; Evaluation of the California General Industrial Storm Water Permit*, H. Chang, (2001), 70 pp., California Regional Water Quality Control Board, Los Angeles Region).

9. The discharge of washwaters and contaminated storm water from industries and businesses specified in this Order for inspection by Permittees is an environmental threat and can also adversely impact public health and safety. For example, a review of industrial waste/ pretreatment records performed in 1995 in the County of Los Angeles on illicit discharges indicates that automotive service facilities and food service facilities sometimes discharge polluted washwaters to the MS4. The pollutants of concern in such washwaters include food waste, oil and grease, and toxic chemicals. Other storm water/industrial waste programs in California have reported similar observations. Illicit discharges from automotive service facilities and food service facilities have been identified elsewhere as a major cause of widespread contamination and water quality problems (Washtenaw County Statutory Drainage Board - 1987 Huron River Pollution Abatement Program).

10. Studies indicate that facilities with paved surfaces subject to frequent motor vehicular traffic (such as parking lots and fast food restaurants), or facilities that perform vehicle repair, maintenance, or fueling (automotive service facilities) are potential sources of pollutants of concern in storm water. [References: Pitt *et al.*, *Urban Storm Water Toxic Pollutants: Assessment, Sources, and Treatability*, Water Environment Res., 67, 260 (1995); *Results of Retail Gas Outlet and Commercial Parking Lot Storm Water Runoff Study*, Western States Petroleum Association and American Petroleum Institute, (1994); *Action Plan Demonstration Project, Demonstration of Gasoline Fueling Station Best Management Practices*, Final Report, County of Sacramento (1993); *Source Characterization*, R. Pitt, In Innovative Urban Wet-Weather Flow Management Systems (2000) Technomic Press, Field, R *et al.* editors; *Characteristics of Parking Lot Runoff Produced by Simulated Rainfall*, , L.L. Tiefenthaler *et al.* Technical Report 343, Southern California Coastal Water Research Project (2001).]

11. Retail Gasoline Outlets (RGOs) are points of convergence for vehicular traffic and are similar to parking lots and urban roads. Studies indicate that storm water discharges from RGOs have high concentrations of hydrocarbons and heavy metals. [*The Quality of Trapped Sediments and Poor Water within Oil Grit Separators in Suburban MD,* Schueler T. and Shepp D. (1992), and *Concentrations of Selected Constituents in Runoff from Impervious Surfaces in Four Urban Catchments of Different*

Landuse, Ranabal, F.I., and T.J. Gizzard (1995), In Proceedings of the Fourth Biennial Stormwater Research Conference, Florida, pp-42-52]. Pilot studies indicate that treatment control best management practices installed at retail gasoline stations are effective in removing pollutants, reasonable in capital cost, easy to operate, and do not present safety risks [*Rouge River National Wet Weather Demonstration Project, Task Product Memorandum – Evaluation of On-line Media Filters RPO-NPS-TPM59.00*, Wayne County, MI, March 1999]. The Regional Board and the San Diego Regional Board have jointly prepared a Technical Report on the applicability of new development BMP design criteria for retail gasoline outlets, (*Retail Gasoline Outlets: New Development Design Standards for Mitigation of Storm Water Impacts*, (June 2001)). Retail Gasoline Outlets in Western U.S. States (such as Washington and Oregon) are already subject to numerical BMP design criteria, as well in other U.S. States.

C. Permit Background

1. The essential components of the Storm Water Management Program, as established by federal regulations [40 CFR 122.26(d)] are: (i) Adequate Legal Authority, (ii) Fiscal Resources, (iii) Storm Water Quality Management Program (SQMP) - (Public Information and Participation Program, Industrial/Commercial Facilities Program, Development Planning Program, Development Construction Program, Public Agency Activities Program, Illicit Connection and Illicit Discharges Elimination Program), and (iv) Monitoring and Reporting Program.

2. The Permittees have filed a Report of Waste Discharge (ROWD), dated February 1, 2001, and applied for renewal of their waste discharge requirements that serves as an NPDES permit to discharge wastes to surface waters. The ROWD includes a proposed SQMP and a Monitoring Program. The proposed SQMP contains programs previously approved under Board Order No. 96-054 in the following areas:

   Public Information and Participation
   Development Planning
   Development Construction
   Public Agency Activities
   Illicit Connection/Illicit Discharge Elimination Program

   These programs are revised pursuant to the provisions of this Order after adoption.

3. The County of Los Angeles has previously conducted source identification and pollutant characterization consistent with 40 CFR 122.26(d)(1)(ii) and (iii) under its storm water Monitoring Program. The Monitoring Program submitted with the ROWD proposes to advance the assessment of receiving water impacts, identification of sources of pollution, evaluation of Best Management Practices (BMPs), and measurement of long term trends in mass emissions.

4. The Regional Board has reviewed the ROWD and has determined it to be complete under the reapplication policy of MS4s issued by the U.S. Environmental Protection Agency (USEPA) (61 *Fed. Reg.* 41697). The Regional Board finds that the Permittees' proposed SQMP, incorporating the additional and/or revised provisions contained in this Order would meet the minimum requirements of federal regulations.

5. The City of Los Angeles has conducted shoreline and nearshore water quality monitoring off the Santa Monica Bay since the 1950s under the monitoring program for the Hyperion Waste Water Treatment Plant (NPDES No. CA0109991). The monitoring results indicate that effluent from Hyperion's 5-Mile Outfall does not impinge the shoreline, and that elevated bacterial counts are associated with runoff from storm drains and discharges from piers. In 1994, the Regional Board approved the relocation of Hyperion's shoreline stations to implement a bay-wide, regional shoreline-monitoring program associated with storm drain outfalls in the Santa Monica Bay. The City of Los Angeles requested that the shoreline-monitoring requirement be incorporated in this Order. The shoreline pathogen monitoring requirements are outlined in the Monitoring Program for this Order.

D. Permit Coverage

1. The requirements in this Order cover all areas within the boundaries of the Permittee municipalities (see Attachment A) over which they have regulatory jurisdiction as well as unincorporated areas in Los Angeles County within the jurisdiction of the Regional Board. The Permittees serve a population of about 9.5 million [Reference: *2000 Census of Population and Housing,* Bureau of the Census, U.S. Department of Commerce (2001)] in an area of approximately 3,100 square miles.

2. Federal, state, regional or local entities within the Permittees' boundaries or in jurisdictions outside the Los Angeles County Flood Control District, and not currently named in this Order, may operate storm drain facilities and/or discharge storm water to storm drains and watercourses covered by this Order. The Permittees may lack legal jurisdiction over these entities under state and federal constitutions. The Regional Board will coordinate with these entities to implement programs that are consistent with the requirements of this Order. The Regional Board will consider such facilities for coverage in 2003 under its NPDES permitting scheme pursuant to USEPA Phase II storm water regulations.

3. Sources of discharges into receiving waters in the County of Los Angeles but in jurisdictions outside its boundary include the following:

   About 34 square miles of unincorporated area in Ventura County, which drain into Malibu Creek and then to Santa Monica Bay,

   About 9 square miles of the City of Thousand Oaks, which also drain into Malibu Creek and then to Santa Monica Bay, and

About 86 square miles of area in Orange County, which drain into Coyote Creek and then into the San Gabriel River.

The Regional Board will ensure that storm water management programs for the areas in Ventura County and the City of Thousand Oaks that drain into Santa Monica Bay are consistent with the requirements of this Order. The Regional Board will coordinate with the Santa Ana Regional Board so that storm water management programs for the areas in Orange County that drain into Coyote Creek are consistent with the requirements of this Order.

4. This permit is intended to develop, achieve, and implement a timely, comprehensive, cost-effective storm water pollution control program to reduce the discharge of pollutants in storm water to the Maximum Extent Practicable (MEP) from the permitted areas in the County of Los Angeles to the waters of the U.S. subject to the Permittees' jurisdiction.

5. Permittees have expressed their intention to work cooperatively to control the contribution of pollutants from one portion of the MS4 to another portion of the system. Permittees may control the contribution of pollutants to the MS4 from non-permittee dischargers such as Caltrans, the U.S. Department of Defense, and other state and federal facilities, through interagency agreements.

E. Federal, State, and Regional Regulations

1. The Water Quality Act of 1987 added Section 402(p) to the federal Clean Water Act (CWA) (33 U.S.C. § 1251-1387). This section requires the USEPA to establish regulations setting forth NPDES requirements for storm water discharges in two phases.

   - The USEPA Phase I storm water regulations were directed at MS4s serving a population of 100,000 or more, including interconnected systems and storm water discharges associated with industrial activities, including construction activities. The Phase I Final Rule was published on November 16, 1990 (55 *Fed. Reg.* 47990).

   - The USEPA Phase II storm water regulations are directed at storm water discharges not covered in Phase I, including small MS4s (serving a population of less than 100,000), small construction projects (one to five acres), municipal facilities with delayed coverage under the Intermodal Surface Transportation Efficiency Act of 1991, and other discharges for which the USEPA Administrator or the State determines that the storm water discharge contributes to a violation of a water quality standard, or is a significant contributor of pollutants to waters of the United States. The Phase II Final Rule was published on December 8, 1999 (64 *Fed. Reg.* 68722).

2. The USEPA published an 'Interim Permitting Approach for Water Quality-Based Effluent Limitations in Storm Water Permits' on August 26, 1996 (61 *Fed. Reg.* 43761). This policy discusses the appropriate kinds of

water quality-based effluent limitations to be included in NPDES storm water permits to provide for the attainment of water quality standards.

3. The USEPA published an 'Interpretative Policy Memorandum on Reapplication Requirements' for MS4 permits on August 9, 1996 (61 *Fed. Reg.* 41697). This policy requires that MS4 reapplication for reissuance for a subsequent five-year permit term contain certain basic information and information for proposed changes and improvements to the storm water management program and monitoring program.

4. The USEPA has entered into a Memorandum of Agreement (MOA) with the U.S. Fish and Wildlife Service and the National Marine Fisheries Service for enhancing coordination regarding the protection of endangered and threatened species under Section 7 of the Endangered Species Act and the CWA's Water Quality Standards and NPDES programs. Among other actions, the MOA establishes a framework for coordination of actions by the USEPA, the Services, and CWA delegated States on CWA permit issuance under Section 402 of the CWA [66 *Fed. Reg.* 11202 – 11217].

5. USEPA regulations at 40 CFR 122.26(d)(2)(iv)(A) and 40 CFR 122.26(d)(2)(iv)(C) require that MS4 permittees implement a program to monitor and control pollutants in discharges to the municipal system from industrial and commercial facilities that contribute a substantial pollutant load to the MS4. The regulations require that permittees establish priorities and procedures for inspection of industrial facilities and priority commercial establishments. This permit, consistent with the USEPA policy, incorporates a cooperative partnership, including the specifications of minimum expectations, between the Regional Board and the Permittees for the inspection of industrial facilities and priority commercial establishments to control pollutants in storm water discharges (58 *Fed. Reg.* 61157).

6. Section 402 (p) of the CWA (33 U.S.C. § 1342(p) provides that MS4 permits must "require controls to reduce the discharge of pollutants to the maximum extent practicable, including management practices, control techniques and system, design engineering method and such other provisions as the [EPA] Administrator or the State determines appropriate for the control of such pollutants." The State Water Resources Control Board's (State Board) Office of Chief Counsel (OCC) has issued a memorandum interpreting the meaning of MEP to include technical feasibility, cost, and benefit derived with the burden being on the municipality to demonstrate compliance with MEP by showing that a BMP is not technically feasible in the locality or that BMPs costs would exceed any benefit to be derived (dated February 11, 1993).

7. The CWA authorizes the USEPA to permit a state to serve as the NPDES permitting authority in lieu of the USEPA. The State of California has in-lieu authority for an NPDES program. The Porter-Cologne Water Quality Control Act authorizes the State Board, through the Regional Boards, to regulate and control the discharge of pollutants into waters of the State. The State Board entered into a MOA with the USEPA, on

September 22, 1989, to administer the NPDES Program governing discharges to waters of the U.S.

8. Section 303(d) of the CWA requires that the State identify a list of impaired water-bodies and develop and implement Total Maximum Daily Loads (TMDLs) for these waterbodies (33 U.S.C. §1313(d)(1)). A TMDL specifies the maximum amount of a pollutant that a water-body can receive, still meet applicable water quality standards and protect beneficial uses. The USEPA entered into a consent decree with the Natural Resources Defense Council (NRDC), Heal the Bay, and the Santa Monica BayKeeper on March 22, 1999, under which the Regional Board must adopt all TMDLs for the Los Angeles Region within 13 years from that date. This permit incorporates a provision to implement and enforce approved load allocations for municipal storm water discharges and requires amending the SQMP after pollutants loads have been allocated and approved.

9. Section 6217(g) of the Coastal Zone Act Reauthorization Amendments of 1990 (CZARA) requires coastal states with approved coastal zone management programs to address non-point pollution impacting or threatening coastal water quality. CZARA (16 U.S.C. § 1451-1465) amends the Coastal Zone Management Act of 1972, to address five sources of non-point pollution: agriculture, silviculture, urban, marinas, and hydromodification. This NPDES permit addresses the management measures required for the urban category, with the exception of septic systems. The Regional Board addresses septic systems through the administration of other programs.

10. On May 18, 2000, the USEPA established numeric criteria for priority toxic pollutants for the State of California (California Toxics Rule (CTR)) 65 *Fed. Reg.* 31682 (40 CFR 131.38), for the protection of human health and aquatic life. These apply as ambient water quality criteria for inland surface waters, enclosed bays, and estuaries. The State Board adopted the *Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California (SIP) – 2000,* on March 2, 2000, for implementation of the CTR (State Board Resolution No. 2000-15 as amended by Board Resolution No. 2000-030). This policy requires that discharges comply with TMDL-derived load allocations as soon as possible but no later than 20 years from the effective date of the policy.

11. The State Board adopted a revised Water Quality Control Plan for Ocean Waters of California (Ocean Plan) on July 23, 1997. The Ocean Plan contains water quality objectives which apply to all discharges to the coastal waters of California.

12. The State Board in *In Re*: California Department of Transportation (State Board Order WQ 2001-08), determined that the discharge of storm water to ASBS is subject to the prohibition in the Ocean Plan against the discharge of wastes to an ASBS.

13. The Regional Board adopted an updated Water Quality Control Plan (Basin Plan) for the Los Angeles Region on June 13, 1994, *'Water Quality Control Plan, Los Angeles Region: Basin Plan for the Coastal Watersheds of Los Angeles and Ventura Counties*, (1994).' The Basin Plan designates beneficial uses of receiving waters and specifies both narrative and numerical water quality objectives for the receiving waters in Los Angeles County.

14. The Regional Board on September 19, 2001, adopted amendments to the Basin Plan, to incorporate TMDLs for trash in the Los Angeles River (Resolution No. 01-013) and Ballona Creek (Resolution No. 01-014). After approval by the State Board, the Office of Administrative Law, and the USEPA, the TMDLs for trash will be effective and enforceable.

15. The Regional Board on April 13, 1998, approved BMPs for sidewalk rinsing to minimize the discharge of wash waters to the storm drain system (Resolution No. 98-08). By the same resolution, the Regional Board prohibited the discharge of municipal street wash waters to the storm drain system.

16. The Regional Board on April 13, 1998, approved recommended BMPs for industrial/commercial facilities (Resolution No. 98-08).

17. The Regional Board on April 22, 1999, approved a list of BMPs for use in development planning and development construction (Resolution No. 99-03)

18. The Regional Board adopted and approved requirements for new development and significant redevelopment projects in Los Angeles County to control the discharge of storm water pollutants in post-construction storm water, on January 26, 2000, in Board Resolution No. R-00-02. The Regional Board Executive Officer issued the approved Standard Urban Storm Water Mitigation Plans (SUSMPs) on March 8, 2000. The State Board in large part affirmed the Regional Board action and SUSMPs in State Board Order No. WQ 2000-11 issued on October 5, 2000.

    - The State Board's Chief Counsel has issued a statewide policy memorandum (dated December 26, 2000), which interprets the Order to provide broad discretion to Regional Boards and identifies potential future areas for inclusion in SUSMPs and the types of evidence and findings necessary. Such areas include ministerial projects, projects in environmentally sensitive areas, and water quality design criteria for RGOs.

    - The State Board's Chief Counsel interprets the Order to encourage regional solutions and endorses a mitigation fund or "bank" that may be funded by developers who obtain waivers from the numerical design standards for new development and significant redevelopment.

19. 40 CFR 131.10(a) prohibits states from designating waste transport or waste assimilation as a use for any water of the U.S. Authorizing the

construction of a storm water/ urban runoff treatment facility in a jurisdictional water body would be tantamount to accepting waste assimilation as an appropriate use for that water body. Furthermore, the construction and operation of a pollution control facility in a water body can impact the physical, chemical, and biological integrity as well as the beneficial uses of the water body. Therefore, storm water treatment and/or mitigation in accordance with SUSMPs and any other requirements of this Order must occur prior to the discharge of storm water into a water of the U.S.

20. The Regional Board supports a Watershed Management Approach to address water quality protection in the region. The objective of the Watershed Management Approach should be to provide a comprehensive and integrated strategy towards water resource protection, enhancement, and restoration while balancing economic and environmental impacts within a hydrologically defined drainage basin or watershed. It emphasizes cooperative relationships between regulatory agencies, the regulated community, environmental groups, and other stakeholders in the watershed to achieve the greatest environmental improvements with available resources.

21. To promote a watershed management approach, the County of Los Angeles is divided into six Watershed Management Areas (WMAs) as follows:

    Malibu Creek and Rural Santa Monica Bay WMA
    Ballona Creek and Urban Santa Monica Bay WMA
    Los Angeles River WMA
    San Gabriel River WMA
    Dominguez Channel/Los Angeles Harbor WMA, and
    Santa Clara River WMA

    Attachment A shows the list of Permittees under each WMA and some Permittees have expressed an intent to form sub-watershed groups within the WMA to promote regional solutions for the mitigation of storm water discharge pollution.

22. To facilitate compliance with federal regulations, the State Board has issued two statewide general NPDES permits for storm water discharges: one for storm water from industrial sites [NPDES No. CAS000001, General Industrial Activity Storm Water Permit (GIASP)] and the other for storm water from construction sites [NPDES No. CAS000002, General Construction Activity Storm Water Permit (GCASP)]. The GCASP was reissued on August 19, 1999. The GIASP was reissued on April 17, 1997. Facilities discharging storm water associated with industrial activities and construction projects with a disturbed area of five acres or more are required to obtain individual NPDES permits for storm water discharges, or to be covered by a statewide general permit by completing and filing a Notice of Intent (NOI) with the State Board. The USEPA guidance anticipates coordination of the state-administered programs for

industrial and construction activities with the local agency program to reduce pollutants in storm water discharges to the MS4.

The Regional Board is the enforcement authority in the Los Angeles Region for the two statewide general permits regulating discharges from industrial facilities and construction sites, and all NPDES storm water and non-storm water permits issued by the Regional Board. These industrial and construction sites and discharges are also regulated under local laws and regulations.

23. The State Board, on October 28, 1968, adopted Resolution No. 68-16, which established an anti-degradation policy for the State and Regional Boards. This policy restricts the degradation of surface waters and protects waterbodies where existing water quality is higher than is necessary for the protection of beneficial uses.

24. The State Board, on June 17, 1999, adopted Order No. WQ 99-05, which, in a precedential decision, identifies acceptable receiving water limitations language to be included in municipal storm water permits issued by the State and Regional Boards. The receiving water limitations included herein are consistent with the State Board Order, USEPA Policy, and the U.S. Appellate court decision in, *Defenders of Wildlife v. Browner* (9th. Cir, 1999). The State Board OCC has determined that the federal court decision did not conflict with State Board Order No. WQ 99-05 (memorandum dated October 14, 1999)

25. California Water Code (CWC) § 13263(a) requires that waste discharge requirements issued by the Regional Board shall implement any relevant water quality control plans that have been adopted; shall take into consideration the beneficial uses to be protected and the water quality objectives reasonably required for that purpose; other waste discharges; the need to prevent nuisance; and provisions of CWC § 13241. The Regional Board has considered the requirements of § 13263 and § 13241, and applicable plans, policies, rules, and regulations in developing these waste discharge requirements.

26. CWC § 13370 *et seq.* requires that waste discharge requirements issued by the Regional Boards be consistent with provisions of the federal CWA and its amendments.

27. On March 12, 2001, the U.S. Court of Appeals ruled that it is necessary to obtain a NPDES permit for application of aquatic pesticides to waterways. (*Headwaters, Inc. vs. Talent Irrigation District,* 243 F.3d. 526 (9th Cir., 2001)) This decision is controlling in California for nonagricultural applications of pesticides to waterways. The State Board adopted a general NPDES permit (Order No. 2001-12-DWQ) on July 19, 2001, for public entities that discharge pollutants to waters of the U.S. associated with the application of aquatic pesticides for resource or pest management. Public entities that conduct such activities must seek coverage under the general permit.

F. Implementation

1. The California Environmental Quality Act (CEQA) (Cal. Pub. Resources Code § 21000 *et seq.*) requires that public agencies consider the environmental impacts of the projects they approve for development. CEQA applies to projects that are considered discretionary and does not apply to ministerial projects, which involve the use of established standards or objective measurements. A ministerial project may be made discretionary by adopting local ordinance provisions or imposing conditions to create decision-making discretion in approving the project. In the alternative, Permittees may establish standards and objective criteria administratively for storm water mitigation for ministerial projects. For water quality purposes, the Regional Board considers that all new development and significant redevelopment activity in specified categories, that receive approval or permits from a municipality, are subject to storm water mitigation requirements.

2. The objective of this Order is to protect the beneficial uses of receiving waters in Los Angeles County. To meet this objective, this Order requires that the SQMP specify BMPs that will be implemented to reduce the discharge of pollutants in storm water to the maximum extent practicable. Further, Permittees are to assure that storm water discharges from the MS4 shall neither cause nor contribute to the exceedance of water quality standards and objectives nor create conditions of nuisance in the receiving waters, and that the discharge of non-storm water to the MS4 has been effectively prohibited.

3. The SQMP required in this Order builds upon the programs established in Order Nos. 90-079, and 96-054, consists of the components recommended in the USEPA guidance manual, and was developed with the cooperation of representatives from the regulated community and environmental groups. The SQMP includes provisions that promote customized initiatives, both on a countywide and watershed basis, in developing and implementing cost-effective measures to minimize discharge of pollutants to the receiving water. The various components of the SQMP, taken as a whole rather than individually, are expected to reduce pollutants in storm water and urban runoff to the maximum extent practicable. Provisions of the SQMP are fully enforceable under provisions of this Order.

4. The emphasis of the SQMP is pollution prevention through education, public outreach, planning, and implementation as source control BMPs first and then Structural and Treatment Control BMPs next. Successful implementation of the provisions of the SQMP will require cooperation and coordination of all public agencies in each Permittee's organization, among Permittees, and with the regulated community.

5. The implementation of a Public Information and Participation Program is a critical component of a storm water management program. An informed and knowledgeable community is critical to the success of a storm water management program since it helps insure the following: (i) greater support for the program as the public gains a greater understanding of

the reasons why it is necessary and important, and (ii) greater compliance with the program as the public becomes aware of the personal responsibilities expected of them and others in the community, including the individual actions they can take to protect or improve the quality of area waters.

6. This Order includes a Monitoring Program that incorporates Minimum Levels (MLs) established under the SIP. The SIP's MLs represent the lowest quantifiable concentration for priority toxic pollutants that is measurable with the use of proper method-based analytical procedures and factoring out matrix interference. The SIP's MLs therefore represent the best available science for determining MLs and are appropriate for a storm water monitoring program. The use of MLs allows the detection of toxic priority pollutants at concentrations of concern using recent advances in chemical analytical methods.

7. This Order provides flexibility for Permittees to petition the Regional Board Executive Officer to substitute a BMP under the SQMP with an alternative BMP, if they can provide information and documentation on the effectiveness of the alternative, equal to or greater than the prescribed BMP in meeting the objectives of this Order.

8. This Order contemplates that the Permittees are responsible for considering potential storm water impacts when making planning decisions in order to fulfill the Permittees' CWA requirement to reduce the discharge of pollutants in municipal storm water to the MEP from new development and redevelopment activities. However, the Permittees retain authority to make the final land-use decisions and retain full statutory authority for deciding what land uses are appropriate at specific locations within each Permittee's jurisdiction. This Order and its requirements are not intended to restrict or control local land use decision-making authority.

9. This Order is not intended to prohibit the inspection for or abatement of vectors by the State Department of Health Services or local vector agencies in accordance with Cal. Health and Safety Code § 2270 *et seq.* and §116110 *et seq.* Certain Treatment Control BMPs if not properly designed, operated or maintained may create habitats for vectors (e.g. mosquito and rodents). This Order contemplates that the Permittees will closely cooperate and collaborate with local vector control agencies and the State Department of Health Services for the implementation, operation, and maintenance of Treatment Control BMPs in order to minimize the risk to public health from vector borne diseases.

G. Public Process

1. The Regional Board has notified the Permittees and interested agencies and persons of its intent to issue waste discharge requirements for this discharge, and has provided them with an opportunity to submit their written view and recommendations.

2. The Regional Board, in a public hearing, heard and considered all comments pertaining to the discharge and to the tentative requirements.

3. The Regional Board has conducted public workshops to discuss drafts of the permit. On April 24, 2001, Regional Board staff conducted a workshop outlining the reasoning behind the changes proposed for the new permit and received input from the Permittees and the public regarding those proposed changes. On July 26, 2001, a second public workshop was held at a special Regional Board meeting. The Permittees and the public had another opportunity to express their opinions regarding the proposed changes to the permit in front of the Regional Board members. A significant number of working meetings with the Permittees and other interested parties have occurred throughout the period from the submittal of the ROWD and completion of the tentative draft, in an attempt to incorporate and address all the comments presented.

4. The Los Angeles County Flood Control District, the County of Los Angeles and the other municipalities are co-permittees as defined in 40 CFR 122.26 (b)(1). Los Angeles County Flood Control District will coordinate with the other municipalities and facilitate program implementation. Each Permittee is responsible only for a discharge for which it is the operator.

5. This Order shall serve as a NPDES Permit, pursuant to CWA § 402, or amendments thereto, and shall take effect 50 days from Order adoption provided the Regional Administrator of the USEPA has no objections.

6. The action to adopt an NPDES permit is exempt from the provisions of Chapter 3 of CEQA (Cal. Pub. Resources Code § 21100 *et seq.*), in accordance with CWC § 13389.

7. Pursuant to CWC §13320, any aggrieved party may seek review of this Order by filing a petition with the State Board. A petition must be sent to: State Water Resources Control Board, P.O. Box 100, Sacramento, California, 95812, within 30 days of adoption of the Order by the Regional Board.

8. This Order may be modified or alternatively revoked or reissued prior to its expiration date, in accordance with the procedural requirements of the NPDES program, and the CWC for the issuance of waste discharge requirements.

IT IS HEREBY ORDERED that the Los Angeles County Flood Control District, Los Angeles County, and the Cities of Agoura Hills, Alhambra, Arcadia, Artesia, Azusa, Baldwin Park, Bell, Bellflower, Bell Gardens, Beverly Hills, Bradbury, Burbank, Calabasas, Carson, Cerritos, Claremont, Commerce, Compton, Covina, Cudahy, Culver City, Diamond Bar, Downey, Duarte, El Monte, El Segundo, Gardena, Glendale, Glendora, Hawaiian Gardens, Hawthorne, Hermosa Beach, Hidden Hills, Huntington Park, Industry, Inglewood, Irwindale, La Cañada Flintridge, La Habra Heights, Lakewood, La Mirada, La Puente, La Verne, Lawndale, Lomita, Los Angeles, Lynwood, Malibu, Manhattan Beach, Maywood, Monrovia, Montebello, Monterey Park, Norwalk, Palos Verdes Estates, Paramount, Pasadena, Pico Rivera, Pomona, Rancho Palos Verdes,

Redondo Beach, Rolling Hills, Rolling Hills Estates, Rosemead, San Dimas, San Fernando, San Gabriel, San Marino, Santa Clarita, Santa Fe Springs, Santa Monica, Sierra Madre, Signal Hill, South El Monte, South Gate, South Pasadena, Temple City, Torrance, Vernon, Walnut, West Covina, West Hollywood, Westlake Village, and Whittier, in order to meet the provisions contained in Division 7 of the CWC and regulations adopted thereunder, and the provisions of the CWA, as amended, and regulations and guidelines adopted thereunder, shall comply with the following:

Part 1. DISCHARGE PROHIBITIONS

The Permittees shall effectively prohibit non-storm water discharges into the MS4 and watercourses, except where such discharges:

1. Are covered by a separate individual or general NPDES permit for non-storm water discharges; or

2. Fall within one of the categories below, and meet all conditions when specified by the Regional Board Executive Officer:

   a) Category A - Natural flow:

      (1) Natural springs and rising ground water;

      (2) Flows from riparian habitats or wetlands;

      (3) Stream diversions, permitted by the State Board; and

      (4) Uncontaminated ground water infiltration [as defined by 40 CFR 35.2005(20)].

   b) Category B - Flows from emergency fire fighting activity.

   c) Category C - Flows incidental to urban activities:

      (1) Reclaimed and potable landscape irrigation runoff;

      (2) Potable drinking water supply and distribution system releases (consistent with American Water Works Association guidelines for dechlorination and suspended solids reduction practices);

      (3) Drains for foundations, footings, and crawl spaces;

      (4) Air conditioning condensate;

      (5) Dechlorinated/debrominated swimming pool discharges;

      (6) Dewatering of lakes and decorative fountains;

      (7) Non-commercial car washing by residents or by non-profit organizations; and

      (8) Sidewalk rinsing.

   The Regional Board Executive Officer may add or remove categories of non-storm water discharges above. Furthermore, in the event that any of

the above categories of non-storm water discharges are determined to be a source of pollutants by the Regional Board Executive Officer, the discharge will no longer be exempt from this prohibition unless the Permittee implements conditions approved by the Regional Board Executive Officer to ensure that the discharge is not a source of pollutants. Notwithstanding the above, the Regional Board Executive Officer may impose additional prohibitions of non-storm water discharges in consideration of anti-degradation policies and TMDLs.

Part 2. RECEIVING WATER LIMITATIONS

1. Discharges from the MS4 that cause or contribute to the violation of Water Quality Standards or water quality objectives are prohibited.

2. Discharges from the MS4 of storm water, or non-storm water, for which a Permittee is responsible for, shall not cause or contribute to a condition of nuisance.

3. The Permittees shall comply with Part 2.1. and 2.2. through timely implementation of control measures and other actions to reduce pollutants in the discharges in accordance with the SQMP and its components and other requirements of this Order including any modifications. The SQMP and its components shall be designed to achieve compliance with receiving water limitations. If exceedances of Water Quality Objectives or Water Quality Standards (collectively, Water Quality Standards) persist, notwithstanding implementation of the SQMP and its components and other requirements of this permit, the Permittee shall assure compliance with discharge prohibitions and receiving water limitations by complying with the following procedure:

   a) Upon a determination by either the Permittee or the Regional Board that discharges are causing or contributing to an exceedance of an applicable Water Quality Standard, the Permittee shall promptly notify and thereafter submit a Receiving Water Limitations (RWL) Compliance Report (as described in the Program Reporting Requirements, Section I of the Monitoring and Reporting Program) to the Regional Board that describes BMPs that are currently being implemented and additional BMPs that will be implemented to prevent or reduce any pollutants that are causing or contributing to the exceedances of Water Quality Standards. This RWL Compliance Report may be incorporated in the annual Storm Water Report and Assessment unless the Regional Board directs an earlier submittal. The RWL Compliance Report shall include an implementation schedule. The Regional Board may require modifications to the RWL Compliance Report.

   b) Submit any modifications to the RWL Compliance Report required by the Regional Board within 30 days of notification.

   c) Within 30 days following the approval of the RWL Compliance Report, the Permittee shall revise the SQMP and its components and monitoring program to incorporate the approved modified

BMPs that have been and will be implemented, an implementation schedule, and any additional monitoring required.

d) Implement the revised SQMP and its components and monitoring program according to the approved schedule.

4. So long as the Permittee has complied with the procedures set forth above and is implementing the revised SQMP and its components, the Permittee does not have to repeat the same procedure for continuing or recurring exceedances of the same receiving water limitations unless directed by the Regional Board to develop additional BMPs.

Part 3. STORM WATER QUALITY MANAGEMENT PROGRAM (SQMP) IMPLEMENTATION

A. General Requirements

1. Each Permittee shall, at a minimum, implement the SQMP. The SQMP is an enforceable element of this Order. The SQMP shall be implemented no later than February 1, 2002, unless a later date has been specified for a particular provision in this Order.

2. The SQMP shall, at a minimum, comply with the applicable storm water program requirements of 40 CFR 122.26(d)(2). The SQMP and its components shall be implemented so as to reduce the discharges of pollutants in storm water to the MEP.

3. Each Permittee shall implement additional controls, where necessary, to reduce the discharges of pollutants in storm water to the MEP.

4. Permittees that modify the countywide SQMP (i.e., implement additional controls, implement different controls than described in the countywide SQMP, or determine that certain BMPs in the countywide SQMP are not applicable in the area under its jurisdiction), shall develop a local SQMP, no later than August 1, 2002. The local SQMP shall be customized to reflect the conditions in the area under the Permittee's jurisdiction and shall specify activities being implemented under the appropriate elements described in the countywide SQMP.

B. Best Management Practice Implementation

The Permittees shall implement or require the implementation of the most effective combination of BMPs for storm water/urban runoff pollution control. When implemented, BMPs are intended to result in the reduction of pollutants in storm water to the MEP.

C. Revision of the Storm Water Quality Management Program

The Permittees shall revise the SQMP, at the direction of the Regional Board Executive Officer, to incorporate program implementation amendments so as to comply with regional, watershed specific requirements, and/or waste load

allocations developed and approved pursuant to the process for the designation and implementation of Total Maximum Daily Loads (TMDLs) for impaired water bodies.

D. Designation and Responsibilities of the Principal Permittee

The Los Angeles County Flood Control District is hereby designated as the Principal Permittee. As such, the Principal Permittee shall:

1. Coordinate and facilitate activities necessary to comply with the requirements of this Order, but is not responsible for ensuring compliance of any individual Permittee;

2. Coordinate permit activities among Permittees and act as liaison between Permittees and the Regional Board on permitting issues;

3. Provide personnel and fiscal resources for the necessary updates of the SQMP and its components;

4. Provide technical and administrative support for committees that will be organized to implement the SQMP and its components;

5. Convene the Watershed Management Committees (WMCs) constituted pursuant to Part F, below, upon designation of representatives;

6. Implement the Countywide Monitoring Program required under this Order and evaluate, assess and synthesize the results of the monitoring program;

7. Provide personnel and fiscal resources for the collection, processing and submittal to the Regional Board of annual reports and summaries of other reports required under the SQMP; and

8. Comply with the "Responsibilities of the Permittees" in Part 3.E., below.

E. Responsibilities of the Permittees

Each Permittee is required to comply with the requirements of this Order applicable to discharges within its boundaries (see Findings D.1, D.2. and D.3.) and not for the implementation of the provisions applicable to the Principal Permittee or other Permittees. Each Permittee shall, within its geographic jurisdiction:

1. Comply with the requirements of the SQMP and any modifications thereto;

2. Coordinate among its internal departments and agencies, as appropriate, to facilitate the implementation of the requirements of the SQMP applicable to such Permittee in an efficient and cost-effective manner;

3. Designate a technically knowledgeable representative to the appropriate WMC;

4. Participate in intra-agency coordination (e.g. Fire Department, Building and Safety, Code Enforcement, Public Health, etc.) necessary to successfully implement the provisions of this Order and the SQMP.

5. Prepare an annual Budget Summary of expenditures applied to the storm water management program. This summary shall identify the storm water budget for the following year, using estimated percentages and written explanations where necessary, for the specific categories noted below:

   a) Program management
      - Administrative costs

   b) Program Implementation

      Where information is available, provide an estimated percent breakdown of expenditures for the categories below:
      - Illicit connection/illicit discharge
      - Development planning
      - Development construction
      - Construction inspection activities
      - Industrial/Commercial inspection activities
      - Public Agency Activities
        - Maintenance of Structural BMPs and Treatment Control BMPs
        - Municipal Street Sweeping
        - Catch basin clean-up
        - Trash collection
        - Capital costs

   c) Public Information and Participation

   d) Monitoring Program

   e) Miscellaneous Expenditures

6. Each Permittee, in addition to the Budget Summary, shall report any supplemental dedicated budgets for the same categories.

F. Watershed Management Committees (WMCs)

1. Each WMC shall be comprised of a voting representative from each Permittee in the WMA.

2. The WMC's chair and secretary shall be chosen by the WMC upon Order adoption and on an annual basis, thereafter. In the absence of volunteer Permittee(s) for the positions, the Principal Permittee shall assume those roles until the WMC chooses members of the committee for the positions.

3. Each WMC shall:

   a) Facilitate cooperation and exchange of information among Permittees;

b) Establish additional goals and objectives and associated deadlines for the WMA, as the program implementation progresses;

c) Prioritize pollution control efforts based on beneficial use impairment(s), watershed characteristics and analysis of results from studies and the monitoring program;

d) Develop and/or update and monitor the adequate implementation, on an annual basis, of the tasks identified for the WMA;

e) Assess the effectiveness of, prepare revisions for, and recommend appropriate changes to the SQMP and its components;

f) Continue to prioritize the Industrial/Commercial critical sources for investigation, outreach and follow-up; and

g) Meet four times per year and, as necessary.

G. Legal Authority

1. Permittees shall possess the necessary legal authority to prohibit non-storm water discharges to the storm drain system, including, but not limited to:

a) Illicit discharges and illicit connections and require removal of illicit connections;

b) The discharge of wash waters to the MS4 from the cleaning of gas stations, auto repair garages, or other types of automotive service facilities;

c) The discharge of runoff to the MS4 from mobile auto washing, steam cleaning, mobile carpet cleaning, and other such mobile commercial and industrial operations;

d) The discharge of runoff to the MS4 from areas where repair of machinery and equipment which are visibly leaking oil, fluid or antifreeze, is undertaken;

e) The discharge of runoff to the MS4 from storage areas of materials containing grease, oil, or other hazardous substances, and uncovered receptacles containing hazardous materials;

f) The discharge of chlorinated/ brominated swimming pool water and filter backwash to the MS4;

g) The discharge of runoff from the washing of toxic materials from paved or unpaved areas to the MS4;

h) Washing impervious surfaces in industrial/commercial areas that results in a discharge of runoff to the MS4;

i) The discharge of concrete or cement laden wash water from concrete trucks, pumps, tools, and equipment to the MS4; and

j) Dumping or disposal of materials into the MS4 other than storm water, such as:

(1) Litter, landscape debris and construction debris;

(2) Any state or federally banned or unregistered pesticides;

(3) Food and food processing wastes; and

(4) Fuel and chemical wastes, animal wastes, garbage, batteries, and other materials that have potential adverse impacts on water quality.

2. The Permittees shall possess adequate legal authority to:

a) Require persons within their jurisdiction to comply with conditions in Permittees' ordinances, permits, contracts, model programs, or orders (i.e. hold dischargers to its MS4 accountable for their contributions of pollutants and flows);

b) Utilize enforcement mechanisms to require compliance with Permittees ordinances, permits, contracts, or orders;

c) Control pollutants, including potential contribution, in discharges of storm water runoff associated with industrial activities (including construction activities) to its MS4 and control the quality of storm water runoff from industrial sites (including construction sites). This requirement applies to Source Control, and Treatment Control BMPs;

d) Carry out all inspection, surveillance and monitoring procedures necessary to determine compliance and non-compliance with permit conditions, including the prohibition of illicit discharges to the MS4. Permittees must possess authority to enter, sample, inspect, review and copy records, and require regular reports from industrial facilities (including construction sites) discharging polluted or with the potential to discharge polluted storm water runoff into its MS4;

e) Require the use of BMPs to prevent or reduce the discharge of pollutants to MS4s to MEP; and

f) Require that Treatment Control BMPs be properly operated and maintained to prevent the breeding of vectors.

3. Each Permittee shall, no later than November 1, 2002, amend and adopt (if necessary), a Permittee-specific storm water and urban runoff ordinance to enforce all requirements of this permit.

4. Each Permittee shall submit no later than December 2, 2002, a new or updated statement by its legal counsel that the Permittee has obtained all

necessary legal authority to comply with this Order through adoption of ordinances and/or municipal code modifications.

Part 4. SPECIAL PROVISIONS

Maximum Extent Practicable Standard

This permit, and the provisions herein, are intended to develop, achieve, and implement a timely, comprehensive, cost-effective storm water pollution control program to reduce the discharge of pollutants in storm water to the MEP from the permitted areas in the County of Los Angeles to the waters of the State.

A. General Requirements

1. Best Management Practice Substitution

   The Regional Board Executive Officer may approve any site-specific BMP substitution upon petition by a Permittee(s), if the Permittee can document that:

   a) The proposed alternative BMP or program will meet or exceed the objective of the original BMP or program in the reduction of storm water pollutants; or

   b) The fiscal burden of the original BMP or program is substantially greater than the proposed alternative and does not achieve a substantially greater improvement in storm water quality; and,

   c) The proposed alternative BMP or program will be implemented within a similar period of time.

B. Public Information and Participation Program (PIPP)

The Principal Permittee shall implement a Public Information and Participation Program (PIPP) that includes, but is not limited to, the requirements listed in this section. The Principal Permittee shall be responsible for developing and implementing the Public Education Program, as described in the SQMP, and shall coordinate with Permittees to implement specific requirements.

The objectives of the PIPP are as follows:

- To measurably increase the knowledge of the target audiences regarding the MS4, the impacts of storm water pollution on receiving waters, and potential solutions to mitigate the problems caused;
- To measurably change the waste disposal and runoff pollution generation behavior of target audiences by encouraging implementation of appropriate solutions; and
- To involve and engage socio-economic groups and ethnic communities in Los Angeles County to participate in mitigating the impacts of storm water pollution.

The Principal Permittee shall convene an advisory committee to provide input and assistance in meeting the goals and objectives of the public education campaign. The advisory committee shall be consulted during the process of developing the PIPP campaign, and shall provide comments and advice during the process of preparing a Request For Proposals for a storm water public education contractor. The committee may participate as a part of a working group that evaluates contractor proposals and other tasks as appropriate. The committee shall be comprised of representatives of the environmental community, Permittee cities, Regional Board staff, and experts in the fields of public education and marketing. The Principal Permittee shall ensure that the committee meets at least once a year.

1. Residential Program

a) "No Dumping" Message

Each Permittee shall mark all storm drain inlets that they own with a legible "no dumping" message. In addition, signs with prohibitive language discouraging illegal dumping must be posted at designated public access points to creeks, other relevant water bodies, and channels no later than February 2, 2004. Signage and storm drain messages shall be legible and maintained as necessary during the term of the permit.

b) Countywide Hotline

The 888-CLEAN-LA hotline will serve as the general public reporting contact for reporting clogged catch basin inlets and illicit discharges/dumping, faded or lack of catch basin stencils, and general storm water management information. Each Permittee may establish its own hotline if preferred. Permittees shall include this information, updated when necessary, in public information, and the government pages of the telephone book, as they are developed or published. The Principal Permittee shall compile a list of the general public reporting contacts from all Permittees and make this information available on the web site (888CleanLA.com) and upon request. Permittees shall provide the Principal Permittee with their reporting contacts no later than March 1, 2002. Permittees are responsible for providing current, updated information to the Principal Permittee.

c) Outreach and Education

(1) The Principal Permittee shall continue to implement the following activities that were components of the first five-year PIPP:

(i) Advertising;

(ii) Media relations;

(iii) Public service announcements;

(iv) "How To" instructional material distributed in a targeted and activity-related manner;

(v) Corporate, community association, environmental organization and entertainment industry tie-ins; and

(vi) Events targeted to specific activities and population subgroups.

(2) The Principal Permittee shall develop a strategy to educate ethnic communities and businesses through culturally effective methods. Details of this strategy should be incorporated into the Public Education Program, and implemented, no later than February 3, 2003.

(3) The Principal Permittee shall enhance the existing outreach efforts to residents and businesses related to the proper disposal of cigarette butts.

(4) Each Permittee shall conduct educational activities within its jurisdiction and participate in countywide events.

(5) The Principal Permittee shall organize Public Outreach Strategy meetings for Permittees on a quarterly basis, beginning no later than May 1, 2002. The Principal Permittee shall provide guidance for Permittees to augment the countywide outreach and education program. Permittees shall coordinate regional and local outreach and education to reduce duplication of efforts. Permittees are encouraged to include other interested parties in the outreach strategy to strengthen and coordinate educational efforts.

(6) The Principal Permittee shall ensure that a minimum of 35 million impressions per year are made on the general public about storm water quality via print, local TV access, local radio, or other appropriate media.

(7) The Principal Permittee, in cooperation with the Permittees, shall provide schools within each School District in the County with materials, including, but not limited to, videos, live presentations, and other information necessary to educate a minimum of 50 percent of all school children (K-12) every 2 years on storm water pollution.

(8) Permittees shall provide the contact information for their appropriate staff responsible for storm water public education activities to the Principal Permittee no later than April 1, 2002, and changes to contact information no later than 30 days after a change occurs.

(9) The Principal Permittee shall develop a strategy to measure the effectiveness of in-school educational programs. The protocol shall include assessment of students' knowledge of storm water pollution problems and

solutions before and after educational efforts are conducted. The protocol shall be developed and submitted to the Regional Board Executive Officer for approval no later than May 1, 2002. It shall be implemented upon approval.

(10) In order to ensure that the PIPP is demonstrably effective in changing the behavior of the public, the Principal Permittee shall develop a behavioral change assessment strategy no later than May 1, 2002. The strategy shall be developed based on sociological data and studies (such as the County Segmentation Study). The Principal Permittee shall submit the assessment strategy to the Regional Board Executive Office for approval. It shall be implemented on approval.

d) Pollutant-Specific Outreach

The Principal Permittee, in cooperation with Permittees, shall coordinate to develop outreach programs that focus on the watershed-specific pollutants listed in Table 1 no later than February 3, 2003. Metals may be appropriately addressed through the Industrial/Commercial Facilities Program (e.g. distribute education materials on appropriate BMPs for metal waste management to facilities that have been identified as a potential source, such as metal fabricating facilities). Region-wide pollutants may be included in the Principal Permittee's mass media outreach efforts.

Table 1.	
Watershed	***Target Pollutants for Outreach***
Ballona Creek	Trash, Indicator Bacteria, Metals, PAHs
Malibu Creek	Trash, Nutrients (Nitrogen), Indicator Bacteria, Sediments
Los Angeles River	Trash, Nutrients (Nitrogen), Indicator Bacteria, Metals, Pesticides, PAHs
San Gabriel River	Trash, Nutrients (Nitrogen), Indicator Bacteria, Metals
Santa Clara River	Nutrients (Nitrogen), Coliform
Dominguez Channel	Trash, Indicator Bacteria, PAHs

Each Permittee shall make outreach materials available to the general public and target audiences, such as schools, community groups, contractors and developers, and at appropriate public counters and events. Outreach material shall include information on pollutants, sources of concern, and source abatement measures.

2. Businesses Program

a) Corporate Outreach

The Principal Permittee shall develop and implement a Corporate Outreach program to educate and inform corporate managers about storm water regulations. The program shall target RGOs and restaurant chains. At a minimum, this program shall include:

(1) Conferring with corporate management to explain storm water regulations;

(2) Distribution and discussion of educational material regarding storm water pollution and BMPs, and provide managers with suggestions to facilitate employee compliance with storm water regulations.

Corporate Outreach for all RGOs and restaurant chain corporations shall be conducted not less than twice during the permit term, with the first outreach contact to begin no later than February 3, 2003.

b) Business Assistance Program

The Principal Permittee and Permittees may implement a Business Assistance Program to provide technical resource assistance to small businesses to advise them on BMPs implementation to reduce the discharge of pollutants in storm water runoff. Programs may include:

(1) On-site technical assistance or consultation via telephone to identify and implement storm water pollution prevention methods and best management practices; and

(2) Making available, distributing, and discussing of applicable BMP and educational materials.

C. Industrial/Commercial Facilities Control Program

Each Permittee shall require implementation of pollutant reduction and control measures at industrial and commercial facilities, with the objective of reducing pollutants in storm water runoff. Except as specified in other sections of this Order, pollutant reduction and control measures can be used alone or in combination, and can include Structural and Source Control BMPs, and operation and maintenance procedures, which can be applied before, during, and/or after pollution generating activities. At a minimum, the Industrial/Commercial Facilities Control Program shall include requirements to: (1) track, (2) inspect, and (3) ensure compliance at industrial and commercial facilities that are critical sources of pollutants in storm water.

1. Track Critical Sources

a) Each Permittee shall maintain a watershed-based inventory or database of all facilities within its jurisdiction that are critical sources of storm water pollution. Critical sources to be tracked are summarized below, and also specified in Attachment B:

(1) Commercial Facilities

- restaurants;
- automotive service facilities; and
- RGOs and automotive dealerships.

(2) USEPA Phase I Facilities (Tier 1 and 2)

(3) Other Federally-mandated Facilities [as specified in 40 CFR 122.26(d)(2)(iv)(C)]

- municipal landfills;
- hazardous waste treatment, disposal, and recovery facilities; and
- facilities subject to SARA Title III (also known as EPCRA).

b) Each Permittee shall include the following minimum fields of information for each industrial and commercial facility:

- name of facility and name of owner/operator;
- address;
- coverage under the GIASP or other individual or general NPDES permits; and
- a narrative description including SIC codes that best reflects the industrial activities at and principal products of each facility.

The Regional Board encourages Permittees to add other fields of information, such as material usage and/or industrial output, and discrepancies between SIC Code designations (as reported by facility operators) and the actual type of industrial activity has the potential to pollute storm water. In addition, the Regional Board recommends use of an automated database system, such as a Geographical Information System (GIS) or Internet-based system; however, this is not required.

c) Each Permittee shall update its inventory of critical sources at least annually. The update may be accomplished through collection of new information obtained through field activities or through other readily available intra-agency informational databases (e.g. business licenses, pretreatment permits, sanitary sewer hook-up permits).

2. Inspect Critical Sources

Each Permittee shall inspect all facilities in the categories and at a level and frequency as specified in the following subsections.

a) Commercial Facilities

(1) Restaurants

Frequency of Inspections: Twice during the 5-year term of the Order, provided that the first inspection occurs no later than August 1, 2004, and that there is a minimum interval of one year in between the first compliance inspection and the second compliance inspection.

Level of inspections: Each Permittee, in cooperation with its appropriate department (such as health or public works), shall inspect all restaurants within its jurisdiction to confirm that storm water BMPs are being effectively implemented in compliance with State law, County and municipal ordinances, Regional Board Resolution 98-08, and the SQMP. At each restaurant, inspectors shall verify that the restaurant operator:

- has received educational materials on storm water pollution prevention practices;
- does not pour oil and grease or oil and grease residue onto a parking lot, street or adjacent catch basin;
- keeps the trash bin area clean and trash bin lids closed, and does not fill trash bins with washout water or any other liquid;
- does not allow illicit discharges, such as discharge of washwater from floormats, floors, porches, parking lots, alleys, sidewalks and street areas (in the immediate vicinity of the establishment), filters or garbage/trash containers;
- removes food waste, rubbish or other materials from parking lot areas in a sanitary manner that does not create a nuisance or discharge to the storm drain.

(2) Automotive Service Facilities

Frequency of Inspections: Twice during the 5-year term of the Order, provided that the first inspection occurs no later than August 1, 2004, and that there is a minimum interval of one year in between the first compliance inspection and the second compliance inspection.

Level of inspections: Each Permittee shall inspect all automotive service facilities within its jurisdiction to confirm that storm water BMPs are effectively implemented in compliance with County and municipal ordinances, Regional Board Resolution 98-08, and the SQMP. At each

automotive service facility, inspectors shall verify that each operator:

- maintains the facility area so that it is clean and dry and without evidence of excessive staining;
- implements housekeeping BMPs to prevent spills and leaks;
- properly discharges wastewaters to a sanitary sewer and/or contains wastewaters for transfer to a legal point of disposal;
- is aware of the prohibition on discharge of non-storm water to the storm drain;
- properly manages raw and waste materials including proper disposal of hazardous waste;
- protects outdoor work and storage areas to prevent contact of pollutants with rainfall and runoff;
- labels, inspects, and routinely cleans storm drain inlets that are located on the facility's property; and
- trains employees to implement storm water pollution prevention practices.

(3) Retail Gasoline Outlets and Automotive Dealerships

Frequency of Inspection: Twice during the 5-year term of the Order, provided that the first inspection occurs no later than August 1, 2004, and that there is a minimum interval of one year in between the first compliance inspection and the second compliance inspection.

Level of Inspection: Each Permittee shall confirm that BMPs are being effectively implemented at each RGO and automotive dealership within its jurisdiction, in compliance with the SQMP, Regional Board Resolution 98-08, and the Stormwater Quality Task Force Best Management Practice Guide for RGOs. At each RGO and automotive dealership, inspectors shall verify that each operator:

- routinely sweeps fuel-dispensing areas for removal of litter and debris, and keeps rags and absorbents ready for use in case of leaks and spills;
- is aware that washdown of facility area to the storm drain is prohibited;
- is aware of design flaws (such as grading that doesn't prevent run-on, or inadequate roof covers and berms), and that equivalent BMPs are implemented;
- inspects and cleans storm drain inlets and catch basins within each facility's boundaries no later than October 1st of each year;

- posts signs close to fuel dispensers, which warn vehicle owners/operators against "topping off" of vehicle fuel tanks and installation of automatic shutoff fuel dispensing nozzles;
- routinely checks outdoor waste receptacle and air/water supply areas, cleans leaks and drips, and ensures that only watertight waste receptacles are used and that lids are closed; and
- trains employees to properly manage hazardous materials and wastes as well as to implement other storm water pollution prevention practices.

b) Phase I Facilities

Permittees need not inspect facilities that have been inspected by the Regional Board within the past 24 months. For the remaining Phase I facilities that the Regional Board has not inspected, each Permittee shall conduct compliance inspections as specified below.

Frequency of Inspection

Facilities in Tier 1 Categories: Twice during the 5-year term of the Order, provided that the first inspection occurs no later than August 1, 2004, and that there is a minimum interval of one year in between the first compliance inspection and the second compliance inspection.

Facilities in Tier 2 Categories: Twice during the 5-year term of the permit, provided that the first inspection occurs no later than August 1, 2004. Permittees need not perform additional inspections at those facilities determined to have no risk of exposure of industrial activity to storm water. For those facilities that do have exposure of industrial activities to storm water, a Permittee may reduce the frequency of additional compliance inspections to once every 5 years, provided that the Permittee inspects at least 20% of the facilities in Tier 2 each year.

Level of Inspection: Each Permittee shall confirm that each operator:

- has a current Waste Discharge Identification (WDID) number for facilities discharging storm water associated with industrial activity, and that a Storm Water Pollution Prevention Plan is available on-site, and
- is effectively implementing BMPs in compliance with County and municipal ordinances, Regional Board Resolution 98-08, and the SQMP.

c) Other Federally-mandated Facilities

Frequency of Inspection: Twice during the 5-year term of the Order, provided that the first inspection occurs no later than August 1, 2004, and that there is a minimum interval of one year in between the first compliance inspection and the second compliance inspection.

Level of Inspection: Each Permittee shall confirm that each operator:

- has a current Waste Discharge Identification (WDID) number for facilities discharging storm water associated with industrial activity, and that a Storm Water Pollution Prevention Plan is available on-site, and
- is effectively implementing BMPs in compliance with County and municipal ordinances, Regional Board Resolution 98-08, and the SQMP.

3. Ensure Compliance of Critical Sources

a) **BMP Implementation:** In the event that a Permittee determines that a BMP specified by the SQMP or Regional Board Resolution 98-08 is infeasible at any site, that Permittee shall require implementation of other BMPs that will achieve the equivalent reduction of pollutants in the storm water discharges. Likewise, for those BMPs that are not adequate to achieve water quality objectives, Permittees may require additional site-specific controls, such as Treatment Control BMPs.

b) **Environmentally Sensitive Areas and Impaired Waters:** For critical sources that are in ESAs or that are tributary to CWA § 303(d) impaired water bodies, Permittees shall consider requiring operators to implement additional controls to reduce pollutants in storm water runoff that are causing or contributing to the exceedences of Water Quality Objectives.

c) **Progressive Enforcement:** Each Permittee shall implement a progressive enforcement policy to ensure that facilities are brought into compliance with all storm water requirements within a reasonable time period as specified below.

(1) In the event that a Permittee determines, based on an inspection conducted above, that an operator has failed to adequately implement all necessary BMPs, that Permittee shall take progressive enforcement action which, at a minimum, shall include a follow-up inspection within 4 weeks from the date of the initial inspection.

(2) In the event that a Permittee determines that an operator has failed to adequately implement BMPs after a follow-up inspection, that Permittee shall take further enforcement action as established through authority in its municipal code and ordinances or through the judicial system.

(3) Each Permittee shall maintain records, including inspection reports, warning letters, notices of violations, and other enforcement records, demonstrating a good faith effort to bring facilities into compliance.

d) Interagency Coordination

(1) **Referral of Violations of the SQMP, Regional Board Resolution 98-08, and Municipal Storm Water Ordinances:** A Permittee may refer a violation(s) to the Regional Board provided that that Permittee has made a good faith effort of progressive enforcement. At a minimum, a Permittee's good faith effort must include documentation of:

- Two follow-up inspections, and
- Two warning letters or notices of violation.

(2) **Referral of Violations of the GIASP, including Requirements to File a Notice of Intent:** For those facilities in violation of the GIASP, Permittees may escalate referral of such violations to the Regional Board after one inspection and one written notice to the operator regarding the violation. In making such referrals, Permittees shall include, at a minimum, the following documentation:

- Name of the facility;
- Operator of the facility;
- Owner of the facility;
- Industrial activity being conducted at the facility that is subject to the GIASP; and
- Records of communication with the facility operator regarding the violation, which shall include at least an inspection report and one written notice of the violation.

Permittees shall, at a minimum, make such referrals on a quarterly basis.

(3) **Investigation of Complaints Regarding Facilities – Transmitted by the Regional Board Staff:** Each Permittee shall initiate, within one business day, investigation of complaints (other than non-storm water discharges) regarding facilities within its jurisdiction. The initial investigation shall include, at a minimum, a limited

inspection of the facility to confirm the complaint to determine if the facility is effectively complying with the SQMP and municipal storm water/urban runoff ordinances, and to oversee corrective action.

(4) **Support of Regional Board Enforcement Actions:** As directed by the Regional Board Executive Officer, Permittees shall support Regional Board enforcement actions by: assisting in identification of current owners, operators, and lessees of facilities; providing staff, when available, for joint inspections with Regional Board inspectors; appearing as witnesses in Regional Board enforcement hearings; and providing copies of inspection reports and other progressive enforcement documentation.

(5) **Participation in a Task Force:** The Permittees, Regional Board, and other stakeholders may form a Storm Water Task Force, the purpose of which is to communicate concerns regarding special cases of storm water violations by industrial and commercial facilities and to develop a coordinated approach to enforcement action.

D. Development Planning Program

The Permittees shall implement a development-planning program that will require all Planning Priority development and Redevelopment projects to:

- Minimize impacts from storm water and urban runoff on the biological integrity of Natural Drainage Systems and water bodies in accordance with requirements under CEQA (Cal. Pub. Resources Code § 21100), CWC § 13369, CWA § 319, CWA § 402(p), CWA § 404, CZARA § 6217(g), ESA § 7, and local government ordinances ;
- Maximize the percentage of pervious surfaces to allow percolation of storm water into the ground;
- Minimize the quantity of storm water directed to impervious surfaces and the MS4;
- Minimize pollution emanating from parking lots through the use of appropriate Treatment Control BMPs and good housekeeping practices;
- Properly design and maintain Treatment Control BMPs in a manner that does not promote the breeding of vectors; and
- Provide for appropriate permanent measures to reduce storm water pollutant loads in storm water from the development site.

1. Peak Flow Control

The Permittees shall control post-development peak storm water runoff discharge rates, velocities, and duration (peak flow control) in Natural

Drainage Systems (i.e., mimic pre-development hydrology) to prevent accelerated stream erosion and to protect stream habitat. Natural Drainage Systems are located in the following areas:

a) Malibu Creek;

b) Topanga Canyon Creek;

c) Upper Los Angeles River;

d) Upper San Gabriel River;

e) Santa Clara River; and

f) Los Angeles County Coastal streams (see Basin Plan Table 2-1).

The Principal Permittee in consultation with Permittees shall develop numerical criteria for peak flow control, based on the results of the Peak Discharge Impact Study (see Monitoring Program Section II.I).

Each Permittee shall, no later than February 1, 2005, implement numerical criteria for peak flow control.

A Permittee or group of Permittees may substitute for the countywide peak flow control criteria with a Hydromodification Control Plan (HCP), on approval by the Regional Board, in the following circumstances:

(1) Stream or watershed-specific conditions indicate the need for a different peak flow control criteria, and the alternative numerical criteria is developed through the application of hydrologic modeling and supporting field observations; or

(2) A watershed-wide plan has been developed for implementation of control measures to reduce erosion and stabilize drainage systems on a watershed basis.

2. Standard Urban Storm Water Mitigation Plans (SUSMPs)

a) Each Permittee shall amend codes and ordinances not later than August 1, 2002 to give legal effect to SUSMP changes contained in this Order. Changes to SUSMP requirements shall take effect not later than September 2, 2002.

b) Each Permittee shall require that a single-family hillside home:

(1) Conserve natural areas;

(2) Protect slopes and channels;

(3) Provide storm drain system stenciling and signage;

(4) Divert roof runoff to vegetated areas before discharge unless the diversion would result in slope instability; and

(5) Direct surface flow to vegetated areas before discharge unless the diversion would result in slope instability.

c) Each Permittee shall require that a SUSMP as approved by the Regional Board in Board Resolution No. R 00-02 be implemented for the following categories of developments:

(1) Ten or more unit homes (includes single family homes, multifamily homes, condominiums, and apartments);

(2) A 100,000 or more square feet of impervious surface area industrial/ commercial development;

(3) Automotive service facilities (SIC 5013, 5014, 5541, 7532-7534, and 7536-7539);

(4) Retail gasoline outlets;

(5) Restaurants (SIC 5812);

(6) Parking lots 5,000 square feet or more of surface area or with 25 or more parking spaces; and

(7) Redevelopment projects in subject categories that meet Redevelopment thresholds.

d) Each Permittee shall submit an ESA Delineation Map for its jurisdictional boundary, based on the Regional Board's ESA Definition, no later than June 3, 2002, for approval by the Regional Board Executive Officer in consultation with the California Department of Fish and Game, and the California Coastal Commission.

e) Each Permittee shall require the implementation of SUSMP provisions no later than September 2, 2002, for all projects located in or directly adjacent to or discharging directly to an ESA, where the development will:

(1) Discharge storm water and urban runoff that is likely to impact a sensitive biological species or habitat; and

(2) Create 2,500 square feet or more of impervious surface area.

3. Numerical Design Criteria

The Permittees shall require that post-construction Treatment Control BMPs incorporate, at a minimum, either a volumetric or flow based treatment control design standard, or both, as identified below to mitigate (infiltrate, filter or treat) storm water runoff:

a) Volumetric Treatment Control BMP

(1) The 85th percentile 24-hour runoff event determined as the maximized capture storm water volume for the area, from

the formula recommended in *Urban Runoff Quality Management, WEF Manual of Practice No. 23/ ASCE Manual of Practice No. 87, (1998)*; or

(2) The volume of annual runoff based on unit basin storage water quality volume, to achieve 80 percent or more volume treatment by the method recommended in *California Stormwater Best Management Practices Handbook – Industrial/ Commercial,* (1993); or

(3) The volume of runoff produced from a 0.75 inch storm event, prior to its discharge to a storm water conveyance system; or

(4) The volume of runoff produced from a historical-record based reference 24-hour rainfall criterion for "treatment" (0.75 inch average for the Los Angeles County area) that achieves approximately the same reduction in pollutant loads achieved by the 85th percentile 24-hour runoff event.

b) Flow Based Treatment Control BMP

(1) The flow of runoff produced from a rain event equal to at least 0.2 inches per hour intensity; or

(2) The flow of runoff produced from a rain event equal to at least two times the 85th percentile hourly rainfall intensity for Los Angeles County; or

(3) The flow of runoff produced from a rain event that will result in treatment of the same portion of runoff as treated using volumetric standards above.

4. Applicability of Numerical Design Criteria

The Permittees shall require the following categories of Planning Priority Projects to design and implement post-construction treatment controls to mitigate storm water pollution:

a) Single-family hillside residential developments of one acre or more of surface area;

b) Housing developments (includes single family homes, multifamily homes, condominiums, and apartments) of ten units or more;

c) A 100,000 square feet or more impervious surface area industrial/ commercial development;

d) Automotive service facilities (SIC 5013, 5014, 5541, 7532-7534 and 7536-7539) [5,000 square feet or more of surface area];

e) Retail gasoline outlets [5,000 square feet or more of impervious surface area and with projected Average Daily Traffic (ADT) of 100 or more vehicles]. Subsurface Treatment Control BMPs

which may endanger public safety (i.e., create an explosive environment) are considered not appropriate;

f) Restaurants (SIC 5812) [5,000 square feet or more of surface area];

g) Parking lots 5,000 square feet or more of surface area or with 25 or more parking spaces;

h) Projects located in, adjacent to or discharging directly to an ESA that meet threshold conditions identified above in 2.e; and

i) Redevelopment projects in subject categories that meet Redevelopment thresholds.

5. Not later than March 10, 2003, each Permittee shall require the implementation of SUSMP and post-construction control requirements for the industrial/commercial development category to projects that disturb one acre or more of surface area.

6. Site Specific Mitigation

Each Permittee shall, no later than September 2, 2002, require the implementation of a site-specific plan to mitigate post-development storm water for new development and redevelopment not requiring a SUSMP but which may potentially have adverse impacts on post-development storm water quality, where one or more of the following project characteristics exist:

a) Vehicle or equipment fueling areas;

b) Vehicle or equipment maintenance areas, including washing and repair;

c) Commercial or industrial waste handling or storage;

d) Outdoor handling or storage of hazardous materials;

e) Outdoor manufacturing areas;

f) Outdoor food handling or processing;

g) Outdoor animal care, confinement, or slaughter; or

h) Outdoor horticulture activities.

7. Redevelopment Projects

The Permittees shall apply the SUSMP, or site specific requirements including post-construction storm water mitigation to all Planning Priority Projects that undergo significant Redevelopment in their respective categories.

a) Significant Redevelopment means land-disturbing activity that results in the creation or addition or replacement of 5,000 square

feet or more of impervious surface area on an already developed site.

Where Redevelopment results in an alteration to more than fifty percent of impervious surfaces of a previously existing development, and the existing development was not subject to post development storm water quality control requirements, the entire project must be mitigated. Where Redevelopment results in an alteration to less than fifty percent of impervious surfaces of a previously existing development, and the existing development was not subject to post development storm water quality control requirements, only the alteration must be mitigated, and not the entire development.

b) Redevelopment does not include routine maintenance activities that are conducted to maintain original line and grade, hydraulic capacity, original purpose of facility or emergency redevelopment activity required to protect public health and safety.

c) Existing single family structures are exempt from the Redevelopment requirements.

8. Maintenance Agreement and Transfer

Each Permittee shall require that all developments subject to SUSMP and site specific plan requirements provide verification of maintenance provisions for Structural and Treatment Control BMPs, including but not limited to legal agreements, covenants, CEQA mitigation requirements, and or conditional use permits. Verification at a minimum shall include:

a) The developer's signed statement accepting responsibility for maintenance until the responsibility is legally transferred; and either

b) A signed statement from the public entity assuming responsibility for Structural or Treatment Control BMP maintenance and that it meets all local agency design standards; or

c) Written conditions in the sales or lease agreement, which requires the recipient to assume responsibility for maintenance and conduct a maintenance inspection at least once a year; or

d) Written text in project conditions, covenants and restrictions (CCRs) for residential properties assigning maintenance responsibilities to the Home Owners Association for maintenance of the Structural and Treatment Control BMPs; or

e) Any other legally enforceable agreement that assigns responsibility for the maintenance of post-construction Structural or Treatment Control BMPs.

9. Regional Storm Water Mitigation Program

A Permittee or Permittee group may apply to the Regional Board for approval of a regional or sub-regional storm water mitigation program to substitute in part or wholly SUSMP requirements. Upon review and a determination by the Regional Board Executive Officer that the proposal is technically valid and appropriate, the Regional Board may consider for approval such a program if its implementation will:

a) Result in equivalent or improved storm water quality;

b) Protect stream habitat;

c) Promote cooperative problem solving by diverse interests;

d) Be fiscally sustainable and has secure funding; and

e) Be completed in five years including the construction and start-up of treatment facilities.

Nothing in this provision shall be construed as to delay the implementation of SUSMP requirements, as approved in this Order.

10. Mitigation Funding

The Permittees may propose a management framework, for endorsement by the Regional Board Executive Officer, to support regional or sub-regional solutions to storm water pollution, where any of the following situations occur:

a) A waiver for impracticability is granted;

b) Legislative funds become available;

c) Off-site mitigation is required because of loss of environmental habitat; or

d) An approved watershed management plan or a regional storm water mitigation plan exists that incorporates an equivalent or improved strategy for storm water mitigation.

11. California Environmental Quality Act (CEQA) Document Update

Each Permittee shall incorporate into its CEQA process, with immediate effect, procedures for considering potential storm water quality impacts and providing for appropriate mitigation when preparing and reviewing CEQA documents. The procedures shall require consideration of the following:

a) Potential impact of project construction on storm water runoff;

b) Potential impact of project post-construction activity on storm water runoff;

c) Potential for discharge of storm water from areas from material storage, vehicle or equipment fueling, vehicle or equipment maintenance (including washing), waste handling, hazardous

materials handling or storage, delivery areas or loading docks, or other outdoor work areas;

d) Potential for discharge of storm water to impair the beneficial uses of the receiving waters or areas that provide water quality benefit;

e) Potential for the discharge of storm water to cause significant harm on the biological integrity of the waterways and water bodies;

f) Potential for significant changes in the flow velocity or volume of storm water runoff that can cause environmental harm; and

g) Potential for significant increases in erosion of the project site or surrounding areas.

12. General Plan Update

a) Each Permittee shall amend, revise or update its General Plan to include watershed and storm water quality and quantity management considerations and policies when any of the following General Plan elements are updated or amended: (i) Land Use, (ii) Housing, (iii) Conservation, and (iv) Open Space.

b) Each Permittee shall provide the Regional Board with the draft amendment or revision when a listed General Plan element or the General Plan is noticed for comment in accordance with Cal. Govt. Code § 65350 *et seq*.

13. Targeted Employee Training

Each Permittee shall train its employees in targeted positions (whose jobs or activities are engaged in development planning) regarding the development planning requirements on an annual basis beginning no later than August 1, 2002, and more frequently if necessary. For Permittees with a population of 250,000 or more (2000 U.S. Census), training shall be completed no later than February 3, 2003.

14. Developer Technical Guidance and Information

a) Each Permittee shall develop and make available to the developer community SUSMP (development planning) guidelines immediately.

b) The Principal Permittee in partnership with Permittees shall issue no later than February 2, 2004, a technical manual for the siting and design of BMPs for the development community in Los Angeles County. The technical manual may be adapted from the revised California Storm Water Quality Task Force Best Management Practices Handbooks scheduled for publication in September 2002. The technical manual shall at a minimum include:

(1) Treatment Control BMPs based on flow-based and volumetric water quality design criteria for the purposes of countywide consistency;

(2) Peak Flow Control criteria to control peak discharge rates, velocities and duration;

(3) Expected pollutant removal performance ranges obtained from national databases, technical reports and the scientific literature;

(4) Maintenance considerations; and

(5) Cost considerations.

E. Development Construction Program

1. Each Permittee shall implement a program to control runoff from construction activity at all construction sites within its jurisdiction. The program shall ensure the following minimum requirements are effectively implemented at all construction sites:

   a) Sediments generated on the project site shall be retained using adequate Treatment Control or Structural BMPs;

   b) Construction-related materials, wastes, spills, or residues shall be retained at the project site to avoid discharge to streets, drainage facilities, receiving waters, or adjacent properties by wind or runoff;

   c) Non-storm water runoff from equipment and vehicle washing and any other activity shall be contained at the project site; and

   d) Erosion from slopes and channels shall be controlled by implementing an effective combination of BMPs (as approved in Regional Board Resolution No. 99-03), such as the limiting of grading scheduled during the wet season; inspecting graded areas during rain events; planting and maintenance of vegetation on slopes; and covering erosion susceptible slopes.

2. For construction sites one acre and greater, each Permittee shall comply with all conditions in section E.1. above and shall:

   a) Require the preparation and submittal of a Local Storm Water Pollution Prevention Plan (Local SWPPP), for approval prior to issuance of a grading permit for construction projects.

   The Local SWPPP shall include appropriate construction site BMPs and maintenance schedules. (A Local SWPPP may substitute for the State SWPPP if the Local SWPPP is at least as inclusive in controls and BMPs as the State SWPPP). The Local SWPPP must include the rationale used for selecting or rejecting BMPs. The project architect, or engineer of record, or authorized

qualified designee, must sign a statement on the Local SWPPP to the effect:

"As the architect/engineer of record, I have selected appropriate BMPs to effectively minimize the negative impacts of this project's construction activities on storm water quality. The project owner and contractor are aware that the selected BMPs must be installed, monitored, and maintained to ensure their effectiveness. The BMPs not selected for implementation are redundant or deemed not applicable to the proposed construction activity."

The landowner or the landowner's agent shall sign a statement to the effect:

"I certify that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, to the best of my knowledge and belief, the information submitted is true, accurate, and complete. I am aware that submitting false and/or inaccurate information, failing to update the Local SWPPP to reflect current conditions, or failing to properly and/or adequately implement the Local SWPPP may result in revocation of grading and/or other permits or other sanctions provided by law."

The Local SWPPP certification shall be signed by the landowner as follows, for a corporation: by a responsible corporate officer which means (a) a president, secretary, treasurer, or vice president of the corporation in charge of a principal business function, or any other person who performs similar policy or decision-making functions for the corporation, or (b) the manager of the construction activity if authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures; for a partnership or sole proprietorship: by a general partner or the proprietor; or for a municipality or other public agency: by an elected official, a ranking management official (e.g., County Administrative Officer, City Manager, Director of Public Works, City Engineer, District Manager), or the manager of the construction activity if authority to sign Local SWPPPs has been assigned or delegated to the manager in accordance with established agency policy.

b) Inspect all construction sites for storm water quality requirements during routine inspections a minimum of once during the wet season. The Local SWPPP shall be reviewed for compliance with local codes, ordinances, and permits. For inspected sites that have not adequately implemented their Local SWPPP, a follow-up inspection to ensure compliance will take place within 2 weeks. If compliance has not been attained, the Permittee will take additional actions to achieve compliance (as specified in municipal

codes). If compliance has not been achieved, and the site is also covered under a statewide general construction storm water permit, each Permittee shall enforce their local ordinance requirements, and if non-compliance continues the Regional Board shall be notified for further joint enforcement actions.

c) Require, no later than March 10, 2003, prior to issuing a grading permit for all projects less than five acres requiring coverage under a statewide general construction storm water permit, proof of a Waste Discharger Identification (WDID) Number for filing a Notice of Intent (NOI) for permit coverage and a certification that a SWPPP has been prepared by the project developer. A Local SWPPP may substitute for the State SWPPP if the Local SWPPP is at least as inclusive in controls and BMPs as the State SWPPP.

3. For sites five acres and greater, each Permittee shall comply with all conditions in Sections E.1. and E.2. and shall:

a) Require, prior to issuing a grading permit for all projects requiring coverage under the state general permit, proof of a Waste Discharger Identification (WDID) Number for filing a Notice of Intent (NOI) for coverage under the GCASP and a certification that a SWPPP has been prepared by the project developer. A Local SWPPP may substitute for the State SWPPP if the Local SWPPP is at least as inclusive in controls and BMPs as the State SWPPP.

b) Require proof of an NOI and a copy of the SWPPP at any time a transfer of ownership takes place for the entire development or portions of the common plan of development where construction activities are still on-going.

c) Use an effective system to track grading permits issued by each Permittee. To satisfy this requirement, the use of a database or GIS system is encouraged, but not required.

4. GCASP Violation Referrals

a) Referral of Violations of the SQMP, Regional Board Resolution 98-08, and municipal storm water ordinances:

A Permittee may refer a violation(s) to the Regional Board provided that the Permittee has made a good faith effort of progressive enforcement. At a minimum, a Permittee's good faith effort must include documentation of:

- Two follow-up inspections within 3 months, and
- Two warning letters or notices of violation.

b) Referral of Violations of GCASP Filing Requirements:

For those projects subject to the GCASP, Permittees shall refer non-filers (i.e., those projects which cannot demonstrate that they have a WDID number) to the Regional Board, within 15 days of

making a determination. In making such referrals, Permittees shall include, at a minimum, the following documentation:

- Project location;
- Developer;
- Estimated project size; and
- Records of communication with the developer regarding filing requirements.

5. Each Permittee shall train employees in targeted positions (whose jobs or activities are engaged in construction activities including construction inspection staff) regarding the requirements of the storm water management program no later than August 1, 2002, and annually thereafter. For Permittees with a population of 250,000 or more (2000 U.S. Census), initial training shall be completed no later than February 3, 2003. Each Permittee shall maintain a list of trained employees.

F. Public Agency Activities Program

Each Permittee shall implement a Public Agency program to minimize storm water pollution impacts from public agency activities. Public Agency requirements consist of:

- Sewage Systems Maintenance, Overflow, and Spill Prevention
- Public Construction Activities Management
- Vehicle Maintenance/Material Storage Facilities/Corporation Yards Management
- Landscape and Recreational Facilities Management
- Storm Drain Operation and Management
- Streets and Roads Maintenance
- Parking Facilities Management
- Public Industrial Activities Management
- Emergency Procedures
- Treatment Feasibility Study

1. Sewage System Maintenance, Overflow, and Spill Prevention

   a) Each Permittee shall implement a response plan for overflows of the sanitary sewer system within their respective jurisdiction, which shall consist at a minimum of the following:

      (1) Investigation of any complaints received;

      (2) Upon notification, immediate response to overflows for containment; and

      (3) Notification to appropriate sewer and public health agencies when a sewer overflows to the MS4.

   b) In addition to 1.a.1, 1.a.2, and 1.a.3 above, for those Permittees, which own and/or operate a sanitary sewer system, the Permittee shall also implement the following requirements:

(1) Procedures to prevent sewage spills or leaks from sewage facilities from entering the MS4; and

(2) Identify, repair, and remediate sanitary sewer blockages, exfiltration, overflow, and wet weather overflows from sanitary sewers to the MS4.

2. Public Construction Activities Management

a) Each Permittee shall implement the Development Planning Program requirements (Permit Part 4.D) at public construction projects.

b) Each Permittee shall implement the Development Construction Program requirements (Permit Part 4.E) at Permittee owned construction sites.

c) Each Permittee shall obtain coverage under the GCASP for public construction sites 5 acres or greater (or part of a larger area of development) except that a municipality under 100,000 in population (1990 U.S. Census) need not obtain coverage under a separate permit until March 10, 2003.

d) Each Permittee, no later than March 10, 2003, shall obtain coverage under a statewide general construction storm water permit for public construction sites for projects between one and five acres.

3. Vehicle Maintenance/Material Storage Facilities/Corporation Yards Management

a) Each Permittee, consistent with the SQMP, shall implement SWPPPs for public vehicle maintenance facilities, material storage facilities, and corporation yards which have the potential to discharge pollutants into storm water.

b) Each Permittee shall implement BMPs to minimize pollutant discharges in storm water including but not be limited to:

(1) Good housekeeping practices;

(2) Material storage control;

(3) Vehicle leaks and spill control; and

(4) Illicit discharge control.

c) Each Permittee shall implement the following measures to prevent the discharge of pollutants to the MS4:

(1) For existing facilities, that are not already plumbed to the sanitary sewer, all vehicle and equipment wash areas (except for fire stations) shall either be:

(i) Self-contained;

(ii) Equipped with a clarifier;

(iii) Equipped with an alternative pre-treatment device; or

(iv) Plumbed to the sanitary sewer.

(2) For new facilities, or during redevelopment of existing facilities (including fire stations), all vehicle and equipment wash areas shall be plumbed to the sanitary sewer and be equipped with a pre-treatment device in accordance with requirements of the sewer agency.

4. Landscape and Recreational Facilities Management

Each Permittee shall implement the following requirements:

a) A standardized protocol for the routine and non-routine application of pesticides, herbicides (including pre-emergents), and fertilizers;

b) Consistency with State Board's guidelines and monitoring requirements for application of aquatic pesticides to surface waters (WQ Order No. 2001-12 DWQ);

c) Ensure no application of pesticides or fertilizers immediately before, during, or immediately after a rain event or when water is flowing off the area to be applied;

d) Ensure that no banned or unregistered pesticides are stored or applied;

e) Ensure that staff applying pesticides are certified by the California Department of Food and Agriculture, or are under the direct supervision of a certified pesticide applicator;

f) Implement procedures to encourage retention and planting of native vegetation and to reduce water, fertilizer, and pesticide needs;

g) Store fertilizers and pesticides indoors or under cover on paved surfaces or use secondary containment;

h) Reduce the use, storage, and handling of hazardous materials to reduce the potential for spills; and

i) Regularly inspect storage areas.

5. Storm Drain Operation and Management

a) Each Permittee shall designate catch basin inlets within its jurisdiction as one of the following:

Priority A: Catch basins that are designated as consistently generating the highest volumes of trash and/or debris.

Priority B: Catch basins that are designated as consistently generating moderate volumes of trash and/or debris.

Priority C: Catch basins that are designated as generating low volumes of trash and/or debris.

b) Permittees subject to a trash TMDL (Los Angeles River and Ballona Creek WMAs) shall continue to implement the requirements listed below until trash TMDL implementation measures are adopted. Thereafter, the subject Permittees shall implement programs in conformance with the TMDL implementation schedule, which shall include an effective combination of measures such as street sweeping, catch basin cleaning, installation of treatment devices and trash receptacles, or other BMPs. Default requirements include:

(1) Inspection and cleaning of catch basins between May 1 and September 30 of each year;

(2) Additional cleaning of any catch basin that is at least 40% full of trash and/or debris;

(3) Record keeping of catch basins cleaned; and

(4) Recording of the overall quantity of catch basin waste collected.

If the implementation phase for the Los Angeles River and Ballona Creek Trash TMDLs has not begun by October 2003, subject Permittees shall implement the requirements described below in subsection 5(c), until such time programs in conformance with the subject Trash TMDLs are being implemented.

c) Permittees not subject to a trash TMDL shall:

(1) Clean catch basins according to the following schedule:

Priority A: A minimum of three times during the wet season and once during the dry season every year.

Priority B: A minimum of once during the wet season and once during the dry season every year.

Priority C: A minimum of once per year.

In addition to the schedule above, between February 1, 2002 and July 1, 2003, Permittees shall ensure that any catch basin that is at least 40% full of trash and/or debris shall be cleaned out. After July 1, 2003, Permittees shall ensure that any catch basin that is at least 25% full of trash and debris shall be cleaned out.

(2) For any special event that can be reasonably expected to generate substantial quantities of trash and litter, include provisions that require for the proper management of trash and litter generated, as a condition of the special use permit issued for that event. At a minimum, the municipality who issues the permit for the special event shall arrange for either temporary screens to be placed on catch basins or for catch basins in that area to be cleaned out subsequent to the event and prior to any rain event.

(3) Place trash receptacles at all transit stops within its jurisdiction that have shelters no later than August 1, 2002, and at all other transit stops within its jurisdiction no later than February 3, 2003. All trash receptacles shall be maintained as necessary.

d) Each Permittee shall inspect the legibility of the catch basin stencil or label nearest the inlet. Catch basins with illegible stencils shall be recorded and re-stenciled or re-labeled within 180 days of inspection.

e) Each Permittee shall implement BMPs for Storm Drain Maintenance that include:

(1) A program to visually monitor Permittee-owned open channels and other drainage structures for debris at least annually and identify and prioritize problem areas of illicit discharge for regular inspection;

(2) A review of current maintenance activities to assure that appropriate storm water BMPs are being utilized to protect water quality;

(3) Removal of trash and debris from open channel storm drains shall occur a minimum of once per year before the storm season;

(4) Minimize the discharge of contaminants during MS4 maintenance and clean outs; and

(5) Proper disposal of material removed.

6. Streets and Roads Maintenance

a) Each Permittee shall designate streets and/or street segments within its jurisdiction as one of the following:

Priority A: Streets and/or street segments that are designated as consistently generating the highest volumes of trash and/or debris.

Priority B: Streets and/or street segments that are designated as consistently generating moderate volumes of trash and/or debris.

Priority C: Streets and/or street segments that are designated as generating low volumes of trash and/or debris.

b) Each Permittee shall perform street sweeping of curbed streets according to the following schedule:

Priority A: These streets and/or street segments shall be swept at least two times per month.

Priority B: Each Permittee shall ensure that each street and/or street segments is swept at least once per month.

Priority C: These streets and/or street segments shall be swept as necessary but in no case less than once per year.

c) Each Permittee shall require that:

(1) Sawcutting wastes be recovered and disposed of properly and that in no case shall waste be left on a roadway or allowed to enter the storm drain;

(2) Concrete and other street and road maintenance materials and wastes shall be managed to prevent discharge to the MS4; and

(3) The washout of concrete trucks and chutes shall only occur in designated areas and never discharged to storm drains, open ditches, streets, or catch basins.

d) Each Permittee shall, no later than August 1, 2002, train their employees in targeted positions (whose interactions, jobs, and activities affect storm water quality) regarding the requirements of the storm water management program to:

(1) Promote a clear understanding of the potential for maintenance activities to pollute storm water; and

(2) Identify and select appropriate BMPs.

For Permittees with a population of 250,000 or more (2000 U.S. Census) training shall be completed no later than February 1, 2003.

7. Parking Facilities Management

Permittee-owned parking lots exposed to storm water shall be kept clear of debris and excessive oil buildup and cleaned no less than 2 times per month and/or inspected no less than 2 times per month to determine if cleaning is necessary. In no case shall a Permittee-owned parking lot be cleaned less than once a month.

8. Public Industrial Activities Management

Each Permittee shall, for any municipal activity considered a discharge of storm water associated with industrial activity, obtain separate coverage under the GIASP except that a municipality under 100,000 in population (1990 U.S. Census) need not file the Notice Of Intent to be covered by said permit until March 10, 2003 (with the exception of power plants, airports, and uncontrolled sanitary landfills).

9. Emergency Procedures

Each Permittee shall repair essential public services and infrastructure in a manner to minimize environmental damage in emergency situations such as: earthquakes; fires; floods; landslides; or windstorms. BMPs shall be implemented to the extent that measures do not compromise public health and safety. After initial emergency response or emergency repair activities have been completed, each Permittee shall implement BMPs and programs as required under this Order.

10. Treatment Feasibility Study

The Permittees in cooperation with the County Sanitation Districts of Los Angeles County shall conduct a study to investigate the possible diversion of dry weather discharges or the use of alternative Treatment Control BMPs to treat flows from their jurisdiction which may impact public health and safety and/or the environment. The Permittees shall collectively review their individual prioritized lists and create a watershed based priority list of drains for potential diversion or treatment and submit the priority listing to the Regional Board Executive Officer, no later than July 1, 2003.

G. Illicit Connections and Illicit Discharges Elimination Program

Permittees shall eliminate all illicit connections and illicit discharges to the storm drain system, and shall document, track, and report all such cases in accordance

with the elements and performance measures specified in the following subsections.

1. General

   a) Implementation: Each Permittee must develop an Implementation Program which specifies how each Permittee is implementing revisions to the IC/ID Program of the SQMP. This Implementation Program must be documented, and available for review and approval by the Regional Board Executive Officer, upon request.

   b) Tracking: All Permittees shall, no later than February 3, 2003, develop and maintain a listing of all permitted connections to their storm drain system. All Permittees shall map at a scale and in a format specified by the Principal Permittee all illicit connections and discharges on their baseline maps, and shall transmit this information to the Principal Permittee. No later than February 3, 2003, the Principal Permittee shall use this information as well as results of baseline and priority screening for illicit connections (as set forth in subsection 2 below) to start an annual evaluation of patterns and trends of illicit connections and illicit discharges, with the objectives of identifying priority areas for elimination of illicit connections and illicit discharges.

   c) Training: All Permittees shall train all targeted employees who are responsible for identification, investigation, termination, cleanup, and reporting of illicit connections and discharges. For Permittees with a population of less than 250,000 (2000 U.S. Census), training shall be completed no later than August 1, 2002. For Permittees with a population of 250,000 or more (2000 U.S. Census), training shall be completed no later than February 3, 2003. Furthermore, all Permittees shall conduct refresher training on an annual basis thereafter.

2. Illicit Connections

   a) Screening for Illicit Connections

      (1) Field Screening: All Permittees shall field Screen the storm drain system for illicit connections in accordance with the following schedule:

         (i) Open channels: No later than February 3, 2003;

         (ii) Underground pipes in priority areas: No later than February 1, 2005; and

         (iii) Underground pipes with a diameter of 36 inches or greater: No later than December 12, 2006.

      Permittees shall report, to the Principal Permittee, on the location and length of open channels or underground pipes that have been Screened *vis a vis* the entire storm drain

network, and on the status of suspected, confirmed, and terminated illicit connections. Permittees shall maintain a list containing all permitted connections and the status of connections under investigation for possible illicit connection.

(2) Permit Screening: No later than December 12, 2006, Permittees shall complete a review of all permitted connections to the storm drain system, to confirm compliance with Part 1 (Discharge Prohibition).

b) Response to Illicit Connections

(1) Investigation: Upon discovery or upon receiving a report of a suspected illicit connection, Permittees shall initiate an investigation within 21 days, to determine the source of the connection, the nature and volume of discharge through the connection, and the responsible party for the connection.

(2) Termination: Upon confirmation of the illicit nature of a storm drain connection, Permittees shall ensure termination of the connection within 180 days, using enforcement authority as needed.

3. Illicit Discharges

a) Abatement and Cleanup: Permittees shall respond, within one business day of discovery or a report of a suspected illicit discharge, with activities to abate, contain, and clean up all illicit discharges, including hazardous substances.

b) Investigation: Permittees shall investigate illicit discharges as soon as practicable (during or immediately following containment and cleanup activities), and shall take enforcement action as appropriate.

Part 5. DEFINITIONS

The following are definitions for terms applicable to this Order:

"Adverse Impact" means a detrimental effect upon water quality or beneficial uses caused by a discharge or loading of a pollutant or pollutants.

"Anti-degradation policies" means the *Statement of Policy with Respect to Maintaining High Quality Water in California* (State Board Resolution No. 68-16) which protects surface and ground waters from degradation. In particular, this policy protects waterbodies where existing quality is higher than that necessary for the protection of beneficial uses including the protection of fish and wildlife propagation and recreation on and in the water.

"Applicable Standards and Limitations" means all State, interstate, and federal standards and limitations to which a "discharge" or a related activity is subject under the CWA, including

"effluent limitations, "water quality standards, standards of performance, toxic effluent standards or prohibitions, "best management practices," and pretreatment standards under sections 301, 302, 303, 304, 306, 307, 308, 403 and 404 of CWA.

"**Areas of Special Biological Significance (ASBS)**" means all those areas of this state as ASBS, listed specifically within the California Ocean Plan or so designated by the State Board which, among other areas, includes the area from Mugu Lagoon to Latigo Point: Oceanwater within a line originating from Laguna Point at 34° 5' 40" north, 119° 6'30" west, thence southeasterly following the mean high tideline to a point at Latigo Point defined by the intersection of the meanhigh tide line and a line extending due south of Benchmark 24; thence due south to a distance of 1000 feet offshore or to the 100 foot isobath, whichever distance is greater; thence northwesterly following the 100 foot isobath or maintaining a 1,000-foot distance from shore, whichever maintains the greater distance from shore, to a point lying due south of Laguna Point, thence due north to Laguna Point.

"Authorized Discharge" means any discharge that is authorized pursuant to an NPDES permit or meets the conditions set forth in this Order.

"Automotive Service Facilities" means a facility that is categorized in any one of the following Standard Industrial Classification (SIC) codes: 5013, 5014, 5541, 5511, 7532-7534, or 7536-7539. For inspection purposes, Permittees need not inspect facilities with SIC codes 5013, 5014, 5541, 5511, provided that these facilities have no outside activities or materials that may be exposed to storm water.

"Basin Plan" means the Water Quality Control Plan, Los Angeles Region, Basin Plan for the Coastal Watersheds of Los Angeles and Ventura Counties, adopted by the Regional Board on June 13, 1994 and subsequent amendments.

"Beneficial Uses" means the existing or potential uses of receiving waters in the permit area as designated by the Regional Board in the Basin Plan.

"Best Management Practices (BMPs)" means methods, measures, or practices designed and selected to reduce or eliminate the discharge of pollutants to surface waters from point and nonpoint source discharges including storm water. BMPs include structural and nonstructural controls, and operation and maintenance procedures, which can be applied before, during, and/or after pollution producing activities.

"Commercial Development" means any development on private land that is not heavy industrial or residential. The category includes, but is not limited to: hospitals, laboratories and other medical facilities, educational institutions, recreational facilities, plant nurseries, car wash facilities, mini-malls and other business complexes, shopping malls, hotels, office buildings, public warehouses and other light industrial complexes.

"Construction" means constructing, clearing, grading, or excavation that results in soil disturbance. Construction includes structure teardown. It does not include routine maintenance to maintain original line and grade, hydraulic capacity, or original purpose of facility; emergency construction activities required to immediately protect public health and safety; interior remodeling with no outside exposure of construction material or construction waste to storm water; mechanical permit work; or sign permit work.

"Control" means to minimize, reduce, eliminate, or prohibit by technological, legal, contractual or other means, the discharge of pollutants from an activity or activities.

"Dechlorinated/Debrominated Swimming Pool Discharge" means swimming pool discharges which have no measurable chlorine or bromine and do not contain any detergents, wastes, or additional chemicals not typically found in swimming pool water. The term does not include swimming pool filter backwash.

"Development" means any construction, rehabilitation, redevelopment or reconstruction of any public or private residential project (whether single-family, multi-unit or planned unit development); industrial, commercial, retail and other non-residential projects, including public agency projects; or mass grading for future construction. It does not include routine maintenance to maintain original line and grade, hydraulic capacity, or original purpose of facility, nor does it include emergency construction activities required to immediately protect public health and safety.

"Directly Adjacent" means situated within 200 feet of the contiguous zone required for the continued maintenance, function, and structural stability of the environmentally sensitive area.

"Director" means the Director of a municipality and Person(s) designated by and under the Director's instruction and supervision.

"Discharge" means when used without qualification the "discharge of a pollutant."

"**Discharging Directly**" means outflow from a drainage conveyance system that is composed entirely or predominantly of flows from the subject, property, development, subdivision, or industrial facility, and not commingled with the flows from adjacent lands.

"Discharge of a Pollutant" means: any addition of any "pollutant" or combination of pollutants to "waters of the United States" from any "point source" or, any addition of any pollutant or combination of pollutants to the waters of the "contiguous zone" or the ocean from any point source other than a vessel or other floating craft which is being used as a means of transportation. The term discharge includes additions of pollutants into waters of the United States from: surface runoff which is collected or channeled by man; discharges through pipes, sewers, or other conveyances owned by a State, municipality, or other person which do not lead to a treatment works; and discharges through pipes, sewers, or other conveyances, leading into privately owned treatment works.

"Disturbed Area" means an area that is altered as a result of clearing, grading, and/or excavation.

"Environmentally Sensitive Areas (ESAs)" means an area in which plant or animal life or their habitats are either rare or especially valuable because of their special nature or role in an ecosystem and which would be easily disturbed or degraded by human activities and developments (California Public Resources Code § 30107.5). Areas subject to storm water mitigation requirements are: areas designated as Significant Ecological Areas by the County of Los Angeles (*Los Angeles County Significant Areas Study, Los Angeles County Department of Regional Planning (1976)* and amendments); an area designated as a Significant Natural Area by the California Department of Fish and Game's Significant Natural Areas Program, provided that area has been field verified by the Department of Fish and Game; an area listed in the

Basin Plan as supporting the "Rare, Threatened, or Endangered Species (RARE)" beneficial use; and an area identified by a Permittee as environmentally sensitive.

"General Construction Activities Storm Water Permit (GCASP)" means the general NPDES permit adopted by the State Board which authorizes the discharge of storm water from construction activities under certain conditions.

"General Industrial Activities Storm Water Permit (GIASP)" means the general NPDES permit adopted by the State Board which authorizes the discharge of storm water from certain industrial activities under certain conditions.

"Hillside" means property located in an area with known erosive soil conditions, where the development contemplates grading on any natural slope that is 25% or greater and where grading contemplates cut or fill slopes.

"Illicit Connection" means any man-made conveyance that is connected to the storm drain system without a permit, excluding roof drains and other similar type connections. Examples include channels, pipelines, conduits, inlets, or outlets that are connected directly to the storm drain system.

"Illicit Discharge" means any discharge to the storm drain system that is prohibited under local, state, or federal statutes, ordinances, codes, or regulations. The term illicit discharge includes all non storm-water discharges except discharges pursuant to an NPDES permit, discharges that are identified in Part 1, "Discharge Prohibitions" of this order, and discharges authorized by the Regional Board Executive Officer.

"Illicit Disposal" means any disposal, either intentionally or unintentionally, of material(s) or waste(s) that can pollute storm water.

"Industrial/Commercial Facility" means any facility involved and/or used in the production, manufacture, storage, transportation, distribution, exchange or sale of goods and/or commodities, and any facility involved and/or used in providing professional and non-professional services. This category of facilities includes, but is not limited to, any facility defined by the Standard Industrial Classifications (SIC). Facility ownership (federal, state, municipal, private) and profit motive of the facility are not factors in this definition.

"Infiltration" means the downward entry of water into the surface of the soil.

"Inspection" means entry and the conduct of an on-site review of a facility and its operations, at reasonable times, to determine compliance with specific municipal or other legal requirements. The steps involved in performing an inspection, include, but are not limited to:

1. Pre-inspection documentation research.;
2. Request for entry;
3. Interview of facility personnel;
4. Facility walk-through.
5. Visual observation of the condition of facility premises;
6. Examination and copying of records as required;
7. Sample collection (if necessary or required);

8. Exit conference (to discuss preliminary evaluation); and,
9. Report preparation, and if appropriate, recommendations for coming into compliance.

In the case of restaurants, a Permittee may conduct an inspection from the curbside, provided that such "curbside" inspection provides the Permittee with adequate information to determine an operator's compliance with BMPs that must be implemented per requirements of this Order, Regional Board Resolution 98-08, County and municipal ordinances, and the SQMP.

"Large Municipal Separate Storm Sewer System (MS4)" means all MS4s that serve a population greater than 250,000 (1990 Census) as defined in 40 CFR 122.26 (b)(4). The Regional Board designated Los Angeles County as a large MS4 in 1990, based on: (i) the U.S. Census Bureau 1990 population count of 8.9 million, and (ii) the interconnectivity of the MS4s in the incorporated and unincorporated areas within the County.

"Local SWPPP" means the Storm Water Pollution Prevention Plan required by the local agency for a project that disturbs one or more acres of land.

"Maximum Extent Practicable (MEP)" means the standard for implementation of storm water management programs to reduce pollutants in storm water. CWA § 402(p)(3)(B)(iii) requires that municipal permits "shall require controls to reduce the discharge of pollutants to the maximum extent practicable, including management practices, control techniques and system, design and engineering methods, and such other provisions as the Administrator or the State determines appropriate for the control of such pollutants. See also State Board Order WQ 2000-11 at page 20.

"Method Detection Limit (MDL)" means the minimum concentration of a substance that can be measured and reported with 99 percent confidence that the analyte concentration is greater than zero, as defined in 40 CFR 136, Appendix B.

"Minimum Level (ML)" means the concentration at which the entire analytical system must give a recognizable signal and acceptable calibration point. The ML is the concentration in a sample that is equivalent to the concentration of the lowest calibration standard analyzed by a specific analytical procedure, assuming that all the method specified sample weights, volumes, and processing steps have been followed.

"Municipal Separate Storm Sewer System (MS4)" means a conveyance or system of conveyances (including roads with drainage systems, municipal streets, alleys, catch basins, curbs, gutters, ditches, manmade channels, or storm drains) owned by a State, city, county, town or other public body, that is designed or used for collecting or conveying storm water, which is not a combined sewer, and which is not part of a publicly owned treatment works, and which discharges to Waters of the United States.

"National Pollutant Discharge Elimination System (NPDES)" means the national program for issuing, modifying, revoking and reissuing, terminating, monitoring and enforcing permits, and imposing and enforcing pretreatment requirements, under CWA §307, 402, 318, and 405. The term includes an "approved program."

"Natural Drainage Systems" means unlined or unimproved (not engineered) creeks, streams, rivers or similar waterways.

"New Development" means land disturbing activities; structural development, including construction or installation of a building or structure, creation of impervious surfaces; and land subdivision.

"Non-Storm Water Discharge" means any discharge to a storm drain that is not composed entirely of storm water.

"Nuisance" means anything that meets all of the following requirements: (1) is injurious to health, or is indecent or offensive to the senses, or an obstruction to the free use of property, so as to interfere with the comfortable enjoyment of life or property; (2) affects at the same time an entire community or neighborhood, or any considerable number of persons, although the extent of the annoyance or damage inflicted upon individuals may be unequal.; (3) occurs during, or as a result of, the treatment or disposal of wastes.

"Parking Lot" means land area or facility for the parking or storage of motor vehicles used for businesses, commerce, industry, or personal use, with a lot size of 5,000 square feet or more of surface area, or with 25 or more parking spaces.

"Permittee(s)" means Co-Permittees and any agency named in this Order as being responsible for permit conditions within its jurisdiction. Permittees to this Order include the Los Angeles County Flood Control District, Los Angeles County, and the cities of Agoura Hills, Alhambra, Arcadia, Artesia, Azusa, Baldwin Park, Bellflower, Bell Gardens, Beverly Hills, Bradbury, Burbank, Calabasas, Carson, Cerritos, Claremont, Commerce, Compton, Covina, Cudahy, Culver City, Diamond Bar, Downey, Duarte, El Monte, El Segundo, Gardena, Glendale, Glendora, Hawaiian Gardens, Hawthorne, Hermosa Beach, Hidden Hills, Huntington Park, Industry, Inglewood, Irwindale, La Canada Flintridge, La Habra Heights, Lakewood, La Mirada, La Puente, La Verne, Lawndale, Lomita, Los Angeles, Lynwood, Malibu, Manhattan Beach, Maywood, Monrovia, Montebello, Monterey Park, Norwalk, Palos Verdes Estates, Paramount, Pasadena, Pico Rivera, Pomona, Rancho Palos Verdes, Redondo Beach, Rolling Hills, Rolling Hills Estates, Rosemead, San Dimas, San Fernando, San Gabriel, San Marino, Santa Clarita, Santa Fe Springs, Santa Monica, Sierra Madre, Signal Hill, South El Monte, South Gate, South Pasadena, Temple City, Torrance, Vernon, Walnut, West Covina, West Hollywood, Westlake Village, and Whittier.

"Planning Priority Projects" means those projects that are required to incorporate appropriate storm water mitigation measures into the design plan for their respective project. These types of projects include:

1. Ten or more unit homes (includes single family homes, multifamily homes, condominiums, and apartments)
2. A 100,000 or more square feet of impervious surface area industrial/ commercial development (1 ac starting March 2003)
3. Automotive service facilities (SIC 5013, 5014, 5541, 7532-7534, and 7536-7539)
4. Retail gasoline outlets
5. Restaurants (SIC 5812)
6. Parking lots 5,000 square feet or more of surface area or with 25 or more parking spaces

7. Redevelopment projects in subject categories that meet Redevelopment thresholds
8. Projects located in or directly adjacent to or discharging directly to an ESA, which meet thresholds; and
9. Those projects that require the implementation of a site-specific plan to mitigate post-development storm water for new development not requiring a SUSMP but which may potentially have adverse impacts on post-development storm water quality, where the following project characteristics exist:

    a) Vehicle or equipment fueling areas;
    b) Vehicle or equipment maintenance areas, including washing and repair;
    c) Commercial or industrial waste handling or storage;
    d) Outdoor handling or storage of hazardous materials;
    e) Outdoor manufacturing areas;
    f) Outdoor food handling or processing;
    g) Outdoor animal care, confinement, or slaughter; or
    h) Outdoor horticulture activities.

"Pollutants" means those "pollutants" defined in CWA §502(6) (33.U.S.C.§1362(6)), and incorporated by reference into California Water Code §13373.

"Potable Water Distribution Systems Releases" means sources of flows from drinking water storage, supply and distribution systems including flows from system failures, pressure releases, system maintenance, distribution line testing, fire hydrant flow testing; and flushing and dewatering of pipes, reservoirs, vaults, and minor non-invasive well maintenance activities not involving chemical addition(s). It does not include wastewater discharges from activities that occur at wellheads, such as well construction, well development (i.e., aquifer pumping tests, well purging, etc.), or major well maintenance.

"Project" means all development, redevelopment, and land disturbing activities. The term is not limited to "Project" as defined under CEQA (Pub. Resources Code §21065).

"Rain Event" means any rain event greater than 0.1 inch in 24 hours except where specifically stated otherwise.

"Rare, Threatened, or Endangered Species (RARE)" means a beneficial use for waterbodies in the Los Angeles Region, as designated in the Basin Plan (Table 2-1), that supports habitats necessary, at least in part, for the survival and successful maintenance of plant or animal species established under state or federal law as rare, threatened, or endangered.

"Receiving Waters" means all surface water bodies in the Los Angeles Region that are identified in the Basin Plan.

"Redevelopment" means land-disturbing activity that results in the creation, addition, or replacement of 5,000 square feet or more of impervious surface area on an already developed site. Redevelopment includes, but is not limited to: the expansion of a building footprint;

addition or replacement of a structure; replacement of impervious surface area that is not part of a routine maintenance activity; and land disturbing activities related to structural or impervious surfaces. It does not include routine maintenance to maintain original line and grade, hydraulic capacity, or original purpose of facility, nor does it include emergency construction activities required to immediately protect public health and safety.

"Regional Administrator" means the Regional Administrator of the Regional Office of the USEPA or the authorized representative of the Regional Administrator.

"Restaurant" means a facility that sells prepared foods and drinks for consumption, including stationary lunch counters and refreshment stands selling prepared foods and drinks for immediate consumption (SIC Code 5812).

"Retail Gasoline Outlet" means any facility engaged in selling gasoline and lubricating oils.

"Runoff" means any runoff including storm water and dry weather flows from a drainage area that reaches a receiving water body or subsurface. During dry weather it is typically comprised of base flow either contaminated with pollutants or uncontaminated, and nuisance flows.

"Screening" means using proactive methods to identify illicit connections through a continuously narrowing process. The methods may include: performing baseline monitoring of open channels, conducting special investigations using a prioritization approach, analyzing maintenance records for catch basin and storm drain cleaning and operation, and verifying all permitted connections into the storm drains. Special investigation techniques may include: dye testing, visual inspection, smoke testing, flow monitoring, infrared, aerial and thermal photography, and remote control camera operation.

"Sidewalk Rinsing" means pressure washing of paved pedestrian walkways with average water usage of 0.006 gallons per square foot, with no cleaning agents, and properly disposing of all debris collected, as authorized under Regional Board Resolution No. 98-08.

"Significant Ecological Area (SEA)" means an area that is determined to possess an example of biotic resources that cumulatively represent biological diversity, for the purposes of protecting biotic diversity, as part of the Los Angeles County General Plan.[1]
Areas are designated as SEAs, if they possess one or more of the following criteria:

1. The habitat of rare, endangered, and threatened plant and animal species.
2. Biotic communities, vegetative associations, and habitat of plant and animal species that are either one of a kind, or are restricted in distribution on a regional basis.
3. Biotic communities, vegetative associations, and habitat of plant and animal species that are either one of a kind or are restricted in distribution in Los Angeles County.

[1] The 61 existing SEAs represent the findings of a study that was completed in 1976 by England and Nelson, Environmental Consultants, as amended through the adoption of a revised Los Angeles County General Plan in 1980. The results of an update study to evaluate existing SEAs within unincorporated Los Angeles County is currently being proposed to the Los Angeles County Planning Commission (*Los Angeles County Significant Ecological Area Update Study 2000, Background Report*, PCR Services Corporation). The *Update Study 2000*, which contains existing and proposed SEA boundaries, can be downloaded from the Los Angeles County Department of Planning website at http://planning.co.la.ca.us/drp_revw.html#SEA

4. Habitat that at some point in the life cycle of a species or group of species, serves as a concentrated breeding, feeding, resting, migrating grounds and is limited in availability either regionally or within Los Angeles County.
5. Biotic resources that are of scientific interest because they are either an extreme in physical/geographical limitations, or represent an unusual variation in a population or community.
6. Areas important as game species habitat or as fisheries.
7. Areas that would provide for the preservation of relatively undisturbed examples of natural biotic communities in Los Angeles County.
8. Special areas.[2]

"Significant Natural Area (SNA)" means an area defined by the California Department of Fish and Game (DFG), Significant Natural Areas Program, as an area that contains an important example of California's biological diversity. The most current SNA maps, reports, and descriptions can be downloaded from the DFG website at ftp://maphost.dfg.ca.gov/outgoing/whdab/sna/. These areas are identified using the following biological criteria only, irrespective of any administrative or jurisdictional considerations:

1. Areas supporting extremely rare species or habitats.
2. Areas supporting associations or concentrations of rare species or habitats.
3. Areas exhibiting the best examples of rare species and habitats in the state.

"Site" means the land or water area where any "facility or activity" is physically located or conducted, including adjacent land used in connection with the facility or activity.

"Source Control BMP" means any schedules of activities, prohibitions of practices, maintenance procedures, managerial practices or operational practices that aim to prevent storm water pollution by reducing the potential for contamination at the source of pollution.

"SQMP" means the Los Angeles Countywide Stormwater Quality Management Program.

"State Storm Water Pollution Prevention Plan (State SWPPP)" means a plan, as required by a State General Permit, identifying potential pollutant sources and describing the design, placement and implementation of BMPs, to effectively prevent non-stormwater Discharges and reduce Pollutants in Stormwater Discharges during activities covered by the General Permit.

"Storm Water" means storm water runoff, snow melt runoff, and surface runoff and drainage.

"Storm Water Discharge Associated with Industrial Activity" means industrial discharge as defined in 40 CFR 122.26(b)(14)

"Stormwater Quality Management Program" means the Los Angeles Countywide Stormwater Quality Management Program, which includes descriptions of programs, collectively developed by the Permittees in accordance with provisions of the NPDES Permit, to comply with applicable federal and state law, as the same is amended from time to time.

[2] These criteria from the 1976 study have been modified in the *Update Study 2000.*

"Structural BMP" means any structural facility designed and constructed to mitigate the adverse impacts of storm water and urban runoff pollution (e.g. canopy, structural enclosure). The category may include both Treatment Control BMPs and Source Control BMPs.

"SUSMP" means the Los Angeles Countywide Standard Urban Stormwater Mitigation Plan. The SUSMP shall address conditions and requirements of new development.

"Total Maximum Daily Load (TMDL)" means the sum of the individual waste load allocations for point sources and load allocations for nonpoint sources and natural background.

"Toxicity Identification Evaluation (TIE)" means a set of procedures to identify the specific chemical(s) responsible for toxicity. These procedures are performed in three phases (characterization, identification, and confirmation) using aquatic organism toxicity tests.

"Toxicity Reduction Evaluation (TRE)" means a study conducted in a step-wise process to identify the causative agents of effluent or ambient toxicity, isolate the sources of toxicity, evaluate the effectiveness of toxicity control options, and then confirm the reduction in toxicity.

"Treatment" means the application of engineered systems that use physical, chemical, or biological processes to remove pollutants. Such processes include, but are not limited to, filtration, gravity settling, media absorption, biodegradation, biological uptake, chemical oxidation and UV radiation.

"Treatment Control BMP" means any engineered system designed to remove pollutants by simple gravity settling of particulate pollutants, filtration, biological uptake, media absorption or any other physical, biological, or chemical process.

"USEPA Phase I Facilities" means facilities in specified industrial categories that are required to obtain an NPDES permit for storm water discharges, as required by 40 CFR 122.26(c). These categories include:

i. facilities subject to storm water effluent limitation guidelines, new source performance standards, or toxic pollutant effluent standards (40 CFR N)
ii. manufacturing facilities
iii. oil and gas/mining facilities
iv. hazardous waste treatment, storage, or disposal facilities
v. landfills, land application sites, and open dumps
vi. recycling facilities
vii. steam electric power generating facilities
viii. transportation facilities
ix. sewage of wastewater treatment works
x. light manufacturing facilities

"Vehicle Maintenance/Material Storage Facilities/Corporation Yards" means any Permittee owned or operated facility or portion thereof that:

i. Conducts industrial activity, operates equipment, handles materials, and provides services similar to Federal Phase I facilities;
ii. Performs fleet vehicle service/maintenance on ten or more vehicles per day including repair, maintenance, washing, and fueling;

iii. Performs maintenance and/or repair of heavy industrial machinery/equipment ; and
iv. Stores chemicals, raw materials, or waste materials in quantities that require a hazardous materials business plan or a Spill Prevention, Control , and Counter-measures (SPCC) plan.

"Water Quality Standards and Water Quality Objectives" means water quality criteria contained in the Basin Plan, the California Ocean Plan, the National Toxics Rule, the California Toxics Rule, and other state or federally approved surface water quality plans. Such plans are used by the Regional Board to regulate all discharges, including storm water discharges.

"Waters of the State" means any surface water or groundwater, including saline waters, within boundaries of the state.

"Waters of the United States" or "Waters of the U.S." means:

a. All waters that are currently used, were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide;
b. All interstate waters, including interstate "wetlands";
c. All other waters such as intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, "wetlands," sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds the use, degradation, or destruction of which would affect or could affect interstate or foreign commerce including any such waters:

    1. Which are or could be used by interstate or foreign travelers for recreational or other purposes;
    2. From which fish or shellfish are or could be taken and sold in interstate or foreign commerce; or
    3. Which are used or could be used for industrial purposes by industries in interstate commerce;
d. All impoundments of waters otherwise defined as waters of the United States under this definition;
e. Tributaries of waters identified in paragraphs (a) through (d) of this definition;
f. The territorial sea; and
g. "Wetlands" adjacent to waters (other than waters that are themselves wetlands) identified in paragraph (a) through (f) of this definition.

Waste treatment systems, including treatment ponds or lagoons designed to meet the requirements of CWA (other than cooling ponds as defined in 40 CFR 423.22(m), which also meet the criteria of this definition) are not waters of the United States. This exclusion applies only to man-made bodies of water, which neither were originally created in waters of the United States (such as disposal area in wetlands) nor resulted from the impoundment of waters of the United States. Waters of the United States do not include prior converted cropland. Notwithstanding the determination of an area's status as prior converted cropland by any other federal agency, for the purposes of the CWA, the final authority regarding CWA jurisdiction remains with USEPA.

"Wet Season" means the calendar period beginning October 1 through April 15.

Part 6. STANDARD PROVISIONS

A. Standard Requirements

1. Each Permittee shall comply with all provisions and requirements of this permit.

2. Should a Permittee discover a failure to submit any relevant facts or that it submitted incorrect information in a report, it shall promptly submit the missing or correct information.

3. Each Permittee shall report all instances of non-compliance not otherwise reported at the time monitoring reports are submitted.

4. This Order includes the attached Monitoring and Reporting Program, and SUSMP(Regional Board Resolution No. R00-02), which are a part of the permit and must be complied with in the same manner as with the rest of the requirements in the permit.

B. Regional Board Review

Any formal determination or approval made by the Regional Board Executive Officer pursuant to the provisions of this Order may be reviewed by the Regional Board. A Permittee(s) or a member of the public may request such review upon petition within 30 days of the effective date of the notification of such decision to the Permittee(s) and interested parties on file at the Regional Board.

C. Public Review

1. All documents submitted to the Regional Board in compliance with the terms and conditions of this Order shall be made available to members of the public pursuant to the Freedom of Information Act (5 U.S.C. § 552 (as amended) and the Public Records Act (Cal. Government Code § 6250 *et seq.*).

2. All documents submitted to the Regional Board Executive Officer for approval shall be made available to the public for a 30-day period to allow for public comment.

D. Duty to Comply

1. Each Permittee must comply with all of the terms, requirements, and conditions of this Order. Any violation of this order constitutes a violation of the Clean Water Act, its regulations and the California Water Code, and is grounds for enforcement action, Order termination, Order revocation and reissuance, denial of an application for reissuance; or a combination thereof [40 CFR 122.41(a), CWC § 13261, 13263, 13265, 13268, 13300, 13301, 13304, 13340, 13350].

2. A copy of these waste discharge specifications shall be maintained by each Permittee so as to be available during normal business hours to Permittee employees and members of the public.

3. Any discharge of wastes at any point(s) other than specifically described in this Order is prohibited, and constitutes a violation of the Order.

E. Duty to Mitigate [40 CFR 122.41 (d)]

Each Permittee shall take all reasonable steps to minimize or prevent any discharge that has a reasonable likelihood of adversely affecting human health or the environment.

F. Inspection and Entry [40 CFR 122.41(i), CWC § 13267]

The Regional Board, USEPA, and other authorized representatives shall be allowed:

1. Entry upon premises where a regulated facility is located or conducted, or where records are kept under conditions of this Order;

2. Access to copy any records, at reasonable times, that are kept under the conditions of this Order;

3. To inspect at reasonable times any facility, equipment (including monitoring and control equipment), practices, or operations regulated or required under this Order; and,

4. To photograph, sample, and monitor at reasonable times for the purpose of assuring compliance with this Order, or as otherwise authorized by the CWA and the CWC.

G. Proper Operation and Maintenance [40 CFR 122.41 (e), CWC § 13263(f)]

The Permittees shall at all times properly operate and maintain all facilities and systems of treatment (and related appurtenances) that are installed or used by the Permittees to achieve compliance with this Order. Proper operation and maintenance includes adequate laboratory controls and appropriate quality assurance procedures. This provision requires the operation of backup or auxiliary facilities or similar system that are installed by a Permittee only when necessary to achieve compliance with the conditions of this Order.

H. Signatory Requirements [40 CFR 122.41(k) & 122.22]

Except as otherwise provided in this Order, all applications, reports, or information submitted to the Regional Board shall be signed by the Director of Public Works, City Engineer, or authorized designee and certified as set forth in 40 CFR 122.22.

I. Reopener and Modification [40 CFR 122.41(f) & 122.62]

1. This Order may only be modified, revoked, or reissued, prior to the expiration date, by the Regional Board, in accordance with the procedural requirements of the CWC and CCR Title 23 for the issuance of waste

discharge requirements, 40 CFR 122.62, and upon prior notice and hearing, to:

a) Address changed conditions identified in the required reports or other sources deemed significant by the Regional Board;

b) Incorporate applicable requirements or statewide water quality control plans adopted by the State Board or amendments to the Basin Plan;

c) Comply with any applicable requirements, guidelines, and/or regulations issued or approved pursuant to CWA Section 402(p); and/or,

d) Consider any other federal, or state laws or regulations that became effective after adoption of this Order.

2. After notice and opportunity for a hearing, this Order may be terminated or modified for cause, including, but not limited to:

a) Violation of any term or condition contained in this Order;

b) Obtaining this Order by misrepresentation, or failure to disclose all relevant facts; or,

c) A change in any condition that requires either a temporary or permanent reduction or elimination of the authorized discharge.

3. The filing of a request by the Principal Permittee or Permittees for a modification, revocation and re-issuance, or termination, or a notification of planned changes or anticipated noncompliance does not stay any condition of this Order.

4. This Order may be modified to make corrections or allowances for changes in the permitted activity listed in this section, following the procedures at 40 CFR 122.63, if processed as a minor modification. Minor modifications may only:

a) Correct typographical errors, or

b) Require more frequent monitoring or reporting by the Permittee.

J. Severability

The provisions of this permit are severable; and if any provision of this permit or the application of any provision of this permit to any circumstance is held invalid, the application of such provision to other circumstances and the remainder of this permit shall not be affected.

K. Duty to Provide Information [40 CFR 122.41(h)]

The Permittees shall furnish, within a reasonable time, any information the Regional Board or USEPA may request to determine whether cause exists for

modifying, revoking and reissuing, or terminating this Order. The Permittees shall also furnish to the Regional Board, upon request, copies of records required to be kept by this Order.

L. Twenty-four Hour Reporting [40 CFR 122.41(l)(6)][3]

1. The Permittees shall report to the Regional Board any noncompliance that may endanger health or the environment. Any information shall be provided orally within 24 hours from the time any Permittee becomes aware of the circumstances. A written submission shall also be provided within five days of the time the Permittee becomes aware of the circumstances. The written submission shall contain a description of the noncompliance and its cause; the period of noncompliance, including exact dates and times and, if the noncompliance has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance.

2. The Regional Board may waive the required written report on a case-by-case basis.

M. Bypass [40 CFR 122.41(m)][4]

Bypass (the intentional diversion of waste streams from any portion of a treatment facility) is prohibited. The Regional Board may take enforcement action against Permittees for bypass unless:

1. Bypass was unavoidable to prevent loss of life, personal injury or severe property damage. (Severe property damage means substantial physical damage to property, damage to the treatment facilities that causes them to become inoperable, or substantial and permanent loss of natural resources that can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production.);

2. There were no feasible alternatives to bypass, such as the use of auxiliary treatment facilities, retention of untreated waste, or maintenance during normal periods of equipment down time. This condition is not satisfied if adequate back-up equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass that could occur during normal periods of equipment downtime or preventive maintenance;

3. The Permittee submitted a notice at least ten days in advance of the need for a bypass to the Regional Board; or,

4. Permittees may allow a bypass to occur that does not cause effluent limitations to be exceeded, but only if it is for essential maintenance to

[3] This provision applies to incidents where effluent limitations (numerical or narrative) as provided in this Order or in the Los Angeles County SQMP are exceeded, and which endanger public health or the environment.

[4] This provision applies to the operation and maintenance of storm water controls and BMPs as provided in this Order or in the SQMP.

assure efficient operation. In such a case, the above bypass conditions are not applicable. The Permittee shall submit notice of an unanticipated bypass as required.

N. Upset [40 CFR 122.41(n)][5]

Upset means an exceptional incident in which there is unintentional and temporary noncompliance with technology based permit effluent limitations because of factors beyond the reasonable control of the permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation.

1. A Permittee that wishes to establish the affirmative defense of an upset in an action brought for non compliance shall demonstrate, through properly signed, contemporaneous operating logs, or other relevant evidence that:

   a) An upset occurred and that the Permittee can identify the cause(s) of the upset;

   b) The permitted facility was being properly operated by the time of the upset;

   c) The Permittee submitted notice of the upset as required; and,

   d) The Permittee complied with any remedial measures required.

2. No determination made before an action for noncompliance, such as during administrative review of claims that non-compliance was caused by an upset, is final administrative action subject to judicial review.

3. In any enforcement proceeding, the Permittee seeking to establish the occurrence of an upset has the burden of proof.

O. Property Rights [40 CFR 122.41(g)]

This Order does not convey any property rights of any sort, or any exclusive privilege.

P. Enforcement

1. Violation of any of the provisions of the NPDES permit or any of the provisions of this Order may subject the violator to any of the penalties described herein, or any combination thereof, at the discretion of the prosecuting authority; except that only one kind of penalties may be applied for each kind of violation. The CWA provides the following:

   a) Criminal Penalties for:

[5] *Supra*. See footnote number 3.

(1) Negligent Violations:

The CWA provides that any person who negligently violates permit conditions implementing § 301, 302, 306, 307, 308, 318, or 405 is subject to a fine of not less than $2,500 nor more than $25,000 per day for each violation, or by imprisonment for not more than 1 year, or both.

(2) Knowing Violations:

The CWA provides that any person who knowingly violates permit conditions implementing § 301, 302, 306, 307, 308, 318, or 405 is subject to a fine of not less than $5,000 nor more than $50,000 per day of violation, or by imprisonment for not more than 3 years, or both.

(3) Knowing Endangerment:

The CWA provides that any person who knowingly violates permit conditions implementing § 301, 302, 307, 308, 318, or 405 and who knows at that time that he is placing another person in imminent danger of death or serious bodily injury is subject to a fine of not more than $250,000, or by imprisonment for not more than 15 years, or both.

(4) False Statement:

The CWA provides that any person who knowingly makes any false material statement, representation, or certification in any application, record, report, plan, or other document filed or required to be maintained under the Act or who knowingly falsifies, tampers with, or renders inaccurate, any monitoring device or method required to be maintained under the Act, shall upon conviction, be punished by a fine of not more than $10,000 or by imprisonment for not more than two years, or by both. If a conviction is for a violation committed after a first conviction of such person under this paragraph, punishment shall be by a fine of not more than $20,000 per day of violation, or by imprisonment of not more than four years, or by both. (See CWA § 309(c)(4))

b) Civil Penalties

The CWA provides that any person who violates a permit condition implementing § 301, 302, 306, 307, 308, 318, or 405 is subject to a civil penalty not to exceed $27,500 per day for each violation.

2. The CWC provides that any person who violates a waste discharge requirement provision of the CWC is subject to civil penalties of up to $5,000 per day, $10,000 per day, or $25,000 per day of violation; or when the violation involves the discharge of pollutants, is subject to civil penalties of up to $10 per gallon per day or $25 per gallon per day of violation; or some combination thereof, depending on the violation or combination of violations.

Q. Need to Halt or Reduce Activity not a Defense [40 CFR 122.41(c)]

It shall not be a defense for a Permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this Order.

R. Rescission

Regional Board Order No. 96-054 is hereby rescinded.

S. Expiration

This Order expires on December 12, 2006. The Permittees must submit a Report of Waste Discharges and a proposed Storm Water Quality Management Program in accordance with CCR Title 23 as application for reissuance of waste discharge requirements no later than June 12, 2006.

I, Dennis A. Dickerson, Regional Board Executive Officer, do hereby certify that the foregoing is a full, true, and correct copy of an order adopted by the California Regional Water Quality Control Board, Los Angeles Region, on December 13, 2001.

_____

Dennis A. Dickerson
Executive Officer

Protection of Groundwater From Intentional
and Nonintentional Stormwater Infiltration

Pitt, R., S. Clark, and K. Parmer. *Protection of Groundwater from Intentional and Nonintentional Stormwater Infiltration*. U.S. Environmental Protection Agency, EPA/600/SR-94/051. PB94-165354AS, Storm and Combined Sewer Program, Cincinnati, Ohio. 187 pgs. May 1994.

CHAPTER 1

SUMMARY AND CONCLUSIONS

Prior to urbanization, groundwater recharge resulted from infiltration of precipitation through pervious surfaces, including grasslands and woods. This infiltrating water was relatively uncontaminated. With urbanization, the permeable soil surface area through which recharge by infiltration could occur was reduced. This resulted in much less groundwater recharge and greatly increased surface runoff. In addition, the waters available for recharge generally carried increased quantities of pollutants. With urbanization, new sources of groundwater recharge also occurred, including recharge from domestic septic tanks, percolation basins and industrial waste injection wells, and from agricultural and residential irrigation. This book addresses potential groundwater problems associated with stormwater toxicants, and describes how conventional stormwater control practices can reduce these problems. This chapter is a summary of the main findings, conclusions, and recommendations contained in the main body of the book, where more detailed and referenced discussions are contained.

Chapter 2 presents a summary of the characteristics of urban runoff, especially from different source areas as monitored in an earlier phase of this EPA funded research. This information is needed to identify critical sources of contaminants that may adversely affect ground and surface receiving waters. These sources can either be controlled, or otherwise diverted from the receiving waters. Chapter 3 is a literature review of potential groundwater impacts associated with pollutants that may be found in stormwater. This information is based on literature describing groundwater problem case studies associated with several classes of stormwater pollutants from different types of source waters, including: stormwater, sanitary wastewater, agriculture operations, and some industrial operations. Appendix A is an annotated bibliography of this literature, including abstracts of the references. The information in chapters 2 and 3 can be used to identify which stormwater pollutants may adversely affect groundwater, and where they may originate. Chapter 4 summarizes the available treatment options for stormwater before discharge. This information can be used to suggest control methods that should be used at critical source areas, or at an outfall, before groundwater discharge. If pretreatment before infiltration is not practicable for a critical area, then other control options may need to be considered, especially pollution prevention or diversion of the runoff away from areas prone to groundwater infiltration.

This book presents information collected as part of a multi-year research project sponsored by the U.S. EPA. The first year of this research project included conducting the literature review and preparation of this book and the design and construction of a treatment device suitable for use at a class of critical

source areas, specifically automobile service areas (gas stations, vehicle repair shops, public works maintenance yards, bus barns, etc.), and the installation of several inlet retro-fitted devices to control runoff in residential and commercial areas. As part of this design effort, more than 20 samples were collected from a residential area, a school bus maintenance area, and two public works yards in Stafford, New Jersey. These samples were analyzed for a wide range of conventional and toxic pollutants that could potentially affect groundwater quality (if the water was infiltrated) and the design of the inlet devices and special treatment device. This information was used in the design of the critical area treatment device (the Multi Chambered Treatment Tank, or MCTT) and will be included in an EPA research report.

The second project phase includes monitoring three inlet and the MCTT stormwater treatment device over an extended period of time for many toxicants. Controlled tests for different filtering media are also being conducted during this project phase. These devices can all play a role in the pretreatment of stormwater before discharge to groundwaters. These research activities will result in design manuals for these devices for many U.S. locations. The third project phase is expected to include groundwater monitoring near an existing stormwater infiltrating trench gallery that has been operating in Stafford, New Jersey, for several years.

CHARACTERISTICS OF URBAN RUNOFF

Urban runoff is comprised of many different flow phases. These may include dry-weather base flows, stormwater runoff, combined sewer overflows (CSOs) and snowmelt. The relative magnitudes of these discharges vary considerably, based on a number of factors. Season (such as cold versus warm weather, or dry versus wet weather) and land use have been identified as important factors affecting base flow and stormwater runoff quality.

Land development increases stormwater runoff volumes and pollutant concentrations. Impervious surfaces, such as rooftops, driveways and roads, reduce infiltration of rainfall and runoff into the ground and degrade runoff quality. The most important hydraulic factors affecting urban runoff volume (and therefore the amount of water available for groundwater infiltration) are the quantity of rain and the extent of impervious surfaces directly connected to a stream or drainage system. Directly connected impervious areas include paved streets, driveways, and parking areas draining to curb and gutter drainage systems, and roofs draining directly to a storm or combined sewer pipe.

BOD_5 and nutrient concentrations in stormwater are lower than in raw sanitary wastewater; they are closer in quality to typically treated sanitary wastewaters. However, urban stormwater has relatively high concentrations of bacteria, along with high concentrations of many metallic and some organic toxicants.

Flow Phases

Possibly 25 percent of all separate stormwater outfalls have water flowing in them during dry weather, and as much as 10 percent are grossly contaminated with raw sewage, industrial wastewaters, etc. If stormwater is infiltrated before it enters the drainage system (such as by using French drains, infiltration trenches, grass swales, porous pavements or percolation ponds in upland areas) then the effects

of inappropriate contaminated discharges into the drainage system on groundwater will be substantially reduced, compared to outfall infiltration practices. If outfall waters are to be infiltrated in larger regional facilities, then the effects of contaminated dry-weather flows will have to be considered.

Pathogenic Microorganisms

Most of the effort in describing bacteria associated with urban runoff has involved fecal coliform analyses, mainly because of its historical use in water quality standards. However, many researchers have concluded that the fecal coliform test cannot be relied on to accurately assess the pathogenicity of recreational waters receiving urban runoff from uncontaminated storm sewers. Pathogenic bacteria have routinely been found in urban runoff at many locations.

Historically, fecal coliform standards of less than 200 organisms/100 mL have been recommended because the frequency of Salmonella detection has been found to increase sharply at fecal coliform concentrations greater than this value in waters receiving sanitary sewage discharges. The occurrence of Salmonella biotypes in urban runoff is generally low, with their reported densities ranging from less than one, to a high of ten organism/100 mL. However, numerous urban runoff studies have not detected any Salmonella. In addition, Salmonella observations in urban runoff have not correlated well with fecal coliform observations. Salmonella is not usually considered a significant hazard in urban runoff because of the relatively large required infective dose and the low concentrations found in urban runoff.

The evidence of low densities and required high infective doses for Salmonella cannot minimize the health hazard of other pathogens that have been found in urban runoff (such as *P. aeruginosa*, *Shigella*, or enteroviruses) that do not require ingestion, or only require very low infective doses. Shigella species causing bacillary dysentery are one of the primary human enteric disease producing bacteria present in water. Pseudomonas is reported to be the most abundant pathogenic bacteria organism in urban runoff and streams. Several thousand *Pseudomonas aeruginosa* organisms per 100 mL have been commonly found in many urban runoff samples. Relatively small populations of *P. aeruginosa* may be capable of causing water contact health problems ("swimmers ear", and skin infections) and it is resistant to antibiotics. Pathogenic *E. coli* can also be commonly found in urban runoff.

Viruses may also be important pathogens in urban runoff. Very small amounts of a virus are capable of producing infections or diseases, especially when compared to the large numbers of bacteria organisms required for infection. Viruses are usually detected, but at low levels, in urban receiving waters and stormwater.

Toxicants

Nationwide testing has not indicated any significant regional differences in the toxicants detected, or in their concentrations. However, land use (especially residential versus industrial areas) has been found to be a significant factor in toxicant concentrations and yields. Concentrations of many urban runoff toxicants have exceeded the EPA water quality criteria for human health protection by large amounts.

Pesticides (α-BHC, γ-BHC, chlordane and α-Endosulfan) are mostly found in dry-weather flows from residential areas, while heavy metals (As, Cd, Cr, Cu, Pb, and Zn) and other toxic materials

(pentachlorophenol, bis (2-ethylhexyl) phthalate, and the PAHs: chrysene, fluoranthene, phenanthrene, and pyrene) are more prevalent in stormwater from industrial areas, although they are also commonly found in runoff from residential and commercial areas. Many of the heavy metals found in industrial area urban runoff were found at high concentrations during both dry-weather and wet-weather conditions.

Sources of Pollutants

High bacteria populations have been found in sidewalk, road, and some bare ground sheetflow samples (collected from locations where dogs would most likely be "walked"). Tables 1 and 2 summarize toxicant concentrations and likely sources or locations having some of the highest concentrations found during an earlier phase of this EPA funded research. The detection frequencies for the heavy metals are all close to 100 percent for all source areas, while the detection frequencies for the organics shown ranged from about 10 to 25 percent. Vehicle service areas had the greatest abundance of observed organics, with landscaped areas having many of the observed organics.

Table 1. Heavy Metal Source Area Observations

Toxicant	**Highest median conc. (µg/L)**	**Source Area**	**Highest conc. (µg/L)**	**Source Area**
Cadmium	8	vehicle service area runoff	220	street runoff
Chromium	100	landscaped area runoff	510	roof runoff
Copper	160	urban receiving water	1250	street runoff
Lead	75	CSO	330	storage area runoff
Nickel	40	parking area runoff	130	landscaped area runoff
Zinc	100	roof runoff	1580	roof runoff

Table 2 Toxic Organic Source Area Observations

Toxicant	**Maximum (µg/L)**	**Detection Frequency (%)**	**Significant Sources**
Benzo (a) anthracene	60	12	gasoline, wood preservative
Benzo (b) fluoranthene	226	17	gasoline, motor oils
Benzo (k) fluoranthene	221	17	gasoline, bitumen, oils
Benzo (a) pyrene	300	17	asphalt, gasoline, oils
Fluoranthene	128	23	oils, gasoline, wood preservative
Naphthalene	296	13	coal tar, gasoline, insecticides
Phenanthrene	69	10	oils, gasoline, coal tar
Pyrene	102	19	oils, gasoline, bitumen, coal tar, wood preservative
Chlordane	2.2	13	insecticide
Butyl benzyl phthalate	128	12	plasticizer
Bis (2-chloroethyl) ether	204	14	fumigant, solvents, insecticides, paints, lacquers, varnishes
Bis (2-chloroisopropyl) ether	217	14	pesticides

1,3-Dichlorobenzene	120	23	pesticides

CONSTITUENTS OF CONCERN

Nutrients

Nitrates are one of the most frequently encountered contaminants in groundwater. Groundwater contamination of phosphorus has not been as widespread, or as severe, as for nitrogen compounds.

Whenever nitrogen-containing compounds come into contact with soil, a potential for nitrate leaching into groundwater exists, especially in rapid-infiltration wastewater basins, stormwater infiltration devices, and in agricultural areas. Nitrate has leached from fertilizers and affected groundwaters under various turf grasses in urban areas, including golf courses, parks and home lawns. Significant leaching of nitrates occurs during the cool, wet seasons. Cool temperatures reduce denitrification and ammonia volatilization, and limit microbial nitrogen immobilization and plant uptake. The use of slow-release fertilizers is recommended in areas having potential groundwater nitrate problems. The slow-release fertilizers include urea formaldehyde (UF), methylene urea, isobutylidene diurea (IBDU), and sulfur-coated urea.

Residual nitrate concentrations are highly variable in soil due to soil texture, mineralization, rainfall and irrigation patterns, organic matter content, crop yield, nitrogen fertilizer/sludge rate, denitrification, and soil compaction. Nitrate is highly soluble (>1 kg/L) and will stay in solution in the percolation water, after leaving the root zone, until it reaches the groundwater.

Pesticides

Urban pesticide contamination of groundwater can result from municipal and homeowner use of pesticides for pest control and their subsequent collection in stormwater runoff. Pesticides that have been found in urban groundwaters include: 2,4-D, 2,4,5-T, atrazine, chlordane, diazinon, ethion, malathion, methyl trithion, silvex, and simazine. Heavy repetitive use of mobile pesticides on irrigated and sandy soils likely contaminates groundwater. Fungicides and nematocides must be mobile in order to reach the target pest and hence, they generally have the highest contamination potential. Pesticide leaching depends on patterns of use, soil texture, total organic carbon content of the soil, pesticide persistence, and depth to the water table.

The greatest pesticide mobility occurs in areas with coarse-grained or sandy soils without a hardpan layer, having low clay and organic matter content and high permeability. Structural voids, which are generally found in the surface layer of finer-textured soils rich in clay, can transmit pesticides rapidly when the voids are filled with water and the adsorbing surfaces of the soil matrix are bypassed. In general, pesticides with low water solubilities, high octanol-water partitioning coefficients, and high carbon partitioning coefficients are less mobile. The slower moving pesticides have been recommended in areas of groundwater contamination concern. These include the fungicides iprodione and triadimefon, the insecticides isofenphos and chlorpyrifos and the herbicide glyphosate. The most mobile pesticides include:

2,4-D, acenaphthylene, alachlor, atrazine, cyanazine, dacthal, diazinon, dicamba, malathion, and metolachlor.

Pesticides decompose in soil and water, but the total decomposition time can range from days to years. Literature half-lives for pesticides generally apply to surface soils and do not account for the reduced microbial activity found deep in the vadose zone. Pesticides with a thirty-day half life can show considerable leaching. An order-of-magnitude difference in half-life results in a five- to ten-fold difference in percolation loss. Organophosphate pesticides are less persistent than organochlorine pesticides, but they also are not strongly adsorbed by the sediment and are likely to leach into the vadose zone, and the groundwater.

Other Organics

The most commonly occurring organic compounds that have been found in urban groundwaters include phthalate esters (especially bis(2-ethylhexyl)phthalate) and phenolic compounds. Other organics more rarely found, possibly due to losses during sample collection, have included the volatiles: benzene, chloroform, methylene chloride, trichloroethylene, tetrachloroethylene, toluene, and xylene. PAHs (especially benzo(a)anthracene, chrysene, anthracene and benzo(b)fluoroanthenene) have also been found in groundwaters near industrial sites.

Groundwater contamination from organics, like from other pollutants, occurs more readily in areas with sandy soils and where the water table is near the land surface. Removal of organics from the soil and recharge water can occur by one of three methods: volatilization, sorption, and degradation. Volatilization can significantly reduce the concentrations of the most volatile compounds in groundwater, but the rate of gas transfer from the soil to the air is usually limited by the presence of soil water. Hydrophobic sorption onto soil organic matter limits the mobility of less soluble base/neutral and acid extractable compounds through organic soils and the vadose zone. Sorption is not always a permanent removal mechanism, however. Organic re-solubilization can occur during wet periods following dry periods. Many organics can be at least partially degraded by microorganisms, but others cannot. Temperature, pH, moisture content, ion exchange capacity of soil, and air availability may limit the microbial degradation potential for even the most degradable organic.

Pathogenic Microorganisms

Viruses have been detected in groundwater where stormwater recharge basins were located short distances above the aquifer. Enteric viruses are more resistant to environmental factors than enteric bacteria and they exhibit longer survival times in natural waters. They can occur in potable and marine waters in the absence of fecal coliforms. Enteroviruses are also more resistant to commonly used disinfectants than are indicator bacteria, and can occur in groundwater in the absence of indicator bacteria.

The factors that affect the survival of enteric bacteria and viruses in the soil include pH, antagonism from soil microflora, moisture content, temperature, sunlight, and organic matter. The two most important attributes of viruses that permit their long-term survival in the environment are their structure and very small size. These characteristics permit virus occlusion and protection within colloid-size

particles. Viral adsorption is promoted by increasing cation concentration, decreasing pH and decreasing soluble organics. Since the movement of viruses through soil to groundwater occurs in the liquid phase and involves water movement and associated suspended virus particles, the distribution of viruses between the adsorbed and liquid phases determines the viral mass available for movement. Once the virus reaches the groundwater, it can travel laterally through the aquifer until it is either adsorbed or inactivated.

The major bacterial removal mechanisms in soil are straining at the soil surface and at intergrain contacts, sedimentation, sorption by soil particles, and inactivation. Because of their larger size than for viruses, most bacteria are therefore retained near the soil surface due to this straining effect. In general, enteric bacteria survive in soil between two and three months, although survival times up to five years have been documented.

Heavy Metals and Other Inorganic Compounds

Heavy metals and other inorganic compounds in stormwater of most environmental concern, from a groundwater pollution standpoint, are aluminum, arsenic, cadmium, chromium, copper, iron, lead, mercury, nickel, and zinc. However, the majority of these compounds, with the consistent exception of zinc, are mostly found associated with the particulate solids in stormwaters and are thus relatively easily removed through sedimentation practices. Filterable forms of the metals may also be removed by either sediment adsorption or are organically complexed with other particulates.

In general, studies of recharge basins receiving large metal loads found that most of the heavy metals are removed either in the basin sediment or in the vadose zone. Dissolved metal ions are removed from stormwater during infiltration mostly by adsorption onto the near-surface particles in the vadose zone, while the particulate metals are filtered out at the soil surface. Studies at recharge basins found that lead, zinc, cadmium, and copper accumulated at the soil surface with little downward movement over many years. However, nickel, chromium, and zinc concentrations have exceeded regulatory limits in the soils below a recharge area at a commercial site. Elevated groundwater heavy metal concentrations of aluminum, cadmium, copper, chromium, lead, and zinc have been found below stormwater infiltration devices where the groundwater pH has been acidic. Allowing percolation ponds to go dry between storms can be counterproductive to the removal of lead from the water during recharge. Apparently, the adsorption bonds between the sediment and the metals can be weakened during the drying period.

Similarities in water quality between runoff water and groundwater has shown that there is significant downward movement of copper and iron in sandy and loamy soils. However, arsenic, nickel, and lead did not significantly move downward through the soil to the groundwater. The exception to this was some downward movement of lead with the percolation water in sandy soils beneath stormwater recharge basins. Zinc, which is more soluble than iron, has been found in higher concentrations in groundwater than iron. The order of attenuation in the vadose zone from infiltrating stormwater is: zinc (most mobile) > lead > cadmium > manganese > copper > iron > chromium > nickel > aluminum (least mobile).

Salts

Salt applications for winter traffic safety is a common practice in many northern areas and the sodium and chloride, which are collected in the snowmelt, travel down through the vadose zone to the groundwater with little attenuation. Soil is not very effective at removing salts. Salts that are still in the percolation water after it travels through the vadose zone will contaminate the groundwater. Infiltration of stormwater has led to increases in sodium and chloride concentrations above background concentrations. Fertilizer and pesticide salts also accumulate in urban areas and can leach through the soil to the groundwater.

Studies of depth of pollutant penetration in soil have shown that sulfate and potassium concentrations decrease with depth, while sodium, calcium, bicarbonate, and chloride concentrations increase with depth. Once contamination with salts begin, the movement of salts into the groundwater can be rapid. The salt concentration may not decrease until the source of the salts is removed.

TREATMENT OF STORMWATER

Table 3 summarizes the filterable fraction of toxicants found in stormwater runoff sheet flows from many urban areas found during an earlier phase of this EPA funded research. Pollutants that are mostly in filterable forms have a greater potential of affecting groundwater and are more difficult to control using conventional stormwater control practices that mostly rely on sedimentation and filtration principles. Luckily, most of the toxic organics and metals are associated with the non-filterable (suspended solids) fraction of the wastewaters during wet weather. Likely exceptions include zinc, fluoranthene, pyrene, and 1,3-dichlorobenzene, which may be mostly found in the filtered sample portions. However, dry-weather flows in storm drainage tend to have much more of the toxicants associated with filtered sample fractions.

Table 3. Reported Filterable Fractions of Stormwater Toxicants from Source Areas

Constituent	**Filterable Fraction (%)**
Cadmium	20 to 50
Chromium	<10
Copper	<20
Iron	small amount
Lead	<20
Nickel	small amount
Zinc	>50
Benzo (a) anthracene	none found in filtered fraction
Fluoranthene	65
Naphthalene	25
Phenanthrene	none found in filtered fraction
Pyrene	95
Chlordane	none found in filtered fraction
Butyl benzyl phthalate	irregular
Bis (2-chloroethyl) ether	irregular
Bis (2-chlrorisopropyl) ether	none found in filtered fraction
1,3-dichlorobenzene	75

Sedimentation is the most common fate and control mechanism for particulate related pollutants. This would be common for most stormwater pollutants, as noted above. Particulate removal can occur in many conventional stormwater control processes, including catchbasins, screens, drainage systems, and detention ponds. Sorption of pollutants onto solids and metal precipitation increase the sedimentation potential of these pollutants and also encourages more efficient bonding of the pollutants in soils, preventing their leaching to groundwaters. Detention ponds are probably the most common management practice for the control of stormwater runoff. If properly designed, constructed, and maintained, wet detention ponds can be very effective in controlling a wide range of pollutants. The monitored performance of wet detention ponds can be more than 90 percent removal of suspended solids, 70 percent for BOD_5 and COD, nutrient removals of about 60 to 70 percent, and heavy metal removals of about 60 to 95 percent. Catchbasins are very small sedimentation devices. Adequate cleaning can help to reduce the total solids and lead urban runoff yields by between 10 and 25 percent, and COD, total Kjeldahl nitrogen, total phosphorus, and zinc by between 5 and 10 percent. Other important fate mechanisms available in wet detention ponds, but which are probably not as important in small sump devices such as catchbasins, include volatilization and photolysis. Biodegradation, biotransformation, and bioaccumulation (into plants and animals) may also occur in ponds.

Upland infiltration devices (such as infiltration trenches, porous pavements, percolation ponds, and grass roadside drainage swales) are located at urban source areas. Infiltration (percolation) ponds are usually located at stormwater outfalls, or at large paved areas. These basins, along with perforated storm sewers, can infiltrate flows and pollutants from all upland sources combined. Infiltration devices can safely deliver large fractions of the surface flows to groundwater, if carefully designed and located. Local conditions that can make stormwater infiltration inappropriate include steep slopes, slowly percolating soils, shallow groundwater, and nearby groundwater uses. Grass filter strips may be quite effective in removing particulate pollutants from overland flows. The filtering effects of grasses, along with increased infiltration/recharge, reduce the particulate sediment load from urban landscaped areas. Grass swales are another type of infiltration device and can be used in place of concrete curb and gutters in most land uses, except possibly strip commercial and high density residential areas. Grass swales allow the recharge of significant amounts of surface flows. Swales can also reduce the concentration of pollutants, due to filtration. Soluble and particulate heavy metal (copper, lead, zinc, and cadmium) concentrations can be reduced by at least 50 percent, COD, nitrate nitrogen, and ammonia nitrogen concentrations can be reduced by about 25 percent, but only very small concentration reductions can be expected for organic nitrogen, phosphorus, and bacteria.

Sorption of pollutants to soils is probably the most significant fate mechanism of toxicants in biofiltration devices. Many of the devices also use sedimentation and filtration to remove the particulate forms of the pollutants from the water. Incorporation of the pollutants onto soil with subsequent biodegradation, with minimal resultant leaching to the groundwater, is desired. Volatilization, photolysis, biotransformation, and bioconcentration may also be significant in grass filter strips and grass swales. Underground French drains and porous pavements offer little biological activity to reduce toxicants.

CONCLUSIONS

Table 4 is a summary of the pollutants found in stormwater that may cause groundwater contamination problems for various reasons. This table does not consider the risk associated with using groundwater contaminated with these pollutants. Causes of concern include high mobility (low sorption potential) in the vadose zone, high abundance (high concentrations and high detection frequencies) in stormwater, and high soluble fractions (small fraction associated with particulates which would have little removal potential using conventional stormwater sedimentation controls) in the stormwater. The contamination potential is the lowest rating of the influencing factors. As an example, if no pretreatment was to be used before percolation through surface soils, the mobility and abundance criteria are most important. If a compound was mobile, but was in low abundance (such as for VOCs), then the groundwater contamination potential would be low. However, if the compound was mobile and was also in high abundance (such as for sodium chloride, in certain conditions), then the groundwater contamination would be high. If sedimentation pretreatment was to be used before infiltration, then some of the pollutants will likely be removed before infiltration. In this case, all three influencing factors

Table 4. Groundwater Contamination Potential for Stormwater Pollutants

	Compounds	**Mobility (sandy/low organic soils)**	**Abundance in storm-water**	**Fraction filterable**	**Contamination potential for surface infilt. and no pretreatment**	**Contamination potential for surface infilt. with sediment-ation**	**Contamination potential for sub-surface inj. with minimal pretreatment**
Nutrients	nitrates	mobile	low/moderate	high	low/moderate	low/moderate	low/moderate
Pesticides	2,4-D	mobile	low	likely low	low	low	low
	γ-BHC (lindane)	intermediate	moderate	likely low	moderate	low	moderate
	malathion	mobile	low	likely low	low	low	low
	atrazine	mobile	low	likely low	low	low	low
	chlordane	intermediate	moderate	very low	moderate	low	moderate
	diazinon	mobile	low	likely low	low	low	low
Other organics	VOCs	mobile	low	very high	low	low	low
	1,3-dichloro-benzene	low	high	high	low	low	high
	anthracene	intermediate	low	moderate	low	low	low
	benzo(a) anthracene	intermediate	moderate	very low	moderate	low	moderate
	bis (2-ethylhexyl) phthalate	intermediate	moderate	likely low	moderate	low?	moderate
	butyl benzyl phthalate	low	low/moderate	moderate	low	low	low/moderate
	fluoranthene	intermediate	high	high	moderate	moderate	high
	fluorene	intermediate	low	likely low	low	low	low
	naphthalene	low/inter.	low	moderate	low	low	low
	penta-chlorophenol	intermediate	moderate	likely low	moderate	low?	moderate
	phenanthrene	intermediate	moderate	very low	moderate	low	moderate
	pyrene	intermediate	high	high	moderate	moderate	high
Pathogens	enteroviruses	mobile	likely present	high	high	high	high
	Shigella	low/inter.	likely present	moderate	low/moderate	low/moderate	high
	Pseudomonas aeruginosa	low/inter.	very high	moderate	low/moderate	low/moderate	high

	protozoa	low/inter.	likely present	moderate	low/moderate	low/moderate	high
Heavy metals	nickel	low	high	low	low	low	high
	cadmium	low	low	moderate	low	low	low
	chromium	inter./very low	moderate	very low	low/moderate	low	moderate
	lead	very low	moderate	very low	low	low	moderate
	zinc	low/very low	high	high	low	low	high
Salts	chloride	mobile	seasonally high	high	high	high	high

(mobility, abundance in stormwater, and soluble fraction) would be considered important. As an example, chlordane would have a low contamination potential with sedimentation pretreatment, while it would have a moderate contamination potential if no pretreatment was used. In addition, if subsurface infiltration/injection was used instead of surface percolation, the compounds would most likely be more mobile, making the abundance criteria the most important, with some regard given to the filterable fraction information for operational considerations.

This table is only appropriate for initial estimates of contamination potential because of the simplifying assumptions made, such as the likely worst case mobility measures for sandy soils having low organic content. If the soil was clayey and had a high organic content, then most of the organic compounds would be less mobile than shown on this table. The abundance and filterable fraction information is generally applicable for warm weather stormwater runoff at residential and commercial area outfalls. The concentrations and detection frequencies would likely be greater for critical source areas (especially vehicle service areas) and critical land uses (especially manufacturing industrial areas).

The stormwater pollutants of most concern (those that may have the greatest adverse impacts on groundwaters) include:

• nutrients: nitrate has a low to moderate groundwater contamination potential for both surface percolation and subsurface infiltration/injection practices because of its relatively low concentrations found in most stormwaters. If the stormwater nitrate concentration was high, then the groundwater contamination potential would likely also be high.

• pesticides: lindane and chlordane have moderate groundwater contamination potentials for surface percolation practices (with no pretreatment) and for subsurface injection (with minimal pretreatment). The groundwater contamination potentials for both of these compounds would likely be substantially reduced with adequate sedimentation pretreatment.

• other organics: 1,3-dichlorobenzene may have a high groundwater contamination potential for subsurface infiltration/injection (with minimal pretreatment). However, it would likely have a lower groundwater contamination potential for most surface percolation practices because of its relatively strong sorption to vadose zone soils. Both pyrene and fluoranthene would also likely have high groundwater contamination potentials for subsurface infiltration/injection practices, but lower

contamination potentials for surface percolation practices because of their more limited mobility through the unsaturated zone (vadose zone). Others (including benzo(a)anthracene, bis (2-ethylhexyl) phthalate, pentachlorophenol, and phenanthrene) may also have moderate groundwater contamination potentials, if surface percolation with no pretreatment, or subsurface injection/infiltration is used. These compounds would have low groundwater contamination potentials if surface infiltration was used with sedimentation pretreatment. Volatile organic compounds (VOCs) may also have high groundwater contamination potentials if present in the stormwater (likely for some industrial and commercial facilities and vehicle service establishments).

• pathogens: enteroviruses likely have a high groundwater contamination potential for all percolation practices and subsurface infiltration/injection practices, depending on their presence in stormwater (likely, especially if contaminated with sanitary sewage). Other pathogens, including *Shigella*, *Pseudomonas aeruginosa*, and various protozoa, would also have high groundwater contamination potentials if subsurface infiltration/injection practices are used without disinfection. If disinfection (especially by chlorine or ozone) is used, then disinfection byproducts (such as trihalomethanes or ozonated bromides) would have high groundwater contamination potentials.

• heavy metals: nickel and zinc would likely have high groundwater contamination potentials if subsurface infiltration/injection was used. Chromium and lead would have moderate groundwater contamination potentials for subsurface infiltration/injection practices. All metals would likely have low groundwater contamination potentials if surface infiltration was used with sedimentation pretreatment.

• salts: chloride would likely have a high groundwater contamination potential in northern areas where road salts are used for traffic safety, irrespective of the pretreatment, infiltration or percolation practice used.

Pesticides have been mostly found in urban runoff from residential areas, especially in dry-weather flows associated with landscaping irrigation runoff. The other organics, especially the volatiles, are mostly found in industrial areas. The phthalates are found in all areas. The PAHs are also found in runoff from all areas, but they are in higher concentrations and occur more frequently in industrial areas. Pathogens are most likely associated with sanitary sewage contamination of storm drainage systems, but several bacterial pathogens are commonly found in surface runoff in residential areas. Zinc is mostly found in roof runoff and other areas where galvanized metal comes into contact with rainwater. Salts are at their greatest concentrations in snowmelt and early spring runoff in northern areas.

The control of these compounds will require a varied approach, including source area controls, end-of-pipe controls, and pollution prevention. All dry-weather flows should be diverted from infiltration devices because of their potentially high concentrations of soluble heavy metals, pesticides, and pathogens. Similarly, all runoff from manufacturing industrial areas should also be diverted from infiltration devices because of their relatively high concentrations of soluble toxicants. Combined sewer overflows should also be diverted because of sanitary sewage contamination. In areas of extensive snow and ice, winter snowmelt and early spring runoff should also be diverted from infiltration devices.

All other runoff should include pretreatment using sedimentation processes before infiltration, to both minimize groundwater contamination and to prolong the life of the infiltration device (if needed). This

pretreatment can take the form of grass filters, sediment sumps, wet detention ponds, etc., depending on the runoff volume to be treated and other site specific factors. Pollution prevention can also play an important role in minimizing groundwater contamination problems, including reducing the use of galvanized metals, pesticides, and fertilizers in critical areas. The use of specialized treatment devices can also play an important role in treating runoff from critical source areas before these more contaminated flows commingle with cleaner runoff from other areas. Sophisticated treatment schemes, especially the use of chemical processes or disinfection, may not be warranted, except in special cases, especially considering the potential of forming harmful treatment by-products (such as THMs and soluble aluminum).

The use of surface percolation devices (such as grass swales and percolation ponds) that have a substantial depth of underlying soils above the groundwater, is preferable to using subsurface infiltration devices (such as dry wells, trenches or French drains, and especially injection wells), unless the runoff water is known to be relatively free of pollutants. Surface devices are able to take greater advantage of natural soil pollutant removal processes. However, unless all percolation devices are carefully designed and maintained, they may not function properly and may lead to premature hydraulic failure or contamination of the groundwater.

RECOMMENDATIONS

It has been suggested that, with a reasonable degree of site-specific design considerations to compensate for soil characteristics, infiltration can be very effective in controlling both urban runoff quality and quantity problems. This strategy encourages infiltration of urban runoff to replace the natural infiltration capacity lost through urbanization and to use the natural filtering and sorption capacity of soils to remove pollutants. However, potential groundwater contamination through infiltration of some types of urban runoff requires some restrictions. Infiltration of urban runoff having potentially high concentrations of pollutants that may pollute groundwater requires adequate pretreatment, or the diversion of these waters away from infiltration devices. The following general guidelines for the infiltration of stormwater and other storm drainage effluent are recommended in the absence of comprehensive site-specific evaluations:

- Dry-weather storm drainage effluent should be diverted from infiltration devices because of their probable high concentrations of soluble heavy metals, pesticides, and pathogenic microorganisms.

- Combined sewage overflows should be diverted from infiltration devices because of their poor water quality, especially high pathogenic microorganism concentrations, and high clogging potential.

- Snowmelt runoff should also be diverted from infiltration devices because of its potential for having high concentrations of soluble salts.

- Runoff from manufacturing industrial areas should also be diverted from infiltration devices because of its potential for having high concentrations of soluble toxicants.

• Construction site runoff must be diverted from stormwater infiltration devices (especially subsurface devices) because of its high suspended solids concentrations which would quickly clog infiltration devices.

• Runoff from other critical source areas, such as vehicle service facilities and large parking areas, should at least receive adequate pretreatment to eliminate their groundwater contamination potential before infiltration.

• Runoff from residential areas (the largest component of urban runoff from most cities) is generally the least polluted urban runoff flow and should be considered for infiltration. Very little treatment of residential area stormwater runoff should be needed before infiltration, especially if surface infiltration is through the use of grass swales. If subsurface infiltration (French drains, infiltration trenches, dry wells, etc.) is used, then some pretreatment may be needed, such as by using grass filter strips, or other surface filtration devices.

Recommended Stormwater Quality Monitoring to Evaluate Potential Groundwater Contamination

Most past stormwater quality monitoring has not been adequate to completely evaluate groundwater contamination potential. The following list shows the parameters that are recommended to be monitored if stormwater contamination potential needs to be considered, or infiltration devices are to be used. Other analyses are appropriate for additional monitoring objectives (such as evaluating surface water problems). In addition, all phases of urban runoff should be sampled, including stormwater runoff, dry-weather flows, and snowmelt.

- Contamination potential:
  - Nutrients (especially nitrates)
  - Salts (especially chloride)
  - VOCs (if expected in the runoff, such as from manufacturing industrial or vehicle service areas, could screen for VOCs with purgable organic carbon, POC, analyses)
  - Pathogens (especially enteroviruses, if possible, along with other pathogens such as *Pseudomonas aeruginosa*, Shigella, and pathogenic protozoa)
  - Bromide and total organic carbon, TOC (to estimate disinfection by-product generation potential, if disinfection by either chlorination or ozone is being considered)
  - Pesticides, in both filterable and total sample components (especially lindane and chlordane)
  - Other organics, in both filterable and total sample components (especially 1,3 dichlorobenzene, pyrene, fluoranthene, benzo (a) anthracene, bis (2-ethylhexyl) phthalate, pentachlorophenol, and phenanthrene)
  - Heavy metals, in both filterable and total sample components (especially chromium, lead, nickel, and zinc)
- Operational considerations:
  - Sodium, calcium, and magnesium (in order to calculate the sodium adsorption ratio to predict clogging of clay soils)
  - Suspended solids (to determine the need for sedimentation pretreatment to prevent clogging)

CHAPTER 2

CHARACTERISTICS OF URBAN RUNOFF

Unfortunately, some stormwaters from urban areas may be badly polluted. These waters may pose a potential threat to both surface and subsurface receiving waters. In order to protect these receiving water resources, treatment before discharge is likely needed. This chapter summarizes urban runoff quality. Many studies have investigated stormwater quality, with the EPA's Nationwide Urban Runoff Program (NURP) (EPA 1983) providing the largest and best known data base. This water quality data can be compared to the information presented in the following chapter to identify which urban runoff waters need treatment to protect groundwaters.

Urban runoff is comprised of many different flow types. These include dry-weather base flows, stormwater runoff, combined sewer overflows (CSOs) and snowmelt. The relative magnitudes of these discharges vary considerably, based on a number of factors. Season (especially cold versus warm weather) and land use have been identified as important factors affecting base flow and stormwater runoff quality, respectively (Pitt and McLean 1986). This chapter briefly summarizes a number of different observations of runoff quality for these different phases and land uses, along with summaries of observations of source area flows contributing to these combined discharges. This information can be used to identify the best stormwater candidates for infiltration controls, and which ones to avoid.

STORMWATER CHARACTERISTICS

Land development increases stormwater pollutant concentrations and volumes. Impervious surfaces, such as rooftops, driveways and roads, reduce infiltration of rainfall and runoff into the ground and degrade runoff quality. Maintenance of landscaped areas further degrades runoff quality. The average runoff volume from developing subdivisions has been reported to be more than ten times greater than that of typical pre-development agricultural areas (Madison, *et al.* 1979).

Factors affecting runoff water volume (and therefore the amount of water available for groundwater infiltration) include rainfall quantity and intensity, slope, soil permeability, land cover, impervious area and depression storage. Research during the Nationwide Urban Runoff Program (NURP) showed that the most important hydraulic factors affecting urban runoff volume were the quantity of rain and the extent of impervious surfaces directly connected to a stream or drainage system (EPA 1983).

Directly connected impervious areas include paved streets, driveways, and parking areas draining to curb and gutter drainage systems, or roofs draining directly to a storm sewer.

Table 5 presents historical stormwater quality data (APWA 1969) while Table 6 is a summary of the Nationwide Urban Runoff Program stormwater data collected from about 1979 through 1982 (EPA 1983). BOD_5 and nutrient concentrations in stormwater are lower than associated values for raw sanitary wastewater; they are closer in quality to typically treated sanitary wastewaters. However, urban stormwater has relatively high concentrations of bacteria, along with high concentrations of many metallic and some organic toxicants. As will be shown later, land use and source areas (parking areas, rooftops, streets, landscaped areas, etc.) all have important effects on stormwater runoff quality.

Urban Runoff Bacteria and their Associated Public Health Significance

Most of the effort in describing bacteria characteristics of urban runoff has involved fecal coliform analyses, mainly because of its historical use in water quality standards. Fecal coliform bacteria observations have long been used as an indicator of sanitary sewage contamination and therefore has been used as an indicator of possible pathogenic microorganism contamination (Field and O'Shea 1992). Fecal streptococci analyses are also relatively common for urban runoff. Unfortunately, relatively few analyses of specific pathogenic microorganisms have been made for urban runoff.

The fecal coliform test is not specific for any one coliform type, or groups of types, but instead has an excellent positive correlation for coliform bacteria derived from the intestinal tract of warm blooded animals (Geldreich, *et al.* 1968). The fecal coliform test measures *Escherichia coli* as well as all other coliforms that can ferment lactose at 44.5°C and are found in warm blooded fecal discharges. Geldreich (1976) found that the fecal coliform test represents over 96 percent of the coliforms derived from human feces and from 93 to 98 percent of those discharged in feces from other warm blooded animals, including livestock, poultry, cats, dogs, and rodents. In many urban runoff studies, all of the fecal coliforms were *E. coli* (Quresh and Dutka 1979). Field and O'Shea (1992) conclude that the fecal coliform test cannot be relied on to accurately assess the pathogenicity of recreational waters receiving urban runoff from uncontaminated storm sewers. The fecal streptococci test is sensitive to all of the intestinal Streptococci bacteria from warm blooded animal feces (Geldreich and Kenner 1969).

Pathogenic bacteria have been found in urban runoff at many locations and are probably from several different sources (Field, *et al.* 1976; Oliveria, *et al.* 1977; Qureshi and Dutka 1979; Environment Canada 1980; Pitt 1983; Pitt and McLean 1986; and Field and O'Shea 1992). Table 7 summarizes the occurrence of various pathogenic bacteria types found in urban stormwaters at Burlington, Ontario; Milwaukee; and Cincinnati. The observed ranges of concentrations and percent isolations of these biotypes vary significantly from site to site and at the same location for different times. However, it is seen that many of the potentially pathogenic bacteria biotypes can be present in urban stormwater runoff. The occurrence of Salmonella biotypes is generally low and their reported density is usually less than one organism/100 mL. *Pseudomonas aeruginosa* are frequently encountered at densities greater than ten organisms/100 mL.

Some authors do not feel that urban runoff presents a significant health problem. Olivieri, *et al.* (1977) do not believe that urban runoff constitutes a major health problem because of the large numbers of

TABLE 7. PATHOGENIC MICROORGANISMS FOUND IN URBAN STORMWATER (organisms/100mL)

City, Province/ State	catchment/ land-use	*Staphylo-coccus aureus*	*Pseudomonas aeruginosa*	Salmonella	Streptococci	Reference
Burlington, Ontario	Aldershot Plaza		14-3,000	*S. seftenberg* & *S. newport* isolated		Qureshi and Dutka, 1979
	Malvern Road		<1-740	100% negative		Qureshi and Dutka, 1979
Milwaukee, WI	highway runoff	all <1,000	all <1,000	45% positive		Gupta, et al, 1981
Cincinnati, OH	business district				79% positive [1]	Geldreich and Kenner, 1969
	residential area				80% positive [2]	Geldreich and Kenner, 1969
	rural area				87% positive [3]	Geldreich and Kenner, 1969

[1]Strep. bacteria types found: *S. bovis/S. equinus* (2%), Atypical *S. faecalis* (1%), *S. faecalis liquifaciens* (18%)

S. thompson: 4,500/100mL

[2]Strep. bacteria types found: *S. bovis/S. equinus* (0.5%), Atypical *S. faecalis* (1%), *S. faecalis liquifaciens* (18%)

[3]Strep. bacteria types found: *S. bovis/S. equinus* (0.5%), Atypical *S. faecalis* (0.2%), *S. faecalis liquifaciens* (12%)

in urban runoff. For urban runoff, it may be impossible to consume enough bacteria cells to establish the infective dose. The importance of urban runoff in disease transmission in the Ottawa area was also questioned by Gore and Storrie/Proctor and Redfern (1981). They stated that little or no correlation was found between fecal coliform indicator bacteria and pathogenic bacteria in Ottawa stormwater runoff and local receiving waters. They further stated that the currently applied objectives in Ontario for fecal coliforms for body contact recreation are neither universal nor absolute standards relating to disease or infection. They concluded that these numeric objectives should be reviewed for their applicability to the local swimming beaches. However, Field and O'Shea (1992) pointed out that the evidence of low densities and required high infective doses for some pathogens cannot minimize the health hazard of other pathogens that have been found in urban runoff (such as *P. aeruginosa*, *Salmonella typhosa*, *Shigella*, or enteroviruses) that do not require ingestion, or only require very low infective doses.

Urban Runoff Salmonella Observations--

Salmonella has been reported in some, but not all, urban stormwaters. Oureshi and Dutka (1979) frequently detected Salmonella in southern Ontario stormwaters. They did not find any predictable patterns of Salmonella isolations as they were found throughout the various sampling periods. Olivieri, *et al.* (1977) frequently found Salmonella in Baltimore runoff, but at relatively low concentrations. Typical concentrations were from five to 300 Salmonella organisms per ten liters. The concentrations of Salmonella were about ten times higher in the Baltimore stormwater samples than in the urban stream receiving the runoff. They also did not find any marked seasonal variations in Salmonella concentrations. Almost all of the stormwater samples that had fecal coliform concentrations greater that 2000 organisms/100 mL had detectable Salmonella concentrations. However, about 27 percent of the samples having fecal coliform concentrations less than 200 organisms/100 mL had detectable Salmonella.

Quite a few urban runoff studies did not detect Salmonella. Schillinger and Stuart (1978) found that Salmonella isolations were not common in a Montana subdivision study and that the isolations did not correlate well with fecal coliform concentrations. Environment Canada (1980) stated that Salmonella were virtually absent from Ottawa storm drainage samples obtained in 1979. They concluded that Salmonella are seldom present in significant numbers in Ottawa urban runoff. The types of Salmonella found in southern Ontario were *S. thompson* and *S. tvphimurium* var. *copenhagen* (Qureshi and Dutka 1979).

Olivieri, *et al.* (1977) stated that the primary human enteric disease producing Salmonella biotypes associated with the ingestion of water include *S. typhi* (typhoid fever), *S. paratyphi* (paratyphoid fever), and Salmonella species (salmonellosis). These biotypes are all rare, except for Salmonella. The dose of Salmonella required to produce an infection in a healthy adult is quite large (approximately 100,000 organisms). However, more sensitive individuals, such as children and the elderly, are much more susceptible to disease. The salmonellosis health hazard associated with urban streams is believed to be small because of this relatively large infective dose. If two liters of stormwater having typical Salmonella concentrations (ten Salmonella organisms per/ten liters) is ingested, less than 0.001 of the required infective dose would be ingested. If a worse case Salmonella stormwater concentration of 10,000 organisms/ten liters occurred, the ingestion of 20 liters of stormwater would be necessary for an infective dose. They stated that the low concentrations of Salmonella, coupled with the unlikely event of consuming enough stormwater, make the Salmonella health hazard associated with urban runoff small.

Geldreich (1965) recommended a fecal coliform standard of 200 organisms/100 mL because the frequency of Salmonella detection increased sharply at fecal coliform concentrations greater than this value. Setmire and Bradford (1980) stated that the National Academy of Sciences recommended a fecal coliform standard of 70/100 mL in waters with shellfish harvesting to restrict Salmonella concentrations in edible tissues. However, Field, *et al.* (1976) concluded that the use of indicator bacteria to protect Salmonella ingestion is less meaningful in stormwater runoff than in other waters.

Urban Runoff Shigella Observations--

Olivieri, *et al.* (1977) stated that there is circumstantial evidence that Shigella is present in urban runoff and receiving waters and could present a significant health hazard. There have been problems in isolating and quantifying Shigella bacteria. Shigella species causing bacillary dysentery are one of the primary human enteric disease producing bacteria agents present in water. The infective dose of Shigella necessary to cause dysentery is quite low (10 to 100 organisms). Because of this low required infective

dose and the assumed presence of Shigella in urban waters, it may be a significant health hazard associated with urban runoff.

Urban Runoff *Pseudomonas aeruginosa* Observations--

Pseudomonas is reported to be the most abundant pathogenic bacteria organism in urban runoff and streams (Olivieri, *et al.* 1977). Pitt and McLean (1986) found *P. aeruginosa* populations of several thousand organisms per 100 mL in many urban runoff samples. No information could be found concerning the problems associated with ingestion of *P. aeruginosa* contaminated drinking waters. However, relatively small populations of *P. aeruginosa* may be capable of causing water contact health problems ("swimmers ear", and skin infections) and it is resistant to antibiotics.

Other Urban Runoff Pathogen Observations--

E. coli and *Vibrio cholerae* are disease producing pathogens associated with the ingestion of water. The cholera pathogen is quite rare, but *E. coli* is more common in urban runoff. The required infective oral dose of both of these pathogens is about 10^8 organisms for healthy adults (Olivieri, *et al.* 1977).

Viruses may also be significant pathogens in urban runoff. Very small amounts of a virus are capable of producing infections or diseases, especially when compared to the large numbers of bacteria organisms required for infection (Berg 1965). Olivieri, *et al.* (1977) stated that viruses are usually detected at low levels in urban receiving waters and storm runoff.

Summary of Urban Runoff Pathogenic Microorganism Observations--

Many potentially pathogenic bacteria biotypes may be present in urban runoff. Because of the low probability of direct ingestion of urban runoff, many of the potential human diseases associated with these biotypes are not likely to occur in normal receiving waters. The pathogenic organisms of most concern in urban runoff (and therefore that have received the most attention) are usually associated with skin infections and body contact in recreation waters. The most significant stormwater biotype causing skin infections would be *Pseudomonas aeruginosa*. This biotype has been detected frequently in most urban runoff studies in concentrations that may cause potential infections. Shigella may be present in urban runoff and receiving waters. This pathogen, when ingested in low numbers, can cause dysentery. A number of other pathogenic microorganisms have been periodically reported in urban runoff.

Significant Stormwater Toxicants

Stormwater research has quantified some inorganic and organic hazardous and toxic substances frequently found in urban runoff. The NURP data (Table 8), collected from mostly residential areas throughout the U.S., did not indicate any significant regional differences in the substances detected, or in their concentrations (EPA 1983). However, the residential and industrial data obtained by Pitt and McLean (1986) in Toronto found significant concentration and yield differences for these two distinct land uses and for dry-weather and wet-weather urban runoff flows.

The concentrations of many of these toxic pollutants exceeded the U.S. EPA water quality criteria for human health protection by large amounts. As an example, typical standards for PAHs in surface waters used as drinking water supplies are 2.8 ng/L (0.0028 µg/L) (EPA 1986). As shown on

Table 8, urban runoff concentrations of chrysene (0.6 to 10 µg/L), fluoranthene (0.3 to 21 µg/L), phenanthrene (0.3 to 10 µg/L) and pyrene (0.3 to 16 µg/L) (four of the most common PAHs found in urban runoff) have been reported to be from 100 to as much as several thousand times greater than this criteria.

TABLE 8. SUMMARY OF NURP PRIORITY POLLUTANT ANALYSES[1]
(Only those compounds found in greater than 10% of outfall samples are shown)

	Frequency of Detection %	Range of Detected Concentrations (µg/L)
Pesticide		
α - BHC	20	0.0027 to 0.1
γ - BHC (lindane)	15	0.007 to 0.1
Chlordane	17	0.01 to 10
α - Endosulfan	19	0.008 to 0.2
Metals and Cyanide		
Antimony	13	2.6 to 23
Arsenic	52	1 to 51
Beryllium	12	1 to 49
Cadmium	48	0.1 to 14
Chromium	58	1 to 190
Copper	91	1 to 100
Cyanides	23	2 to 300
Lead	94	6 to 460
Mercury	10	0.6 to 1.2
Nickel	43	1 to 182
Selenium	11	2 to 77
Zinc	94	10 to 2400
PCBs and Related Compounds (none detected in greater than 1% of all samples)		
Halogenated Aliphatics		
Methylene chloride	11	5 to 15
Ethers (None detected in any of the samples)		
Monocyclic Aromatics (None detected in greater than 6% of all samples)		
Phenols and Cresols		
Phenol	14	1 to 13
Pentachlorophenol	19	1 to 115
4-nitro phenol	10	1 to 37
Phthalate Esters		
bis (2-ethylhexyl) phthalate	22	4 to 62

Polycyclic Aromatic Hydrocarbons		
Chrysene	10	0.6 to 10
Fluoranthene	16	0.3 to 21
Phenanthrene	12	0.3 to 10
Pyrene	15	0.3 to 16

[1]Based on 121 samples from 17 cities

Source: EPA 1983.

Table 9 lists the toxic and hazardous substances that have been found in more than 10 percent of the industrial and residential urban runoff samples analyzed (Galvin and Moore 1982; EPA 1983; and Pitt and McLean 1986). As noted above, available NURP data do not reveal toxic urban runoff conditions significantly different from different parts of the U.S. (EPA 1983). The pesticides shown were mostly found in urban runoff from residential areas, while heavy metals and other hazardous materials were much more prevalent in industrial areas. Urban runoff dry-weather base flows may also be significant contributors of hazardous and toxic pollutants. Lindane (gamma-BHC) and dieldrin may be common in residential dry-weather storm sewer flows, while PCBs may be common in industrial dry-weather storm sewer flows. Many of the heavy metals found in industrial area urban runoff were found at high concentrations during both dry-weather and wet-weather conditions.

COMBINED SEWAGE CHARACTERISTICS

Combined sewage is made up of sanitary wastewater during dry-weather flow conditions, but also includes stormwater during wet-weather flow conditions. Because of the relatively slow sewage flow rates during dry weather, many combined sewage systems experience deposition of solids in the sewerage system. When stormwater enters the system during wet weather, this deposited material is flushed from the system. This "first-flush" therefore typically has greater pollutant concentrations than either separate stormwater or separate sanitary sewage (Moffa 1989). Tables 10 through 14 summarize various aspects of combined sewage. Table 12 compares bacteria densities of combined sewage with separate stormwater in Baltimore (Olivieri, *et al.* 1977). This table shows very little difference in the bacteria densities of these two sample types. Tables 13 and 14 show heavy metal and other toxicant concentrations in combined sewage. Pitt and Barron (1990) found all of the heavy metals investigated in New York City combined sewage samples, but only two of the base-neutral organic compounds were found in more than one of the 20 samples analyzed. None of the base-neutrals were detected (at a detection limit of about 1 µg/L) in the filtered sample portions, but most of the metals were found in the filtered samples.

RELATIVE CONTRIBUTIONS OF URBAN RUNOFF FLOW PHASES

Tables 15 and 16 summarize Toronto residential/commercial and industrial urban runoff characteristics during both warm and cold weather (Pitt and McLean 1986). These tables show the relative importance of wet-weather and dry-weather flows coming from separate stormwater systems. If urban runoff is to be directed to an outfall infiltration device, then the dry-weather flows will also be present at the outfalls. Possibly 25 percent of all separate stormwater outfalls have water flowing in them during dry weather, and as much as 10 percent are grossly contaminated with raw sewage, industrial wastewaters, etc. (Pitt, *et al.* 1993). The EPA's Stormwater Permit program requires municipalities to conduct stormwater outfall surveys to identify, and then correct, inappropriate discharges into separate storm drainage. However, it can be expected that substantial outfall contamination will exist for many years. If stormwater is infiltrated before it enters the drainage system (such as by using French drains, infiltration trenches, grass swales, porous pavements or percolation ponds in upland areas) then the effects of contamination problems in the drainage system on groundwater will be substantially reduced. If outfall waters are to be infiltrated in larger regional facilities, then these periods of dry-weather flows will have to be considered.

TABLE 9. HAZARDOUS AND TOXIC SUBSTANCES FOUND IN URBAN RUNOFF*

	Residential Areas	Industrial Areas
Haloginated Aliphatics		
1,2,-dichlorethene		x
Methylene chloride		x
Tetrachloroethylene		x
Phthalate Esters		
Bis (2-Ethylene) phthalate	x	
Butylbenzyl phthalate	x	x
Diethyl phthalate		x
Di-N-Butyl phthalate	x	x
Polycyclic Aromatic Hydrocarbons		
Phenanthrene		x
Pyrene		x
Other Volatiles		
Benzene	x	x
Chloroform		x
Ethylbenzene		x
N-Nitro-sodimethylamine		x
Toluene		x
Heavy Metals		
Aluminum	x	x
Chromium		x
Copper	x	x
Lead	x	x
Zinc	x	x
Pesticides and Phenols		
BHC	x	
Chlordane	x	
Dieldrin	x	
Endosulfan sulfate	x	
Endrin	x	
Isophorone	x	
Methoxychlor	x	
PCB-1254		x
PCB-1260		x
Pentachlorophenol	x	x
Phenol	x	x

*Substances found in at least 10 percent of the stormwater samples analyzed

TABLE 11. SELECTED COMBINED SEWER OVERFLOW BACTERIA DATA
(organisms/100mL)

City (reference)	Fecal Coliforms	Fecal strep
Ottawa (Ontario Ministry of the Environment 1983)	$5x10^5$-$9x10^6$	---
Toronto (Ontario Ministry of the Environment 1982)	10^6	---
Detroit (Geldreich 1976)	10^6-10^7	10^5
Selected Nationwide Data (Field & Struzeski 1972)	$2x10^4$-$2x10^7$	$2x10^4$-$2x10^6$

TABLE 13. CONCENTRATIONS OF HEAVY METALS
IN COMBINED SEWER OVERFLOWS

Land Use Type	Copper (µg/L)	Zinc (µg/L)	Lead (µg/L)
COMBINED SEWER OVERFLOW			
Medium Density Residential[1]	77	191	93
High Density Residential[2]	48	185	84
Residential/Commercial	100	255	135
Light Industrial	58	136	47
Heavy Industrial	98	447	223
Mean for All Land Uses	76	242	116

[1]Medium Density Residential — 3 to 8 dwelling units per acre
[2]High Density Residential — 9 and more dwelling units per acre

Source: Johnson 1990

TABLE 14. NEW YORK CITY COMBINED SEWER OVERFLOW QUALITY SUMMARY
(average of observed values)

	total sample		filtered sample [1]		
	mean of observ.	detection frequency	mean of observ.	detection frequency	percent filterable [2]
Microtox toxicity (I_{35}, % light decrease)	59	20 of 20	-	-	-
pH	6.8	20 of 20	-	-	-
Suspended solids (mg/L)	94	20 of 20	-	-	-
Turbidity (NTU)	22	20 of 20	-	-	-
Particle size (median, microns)	50	20 of 20	-	-	-
Base Neutrals (1 µg/L detection limit)					
Nitrobenzene	26.5	1 of 20	nd [3]	0 of 20	0
Isophorone	10.4	1 of 20	nd	0 of 20	0
Bis(2-chloroethyl) ether	15.5	1 of 20	nd	0 of 20	0
1,3-Dichlorobenzene	22	1 of 20	nd	0 of 20	0
Naphthalene	7.7	1 of 20	nd	0 of 20	0
Diethyl phthalate	103	1 of 20	nd	0 of 20	0
Fluorene	9.3	1 of 20	nd	0 of 20	0
Di-n-butyl phthalate	33.2	4 of 20	nd	0 of 20	0
Phenanthrene	33.2	1 of 20	nd	0 of 20	0
Benzyl butyl phthalate	82.3	1 of 20	nd	0 of 20	0
Fluoranthene	6.6	1 of 20	nd	0 of 20	0
Bis(2-ethyl hexyl) phthalate	11500	5 of 20	nd	0 of 20	0
Pyrene	15.3	1 of 20	nd	0 of 20	0
Di-n-octyl phthalate	42.6	1 of 20	nd	0 of 20	0
Benzo(a) anthracene	10.9	1 of 20	nd	0 of 20	0
Chrysene	8.2	1 of 20	nd	0 of 20	0
Pesticides (0.3 µg/L detection limit)					
BHC	0.3	1 of 20	nd	0 of 20	0
DDD	1.2	1 of 20	nd	0 of 20	0
Chlordane	0.5	1 of 20	nd	0 of 20	0
Heavy Metals (1 µg/L detection limit)					
Aluminum (5 µg/L detection limit)	1890	20 of 20	204	14 of 20	11
Cadmium (0.1 µg/L detection limit)	2.8	20 of 20	0.9	20 of 20	32
Chromium	21.7	20 of 20	13.9	9 of 20	64
Copper	93.5	20 of 20	12.8	20 of 20	14
Lead	45.3	20 of 20	3.5	14 of 20	8
Nickel	15.3	20 of 20	8.8	19 of 20	58
Zinc	116	20 of 20	35.5	20 of 20	31

(1) A split sample portion was also filtered through a 0.45µm membrane filter before analysis to determine the filterable pollutant concentrations.

(2) The "percent filterable" is the percentage of the total sample concentration associated with the filtered sample portion: (filtered sample conc./total sample conc.)X100.

(3) nd: not detected

TABLE 15. MEDIAN CONCENTRATIONS OBSERVED AT TORONTO OUTFALLS DURING WARM WEATHER[1]

Constituent (mg/L unless noted)	Warm Weather Baseflow		Warm Weather Stormwater	
	Residential	Industrial	Residential	Industrial
Stormwater volume (m^3/ha/season)	--	--	950	1500
Baseflow volume (m^3/ha/season)	1700	2100	--	--
Total residue	979	554	256	371
Total dissolved solids (TDS)	973	454	230	208
Suspended solids (SS)	<5	43	22	117
Chlorides	281	78	34	17
Total phosphorus	0.09	0.73	0.28	0.75
Phosphates	<0.06	0.12	0.02	0.16
Total Kjeldahl nitrogen (organic N plus NH_3)	0.9	2.4	2.5	2.0
Ammonia nitrogen	<0.1	<0.1	<0.1	<0.1
Chemical oxygen demand (COD)	22	108	55	106
Fecal coliform bacteria (#/100mL)	33,000	7,000	40,000	49,000
Fecal strep. bacteria (#/100mL)	2,300	8,800	20,000	39,000
Pseudo. aeruginosa bacteria (#/100mL)	2,900	2,380	2,700	11,000
Arsenic	<0.03	<0.03	<0.03	<0.03
Cadmium	<0.01	<0.01	<0.01	<0.01
Chromium	<0.06	0.42	<0.06	0.32
Copper	0.02	0.05	0.03	0.06
Lead	<0.04	<0.04	<0.06	0.08
Selenium	<0.03	<0.03	<0.03	<0.03
Zinc	0.04	0.18	0.06	0.19
Phenolics (µg/L)	<1.5	2.0	1.2	5.1
α - BHC (ng/L)	17	<1	1	3.5
γ - BHC (Lindane) (ng/L)	5	<2	<1	<1
Chlordane (ng/L)	4	<2	<2	<2
Dieldrin (ng/L)	4	<5	<2	<2
Polychlorinated biphenols (PCBs) (ng/L)	<20	<20	<20	33
Pentachlorophenol (PCP) (ng/L)	280	50	70	705

(1) Warm weather samples were obtained during the late spring, summer, and early fall months when the air temperatures were above freezing and no snow was present.

Source: Pitt and McLean 1986

TABLE 16. MEDIAN CONCENTRATIONS OBSERVED AT TORONTO OUTFALLS DURING COLD WEATHER[2]

Constituent (mg/L unless noted)	Cold Weather Baseflow		Cold Weather Snowmelt	
	Residential	Industrial	Residential	Industrial
Stormwater volume (m^3/ha/season)	--	--	1800	830
Baseflow volume (m^3/ha/season)	1100	660	--	--
Total residue	2230	1080	1580	1340
Total dissolved solids (TDS)	2210	1020	1530	1240
Suspended solids (SS)	21	50	30	95
Chlorides	1080	470	660	620
Total phosphorus	0.18	0.34	0.23	0.50
Phosphates	<0.05	<0.02	<0.06	0.14
Total Kjeldahl nitrogen (organic N plus NH_3)	1.4	2.0	1.7	2.5
Ammonia nitrogen	<0.1	<0.1	0.2	0.4
Chemical oxygen demand (COD)	48	68	40	94
Fecal coliform bacteria (#/100mL)	9800	400	2320	300
Fecal strep bacteria (#/100mL)	1400	2400	1900	2500
Pseudo. aeruginosa bacteria (#/100mL)	85	55	20	30
Cadmium	<0.01	<0.01	<0.01	0.01
Chromium	<0.01	0.24	<0.01	0.35
Copper	0.02	0.04	0.04	0.07
Lead	<0.06	<0.04	0.09	0.08
Zinc	0.07	0.15	0.12	0.31
Phenolics (mg/L)	2.0	7.3	2.5	15
α - BHC (ng/L)	NA[2]	3	4	5
γ - BHC (Lindane) (ng/L)	NA	NA	2	1
Chlordane (ng/L)	NA	NA	11	2
Dieldrin (ng/L)	NA	NA	2	NA
Pentachlorophenol (PCP) (ng/L)	NA	NA	NA	40

(1) Cold weather samples were obtained during the winter months when the air temperatures were commonly below freezing. Snowmelt samples were obtained during snowmelt episodes and when rain fell on snow.

(2) NA: not analyzed

Source: Pitt and McLean 1986

Similar problems occur in areas having substantial snowfalls. Table 16 summarizes Toronto snowmelt and cold weather baseflow characteristics (Pitt and McLean 1986). The bacteria densities during cold weather are substantially less than during warm weather, but are still relatively high (EPA 1983). However, chloride concentrations and dissolved solids are much higher during cold weather. Early spring stormwater events also contain high dissolved solids concentrations (Bannerman, personal communication, WI DNR). Unfortunately, upland infiltration devices do not work well during cold weather due to freezing soils. Outfall flows occur under ice into receiving waters (including detention ponds) and may enter regional infiltration devices if not specifically diverted.

POLLUTANT CONTRIBUTIONS FROM DIFFERENT URBAN SOURCE AREAS

Limited source area sheetflow quality data is available from several studies conducted in California, Washington, Nevada, Wisconsin, Illinois, Ontario, Colorado, New Hampshire, New York, and Alabama since 1979. A relatively large amount of parking and roof runoff quality data has been obtained from all of these locations, but only a few of these studies evaluated a broad range of source areas or land uses. This information can be used to identify which upland areas can be controlled by direct infiltration, which ones would require significant pretreatment before infiltration, and which ones should not be discharged to the groundwater because of potentially high concentrations of problem pollutants that may not be able to be adequately treated. The major urban source area categories that have been studied include:

- roofs
- paved parking areas
- paved storage areas
- unpaved parking and storage areas
- driveways
- streets
- landscaped areas
- undeveloped areas
- freeway paved lanes and shoulders
- vehicle service areas

Tables 17 through 20, summarize much of the data available describing urban area runoff pollutants from these source areas for different land uses and seasons.

Lead and zinc concentrations are generally the highest in sheetflows from paved parking areas and streets, with some high zinc concentrations also found in roof drainage samples. High bacteria populations have been found in sidewalk, road, and some bare ground sheetflow samples (collected from locations where dogs would most likely be "walked").

Pentachlorophenol was detected (400 to 500 ng/L concentrations) in four of the five industrial source area samples analyzed for priority pollutants in Toronto (Pitt and McLean 1986). These samples were collected from an industrial subdrainage area and from a paved storage yard. Two of the five

TABLE 19. OTTAWA SHEETFLOW BACTERIA CHARACTERISTICS
(August 15 and September 23, 1981 samples)

		rooftop runoff	vacant land and park runoff	parking lot runoff	gutter flow
Fecal Coliforms	geometric mean (#/100mL)	85	5,600	2,900	3,500
	min (#/100mL)	10	360	200	500
	max (#/100mL)	400	79,000	19,000	10,000
	number of observations	4	7	6	7
Fecal Strep.	geometric mean (#/100mL)	170	16,500	11,900	22,600
	min (#/100mL)	20	12,000	1,600	1,800
	max (#/100mL)	3,600	57,000	40,000	1,200,000
	number of observations	4	7	6	7

Source: Pitt 1983

industrial source area priority pollutant sheetflow samples analyzed also had detectable PCBs (80 and 190 ng/L), α-BHC (8 and 10 ng/L), and γ-BHC (2 and 10 ng/L) concentrations.

Some of the sheetflow contributions observed at these locations were not sufficient to explain the concurrent concentrations observed in runoff at outfalls. The low chromium surface sheetflow concentrations and the high outfall concentrations at the Toronto industrial area, as an example, indicated a high likelihood of direct industrial wastewater connections to the storm drainage system. Chromium was rarely detected in any sheetflow samples, but was commonly found in potentially problem concentrations at the industrial outfall. Similarly, most of the fecal coliform populations observed in sheetflows were significantly lower than those observed at the outfall.

The following paragraphs briefly summarize likely sources of important pollutants in urban areas:

Cadmium was commonly detected by Pitt, *et al.* (1995) in almost all stormwater source area runoff samples. They found the highest median concentration (8 μg/L) in vehicle service area runoff, while a street runoff sample had the highest concentration observed (220 μg/L). Durum (1974) stated that concentrations of the carbonate and hydroxide forms of cadmium, with pH values equal to or less than 7, are relatively high, and that waters exceeding the U.S. Public Health Service (USPHS) standard of 10 μ g/L may occur in many stable water systems, including both surface and groundwaters.

Chromium was detected by Pitt, *et al.* (1995) at concentrations above 1 μg/L in almost all of the stormwater source area sheetflow and receiving water samples analyzed. Landscaped area samples had the highest median total chromium concentrations observed (100 μg/L), while a roof runoff sample had the highest sample concentration observed (510 μg/L). Phillips and Russo (1978) stated that in water, trivalent (Cr^{+3}) chromium exists as a complex, colloid or precipitate, depending on pH. The more toxic hexavalent (Cr^{+6}) chromium form is usually present only as an ion and would therefore not be directly removable through filtering or sedimentation practices.

Copper was detected by Pitt, *et al.* (1995) at concentrations greater than 1 μg/L in practically all of the stormwater samples analyzed. Urban creek samples contained the greatest median concentrations (160 μg/L), while a street runoff sample had the highest copper concentration observed (1250 μg/L). Callahan, *et al.* (1979) stated that copper in unpolluted waters occurs mostly as a carbonate complex and in polluted waters forms complexes with organic materials. Pitt and Amy (1973) found that inorganic copper is mostly found with valence states of plus one and plus two in natural water systems near pH 7. The common inorganic copper forms at these pH include copper combined with sulfides, sulfates, oxides, hydroxides, cyanides, and iodide. Phillips and Russo (1978) stated that alkalinity and pH are believed to be the major factors controlling copper speciation. Callahan, *et al.* (1979) stated that copper speciation with organics is most important in polluted waters. Cu^{+2} is especially likely to form complexes with humic materials.

The EPA (1976) stated that the ferrous form of *iron* can persist in waters void of dissolved oxygen, and originates usually from anaerobic groundwaters or from mine drainage. Iron can exist in natural organometallic, humic, and colloidal forms. Black or brown "swamp waters" may contain iron concentrations of several milligrams per liter in the presence or absence of dissolved oxygen, but this iron

form has little effect on aquatic life because it is complexed and relatively inactive chemically or physiologically.

Pitt, *et al.* (1995) found *lead* at concentrations greater than 1 μg/L in all of the stormwater runoff and CSO samples analyzed. Vehicle service area samples contained the greatest median concentrations (75 μg/L), while a storage area runoff sample had the highest lead concentration observed (330 μg/L). Lead exists in nature mainly as lead sulfide (Galena) (EPA 1976). Other common natural forms of lead are lead carbonate (Cerussite), lead sulfate (Anglesite) and lead chlorophosphate (Pyromorphite). Stable complexes result from the interaction of lead with organic materials. The toxicity of lead in water is affected by pH, hardness, organic materials and the presence of other metals. Pitt and Amy (1973) reported that most inorganic lead in runoff water systems near pH 7 exist in the plus 2 or plus 4 valence states as lead sulfide, carbonate, sulfate, chromate, hydroxide, or chloride. Rolfe and Reinbold (1977) found that about 46 percent of the total lead input in a test watershed remained airborne. The total input included gaseous and particulate vehicle emissions. About 5 percent of the total lead input to the watershed occurred with rainfall and about 60 percent occurred with atmospheric settleable particulates. The streamflow accounted for the majority of all of the lead discharged from the watershed (about 7 to 8 percent of the total lead input).

Nickel was detected at concentrations greater than 1 μg/L in most of the stormwater samples analyzed by Pitt, *et al.* (1995). Parking area runoff samples contained the greatest median concentrations (40 μg/L), while a landscaped area runoff sample had the highest nickel concentration observed (130 μg/L).

Zinc was detected by Pitt, *et al.* (1995) at concentrations greater than 1 μg/L in all of the stormwater runoff samples analyzed. Roof runoff samples contained the greatest median concentration (100 μg/L) and the highest concentration observed (1580 μg/L). The EPA (1976) stated that zinc is usually found in nature as the sulfide. It is often associated with the sulfides of other metals, especially lead, copper, cadmium and iron. Callahan, *et al.* (1979) stated that zinc in unpolluted waters is mostly as the hydrated divalent cation (Zn^{+2}) but in polluted waters complexation of zinc predominates. Pitt and Amy (1973) reported that zinc is mostly found as the divalent form, as a sulfide, oxide, sulfate or hydroxide.

The *polycyclic aromatic hydrocarbon* (PAH) compounds found in urban runoff (most commonly anthracene, chrysene, fluoranthene and phenanthrene) are formed by incomplete combustion when organic compounds are burned with insufficient oxygen. Most of the PAHs are associated with suspended solids and humic materials, with little dissolved fractions found in natural waters. There are some studies that have examined the carcinogenic risk associated with the ingestion of PAHs by humans. Many animal studies have established the wide range of carcinogenicity of PAHs by skin contact and ingestion (Varanasi 1989). The concentrations of PAHs needed to produce cancers can be extremely low. As an example, the PAH concentration associated with a cancer risk level of 10^{-6} is only 9.7×10^{-4} μg/L. Tissue damage and systemic toxicity has also been associated with PAH exposure (PHS 1981).

Benzo (a) anthracene, a PAH, was detected at concentrations of about 2 to 60 μg/L in 12 percent of the stormwater samples analyzed by Pitt, *et al.* (1995). The greatest concentration observed was found in an urban creek sample. A major source of benzo (a) anthracene is gasoline, with an emission

factor as high as 0.5 mg emitted in the exhaust condensate per liter of gasoline consumed (Verschueren 1983). Wood preservative use may also contribute benzo (a) anthracene. Typical domestic sewage effluent values ranged from 0.2 to more than 1 μg/L (in heavily industrialized areas). During heavy rains, sewage concentrations of benzo (a) anthracene increased substantially to more than 10 μg/L. Benzo (a) anthracene was reported to be both carcinogenic and mutagenic (Verschueren 1983).

Pitt, *et al.* (1995) detected *benzo (b) fluoranthene* in concentrations greater than about 1μg/L in 17 percent of the stormwater samples analyzed. The greatest concentration observed was 226 μg/L, found in a roof runoff sample. Benzo (b) fluoranthene, a PAH, is found in gasoline, in addition to fresh and used motor oils (Verschueren 1983). The automobile emission factor for benzo (b) fluoranthene is about 20 to 50 μg in the exhaust condensate per liter of gasoline consumed. It is also found in bitumen, an ingredient of roofing compounds. Benzo (b) fluoranthene was found in domestic wastewater effluent in concentrations of about 0.04 to 0.2 μg/L. Raw sewage concentrations were as high as 0.9 μg/L in areas of heavy industry. Typical sewage concentrations were about 0.04 μg/L, but increased to about 10 μg/L during heavy rains. The IARC (1979) has found sufficient evidence of carcinogenicity of benzo (b) fluoranthene in animals.

Pitt, *et al.* (1995) detected *benzo (k) fluoranthene* in concentrations greater than 1 μg/L in 17 percent of all stormwater runoff samples analyzed. The greatest concentration observed was 221 μg/L, found in a roof runoff sample. Benzo (k) fluoranthene, a PAH, is found in crude oils, gasoline, and bitumen (Verschueren 1983). Sewage sludges have been found to contain from 100 to 400 μg/L benzo (k) fluoranthene. Domestic sewage effluent can contain from 0.03 to 0.2 μg/L benzo (k) fluoranthene, while sewage in heavily industrialized areas may contain concentrations as great as 0.5 μg/L. During heavy rains, sewage concentrations of benzo (k) fluoranthene increased to more than 4 μg/L.

Benzo (a) pyrene, a PAH, was detected by Pitt, *et al.* (1995) in concentrations greater than about 1 μg/L in 17 percent of the stormwater samples analyzed. The greatest concentration observed was 300 μg/L, found in a roof runoff sample. Benzo (a) pyrene can be synthesized by various bacteria (including *Escherichia coli*) at a rate of about 20 to 60 μg per dry kg of bacterial biomass (Verschueren 1983). It is also a potential leachate of asphalt and is present in oils and gasoline. Benzo (a) pyrene is present in domestic sewage effluents at concentrations of about 0.05 μg/L and in raw sewage sludge at concentrations of about 400 μg/L. Benzo (a) pyrene is a known carcinogen and mutagen.

Fluoranthene, a PAH, was detected in concentrations greater than about 1 μg/L in 23 percent of the stormwater samples analyzed by Pitt, *et al.* (1995). The greatest concentration observed was 128 μ g/L, found in an urban creek sample. Fluoranthene was the only PAH found in an EPA drinking water survey of 110 samples in 1977 (Harris 1982). Fluoranthene is found in crude oils, gasoline, motor oils and wood preservatives (Verschueren 1983). It is found in the exhaust condensate of gasoline engines at a rate of about 1 mg per liter of gasoline consumed. It is found in domestic sewage effluents in concentrations of about 0.01 to 2.5 μg/L, and in raw sewage sludge at concentrations of up to about 1200 μg/L. In one case, sewage effluent had concentrations of fluoranthene of about 0.4 μg/L during dry weather, but increased to about 16 μg/L during heavy rains. Several studies have shown that fluoranthene is a potent carcinogen which substantially increases the carcinogenic potential of other known carcinogens (EPA 1980).

Naphthalene, a PAH, was detected in concentrations greater than about 1 µg/L in 13 percent of the runoff samples analyzed by Pitt, *et al.* (1995). The greatest concentration observed was 296 µg/L, found in an urban creek sample. Naphthalene is the single most abundant component of coal tar, and is present in gasoline and insecticides (especially moth balls). Naphthalene may also originate from natural uncontrolled combustion, such as forest fires, along with house fires in urban areas (Howard 1989). However, vehicle emissions are probably the most significant urban source of naphthalene. Additional major urban naphthalene sources included detergents, solvents, and asphalt (Verschueren 1983). Carcinogenicity and mutagenicity tests were negative for naphthalene (Howard 1989).

Phenanthrene, a PAH, was detected in concentrations greater than about 1 µg/L in 10 percent of the runoff samples analyzed by Pitt, *et al.* (1995). The greatest concentration observed was 69 µg/L, found in an urban creek sample. Phenanthrene is found in crude oil, gasoline, and coal tar. Its emission factor in gasoline engine exhaust condensate is about 2.5 mg per liter of gasoline consumed. Carcinogenicity and mutagenicity tests were negative for phenanthrene (Verschueren 1983).

Pyrene, a PAH, was detected in concentrations greater than about 1 µg/L in 19 percent of the runoff samples analyzed by Pitt, *et al.* (1995). The greatest concentration observed was 102 µg/L, found in an urban creek sample. Pyrene is found in crude oils, gasoline, motor oils, bitumen, coal tar, and wood preservatives (Verschueren 1983). The emission factor of pyrene from gasoline engine exhaust condensates is about 2.5 mg per liter of gasoline consumed. It was degraded in seawater by 85 percent from an initial concentration of 365 µg/L after 12 days. Pyrene is discharged in domestic wastewater effluents at concentrations of about 2 µg/L. In one study, dry-weather raw sewage had pyrene concentrations of about 0.2 µg/L, while pyrene concentrations in raw sewage during a heavy rain increased to about 16 µg/L. Mutagenicity test results of pyrene were negative, but pyrene is considered a human carcinogen (Verschueren 1983).

Pitt, *et al.* (1995) detected *chlordane* in concentrations greater than about 0.3 µg/L in 13 percent of the stormwater samples analyzed. The greatest concentration observed was 2.2 µg/L, found in a roof runoff sample. Chlordane is a non-systemic insecticide and its registered use has been canceled by the EPA. The food chain concentration potential of chlordane is considered high. The EPA has also revoked chlordane residual tolerances in foods (Federal Register, Vol. 51, No. 247, page 46665, Dec. 24, 1986).

Butyl benzyl phthalate (BBP), a phthalate ester, was detected in concentrations greater than about 1 µg/L in 12 percent of the stormwater samples analyzed by Pitt, *et al.* (1995). The greatest concentration observed was 128 µg/L, found in a landscaped area runoff sample. BBP is used chiefly as a plasticizer in polyvinylchlorides (Verschueren 1983). BBP is not tightly bound to the plastic and is readily lost and enters aqueous solutions in contact with the plastic. The typical average concentration of BBP in natural U.S. waters is about 0.4 µg/L, but was reported to be as high as 4.1 µg/L.

Bis (2-chloroethyl) ether (BCEE) was detected in concentrations greater than about 1 µg/L in 14 percent of the stormwater samples analyzed by Pitt, *et al.* (1995). The greatest concentration observed was 204 µg/L, found in an urban creek sample. BCEE is used as a fumigant, and as an ingredient in

solvents, insecticides, paints, lacquers and varnishes (Verschueren 1983). It is also formed by the chlorination of waters that contain ethers.

Bis (2-chloroisopropyl) ether (BCIE) was detected by Pitt, *et al.* (1995) in stormwater at concentrations greater than about 1 µg/L in 14 percent of the samples analyzed. The greatest concentration observed was 217 µg/L, found in a parking area runoff sample. BCIE was not found to be carcinogenic during rat tests (HEW 1979).

1,3-Dichlorobenzene (1,3-DCB) was detected in concentrations greater than about 1 µg/L in 23 percent of the stormwater samples analyzed by Pitt, *et al.* (1995). The greatest concentration observed was 120 µg/L, found in an urban creek sample.

CHAPTER 3

POTENTIAL GROUNDWATER CONTAMINATION ASSOCIATED WITH URBAN RUNOFF

This chapter addresses several categories of constituents that are known to affect groundwater quality, or the operation of infiltration or recharge devices, as documented in the groundwater contamination literature. The categories that can adversely affect groundwater quality include nutrients, pesticides, other organics, pathogens, metals, and salts and other dissolved minerals. Suspended solids, dissolved oxygen, and the sodium adsorption ratio (the ratio of monovalent, Na^{+}, to divalent cations, Ca^{+2} and Mg^{+2}) are also important for the operation of recharge and infiltration devices. The intention of this chapter is to identify known stormwater contaminants as to their potential to contaminant groundwater. Many of the references describe groundwater contamination problems with these pollutants from sanitary sewage and agricultural sources, not specifically from stormwater sources. Therefore, care must be taken when assuming that similar problems would occur with stormwater sources. Major differences between stormwater and these other sources which may affect groundwater contamination likely include the rate of pollutant application, intermittent versus continuous applications, and the presence of interfering compounds. However, the information included in this chapter enables the recognition of pollutants which should be considered when investigating stormwater infiltration.

GROUNDWATER CONTAMINATION ASSOCIATED WITH NUTRIENTS

Definition

Primary nutrients are defined as "compounds or constituents that contain nitrogen (N), phosphorus (P) and other elements that are essential for plant growth" (Hampson 1986). Other needed aspects of nutrient use include the organic matter and bacteria that are needed to convert the primary nutrient from its natural form to a form that the organism can use. Nitrogen-containing compounds of interest are primarily from fertilizers and sanitary sewage, with the available nitrogen forms being nitrate, nitrite, ammonium, and urea. The phosphorus containing compounds of interest are generally found in fertilizers, with the available phosphorus form being orthophosphate. Nitrogen and phosphorus are cyclic elements in that the combined forms may be changed and metabolized by decomposition and synthesis (Reichenbaugh 1977).

Examples of Nutrients Contaminating Groundwaters

Nutrients can originate from many different sources, including natural occurrence, sanitary sewage discharges and combined sewage overflows, landscaping/lawn maintenance and other urban sources (including septic tank and sewer system leakage, waste decomposition, and highway runoff) plus agricultural sources. Nitrates are one of the most frequently encountered contaminants in groundwater (AWWA 1990).

Phosphorus compounds of interest are associated with phosphorus containing fertilizers (Lauer 1988a and 1988b) and detergents. Groundwater contamination by phosphorus has not been as widespread, or as severe, as for nitrogen compounds. Nitrogen loadings are usually much greater than phosphorus loadings, especially from nonagricultural sources (Hampson 1986). Spray-irrigation with secondary-treated sanitary wastewater was found to increase both the total nitrogen and nitrate concentrations in a shallow aquifer in Florida, but these, and the total phosphorus concentrations, were significantly reduced within 200 feet of the test site (Brown 1982).

Natural Sources--

Nitrogen occurs naturally both in the atmosphere and in the earth's soils. Natural nitrogen can lead to groundwater contamination by nitrates. As an example, in regions with relatively unweathered sedimentary deposits or loess beneath the root zone, residual exchangeable ammonium in the soil can be readily oxidized to nitrate if exposed to the correct conditions. Leaching of this naturally occurring nitrate caused groundwater contamination (with concentrations greater than 30 μg/L) in non-populated and non-agricultural areas of Montana and North Dakota (Power and Schepers 1989).

Forms of nitrogen from precipitation may be either nitrate or ammonium. Atmospheric nitrate results from combustion, with the highest ambient air concentrations being downwind of power plants, major industrial areas, and major automobile activity. Atmospheric ammonium results from volatilization of ammonia from soils, fertilizers, animal wastes and vegetation (Power and Schepers 1989).

Urban Areas--

Roadway runoff has been documented as the major source of groundwater nitrogen contamination in urban areas of Florida (Hampson 1986; Schiffer 1989; and German 1989). This occurs from both vehicular exhaust onto road surfaces and onto adjacent soils, and from roadside fertilization of landscaped areas. Roadway runoff also contains phosphorus from motor oil use and from other nutrient sources, such as bird droppings and animal remains, that has contaminated groundwaters (Schiffer 1989). Nitrate has leached from fertilizers and affected groundwaters under various turf grasses in urban areas, including at golf courses, parks and home lawns (Petrovic 1990; Ku and Simmons 1986; and Robinson and Snyder 1991).

Leakage from sanitary sewers and septic tanks in urban areas can contribute significantly to nitrate-nitrogen contamination of the soil and groundwater (Power and Schepers 1989). Nitrate contamination of groundwater from sanitary sewage and sludge disposal has been documented in New York (Ku and Simmons 1986; and Smith and Myott 1975), California (Schmidt and Sherman 1987), Narbonne, France (Razack, *et al.* 1988), Florida (Waller, *et al.* 1987) and Delaware (Ritter, *et al.* 1989).

Elevated groundwater nitrate concentrations have been found in the heavily industrialized areas of Birmingham, UK, due to industrial area stormwater infiltration (Lloyd, *et al.* 1988). The deep-well injection

of organonitrile and nitrate containing industrial wastes in Florida has also increased the groundwater nitrate concentration in parts of the Floridan aquifer (Ehrlich, *et al.* 1979a and 1979b).

Agriculture Operations--

In the United States, the areas with the greatest nitrate contamination of groundwater include heavily-populated states with large dairy and poultry industries, or states having extensive agricultural irrigation. Extensively irrigated areas of the United States include the corn-growing areas of Delaware, Pennsylvania and Maryland; the vegetable growing areas of New York and the Northeast; the potato growing areas of New Jersey; the tobacco, soybean and corn growing areas of Virginia, Delaware and Maryland (Ritter, *et al.* 1989); the chicken, corn and soybean production areas in New York (Ritter, *et al.* 1991); the western Corn Belt states (Power and Schepers 1989); and the citrus, potato and grape vineyard areas in California (Schmidt and Sherman 1987). Table 21 groups the states according to the percentage of wells in the state which have groundwater nitrate concentrations greater than 3.0 mg/L.

Nitrogen leaching from agricultural fertilizers to irrigation return/drainage waters and eventually to underlying aquifers has been documented in California (Schmidt and Sherman 1987), Arizona and New Mexico (Sabol, *et al.* 1987). Groundwater nitrate contamination has increased in these areas since the 1930s, when large-scale irrigation was instituted (Sabol, *et al.* 1987). Typical nitrate concentrations in shallow vadose-zone water beneath agricultural fields in Nebraska exceed 10 mg/L (Power and Schepers 1989; and Spalding and Kitchen 1988). Irrigation is necessary to leach and reduce salt accumulation in plant root zones in many agricultural areas (Power and Schepers 1989). This leaching generally leads to increased groundwater contamination. Similar processes are likely to occur under irrigated urban landscaped areas, including private homes, parks, and golf courses.

Rates of nitrate concentration increases in groundwater in Nebraska can be from 0.4 to 1.0 mg/L/year (as nitrogen) in well-drained agricultural soils. In areas with fine-textured soils and thick vadose zone sediments, the increase is smaller, from 0.1 to 0.2 mg/L/year, (Spalding and Kitchen 1988).

Leachate from waste decomposition can also contribute nitrogen-containing compounds to groundwater. The urine of grazing animals was the source of groundwater nitrate contamination in New Zealand (Close 1987). Grazing cattle return to the soil between seventy-five and eighty percent of the nitrogen, phosphorus and potassium from their food (Reichenbaugh 1977). Land spreading of animal waste from large-scale, concentrated dairy and poultry industries in the Northeast U.S., the Great Lakes states (Power and Schepers 1989), and Maryland (Ritter, *et al.* 1989) caused the nitrate contamination of groundwater. Poorly managed feed lots can cause enhanced nitrate production from animal wastes which in turn leach through soil during rainfalls and enter the groundwater (Power and Schepers 1989).

Nutrient Leaching and Soil Removal Processes

Whenever nitrogen-containing compounds come into contact with soil, a potential for nitrate leaching into groundwater exists, especially in rapid-infiltration wastewater basins, stormwater infiltration devices, and in agricultural areas. Nitrate is highly soluble (>1 kg/L) and will stay in solution in the percolation water, after leaving the root zone, until it reaches the groundwater. Therefore, vadose-zone sampling can be an effective tool in predicting nonpoint sources that may adversely affect groundwater (Spalding and Kitchen 1988).

TABLE 21. GROUNDWATER NITRATE CONTAMINATION IN THE UNITED STATES

Contaminated Well Percentage - Between 0.0 and 10.0%	
Alabama (7.4%)	Alaska (5.2%)
Florida (4.3%)	Georgia (4.8%)
Hawaii (9.1%)	Louisiana (2.4%)
Massachusetts (5.5%)	Michigan (3.9%)
Mississippi (1.8%)	Missouri (8.7%)
Nevada (8.4%)	New Hampshire (4.3%)
North Carolina (5.9%)	North Dakota (9.0%)
Ohio (8.5%)	Oregon (6.6%)
South Carolina (4.1%)	Tennessee (5.5%)
Vermont (6.9%)	Virginia (3.9%)
West Virginia (5.5%)	

Contaminated Well Percentage - Between 10.1 and 20.0%	
Arkansas (12.4%)	Connecticut (16.7%)
Idaho (14.6%)	Illinois (14.0%)
Indiana (11.1%)	Iowa (18.4%)
Kentucky (17.2%)	Maine (14.2%)
Montana (11.5%)	New Jersey (11.4%)
New Mexico (12.7%)	South Dakota (14.9%)
Utah (10.4%)	Wisconsin (18.9%)
Wyoming (11.4%)	

Contaminated Well Percentage - Between 20.1 and 30.0%	
Colorado (22.9%)	Maryland (28.8%)
Minnesota (20.2%)	Texas (23.5%)
Washington (22.9%)	

Contaminated Well Percentage - Between 30.1 and 40.0%	
California (32.6%)	Delaware (34.6%)
Nebraska (32.7%)	Oklahoma (35.9%)
Pennsylvania (30.3%)	Puerto Rico (35.4%)

Contaminated Well Percentage - Between 40.1 and 50.0%	
Arizona (49.3%)	New York (40.3%)
Rhode Island (45.1%)	

Contaminated Well Percentage - Greater than 50.0%
Kansas (54.2%)

Source: Power and Schepers 1989.

Urban Areas--

Nitrogen containing compounds in urban stormwater runoff may be carried long distances before infiltration into soil and subsequent contamination of groundwater, affecting South Carolina's approach to golf course stormwater management (Robinson and Snyder 1991). The amount of nitrogen available for leaching is directly related to the impervious cover in the watershed (Butler 1987). Nitrogen infiltration is controlled by soil texture and the rate and timing of water application (either through irrigation or rainfall) (Petrovic 1990; and Boggess 1975). Landfills, especially those that predate the RCRA Subtitle D Regulations, often produce significant nitrogen contamination in nearby groundwater, as demonstrated in Lee County, Florida (Boggess 1975). Studies in Broward County, Florida, found that nitrogen contamination problems can also occur in areas with older septic tanks and sanitary sewer systems (Waller, *et al.* 1987).

Nutrient leachates usually move vertically through the soil and dilute rapidly downgradient from their source. The primary factors affecting leachate movement are the layering of geologic materials, the hydraulic gradients, and the volume of the leachate discharge. Sandy soils show less rapid dilution of the contaminant (mixing of leachate with groundwater), compared to limestone (Waller, *et al.* 1987), silts, clays, and organic-rich sediments (Wilde 1994).

Once the leachate, or the waste liquid from an industrial injection well, is in the soil/groundwater system, decomposition by denitrification can occur, with the primary decomposition product being elemental nitrogen (Hickey and Vecchioli 1986). As an example, deep well injection of organonitriles and nitrates in a limestone aquifer acts like an anaerobic filter with nitrate respiring bacteria being the dominant microorganism. These bacteria caused an eighty percent reduction of the waste within one hundred meters of injection in the Floridan aquifer, near Pensacola (Ehrlich, *et al.* 1979b).

Gold and Groffman (1993) reported groundwater leaching losses from residential lawns to be low for nitrates (typically <2mg/L), when using application rates recommended for residential lawn care.

Agricultural Areas--

Nitrogen entry, use and removal in agricultural soils is best described in terms of the nitrogen cycle: plant uptake, atmospheric loss (NH_3 volatilization and denitrification), soil storage, runoff into surface water and/or leaching into groundwater (Petrovic 1990). Nitrogen leaching from soils is common in irrigated agricultural areas. Besides supplying required moisture, irrigation is also needed to prevent the accumulation of salts in the crops' root zone. If salt flushing occurs when there is nitrate in the root zone, the nitrates are leached farther into the soil and potentially into the groundwater (Power and Schepers 1989).

Irrigated areas in the Midwest and Upper Midwest States have a greater potential to leach nitrates to the groundwater than most other areas because: (1) irrigation is concentrated in areas with high soil hydraulic conductivities; (2) irrigated lands generally receive heavy applications of nitrogen fertilizers to increase crop yield to offset the high cost of irrigation; and (3) irrigation accelerates the movement of nitrates, other soluble constituents and percolating water to the groundwater (Mossbarger and Yost 1989). These irrigated areas also have higher water tables than non-irrigated arid areas, further increasing the nitrate leachate potential.

The mass of nitrate leached to groundwater during irrigation is related to the drainage volume (Ritter, *et al.* 1989). Nitrates that are already in the soil or groundwater also travel faster during periods of maximum recharge (when the water table is highest) (Boggess 1975).

Factors that influence the degree of nitrogen leaching in agriculture areas are soil type, irrigation amounts and practices, nitrogen source and application rate, and the season of application. Significant leaching occurs during the cool, wet seasons. Cool temperatures reduce denitrification and ammonia volatilization, and limit microbial nitrogen immobilization and plant uptake; however, they also limit nitrification. The combination of low evapotranspiration and high precipitation means that more water drains out of the root zone into the vadose zone and groundwater (Petrovic 1990). Humid agricultural areas have shown a greater potential for nutrient leaching when compared to arid environments because of the availability of water for leaching during the cool seasons (Close 1987). Land use and soil permeability greatly affect groundwater chemistry, and ultimately its contamination potential, as shown in the Coastal Plains of the East Coast by Ritter, *et al.* (1989) and in California by Schmidt and Sherman (1987).

Although no one has indicated that the potential for nitrate contamination can be prevented, adjustments in fertilizer practices may control the rate of degradation of groundwater (Power and Schepers 1989). Use of slow-release fertilizers is recommended in areas with significant leaching problems, such as coastal golf courses. The slow-release fertilizers include urea formaldehyde (UF), methylene urea, isobutylidene diurea (IBDU), and sulfur-coated urea. The fast-release fertilizers that are not recommended include calcium nitrate, sodium nitrate, ammonium sulfate and urea (Horsley and Moser 1990).

Methods of fertilizer application also affect groundwater contamination. Side-dressing of fertilizers can increase groundwater nitrate concentrations faster than fertigation, the mixing of fertilizers with irrigation water (Ritter, *et al.* 1991). However, other researchers (Saffigna and Keeney 1977) found that side-dressing can reduce leaching, if irrigation is irregular. No difference in the depth of penetration of phosphorus was found between applying the same amount of fertilizer in one application versus the same amount spread over several applications (Lauer 1988a). Frequent fallowing of the soil (leaving unplanted) was found to contribute to nitrate contamination below the root zone. Cultivation (plowing or disking), as part of the planting process, increases aeration and mixes crop residues (which are readily available carbon sources) with soil organisms. A flush of mineralization and nitrification usually occurs after cultivation and results in the accumulation of leachable nitrate in the soil (Power and Schepers 1989). Nitrate contamination, however, appears to be controlled more by denitrification than by preferential flow through the soil (Steenhuis, *et al.* 1988).

Controlled application of wastewater sludge is an effective fertilizer; it has not reduced crop yields where it has been applied and it does not contaminate the groundwater to any greater extent than chemical fertilizer applications. Sludge applications to crop lands are generally controlled by heavy metal accumulations in the soil and plants, not by groundwater contamination of nutrients. Like chemical fertilizers, sludge use in amounts that provide soil with nitrogen in excess of what plants need results in leaching. Liquid sludges mineralize nitrogen faster than composted sludges with the application rate and soil type not affecting the mineralization rate (Chang 1988). The decomposition potential in the

groundwater below wastewater irrigation areas is considerable, as the decomposition is controlled by bacteria which are already in the wastewater (Wolff 1988):

$$5\ C + 4\ NO_3 + 2\ H_2O \rightarrow 2\ N_2 + 4\ HCO_3 + CO_2$$

Decomposition of crop waste affects nitrogen leaching potential. Non-legume residues, such as cornstalks, decompose much slower and initially immobilize inorganic nitrogen in the biomass (Power and Schepers 1989). The ammonium cation (NH_4^+) tends to decompose more readily to form ammonia in alkaline soils than in acid soils (White and Dornbush 1988).

General--

During percolation through the soil, some nutrients are removed and the nutrient concentrations affecting the groundwater are significantly reduced. Phosphorus, in the form of soluble orthophosphate, may be either directly precipitated or chemically adsorbed onto soil surfaces through reactions with exposed iron, aluminum or calcium on solid soil surfaces (Crites 1985). Phosphorus fixation is a two-step process, sorption onto the soil solid and then conversion of the sorbed phosphorus into mineraloids or minerals. If the sorption sites are filled either with phosphate anions or another ion, phosphorus sorption will be low. The sorption of phosphorus per unit of percolation liquid decreases with each year of recharge (White and Dornbush 1988).

Downward movement of phosphorus in different soils was found to be directly related to the reactivity index measured for each soil, especially for surface-applied phosphorus fertilizer. In Washington, a difference in depth of penetration was noted, however, between sandy- and clayey-textured soils, with sandy-textured soils showing the greater depth of penetration. If the fertilizer was surface applied, instead of sprinkler applied, and the soil was not inverted, most of the phosphorus remained within the top 5 to 7.5 cm of the surface (Lauer 1988b).

If the nitrogen is not used by the plant, it will leach through the soil toward the groundwater, with some being removed in the soil prior to its reaching the aquifer. Under certain conditions, losses of dissolved nitrate and nitrite could be described by zero-order kinetics (Hampson 1986). In general, however, the process is regulated by so many limiting factors that such a simplified description is not possible (Follet 1989). Residual nitrate concentrations were found to be highly variable in soil due to factors such as soil texture, mineralization, rainfall, irrigation, organic matter content, crop yield, nitrogen fertilizer/sludge rate, denitrification, and soil compaction (Ferguson, *et al.* 1990). Nitrate's flow to groundwater from stormwater infiltration is controlled by the rate and volume of infiltration, horizontal and vertical groundwater flow, the depth to the water table, and the existence of areas/channels of preferential flow. Once the nitrate has reached the groundwater, its concentration may be reduced by dispersion, diffusion, and mixing with uncontaminated groundwater (Wilde 1994). However, on sludge application plots, it was noted that if the soil receives the same annual amount of organic residue, it will accumulate organic nitrogen until the equilibrium concentration is reached. As shown in Riverside, California, once the sludge application is terminated, the organic nitrogen will continue to mineralize for many years and crop yields will continue to be enhanced (Chang, *et al.* 1988). The amount of ammonia volatilization is influenced by the position of the nitrogen in the soil/turf grass after application. This position is highly influenced by rainfall and/or irrigation (Bowman, *et al.* 1987, as reported by Petrovic 1990).

Nitrate concentrations in the vadose zone of an agricultural field generally are highest near the surface, although during irrigation and in times of winter recharge, nitrate can be leached below the zone where it will be taken up by crops or denitrified. In such cases, nitrate will eventually reach groundwater if excess water is added to overlying soil. As nitrogen passes through the soil, NH_4^+ is removed by cation exchange between the NH_4^+ and the H^+ on the soil (Ragone 1977). Nitrogen is also removed by the soil aquifer treatment process through denitrification, a biological process that needs anaerobic conditions and organic carbon for food for the denitrifying bacteria, which in turn produce free nitrogen gas and nitrous oxides (Bouwer 1985).

Phosphorus concentrations generally decrease with depth in agricultural soils because phosphorus is adsorbed to soil minerals and also precipitates readily with calcium, iron, or aluminum (Lauer 1988b and Ragone 1977). The dominant precipitation reactions are pH dependent, forming mostly iron and aluminum phosphates in acid soils and calcium phosphates under alkaline conditions. In neutral soils, the precipitation reactions are strongly rate-limited, so that the apparent solubility of the phosphate compounds is higher than under either acid or alkaline conditions (Bouwer 1985).

Health Problems

Excessive nutrient concentrations can cause both environmental and human health problems.

Environmental Problems--

Nitrogen and phosphorus are fertilizers in aquatic environments, just as they are on land. The continual fertilization of the aquatic environment increases production of less desirable species and alters the aquatic community structure (Nightingale and Bianchi 1977a). Excess agricultural nitrogen applications can reduce both yields and quality of cotton, tomatoes, sugar beets, sugar cane, potatoes, citrus, avocados, peaches, apricots, apples, and grapes (Bouwer 1987). Nitrate ingestion by livestock has been linked to health problems, although livestock can tolerate up to ten times the maximum permissible concentrations allowed for humans with no significant adverse effects (Mossbarger and Yost 1989).

Excess agricultural phosphorus may reduce crop yields because the excess phosphorus reduces the availability to the plants of some micronutrients, such as copper, iron, and zinc. Excess soil phosphorus also increases calcium precipitation (Bouwer 1987).

Human Health Problems--

Excess nitrate concentrations in water (>10 mg/L as N) consumed by infants causes methemoglobinemia, or "blue-baby disease". In infants, nitrate is converted to nitrite which binds to red blood cells at the oxygen binding sites and asphyxiates the child by causing insufficient oxygen adsorption (Crites 1985). Nitrates may also increase the risk of stomach cancer through nitrate reduction to nitrite in the mouth or stomach. The nitrites then react with the amines to form carcinogenic nitrosamines (Bouwer 1989).

GROUNDWATER CONTAMINATION ASSOCIATED WITH PESTICIDES

Definition

Pesticides are generally classified into one of the following three groups, depending on their targets: herbicides, fungicides, or insecticides. Table 22 lists pesticides of potential concern in

TABLE 22. PESTICIDES OF POTENTIAL CONCERN IN GROUNDWATER CONTAMINATION STUDIES

Herbicides	**Major Commercial Use**
Alachlor	Weed control in beans, corn, potatoes and soybeans
Atrazine	Grassy weed control in corn; soil sterilant on non-crop land
Bromoxynil	Weed control in barley, canary seed, corn, flax, oats and seed-producing grasses
2,4-D	Weed control in field crops and on non-crop land; soil sterilant; aquatic weed control (restricted use)
Difenzoquat	Post-emergent wild oat control in barley, canary grass and wheat
Diclofop-methyl	Annual grass control in alfalfa, barley, soybeans, vegetable, wheat, flax and canola
Glyphosate	Non-selective weed control in field crops, non-crop land and turf
MCPA	Weed control in alfalfa, barley, corn, flax, oats, rye, wheat and pastures
Metolachlor	Weed control in corn, soybeans and potatoes
Triallate	Pre-emergent wild oat control in barley, flax, mustard, peas, canola, sugar beets and wheat
Trifluralin	Pre-emergent weed control in field crops, vegetables and ornamentals
Insecticides	**Major Commercial Use**
Carbaryl	Specific insect control in livestock buildings, field crops and fruits and vegetables
Carbofuran	Specific root worm, maggot, beetle and leaf hopper control in vegetables; grasshopper, alfalfa weevil and other insect control in field crops (restricted product)
Chlorpyrifos	Specific insect control in field crops, vegetables and fruits; seed treatment for corn, beans and peas; mosquito control
Diazinon	Specific insect control on fruits, vegetables, turf and non-crop land;

insect control in livestock buildings; seed treatment

(continued)

TABLE 22. (CONTINUED)

Fenitrothion	Specific insect control on fruits, vegetables, turf and non-crop land; insect control in livestock buildings; seed treatment
Fonofos	Specific insect control in corn, onions, potatoes and tobacco
Lindane	Insect control on livestock, lawns, certain grains; seed treatment
Malathion	Specific insect control on livestock and in certain field crops
Phorate	Specific insect control on beans, corn, lettuce and potatoes
Terbufos	Specific worm control in corn and sugar beets; flea beetle control in mustard and canola

Fungicides	**Major Commercial Use**
Captan	Specific fungal disease control on potato seed pieces, flower, fruit, vegetables, turf and tobacco
Chlorothalonil	Fungal disease control on vegetables, potatoes, tomatoes, turf and conifers
Mancozeb	Specific fungal disease control on various fruits, vegetables and corn and potato seeds
Maneb	Specific fungal disease control on certain fruits and vegetables; seed treatment for barley, flax, oats, rye, sugar beets and wheat
Metiram	Specific fungal disease control on potato seed pieces; seed treatment for barley, flax, oats and wheat
Thiram	Specific fungal disease control in turf; seed treatment for vegetables, mustard, canola, barley, wheat, rye, oats, flax, corn, soybeans, alfalfa and fruits

Adapted from Environment Canada/Agriculture Canada (1987) and Pierce and Wong (1988).

groundwater contamination studies and their typical uses from Environment Canada/Agriculture Canada (1987) and Pierce and Wong (1988).

Examples of Pesticide Contamination of Groundwaters

Urban Areas--

Pesticides are used in urban areas, primarily for weed and insect control in houses, along roadsides, in parks, on golf courses, and on private lawns (Racke and Leslie 1993). The pesticide loading in runoff water has been correlated to the amount of impervious cover and to the distance the runoff will travel prior to infiltration or decomposition, as demonstrated by Lager (1977) and confirmed in Austin, Texas by Butler, *et al.* (1987). Urban pesticide contamination of groundwater in central Florida likely resulted from municipal and homeowner use of these chemicals for pest control and their subsequent collection in stormwater runoff. Samples from the upper part of the Floridan aquifer have contained detectable amounts of diazinon, malathion, 2,4-D, ethion, methyl trithion, silvex ,and 2,4,5-T (German 1989). In California, chlordane groundwater contamination has been traced to its application adjacent to residential foundations where it had been used for termite and ant control (Greene 1992). Atrazine and simazine groundwater contamination was related to their use to control weeds along roadways (Domagalski, *et al.* 1992). In Arizona, diazinon, dacthal, and dioxathion were detected in stormwater runoff entering urban dry wells that recharge the aquifer (Wilson, *et al.* 1990). Diazinon (at 30 μg/L) and methyl parathion (at 10 μg/L) were detected in groundwater below municipal waste treatment plants in Florida which used land spreading or well injection of wastes (Pruitt, *et al.* 1985). Gold and Groffman (1993) reported groundwater leaching losses from residential lawns to be low for dicamba and 2,4-D (<1μ g/L), when using application rates recommended for residential lawn care.

In contrast, groundwater below Fresno, California, stormwater recharge basins contained only one of the organophosphorus pesticides, diazinon. None of the ten chlorinated pesticides (aldrin, chlordane, endosulfan I, endosulfan II, endosulfan sulfate, DDD-mixed isomers, DDT-mixed isomers, DDE-mixed isomers, gamma-BHC, and methoxychlor) and none of the chlorophenoxy herbicides were found (Nightingale 1987b; and Salo, *et al.* 1986).

Agricultural Operations--

Groundwater contamination by agricultural use of pesticides has been documented in the United States and Canada. There have been numerous observations of pesticide contamination of groundwater, including: alachlor (Wisconsin), aldicarb (Wisconsin, Arkansas, and California), atrazine (Wisconsin), bromacil (South Carolina, Georgia, and Florida), DBCP (California and South Carolina), EDB (South Carolina, Georgia, and Florida), and metolachlor (Wisconsin) (Krawchuk and Webster 1987). San Joaquin Valley (California) groundwater has been contaminated by atrazine, bromacil, 2, 4-DP, diazinon, DBCP, 1,2-dibromoethane, dicamba, 1,2-dichloropropane, diuron, prometon, prometryn, propazine, and simazine. Atrazine and simazine were detected in 37.5% of the shallow wells sampled (Domagalski and Dubrovsky 1992). In Bakersfield, California, EDB has been found in wells in concentrations of 4 μg/L, or less (Schmidt and Sherman 1987). Sandy soils in the Coastal Plains states in the East and Southeast are also very susceptible to pesticide leaching, primarily because the aquifer is directly below the recharge areas (Ritter, *et al.* 1989). However, tile drain water samples in the southeastern desert valleys of California showed minimal pesticide residue (Schmidt and Sherman 1987).

The EPA has conducted extensive surveys to investigate the potential contamination of drinking water wells by agricultural pesticides (EPA 1990). Forty-six pesticides have been found in groundwater of 35 states. California had 31 pesticides detected, Illinois had 17, Minnesota and New York each had 14 pesticides detected, Wisconsin had 13 detected, and Iowa had 11 detected. Natarajan and Rajagopal (1993) summarized Iowa DNR studies that concluded that hydrology, pesticide chemistry, and time of sampling all affected the observed occurrence of agricultural pesticides in public drinking ground water supplies. One or more pesticides were detected in less than 10 percent of the 865 public drinking water supply wells tested by Iowa DNR (Iowa DNR 1988 and 1990). Atrazine occurred most often and was found in concentrations as high as 21 μg/L. Almost all atrazine was found in concentrations at less than 1 μg/L. Infiltration of soluble pesticides through the soil column was found to be the major route of pesticides to Iowa's shallow ground water, even though the entry of surface runoff through fractures was responsible for relatively high doses of some pesticides.

Pesticide Removal Processes in Soil

Heavy repetitive use of mobile pesticides, such as EDB, on irrigated and sandy soils likely contaminates groundwater. Fungicides and nematocides must be mobile in order to reach the target pest and hence, they generally have the highest contamination potential. Pesticide leaching depends on patterns of use, soil texture, total organic carbon content of the soil, pesticide persistence, and depth to the water table (Shirmohammadi and Knisel 1989). A pesticide leaches to groundwater when its residence time in the soil is less than the time required to remove it, or transform it to an innocuous form by chemical or biological processes. The residence time is controlled by two factors: water applied and chemical adsorption to stationary solid surfaces. Volatilization losses of soil-applied pesticides can be a significant removal mechanism for compounds having large Henry's constants (K_h), such as DBCP or EPTC (Jury, *et al.* 1983). However, for mobile compounds having low K_h values, such as atrazine, metolachlor, or alachlor, it is a negligible loss pathway compared to the leaching mechanism (Alhajjar, *et al.* 1990).

Mobility of Pesticides--

Estimates of pesticide mobility can be made based on the three removal mechanisms affecting organic compounds (volatilization, sorption, and solubility), as shown on Tables 23 through 25 (Armstrong and Llena 1992). Application methods and formulation state can also play a significant role in pesticide mobility. The type of pesticide formulation will affect their loss, with wettable powders exhibiting the greatest losses to the soil (Domagalski, *et al.* 1992). Residues of foliar-applied water soluble pesticides appear in high concentrations in runoff (Pierce and Wong 1988). Pesticide movement can be retarded or enhanced depending upon the soil conditions (Alhajjar, *et al.* 1990). Leaching is enhanced in alluvial soils (Domagalski, *et al.* 1992), but if the vadose zone contains restricting layers, pesticide movement will be slower (Sabol, *et al.* 1987). Leaching is also enhanced by flood-irrigation, in areas needing high recharge rates, and in areas with preferential flow. The greatest pesticide mobility occurs in areas with coarse-grained or sandy soils without a hardpan layer, having low clay and organic matter content and high permeability (Domagalski, *et al.* 1992). Structural voids, which are generally found in the surface layer of finer-textured soils rich in clay, can transmit pesticides rapidly when the voids are filled with water and the adsorbing surfaces of the soil matrix are bypassed. This preferential (bypass) flow is demonstrated in areas where the observed mobility of the pesticide in the soil is greater than the predicted value. This flow

occurs in structured, coarse grained soils, or soils with cracks, root holes, or worm holes. It generally does not occur on continuously flooded loam soil. It likely results from

TABLE 23. MOBILITY CLASS DEFINITION

Class	K(d)	M(I)
I - Mobile	<0.1 to 1.0	0.1 to 1.0
II - Intermediate mobility	1.0 to 10.0	0.01 to 0.1
III - Low mobility	10.0 to 100.0	0.001 to 0.01
IV - Very low mobility	>100.0	<0.001

Where K(d) is the soil adsorption coefficient
M(I) is the mobility index (ratio of pollutant's migration velocity to migration velocity of water under saturated flow).

Source: Armstrong and Llena 1992.

TABLE 24. ORGANIC COMPOUND MOBILITY FOR SANDY LOAM SOILS

Mobile (Class I)

Organic Carbon = 0.01%

Dicamba	Cyanazine
Dacthal	Metolachlor
2,4-D	Malathion
Diazinon	Atrazine
Alachlor	Acenaphthylene

Organic Carbon = 0.1%

Dicamba	Dacthal
2,4-D	Diazinon
Alachlor	Atrazine
Cyanazine	Metolachlor

Organic Carbon = 1.0%

Dicamba	2,4-D
Diazinon	Alachlor
Dacthal	

Intermediate Mobility (Class II)

Organic Carbon = 0.01%

2,4'-Dichlorobiphenyl	Pentachlorophenol
Fluorene	Anthracene
Phenanthrene	Chlordane
2,4,4'-Trichlorobiphenyl	Fluoranthene
Pyrene	Benzo(a) anthracene
Methoxychlor	Bis(2-ethylhexyl) phthalate
2,3',4',5-Tetrachlorobiphenyl	2,3,3',4',6-Pentachlorobiphenyl

Organic Carbon = 0.1%

Malathion	Acenaphthylene
2,4'-Dichlorobiphenyl	Pentachlorophenol
Fluorene	

Organic Carbon = 1.0%

Atrazine	Cyanazine
Metolachlor	

(continued)

TABLE 24. (CONTINUED)

Low Mobility (Class III)

Organic Carbon = 0.01%

- Chrysene
- Benzo(a) pyrene
- Benzo(b) fluoranthene
- 2,2',3,4,4',5,5'- heptachlorobiphenyl
- 2,2',4,4',5,5'-Hexachlorobiphenyl
- Benzo(k) fluoranthene
- Benzo(ghi) perylene

Organic Carbon = 0.1%

- Anthracene
- Chlordane
- Fluoranthene
- Benzo(a) anthracene
- Bis(2-ethylhexyl) phthalate
- 2,3,3',4',6-Pentachlorobiphenyl
- Phenanthrene
- 2,4,4'-Trichlorobiphenyl
- Pyrene
- Methoxychlor
- 2,3',4',5-Tetrachlorobiphenyl

Organic Carbon = 1.0%

- Malathion
- 2,4'-Dichlorobiphenyl
- Fluorene
- Acenaphthylene
- Pentachlorophenol

Very Low Mobility (Class IV)

Organic Carbon = 0.01%

- Indeno(1,2,3-cd)Pyrene

Organic Carbon = 0.1%

- 2,3,3',4',6-Pentachlorobiphenyl
- Benzo(a) pyrene
- Benzo(b) fluoranthene
- 2,2',3,4,4',5,5'-Heptachlorobiphenyl
- Indeno(1,2,3-cd) pyrene
- Chrysene
- 2,2'4,4',5,5'-hexachlorobiphenyl
- Benzo(k) fluoranthene
- Benzo(ghi) perylene

Organic Carbon = 1.0%

- Anthracene
- Chlordane
- Fluoranthene
- Benzo(a) anthracene
- Bis(2-ethylhexyl) phthalate
- 2,3,3',4',6-Pentachlorobiphenyl
- Benzo(a) pyrene
- Benzo(b) fluoranthene
- 2,2',3,4,4',5,5'- heptachlorobiphenyl
- Indeno(1,2,3-cd) pyrene
- Phenanthrene
- 2,4,4'-Trichlorobiphenyl
- Pyrene
- Methoxychlor
- 2,3',4',5-Tetrachlorobiphenyl
- Chrysene
- 2,2',4,4',5,5'-Hexachlorobiphenyl
- Benzo(k) fluoranthene
- Benzo(ghi) perylene

Source: Armstrong and Llena 1992.

TABLE 25. ORGANIC COMPOUND MOBILITY CLASSES FOR SILT LOAM SOILS

Mobile (Class I)

Organic Carbon = 0.01%

Dicamba	Cyanazine
Dacthal	Metolachlor
2,4-D	Malathion
Diazinon	Atrazine
Alachlor	Acenaphthylene
2,4'-Dichlorobiphenyl	

Organic Carbon = 0.1%

Dicamba	Dacthal
2,4-D	Diazinon
Alachlor	Atrazine
Cyanazine	Metolachlor

Organic Carbon = 1.0%

Dicamba	2,4-D
Diazinon	Alachlor
Dacthal	

Intermediate Mobility (Class II)

Organic Carbon = 0.01%

Pentachlorophenol	Methoxychlor
Fluorene	Anthracene
Phenanthrene	Chlordane
2,4,4'- trichlorobiphenyl	Fluoranthene
Pyrene	Benzo(a) anthracene
Bis(2-ethylhexyl) phthalate	2,3,3',4',6-Pentachlorobiphenyl
2,3',4',5-tetrachlorobiphenyl	

Organic Carbon = 0.1%

Malathion	Acenaphthylene
2,4'-Dichlorobiphenyl	Pentachlorophenol
Fluorene	Anthracene
Phenanthrene	

Organic Carbon = 1.0%

Atrazine	Cyanazine
Metolachlor	Malathion

(continued)

TABLE 25. (CONTINUED)

Low Mobility (Class III)

Organic Carbon = 0.01%

Chrysene	2,2',4,4',5,5'-Hexachlorobiphenyl
Benzo(a) pyrene	Benzo(k) fluoranthene
Benzo(b) fluoranthene	Benzo(ghi) perylene
2,2',3,4,4',5,5'- heptachlorobiphenyl	Indeno(1,2,3-cd) pyrene

Organic Carbon = 0.1%

Chlordane	2,4,4'-Trichlorobiphenyl
Fluoranthene	Pyrene
Benzo(a)Anthracene	Methoxychlor
Bis(2-ethylhexyl) phthalate	2,3',4',5-Tetrachlorobiphenyl
2,3,3',4',6-Pentachlorobiphenyl	2,2'4,4',5,5'-Hexachlorobiphenyl

Organic Carbon = 1.0%

Acenaphthylene	Anthracene
2,4'-Dichlorobiphenyl	Pentachlorophenol
Fluorene	Phenanthrene

Very Low Mobility (Class IV)

Organic Carbon = 0.1%

Chrysene	2,2'4,4',5,5'-hexachlorobiphenyl
Benzo(a) pyrene	Benzo(k) fluoranthene
Benzo(b) fluoranthene	Benzo(ghi) perylene
2,2',3,4,4',5,5'-Heptachlorobiphenyl	Indeno(1,2,3-cd) pyrene

Organic Carbon = 1.0%

Chlordane	2,4,4'-Trichlorobiphenyl
Fluoranthene	Pyrene
Benzo(a) anthracene	Methoxychlor
Bis(2-ethylhexyl) phthalate	2,3',4',5-Tetrachlorobiphenyl
2,3,3',4',6-Pentachlorobiphenyl	Chrysene
Benzo(a) pyrene	2,2',4,4',5,5'-Hexachlorobiphenyl
Benzo(b) fluoranthene	Benzo(k) fluoranthene
2,2',3,4,4',5,5'-heptachlorobiphenyl	Benzo(ghi) perylene
Indeno(1,2,3-cd) pyrene	

Reference: Armstrong and Llena 1992.

unsaturated flow processes and is controlled by the mobile and immobile fractions, soil heterogeneity, and soil spatial variability. Preferential flow allows the pesticide to flow easily through the soil and bypass the area with the greatest microbial activity and degradation (Rice, *et al.* 1991; and Steenhuis, *et al.* 1988).

Pesticide transport past the root zone through the unsaturated zone depends on the lipophilic nature and other chemical characteristics of the compound, on how the compound is used in relation to climate and irrigation practices, and on the properties of the soil and aquifer media, including hydraulic conductivity and total organic carbon (Domagalski, *et al.* 1992). Basic (high pH) pesticides, such as atrazine, become more mobile in soils having high pH values. Acidic pesticides ionize, depending on their dissociation constants, to form cationic and anionic species, and under neutral soil conditions (pH of 5 to 9), the anionic form predominates. Since these anions are negatively charged, they do not adsorb onto the negatively charged clay mineral surfaces. Similarly, acidic pesticides tend to be more mobile in neutral soils (Pierce and Wong 1988). Pesticide movement will often slow as the depth increases in the vadose zone, allowing more soil contact time. However, the soil still may not be able to completely remove the pesticide from the water due to reduced biodegradation activity deeper in the soil (Bouwer 1987).

Pesticide mobility comparisons have been performed for atrazine, metolachlor and alachlor in the same soil type and it was found that alachlor mobility > metolachlor >> atrazine (Alhajjar, *et al.* 1990), with faster movement generally occurring in sandy loam soils versus loam soils (Krawchuk and Webster 1987).

Restricted pesticide usage on coastal golf courses has been recommended by regulatory agencies. The slower moving pesticides were recommended provided they were used in accordance with the label's instructions. These included the fungicides Iprodione and Triadimefon, the insecticides Isofenphos and Chlorpyrifos and the herbicide Glyphosate. Others were recommended against, even when used in accordance with the label's instructions. These included the fungicides Anilazine, Benomyl, Chlorothalonil and Maneb and the herbicides Dicamba and Dacthal. No insecticides were on the "banned list" (Horsley and Moser 1990).

Solubility and Sorbtivity of Pesticides--

Leaching of the less water soluble compounds is determined by the sorption ability of the chemicals to the soil particles, especially the colloids. The sorption ability of the pesticide determines whether it will remain in solution until it reaches the groundwater (Pierce and Wong 1988). Adsorption of a pesticide to the soil stops its travel with the percolating water and prevents its contamination of the groundwater (Bouwer 1987). In general, pesticides with low water solubilities, high octanol-water partitioning coefficients, and high carbon partitioning coefficients are less mobile. Also, in general, basic and nonionic water soluble pesticides are lost in greater amounts in surface runoff than acidic and nonionic, low to moderate water soluble, pesticides with less traveling through the soil toward the groundwater (Pierce and Wong 1988).

Adsorption and desorption control the movement of pesticides in groundwater (Sabatini and Austin 1988). Modeling of pesticide movement using physical non-equilibrium expressions for mass transfer and diffusion most closely mimics the actual movement in soil (Pierce and Wong 1988).

Decomposition of Pesticides--

Pesticides decompose in soil and water, but the total decomposition time can range from days to years. Decomposition and dispersion rates in the soil depend upon many factors, including pH, temperature, light, humidity, air movement, compound volatility, soil type, persistence/half-life and microbiological activity (Ku and Simmons 1986).

Historically, pesticides were thought to adsorb to the soil during recharge, with decomposition then occurring from the sorbed sites. The decomposition rates are a function of temperature, moisture, and organic content, with the microbiological community being stable. Decomposition half-lives of many pesticides have been determined. However, literature half-lives generally apply to surface soils and do not account for the reduced microbial activity found deep in the vadose zone (Bouwer 1987).

Pesticides with a thirty-day half life can show considerable leaching. An order of magnitude difference in half-life results in a five to ten-fold difference in percolation loss (Knisel and Leonard 1989). Organophosphate pesticides are less persistent than organochlorine pesticides, but they also are not strongly adsorbed by the sediment and are likely to leach into the vadose zone, and possibly the groundwater (Norberg-King, *et al.* 1991).

As demonstrated in Central Florida and on Long Island, New York, sediment analysis in recharge basins show sediment with significant organic content, indicating that basin storage and recharge may effectively remove a large percentage of the pesticides (Schiffer 1989; and Ku and Simmons 1986). Most organophosphate and carbamate insecticides are regarded as nonpersistent, but they have been found in older, organic soils used for vegetable production and in the surrounding drainage systems (Norberg-King, *et al.* 1991). Studies of recharge basins in Nassau and Suffolk Counties on Long Island, New York, showed that the DDT concentration in each basin correlated well with the basin's age and showed that DDT can survive in recharge basins for many years (Seaburn and Aronson 1974). Residues of atrazine, triallate and trifluralin have carried over from year to year in Canadian field soils (Smith 1982, as reported by Pierce and Wong 1988). Carbofuran has also survived for long periods in soil in Manitoba, Canada, with resulting detection in the groundwater the following year (11.5 to 158.4 µg/L) (Krawchuk and Webster 1987).

Observed chlorothalonil in groundwater (10.1 to 272.6 µg/L) possibly resulted from one of three sources: 1) carryover in the soil from the previous year before leaching to the groundwater (most probable); 2) use in other fields and subsequent movement of the groundwater; and 3) movement of tile drain water through the soil to the area in question. The source water for removing the pesticide from the soil in Manitoba, Canada, the following year was believed to be snow melt water that leached into the ground in the early spring (Krawchuck, *et al.* 1987).

The following pesticides used in the San Joaquin Valley, California, have high leaching potential: alachlor, aldicarb, atrazine, bromacil, carbaryl, carbofuran, carboxin, chlorothalonil, cyanazine, 2,4-D, dalapon, DCPA, diazinon, dicamba, 1,2-dichloropropane, dinoseb, disulfoton, diuron, methomyl, metolachlor, metribuzin, oxamyl, simazine, tebruthiuron, and trifluralin (Domagalski, *et al.* 1992), with some having already been detected in the groundwater. Controlling pesticide leaching to prevent future groundwater contamination requires a reevaluation of current agricultural and residential practices and implementation of the more progressive ones (Lee 1990).

Health Effects

Some pesticides affect only those workers directly working with them, while others affect people or animals near and/or downwind of the application site (Bouwer 1989). Pesticides have been linked to cancer, nervous system disorders, birth defects, and other systemic disorders. DBCP has been linked to male sterility in the manufacturer's employees and to cancer in animals (Sabol, *et al.* 1987). Aldicarb has not been found to be carcinogenic, but it is highly toxic and causes a reversible inhibition of cholinesterase, an enzyme necessary for nerve function (Bouwer 1987). Methyl parathion and carbofuran are the organic toxic agents in the Colusa Basin water in California. Studies of the aquatic toxicity of these compounds found their toxicological effects to be additive when used in mixtures (Norberg-King, *et al.* 1991). Table 26 lists the toxicological data for many common pesticides.

GROUNDWATER CONTAMINATION ASSOCIATED WITH OTHER ORGANIC COMPOUNDS

Definition

Organic compounds are defined as compounds that are comprised mainly of carbon, nitrogen, and hydrogen. The organic compounds discussed in this chapter are generally analyzed using GC/MSD techniques and are divided into several categories, depending on the analytical technique used or the chemical class. The most common organic compounds that have been investigated during groundwater contamination studies are listed in Table 27.

Examples of Organic Compounds Contaminating Groundwater

Many organic compounds are naturally occurring, although many of concern in groundwater contamination investigations are man-made. Sources of organic contaminants include natural sources, landfills, leaky sewerage systems, highway runoff, agricultural runoff, urban stormwater runoff, and other urban and industrial sources and practices.

Natural Occurrence--

Organic compounds occur naturally from decomposing animal wastes, leaf litter, vegetation, and soil organisms (Reichenbaugh, *et al.* 1977). Aerosols in groundwater usually are from precipitation (Seaburn and Aronson 1974).

Urban Areas--

Concentrations of organic compounds in urban runoff are related to land use, geographic location and traffic volume (Hampson 1986). These compounds result from gasoline and oil drippings, tire residuals and vehicular exhaust material (Seaburn and Aronson 1974; Hampson 1986). The primary source is from the use of petroleum products, such as lubrication oils, fuels, and combustion emissions (Schiffer 1989). The organic compounds on many street surfaces consists of: cellulose, tannins, lignins, grease and oil, automobile exhaust hydrocarbons, carbohydrates and animal droppings (Hampson 1986). Toluene and 2,4-dimethyl phenol are also found in urban runoff and are used in making asphalt (German 1992). Polynuclear aromatic hydrocarbons (PAHs) are also commonly found in urban runoff and result from combustion processes, and include fluoranthene, pyrene, anthracene, and chrysene (German 1989; Greene 1992).

TABLE 26. PESTICIDE TOXICOLOGICAL DATA

Pesticide	LD50/Species
Aldicarb	0.93 mg/kg rat
Atrazine	3080 mg/kg rat 200- >5000 mg/kg quail/mallard
Azinphos-methyl	11-20 mg/kg rat
Bromoxynil	190 mg/kg rat >5000 mg/kg quail/mallard
Bromoxynil Octanoate	260 mg/kg rat
Carbaryl	850 mg/kg rat 2290->10000mg/kg quail/mallard
Carbofuran	8.2-14.1 mg/kg rat 0.397-46 mg/kg quail/mallard
Chlorothalonil	>10000 mg/kg rat
Chlorpyrifos	135-163 mg/kg rat 15.9-492 mg/kg quail/mallard
2,4-D	375 mg/kg rat 412- >5000 mg/kg quail/mallard
Decamethrin	128 mg/kg rat
Diazinon	108 mg/kg rat 3.54-101 mg/kg quail/mallard
Dicamba	1040-2900 mg/kg rat
Diclofop-methyl	557-580 mg/kg rat
Difenzoquat	470 mg/kg rat >5000 mg/kg quail/mallard
Disulfoton	2.6-12.5 mg/kg rat
EPTC	1630 mg/kg rat
Fenitrothion	500 mg/kg rat 652-1662 mg/kg quail/mallard

(continued)

TABLE 26. (CONTINUED)

Fonofos	8-17 mg/kg rat 16.9-290 mg/kg quail/mallard
Glyphosate	4320 mg/kg rat >5000 mg/kg quail/mallard
Lindane	76-200 mg/kg rat 490->2000 mg/kg quail/mallard
Malathion	1200 mg/kg rat 1485-2968 mg/kg quail/mallard
Mancozeb	5000 mg/kg rat
MCPA	700 mg/kg rat
Metiram	10000 mg/kg rat
Metolachlor	2750 mg/kg rat
Metribuzin	2200 mg/kg rat
Paraquat	150 mg/kg rat
Phorate	2 mg/kg rat 0.62-575 mg/kg quail/mallard
Propanil	1400 mg/kg rat
Terbufos	4.5-9.0 mg/kg rat 225 mg/kg quail/mallard
Triallate	1675-2166 mg/kg rat
Trifluralin	>10000 mg/kg rat

Source: Krawchuk and Webster 1987; Pierce and Wong 1988.

TABLE 27. ORGANIC COMPOUNDS INVESTIGATED DURING GROUNDWATER CONTAMINATION STUDIES

Volatile Organic Compounds

Benzene	Bromoform
Carbon Tetrachloride	Chlorobenzene
Chlorodibromomethane	Chloroethane
2-Chloroethylvinyl ether	Chloroform
1,2-Trans-dichloroethylene	Diclorobomomethane
Dichlorofluoromethane	1,1-Dichloroethane
1,2-Dichloroethane	1,1-Dichloroethylene
1,2-Dichloropropane	1,3-Dichloropropene
Ethylbenzene	Methyl bromide
1,1,2,2-Tetrachloroethane	Tetrachloroethane
Toluene	1,1,1-Trichloroethane
1,1,2-Trichloroethane	Trichloroethylene
Trichlorofluoromethane	Vinyl Chloride
Dibromochloropropane	

Acid Extractable Organic Compounds

p-Chloro-m-cresol	2-Chlorophenol
2,4-Dichlorophenol	2,4-Dimethylphenol
4,6-Dinitro-o-cresol	2,4-Dinitrophenol
2-Nitrophenol	4-Nitrophenol
Pentachlorophenol	Phenol
2,4,6-Trichlorophenol	2-Ethylphenol
2-Methylphenol	2,6-Dimethylphenol
3-Methylphenol	2,5-Dimethylphenol
3,4-Dimethylphenol	2,3-Dimethylphenol
3,5-Dimethylphenol	2,4,6-Trimethylphenol
2,3,5-Trimethylphenol	2,3,6-Trimethylphenol
2,3,5,6-Tetramethylphenol	2-Napthol

(continued)

TABLE 27. (CONTINUED)

Base-Neutral Extractable Compounds

Acenaphthene	Acenaphthylene
Antracene	Benzidene
Benzo(a)anthracene	Benzo(a)pyrene
Benzo(g,h,i)perylene	Benzo(k)fluoranthene
Benzo(b)fluoranthene	4-Bromophenyl phenyl ether
Butyl benzyl phthalate	Bis(2-chloroethyoxy) methane
Bis(2-chloroethyl)ether	Bis(2-chloroisopropyl)ether
2-Chloronaphthalene	4-Chlorophenyl phenyl ether
Chrysene	Dibenzo(a,h)anthracene
Di-n-butyl phthalate	1,3-Dichlorobenzene
1,4-Dichlorobenzene	1,2-Dichlorobenzene
3,3'-Dichlorobenzidene	Diethyl phthalate
Dimethyl phthalate	2,6-Dinitrotoluene
2,4-Dinitrotoluene	Dioctylphthalate
Bis(2-ethylhexyl)phthalate	Fluoranthene
Hexachlorobenzene	Hexachlorobutadiene
Hexachlorocyclopentadiene	Hexachloroethane
Indeno(1,2,3-cd)pyrene	Isophrone
Naphthalene	Nitrobenzene
N-nitrosodi-n-propylamine	N-nitrosodimethylamine
N-nitrosodiphenylamine	Phenanthrene
Pyrene	1,2,4-Trichlorobenzene
Benzo(b)pyrene	Butyl benzylphthalate

Source: German 1989; Troutman, *et al.* 1984; Wanielista, *et al.* 1991; and Salo, *et al.* 1986.

In Florida, organic compounds found in runoff were attenuated in the soil, with only one priority pollutant being detected in the Floridan aquifer as a result of stormwater runoff. This compound was bis(2-ethylhexyl) phthalate, which is a plasticizer which readily leaches from plastics (German 1989). In Pima County, Arizona, base/neutral compounds appeared in groundwater from residential areas, while phenols in the groundwater were noted only near a commercial site. Groundwater from a commercial site, also in Pima County, has been contaminated with ethylbenzene and toluene. Perched groundwater samples from residential sites showed the presence of toluene, xylene, and phenol (Wilson, *et al.* 1990). On Long Island, New York, benzene (groundwater concentrations of 2 to 3 μg/L); bis(2-ethylhexyl) phthalate (5 to 13 μg/L); chloroform (2 to 3 μg/L); methylene chloride (stormwater concentration of 230 μg/L and groundwater concentrations of 6 to 20 μg/L); toluene (groundwater concentrations of 3 to 5 μg/L); 1,1,1-trichloroethane (2 to 23 μg/L); p-chloro-m-cresol (79 μg/L); 2,4-dimethyl phenol (96 μg/L); and 4-nitrophenol (58 μg/L) were detected in groundwater beneath stormwater recharge basins (Ku and Simmons 1986).

Organic compounds occasionally found in runoff at three stormwater infiltration sites in Maryland included benzene, trichlorofluoromethane, 1,2-dichloroethane, 1,2-dibromoethylene, toluene, and methylene blue active substances (MBAS). Only MBAS's were found consistently and in elevated concentrations beneath the infiltration devices. The other organic compounds found in runoff were removed either in the device or in the vadose zone. Although specific organic compounds were not detected in the groundwater beneath and downgradient of the infiltration device, the dissolved organic carbon (DOC) concentration in the groundwater affected by infiltration was greater than that in the native groundwater (Wilde 1994).

Leaky sanitary sewerage in the Munich, Germany urban area has caused elevated concentrations in groundwater of total organic carbon, chloroform, trichloroethylene, and tetrachloroethylene (Merkel, *et al.* 1988). Volatile organic compounds (chloroform concentrations of 4.5 to 29 μg/L) were detected in the groundwater below twelve of fifteen municipal wastewater treatment plants throughout Florida (Pruitt, *et al.* 1985).

Organic compounds can leach from municipal waste landfills and other disposal sites, including unlined industrial surface impoundments and older hazardous waste landfills. Municipal waste landfills are sources of phthalate compounds that leach from plastic and detergents. Bis(2-ethylhexyl)phthalate can become airborne during municipal waste incineration, can be leached from plastics in a landfill, and was detected in water samples from the Floridan aquifer (German 1989). Surface impoundments used to contain industrial wastewater at a wood treatment plant showed significant amounts of residual pentachlorophenol (PCP), creosote, and diesel fluids and has led to the phenolic contamination of the groundwater near a wood treatment facility near Pensacola, Florida (Troutman, *et al.* 1984).

Industrial areas contribute heavily to the organic compound load that could potentially leach to the groundwater. Surface impoundments may be used to contain industrial wastes, deep well injection may be used to dispose of water, and stormwater runoff may collect organics as it passes over an industrial site. Phenols and the PAHs benzo(a)anthracene, chrysene, anthracene and benzo(b)fluoroanthenene, have been found in groundwater near an industrial site in Pima County, Arizona. The phenols are primarily used as disinfectants and as wood preservatives and were present in the stormwater runoff, although they were

significantly reduced in concentration by the time they reached the groundwater (generally less than 50 μ g/L). At an Arizona recharge site, the groundwater has higher concentrations of trichloroethylene, tetrachloroethylene, and pentachloroanisole, than the inflow water, indicating past industrial contamination (Bouwer *et al.* 1984).

Documented industrial groundwater contamination is not limited to the United States. In Birmingham, UK, groundwater contamination resulted from hydrocarbon oil and volatile chlorinated solvent use. The metals-related industries have contributed significant amounts of trichloroethylene (groundwater concentrations of up to 4.9 mg/L have been noted) to the groundwater in this area, and since trichloroethylene has been replaced by 1,1,1-tri-chloroethane in industry, 1,1,1-tri-chloroethane contamination is beginning to occur. The other organic compound to show up in significant concentrations in Birmingham is perchloroethylene, a solvent used primarily in the dry cleaning laundry industry (Lloyd, *et al.* 1988). On the left bank of the Danube, the petrochemical refinery Slovnaft has contributed to groundwater contamination by leaking oil during tanker loading and unloading (Marton and Mohler 1988).

Soil Removal Processes for Organic Compounds

The appearance in groundwater of organic compounds, along with elevated nitrate concentrations, has been used as an indicator of groundwater contamination (Lloyd 1988). Most organics are reduced in concentration during percolation through the soil, although they may still be detectable in the groundwater. Groundwater contamination from organics, like from other pollutants, occurs readily in areas with pervious soils, such as sand and gravel, and where the water table is near the land surface (Troutman, *et al.* 1984). Based on septic tank effluent studies, sand seems to be more effective than limestone in filtering the organic material (Schneider, *et al.* 1987). In coastal areas and valleys, direct interaction of groundwater and surface water will result in groundwater contamination if the surface water is contaminated (Troutman, *et al.* 1984). Organic removal from the soil and recharge water can occur by one of three methods: volatilization, sorption, and/or degradation (Crites 1985; and Nellor, *et al.* 1985). Estimates of organic compound mobility can be made based on volatilization, sorption, and solubility, as previously shown on Tables 23 through 25 (Armstrong and Llena 1992).

Volatilization of Organics--

The rate of volatilization is controlled by the compound's physical and chemical properties; its concentration; the soil's sorptive characteristics; the soil-water content; air movement; temperature; and the soil's diffusion ability. Volatilization can occur both during application and from soil sites after infiltration. Volatilization during application is controlled by the compound's physical and chemical characteristics, atmospheric conditions, and application method (Crites 1985) and has been measured by observing the reduction in the organic concentration across an infiltration basin.

Volatilization from sorbed sites of soils is a function of: transfer of the organic compound from the soil's sorbed sites to the solution, movement from the solution to the air trapped in the soil and diffusion of the compound in the soil air to the atmosphere. The extent of each of the above reactions depends on the compound's solubility, its concentration gradient in the soil, and proximity of the molecule of interest to the soil surface (Crites 1985).

Volatile organic compounds are rarely found in stormwater recharge basins (<2.4 μg/L), dry wells (<175 μg/L), or the vadose zone or groundwater below the basins (<4 μg/L), as indicated by studies in Fresno, California, by Nightingale (1987b) and in Pima County, Arizona by Wilson, *et al.* (1990).

Sorption of Organic Compounds--

There are at least six different sorption mechanisms: cation exchange, anion exchange, cation-dipole and coordination bonds, hydrogen bonding, van der Waals attraction, and hydrophobic bonding (Crites 1985). Sorption is a function of the following soil-water-compound system characteristics: sorbate shape/configuration (including structure and position of functional groups and presence and degree of molecular saturation); sorbate chemical characteristics (including acidity or basicity; water solubility; charge distribution; polarity and polarizability); and sorbent nature (including mineralogical composition, organic matter content and cation exchange capacity (CEC) (Crites 1985) with the clay and particulate organic matter content controlling the sorption (Bouwer *et al.* 1984).

Hydrophobic sorption onto organic matter were found to limit the mobility of less soluble base/neutral and acid extractable compounds through organic soils and the vadose zone in Orlando, Florida (German 1989). The degree of removal in soil of nonhalogenated organic compounds is greater than that of the halogenated organics (Bouwer, *et al.* 1984). Benzene, toluene and xylene were found in the soils and in the perched water table in Arizona and, as these compounds are relatively soluble, they may percolate easily through the vadose zone. The toluene concentration in the perched-water table was 54 μg/L, while the toluene concentration in the water table was 3.7 μg/L (Wilson, *et al.* 1990).

Sorption is not always a permanent removal mechanism. A study in Florida has shown that organic solubilization can occur for several storms following dry periods. However, extended periods of complete aeration of bottom sediments may be counter-productive when trying to reduce organic compound concentrations (Hampson 1986).

Degradation and Decomposition of Organic Compounds--

The third process for organic compound attenuation is chemical or biological degradation. Examples of chemical degradation processes include hydrolysis and photodegradation. However, most of the trace organic removal is the result of biological degradation (Smith and Myott 1975). Many organics can be degraded by microorganisms, at least partially, but others cannot. Temperature, pH, moisture content, cation exchange capacity, and air availability may limit the microbial degradation potential for even the most degradable organic (Crites 1985). The end products of complete aerobic degradation include carbon dioxide, sulfate, nitrate, phosphate, and water, while the end products under anaerobic conditions include carbon dioxide, nitrogen, hydrogen sulfide, and methane (EPA 1992).

Conditions in the thick, aerobic, unsaturated zone provide a good environment for wastewater detergent concentration reduction through biochemical degradation and adsorption (Smith and Myott 1975). Halogenated one- and two-carbon aliphatic compounds are biotransformed under methanogenic, but not aerobic, conditions (Bouwer, *et al.* 1984). The rate of breakdown of chlorinated hydrocarbons in the soil increases with temperature, water content, and organic matter content (Bouwer 1987). Nonhalogenated hydrocarbons decreased fifty to ninety percent during percolation through the soil, with concentrations in the renovated water being detectable, but near, or below, the detection limit. The halogenated organic compounds generally decreased to a lesser extent during percolation.

The chlorinated aromatics are relatively refractory and mobile in the ground and have lesser concentration decreases than nonchlorinated aromatic hydrocarbons. Significant reductions of TOC concentrations occurred during the first several meters of soil percolation and a gradual decrease in TOC concentration occurred with longer underground travel times at the Phoenix 23rd Ave. recharge project site (Bouwer, *et al.* 1984).

Pretreatment of the recharge water in Arizona by chlorination resulted in higher chloroform concentrations and in the formation of three brominated trihalomethanes (Bouwer, *et al.* 1984). Ponds and lakes affected by stormwater runoff have a high potential for the formation of trihalomethanes (THMs) with chlorination because of the precursor organics existing in the stormwater. Factors which affect THM formation include the chlorine contact time, pH, and temperature. Precursors to THM formation in stormwater include algae, bacteria, and humic substances (Wanielista, *et al.* 1991).

At an injection well site in Florida, organic carbon compounds were microbially converted to carbon dioxide and ammonia within 100 meters of the injection well (Hickey and Vecchioli 1986). In general, deep well injection in Florida showed that organic compounds are being mineralized in the Floridan aquifer (Ehrlich, *et al.* 1979b).

Anaerobic methanogenic bacteria in a surface impoundment located at a wood treatment plant near Pensacola, Florida, reduced the total phenol concentration by forty-five percent. However, the presence of pentachlorophenol inhibits methanogenesis, reducing the removal of some organics in the impoundment (Troutman, *et al.* 1984). In Arizona, partial degradation of the chlorinated benzenes occurs during percolation through the aerobic zone, but the poor overall removal efficiency of chlorinated aromatics probably results from their lack of degradation under anoxic conditions. In general, infiltration and percolation through the soil has the effect of dampening concentration fluctuations and eliminating occasional extreme values (Bouwer, *et al.* 1984).

Health Effects

Some of the organics listed as hazardous to human health include: benzene, ethylenimine, ethylene dibromide, benzidene, carbon tetrachloride, tricresyl phosphate, chloroform, allyl chloride, aroclor 1254, and benzolalpyrene (Crites 1985). Disease outbreaks due to water contamination by organics has been documented for the following compounds: cutting oil, photographic developer fluid (hydroquinone, paramethylamino phenol), ethyl acrylate, fuel oil, leaded gasoline, mixtures of lubricating oil and kerosene, phenol, and polychlorinated biphenyl. In Wisconsin, an accidental phenol spill caused an illness in the area residents that was characterized by diarrhea, mouth sores, burning of the mouth, and dark urine (Craun 1979). Runoff from paved areas in urban Arizona commonly was found to contain the following four suspected carcinogenic PAHs: benzo(a)anthracene, benzo(b)fluoranthene, dibenzo(a,h)anthracene and chrysene (Wilson, *et al.* 1990).

GROUNDWATER CONTAMINATION ASSOCIATED WITH PATHOGENS

Definition

Microorganism pathogens that can be in stormwater and can cause specific human diseases include viruses, protozoa, and bacteria. When evaluating the potential contamination of groundwater, many types of microorganisms are important. Pathogenic microorganisms harmful to human health need to be controlled, while those that are necessary for decomposition of nutrients and contaminants need to be encouraged. Viruses of concern in water are shown in Table 28.

TABLE 28. VIRUSES OF CONCERN IN WATER

Virus Group	**Number Of Types**
Enteroviruses	
Poliovirus	3
Echovirus	34
Coxsackie Virus A	24
Coxsackie Virus B	6
New Enteroviruses	?
Hepatitis Type A (probably an enterovirus)	1
Rotavirus (reovirus family) (gastroenteritis Type B)	2
Reovirus	3
Adenovirus	>30
Parvovirus	3
Adeno-Associated Virus	?

Source: Crites 1985.

Microorganisms that have been studied in urban runoff (both the harmful and the environmentally necessary ones) include: *Shigella, Salmonella, Giardia lamblia, Yersinia Enterocolitica, E. coli, Methanogenic bacteria, Azonmonas, Acinetobacter, Pseudomonas, Bacillus, Flavobacterium, Alcaligenes, Thiobacillus, Leptothrix, Siderocapseceae, Metallogenium, Vibrio, Campylobacter, Leptospira, Streptococci, Beggiotoa, Micrococus, Proteus, Aeromonas, Serratia,* and *Gallionella*.

Examples of Microorganism Contamination of Groundwater

Pathogen sources that potentially contaminate groundwater include waste decomposition, sanitary sewage, agriculture, urban runoff, and natural occurrence.

Natural Occurrence--

Many types of bacteria occur naturally in water. The bacteria groups found in flowing water include sheathed bacteria, iron-manganese bacteria and some of the sulfur oxidizing bacteria (Wanielista, *et al.* 1991). Bacteria that affix to carbon and are water and soil chemoorganotrophs include *Azonmonas, Acinetobacter, Pseudomonas, Bacillus, Flavobacterium* and *Alcaligenes*.

Beggiatoa are filamentous bacteria that produce polysaccharidic sheath-like slimes. They are found at the sulfide/oxic interface of fresh or marine waters or estuaries. *Gallionella* is chemolithotrophic (it oxidizes inorganic ferrous iron and assimilates carbon dioxide). It is characterized by twisted stalks containing the organic material to which the ferric hydrate is bound. *Leptothrix*, if it is the dominant bacteria in water, indicates a high iron and/or manganese concentration in the water. *Metallogenium* are aerobic, chemoorganotroph/parasitic organisms that are found in surface waters near anaerobic sediments, decomposing layers of leaf litter, or bottom deposits of lakes. The *Siderocapsaceae* family of bacteria are non-filamentous, aerobic/anaerobic, facultative/obligate slime-encapsulated bacteria that precipitate iron and manganese. They occur in swamp ditches, stagnant waters, and in the hypolimnion of lakes, and use organic carbon of iron-manganese humates. *Thiobacillus* is an aerobic, non-aggregating bacteria which oxidizes reduced sulfur into sulfate and is found in sulfur-bearing water. *Thiothrix* bacteria are found in sulfide or thiosulfide containing waters and in wastewater treatment plants (Reichenbaugh, *et al.* 1977).

The bacteria found in the aquifer at a recharge site at Bay Park, New York, included obligate aerobes and facultative anaerobes such as *Alcaliganes, Micrococus, Flavobacterium, Acinebacter, Proteurs, Aeromonas*, and *Serratia*. These bacteria used the soluble organic matter in the recharge water as food. Denitrifying strains of *Pseudomonas fluorescens* grow under the anaerobic conditions of the Magothy aquifer by using nitrate as a terminal electron acceptor. Several *Pseudomonas* species, including *P. fluorescens, P. aeruginosa, P. putida, P. alcaligenes,* and *P. pseudoalcaligenes* can sustain themselves under anaerobic conditions by decomposing arginine, an amino acid, through substrate level phosphoration (Ehrlich, *et al.* 1979a).

Urban Areas--

When comparing urban runoff from different land uses on Long Island, New York, low-density residential and nonresidential areas contributed the fewest bacteria to the storm runoff, while medium-density residential and commercial areas contributed the most. The amount of each bacteria species in the runoff varied by season, with the warm seasons having significantly more fecal coliforms and fecal streptococci than the colder seasons. However, total coliform concentrations were not affected by the season (Ku and Simmons 1986). NURP monitoring results also found similar seasonal variations for fecal coliform discharges throughout the U.S. (EPA 1983).

Viruses were detected in groundwater on Long Island at sites where stormwater recharge basins were located less than thirty-five feet above the aquifer (Vaughn, *et al.* 1978). At other locations, viruses are likely removed from the percolation water by either adsorption and/or inactivation.

Rain water infiltration through solid wastes readily carries decomposition products, in addition to bacteria and viruses, downward through the soil to the groundwater. The highest contaminant concentrations occur when the water table is near the land surface (Boggess 1975). Bacterial pathogens found in human and animal feces and the resulting wastewater include *Escherichia coli, Salmonella, Shigella, Yersinia, Vibrio, Campylobacter* and *Leptospira* (Amoros, *et al.* 1989). Leaky sanitary sewerage systems or septic tanks may leach these bacteria into storm drainage systems or directly into groundwater (Pitt, *et al.* 1993).

Shigella is not as common in wastewater as *Salmonella* in developed countries, although it is more prevalent in the tropics and subtropics. *Salmonella* is the most common disease-causing bacteria found in wastewater (Crites 1985).

Agricultural Operations--

Agricultural uses of treated effluent in fertilization can also promote the spread of pathogens to the soil where, during irrigation, they can pass through the soil to the groundwater (Robinson and Snyder 1991). Bacteria also can be returned to humans through vegetables irrigated with inadequately disinfected sewage effluent (Amoros, *et al.* 1989).

Soil Removal Processes for Pathogens

During land application or burial of sewage sludge, pathogens may leach from the sludge and contaminate groundwater, although most are removed in the soil during percolation (Gerba and Haas 1988).

The factors that affect the survival of enteric bacteria and viruses in the soil include pH, antagonism from soil microflora, moisture content, temperature, sunlight, and organic matter. The effect of each of these factors is given in Table 29 (Crites 1985). In general, drying of the soil will kill both bacteria and viruses.

Viruses--

Viral adsorption--Viral adsorption is promoted by increasing cation concentration, decreasing pH and decreasing soluble organics (EPA 1992) and is controlled by both the efficiency of short-term virus retention and the long-term behavior of viruses in the soil (Crites 1985). The effect of each of these factors is given in Table 30 (EPA 1992 and Crites 1985).

The downward movement and distribution of viruses are controlled by convection and hydraulic dispersion mechanisms. Since the movement of viruses through soil to groundwater occurs in the liquid phase and involves water movement and associated suspended virus particles, the distribution of viruses between the adsorbed and liquid phases determines the viral mass available for movement.

The distribution (or sorption) of virus particles in the soil matrix is largely due to electrostatic double layer interactions and Van der Waals forces. Adsorption of viruses in soil is rapid and reversible and can be adequately described by an equilibrium (linear Freundlich isotherm) expression (Tim and Mostaghim 1991). Viral adsorption by the soil does not necessarily result in virus inactivation and has been shown to be reversible after a change in soil conditions, such as the ionic environment (Jansons, *et al.* 1989b; and Vaughn, *et al.* 1978). Also, once the virus reaches the groundwater, it can travel laterally through the aquifer until it is either adsorbed or inactivated (Vaughn, *et al.* 1978).

Viral inactivation--Enterovirus survival in groundwater is highly variable and is influenced by a number of factors, including: virus type, pH, temperature, dissolved oxygen concentration, and microbial antagonism (Jansons, *et al.* 1989b; and Tim and Mostaghim 1991). The two most important attributes of

viruses that permit their long-term survival in the environment are their structure and very small size. These characteristics permit virus occlusion and protection within colloid-size particles. Viruses in

TABLE 29. SOIL CHARACTERISTICS AFFECTING PATHOGEN REMOVAL

Factor	Pathogen Type	Remarks
pH	Bacteria	Shorter survival in acid soils (pH = 3 to 5) than in alkaline and neutral soils.
	Viruses	Insufficient data.
Antagonism from soil microflora	Bacteria	Increased survival time in sterile soil.
	Viruses	Insufficient data.
Moisture content	Bacteria and viruses	Longer survival in moist soils and during periods of high rainfall.
Temperature	Bacteria and viruses	Longer survival at low (winter) temperatures.
Sunlight	Bacteria and viruses	Shorter survival at the soil surface.
Organic matter	Bacteria and viruses	Longer survival (regrowth of some bacteria) when sufficient amounts of organic matter are present.

Source: Crites 1985.

TABLE 30. FACTORS THAT INFLUENCE VIRAL MOVEMENT IN SOIL AND TO GROUNDWATER

Soil Type. Fine-textured soils retain viruses more effectively than light-textured soils. Iron oxides increase the adsorptive capacity of soils. Muck soils are poor adsorbents. The higher the clay content of the soil, the greater the expected removal of the virus. Sandy loam soils and other soils containing organic matter are also favorable for virus removal. Soils with a small surface area do not achieve good virus removal.

pH. Generally, adsorption increases when pH decreases. However, the reported trends are not clear due to complicating factors.

Cations. Adsorption increases in the presence of cations (cations help reduce repulsive forces on both virus and soil particles). Rain water may desorb viruses from soil due to its low conductivity.

Soluble organics. Organics generally compete with viruses for adsorption sites. No significant competition at concentrations found in waste water effluents. Humic and fulvic acids reduce virus adsorption to soils.

Virus type. Adsorption to soils varies with virus type and strain. Viruses may have different isoelectric points.

Flow rate. High flow rates reduce virus adsorption to soils.

Saturated vs. unsaturated flow. Virus movement is less under unsaturated flow conditions.

Rainfall. Viruses retained near the soil surface may be eluted after a heavy rainfall because of the establishment of ionic gradients within the soil column.

Sources: EPA 1992; and Crites 1985.

wastewater applied to the soil are integral parts of submicron particles and are small enough to move with the applied water to the groundwater (Wellings 1988).

Dissolved oxygen is a significant factor in loss of virus activity in groundwater, possibly because direct oxidation of components of the virus capsid inactivates the virus or, as with temperature, the level of dissolved oxygen influences the activity of antagonistic microorganisms. At temperatures below 4°C, microorganisms can survive for months or even years, whereas at higher temperatures, inactivation or dieoff occurs rapidly. Decreasing pH promotes virus adsorption and results in shorter survival times, both of the virus and of the antagonistic bacteria. High levels of organic matter appear to shield viruses from adsorption (Treweek 1985). Virus inactivation in the subsurface environment can be described by a first order decay reaction (Tim and Mostaghim 1991). It is difficult to describe a soil that will remove all viruses effectively, as different soil types affect each virus differently (Jansons, *et al.* 1989a).

Enteric viruses are more resistant to environmental factors than enteric bacteria and they exhibit longer survival times in natural waters. They can occur in potable and marine waters in the absence of fecal coliforms. Enteroviruses are more resistant to commonly used disinfectants than are indicator bacteria, and can occur in groundwater in the absence of indicator bacteria (Marzouk, *et al.* 1979).

Removal of bacterial pathogens--

The major bacterial removal mechanisms in soil are straining at the soil surface and at intergrain contacts, sedimentation, sorption by soil particles, and inactivation (Crites 1985). Potable water use requires continuous disinfection to prevent disease outbreaks in the population served (Craun 1979).

Not all bacteria are harmful and need to be removed from the water. For example, methanogenic bacteria are responsible for the decomposition of phenolic compounds in infiltrating water (Troutman, *et al.* 1984).

Bacterial movement--The characteristics of bacterial movement through porous media, such as an aquifer, include the following (Ehrlich, *et al.* 1979a):

- Bacteria travel with the flow of water, not against the hydraulic gradient.
- The rate of bacterial movement through filtering is a function of the nature of the aquifer materials, with silt and soils having high clay content being the best materials for bacterial removal.
- The rate of bacterial removal by filtering can be characterized by the filter efficiency of the aquifer (filterability).
- Typically, the maximum distance that bacteria travel in a porous media ranges from fifty to one hundred feet.
- Under favorable condition, bacteria may survive as long as five years.

Stable populations of bacteria in soil and water may become established due to an increased concentration of adsorbed organics and due to the large surface area of the granules to which they attach themselves (Wanielista, *et al.* 1991).

Bacteria survival--Factors such as temperature, pH, metal concentration, nutrient availability and other environmental characteristics affect the ability of a bacterial colony to survive in the water or soil (Ku and Simmons 1986). Once the microorganisms are retained in the soil, their survival depends upon the sunlight exposure, oxidation rates, desiccation and antagonism from the established soil microbial population (Crites 1985).

Bacteria survive longer in acid soils and when large amounts of organic matter are present. Bacteria and larger organisms in wastewater are usually removed during percolation through a short distance of soil (EPA 1992). When recharging using deep well injection, the logarithm of the coliform bacteria density decreases linearly with distance from the recharge well (Ehrlich 1979).

In general, enteric bacteria survive in soil between two and three months, although survival times up to five years have been documented (Crites 1985). *E. coli* can survive and multiply on trapped organic matter and *Salmonella* and *Shigella* have survived for forty-four days and twenty-four days, respectively, at a recharge site in Israel (Goldschmid 1974).

Significant dieoff can be achieved using intermittent rapid infiltration of wastewater and allowing the recharge basin to dry out (Crites 1985). When the recharge is stopped, the bacteria multiply, using the accumulated organic debris for food. The decomposition of the organic matter starts as an aerobic process. After the oxygen has been consumed, the process turns anaerobic and septic. At this stage, some denitrification and sulfate reduction takes place and the decomposition of the organic matter will lead to a partial reduction in clogging. Pathogenic enterobacteria are unable to multiply under these conditions, but they can survive for a relatively long time. About a hundred days after recharge, the decomposition process ended and no more coliform bacteria were found in the pumped water from the recharged aquifer in Israel (Goldschmid 1974).

Health Effects

Human health can be affected through waterborne diseases transmitted by bacteria, viruses, protozoa, and parasites (Crites 1985). Many microorganism caused diseases may be spread by person-to-person contact, or through contact of infected material (Gerba and Goyal 1988). Health effect research now goes beyond the acute effect of pathogens to the chronic problems associated with carcinogens and mutagens, and the other problems caused by long-term ingestion of low concentrations of these organisms (DeBoer 1983).

The development of clinical illness depends on numerous factors, including the immune status of the host, the age of the host, virulence of the microorganisms, type and strain of the microorganisms, and the route of infection. Mortality rates are affected by many of the same factors that determine the development of clinical illness (Gerba and Haas 1988).

Viruses--

Enteric viruses can survive typical sewage treatment processes, including chlorination, in sufficient numbers to be detectable in the discharged water. Peak concentrations of these viruses occur in the late summer and early autumn. The documented outbreaks of viral diseases from groundwater contamination have been limited primarily to infectious hepatitis (Crites 1985; Craun 1979).

Human enteric viruses of concern, and their diseases or symptoms, are given in Table 31.

TABLE 31. ENTEROVIRUSES AND DISEASES

Virus Group	Disease or Symptom
Poliovirus	Paralysis, meningitis, fever, encephalitis, gastroenteritis
Echovirus	Meningitis, respiratory diseases, rash, diarrhea, fever
Coxsackie Virus A	Herpangina, respiratory disease, fever meningitis, myocarditis, diabetes
Coxsackie Virus B	Myocarditis, congenital heart anomalies, rash, fever, meningitis, respiratory disease, pleurodynia, encephalitis
New Enteroviruses	Meningitis, encephalitis, respiratory disease, acute hemorrhagic conjunctivitis, fever, gastroenteritis
Hepatitis Type A	Infectious hepatitis
Rotavirus	Epidemic vomiting and diarrhea, chiefly in children, gastroenteritis
Reovirus	Respiratory infections
Adenovirus	Respiratory disease, eye infections, conjunctivitis, gastroenteritis
Parvovirus	Associated with respiratory diseases in children, but etiology not clearly established
Adeno-associated virus	Associated with respiratory diseases in children, but etiology not clearly established
Norwalk virus	Vomiting, diarrhea, fever, acute gastrointestinal disease
Astrovirus	Gastroenteritis
Renovirus	Not clearly established

Sources: Crites 1985; Tim and Mostaghim 1991.

Bacteria--

Shigella and *Shiga bacillus* are dysentery bacilli and cause mild to acute diarrhea, abdominal pains and blood in the stool. Acute gastroenteritis and typhoid fever result from the *Salmonella* bacteria. Symptoms of *Salmonella* contamination include abdominal cramps, nausea, vomiting and diarrhea (Craun 1979). Most outbreaks of salmonellosis can be traced to transmission of the bacteria via food, milk or direct contact, but its contamination of water supplies, with a resulting disease outbreak, occurred as recently as 1963. The bacteria *Escherichia coli* are responsible for some of the diarrhea diseases, as are *Shigella* and *Salmonella* (Crites 1985). *Azomonas, Acinetobacter, Pseudomonas bacillus* and *Flavobacterium* do not pose an immediate threat to human health, but they are opportunistic pathogens, chlorine resistant and/or suppressers of total coliforms (Wanielista, *et al.* 1991).

Reviews of past disease outbreaks due to water contamination has shown that acute gastrointestinal illnesses were slightly higher in groundwater systems, compared to surface water systems, due to the lack of treatment, or the use of poor treatment practices. For surface water systems, contamination and the resulting outbreaks were caused by contaminated ice or containers, backsiphonage, cross-connections, water main breaks, or accidental contamination of treated storage reservoirs (Craun 1979).

GROUNDWATER CONTAMINATION ASSOCIATED WITH METALS

Even in small concentrations, metals may be a problem when infiltrating stormwater, especially when using a rapid infiltration system (Crites 1985). The heavy metals of most concern include lead, copper, nickel, chromium, and zinc. However, most of these metals have very low solubilities at the pHs found in most natural waters and they are readily removed by either sedimentation or sorption removal processes (Hampson 1986). Many are also filtered, or otherwise sorbed, in the surface layers of soils in infiltrating devices using surface infiltration.

Examples of Metals Contaminating Groundwater

Urban Areas--

Nickel, chromium, and zinc concentrations exceeded the regulatory limits in the soil below a recharge area at an Arizona commercial site. However, only manganese was present at an elevated concentration in the groundwater at a residential site (Wilson, *et al.* 1990).

At a site in Lee County, Florida, groundwater near an unlined landfill had elevated iron concentrations due to landfill leachate. The leachate also may have increased the groundwater manganese concentrations (Boggess 1975). In New York, cesspool leachates have elevated the concentrations of boron and barium in the shallow groundwaters of the Magothy Aquifer (Smith and Myott 1975).

Boron concentrations were found to be high in groundwaters below industrialized areas in Birmingham, UK, as it is used in many metal-related industries. The presence of high concentrations of aluminum, cadmium, manganese, and titanium was also noted in the groundwaters near metals industries in the Birmingham industrial area (Lloyd, *et al.* 1988).

Agricultural Operations--

In the Tulare Lake region of the Central Valley of California, the metals that have adversely affected groundwater quality include: boron, cadmium, chromium, copper, molybdenum, nickel, and selenium. Areas being irrigated had lower groundwater selenium concentrations, but had elevated concentrations of barium, molybdenum, vanadium, and zinc compared to non-irrigated areas (Deason 1989). At other agricultural sites, elevated groundwater concentrations of selenium, molybdenum, chromium, and mercury are of concern (Deason 1987).

Soils below drainage irrigation canals and basins have shown higher concentrations of selenium, arsenic, and uranium than normal for the Western United States (Deason 1989). Selenium groundwater contamination beneath irrigated lands was also documented in Wyoming (Peterson 1988).

Metal Removal Processes in Soils

The interaction of surface water and groundwater has resulted in selenium contamination of groundwater in Wyoming (Peterson 1988). Sandy soils performed minimal removal of boron and nickel while the percolate water had no cobalt (Crites 1985). In general, studies of recharge basins receiving large metal loads show that most of the heavy metals are removed either in the basin sediment or in the vadose zone (Ku and Simmons 1986; and Hampson 1986).

Removal of metals by soil may be accomplished through one of several processes, including: (1) soil surface association, (2) precipitation, (3) occlusion with other precipitates, (4) solid-state diffusion into soil minerals, (5) biologic system or residue incorporation, and (6) complexation and chelation (Crites 1985). Most of these removal processes are pH-dependent, as is the solubility of most metals. In general, the solubility of a metal increases as the solution's pH decreases (Wilde 1994).

Adsorption--

Dissolved metal ions are removed from stormwater mostly by adsorption onto the near-surface particles in the vadose zone, while the particulate metals are filtered out at the soil surface (Ku and Simmons 1986). Studies of dissolved lead ions in recharge ponds in Jacksonville, Florida, found that allowing the ponds to go dry between storms was counterproductive to the removal of lead from the water during recharge (Hampson 1986). Apparently, the adsorption bonds were weakened during the drying period. Studies in Fresno, California, recharge basins found that lead, zinc, cadmium, and copper accumulated at the soil surface with little downward movement over five years. However, the microtopographic features, such as small depressions and basin inlet and outlet locations, influenced the metal's distribution in the soil (Nightingale 1987a).

Similarities in water quality between the runoff water and the groundwater show that there is downward movement of copper and iron in sandy and loamy soils. However, the other metals of concern (arsenic, nickel, and lead) did not significantly move downward through the soil to the groundwater. The exception to this was some downward movement of lead with the percolation water in the sandy soils of Fresno stormwater recharge basins (Nightingale 1987b).

The order of sorption ability (from strongest to weakest) for potential substrates is as follows:

manganese oxides > organic matter > iron oxides > clay minerals.

The order of sorption affinity (from strongest to weakest) for certain metals is as follows:

lead > copper > nickel > cobalt > zinc > cadmium > iron > manganese.

Competition between substrates or between metals will affect the overall adsorption ability of various trace metals (Wilde 1994).

Cation Exchange, Organic Complexation, and Chelation of Metals--

In soils, heavy metals enter into general cation exchange reactions with clay and organic matter and into chelation reactions with organic molecules. As the organic molecules are decomposed, the metals become free to react with iron and aluminum hydroxides, calcium, and other compounds. These new compounds are immobilized in the soil profile. The immobilization reactions are more pronounced at high pH and in an aerobic environment. Boron is adsorbed to iron and aluminum hydroxide coatings on clay minerals, to iron and aluminum oxides, to micaceous clay minerals, and to magnesium hydroxide coatings on weathering surfaces of ferro-magnesium minerals. In sandy soils and quartz, boron is not significantly immobilized (Bouwer 1985). Interactions of certain metals with phosphors can form either soluble or insoluble complexes. The type of clay mineral also affects heavy metal adsorption. However, the higher

the cation exchange capacity (CEC) of the soil, the generally greater will be the binding of metallic cations (Nightingale 1987a). A soil's CEC is pH-dependent; therefore, the ion exchange ability of a soil to remove metals from solution is pH-dependent.

Organic complexation of a metal may enhance the metal's ability to move freely to the groundwater. Organic complexes often are stable and uncharged or negatively charged. Because of their negative or neutral charge, they are not attracted to negatively-charged adsorption/ion exchange sites and are not easily removed from solution (Wilde 1994).

Precipitation of Metals--

Selenium in agricultural drainage water is generally in its fully oxidized state, as selenate. Although selenites can be readily precipitated from water, even in the presence of salts, selenate precipitation is inhibited. The precipitation process relies upon the bacteria which occur naturally in the drainage water which convert the inorganic selenate to an organic complex. Part of the selenate is assimilated into the complex, part is reduced to a lower oxidation state, and the rest is reduced to zero valent selenium (Squires, *et al.* 1987). Further testing confirms that selenite can be readily precipitated from drainage water, even in the presence of salts, but selenate precipitation is inhibited in the presence of nitrate and sulfate (Squires, *et al.* 1989).

In central Florida, the dissolved iron concentrations in recharge water is much greater than in the groundwater, indicating that dissolved iron ions are being removed from the recharge water during percolation. The reduction of dissolved iron concentrations resulted from precipitation of iron or complexation into other nonsoluble species (Schiffer 1989). Iron and manganese transformations in groundwater are controlled by both the oxidation-reduction conditions and the acid-alkali balance in the water. The migration and diffusion speed of iron (Fe^{+2}) and oxygen is rather slow in water, but is accelerated by iron bacteria. The amount of iron oxidized by iron bacteria is ten, or even hundreds of times, greater than that oxidized by the chemical reaction alone (Bao-rui 1988). In central Florida, zinc, which is more soluble than iron, was commonly found in higher concentrations in groundwater than iron (Schiffer 1989). Iron and manganese oxidation may lower the pH of a water because the oxidation reactions add acidity (as the H^+ ion) to the water. A lower pH may cause an increase in the dissolved metal concentrations in the water. Concurrent decreases in pH and Eh in the unsaturated zone may have increased the mobility of manganese beneath one stormwater impoundment in Maryland (Wilde 1994).

Dissolved Metal Concentration Increases in Groundwater--

The dissolved iron concentration in the Magothy aquifer was greater after recharge than in the native groundwater and in the recharge water itself. The observed increase in iron concentration from less than 0.5 mg/L to 3 mg/L indicated a constituent of the recharge water reacting with the pyrite and marcasite (FeS_2) in the aquifer (Ragone 1977). For the first twenty feet from the well in the aquifer, the dissolved oxygen in the recharge water reacted with the pyrite to produce ferrous iron, sulfate, and hydrogen ions, according to the following equation:

$$FeS_2 + 7/2\ O_2 + H_2O \rightarrow Fe^{+2} + 2\ SO_4^{-2} + 2\ H^+$$

At distances greater than twenty feet, the dissolved oxygen concentration was zero. The reason for the increase in the dissolved iron concentration was unknown (Ragone 1977).

Although the concentrations of many trace metals were reduced through sorption/ion exchange to bottom materials and/or native sediments, elevated concentrations (greater than background) of these metals were found in groundwater beneath and downgradient of three infiltration devices in Maryland. The greater-than-expected metal concentrations could have resulted from fluctuations in pH and/or dissolved oxygen; unfavorable conditions for sorption, oxidation, ion exchange, or precipitation in the pond and/or unsaturated zone; or significantly greater flow rates through the unsaturated zone (Wilde 1994).

Mobility--

In dry recharge wells in Arizona, manganese was the only metal that was mobile in the nearly-neutral vadose zone sediments and was the only metal to show up in the groundwater at elevated concentrations (Wilson, *et al.* 1990).

Aluminum mobility is governed by pH, amount of stormwater infiltration, horizontal and vertical groundwater flow, depth to water table, and existence of channels for preferential flow. Aluminum is soluble above pH 9.0. Cadmium solubility/mobility is governed by pH, redox potential, biological uptake, and solubilities of carbonates and sulfides. If sulfide is present, cadmium is nearly immobile. Cadmium complexes readily with organic and inorganic ligands but preferentially in the following order:

humic acids > carbonate > hydroxides > chlorides > sulfates.

Hydrophilic and negatively-charged, or neutrally-charged, complexes are not likely to be retarded in the vadose zone. Copper is soluble at high pH values (greater pH than zinc or nickel) and its solubility is affected by complexation with iron and other ligands and by coprecipitation by oxides. If chromium entering an infiltration device is negatively charged, or is bound in a stable, negatively-charged compound, it may move easily through the vadose zone (Wilde 1994).

Chromium was detected in groundwater in Maryland beneath stormwater infiltration devices and was not removed from solution by sorption to the sediments in the device, or to the vadose zone sediments. Lead forms compounds with hydroxides, carbonates, sulfides, and sulfates, all of which have a low solubility. Lead also is removed from solution by binding with organic matter, coprecipitating with manganese oxides, and sorbing to organic and inorganic substrates. Zinc mobility is limited by high pH, the partial pressure of carbon dioxide in the solution, and the presence of sulfide. Aqueous zinc can be reduced by coprecipitation with other minerals, cation-exchange, biochemical activities, and complexation and sorption to organic and inorganic substrates (Wilde 1994).

In Maryland, groundwater pH below and downgradient of stormwater infiltration devices was less than 5.0 and tended to keep the metals in solution or solubilize metals attached to particulates. Concentrations of cadmium, chromium, and lead exceeded U.S. Environmental Protection Agency's Maximum Contaminant Levels in some groundwater samples and concentrations of barium, copper, nickel, strontium, and zinc in downgradient groundwater were often greater than their concentrations in native groundwater (Wilde 1994).

Experiments in Orlando, Florida (Harper 1988), concerning metal mobility in soil and its resultant stability have led to the ranking of metals in order of attenuation from recharge water:

> zinc (most mobile) > lead > cadmium > manganese > copper > iron > chromium > nickel > aluminum (least mobile).

Other studies of metal pollutant mobility in soil have led to the generation of mobility classes, as shown in Tables 23 and 32 (Armstrong and Llena 1992).

TABLE 32. METAL MOBILITY

Inorganic Pollutant	Concentration (mg/L)	Mobility Class Sandy Loam	Silt Loam
Arsenic	1.0	III	III
Arsenic	0.01	IV	IV
Cadmium	1.0	III	III
Cadmium	0.01	III	IV
Chromium	1.0	III	II
Chromium	0.01	IV	III
Copper	1.0	IV	IV
Copper	0.01	IV	IV
Lead	1.0	IV	IV
Lead	0.01	IV	IV
Nickel	1.0	III	III
Nickel	0.01	III	III
Zinc	1.0	III	III
Zinc	0.01	III	IV

Source: Armstrong and Llena 1992.

General-

Table 33 summarizes the principal removal mechanisms in the soil for each metal (Crites 1985). The surface water heavy metal concentrations were the most significant variables in predicting the concentrations of the heavy metals in the groundwater (Harper 1988).

Health and Ecological Effects

Metals in groundwater can cause environmental and ecological problems, as well as human health problems. Groundwater contamination will mostly affect human consumers of the groundwater,

TABLE 33. METAL REMOVAL MECHANISMS IN SOIL

Element	Principal Forms in Soil Solution	Principal Removal Mechanisms
Arsenic	AsO_4^{-3}	Strong associations with clay fractions of soil.
Barium	Ba^{+2}	Precipitation and sorption onto metal oxides and hydroxides.
Cadmium	Cd^{+2} complexes chelates	Ion exchange, sorption, and precipitation.
Chromium	Cr^{+3} Cr^{+6} $Cr_2O_9^{-2}$ CrO_4^{-2}	Sorption, precipitation, and ion exchange.
Cobalt	Co^{+2} Co^{+3}	Surface sorption, surface complex ion formation, lattice penetration, ion exchange, chelation, and precipitation.
Copper	Cu^{+2} $Cu(OH)^{+}$ anionic chelates	Surface sorption, surface complex ion formation, ion exchange, and chelation.
Iron	Fe^{+2} Fe^{+3} polymeric forms	Surface sorption and surface complex ion.
Lead	Pb^{+2}	Surface sorption, ion exchange, chelation, and precipitation.
Manganese	Mn^{+2}	Surface sorption, surface complex ion formation, ion exchange, and chelation, precipitation.
Mercury	Hg^{+} HgS $HgCl_3^{-}$ $HgCl_4^{-2}$ CH_3Hg^{+} Hg^{+2}	Volatilization, sorption, and chemical and microbial degradation.

TABLE 33. (CONTINUED)

Element	Principal Forms in Soil Solution	Principal Removal Mechanisms
Nickel	Ni^{+2}	Surface sorption, ion exchange, and chelation.
Selenium	SeO_3^{-2} SeO_4^{-2}	Ferric-oxide selenite complexation.
Silver	Ag^{+}	Precipitation
Zinc	Zn^{+2} complexes chelates	Surface sorption, surface complex ion formation, lattice penetration, ion exchange, chelation, and precipitation.

Source: Crites 1985.

although the discharge of contaminated groundwaters into surface waters can also have deleterious effects on aquatic organisms.

Environmental Problems--

Boron concentrations in sago pondweed from several lakes and reservoirs affected by irrigation water have been found to be large enough to damage sole consumers of that pondweed and is toxic, especially to citrus crops (Bouwer and Idelovitch 1987). In Wyoming, boron and selenium concentrations from local agriculture had concentrated in the wildlife in sufficient quantities to damage bird livers and eggs, to reduce fish reproduction and to kill water fowl (Peterson 1988; Deason 1989). Molybdenum is toxic to animals that forage on plants with high molybdenum concentrations (Bouwer and Idelovitch 1987). Many different heavy metals also affect aquatic organisms, including microinvertebrates, fish, and plants.

Human Health Problems--

Human health problems due to metal poisoning have been linked to water supplies. Iron and manganese removal in most water supplies is primarily for aesthetic reasons (including taste). However, excess concentrations of certain elements, including arsenic, copper, lead and selenium, in the potable water have caused disease outbreaks (Craun 1979). The following list of human health effects is summarized from Craun (1979) and Crites (1985):

- Arsenic is readily adsorbed from the gastrointestinal system and/or the lungs and distributed throughout the body where it can bioaccumulate. Symptoms of mild chronic arsenic poisoning include fatigue and loss of energy, while symptoms of severe poisoning include gastrointestinal mucous membrane inflammation, kidney degeneration, fluid accumulation in the body, polyneuritis and bone marrow injury.

• Barium enters the body through either inhalation or ingestion. Barium ingestion can cause toxic effects on the heart, blood vessels and nerves.

• Cadmium, because of its similarities to zinc, will bind to sites on enzymes intended for zinc. Symptoms of mild chronic poisoning include proteinurea. Continued exposure to cadmium will lead to renal degradation, respiratory disorders such as emphysema, gastric and intestinal dysfunctions, anemiz, and hypertensive heart disease. Exposures to very large quantities of cadmium have caused itai-itai disease, erthyrocyte destruction, and testicular damage, but the necessarily high concentrations are unlikely to occur in groundwater. All disease outbreaks from very large doses of cadmium have resulted from direct industrial exposure.

• Chromium is necessary for glucose tolerance in animals, including man, however, large quantities of hexavalent chromium can cause tumors if inhaled or through skin contact.

• Copper is also essential for animals, and a lack of copper can cause nutritional anemia in infants. Large doses of copper can produce vomiting and liver damage. Disease outbreaks have been traced to copper leaching from plumbing.

• Iron, common in most metal pipes, is not a desired constituent in drinking water due to taste, fixture staining and deposit accumulation.

• Lead enters the body by either inhalation or ingestion and accumulates in the liver, kidney and bones. Chronic high lead exposures can lead to burning in the mouth, severe thirst, vomiting, and diarrhea. Acute toxicity starts with convulsions and anemia, and may proceed to peripheral nerve disease, joint swelling, kidney degeneration, mental confusion, brain damage, and eventually, death.

• Manganese, like iron, is objectionable in drinking water because it affects taste, stains fixtures, spots laundered clothes and collects in distribution systems.

• Mercury damages while it bioaccumulates in the liver, kidney and brain. Chronic exposure results in mouth and gum inflammation, salivary gland swelling, teeth loosening, kidney damage, muscle spasms and personality changes. Acute mercury poisoning causes severe diarrhea, vomiting, kidney damage and death. Mercury also deforms fetuses.

• Chronic selenium poisoning results in red staining of the fingers, teeth and hair; depression; nose and throat irritation; upset stomach; and skin rashes. Acute poisoning is characterized by nervousness, vomiting, convulsions, hypertension, and respiratory failure.

• Silver poisoning results in skin, eye and mucous membrane discoloration and silver is retained in the body tissue indefinitely.

• Zinc, although it is necessary for life, affects the taste of water if in excessive amounts.

GROUNDWATER CONTAMINATION ASSOCIATED WITH SALTS AND OTHER DISSOLVED MINERALS

Definition

The dissolved minerals of concern in groundwater contamination are primarily salts. These salts include compounds containing combinations of calcium, potassium, sodium, chloride, fluoride, sulfate, or bicarbonate.

Examples of Salts Contaminating Groundwater

Increasing chloride concentrations in groundwater have been used as an indicator of early groundwater contamination in Great Britain (Lloyd, *et al.* 1988). When using rapid infiltration for recharge, inorganic dissolved solids are of concern and include chloride, sulfate, and sodium (Crites 1985). Sources of the dissolved solids include naturally occurring salts, landfill leachate, leaky sewerage, cesspool leachate, and other urban and agricultural sources.

Natural Occurrence--

On Long Island, New York, one of the sources of dissolved solids in the recharge water was salt spray from the sea (Seaburn and Aronson 1974). Salt water from an adjacent surface water body can infiltrate into the aquifer if the hydraulic gradient flows in that direction. A brackish lagoon near Narbonne, France has contaminated groundwater (Razack, *et al.* 1988).

Urban Areas--

Salt applications for winter traffic safety is a common practice in many northern areas and the sodium and chloride, which are collected in the snowmelt, travel down through the vadose zone to the groundwater with little attenuation. Fertilizer and pesticide salts also accumulate in urban areas and leach through the soil to the groundwater (Merkel, *et al.* 1988). In Arizona, stormwater infiltration in dry wells dissolves native salts in the vadose zone which are then carried to the groundwater (Wilson, *et al.* 1990).

Investigations of groundwater near a landfill in Lee County, Florida, showed that the concentrations of sulfates, potassium, chloride, and sodium were ten to 100 times greater than in the unaffected aquifer (Boggess 1975). Elevated sulfate concentrations in the groundwater beneath the city center in Narbonne, France, originated from leaking sanitary sewerage. The use of saltpeter (potassium nitrate) in the numerous wine cellars in the area also contaminated the groundwater (Razack, *et al.* 1988). Elevated chloride, sodium, and sulfate groundwater concentrations resulted from cesspool leachate on Long Island, New York, (Smith and Myott 1975) and from septic tank leachate in Florida (Waller, *et al.* 1987).

Agricultural Operations--

Major sources of dissolved solids in groundwaters in agricultural areas include fertilizers and pesticides. Elevated groundwater total dissolved solids concentrations of 200 mg/L and chloride and sulfate concentrations of about 10 mg/L and 20 mg/L, respectively, have been reported on Long Island, New York (Seaburn and Aronson 1974). The concentrations of sodium, chloride, and sulfate vary with the season and are likely related to precipitation and irrigation patterns (Hampson 1986).

In areas of sustained irrigation, some leaching must occur periodically to remove the salts that accumulate in the root zone of the crops (Power and Schepers 1989). Evapotranspiration concentrates the salts in the root zone which, during irrigation, are flushed into the vadose zone and eventually into the groundwater (Schmidt and Sherman 1987). Spray irrigation with secondary treated effluent can increase chloride concentrations and specific conductance in shallow aquifers (Brown 1982). Grazing cattle return seventy-five to eighty percent of the of the potassium in their forage to the soil (Reichenbaugh 1977).

High groundwater salinity has been noted in the San Joaquin Valley, under the agricultural areas near Fresno, California, in irrigated areas of Arizona and New Mexico, where the salinity has been increasing since the 1930s, and in the Corn Belt and Great Lake states (Schmidt and Sherman 1987; Deason 1989; Bouwer 1989; Sabol, *et al.* 1987; and Mossbarger and Yost 1989). Most salts in groundwater below irrigated areas have resulted from the leaching of natural salts from the arid soils. Use of sludge as fertilizer on sandy loam soil in New Jersey increased the total dissolved solids concentration of the groundwater (Higgins 1984). On Long Island, New York, recharge of the groundwater has led to an increase in the sodium and chloride concentrations above the background concentrations (Schneider, *et al.* 1987). Mathematical modeling has led to the conclusion that salt from agricultural return flows is the greatest single contributor (about 40%) of salt to Upper Midwest groundwater (Schmidt and Sherman 1987).

Salt Removal Processes in Soils

Most salts are not attenuated during movement through soil. In fact, salt concentrations typically increase due to leaching of salts out of soils. Groundwater salt concentration decreases may occur with dilution of less saline recharging waters. Use of lower salinity water as recharge water at the Leaky Acres stormwater recharge facility in Fresno, California, was shown to decrease the salt concentrations in the groundwater (Nightingale and Bianchi 1977a). Reduction in the pH of groundwater, such as would result from nitrification and the biodegradation of carbonaceous substances, resulted in the dissolution of soil minerals and subsequent increases in the total dissolved solids concentrations and the hardness of groundwater at the Whittier Narrows site in Los Angeles County, California (Nellor, *et al.* 1985). This effect was noted in Florida during the deep-well injection of acidic, high-oxygen demanding industrial waste. At first, neutralization of the waste occurred through solution of the calcium carbonate in the limestone. Later, the calcium concentration in the aquifer increased and the pH decreased, but the effects have still been confined to the lower strata of the Floridan aquifer (Goolsby 1972).

Leaching of Salts--

Salt leaching is a greater concern in arid areas of the United States because the irrigation requirements for the arid areas are great and the irrigation water collects the salts that have been concentrated in the soil by increased evapotranspiration. Salts that are still in the percolation water after it travels through the vadose zone will contaminate the groundwater (Sabol, *et al.* 1987; and Bouwer 1987). The rate of contaminated water movement in a water-table aquifer is highest when the water table is highest (Boggess 1975).

Nonuniform irrigation and preferential flow allows the percolation water to reach the groundwater much faster and reduces the amount of salt removal that could occur during slower water passage through

the soil (Bouwer 1987), especially for the chloride ion, which is not readily adsorbed. Irrigation efficiency and interval significantly affect groundwater chloride concentrations. For example, fields in Arizona and New Mexico that were irrigated at nearly 100% efficiency had much higher chloride concentrations in the root zone of the soil (Sabol, *et al.* 1987). The higher the salt concentration of the soil solution, the higher the soil hydraulic conductivity will be for a given sodium adsorption ratio (SAR) (Bouwer and Idelovitch 1987). Schmidt and Sherman (1987) found a direct relationship between concentrations of groundwater nitrates and salts.

Solubility Equilibrium of Salts--

An equilibrium exists between the recharge water and the high groundwater for calcium and total dissolved solids. For chloride, sodium, and sulfate, reductions in concentrations entering the recharge system are likely accounted for by differences in seasonal precipitation, with a higher loading in the summer than in the winter. Changes in the groundwater concentration reflect these loading differences (Hampson 1986). Potassium exchanges with hydrogen ions on the clay during percolation. Other exchanges cause the calcium and magnesium concentrations to be much greater than had been predicted (Ragone 1977). Deep-well injection waters have shown an increase in alkalinity and bicarbonate concentrations, reflecting the mineralization of the organic compounds. Dissolved calcium and bicarbonate are the primary products of limestone dissolution. Many parameters in natural groundwater systems are controlled, or are influenced, by the calcium carbonate equilibrium system.

Removal of Salts in Soil--

Soil is not very effective at removing most salts. Depth of dissolved mineral penetration in soil has been studied (Close 1987) at a site with a shallow, unconfined aquifer. This study found that sulfate and potassium concentrations decreased with depth, while sodium, calcium, bicarbonate and chloride concentrations increased with depth in the soil. The dissolution of the aquifer material may be the source of many of the chloride, bicarbonate, calcium, and sodium ions. The same increase in salt concentrations with depth was noted in the agricultural (irrigated) areas of Arizona and New Mexico, and may be a result of little water and salt uptake by the plants. On Long Island, New York, it was noted that the heavy metals load was significantly reduced during passage through the soil, while chloride was not reduced significantly. This indicated that the soil does not contain an effective removal process for chloride salts (Ku and Simmons 1986). However, fluorine is removed in soil through sorption and precipitation processes (Crites 1985).

In another study (Waller, *et al.* 1987), it was found that chloride and sulfate concentrations from septic tanks increased with depth below the leach field, but were rapidly diluted downgradient. The primary controls on the leachate movement are the lithology and layering of the geologic materials, hydraulic gradient slopes, and the volume and type of use the septic system receives. Dilution occurs more rapidly in limestone than in sand.

Once contamination with salts begin, the movement of salts into the groundwater can be rapid. The salt concentration may not lessen until the source of the salts is removed. The cations sodium, potassium, calcium, and magnesium appeared in a shallow aquifer three to six months after the source water was applied to the soil (Higgins 1984).

At three stormwater infiltration locations in Maryland, the nearby use of deicing salts and their subsequent infiltration to the groundwater shifted the major-ion chemistry of the groundwater to a chloride-dominated solution. Although deicing occurred only three to eight times a year, increasing chloride concentrations were noted in the groundwater throughout the 3-year study, indicating that groundwater systems are not easily purged of conservative contaminants, even if the groundwater flow rate is relatively high. Sodium and/or calcium concentrations also were constantly elevated in the groundwater beneath and downgradient of the infiltration devices (Wilde 1994).

Control of groundwater salt contamination in agricultural areas should result from maintaining irrigation rates at near the minimum leaching rate (Bouwer 1987). This control, with other crop management practices, will slow the leaching rate of the salt to the groundwater (Lee 1990). Reduction of the dissolved solids concentrations will decrease by dilution through recharge with "cleaner" water (Nightingale, *et al.* 1983).

Health and Other Effects

Besides direct effects, dissolved solids concentrations can also affect the pH of the water. Problems may then be caused by the effect of pH on high concentrations of undesirable elements, such as iron, manganese and aluminum in acid waters, and sodium, carbonates and bicarbonates in alkaline waters (Bouwer 1987).

Human Health Problems--

High total dissolved solids concentrations are objectionable because of possible physiologic effects, mineral taste, and corrosion. High concentrations of chloride ions in water affects its taste and accelerates the corrosion of pipes and household appliances. Excess sodium can cause health problems, especially for people who are on sodium-restricted diets, due either to hypertension, edema from congestive cardiac failure and pregnant women with toxemia. High concentrations of sulfate ions affect the taste of the water and are a laxative to humans (Crites 1985). Although small quantities of fluoride are recommended in water by the American Dental Association, excessive amounts of fluoride can mottle, instead of protect, teeth.

Agricultural Problems--

Sodium can adversely affect crops by causing leaf burn in almonds, avocados and stone fruits. Bicarbonate in spray applied irrigation will leave an unappealing white residue after the water evaporates. Sulfate affects the growth of many plants and can cause leaf burn in still others (Bouwer and Idelovitch 1987).

GROUNDWATER CONTAMINATION ASSOCIATED WITH SUSPENDED SOLIDS

Definition

The term suspended solids is usually defined as the non-filterable portion of a water sample after filtering through a 0.45 μm filter. This definition does not accurately describe the fate of this material.

Depending on specific gravity and particle sizes, the "suspended" material also includes floatable matter, rapidly settleable matter, and matter that could settle out of suspension over highly variable periods of time.

Soil Removal Processes of Suspended Solids

Suspended solids are of concern because of the potential for clogging the infiltration area (Crites 1985). The recharge water should be of low salinity and turbidity (Nightingale and Bianchi 1977b). When the groundwater salinity was reduced by using less salty recharge water in Fresno, California, the turbidity of the groundwater increased. Leaching of poorly crystallized and extremely fine colloids from the soil and into the groundwater had occurred. This effect was only temporary, with the groundwater returning to its original turbidity soon after recharge began and was not observed outside of the recharge basin area. Changes in the recharge water salinity, however, may cause this effect to return (Nightingale and Bianchi 1977b).

Laboratory studies on the movement of fine particulate matter through sand aquifers found that the movement is controlled first by the nature of the particle, second by the cation and anion concentrations of the percolating water, and third by the pore size distribution of the soil to the aquifer (Nightingale and Bianchi 1977b). As water flows through passages formed by the soil particles, suspended and colloidal particles too small to be retained at the surface are thrown off their streamline through hydrodynamic actions, diffusion, impingement, and sedimentation. The particles may then be adsorbed onto stationary soil particles. The degree of trapping and adsorption of suspended solids by soils is a function of the suspended solids concentration and size distribution, soil characteristics, and hydraulic loading (EPA 1992). The soil profile will filter out suspended solids from recharge water and, once the particles are in the soils, biological and chemical degradation may occur. Fine to medium textured soils remove essentially all suspended solids from the wastewater by straining (Bouwer 1985), while coarse textured soils enable deeper penetration of suspended and colloidal particles in the soil (Treweek 1985).

DISSOLVED OXYGEN GROUNDWATER PROBLEMS

Dissolved oxygen (DO) in any water is controlled not only by how much DO exists and how much can be produced by aquatic plants, but also by the oxygen needs of the other organisms and compounds in the water. As groundwater recharging proceeds, dissolved oxygen is depleted due to the proliferation of iron bacteria and *T. thioparus*, which leads to anaerobic conditions in the groundwater (Bao-rui 1988). Increases in both dissolved oxygen and temperature should increase virus inactivation (Jansons, *et al.* 1987b). Groundwater has no natural reaeration process available, so once depleted, groundwater DO will remain very low.

COD levels from injection well wastes were reduced approximately eighty percent within relatively short distances from an injection point near Pensacola, Florida (Ehrlich, *et al.* 1979b). During recharge of the Magothy aquifer at Bay Park, New York, it was found that dissolved oxygen persisted for about twelve feet away from the recharge well. At greater distances, the water is essentially oxygen free. Two occurrences can account for the oxygen loss from the recharge water as it moves through the aquifer. First, oxygen reacts with pyrite in the formation to produce ferrous iron, sulfate and hydrogen. Second, microbial respiration associated with waste stabilization depleted the oxygen supply (Ehrlich, *et al.* 1979a).

CHAPTER 4

TREATMENT BEFORE DISCHARGE OF STORMWATER

One of the best overall urban runoff control strategies may be to encourage infiltration of stormwater to replace the natural infiltration capacity lost through urbanization. This significantly reduces the volume of runoff discharged to surface waters, including pollutants. This strategy also improves groundwater conditions by reducing the lowering rate of urban water tables. Exfiltration from groundwater into local streams during dry periods can also substantially improve receiving water biological conditions. The EPA (1983) concluded, as part of the Nationwide Urban Runoff Program, that stormwater can be safely infiltrated to groundwater, if done carefully. Issues that must be considered include a knowledge of pollutant concentrations from different areas, pollutant removals in the vadose zone, and necessary pretreatment that may be needed before infiltration. This chapter reviews characteristics of urban runoff pollutants that will affect their fates in treatment processes, along with reported performance of stormwater treatment devices.

SOLUBILITIES AND TREATMENT POTENTIALS OF SIGNIFICANT URBAN RUNOFF TOXICANTS

This chapter discusses chemical reactions, solubilities and fates of significant urban runoff pollutants. The information presented here is based upon a review of the urban runoff and environmental chemistry literature and addresses toxic heavy metals and organic pollutants that have been detected in various urban runoff waters. This information can be used to identify the potential removal mechanisms that may be available in stormwater control practices and to identify the potential transport and fate mechanisms of the pollutants in the surface or subsurface receiving waters.

Arsenic

Arsenic Sorption--

Arsenic can be adsorbed onto clays, iron oxides, inorganics (Callahan, *et al.* 1979).

Arsenic Fate/Treatment--

Callahan, *et al.* (1979) stated that many environmental fate mechanisms, except for photolysis, can be important for arsenic. Arsenic can either remain suspended or accumulate in sediments (Callahan, *et al.* 1979). Phillips and Russo (1978) stated that arsenic may be bacterially methylated, much like

mercury, to form highly toxic methylarsenic or dimethylarsenic. These methylated forms of arsenic are very volatile and are readily oxidized to less toxic forms.

Cadmium

Cadmium Filterable Fraction, Solubility and Sorption--

Forty to fifty percent of the cadmium in roof, loading docks, and street runoff sampled by Pitt, *et al.* (1995) was found in filtered sample components, while the other stormwater source areas all had less than 20% associated with the filtered sample component. Pitt and Amy (1973) studied the leachability of cadmium from street dirt, along with other metals, and found that in typical urban runoff concentrations, leachable cadmium values of less than 1μg/L occurred in moderately hard water after an exposure of 25 days. This leachable fraction was 14 percent of the total cadmium in the mixture. Wilber and Hunter (1980), in an urban receiving water study in Lodi, New Jersey, found that with most low flows in the Saddle River, the cadmium was mostly dissolved. However, during wet-weather conditions, most of the cadmium was associated with undissolved particulates. Callahan, *et al.* (1979) stated that adsorption of cadmium onto organics, clays, hydrous iron and manganese oxides is important in polluted water.

Chromium

Chromium Filterable Fraction--

Filtered stormwater samples generally contained less than 10 percent of the total chromium detected by Pitt, *et al.* (1995). Pitt and Amy (1973) found that the leachable fraction of chromium associated with street dirt in moderately hard water was about 4 μg/L, or about 0.3 percent of the total chromium in the mixture.

Copper

Copper Filterable Fraction, Sorption, and Solubility--

The filtered stormwater samples analyzed by Pitt, *et al.* (1995) generally had less than 20 percent of the total copper concentrations. Wilber and Hunter (1980), in a study of an urban river in Lodi, New Jersey, found that the readily available copper (at a pH of about 7) was about 13 percent of the street dirt and runoff solids total copper content. Pitt and Amy (1973) found that the leachable fraction of copper associated with street dirt was about 160 μg/L, or about 36 percent of the total copper in the mixture, with moderately hard water conditions. The adsorption of copper can reduce its mobility and enrich suspended and settled sediments (Callahan, *et al.* 1979). Copper is absorbed onto organics, clay minerals, hydrous iron and manganese oxides.

Iron

Iron Filterable Fraction, Sorption, and Solubility--

Pitt and Amy (1973) found that the leachable fraction of iron in street dirt was about 50 μg/L, or much less than 1 percent of the total iron in a mixture with moderately hard water. They also stated that the principal inorganic iron forms, near pH 7, are iron oxide, hydroxide, sulfate, nitrate and carbonate. Phillips and Russo (1978) stated that the soluble ferrous form of iron (Fe^{+2}) is readily oxidized to the

insoluble ferric, or trivalent (Fe^{+3}) state in most natural surface waters. A substantial fraction of iron in natural waters is therefore associated with suspended solids.

Lead

Lead Filterable Fraction, Sorption, and Solubility--

The filtered stormwater samples analyzed by Pitt, *et al.* (1995) generally had less than 20 percent of the total lead concentrations. The EPA (1976) stated that most lead salts are of low solubility. The aqueous solubility of lead ranges from 500 μg/L in soft water to 3 μg/L in hard water (EPA 1976). Durum (1974) stated that lead carbonate and lead hydroxide are soluble lead forms at pH values of 6.5, or less, with low alkalinity conditions (less than 30 mg/L alkalinity as $CaCO_3$). The soluble lead concentrations under these conditions can reach 40 to several hundred μg/L. If the alkalinity is greater than 60 mg/L, and if the pH is near 8, however, the dissolved lead would be less than 10 μg/L. Callahan, *et al.* (1979) stated that lead carbonate and lead sulfate control lead solubility under aerobic conditions and normal pH values. Lead sulfide and lead ions, however, control lead solubility in anaerobic conditions. In polluted water, the organic complexes of lead are most important in controlling lead solubility. Phillips and Russo (1978) stated that most lead is probably precipitated in natural waters due to the presence of carbonates and hydroxides.

Pitt and Amy (1973) found that the leachable fraction of lead in a street dirt and water mixture was about 40 μg/L, or about 3 percent of the total lead, in moderately hard water. Wilber and Hunter (1980) found that the readily available fraction of lead was about 20 percent of the total lead in street dirt and runoff solids. They also found that under most low flow river conditions, most of the lead was dissolved, but under wet-weather conditions, most of the lead was insoluble. Solomon and Natusch (1977) also examined the solubilities of lead associated with street dust. They found solubilities ranging from 500 to 5000 μg/L which was 0.03 to 0.3 percent of the initial mixture total lead concentration. However, the test mixture of street dirt with water was very high (1750 mg/L lead). Rolfe and Reinbold (1977) found that about 80 percent of the lead in stream water was insoluble and associated with suspended solids.

Nickel

Nickel Filterable Fraction--

Very few of the filtered stormwater samples analyzed by Pitt, *et al.* (1995) had detectable (>1 μg/L) nickel concentrations. Wilber and Hunter (1980) found that the readily available nickel fraction of street dirt and runoff solids was about 4 percent at close to neutral pH conditions. Pitt and Amy (1973) found that the leachable fraction of nickel associated with street dirt, in a moderately hard water mixture, was about 30 μg/L, or about 7 percent of the total nickel in the mixture.

Mercury

Mercury Fate/Treatment--

Callahan, *et al.* (1979) stated that almost all of the environmental processes are important when determining the fate of mercury in aquatic environments. Phillips and Russo (1978) reported that inorganic mercury concentrations, availability of inorganic mercury, pH, microbial activity and redox potential all affect mercury methylation rates. In general, more methylmercury is produced when more inorganic mercury is present. Chemical agents which precipitate mercury, such as sulfide, reduce the availability of mercury for methylation, but only when present in large quantities. At neutral pH values, the primary

product of mercury methylation is monomethylmercury. Methylation can occur under both aerobic and anaerobic conditions, but more mercury is produced when more bacteria are present.

Zinc

Zinc Filtered Fraction, Solubility and Sorption--

Filtered stormwater samples contain most of the total zinc concentrations observed, except for storage area and vehicle service area runoff (Pitt, *et al.* 1995). In contrast to most other heavy metals, the major zinc source in urban areas is probably galvanized metal. Short contact periods of naturally acidic rain water with roof galvanized metal flashings and gutters (or other galvanized metal in the drainage area) results in elevated dissolved zinc concentrations. The flow time for these waters to the outfall is rather short and the zinc generally remains dissolved. In the receiving waters, more time is available to form precipitates or associations with particulates. Other sources of zinc are automobile tire wear and exhaust related which are in particulate forms, which are generally insoluble.

Durum (1974) stated that the solubility of zinc is less than 100 μg/L at pH values greater than 8, and less than 1,000 μg/L for pH values greater than 7, if there is a high concentration of dissolved carbon dioxide. Phillips and Russo (1978) stated that zinc sulfates and halides are soluble in water, but zinc carbonates, oxides and sulfides are insoluble. Wilber and Hunter (1980), in a study of an urban stream near Lodi, New Jersey, found that the readily available zinc in street dirt and runoff solids was about 17 percent of the total zinc. Most of the zinc in the river during low flow conditions was dissolved, while during wet weather it was mostly in the solid form. Pitt and Amy (1973) found that the leachable fraction of zinc was about 170 μg/L, or about 8 percent of the total street dirt zinc, in a moderately hard water mixture.

Phenols and Chlorophenols

Phenols and Chlorophenol Filtered Fraction--

The EPA (1979) stated that the solubility of chlorinated phenols in water solutions is low, but increases when the pH increases. Phenoxide salts are also more soluble than the corresponding phenol in water with neutral pH conditions.

Phenols and Chlorophenol Fate/Treatment--

Phenol may be biochemically hydroxylated to ortho and paradihydroxybenzenes and readily oxidized to the corresponding benzoquinones (EPA 1979). These may in turn react with numerous components of industrial waters, sewerage or other waste streams such as mercaptans, amines, or the -SH, or -NH group of proteins. Phenol has also been shown to be highly reactive to chlorine in dilute solutions over a wide pH range. The chlorination of phenol to toxic chlorophenols has been demonstrated under conditions similar to those used for disinfection of wastewater effluent.

Pentachlorophenol (PCP)

Pentachlorophenol Filtered Fraction--

PCP is slightly soluble in water, while PCP salts are highly soluble in water (EPA 1979).

Pentachlorophenol Fate/Treatment--

PCP can undergo photochemical degradation in solutions in the presence of sunlight, with subsequent formation of several chlorinated benzoquinones (EPA 1979). Sodium-PCP can be decomposed directly by sunlight with the formation of numerous products. Microorganisms have also been reported to metabolize PCP. PCP has also been reported to persist in warm and moist soils for a period of one year.

2,4-Dimethylphenol (2,4-DMP)

2,4-Dimethylphenol Filtered Fraction--

2,4-DMP is slightly soluble in water (EPA 1979).

General Polycyclic Aromatic Hydrocarbons (PAHs)

PAH Filtered Fraction--

PAHs are basically insoluble in water (Callahan, *et al.* 1979).

PAH Fate/Treatment--

These materials will be adsorbed onto suspended particulates and biota. The dissolved portion of these compounds can undergo direct photolysis at a rapid rate. Biodegradation and biotransformation by benthic organisms of PAH contaminated sediments is believed to be their ultimate fate (Callahan, *et al.* 1979). Because of the low solubility of PAHs in water, biological treatment has little benefit. However, because of their attraction to solids, physical solids separation processes can be very effective in reducing PAH concentrations (PHS 1981).

Benzo (a) Anthracene

Benzo (a) Anthracene Filtered Fraction--

No detectable (>1 μg/L) benzo (a) anthracene was found by Pitt, *et al.* (1995) in filtered stormwater sample fractions. The solubility of benzo (a) anthracene in water is about 10 to 45 μg/L (Verschueren 1983).

Benzo (a) Anthracene Fate/Treatment--

More than half of the benzo (a) anthracene was adsorbed onto waterborne particulates (including aggregates of dead plankton and bacteria) after just 3 hours exposure (Verschueren 1983). Physical treatment of sewage can reduce the benzo (a) anthracene concentrations by about 80 percent, while biological treatment can remove almost all of the benzo (a) anthracene, leaving less than 0.1 μg/L in the effluent. Ozonation reduced the benzo (a) anthracene concentrations in sewage effluent by about 95 percent, while chlorination reduced the concentrations by about 50 percent.

Benzo (b) Fluoranthene

Benzo (b) Fluoranthene Fate/Treatment--

Physical sewage treatment processes reduced benzo (b) fluoranthene concentrations by 50 to 80 percent, while biological processes provided almost complete removal (Verschueren 1983). Chlorination alone accounted for about a 33 percent reduction. Water treatment reduced initial 0.15 μg/L benzo (b)

fluoranthene concentrations by about 70 percent. Sedimentation in a storage reservoir only slightly reduced the concentrations.

Benzo (k) Fluoranthene

Benzo (k) fluoranthene Fate/Treatment--

Physical sewage treatment reduced concentrations of benzo (k) fluoranthene from 8 to about 2 µg/L (Verschueren 1983). Biological treatment further reduced the concentrations to less than 0.1 µg/L. Chlorination alone reduced the concentrations by about 60 percent, from an initial value of about 70 µg/L.

Benzo (a) Pyrene

Benzo (a) pyrene Filtered Fraction--

Benzo (a) pyrene's solubility is about 3 µg/L (Verschueren 1983).

Benzo (a) pyrene Fate/Treatment--

Benzo (a) pyrene can be degraded in soil that is inoculated with special bacteria, with as much as 80 percent destroyed after eight days (Verschueren 1983). In natural estuarine waters, its degradation rate is only about 2 µg/L destroyed per 1,000 days. Its volatilization half-life is about 1,000 hours (40 days) in waters moving about 1 m/sec with winds of about 2 m/sec. The volatilization half-life extends to about 10,000 hours (400 days) for still water and calm air, and decreases to about 400 hours (20 days) for very violent mixing conditions. About 70 percent of a benzo (a) pyrene mixture, having an initial concentration of 3 µg/L, was adsorbed onto particles after three hours.

From 90 to 99 percent removal of benzo (a) pyrene was found using activated carbon water treatment in waters having initial concentrations of 5 to 50 µg/L (Verschueren 1983). Chlorination (6 mg/L Cl_2) also reduced initial concentrations of 50 µg/L benzo (a) pyrene by 98 percent. Physical wastewater treatment reduced benzo (a) pyrene concentrations by about 65 to 95 percent, and biological treatment further reduced these concentrations by another 50 to 99 percent.

Fluoranthene

Fluoranthene Filtered Fraction--

The observed median filterable portion of fluoranthene in stormwater (in the range of 0.5 to 14 µg/L) was about 85 percent of the total sample concentration (Pitt, *et al.* 1995). The water solubility of fluoranthene is about 200 µg/L (Harris 1982).

Fluoranthene Fate/Treatment--

Harris (1982) reported that sedimentation processes was the most important removal mechanism for fluoranthene, with removals of about 65 percent. Biological treatment increased the removal to about 95 percent. Verschueren (1983) also reported that physical sewage treatment processes reduced initial fluoranthene concentrations of 3 to 45 µg/L by about 60 percent, and biological treatment further reduced the fluoranthene by another 80 percent. Water treatment reduced the raw water fluoranthene

concentrations of 0.15 µg/L by about 50 percent using filtration, and by another 50 percent by chlorination. Storage in a reservoir reduced the fluoranthene concentrations by less than 10 percent.

Naphthalene

Naphthalene Solubility and Filtered Fraction--

The observed median filterable portion of naphthalene (in the range of 7 to 82 µg/L) in runoff samples was about 25 percent (Pitt, *et al.* 1995). At about 32 mg/L, the solubility of naphthalene is quite high compared to other PAHs (Howard 1989). Naphthalene is moderately adsorbed by soils and sediments, but at a much less extent than for other PAHs. It is weakly sorbed by sandy soils, and tests have found that less than one percent was sorbed by particulate matter in a variety of surface waters (Howard 1989).

Naphthalene Fate/Treatment--

In rapidly flowing streams, volatilization accounted for about 80 percent and sediment adsorption accounted for about 15 percent of the removal of naphthalene from the water column (Howard 1989). In deeper and slower moving water, biodegradation (having a half-life of about 1 to 9 days) was probably the most important fate mechanism. Adsorption onto sediments is probably only a significant removal mechanism in waters having high solids concentrations and slow moving waters, such as in lakes. Photolysis degrades naphthalene in surface waters with a half-life of about 3 days, but is much less efficient at deeper waters. In 5 meter deep water, the photolysis half-life was about 550 days. The presence of algae can substantially increase the photolysis rate of naphthalene.

Howard (1989) reported that naphthalene in water biodegrades after a short acclimation period. Bacteria can only utilize soluble naphthalene, however. Biodegradation of sediment bound naphthalene is 8 to 20 times faster than in water. In heavily contaminated sediment, the biodegradation half-life is about 5 hours, but can be longer than 3 months in less contaminated sediments. No anaerobic biodegradation of naphthalene in laboratory tests was observed after 11 weeks. The evaporation half-life of naphthalene in surface waters is about 5 hours for moderate current and wind conditions. The expected half-life of naphthalene in surface waters due to evaporation losses is expected to be about 50 hours in rivers and 200 hours in lakes. Microbial degradation rates were about 0.1 µg/L per day. Less than one percent of the naphthalene was sorbed to particles in water after 3 hours exposure. Ion exchange water treatment was close to 100 percent effective and the evaporation half-life of naphthalene was reported to be about 7 hours at a water depth of 1 meter. Naphthalene would be readily removed by physical and biological treatment processes.

Phenanthrene

Phenanthrene Filtered Fraction--

Its solubility in water is relatively high for a PAH, being about 1,000 µg/L (Verschueren 1983). Pitt, *et al.* (1995) did not detect any filterable phenanthrene in stormwater above the detection limit (about 1 µg/L).

Pyrene

Pyrene Filtered Fraction--

The observed median filterable portion of pyrene (about 1 to 19 µg/L) in stormwater samples was about 95 percent (Pitt, *et al.* 1995). Its solubility in water is about 160 µg/L (Verschueren 1983).

Pyrene Fate/Treatment--

Pyrene can be photo-degraded from soils by UV radiation (Verschueren 1983). Chlorination at 6 mg/L chlorine for 6 hours decreased initial pyrene concentrations of 27 µg/L by about 25 percent (Verschueren 1983). Physical wastewater treatment processes decreased pyrene concentrations by about 80 percent, and biological processes further decreased the pyrene concentrations by about 98 percent. Reservoir storage of river water decreased pyrene concentrations by about 25 percent. Filtration further decreased the concentrations by another 40 percent, and chlorination further decreased the pyrene concentrations by another 60 percent.

Chlordane

Chlordane Filtered Fraction--

Chlordane's solubility in water is about 60 µg/L (Verschueren 1983). Pitt, *et al.* (1995) did not find any chlordane, greater than the detection limit of about 0.3 µg/L, in the filtered portion of stormwater samples.

Chlordane Fate/Treatment--

The persistence of chlordane in water in sealed jars exposed to sunlight indicated a 15 percent decrease after 8 weeks. Chlordane was reduced by 75 to 100 percent from soils after 3 to 5 years (Verschueren 1983).

Butyl Benzyl Phthalate

Butyl Benzyl Phthalate Filtered Fraction--

The only observed filterable value of butyl benzyl phthalate (BBP) (16 µg/L) detected my Pitt, *et al.* (1995) in stormwater was 33 percent of the total value. BBP's solubility in water is about 3 mg/L (Verschueren 1983).

Butyl Benzyl Phthalate Fate/Treatment--

BBP does undergo biodegradation with relatively complete removals within one month (Verschueren 1983). Biodegradation using activated sludge from a wastewater treatment plant was reported to be 99 percent effective after 48 hours. Biodegradation in natural river waters was about 80 percent effective after one week of exposure. Photodegradation and chemical degradation (through hydrolysis) of BBP is much less effective, with reported half-lifes of greater than 100 days.

Bis (2-chloroethyl) Ether

Bis (2-chloroethyl) Ether Filtered Fraction--

The two observed filterable fractions of Bis (2-chloroethyl) ether (BCEE) (17 and 23 µg/L) found by Pitt, *et al.* (1995) in stormwater were 19 and 50 percent of the concentrations observed in the

unfiltered samples. BCEE solubility in water is about 1 mg/L (Howard 1989). It is also adsorbed at low values onto fine sand, implying that it would be highly mobile in soils and could leach rapidly to groundwaters.

Bis (2-chloroethyl) Ether Fate/Treatment--

Bis (2-chloroethyl) ether (BCEE) may degrade in soils, but acclimation may be necessary (Howard 1989). The volatilization half-life of BCEE in streams was estimated to be about 4 days, while the volatilization half-life of BCEE in lakes was estimated to be about 180 days. Photolysis is not expected to be important, but biodegradation can reduce BCEE concentrations by 50 percent over 35 days. After acclimation, only 9 days were required to remove 50 percent of the BCEE by biodegradation. Conventional water treatment removed about 80 percent of the BCEE, while activated carbon, when added to conventional water treatment processes, removed all of the BCEE (Verschueren 1983).

Bis (2-chloroisopropyl) Ether

Bis (2-chloroisopropyl) Ether Filtered Fraction--

The solubility of bis (2-chloroisopropyl) ether (BCIE) was reported to be 1700 mg/L (Verschueren 1983). No concentrations greater than the detection limit of about 1 µg/L were found by Pitt, *et al.* (1995) in filtered stormwater samples.

Bis (2-chloroisopropyl) Ether Fate/Treatment--

Basu and Bosch (1982), in their summary of the literature concerning bis (2-chloroisopropyl) ether (BCIE), reported that hydrolysis is probably its most significant transformation process in aquatic systems. The overall half-life of BCIE was estimated to vary between 3 and 30 days in rivers and 30 to 300 days in lakes and groundwaters. The evaporation half-life in surface waters was estimated to be similar to the hydrolysis half-life. Leaching of BCIE is expected to be important in soils. They also reported that BCIE is unlikely to be significantly sorbed by plants.

Activated carbon treatment of contaminated water resulted in almost complete removal of BCIE. Conventional water treatment reduced the BCIE water content from 24 µg/L to below detection limits (Verschueren 1983).

1,3-Dichlorobenzene

1,3-Dichlorobenzene Filtered Fraction and Sorption--

The observed median filterable portion of 1,3-DCB (3 to 47 µg/L) found by Pitt, *et al.* (1995) in stormwater was about 75 percent of the unfiltered sample concentrations. The solubility of 1,3-DCB is about 125 mg/L (Verschueren 1983). 1,3-DCB may be moderately to tightly adsorbed to soils, but leaching can occur (Howard 1989).

1,3-Dichlorobenzene Fate/Treatment--

Bacterial degradation disturbed the chemical ring structure of 1,3-Dichlorobenzene (1,3-DCB) within 96 hours (Verschueren 1983). Neal and Basu (1982) reported that biotransformation is the most significant transformation process, with a half-life of about 580 days in a river system. Sedimentation and volatilization processes decrease 1,3-DCB concentrations in half over about 1.5 days in rivers and 50 days in lakes. Biodegradation under aerobic conditions and volatilization from soil may be important (Howard 1989). Adsorption of 1,3-DCB to sediment is a major environmental fate mechanism. 1,3-DCB is also quite volatile from water, with a half-life of about 4 hours in moderately turbulent streams. It may biodegrade under aerobic conditions in water, but is not expected to degrade under anaerobic conditions

(such as in polluted sediments). Hydrolysis, oxidation, and direct photolysis are not expected to be important fate mechanisms of 1,3-DCB in the aquatic environment.

Summary

Most of the organics and metals are associated with the non-filterable (suspended solids) fraction of the wastewaters during wet weather. An exception was for stormwater zinc, fluoranthene, pyrene, and 1,3-dichlorobenzene, which were found mostly (>50%) in the filtered sample portions. Dry-weather wastewater flows tended to be much more associated with dissolved sample fractions.

Many processes will affect these pollutants. Sedimentation is the most common fate and control mechanism for particulate related pollutants. This would be common for most stormwater pollutants. Exceptions include the four stormwater constituents noted above which were mostly associated with the filterable sample portions. Particulate removal can occur in many control processes, including catchbasins, screens, drainage systems, and detention ponds. These control processes allow removal of the accumulated polluted sediment for final disposal in an appropriate manner.

Tables 34 and 35 summarize the likely fate mechanisms for these compounds (Callahan, *et al.* 1979). Biological or chemical degradation of the toxicants may occur, but is quite slow for many of the pollutants in anaerobic environments. Degradation of the soluble pollutants in the water column may occur, especially when near the surface in aerated waters. Volatilization is also a mechanism that may affect many of the detected organic toxicants. Increased turbulence and oxygen supplies would encourage these processes that may significantly reduce pollutant concentrations. Sorption of pollutants onto solids and metal precipitation increases the sedimentation potential of the pollutants and also encourages more efficient bonding of the pollutants in soils, preventing their leaching to groundwaters.

OUTFALL PRETREATMENT OPTIONS BEFORE STORMWATER INFILTRATION

Sedimentation Treatment

Wet Detention Ponds--

Detention ponds are probably the most common management practice for the control of stormwater runoff. If properly designed, constructed, and maintained, wet detention ponds can be very effective in controlling a wide range of pollutants and peak runoff flow rates.

There are many kinds of detention ponds, including dry ponds (which typically contain no water between storms), wet ponds (which contain standing water between storms), and combination ponds (which drain slowly after storms and may contain a small permanent pool). In a partial survey of cities in the U.S. and Canada, the American Public Works Association found more than 2,000 wet ponds (about half of which were publicly owned), more than 6,000 dry ponds, more than 3,000 parking lot multi-use detention areas, and more than 500 rooftop storage facilities (Smith 1982).

In selected areas of the U.S., detention ponds have been required for some time and are therefore much more numerous than elsewhere. In Montgomery County, Maryland, as an example, detention ponds were first required in 1971, with more than 100 facilities planned during that first year, and about

Table 34

50 actually constructed. By 1978, more than 500 detention facilities had been constructed in Montgomery County alone (Williams 1982). In DuPage County, Illinois, near Chicago, more than 900 stormwater detention facilities (some natural) receive urban runoff (McComas and Sefton 1985).

The Nationwide Urban Runoff Program (NURP) included full-scale monitoring of nine wet detention ponds (EPA 1983). The Lansing, Michigan, project included two greatly enlarged pipe sections within the storm sewerage system (up-sized pipes) plus a larger detention pond. The project located in Glen Ellyn (west of Chicago) monitored a small lake, the largest detention pond monitored during the NURP program. Ann Arbor, Michigan, monitoring included three detention ponds; Long Island, New York, studied one pond; the Washington, D.C. project included one pond. About 150 storm events were completely monitored at these ponds, and long-term performances ranged from negative removals for the smallest up-sized pipe installation to more than 90 percent removal of suspended solids at the largest wet ponds. The best ponds reported BOD_5 and COD removals of about 70 percent, nutrient removals of about 60 to 70 percent, and heavy metal removals of about 60 to 95 percent.

The Lansing NURP project monitored a wet detention pond (Luzkow *et al.* 1981). The monitored pond was located on a golf course that received urban runoff from an adjacent residential and commercial area. Suspended solids removals were about 70 percent for moderate rains (0.4 to 1-inch rains) while phosphorus removals were usually greater than 50 percent. Total Kjeldahl nitrogen removals ranged from about 30 to 50 percent.

Two wet detention ponds near Toronto, Ontario, were monitored from 1977 through 1979 (Brydges and Robinson 1980). Lake Aquitaine is 4.7 acres in size and receives runoff from a 107-acre urban watershed. Observed pollutant reductions were about 70 to 90 percent for suspended solids, 25 to 60 percent for nitrogen, and about 80 percent for phosphorus. The much smaller Lake Wabukayne (2 acres) received runoff from a much larger urban area (466 acres). Lake Wabukayne experienced much smaller pollutant reductions: about 30 percent for suspended solids, less than 25 percent for nitrogen, and 10 to 30 percent for phosphorus.

Oliver, *et al.* (1981) monitored a small lake detention facility in Rolla, Missouri. Suspended solids yield reductions averaged about 88 percent, with 54 and 60 percent yield reductions for COD and total phosphorus. Organic nitrogen yields were reduced by about 22 percent.

Gietz (1983) studied a 3.3-acre wet detention pond serving a 150-acre urban watershed near Ottawa, Ontario. He compared batch operation (which retains water in the pond without discharge as long as possible) with normal, continuous operation (which has variable but continuous discharges). Batch operation of the pond resulted in substantial pollutant control improvements for particulate solids, bacteria, phosphorus, and nitrate nitrogen. Continuous operation gave slightly better performance for BOD_5 and organic nitrogen. Particulate solid reductions were about 80 to 95 percent, BOD_5 reductions were about 35 to 45 percent, bacteria was reduced by about 50 to 95 percent, phosphorus by about 70 to 85 percent, and organic nitrogen by about 45 to 50 percent.

Yousef (1986) reported long-term nutrient removal information for a wet detention pond in Florida having substantial algal and rooted aquatic plant growths. He found 80 to 90 percent removals of soluble nutrients due to plant uptake. Particulate nutrient removals, however, were quite poor (about ten percent).

Catchbasin, Sewerage, and Street Cleaning--

The mobility of catchbasin sediments was investigated by Pitt (1979) during a research project sponsored by the U.S. EPA's Storm and Combined Sewer Section. This project used particulate fluorescent tracers mixed with catchbasin sediment. It was concluded that the amount of catchbasin and sewerage sediment was very large in comparison with storm runoff yields, but was not very mobile. Cleaning the material from catchbasins would reduce the potential of very large discharges during rare scouring rains.

Further research was conducted in Bellevue, Washington, (Pitt 1984) to investigate the accumulation rate of sediment in storm sewerage and the effects of sewerage cleaning on runoff discharges. The main source of the sediment in the catchbasins and the sewerage was found to be the street surfaces. The catchbasin and sewerage sediment consisted of the largest particles that were washed from the streets. Smaller particles that had washed from the streets during rains had proceeded into receiving waters, leaving behind the larger particles. A few unusual locations were dominated by erosion sediment originating from steep hillsides adjacent to the storm sewer inlets.

Catchbasin sump particulates can be conveniently removed to eliminate this potential source of urban runoff pollutants and to enable the most effective capture of the larger particulates in the storm runoff. Cleaning catchbasins twice a year was found to be most effective. This cleaning schedule was found to reduce the total solids and lead urban runoff yields by between 10 and 25 percent, and COD, total Kjeldahl nitrogen, total phosphorus, and zinc by between 5 and 10 percent (Pitt 1984; Pitt and Shawley 1981).

Street cleaning effectiveness has been monitored at many locations and shows mixed results in removing toxicants from stormwater (Pitt 1979, Pitt and Shawley 1981, Bannerman, *et al.* 1983, and Pitt 1984, for example). Street cleaning has been shown to be very effective in removing the largest particulates on streets (especially those greater than about 200 microns). Unfortunately, street cleaning generally removes only a very small fraction of the small particles that are readily washed-off streets by rains (Pitt 1987). Many of the street cleaning demonstration projects monitored a wide variety of available street cleaning equipment types, including mechanical broom sweepers, vacuum cleaners, and regenerative-air cleaners. Pitt (1984) also monitored a special prototype regenerative-air cleaner specifically modified to increase the removal of small particles. Many types of cleaner operations were investigated in some of these projects, including multiple passes using broom sweepers followed by vacuum cleaners, cleaning frequencies as often as two passes per day, full-street-width street cleaning, etc. Many demonstration projects only monitored relatively small changes in the street cleaning programs, however, and dramatic results could not have been expected.

In arid areas of the west, Pitt (1979) and Pitt and Shawley (1981) found that street cleaning could be beneficial in improving the stormwater quality associated with early fall rains following long dry summers. The dry summers allowed very large street dirt loadings to accumulate (if no street cleaning was used). If frequent street cleaning was used in the late summer (about weekly cleaning during September and October, for example), moderate heavy metal removals (25 to 50%) from the stormwater are likely. In most areas of the U.S., frequent rains would be more successful in keeping the streets clean than intensive street cleaning (Pitt 1984), resulting in very limited benefits.

Street runoff has also been over-emphasized as a source of runoff pollutants for many areas. In most locations, streets contribute only a small portion of the total annual runoff loading, even though they are very important pollutant sources for the smallest rains (Pitt 1987). Therefore, even absolute cleanliness of streets would only result in limited overall stormwater quality improvement. In general, recommended street cleaning programs (cleaning about every three months in residential and commercial areas, and monthly in industrial areas, intensive spring cleaning after snowmelt in northern areas, rapid leaf removal in the fall, and intensive late summer cleaning in the arid west) using any type of street cleaning equipment available would result in optimal, but limited, stormwater quality improvements. Other stormwater control options are usually found to be more cost-effective in removing pollutants from stormwater than street cleaning (Pitt 1986).

Fate Mechanisms in Sedimentation Devices--

The major fate mechanism in wet detention ponds and in smaller sumps, such as catchbasins, is sedimentation. Pollutants mostly associated with particulate matter will be much better removed than pollutants mostly in filterable forms. Unfortunately, sedimentation can result in the development of polluted sediments. These sediments can be anaerobic, with associated chemical and biochemical transformations. Resulting toxic chemical releases from heavily polluted sediments, plus the potential problems associated with the disposal of toxicant contaminated dredging spoils during required maintenance, can present problems.

Other important fate mechanisms available in wet detention ponds, but which are probably not important in small sump devices, include volatilization and photolysis. Biodegradation, biotransformation, and bioaccumulation (into plants and animals) may also occur in ponds. Most wet detention ponds are completely flushed by moderate rains (probably every several weeks), depending on their design. Much of the runoff during moderate and large rains passes through the ponds during several hours during and immediately after rains. Sediments may reside in ponds for several to many years. Therefore, the time available for these other removal or transformation processes can vary greatly for detention ponds. The residence time in small sedimentation devices is just a few minutes and significant biological activity may not be present, except in the anaerobic sediments in catchbasin sumps and in the culverts of sewerage.

Most sedimentation devices (especially ponds) are designed to provide effective sedimentation and sufficient sacrificial storage for the long-term maintenance of accumulated sediment. The removal of many toxicants by other processes can possibly be increased by aerating the water and increasing the associated oxygen content and biological activity in ponds (Pitt, *et al.* 1995).

LOCAL PRETREATMENT OPTIONS BEFORE SOURCE AREA STORMWATER INFILTRATION

Biofiltration Devices

General Infiltration--

All infiltration devices redirect surface runoff waters to the groundwater. They are recharge devices that can be used at many local areas in a watershed area. They must be carefully designed,

especially using appropriate pretreatment as needed, to enable long-term operation and to protect groundwater quality.

Upland infiltration devices (such as infiltration trenches, porous pavements, percolation ponds, and grass roadside drainage swales) are located at urban source areas. Infiltration (percolation) ponds are usually located at stormwater outfalls, or at large paved areas. These ponds, along with perforated storm sewerage, can infiltrate flows and pollutants from all upland sources combined.

Several Nationwide Urban Runoff Program projects investigated infiltration devices (EPA 1983). They found that infiltration devices can safely deliver large fractions of the surface flows to groundwater, if carefully designed and located. Local conditions that can make localized stormwater infiltration inappropriate include steep slopes, slowly percolating soils, high groundwater, and nearby important groundwater uses.

The Lake Tahoe (California/Nevada) Regional Planning Agency has developed a set of design guidelines for infiltration devices in an area that has severe winters (Lake Tahoe 1978). They recommend the use of infiltration trenches to collect and infiltrate runoff from impervious surfaces, such as driveways, roofs, and parking lots. The Ontario Ministry of the Environment (1984) also included infiltration devices in its general stormwater management plan. The states of Florida, Maryland, and Delaware all extensively use infiltration as an important stormwater management and to recharge shallow groundwaters adversely affected by development. However, serious operational problems are very common with infiltration trenches and percolation ponds due to poor maintenance, poor construction practices, and poor placement (Lindsey, *et al.* 1992).

The Long Island, New York, and metropolitan Washington, D.C. NURP projects (EPA 1983) examined the performance of several types of infiltration devices. The Long Island project studied a series of interconnected percolating catchbasins, which were found to recharge more than 99 percent of the stormwater discharges. The Washington, D.C. study found that porous pavement recharged 85 to 95 percent of the pavement runoff flows, while an infiltration trench recharged about 50 percent of the surface flows. The EPA (1983) concluded that, with a reasonable degree of site-specific design considerations to compensate for soil characteristics, infiltration devices can be very effective in controlling urban runoff through recharging groundwaters.

Grass Filter Strips--

Grass filter strips may be quite effective in removing pollutants from overland flows. The filtering effects of grasses, along with increased infiltration/recharge, reduce the pollutant load from urban landscaped areas. Filter strips are extensively used in contour strip cropping systems in agricultural areas to reduce erosion yields associated with grain crop production. Grass filters can be used at urban runoff source areas to reduce the particulate pollutant yields to the storm drainage system. Specific situations may include directing roof runoff to grassed areas instead of pavement, planting grass between eroding slopes and the storm drainage system, and planting grass between paved or unpaved parking or storage areas and the drainage system.

Novotny and Chesters (1981) reviewed several publications describing research on the effectiveness of grass filter strips. Grass filtering occurs during shallow flows, requiring the depth of flow

to be less than the vegetation height. The critical length is defined as the minimum water flow length within which almost 100 percent of the particles of concern are removed. This length (and removal efficiency) varies for different particle sizes, grass density, flow depth and flow velocity. For Bermuda grass, the critical length was found to be about 10 feet for sand, about 50 feet for silt, and about 400 feet for clay (Wilson 1967).

Grass Swales--

Grass swale drainages are a type of infiltration device and can be used in place of concrete curb and gutter drainages in most land uses, except possibly strip commercial and high density residential areas. Grass swales allow the recharge of significant amounts of surface flows.

Several large-scale urban runoff monitoring programs have included test sites that were drained by grass swales. Bannerman, *et al.* (1979), as part of the International Joint Commission (IJC) monitoring program to characterize urban runoff inputs to the Great Lakes, monitored a residential area served by swales and a similar residential area served by concrete curb and gutters in the Menomonee River watershed in the Milwaukee area. This monitoring program included extensive flow and pollutant concentration measurements during a variety of rains. They found that the swale-drained area, even though it had soils characterized as poorly drained, had significantly lower surface flows (up to 95 percent lower) compared to the curb and gutter area.

The ability of grass swales to infiltrate source area sheetflows was also monitored in Durham, New Hampshire (EPA 1983). A special swale was constructed to treat runoff from a commercial parking lot. Flow measurements were not available to directly measure infiltration, but significant pollutant concentration reductions were found, apparently due to filtration. Soluble and particulate heavy metal (copper, lead, zinc, and cadmium) concentrations were reduced by about 50 percent. COD, nitrate nitrogen, and ammonia nitrogen concentrations were reduced by about 25 percent, while no significant concentration reductions were found for organic nitrogen, phosphorus, and bacteria.

Wang, *et al.* (1980) monitored the effectiveness of grass swales at several freeway sites in the State of Washington. Lead was more consistently and effectively trapped in the swale soils than the other metals, possibly because of its greater association with particulates in the runoff. Particulate filtering was therefore an important process during these tests. Lead concentrations were typically reduced by 80 percent or more, while copper was reduced by about 60 percent, and zinc by about 70 percent. Because of the particulate filtering action, they concluded that it may be necessary to remove the contaminated soils and replant the grass periodically to prevent dislodging the deposited polluted sediment. Part of the swales monitored by Wang, *et al.* (1980) were bare earth lined. Pollutant concentrations were not found to be effectively reduced in these sections, and the earth lining was not contaminated.

A project to specifically study the effects of grass swale drainages was also conducted in Brevard County, Florida, by Kercher, *et al.* (1983). Two adjacent low density residential areas, with about 14 acres and 50 homes each, were selected for study. One area had conventional concrete curbs and gutters, while the other had grass swales for roadside drainage. The two areas had very similar characteristics (soils, percentage imperviousness, slopes, vegetation, etc.). Thirteen storm events were monitored in the areas for flow and several selected pollutants. The curb and gutter area produced runoff flows during all 13

events, while the grass swale area produced runoff during only three events. The grass swale system also cost about one-half as much as the curb and gutter system.

In another large-scale urban runoff monitoring project, Pitt and McLean (1985) monitored a residential area in Toronto that was served about evenly by swales and concrete curbs and gutters. The pollutant concentrations in both types of drainage systems were similar, but the area had annual flows about 25 percent less than if the area were served solely by curbs and gutters. For small but frequent rains (less than about 0.5 inch), very little surface runoff was observed, with almost all of the flows being infiltrated to the groundwater.

Porous Pavements--

Porous pavement is a "hard" surface that can support a certain amount of activity, while still allowing water to pass through to recharge the underlying groundwaters. Porous pavement is generally used in areas of low traffic, such as service roads, storage areas, and parking lots. Several different types of porous pavement exist. Open mixes of asphalt appear similar to regular asphalt, but use only a specific size range of rocks in the hot mix. The porosity of the finished asphalt is much higher than regular asphalt, if properly designed and constructed. Concrete grids have open holes up to several inches wide filled with sand or gravel. It is possible to plant grass in the holes, if traffic is very light and if light and moisture conditions are adequate. They can be designed to recharge all of the runoff water from paved areas. The percolation rate of the pavement base is usually the limiting condition in porous pavement installations (Cedergren 1974).

Porous pavements do not provide any direct water quality treatment for the infiltrating water, but they do allow the water to pass through soil before reaching the groundwater. The organic content of the soil and associated sorption capacity of the soils may be limited below porous pavements because of the pavement construction operations.

Porous pavements may be effectively used in areas having soils with adequate percolation characteristics, if carefully designed and maintained. The percolation requirements for porous pavements are not as demanding as they are for other infiltration devices, unless runoff from other areas is directed towards the paved area. The percolation of the soils underlying the porous pavement installation need only to exceed the rain intensity directly. In most cases, several inches of storage is available in the asphalt base to absorb short periods of very high rain intensities. Diniz (1980) states that the entire area contributing to the porous pavement can be removed from the surface hydrologic regime (and therefore be used for groundwater recharge).

Gburek and Urban (1983) studied a porous pavement parking lot in Pennsylvania. They found that percolation below the pavement occurred soon after the start of rain. For small rains (less than 0.25 inches), no percolation under the pavement was observed, with all of the rain being contained in the pavement base. Percolation during large rains was equal to about 70 to 90 percent of the rainfall. The differences between the rain amounts and the observed percolation quantities were caused by flash evaporation (not estimated) and storage in the asphalt base material.

Goforth *et al.* (1983 and 1984) evaluated a porous pavement parking lot in Austin, Texas, over several years and under heavy traffic conditions. Infiltration rates through the pavement averaged about

1800 inches per hour, while the two-inch pavement base had an infiltration rate of about 70,000 inches per hour. Day (1980) conducted a series of laboratory tests using several different types of concrete grid pavements. The geometry of the grid was more important than the percentage of open space in determining the ability of the grid to absorb and detain rainwater. The runoff coefficients from the grids ranged from 0.06 to 0.26 (resulting in recharge rates from 75 to 95 percent) depending on the rain intensity, ground slope, and subsoil type.

Fate Mechanisms in Biofiltration Devices--

Sorption of pollutants to soils is probably the most important fate mechanism of toxicants in biofiltration devices. Many of the devices also use sedimentation and filtration to remove the particulate forms of the pollutants from the water. Incorporation of the pollutants onto soil with subsequent biodegradation and minimal leaching to the groundwater is desired. Volatilization, photolysis, biotransformation, and bioconcentration may also be important in grass filter strips and grass swales. Underground French drains and porous pavements offer little biological activity to reduce toxicants.

REFERENCES

Alhajjar, B.J., G.V. Simsiman and G. Chesters. "Fate and Transport of Alachlor, Metolachlor and Atrazine in Large Columns." *Water Science and Technology*. Volume 22, number 6, pp. 87-94. 1990.

Amoros, I., J.L. Alonso and I. Peris. "Study of Microbial Quality and Toxicity of Effluents from Two Treatment Plants Used for Irrigation." *Water Science and Technology*. Volume 21, number 3, pp. 243-246. 1989.

APWA (American Public Works Assoc.). *Water Pollution Aspects of Urban Runoff.* Water Pollution Control Research Series WP-20-15, Federal Water Pollution Control Administration, January 1969.

Armstrong, David E. and Reynaldo Llena. *Stormwater Infiltration: Potential for Pollutant Removal.* Report prepared for the Wisconsin Department of Natural Resources (Madison) and the U.S. Environmental Protection Agency, Chicago. February 1992.

Aronson, D.A. and G.E. Seaburn. *Appraisal of Operating Efficiency of Recharge Basins on Long Island, New York*. U.S. Geological Survey Water-Supply Paper 2001-D. USGS, Washington, D.C., 1974.

AWWA (American Water Works Association). "Fertilizer Contaminates Nebraska Groundwater." *AWWA Mainstream.* Volume 34, number 4, p. 6. April 1990.

Bannerman, R., K. Baun, M. Bohn, P.E. Hughes, and D.A. Graczyk. *Evaluation of Urban Nonpoint Source Pollution Management in Milwaukee County, Wisconsin*, Vol. I. Grant No. P005432-01-5, PB 84-114164. US Environmental Protection Agency, Water Planning Division, November 1983.

Bannerman, R., J.G. Konrad, and D. Becker. *The IJC Menomonee River Watershed Study*. EPA-905/4-79-029. US Environmental Protection Agency. Chicago Illinois. 1979.

Bao-rui, Yan. "Investigation into Mechanisms of Microbial Effects on Iron and Manganese Transformations in Artificially Recharged Groundwater." *Water Science and Technology*. Volume 20, number 3, pp. 47-53. 1988.

Basu, D. and S.J. Bosch. Bis-(2-Chloroisopropyl) Ether Reportable Quantity (RQ) Ranking Based on Chronic Toxicity. Environmental Criteria and Assessment Office. U.S. Environmental Protection Agency, Contract No. 68-03-3112. Cincinnati, Ohio. July 1982.

Berg, G. editor. *Transmission of Viruses by the Water Route*. Interscience Publishers, New York. 1965.

Boggess, D.H. *Effects of a Landfill On Ground-Water Quality*. United States Department of the Interior Geological Survey, Open File Report 75-594. Prepared in cooperation with the City of Fort Myers. U.S. Government Printing Office, Washington, D.C. 1975.

Bouwer, Edward J., Perry L. McCarty, Herman Bouwer and Robert C. Rice. "Organic Contaminant Behavior During Rapid Infiltration of Secondary Wastewater at the Phoenix 23rd Avenue Project." *Water Resources*. Volume 18, number 4, pp. 463-472. 1984.

Bouwer, Herman. "Renovation of Wastewater with Rapid-Infiltration Land Treatment Systems." In: *Artificial Recharge of Groundwater*. Edited by Takashi Asano. Butterworth Publishers, Boston, pp. 249-282. 1985.

Bouwer, Herman. "Effect of Irrigated Agriculture on Groundwater." *Journal of Irrigation and Drainage Engineering, ASCE*. Volume 113, number 1, pp. 4-15. February 1987.

Bouwer, Herman and Emamuel Idelovitch. "Quality Requirements for Irrigation with Sewage Water." *Journal of Irrigation and Drainage*. Volume 113, number 4, pp. 516-535. November 1987.

Bouwer, Herman. "Agricultural Contamination: Problems and Solutions." *Water Environment and Technology*. Volume 1, number 2, pp. 292-297. October 1989.

Bowman, D.C., J.L. Paul, W.B. Davis, and S.H. Nelson. "Reducing Ammonia Volatilization from Kentucky Bluegrass by Irrigation." *Horticulture Science*. Vol. 22, pp. 84-87. 1987.

Brown, David P. *Effects of Effluent Spray Irrigation on Groundwater at a Test Site near Tarpon Springs, Florida*. United States Department of the Interior Geological Survey Open File Report 81-1197. Prepared in cooperation with Pinellas County, Florida. USGS, Denver, Colorado. 1982.

Brydges, T. and G. Robinson. "Two Examples of Urban Stormwater Impoundment for Aesthetics and for Protection of Receiving Waters." In: *Restoration of Lakes and Inland Waters: International Symposium on Inland Waters and Lake Restoration*. Portland, Main, September 1980. Proceedings published by the U.S. Environmental Protection Agency, Washington, D.C. 1986.

Butler, Kent S. "Urban Growth Management and Groundwater Protection: Austin, Texas." *Planning for Groundwater Protection*. Academic Press, Inc. New York. pp. 261-287. 1987.

Callahan, M.A., M.W. Slimak, N.W. Gabel, I.P. May, C.F. Fowler, J.R. Freed, P. Jennings, R.L. Durfee, F.C. Whitmore, B. Maestri, W.R. Mabey, B.R. Holt, and C. Gould. *Water Related Environmental Fates of 129 Priority Pollutants*. U.S. Environmental Protection Agency, Monitoring and Data Support Division, EPA-4-79-029a and b. Washington D.C., 1979.

Cedergren, H.R. *Drainage of Highway and Airfield Pavements*. John-Wiley and Sons, New York, 1974.

Chang, A.C., A.L. Page, P.F. Pratt and J.E. Warneke. "Leaching of Nitrate from Freely Drained-Irrigated Fields Treated with Municipal Sludge." *Planning Now for Irrigation and Drainage in the 21st Century: Proceedings of a Conference Sponsored by the Irrigation and Drainage Division of the American Society of Civil Engineers*. Lincoln, Nebraska, pp. 455-467. ASCE, New York. July 18-21 1988.

Chase, William L. "Reclaiming Wastewater in Phoenix, Arizona." *Irrigation Systems for the 21st Century - Proceedings of a Conference Sponsored by the Irrigation and Drainage Division of the American Society of Civil Engineers*. Portland, Oregon, July 28-30, 1987. ASCE, New York. pp. 336-343. 1987.

Close, M.E. "Effects of Irrigation on Water Quality of a Shallow Unconfined Aquifer." *Water Resources Bulletin*. Volume 23, number 5, pp. 793-802. October 1987.

Craun, Gunther F. "Waterborne Disease -- A Status Report Emphasizing Outbreaks in Ground-Water Systems." *Groundwater*. Volume 17, number 2, pp. 183-191. March-April 1979.

Crites, Ronald W. "Micropollutant Removal in Rapid Infiltration." In: *Artificial Recharge of Groundwater*. Edited by Takashi Asano. Butterworth Publishers, Boston, pp. 579-608. 1985.

Dalrymple, R.J., S.L. Hodd, and D.C. Morin. *Physical and Settling Characteristics of Particulates in Storm and Sanitary Wastewaters*. EPA-670/2-75-011. U.S. Environmental Protection Agency, Cincinnati, Ohio, 1975.

Day, G.E. "Investigation of Concrete Grid Pavements." In *Proceedings - National Conference on Urban Erosion and Sediment Control: Institutions and Technology*, EPA-905/9-80-002, U.S. Environmental Protection Agency, Chicago, Ill., January 1980.

Deason, Jonathan P. "Selenium: It's Not Just in California." *Irrigation Systems for the 21st Century - Proceeding of a Conference.* Sponsored by the Irrigation and Drainage Division of the American Society of Civil Engineers, New York. pp. 475-482. 1987.

Deason, Jonathan P. "Irrigation-Induced Contamination: How Real a Problem?" *Journal of Irrigation and Drainage Engineering, ASCE*. Volume 115, number 1, pp. 9-20. February 1989.

DeBoer, Jon G. "Wastewater Reuse: A Resource or a Nuisance?" *Journal of the American Water Works Association*. Volume 75, pp. 348-356. July 1983.

Diniz, E.V. *Porous Pavement; Phase I, Design and Operational Criteria*. EPA-600/2-80-135. U.S. Environmental Protection Agency, Cincinnati, Ohio, August 1980.

Domagalski, Joseph L. and Neil M. Dubrovsky, Neil M. "Pesticide Residues in Groundwater of the San Joaquin Valley, California." *Journal of Hydrology*. Volume 130, number 1-4, pp. 299-338. January 1992.

Durum, W. H. Occurrence of Some Trace Metals in Surface Waters and Groundwaters. In Proceeding of the Sixteenth Water Quality Conference, Am. Water Works Assoc., *et al.* Univ. of Illinois Bull., 71(108), Urbana, Illinois. 1974.

Ehrlich, Garry G., Henry F.H. Ku, John Vecchioli and Theodore A. Ehlke. *Microbiological Effects of Recharging the Magothy Aquifer, Bay Park, New York, with Tertiary-Treated Sewage.* Geological Survey Professional Paper 751-E. Prepared in cooperation with the Nassau County Department of Public Works. USGS, Washington, D.C. 1979a.

Ehrlich, G.G., E.M. Godsy, C.A. Pascale and John Vecchioli. "Chemical Changes in an Industrial Waste Liquid during Post-Injection Movement in a Limestone Aquifer, Pensacola, Florida." *Groundwater*. Volume 17, number 6, November-December, pp. 562-573. 1979b.

Environment Canada. Rideau River Water Quality and Stormwater Monitoring Study. MS Report OR-29, Ontario Ministry of the Environment. Feb. 1980.

Environment Canada/Agriculture Canada. *Pesticide Registrant Survey; 1986 Report.* Prepared by the Commercial Chemicals Branch. Conservation and Protection. Environment Canada. January, 1987

EPA. *Areawide Assessment Manual.* Three Volumes. Municipal Envir. Research Lab., Cincinnati, Ohio, July 1976.

EPA. *Results of the Nationwide Urban Runoff Program.* Water Planning Division, PB 84-185552, Washington, D.C., December 1983.

EPA. *Quality Criteria for Water.* U.S. Environmental Protection Agency. EPA 440/5-86-001. Wash., D.C., May 1986.

EPA (U.S. Environmental Protection Agency). *National Pesticide Survey: Summary results of EPA's national survey of pesticides in drinking water wells.* EPA Office of Pesticides and Toxic Substances. U.S. Government Printing Office, Washington, D.C. 1990.

EPA (U.S. Environmental Protection Agency). *Manual: Guidelines for Water Reuse.* EPA Document No. EPA/625/R-92/004. U.S. Government Printing Office, Washington, D.C. September, 1992.

Ferguson, Bruce K. "Role of the Long-Term Water Balance in Management of Stormwater Infiltration." *Journal of Environmental Management.* Volume 30, number 3, pp. 221-233. April 1990.

Ferguson, R.B., D.E. Eisenbauer, T.L. Bockstadter, D.H. Krull and G. Buttermore. "Water and Nitrogen Management in Central Platte Valley of Nebraska." *Journal of Irrigation and Drainage*. Volume 116, number 4, pp. 557-565. July/August 1990.

Field, R., E. J. Struzeski, Jr., H. E. Masters and A. N. Tafuri. Water Pollution and Associated Effects from Street Salting. EPA-R2-73-257, U.S. Environmental Protection Agency, Cincinnati, Ohio. May 1973.

Field, R. and M.L. O'Shea. "The Detection of Pathogens in Storm-Generated Flows." *Water Environment Federation 65th Annual Conference and Exposition*. New Orleans. September, 1992.

Galvin, D.V. and R.K. Moore. *Toxicants in Urban Runoff. Toxicant Control Planning Section, Municipality of Metropolitan Seattle*, Contract # P-16101, U.S. Environmental Protection Agency, Lacy, Washington, Dec. 1982.

Gburek, W.J. and J.B. Urban. "Storm Water Detention and Groundwater Recharge Using Porous Asphalt - Initial Results." *1983 International Symposium on Urban Hydrology, Hydraulics and Sediment Control*, University of Kentucky, Lexington, Kentucky, July 1983.

Gerba, Charles P. and Sagar M. Goyal. "Pathogen Removal from Wastewater during Groundwater Recharge." In: *Artificial Recharge of Groundwater*. Edited by Takashi Asano. Butterworth Publishers, Boston. pp. 283-317. 1988.

Gerba, Charles P. and Charles N. Haas. "Assessment of Risks Associated with Enteric Viruses in Contaminated Drinking Water." *Chemical and Biological Characterization of Sludges, Sediments, Drudge Spoils and Drilling Muds, ASTM STP 976*. American Society for Testing and Materials, Philadelphia, Pennsylvania. pp. 489-494. 1988.

Geldreich, E.E. and B.A. Kenner. Concepts of Fecal Streptococci in Stream Pollution. Journal WPCF, Vol. 41, No. 8, pp. R336-R352. Aug. 1969.

German, Edward R. *Quantity and Quality of Stormwater Runoff Recharged to the Floridan Aquifer System Through Two Drainage Wells in the Orlando, Florida Area*. U.S. Geological Survey - Water Supply Paper 2344. Prepared in cooperation with the Florida Department of Environmental Regulation. USGS, Denver, Colorado. 1989.

Gietz, R.J. *Urban Runoff Treatment in the Kennedy-Burnett Settling Pond*. For the Rideau River Stormwater Management Study, Pollution Control Division, Works Department, Regional Municipality of Ottawa-Carleton, Ottawa, Ontario, March 1983.

Goforth, G.F., E.V. Diniz, and J.B. Rauhut. *Stormwater Hydrological Characteristics of Porous and Conventional Paving Systems*. EPA-600/2-83-106, U.S. Environmental Protection Agency, Cincinnati, Ohio, February 1984 (also dated October 1983).

Gold, A.J. and P.M. Groffman. "Leaching of Agrichemicals from Suburban Areas." In: *Pesticides in Urban Environments - Fate and Significance*. Racke, K.D. and A.R. Leslie, editors. ACS Symposium Series No. 522. American Chemical Society, Washington, D.C. 1993.

Goldshmid, J. "Water-Quality Aspects of Ground-Water Recharge in Israel." *Journal of the American Water Works Association*. Volume 66, number 3, pp. 163-166. March 1974.

Goolsby, Donald A. "Geochemical Effects and Movement of Injected Industrial Waste in a Limestone Aquifer." *Underground Waste Management and Environmental Implications (Reprint)*. The American Association of Petroleum Geologists, Memoir No. 18. 1972.

Gore & Storrie Ltd./Proctor & Redfern Ltd. Executive Summary Report on Rideau River Stormwater Management Study, Phase 1, Rideau River Stormwater Management Study, Ottawa and the Ontario Ministry of the Environment, Kingston, Ontario. 1981.

Greene, Gerald E. "Ozone Disinfection and Treatment of Urban Storm Drain Dry-Weather Flows: A Pilot Treatment Plant - Demonstration Project on the Kenter Canyon Storm Drain System in Santa Monica." *Santa Monica Bay Restoration Project.* Office of the City Engineer, Santa Monica, California. June 1992.

Hampson, Paul S. *Effects of Detention on Water Quality of two Stormwater Detention Ponds Receiving Highway Surface Runoff in Jacksonville, Florida.* U.S. Geological Survey Water-Resources Investigations Report 86-4151. Prepared in cooperation with the Florida Department of Transportation. USGS, Denver, Colorado. 1986.

Harper, Harvey H. *Effects of Stormwater Management Systems on Groundwater Quality*. Final Report for DER Project WM190. Florida Department of Environmental Regulation. September 1988.

Harris, B. Fluoranthene: Reportable Quantity (RQ) Ranking Based on Chronic Toxicity. U.S. Environmental Protection Agency. Contract No. 68-03-3112. Cincinnati, Ohio, July 1982.

HEW (U.S. Dept. of Health, Education, and Welfare). Bioassay of Technical Grade Bis (2-Chloro-1-Methylethyl) Ether for Possible Carcinogenicity. CAS No. 108-60-1, NCI-CG-TR-191. Bethesda, Maryland, 1979.

Hickey, John J. and John Vecchioli. *Subsurface Injection of Liquid Waste with Emphasis on Injection Practices in Florida.* U.S. Geological Survey Water-Supply Paper 2281. USGS, Denver, Colorado. 1986.

Higgins, Andrew J. "Impacts on Groundwater due to Land Application of Sewage Sludge." *Water Resources Bulletin*. Volume 20, number 3, pp. 425-434. June 1984.

Horsley, Scott W. and John A. Moser. "Monitoring Groundwater for Pesticides at a Golf Course -- A Case Study on Cape Cod, Massachusetts." *Groundwater Monitoring Review*. Volume 10, pp. 101-108. Winter 1990.

Howard, P.H. Handbook of Environmental Fate and Exposure Data for Organic Chemicals, Volume 1, Large Production and Priority Pollutants. Lewis Publishers. Chelsea, Mich. 1989.

IARC. Chemicals and Industrial Processes Associated with Cancer in Humans. IARC Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Humans, Supplement 1. World Health Organization. Lyon, France, 1979.

Iowa DNR. *Pesticide and Synthetic Organic Compound Survey*. Iowa Department of Natural Resources. 1988.

Iowa DNR. *The Iowa State-Wide Rural Well-Water Survey Water Quality Data: Initial Analysis.* Iowa Department of Natural Resources. 1990.

Jansons, Janis, Lindsay W. Edmonds, Brent Speight and Marion R. Bucens. "Movement of Viruses after Artificial Recharge." *Water Research*. Volume 23, number 3, pp. 293-299. 1989a.

Jansons, Janis, Lindsay W. Edmonds, Brent Speight and Marion R. Bucens. "Survival of Viruses in Groundwater." *Water Research*. Volume 23, number 3, pp. 301-306. 1989b.

Johnson, C.R. "A New Look at Sewer Separation for CSO Control." *WPCF Specialty Conference Series: Control of Combined Sewer Overflows*, Boston. April 8-11, 1990.

Jury, W.A., W.F. Spencer, and W.J. Farmer. "Model for Assessing Behavior of Pesticides and other Trace Organics using Benchmark Properties. I. Description of Model". *J. Environmental Quality*. No. 12. pp. 558-564. 1983.

Kercher, W.C., J.C. Landon and R. Massarelli. "Grassy Swales Prove Cost-Effective for Water Pollution Control." *Public Works*, April 1983.

Knisel, W.G. and R.A. Leonard. "Irrigation Impact on Groundwater: Model Study in Humid Region." *Journal of Irrigation and Drainage, ASCE*. Volume 115, number 5, pp. 823-838. October 1989.

Krawchuk, Bert P. and G.R. Barrie Webster. "Movement of Pesticides to Groundwater in an Irrigated Soil." *Water Pollution Research Journal of Canada*. Volume 22, pp. 129-146. number 1, 1987.

Ku, Henry F.H., John Vecchioli and Stephen E. Ragone. "Changes in Concentration of Certain Constituents of Treated Waste Water during Movement through the Magothy Aquifer, Bay Park, New York." *Journal Research U.S. Geological Survey*. Volume 3, number 1, pp. 89-92. January-February 1975.

Ku, Henry F. H. and Dale L. Simmons. *Effect of Urban Stormwater Runoff on Groundwater beneath Recharge Basins on Long Island, New York*. U.S. Geological Survey Water-Resources Investigations Report 85-4088. Prepared in cooperation with Long Island Regional Planning Board, Syosset, New York. USGS, Denver, Colorado. 1986.

Ku, Henry H.F., Nathan W. Hagelin and Herbert T. Buxton. "Effects of Urban Storm-Runoff Control on Ground-Water Recharge in Nassau County, New York." *Groundwater*. Volume 30, number 4, pp. 507-514. July-August 1992.

Lager, J.A. *Urban Stormwater Management and Technology: Update and User's Guide*. Rep No. EPA-600/8-77-014. U.S. Environmental Protection Agency. Cincinnati, Ohio. pp. 90-92. 1977.

Lake Tahoe Regional Planning Agency. *Lake Tahoe Basin Water Quality Management Plan, Volume II, Handbook of Best Management Practices*. Lake Tahoe, California, January 1978.

Lauer, D.A. "Vertical Distribution in Soil of Sprinkler-Applied Phosphorus." *Soil Science Society of America Journal.* Volume 52, number 3, pp. 862-868. May/June 1988a.

Lauer, D.A. "Vertical Distribution in Soil of Unincorporated Surface-Applied Phosphorus under Sprinkler Irrigation." *Soil Science Society of America Journal.* Volume 52, number 6, pp. 1685-1692. November/December 1988b.

Lee, Edwin W. "Chapter 21: Drainage Water Treatment and Disposal Options." In: *Agricultural Salinity Assessment and Management.* Edited by Kenneth K. Tanji. American Society of Civil Engineers, New York. pp. 450-468. 1990.

Linsey, G., L. Roberts and W. Page. "Inspection and Maintenance of Infiltration Facilities." *Journal of Soil and Water Conservation*. Vol. 47, No. 6, pp. 481-486, November/December 1992.

Lloyd, J.W., D.N. Lerner, M.O. Rivett and M. Ford. "Quantity and Quality of Groundwater beneath an Industrial Conurbation -- Birmingham, UK." In: *Proceedings of the Conference -- Hydrological Processes and Water Management in Urban Areas*. Duisburg, Federal Republic of Germany. International Hydrological Programme, UNESCO, pp. 445-452. April 24-29, 1988.

Loague, K.M. and R.A. Freeze. "A Comparison of Rainfall-Runoff Modeling Techniques on Small Upland Catchments", *Water Resources Research*, Vol. 21, No. 2, pp 229-248, February 1985.

Luzkow, S.M., D.A. Scherger, and J.A. Davis. "Effectiveness of Two In-Line Urban Stormwater Best Management Practices (BMP's)." *1981 International Symposium on Urban Hydrology, Hydraulics, and Sediment Control*, University of Kentucky, Lexington, Kentucky, July 1981.

Madison, F., J. Arts, S. Berkowitz, E. Salmon, and B. Hagman. *Washington County Project.* EPA 905/9-80-003, U.S. Environmental Protection Agency, Chicago, Ill., 1979.

Marton, J. and I. Mohler. "The Influence of Urbanization on the Quality of Groundwater." In: *Proceedings of the Conference -- Hydrological Processes and Water Management in Urban Areas*. Duisburg, Federal Republic of Germany. International Hydrological Programme, UNESCO, pp. 453-460. April 24-29, 1988.

Marzouk, Yosef, Sagar M. Goyal and Charles P. Gerba. "Prevalence of Enteroviruses in Groundwater of Israel." *Groundwater*. Volume 17, number 5, pp. 487-491. September-October 1979.

McComas, S.R. and D.F. Sefton. "Comparison of Stormwater Runoff Impacts on Sedimentation and Sediment Trace Metals for Two Urban Impoundments." In: *Lake and Reservoir Management: Practical Applications*, proceedings of the Fourth Annual Conference and International Symposium, October, 1984, North American Lake Management Society, McAfee, New Jersey, 1985.

Merkel, B., J. Grossman and P. Udluft. "Effect of Urbanization on a Shallow Quarternary Aquifer." *Proceedings of the Conference -- Hydrological Processes and Water Management in Urban Areas*. Duisburg, Federal Republic of Germany. International Hydrological Programme, UNESCO, pp. 461-468. April 24-29, 1988.

Moffa, P.E. *Control and Treatment of Combined Sewer Overflows*. Van Nostrand Reinhold. New York. 1989

Mossbarger, W.A. and R.W. Yost. "Effects of Irrigated Agriculture on Groundwater Quality in Corn Belt and Lake States." *Journal of Irrigation and Drainage Engineering, ASCE*. Volume 115, number 5, pp. 773-790. October 1989.

Natarajan, U. and R. Rajagopal. "Surveying The Situation." *Environmental Testing and Analysis*. pp. 40 - 50. Jan/Feb. 1993.

Nellor, Margaret H., Rodger B. Baird and John R. Smyth. "Health Aspects of Groundwater Recharge." In: *Artificial Recharge of Groundwater*. Edited by Takashi Asano. Butterworth Publishers, Boston, pp. 329-356. 1985.

Nightingale, Harry I. and William C. Bianchi. "Ground-Water Chemical Quality Management by Artificial Recharge." *Groundwater*. Volume 15, number 1, pp. 15-22. January-February 1977a.

Nightingale, Harry I. and William C. Bianchi. "Ground-Water Turbidity Resulting from Artificial Recharge." *Groundwater*. Volume 15, number 2, pp. 146-152. March-April 1977b.

Nightingale, H.I., J.E. Ayars, R.L. McCormick and D.C. Cehrs. "Leaky Acres Recharge Facility: A Ten-Year Evaluation." *Water Resources Bulletin*. Volume 19, number 3, pp. 429-437. June 1983.

Nightingale, Harry I. "Water Quality beneath Urban Runoff Water Management Basins." *Water Resources Bulletin*. Volume 23, number 2, pp. 197-205. April 1987a.

Nightingale, Harry I. "Accumulation of As, Ni, Cu and Pb in Retention and Recharge Basins Soils from Urban Runoff." *Water Resources Bulletin*. Volume 23, number 4, pp. 663-672. August 1987b.

Norberg-King, Teresa J., Elizabeth J. Durhan, Gerald T. Ankley and Eric Robert. "Application of Toxicity Identification Evaluation Procedures to the Ambient Waters of the Colusa Basin Drain, California." *Environmental Toxicology and Chemistry*. Volume 10, pp. 891-900. 1991.

Novotny, V. and G. Chesters. *Handbook of Nonpoint Pollution*. VanNostrand Reinhold, New York, 1981.

Oliver, L.J. and S.G. Grigoropoulis. "Control of Storm-Generated Pollution Using a Small Urban Lake." *Journal Water Pollution Control Federation*, Vol 53, No. 5, May 1981.

Olivieri, V.P., C.W. Kurse, and K. Kawata. Selected Pathogenic Microorganisms Contributed from Urban Watersheds. In: Watershed Research in Eastern North America, Vol. II, D.L. Correll. NTIS No. PB-279 920/3SL. 1977a.

Olivieri, V.P., C.W. Kurse, and K. Kawata. Microorganisms in Urban Stormwater, U.S. Environmental Protection Agency, EPA-600/2-77-087. July 1977b.

Ontario Ministry of the Environment. *Rideau River Stormwater Management Study*. Kingston, Ontario, 1983.

Ontario (Province of). *Urban Drainage Design Guidelines* (Draft). Urban Drainage Policy Implementation Committee, Technical Sub-Committee No. 3. March 1984.

Ontario Ministry of the Environment. *Humber River Water Quality Management Plan*, Toronto Area Watershed Management Strategy. Toronto, Ontario, 1986.

Peterson, David A. "Selenium in the Kendrick Reclamation Project, Wyoming." *Planning Now for Irrigation and Drainage in the 21st Century*. Proceedings of a conference sponsored by the Irrigation and Drainage Division of the American Society of Civil Engineers, Lincoln, Nebraska, pp. 678-685. ASCE, New York. July 18-21, 1988.

Petrovic, A. Martin. "The Fate of Nitrogenous Fertilizers Applied to Turfgrass." *Journal of Environmental Quality*. Volume 19, number 1, pp. 1-14. January-March 1990.

Phillips, G. R., and R. C. Russo. Metal Bioaccumulation in Fishes and Aquatic Invertebrates: A Literature Review. EPA-600-3-78-103, U.S. Environmental Protection Agency, Duluth, Minnesota. December 1978.

PHS (U.S. Public Health Service). Second Annual Report on Carcinogens. U.S. Dept. of Health and Human Services. Dec. 1981.

Pierce, Ronald C. and Michael P. Wong. "Pesticides in Agricultural Waters: The Role of Water Quality Guidelines." *Canadian Water Resources Journal.* Volume 13, number 3, pp. 33-49. July, 1988.

Pitt, R. and G. Amy. *Toxic Materials Analysis of Street Surface Contaminants*. EPA-R2-73-283, U.S. Environmental Protection Agency, Washington, D.C., August 1973.

Pitt, R. *Demonstration of Nonpoint Pollution Abatement Through Improved Street Cleaning Practices*. EPA-600/2-79-161, U.S. Environmental Protection Agency, Cincinnati, Ohio, August 1979.

Pitt, R. and G. Shawley. *A Demonstration of Non-Point Source Pollution Management on Castro Valley Creek*. Alameda County Flood Control and Water Conservation District (Hayward, CA) for the Nationwide Urban Runoff Program, U.S. Environmental Protection Agency, Water Planning Division, Washington, D.C., June 1982.

Pitt, R. *Urban Bacteria Sources and Control by Street Cleaning in the Lower Rideau River Watershed, Ottawa, Ontario*. Rideau River Stormwater Management Study, Ontario Ministry of the Environment, Ottawa, Ontario, 1983.

Pitt, R. *Characterization, Sources, and Control of Urban Runoff by Street and Sewerage Cleaning.* Contract No. R-80597012, U.S. Environmental Protection Agency, Office of Research and Development, Cincinnati, Ohio, 1984.

Pitt, R. and P. Bissonnette. *Bellevue Urban Runoff Program, Summary Report*. U.S. Environmental Protection Agency and the Storm and Surface Water Utility, Bellevue, Washington, 1984.

Pitt, R. "Runoff Controls in Wisconsin's Priority Watersheds." *Conference on Urban Runoff Impact and Quality Enhancement Technology. Henniker, NH.* Edited by B. Urbonas and L.A. Roesner, Proceedings published by the American Society of Civil Engineering. New York, NY. June 1986.

Pitt, R. and J. McLean. *Toronto Area Watershed Management Strategy Study: Humber River Pilot Watershed Project.* Ontario Ministry of the Environment, Toronto, Ontario, 1986.

Pitt, R. *Small Storm Urban Flow and Particulate Washoff Contributions to Outfall Discharges.* Ph.D. dissertation. Dept. of Civil and Environmental Engineering, University of Wisconsin - Madison. October 1987.

Pitt, R., and P. Barron. *Assessment of Urban and Industrial Stormwater Runoff Toxicity and the Evaluation/Development of Treatment for Runoff Toxicity Abatement - Phase I.* U.S. Environmental Protection Agency, Office of Research and Development, Edison, New Jersey, 1990.

Pitt, R. M. Lalor, R. Field, D.D. Adrian, and D. Barbe'. *Investigation of Inappropriate Pollutant Entries into Storm Drainage Systems*. EPA/600/R-92/238. U. S. Environmental Protection Agency. Office of Research and Development, Cincinnati, Ohio, 1993.

Pitt, R.E., R. Field, M. Lalor, and M. Brown. "Urban Stormwater Toxic Pollutants: Assessment, Sources, and Treatability." *Water Environment Research*. Vol. 67, No. 3, pp. 260-275. May/June 1995.

Power, J.F. and J.S. Schepers. "Nitrate Contamination of Groundwater in North America." *Agriculture, Ecosystems and Environment.* Volume 26, pp. 165-187. number 3-4 1989.

Pruitt, Janet B., David A. Troutman and G.A. Irwin. *Reconnaissance of Selected Organic Contaminants in Effluent and Groundwater at Fifteen Municipal Wastewater Treatment Plants in Florida, 1983-84*. U.S. Geological Survey Water-Resources Investigation Report 85-4167. Prepared in cooperation with the Florida Department of Environmental Regulation. USGS. Denver, Colorado. 1985.

Quresh, A.A. and B.J. Dutka. Microbiological Studies on the Quality of Urban Stormwater Runoff in Southern Ontario, Canada. Water Research, Vol. 13, pp. 977-985. 1979.

Racke, K.D. and A.R. Leslie, editors. *Pesticides in Urban Environments - Fate and Significance.* ACS Symposium Series No. 522. American Chemical Society, Washington, D.C. 1993.

Ragone, Stephen E. *Geochemical Effects of Recharging the Magothy Aquifer, Bay Park, New York, with Tertiary-Treated Sewage*. Geological Survey Professional Paper 751-D. Prepared in cooperation with the Nassau County Department of Public Works. USGS, Washington, D.C. 1977.

Razack, M., C. Drogue and M'Baitelem. "Impact of an Urban Area on the Hydrochemistry of a Shallow Groundwater (Alluvial Reservoir) Town of Narbonne, France." *Proceeding of the Conference - - Hydrological Processes and Water Management in Urban Areas*. International Hydrological Programme, UNESCO, pp.487-494. Duisburg, Federal Republic of Germany, April 24-29, 1988.

Reichenbaugh, R.C. *Effects on Ground-Water Quality from Irrigating Pasture with Sewage Effluent Near Lakeland, Florida*. U.S. Geological Survey Water-Resources Investigations Report 76-108. Prepared in cooperation with Southwest Florida Water Management District. USGS, Denver, Colorado. April 1977.

Rice, R.C., D.B. Jaynes and R.S. Bowman. "Preferential Flow of Solutes and Herbicide under Irrigated Fields." *Transactions of the American Society of Agricultural Engineers*. Volume 34, number 3, pp. 914-918. May-June 1991.

Ritter, W.F., F.J. Humenik and R.W. Skaggs. "Irrigated Agriculture and Water Quality in East." *Journal of Irrigation and Drainage Engineering, ASCE*. Volume 115, number 5, pp. 807-821. October 1989.

Ritter, W.F., R.W. Scarborough and A.E.M. Chirnside. "Nitrate Leaching under Irrigation on Coastal Plain Soil." *Journal of Irrigation and Drainage Engineering, ASCE.* Volume 117, number 4, pp. 490-502. July/August 1991.

Robinson, J. Heyward and H. Stephen Snyder. "Golf Course Development Concerns in Coastal Zone Management." *Coastal Zone '91: Proceedings of the Seventh Symposium on Coastal and Ocean Management.* Long Beach, California, pp. 431-443. ASCE, New York. July 8-12, 1991.

Rolfe, G.L. and K.A. Reinhold. Vol. I: *Introduction and Summary. Environmental Contamination by Lead and Other Heavy Metals.* Institute for Environmental Studies, University of Illinois, Champaign-Urbana, Illinois, July 1977.

Sabatini, David A. and T. Al Austin. "Adsorption, Desorption and Transport of Pesticides in Groundwater: A Critical Review." *Planning Now for Irrigation and Drainage in the 21st Century.* Proceedings of a Conference Sponsored by the Irrigation and Drainage Division of the American Society of Civil Engineers, Lincoln, Nebraska, pp. 571-579. ASCE, New York. July 18-21, 1988.

Sabol, George V., Herman Bouwer and Peter J. Wierenga. "Irrigation Effects in Arizona and New Mexico." *Journal of Irrigation and Drainage Engineering, ASCE.* Volume 113, number 1, pp. 30-57. February 1987.

Saffigna, P.G. and D.R. Keeney. "Nitrate and Chloride in Groundwater under Irrigated Agriculture in Central Wisconsin." *Ground Water.* Vol. 15, no. 2. pp. 170-177. 1977

Salo, John E., Doug Harrison and Elaine M. Archibald. "Removing Contaminants by Groundwater Recharge Basins." *Journal of the American Water Works Association.* Volume 78, number 9, pp. 76-81. September 1986.

Schiffer, Donna M. *Effects of Three Highway-Runoff Detention Methods on Water Quality of the Surficial Aquifer System in Central Florida.* U.S. Geological Survey Water-Resources Investigations Report 88-4170. Prepared in cooperation with the Florida Department of Transportation. USGS, Denver, Colorado. 1989.

Schillinger, J.E. and D.G. Stuart. *Quantification of Non-Point Water Pollutants from Logging, Cattle Grazing, Mining, and Subdivision Activities.* U. S. Environmental Protection Agency. PB 80-174063. 1978

Schmidt, Kenneth D. and Irving Sherman. "Effect of Irrigation on Groundwater Quality in California." *Journal of Irrigation and Drainage Engineering, ASCE.* Volume 113, number 1, pp. 16-29. February 1987.

Schneider, Brian J., Henry F.H. Ku and Edward T. Oaksford. *Hydrologic Effects of Artificial-Recharge Experiments with Reclaimed Water at East Meadow, Long Island, New York.* U.S. Geological Survey Water-Resources Investigations Report 85-4323. Prepared in cooperation with

the Nassau County Department of Public Works, Syosset, New York. USGS, Denver, Colorado. 1987.

Seaburn, G.E. and D.A. Aronson. *Influence of Recharge Basins on the Hydrology of Nassau and Suffolk Counties, Long Island, New York.* U.S. Geological Survey Water-Supply Paper 2031. USGS, Washington, D.C. 1974.

Setmire, J.G. and W.L. Bradford. "Quality of Urban Runoff, Tecolote Creek Drainage Area, San Diego County, CA. U.S. Geological Survey. PB81-159451. Menlo Park, CA. 1980

Shirmohammadi, A. and W.G. Knisel. "Irrigated Agriculture and Water Quality in the South." *Journal of Irrigation and Drainage Engineering, ASCE.* Volume 115, number 5, pp. 791-806. October 1989.

Smith, A.E. "Herbicides and the Soil Environment in Canada." *Canadian Journal of Soil Science.* Volume 62. pp. 433-460. 1982.

Smith, Sheldon O. and Donald H. Myott. "Effects of Cesspool Discharge on Ground-Water Quality on Long Island, N.Y." *Journal of the American Water Works Association.* Volume 67, number 8, pp. 456-458. August 1975.

Smith, W.G. "Water Quality Enhancement through Stormwater Detention." *Proceedings of the Conference on Stormwater Detention Facilities, Planning, Design, Operation, and Maintenance*, Henniker, New Hampshire, Edited by W. DeGroot, published by the American Society of Civil Engineers, New York, August 1982.

Solomon, R. L., and D. F. S. Natusch. Vol:III: Distribution and Characterization of Urban Dists. In: Environmental Contamination by Lead and Other Heavy Metals, G. L. Rolfe and K. G. Reinbold, eds. Institute for Environmental Studies, Univ. of Illinois, Urbana-Champaign, Illinois. July 1977.

Spalding, Roy F. and Lisa A. Kitchen. "Nitrate in the Intermediate Vadose Zone Beneath Irrigated Cropland." *Groundwater Monitoring Review.* Volume 8, number 2, pp. 89-95. Spring 1988.

Squires, Rodney C. and William R. Johnston. "Selenium Removal - Can We Afford It? *Irrigation Systems for the 21st Century - Proceeding of a Conference.* Sponsored by the Irrigation and Drainage Division of the American Society of Civil Engineers. New York, New York, pp. 455-466. 1987.

Squires, Rodney C., G. Raymond Groves and William R. Johnston. "Economics of Selenium Removal from Drainage Water." *Journal of Irrigation and Drainage Engineering.* Volume 115, number 1, pp. 48-57. February 1989.

Steenhuis, Tammo, Robert Paulsen, Tom Richard, Ward Staubitz, Marc Andreini and Jan Surface. "Pesticide and Nitrate Movement under Conservation and Conventional Tilled Plots." *Planning Now for Irrigation and Drainage in the 21st Century.* Proceedings of a conference sponsored

by the Irrigation and Drainage Division of the American Society of Civil Engineers, Lincoln, Nebraska, pp. 587-595. ASCE, New York. July 18-21, 1988.

Tetra Tech. *Detention and Retention Effects on Groundwater, A Literature Review*. Contract No. 68-C9-0013. U.S. Environmental Protection Agency. Watershed Management Unit. Water Division. Region V. Chicago. Ill. February 1991.

Tim, Udoyara S. and Saied Mostaghim. "Model for Predicting Virus Movement through Soil." *Groundwater*. Volume 29, number 2, pp. 251-259. March-April 1991.

Treweek, Gordon P. "Pretreatment Processes for Groundwater Recharge." In: *Artificial Recharge of Groundwater*. Edited by Takashi Asano. Butterworth Publishers, Boston, pp. 205-248. 1985.

Troutman, D.E., E.M. Godsy, D.F. Goerlitz and G.G. Ehrlich. *Phenolic Contamination in the Sand-and-Gravel Aquifer from a Surface Impoundment of Wood Treatment Wastewaters, Pensacola, Florida*. U.S. Geological Survey Water-Resources Investigations Report 84-4230. Prepared in cooperation with the Florida Department of Environmental Regulation. USGS, Denver, Colorado. 1984.

Varanasi, U. (ed.). Metabolism of Polycyclic Aromatic Hydrocarbons in the Aquatic Environment. CRC Press. Boca Raton, Florida, 1989.

Verschueren, K. Handbook of Environmental Data on Organic Chemic als. Second Edition, Van Nostrand Reinhold. New York, 1989.

Vaughn, J.M., E.F. Landry, L.J. Baranosky, C.A. Beckwith, M.C. Dahl and N.C. Delihas. "Survey of Human Virus Occurrence in Wastewater Recharged Groundwater on Long Island." *Applied and Environmental Microbiology*. Volume 36, number 1, pp. 47-51. July, 1978.

Verschueren, K. *Handbook of Environmental Data on Organic Chemicals*. Second Edition, Van Nostrand Reinhold. New York, 1983.

Waller, Bradley, Barbara Howie and Carmen R. Causaras. *Effluent Migration from Septic Tank Systems in Two Different Lithologies, Broward County, Florida*. U.S. Geological Survey Water Resources Investigations Report 87-4075. Prepared in cooperation with Broward County. USGS, Denver, Colorado. 1987.

Wang, T.S., D.E. Spyridakis, B.W. Mar, and R.R. Horner. *Transport Deposition and Control of Heavy Metals in Highway Runoff*. WA-RD-39.10, U.S. Dept. of Transportation and Washington State Department of Transportation, Seattle, January 1980.

Wanielista, M.P., Y.A. Yousef and H.H. Harper. "Hydrology/Hydraulics of Swales", *Open Channel Hydraulics Workshop*, by the University of Central Florida and American Society of Civil Engineers, Florida Section, Orlando, Sept. 1983.

Wanielista, Martin P., Julius Charba, John Dietz, Richard S. Lott and Bryon Russell. *Evaluation of the Stormwater Treatment Facilities at the Lake Angel Detention Pond, Orange County, Florida*. State of Florida Department of Transportation Environmental Research Paper FL-ER-49-91. National Technical Information Service, Springfield, VA. 1991.

Wellings, F.M. "Perspective on Risk of Waterborne Enteric Virus Infection." *Chemical and Biological Characterization of Sludges, Sediments, Dredge Spoils, and Drilling Muds*. ASTM STP 976. American Society for Testing and Materials, Philadelphia, Pennsylvania, pp. 257-264. 1988.

White, Everett M. and James M. Dornbush. "Soil Change Caused by Municipal Waste Water Applications in Eastern South Dakota." *Water Resources Bulletin*. Volume 24, number 2, pp. 269-273. April 1988.

Wilber, W.G. and J.V. Hunter. *The Influence of Urbanization on the Transport of Heavy Metals in New Jersey Streams*. Water Resources Research Institute, Rutgers University, New Brunswick, New Jersey, February 1980.

Wilde, F. D. *Geochemistry and Factors Affecting Ground-Water Quality at Three Storm-Water-Management Sites in Maryland*: *Report of Investigations No. 59*. Department of Natural Resources, Maryland Geological Survey, Baltimore, Maryland. (Prepared in Cooperation with the U.S. Department of the Interior Geological Survey, The Maryland Department of the Environment, and The Governor's Commission on Chesapeake Bay Initiatives). 1994.

Williams, L.H. "Effectiveness of Stormwater Detention." *Proceedings of the Conference on Stormwater Detention Facilities, Planning, Design, Operation, and Maintenance*, Henniker, New Hampshire, Edited by W. DeGroot, published by the American Society of Civil Engineers, New York, August 1982.

Wilson, L.G. "Sediment Removal from Flood Water." *Transactions American Society of Agricultural Engineers* 10(1):35-37, 1967.

Wilson, L.G., M.D. Osborn, K.L. Olson, S.M. Maida and L.T. Katz. "The Groundwater Recharge and Pollution Potential of Dry Wells in Pima County, Arizona." *Groundwater Monitoring Review*. Volume 10, pp. 114-121. Summer 1990.

Wolff, J., J. Ebeling, and A. Muller. "Waste Water Irrigation Suited to the Environment as Shown by the Example of 'Abwasserverband Wolfsburg.'" *Hydrological Processes and Water Management in Urban Areas - Proceedings of the Conference*, International Hydrological Programme, UNESCO. pp. 599-607. Duisburg, Federal Republic of Germany. April 24-29 1988.

Yousef, Y.A., M.P. Wanielista, and H.H. Harper. "Design and Effectiveness of Urban Retention Basins." *Engineering Foundation Conference: Urban Runoff Quality - Impact and Quality Enhancement Technology*, Henniker, New Hampshire, edited by B. Urbonas and L. A. Roesner, published by the American Society of Civil Engineers, New York, June 1986.

APPENDIX A

ANNOTATED BIBLIOGRAPHY OF GROUNDWATER CONTAMINATION

A bibliography of all of the literature sources used in the preparation of Chapter 3 of this report (Potential Groundwater Contamination Associated with Urban Runoff) was assembled and is included in this appendix. This bibliography contains the abstracts of the various sources, as published in the original documents. A matrix of information (Table A-1) was also prepared. This matrix includes the author and the date of the reference in the same format that is used in the report. The matrix also notes the source water considered in the reference (stormwater, sanitary wastewater, industrial wastewater, or agricultural runoff), the location of the research (where applicable), and the contaminants discussed. The contaminants are organized in the same manner as in Chapter 3: Nutrients, Pesticides, Organics, Pathogens, Metals, Dissolved Solids, Suspended Solids and Dissolved Oxygen. If a contaminant was addressed in the literature source, an "X" was placed in the appropriate column on Table A-1.

Alhajjar, B. J., G. V. Simsiman and G. Chesters. "Fate And Transport Of Alachlor, Metolachlor And Atrazine In Large Columns." ***Water Science And Technology: A Journal Of The International Association Of Water Pollution Research.*** **V. 22, n. 6. pp. 87-94. 1990.**

Abstract. ^{14}C ring-labeled atrazine, alachlor, and metolachlor were surface-applied at 3.14 kg a.i./ha in greenhouse lysimeters containing two soils in an ongoing experiment. Bromide (Br) --a conservative tracer-- at 6.93 kg/ha as KBr and nitrate-nitrogen (NO_3-N) at 112 kg/ha as KNO_3 were mixed with each herbicide and surface-applied. Growth of Red top (*Agrostis alba*) was established in each column (105 cm long and 29.4 cm i.d.). The experiment consisted of 12 columns (2 soils x 3 herbicides x 2 replicates) each fitted with four sampling ports for leachates, a volatilization chamber, and an aeration and irrigation system. Volatile materials are being trapped directly in solvents. One column replicate was dismantled for soil and plant analyses. Columns of Plainfield sand and Plano silt loam treated with alachlor and metolachlor were sampled after 23 and 28 weeks, respectively; the atrazine columns after 35 weeks. Herbicide residues are determined by liquid scintillation counting, extracted and separated by thin-layer chromatography using autoradiographic detection. Volatilization was $\leq 0.01\%$ of the amount of herbicide applied. The order of herbicide mobility was alachlor > metolachlor >> atrazine. As many as 8 to 12 alachlor metabolites and 2 to 6 metolachlor metabolites were separated in leachates. .

American Water Works Association. "Fertilizer Contaminates Nebraska Groundwater." ***AWWA Mainstream.*** **V. 34, n. 4. pp. 6. 1990.**

Abstract. Nitrates and nitrogen from commercial fertilizers, manure, and other sources are increasingly contaminating large areas of groundwater in Nebraska. Nitrate was by far Nebraska's most frequently encountered contaminant. Most of the contamination stems from nonpoint sources such as rainwater runoff and erosion, not from spills or other accidents.

Amoros, I., J. L. Alonso and I. Peris. "Study Of Microbial Quality And Toxicity Of Effluents From Two Treatment Plants Used For Irrigation." ***Water Science And Technology: A Journal Of The International Association On Water Pollution Research.*** **V. 21, n. 3. pp. 243-246. 1989.**

Abstract. The use of treated wastewater for agriculture is currently practiced in many countries. The benefits of recycling wastewater are based upon its constituents, particularly nitrogen, phosphorus and potassium, which are of value as fertilizers for many crops. There are, however, potential health risks associated with wastewater reuse. A number of bacterial pathogens excreted in the faeces of humans and animals are found in wastewater. The most significant pathogens, such as enteropathogenic *Escherichia coli*, Salmonella, Shigella, Yersinia, Vibrio, Campylobacter and Leptospira, can be transmitted via sewage-irrigated vegetables. Populations of bacterial pathogens in wastewater may be quite high, although variable, and may depend on the effectiveness of wastewater treatment. In addition, toxic substances, such as heavy metals and some organic compounds, may be found.

In the province of Alicante, there are some arid agricultural areas designated for grape cultivation but which have water resource problems. The use of treated wastewater from secondary treatment plants is one solution to this problem. Some reservoirs have been constructed to store wastewater destined for irrigation.

A study of the health risks associated with wastewater reuse (especially important since grapes are destined for human consumption and are normally eaten raw, and not peeled) was carried out. The

presence in water and on fruit of total coliforms, faecal coliforms and faecal streptococci, and pathogens such as Salmonella and *Vibrio cholerae*(only in wastewater) was investigated. Total and faecal coliforms and faecal streptococci were considered as indicator bacteria for the evaluation of the faecal pollution. Salmonella species were investigated because they are one of the pathogenic organisms most frequently found in sewage and they have been isolated from effluent samples after secondary treatment and disinfection with chlorine dioxide and ozone. *V. cholerae* is also transmitted via contaminated water and some studies have reported prolonged survival of this micro-organism in sewage with increased resistance to chlorine. Microbial toxicity tests to detect the potential toxicity of the wastewaters were conducted.

Armstrong, D. E. and R. Llena. *Stormwater Infiltration: Potential For Pollutant Removal.* Project Report To The U.S. Environmental Protection Agency. Wisconsin Department Of Natural Resources, Water Chemistry Program. 1992.

Abstract. The potential mobility of pollutants during infiltration of urban stormwater through soil was investigated. Groups of 32 organic and seven inorganic chemicals were evaluated. The framework for evaluating mobility was that of a conservative (non-sorbed) chemical. The main parameter controlling relative leaching rate was the pollutant K_d for sorption by the soil. For organic chemicals, K_d values were calculated based on predicted sorption to soil organic and inorganic components. Values were estimated for each compound in two soils at three organic matter contents. Soil organic matter was the dominant component controlling K_d, even in low organic matter soils. Among compounds, K_d increased with increasing hydrophobicity (octanol-water partition coefficient). For inorganic pollutants, published K_d values for two "typical" soils were used.

A mobility index (M_I = velocity of chemical/velocity of water under saturated flow) was used to classify pollutant leaching mobility. M_I values were calculated for each organic compound in two soils at three levels of organic concentrations. For organic chemicals, mobility was controlled by a combination of pollutant and soil properties. Organic matter content was the main soil property controlling mobility. In a low organic matter sandy loam soil (organic carbon = 0.01% by weight), ten compounds were classified as mobile (M_I =0.1 to 1.0), while one was in the very low mobility group ($M_I < 0.001$). When soil organic carbon was increased to 1%, only five compounds remained in the high mobility group, and nineteen were in the very low mobility group. Hydrophobicity was the main organic chemical property controlling mobility. Pollutants remaining in the mobile and intermediate mobility groups even when soil organic matter was relatively high (1%) were characterized by octanol-water partition coefficients below 10^3.

The potential mobility of the inorganic pollutant group (mostly trace metals) was generally lower than for the organic chemical group. A non- linear sorption model resulted in a predicted increase in mobility with concentration. At low concentration (0.01 mg/L), calculated mobilities were in the low (M_I = 0.001 to 0.01) or very low ($M_I < 0.001$) ranges.

Estimated residence times for leaching through the soil to the water table were estimated for a 1.0 meter soil layer and a water infiltration rate of about 60 meters/year. Residence times were influenced by pollutant mobility and infiltration site characteristics. Under the site conditions assumed, predicted residence times per meter were less than one year for mobile pollutants and less than 10 years for most low mobility pollutants. Predicted residence times would increase directly with increasing soil depth or decreasing water loading rate. Residence times were calculated for a set of six pollutants at a hypothetical infiltration site in the Milwaukee, WI area.

Aronson, D. A. and G. E. Seaburn. *Appraisal Of Operating Efficiency Of Recharge Basins On Long Island, New York, In 1969.* Geological Survey Water-Supply Paper 2001-D. U.S.

Government Printing Office, Washington, D.C. 1974.

Abstract. Recharge basins on Long Island are unlined pits of various shapes and sizes excavated in surficial deposits of mainly glacial origin. Of the 2,124 recharge basins on Long Island in 1969, approximately 9 percent (194) contain water 5 or more days after a 1-inch rainfall. Basins on Long Island contain water because (1) they intersect the regional water table or a perched water table, (2) they are excavated in material of low hydraulic conductivity, (3) layers of sediment and debris of low hydraulic conductivity accumulate on the basin floor, or (4) a combination of these factors exists.

Data obtained as part of this study show that (1) 22 basins contain water because they interest the regional water table, (2) a larger percentage of the basins excavated in the Harbor Hill and the Ronkonkoma morainal deposits contain water than basins excavated in the outwash deposits, (3) a larger percentage of basins that drain industrial and commercial areas contain water than basins that drain highways and residential areas, (4) storm runoff from commercial and industrial areas and highways generally contains high concentrations of asphalt, grease, oil, tar, and rubber particles, whereas runoff from residential areas mainly contains leaves, grass cuttings, and other plant material, and (5) differences in composition of the soils within the drainage areas of the basins on Long Island apparently are not major factors in causing water retention.

Water-containing basins dispose of an undetermined amount of storm runoff primarily by the slow infiltration of water through the bottoms and the sides of the basins. The low average specific conductance of water in most such basins suggests that evaporation does not significantly concentrate the chemical constituents and, therefore, that evaporation is not a major mechanism of water disposal from these basins.

Asano, T. "Irrigation With Reclaimed Wastewater - Recent Trends." ***Irrigation Systems For The 21st Century, Portland, Oregon, 1987.*** **(American Society Of Civil Engineers, New York, New York, pp. 735-742). 1987.**

Abstract. Land application of municipal wastewater is a well established practice in California. Since approximately 33 million acre-feet (4×10^{10} m^3) of water, or about 85 percent of the total water used in the State are applied annually to approximately 9 million acres (36,400 km^2) of irrigated cropland (Calif. State Water Resources Control Board, 1981), irrigation with reclaimed wastewater has become a logical and important component of total water resources planning and development.

Much of the reclaimed municipal wastewater (57%) in California is used for irrigation of fodder, fiber and seed crops (a use not requiring a high degree of wastewater treatment), and about 7% is used for irrigation of orchard, vine, and other food crops. An important use in recent years (about 14%) is irrigation of golf courses, other turfgrass, and landscape areas. According to a survey (Crook, 1985) conducted by California Department of Health Services, approximately 220,000 (271×10^6 m^3) feet of wastewater is reclaimed by 240 municipal wastewater treatment plants that supply reclaimed water to more than 380 use areas. Data from the 1984 survey on the types of reuse and numbers of use areas are listed.

Bao-rui, Y. "Investigation Into Mechanisms Of Microbial Effects On Iron And Manganese Transformations In Artificially Recharged Groundwater." *Water Science And Technology: A Journal Of The International Association On Water Pollution Research.* V. 20, n. 3. pp. 47-53. 1988.

Abstract. After artificial recharging of groundwater some problems occurred, such as changes in groundwater quality, the silting up of recharge (injection) wells, etc. Therefore, the mechanisms of microbial effects on groundwater quality after artificial recharging were studied in Shanghai and the district of Changzhou. These problems were approached on the basis of the amounts of biochemical reaction products generated by the metabolism of iron bacteria, sulphate-reducing bacteria, *Thiobacillus thioparus*, and *Thiobacillus denitrificans*. The experiments showed that in the transformations occurring and the siltation of recharge wells, microorganisms play an important role, due to the various chemical and biochemical activities. A water-rock-microorganisms system is proposed, and some methods for the prevention and treatment of these effects are given.

Barraclough, J. T. "Waste Injection Into A Deep Limestone In Northwestern Florida." *Ground Water.* V. 3, n. 1. pp. 22-24. 1966.

Abstract. During a three-month trial period, 70 million gallons of industrial wastes were successfully injected at moderate pressures into a deep limestone in the westernmost part of Florida. The movement of these wastes is expected to be predominantly southward toward the natural discharge area which is presumed to be far out in the Gulf of Mexico. The limestone lies between two thick beds of clay (aquicludes) and contains 13, 000 parts per million salty water. A series of aquifers and aquicludes appear capable of preventing contamination of the overlying fresh-water aquifers.

Boggess, D. H. *Effects Of A Landfill On Ground Water Quality*. Geological Survey Open File Report 75-594. U.S. Geological Survey, Tallahassee, Florida. 1975.

Abstract. Chemical analyses of water from 11 wells were adequate to show definite effects on ground-water quality in the vicinity of a landfill site in Lee County, Florida, operated by the city of Fort Myers. These effects were observed as far as 1,200 feet (320 metres) down gradient. When compared to the average concentrations of chemical constituents determined in comparable wells used as controls, water from the well with the greatest effect had sulfate 72 times greater, potassium 43 times greater, ammonia nitrogen 20 times greater, sodium and chloride 12 times greater, and most other chemical constituents 2 to 8 times greater.

The leachate was transported downgradient in the water- table aquifer in the general direction of ground-water movement. A subsurface clay barrier and paths of higher permeability apparently caused some local variation in the direction of leachate movement. The leachate probably is transported more rapidly during high stages of the water table due to higher hydraulic gradients and increased transmissivity.

Because of the high water table,, which is at or near the land surface during periods of maximum recharge from rainfall, extensive modification of the waste-disposal procedures would be required to reduce or eliminate the effect of the leachate.

Bouchard, A. B. "Virus Inactivation Studies For A California Wastewater Reclamation Plant." *Water Environment Federation 65th Annual Conference & Exposition, New Orleans, Louisiana, 1992.* (Water Environment Federation, Alexandria, Virginia). 1992.

Abstract. Engineering-Science, Inc. (ES) was retained by Thetford Systems, Inc. to develop, implement and supervise a virus inactivation study program for the Thetford Cycle-Let Wastewater Reclamation System. Thetford has installed a Cycle-Let system at the Water Garden Development Project in Santa Monica, California, to treat the collected municipal sewage from the project's office buildings and facilities. The Water Garden Cycle-Let system will produce reclaimed water for use as landscape irrigation for the development's property, and as make-up water for an on-site decorative lake. Phase II of the Water Garden Project proposes to use the reclaimed water as a source of toilet flush water in the office buildings. The State of California has established treatment process criteria required for certain types of reclaimed water use. Specifically, the California Administrative Code Title 22 identifies the processes required to treat municipal wastewater prior to reuse. Title 22 stipulates the following treatment processes to use reclaimed water as landscape irrigation -- oxidation, clarification, coagulation, filtration and disinfection using chlorination. The Thetford Cycle-Let extended aeration activated sludge with biological nitrification, followed by ultramembrane filtration, granular activated carbon adsorption, and ultraviolet light disinfection. As such, the California Department of Health Services (DOHS) has the requirements of Title 22. These requirements stipulate that the median number of coliform organisms in the plant effluent does not exceed 2.2 MPN per 100 milliliters and that the effluent must be essentially pathogen free. ES was retained by Thetford to develop a DOHS approved testing protocol, to implement the test program, to supervise the test program, and to prepare an engineering report to be submitted to the DOHS that demonstrates the adequacy of the extensive seeded virus inactivation study, followed by an in-situ virus study, and the necessary bacteriological analyses. Since the Water Garden Project is still under construction and no wastewater is being currently generated, the study was conducted at a similar facility that serves an office park in Princeton, New Jersey. The effluent from the Cycle-Let system at this plant is used for toilet flush water in the office complex. By conducting the study at this plant, ES was able to test the Cycle-Let system's adequacy of meeting Title 22 and the possibility of using reclaimed water as toilet flush water for the Water Garden Project.

Bouwer, E. J., P. L. McCarty, H. Bouwer and R. C. Rice. "Organic Contaminant Behavior During Rapid Infiltration Of Secondary Wastewater At The Phoenix 23rd Avenue Project." *Water Resource.* V. 18, n. 4. pp. 463-472. 1984.

Abstract. Movement of trace organic pollutants during rapid infiltration of secondary wastewater for groundwater recharge was studied at the 23rd Avenue Rapid Infiltration Project in Phoenix, Arizona. Samples of the wastewater applied to the spreading basins and of renovated water taken from monitoring wells were characterized for priority pollutants and other specific organic compounds using gas chromatography/mass spectrometry. The concentrations of organic constituents were affected by volatilization, biodegradation and sorption processes. Nonhalogenated aliphatics and aromatic hydrocarbons exhibited concentration decreases of 50-99% during soil percolation. Halogenated organic compounds were generally removed to a lesser extent. Concentrations of trichloroethylene, tetrachloroethylene, and pentachloroanisole appeared to be significantly higher in the renovated water than in the basin water; reasons for this behavior remain unclear. Many organic contaminants were detected in the groundwater indicating such systems should be designed to localize contamination of the aquifer. Chlorination of the wastewater had no significant effect on concentrations and types of trace organic compounds.

Bouwer, H. "Agricultural Contamination: Problems And Solutions." ***Water Environment And Technology*****. V. 1, n. 2. pp. 292-297. 1989.**

Abstract. Salts from irrigation water concentrate in the deep percolation water and can pollute groundwater, especially in dry climates where there is little natural dilution. Under certain geologic conditions, selenium and other trace elements may leach from the root and vadose zones into the groundwater. Salt and trace element contamination is a direct result of agricultural activities, but neither is caused by anthropogenic chemicals, such as nitrate and pesticides, which can cause severe groundwater contamination.

Not long ago, it was thought that pesticides would not migrate to groundwater except, perhaps, under situations of very coarse or cracked soils, shallow groundwater tables, high pesticide application rates, or accidental spills. In the mid- to late-1970s, more and more cases of pesticide contamination were reported as well testing increased and more sensitive analytical equipment was used. The problem is now widespread. Many pesticides have been detected in groundwater, and thousands of wells have been closed.

Nitrogen-containing fertilizers also threaten groundwater quality because they produce nitrate in the soil. Nitrate moves readily with deep percolation through the vadose zone to groundwater. Thus, nitrogen not used by crops or denitrified in the soil and volatilized eventually appears as nitrate in groundwater. Nitrate concentrations in vadose-zone water beneath agricultural fields typically range from 5 to 100 mg/L and are often 20 to 40 mg/L -- 10 to 30 mg/L greater than the maximum drinking water limit.

Growing concern over groundwater contamination caused by fertilizer and pesticide use has triggered an increase in legislative and regulatory activity. However, more research, including that on health effects and acceptable risks, is needed to establish sound regulations. Contaminant migration must also be better understood so that pesticide transport can be more accurately predicted. Preventing contamination is more effective than cleaning polluted aquifers and, for this purpose, best management practices (BMPs) must be developed. Realistic regulatory policies and management practices that will protect public health while ensuring viable and sustainable agriculture must be implemented.

Bouwer, H. "Effect Of Irrigated Agriculture On Groundwater." ***Journal of Irrigation and Drainage Engineering*****. V. 113, n. 1. pp. 4-15. 1987.**

Abstract. The time it takes for deep percolation water from irrigated fields to reach underlying groundwater increases with decreasing particle size of the vadose zone material and increasing depth to groundwater. For average deep percolation rates, decades may be required before the water joins the groundwater. Due to nonuniform irrigation applications and preferential flow, some deep percolation water will reach the groundwater much faster. Dissolved salts, nitrate, and pesticides are the chemicals in deep percolation water of main concern in groundwater pollution. Movement of pesticides may be retarded in the vadose zone, but biodegradation may also be slowed due to reduced organic carbon content and microbial activity at greater depths. Because of the large area of irrigated land in the world and the real potential for groundwater pollution, more research is necessary on downward movement of water and chemicals in the vadose zone.

Bouwer, H. and E. Idelovitch. "Quality Requirements For Irrigation With Sewage Water ." *Journal of Irrigation and Drainage Engineering*. V. 113, n. 4. pp. 516-535. 1987.

Abstract. Irrigation is an excellent use for sewage effluent because it is mostly water with nutrients. For small flows, the effluent can be used on special, well-supervised "sewage farms," where forage, fiber, or seed crops are grown that can be irrigated with standard primary or secondary effluent. Large-scale use of the effluent requires special treatment so that it meets the public health, agronomic, and aesthetic requirements for unrestricted use (no adverse effects on crops, soils, humans, and animals). Crops in the unrestricted-use category include those that are consumed raw or brought raw into the kitchen. Most state or government standards deal only with public health aspects, and prescribe the treatment processes or the quality parameter that the effluent must meet before it can be used to irrigate a certain category of crops. However, agronomic aspects related to crops and soils must also be taken into account. Quality parameters to be considered include bacteria, viruses, and other pathogens; total salt content and sodium adsorption ratio of the water (soil as well as crop effects); nitrogen; phosphorus; chloride and chlorine; bicarbonate; heavy metals, boron, and other trace elements; pH; and synthetic organics (including pesticides).

Brown, D. P. *Effects Of Effluent Spray Irrigation On Ground Water At A Test Site Near Tarpon Springs, Florida.* Geological Survey Open-File Report 81-1197. U.S. Geological Survey, Tallahassee, Florida. 1982.

Abstract. Secondary-treated effluent was applied to a 7.2-acre test site for about 1 year at an average rate of 0.06 million gallons per day and 3 years at 0.11 million gallons per day. Chemical fertilizer was applied periodically to the test site and adjacent areas. Mounding of the water table occurred due to effluent irrigation, inducing radial flow from the test site.

Ground water in the surficial aquifer at the test site and adjacent areas showed substantial increases in most chemical and physical parameters (including chloride, specific conductance, pH, total nitrogen, and total carbon) above the range of values observed in nearby areas that were irrigated with water from the Floridan aquifer and periodically fertilized.

In the surficial aquifer, about 200 feet downgradient from the test site, physical, geochemical, and biochemical processes effectively reduced total nitrogen concentration 90 percent and total phosphorus concentration more than 95 percent from that of the applied effluent. In the effluent, total nitrogen averaged 26 milligrams per liter and total phosphorus averaged 7.3 milligrams per liter. Downgradient, total nitrogen averaged 2.4 milligrams per liter and total phosphorus averaged 0.17 milligrams per liter. Increases in total phosphorus concentration were observed where the pH of ground water increased.

Microbiological data did not indicate fecal contamination in the surficial aquifer. Fecal coliform bacteria were generally less than 25 colonies per 100 milliliters at the test site and were not detected downgradient or near the test site. Fecal streptococcal bacteria were generally less than 100 colonies per 100 milliliters at the test site and on three occasions were detected adjacent to the test site. In the Floridan aquifer, total and fecal coliform bacteria were detected in 50 percent of the samples. Total coliform bacteria were generally less than 100 colonies per 100 milliliters and fecal coliform bacteria were generally less than 10 colonies per 100 milliliters. .

Butler, K. S. "Urban Growth Management And Groundwater Protection: Austin, Texas." *Planning For Groundwater Protection*. Academic Press, New York, New York. pp. 261-287. 1987.

Abstract. Austin, Texas has recognized that the greatest opportunity to prevent declining groundwater quality is through proper location, design, construction, and maintenance of new urban development and its associated drainage systems. Increasing development in the environmentally sensitive watersheds south and west of Austin resulted in the promulgation of a series of innovative watershed development ordinances in the early 1980s (Butler, 1983). These regulations are designed to protect the water quality of the Edwards Aquifer, a unique karstic limestone system. This process of planning for the protection of groundwater is the subject of this report.

Specifically, this report concerns the effects that the ordinances for several watersheds and the associated aquifer will have on suburban land development and water quality protection for the Edwards Aquifer. These ordinances are salient examples of a new, largely untested venture into urban runoff pollution control using a combination of engineering and land use management techniques. The immediate motivation for adopting these 4 techniques is protecting groundwater and spring discharges from degradation and contamination with nontoxic chemicals. Austin also recognized that toxic contaminants may become a threat to groundwater. The combination of engineering and land use management techniques as adopted in Austin's ordinances should protect the groundwater from organic and inorganic microcontaminants as well as more common pollutants associated with urban storm runoff.

This report addresses three key questions: Why is the Edwards Aquifer are so deserving of special protection in the face of urban expansion? How do these development standards affect the planning of new subdivisions and site developments? And how do groundwater quality protection standards operate in the broader context of growth management in this rapidly urbanizing region of central Texas?

Cavanaugh, J. E., H. S. Weinberg, A. Gold, R. Sangalah, D. Marbury, W. H. Glaze, T. W. Collette, S. D. Richardson and A. D. Thruston Jr. "Ozonation Byproducts: Identification Of Bromohydrins From The Ozonation Of Natural Water With Enhanced Bromide Levels." *Environmental Science & Technology*. V. 26, n. 8. pp. 1658-1662. 1992.

Abstract. When ozone is used in the treatment of drinking water, it reacts with both inorganic and organic compounds to form byproducts. If bromide is present, it may be oxidized to hypobromous acid, which may then react with natural organic matter (NOM) to form brominated organic compounds. The formation of bromoform has been well documented and more recently, other byproducts, such as bromoacetic acids, bromopicrin, cyanogen bromide, bromoacetones, and bromate, have been identified. The purpose of this communication is to report the identification of bromohydrins, a new group of labile brominated organic byproducts from the ozonation of a natural water in the presence of enhanced levels of bromide.

Chang, A. C., A. L. Page, P. F. Pratt and J. E. Warneke. "Leaching Of Nitrate From Freely Drained-Irrigated Fields Treated With Municipal Sludges." *Planning Now For Irrigation And Drainage In The 21st Century, Lincoln, Nebraska, 1988.* (American Society Of Civil Engineers, New York, New York, pp. 455-467). 1988.

Abstract. A municipal sludge land application experiment was initiated in 1975 near Riverside, California. From 1975 to 1983 sludges from the Los Angeles Metropolitan Area were applied on

experimental plots where crops were grown annually. Results indicated that (1) crop yields were not affected by the sludge application and the total biomass harvested was a function of total N input, (2) the extent and the rate of N mineralization of liquid sludges were consistently higher than composted sludges and the sludge application rate and the soil type did not affect mineralization of N, and (3) nitrogen application exceeding N requirements for crop growth always results in leaching and accumulation of nitrate in the soil profile.

Chase, W. L. J. "Reclaiming Wastewater In Phoenix, Arizona." ***Irrigation Systems For The 21st Century, Portland, Oregon, 1987.*** **(American Society Of Civil Engineers, New York, New York, pp. 336-343). 1987.**

Abstract. This paper examines the role of wastewater effluent reuse in the future water resource management of the City of Phoenix. The paper seeks to explain why a proposal to renovate effluent through rapid infiltration land treatment and to recycle that renovated water for agricultural irrigation has still not been implemented 20 years after the first serious studies of this project were initiated by the Salt River Project and the U.S. Department of Agriculture's Water Conservation Laboratory in Phoenix. While answering the technical questions concerning the safety of using renovated wastewater effluent for unrestricted agricultural irrigation accounted for a little of over half of that time, the primary problems since 1982 have been economic, legal and institutional.

Cisic, S., D. Marske, B. Sheikh, B. Smith and F. Grant. "City Of Los Angeles Effluent - Today's Waste, Tomorrow's Resource." ***Water Environment Federation 65th Annual Conference & Exposition, New Orleans, Louisiana, 1992.*** **(Water Environment Federation, Alexandria, Virginia). 1992.**

Abstract. The City Of Los Angeles (City) receives water from three sources. In an average year, 70 percent of the water used to come from the Eastern Sierra Nevada via the Los Angeles Aqueduct; wells in the San Fernando Valley and other local groundwater basins supplied 16 percent; and purchases from the Metropolitan Water District of Southern California (Metropolitan) provided the remaining 14 percent. Faced with the fifth consecutive year of drought and supply cut from all three present sources, the City is planning to tap into a fourth -- its wastewater.

Close, M. E. "Effects Of Irrigation On Water Quality Of A Shallow Unconfined Aquifer." ***Water Resources Bulletin.*** **V. 23, n. 5. pp. 793-802. 1987.**

Abstract. The ground water quality of a shallow unconfined aquifer was monitored before and after implementation of a border strip irrigation scheme, by taking monthly samples from an array of 13 shallow wells. Two 30 m deep wells were sampled to obtain vertical concentration profiles. Marked vertical, temporal, and spatial variabilities were recorded. The monthly data were analyzed for step and linear trends using nonparametric tests that were adjusted for the effects of serial correlation. Average nitrate concentrations increased in the preirrigation period and decreased after irrigation began. This was attributed to wetter years in 1978-1979 than 1976-1977 which increased leaching, and to disturbance of the topsoil during land contouring before irrigation, followed by excessive drainage after irrigation. Few significant trends were recorded for other determinants, possibly because of shorter data records.

Nitrate, sulphate, and potassium concentrations decreased with depth, whereas sodium, calcium, bicarbonate, and chloride concentrations increased. These trends allowed an estimation to be made of the depth of ground water affected by percolating drainage. This depth increased during the irrigation season

and after periods of winter recharge. Furthermore, an overall increase in the depth of drainage-affected ground waster occurred with time, which paralleled the development of the irrigation scheme.

Clothier, B. E. and T. J. Sauer. "Nitrogen Transport During Drip Fertigation With Urea." ***Soil Science Society Of America Journal.*** **V. 52, n. 2. pp. 345-349. 1988.**

Abstract. Urea added to drip irrigation water will be rapidly hydrolyzed in the soil to ammonium and then oxidized to nitrate. An approximate theory is presented for the unsteady, three- dimensional transport of water and N through unsaturated soil around a dripper discharging a urea solution. The results were compared with measurements from laboratory experiments with repacked silt loam. Water and solute movement in the course of the irrigation cycle and during the subsequent redistribution are considered. The theory successfully located the penetration of both the inert nitrate and reactive ammonium derived from the applied urea. It was possible to predict the direction, and approximated the magnitude of pH changes proximal to the emitter.

Craun, G. F. "Waterborne Disease - A Status Report Emphasizing Outbreaks In Ground-Water Systems." ***Ground Water.*** **V. 17, n. 2. pp. 183-191. 1979.**

Abstract. A total of 192 outbreaks of waterborne disease affecting 36,757 persons were reported in the United States during the period 1971-1977. More outbreaks occurred in nonmunicipal-water systems (70 %) than municipal-water systems; however, more illness (67 %) resulted from outbreaks in municipal systems. Almost half of the outbreaks (49 %) and illness (42 %) were caused by either the use of untreated or inadequately treated ground water. An unusually large number of waterborne outbreaks affected travelers, campers, visitors to recreational areas, and restaurant patrons during the months of May-August and involved nonmunicipal-water systems which primarily depend on ground-water sources. The major causes of outbreaks in municipal systems were contaminations of the distribution systems and treatment deficiencies which accounted for 68 % of the outbreaks and 75% of the illness that occurred in municipal systems. Use of untreated ground water was responsible for only 10% of the municipal system outbreaks and 1% of the illness. The major cause of the outbreaks in nonmunicipal systems was used of untreated ground water which accounted for 44% of the outbreaks and 44% of the illness in these systems. Treatment deficiencies, primarily inadequate and interrupted chlorination of ground- water sources, were responsible for 34% of the outbreaks and 50% of the illness in nonmunicipal-water systems.

Crites, R. W. "Micropollutant Removal In Rapid Infiltration." ***Artificial Recharge Of Groundwater.*** **Butterworth Publishers, Boston. pp. 579-608. 1985.**

Abstract. In a rapid-infiltration land treatment system, wastewater is treated as it percolates through the soil. The wastewater is applied to moderately and highly permeable soils (such as sands) by surface spreading in level basins or by sprinkling. Treatment is accomplished by biologic, physical and chemical means within the soil.

The need for definitive information on the extent of soil treatment during rapid infiltration has been recognized. Rapid infiltration is effective in removing many wastewater constituents such as suspended solids, BOD_5, ammonium-nitrogen, phosphorus, bacteria, and virus and is less effective in removing other constituents such as nitrate-nitrogen, trace organics, and trace minerals.

The constituents addressed in this report include trace organics, inorganics (those covered by drinking water standards), and microorganisms. For these three classes of constituents, the health effects, removal mechanisms and removals in existing rapid infiltration systems are discussed.

Crook, J., T. Asano and M. Nellor. "Groundwater Recharge With Reclaimed Water In California." ***Water Environment & Technology*****. V. 2, n. 8. pp. 42-49. 1990.**

Abstract. In California, increasing demands for water have given rise to surface water development and large-scale projects for water importation. Economic and environmental concerns associated with these projects have expanded interest in reclaiming municipal wastewater to supplement existing water supplies. Groundwater recharge represents a large potential use of reclaimed water in the state. For example, several projects have been identified in the Los Angeles area that could use up to 150 X 10^6 m^3/a (120,000 ac-ft/yr) of reclaimed water for groundwater recharge. Recharging groundwater with reclaimed wastewater has several purposes: to prevent saltwater intrusion into freshwater aquifers, to store the reclaimed water for future use, to control or prevent ground subsidence, and to augment nonpotable or potable groundwater aquifers. Recharge can be accomplished by surface spreading or direct injection.

With surface spreading, reclaimed water percolates from spreading basins through an unsaturated zone to the groundwater. Direct injection entails pumping reclaimed water directly into the groundwater, usually into a confined aquifer. In coastal areas, direct injection effectively creates barriers that prevent saltwater intrusion. In other areas, direct injection may be preferred where groundwater is deep or where the topography or existing land use makes surface spreading impractical or too expensive. While only two large-scale, planned operations for groundwater recharge are using reclaimed water in California, incidental or unplanned recharge is widespread.

The constraints of groundwater recharge with reclaimed water include water quality, the potential for health hazards, economic feasibility, physical limitations, legal restriction, and the availability of reclaimed water. Of these concerns, the health concerns are by far the most important, as they pervade all potential recharge projects. Health authorities emphasize that indirect potable reuse of reclaimed wastewater through groundwater recharge encompasses a much broader range of potential risks to the public's health than nonpotable uses of reclaimed water. Because the reclaimed water eventually becomes drinking water and is consumed, health effects associated with prolonged exposure to low levels of contaminants and acute health effects from pathogens or toxic substances must be considered. Particular attention must be given to organic and inorganic substances that may elicit adverse health responses in humans after many years of exposure.

Deason, J. P. "Irrigation-Induced Contamination: How Real A Problem?" ***Journal of Irrigation and Drainage Engineering*****. V. 115, n. 1. pp. 9-20. 1989.**

Abstract. The U.S. Department of the Interior has embarked on a series of reconnaissance-level investigations throughout the western states to identify, evaluate, and respond to irrigation-induced water quality problems. A series of water, sediment, and biological samples are being analyzed for 17 inorganic constituents and a number of pesticides. 19 studies in 13 states have been undertaken. Seven have been completed to date. Results of the seven studies that have been completed are presented and compared to baselines, standards, criteria, and other guidelines helpful for assessing the potential of observed constituent concentrations in water, bottom sediment, and biota, to result in physiological harm to fish, wildlife, or humans. These initial results indicate that a new environmental problem of major

proportions does not exit, but that some localized problems of significant magnitude do exist and should be addressed.

Deason, J. P. "Selenium: It's Not Just In California." ***Irrigation Systems For The 21st Century, Portland, Oregon, 1987.*** **(American Society Of Civil Engineers, New York, New York, pp. 475-482). 1987.**

Abstract. The U.S. Department of the Interior has embarked on a series of reconnaissance level investigations throughout the western states to identify and assess potential irrigation-induced water quality problems. A series of water, sediment and biological samples are being analyzed for selenium and 16 other trace elements, as well as a number of pesticides. Nine studies in seven states are underway currently and 10 additional locations for study have been identified.

DeBoer, J. G. "Wastewater Reuse: A Resource Or A Nuisance?" ***Journal of the American Water Works Association.*** **V. 75, . pp. 348-356. 1983.**

Abstract. As demand for good quality water increases, some areas in the United States find that traditional finite sources cannot meet all needs. although many utilities draw potable supplies from water that has previously been used upstream, the direct reuse of treated water for potable supplies is limited by unknowns concerning health effects and by costs. Planned reuse options, however, are feasible water conservation techniques, especially for industrial and agricultural uses. Reclaimed wastewater can also be used to recharge groundwater, thereby augmenting potable supplies.

Domagalski, J. L. and N. M. Dubrovsky. "Pesticide Residues In Ground Water Of The San Joaquin Valley, California." ***Journal Of Hydrology.*** **V. 130, n. 1-4. pp. 299-338. 1992.**

Abstract. A regional assessment of non-point-source contamination of pesticide residues in ground water was made of the San Joaquin Valley, an intensively farmed and irrigated structural trough in central California. About 10% of the total pesticide use in the USA is in the San Joaquin Valley. Pesticides detected include atrazine, bromacil, 2,4-DP, diazinon, dibromochloropropane, 1,2- dibromoethane, dicamba, 1,2-dichloropropane, diuron, prometon, prometryn, propazine and simazine. All are soil applied except diazinon.

Pesticide leaching is dependent on use patterns, soil texture, total organic carbon in soil, pesticide half-life and depth to water table. Leaching is enhanced by flood-irrigation methods except where the pesticides is foliar applied such as diazinon. Soils in the western San Joaquin Valley are fine grained and are derived primarily from marine shales of the Coast Ranges. Although shallow ground water is present, the fewest number of pesticides were detected in this region. The fine- grained soil inhibits pesticide leaching because of either low vertical permeability or high surface area; both enhance adsorption on to solid phases. Soils in the eastern part of the valley are coarse grained with low total organic carbon and are derived from Sierra Nevada granites. Most pesticide leaching is in these alluvial soil, particularly in areas where depth to ground water is less than 30 m. The areas currently most susceptible to pesticide leaching are eastern Fresno and Tulare Counties.

Tritium in water molecules is an indicator of aquifer recharge with water of recent origin. Pesticide residues transported as dissolved species were not detected in non- tritiated water. Although pesticides were not detected in all samples containing high tritium, these samples are indicative of the presence of recharge water that interacted with agricultural soils.

Ehrlich, G. G., E. M. Godsy, C. A. Pascale and J. Vecchioli. "Chemical Changes In An Industrial Waste Liquid During Post- Injection Movement In A Limestone Aquifer, Pensacola, Florida." *Ground Water.* V. 17, n. 6. pp. 562-573. 1979a.

Abstract. An industrial waste liquid containing organonitrile compounds and nitrate ion has been injected into the lower limestone of Floridan aquifer near Pensacola, Florida since June 1975. Chemical analyses of water from monitor wells and backflow from the injection well indicate that organic carbon compounds are converted to CO_2 and nitrate is converted to N_2. These transformations are caused by bacteria immediately after injection, and are virtually completed within 100 m of the injection well. The zone near the injection well behaves like an anaerobic filter with nitrate respiring bacteria dominating the microbial flora in this zone.

Sodium thiocyanate contained in the waste is unaltered during passage through the injection zone and is used to detect the degree of mixing of injected waste liquid with native water at a monitor well 312 m (712 ft) from the injection well. The dispersivity of the injection zone was calculated to be 10 m (33 ft). Analyses of samples from the monitor well indicate 80 percent reduction in chemical oxygen demand and virtually complete loss of organonitriles and nitrate from the waste liquid during passage from the injection well to the monitor well. Bacteria densities were much lower at the monitor well than in backflow from the injection well.

Ehrlich, G. G., H. F. H. Ku, J. Vecchioli and T. A. Ehlke. *Microbiological Effects Of Recharging The Magothy Aquifer, Bay Park, New York, With Tertiary-Treated Sewage.* Geological Survey Professional Paper 751-E. U.S. Government Printing Office, Washington, D.C. 1979b.

Abstract. Injection of highly treated sewage (reclaimed water) into a sand aquifer on Long Island, N.Y., stimulated microbial growth near the well screen. Chlorination of the injectant to 2.5 milligrams per liter suppressed microbial growth to the extent that it did not contribute significantly to head buildup during injection. In the absence of chlorine, microbial growth caused extensive well clogging in a zone immediately adjacent to the well screen.

During a resting period of several days between injection and well redevelopment, the inhibitory effect of chlorine dissipated and microbial growth ensued. The clogging mat at the well/ aquifer interface was loosened during this period, probably as a result of microbial activity.

Little microbial activity was noted in the aquifer beyond 20 feet from the well screen; this activity probably resulted from small amounts of biotransformable substances not completely filtered out of the injectant by the aquifer materials.

Movement of bacteria from the injection well into the aquifer was not extensive. In one test, in which injected water had substantial total-coliform, fecal-coliform, and fecal-streptococcal densities , no fecal- coliform or fecal - streptococcal bacteria, and only nominal total-coliform bacteria, were found in water from an observation well 20 feet from the point of injection.

Elder, J. F., J. D. Hunn and C. W. Calhoun. ***Wastewater Application By Spray Irrigation On A Field Southeast Of Tallahassee, Florida: Effects On Ground-Water Quality And Quantity.*** **Geological Survey Water-Resources Investigations Report 85-4006. U.S. Geological Survey, Tallahassee, Florida. 1985.**

Abstract. An 1,840-acre agriculture field southeast of Tallahassee, Florida, which has been used for land applic ation of wastewater by spray irrigation, is the site of a long-term, ground-water monitoring study. The purpose of the study is to determine effects of wastewater application on water-table elevations and ground-water quality. The study was conducted in cooperation with the City of Tallahassee. This report summarizes the findings for the period 1980-82.

Wastewater used for spray irrigation has high concentrations, relative to those in ground water, of chloride, nitrogen, phosphorus, organic carbon, coliform bacteria, sodium, and potassium. At most locations, percolation through the soil has been quite effective in attenuation of these substances before they can impact the ground water. However, increases in chloride and nitrate-nitrogen were evident in ground water in some of the monitoring wells during the study, especially those wells which are within the sprayed areas. Chloride concentrations, for example, increased from approximately 3 milligrams per liter to 15 to 20 milligrams per liter in some wells and nitrate-nitrogen concentrations increased less than 0.5 milligrams per liter to 4 milligrams per liter or more.

Ground-water levels in the area of the spray field fluctuated over a range of several feet. These fluctuations were affected somewhat by spray irrigation, but the primary control on water levels was rainfall.

As of December 1982, constituents introduced to the system by spray irrigation of effluent had not exceeded drinking water standards in the ground water. The system has not yet stabilized, however, and more changes in ground-water quality may be expected.

Eren, J. "Changes In Wastewater Quality During Long Term Storage." pp. 1291-1300.

Abstract. The rainfall in Israel is in the winter months November-April and the irrigation period is during the summer months May-October. Cotton which is the main crop irrigated by reused wastewater requires irrigation during 3 months (June- August) only.

Therefore wastewater reuse projects require facilities to store the winter effluents for summer utilization.

It is either underground storage in sandy aquifers as in the Dan Region reclamation project or storage in deep wastewater reservoirs which are used in all the other projects. The largest of these reservoirs is the Maale Kishon (Upper Kishon) Reservoir which is part of the Kishon Project that reuses wastewater from the Haifa Metropolitan Region.

The storage duration is few weeks up to several months and during this period there is intense biological activity which causes significant changes in water quality in the reservoirs. In a preliminary study in a small reservoir (1) prior to the construction of the Maale Kishon Reservoir it was observed that 6 weeks storage improved considerably the water quality. The purpose of this investigation was to determine the changes that occur in relative large water body and how those affect those parameters which are important for agricultural irrigation.

Ferguson, B. K. "Role Of The Long-term Water Balance In Management of Stormwater Infiltration." *Journal Of Environmental Management.* V. 30, n. 3. pp. 221-233. 1990.

Abstract. Artificial infiltration of urban stormwater can potentially recharge ground water and sustain stream base flows while improving stormwater quality and contributing to flood control. It involves capturing stormwater in basins where it is stored while infiltrating the surrounding soil. This paper suggests that management of these basins with design-storm approaches needs to be supplemented by the long-term water balance incorporates continuous low-level background flows, in contrast to the design storm, which is an isolated, rare and brief event. Background flows can accumulate in basins with no regular surface outlets, potentially reducing basin capacity and causing nuisances associated with standing water. A model is described for routing monthly average flows through infiltration basins. Using this model, 12 infiltration basins representing different construction methods and management objectives were designed for a hypothetical catchment in the Atlanta area. The effects of these basins in terms of cost, presence of standing water, capture of flood flows and average annual disposition of water were evaluated. The results show that background flows cannot be disregarded in infiltration management, since the performance of basins designed without considering background flows can be considerably hampered by their presence. The results also invite discussion of alternative basin geometries, materials and hydroperiods as ways of meeting site-specific objectives for water resources and urban amenities.

Ferguson, R. B., D. E. Eisenhauer, T. L. Bockstadter, D. H. Krull and G. Buttermore. "Water And Nitrogen Management In Central Platte Valley Of Nebraska." *Journal Of Irrigation And Drainage Engineering*. V. 116, n. 4. pp. 557-565. 1990.

Abstract. Contamination of ground water by nitrogen leached from fertilizer on irrigated soils is related to the quantity of nitrate-N (NO_3^--N) present, the leaching potential based on soil texture and percent depletion of available soil water in the root zone, and the amount of water entering the soil profile. Research and demonstration projects in the central Platte valley of Nebraska have shown that NO_3^--N leaching is influenced by both irrigation and fertilizer-nitrogen (N) management in corn production. Scheduling irrigation according to available soil-water depletion can reduce deep percolation to a certain extent. Additional reduction in deep percolation can be achieved by improving efficiency of water application, particularly on furrow irrigated fields. Testing for NO_3^--N in irrigation water and soil can provide for substantial reductions in fertilizer N application, if residual levels in the soil are high, or if considerable NO_3^--N will be applied with irrigation water. Grain yields were not appreciably affected by the use of these management practices, while in most cases input costs for fertilizer nitrogen and irrigation water were reduced.

Gerba, C. P. and S. M. Goyal. "Pathogen Removal From Wastewater During Groundwater Recharge." *Artificial Recharge Of Groundwater.* Butterworth Publishers, Boston. pp. 283-317. 1985.

Abstract. Groundwater contamination by pathogenic microorganisms has not received as much attention as surface water pollution because it is generally assumed that groundwater has a good microbiologic quality and is free of pathogenic microorganisms. A number of well-documented disease outbreaks have, however, been traced to contaminated groundwater. A total of 673 waterborne outbreaks affecting 150,268 persons occurred in the United States from 1946 to 1980. Of these, 295 (44%) involving 65,173 cases were attributed to contamination of groundwater.

Currently, 20 percent of the total water consumed in the United States is drawn from groundwater sources and it estimated that this usage will increase to 33 percent in the year 2000. According to Duboise

et al. over 60 million people in the United States are served by public water supplies using groundwater, and about 54 percent of rural population and 2 percent of the urban population obtain their water from individual well. Since groundwater is often used for human consumption without any treatment, it is imperative to understand the fate of pathogenic microorganisms during land application of wastewater.

The sources of fecal contamination may include septic tanks, leaky sewer lines, lagoons and leaching ponds, sanitary landfills for solid wastes, and sewage oxidation ponds. Additional sources of pathogens in groundwater may involve artificial recharge of groundwater aquifers with renovated wastewater including deep well injection, spray irrigation of crops and landscape, basin recharge, and land application of sewage effluent and sludges. Leakage of sewage into the groundwater from septic tanks, treatment lagoons and leaky sewers is estimated to be over a trillion gallons a year in the United States.

It should be realized that, as opposed to surface water pollution, contamination of groundwater is much more persistent and is difficult to eradicate. Because restoration of groundwater quality is difficult, time-consuming, and expensive, efforts should be made for the protection of groundwater quality rather than only for its restoration after degradation.

Gerba, C. P. and C. N. Haas. "Assessment Of Risks Associated With Enteric Viruses In Contaminated Drinking Water." ***Chemical And Biological Characterization Of Sludges, Sediments, Dredge Spoils, And Drilling Muds. ASTM STP 976.*** **American Society For Testing And Materials, Philadelphia, Pennsylvania. pp. 489-494. 1988.**

Abstract. It is now well established that enteric viruses, such as hepatitis A, Norwalk, rotavirus, and so forth, can be transmitted by sewage-contaminated water and food. Standards for viruses in water have been suggested by the World Health Organization and several other organizations. Few attempts have been made to assess the risks associated with exposure to low numbers of enteric viruses in the environment.

To determine the risks that may be associated with exposure to human enteric viruses, the literature on minimum infectious dose, incidence of clinical illness, and mortality was reviewed. This information was then used to assess the probability of infection, illness, and mortality for individuals consuming drinking water containing various concentrations of enteric viruses. Risks were determined on a daily, annual, and lifetime basis. This analysis suggested that significant risks of illness($>1:10^6$) may arise from the exposure to low levels of the enteric virus.

German, E. R. ***Quantity And Quality Of Stormwater Runoff Recharged To The Floridan Aquifer System Through Two Drainage Wells In The Orlando, Florida, Area.*** **Geological Survey Water Supply Paper 2344. U.S. Government Printing Office, Washington, D.C. 1989.**

Abstract. Quantity and quality of inflow to two drainage wells in the Orlando, Fla. ,area were determined for the period April 1982 through March 1983. The wells, located at Lake Midget and at Park Lake, are used to control the lake levels during rainy periods. The lakes receive stormwater runoff from mixed residential-commercial areas of about 64 acres (Lake Midget) and 96 acres (Park Lake) and would frequently flood adjacent areas if the wells did not drain the excess stormwater. These lakes and wells are typical of stormwater drainage systems in the area.

Lake stages were monitored and used to estimate quantities of drainage-well inflow. Estimated inflow for April 1982 through March 1983 was 62.4 acre-feet at Lake Midget and 84.0 acre-feet at Park Lake. Inflow to the drainage wells was sampled periodically. The quality of water prior to inflow to the

drainage wells was estimated from samples of stormwater runoff to the lakes. The quality of formation water near the wells was estimated from samples pumped from the two drainage wells. a reconnaissance sampling of inflow at seven other drainage wells in the Orlando area was done, once at each well, to broaden the areal coverage of the investigation. The laboratory analyses included determinations of selected nutrients, bacteria, major constituents, trace elements, and numerous organic compounds , including many designated priority pollutants by the U.S. Environmental Protection Agency.

Comparison of quality of drainage-well inflow with State criteria for drinking water supply indicated that color and bacteria were excessively high, and pH excessively low, in some samples. Constituents that exceeded the criteria were iron, in 10 to 21 inflow samples, manganese, in 1 sample, and lead, in 1 sample.

The priority pollutant dibenzo(a,h)anthracene was present in one of two sample pumped from the Lake Midget drainage well (concentration of 370 micrograms per liter). The presence of this compound in that high a concentration is puzzling because it was not detected in any samples of stormwater runoff or drainage-well inflow.

Pesticides, especially diazinon, malathion, and 2,4-D, were the most frequently detected organic compounds in stormwater runoff, drainage-well inflow, and Floridan aquifer system water samples. The priority pollutant bis(2-ethylhexyl)phthalate was detected in seven samples from five sites, probably because of widespread use of the compound in plastic products. Polynuclear aromatic compounds (fluoranthene, pyrene, anthracene, and chrysene) were found in stormwater runoff or inflow to drainage wells at Lake Midget or Park Lake and may be associated with runoff containing petroleum products.

Estimated annual loads to the Floridan aquifer system through drainage-well inflow in the Orlando area, in pounds, are dissolved solids, 32,000,000; total nitrogen, 100, 000; total phosphorus, 13,000; total recoverable lead, 2,300; and total recoverable zinc, 3,700.

Goldschmid, J. "Water-Quality Aspects Of Ground-Water Recharge In Israel." ***Journal Of The American Water Works Association.*** **V. 66, n. 3. pp. 163-166. 1974.**

Abstract. Because of the difference in rainfall and water needs in northern and southern Israel, a method of recharging ground water and transporting it from the north to the south was needed. This article details the new system, including problems encounter and overcome.

Goolsby, D. A. ***Geochemical Effects And Movement Of Injected Industrial Waste In A Limestone Aquifer.*** **Memoir No. 18. American Association Of Petroleum Geologists. 1972.**

Abstract. Since 1963, more than 6 billion gal of acidic industrial waste has been injected into a limestone aquifer near Pensacola, Florida. The industrial waste, an aqueous solution containing nitric acid, inorganic salts, and numerous organic compounds, is injected through two wells into the aquifer between depths of 1, 400 and 1,700 ft (425-520 m). The aquifer receiving the waste is overlain by an extensive clay confining layer which, at the injection site, is about 200 ft (60 m) thick.

Industrial waste is presently (late 1971) being injected at a rate of about 2,100 gal per minute. Wellhead injection pressures are about 175 psi. Calculations indicate that pressure effects in the receiving aquifer extend out more than 30 mi (48 km). No apparent change in pressure has been detected in the aquifer directly above the clay confining layer. Geochemical effects were detected at a monitor well in the receiving aquifer 0.25 mi (0.4 km) from the injection wells about 10 months after injection began. The

geochemical effects included increases in calcium-ion concentration and total alkalinity and formation of large quantities of nitrogen and methane gas.

Geochemical effects have not been detected at monitor wells in the receiving aquifer 1.9 mi (3.0 km) north and 1.5 mi (2.4 km) south of the injection wells, nor have effects been detected in a monitor well at the injection site open to the aquifer directly overlying the clay confining layer. Tests made at the injection wells early in 1968 indicated that rapid denitrification and neutralization of the waste occurred near the injection wells. Denitrification may have accounted for more than half neutralization, and solution of calcium carbonate accounted for the rest. Denitrification has not been observed since mid-1968, when the pH of the injected waste was lowered from 5.5 to 3.

Greene, G. E. ***Ozone Disinfection And Treatment Of Urban Storm Drain Dry-Weather Flows: A Pilot Treatment Plant Demonstration Project On The Kenter Canyon Storm Drain System In Santa Monica.*** **The Santa Monica Bay Restoration Project, Monterey Park, CA. 1992.**

Abstract. The Pico-Kenter Canyon storm drain has become the archetype for assessing the problems and possible solutions that can be associated with many of the urban storm drains in the Santa Monica Bay region. While known events of chemical contamination are few, the drain has long been known to be contaminated with indicator bacteria such as Total and Fecal Coliforms. More recently, the consistent identification of Human Enteric Viruses, F-male Specific Coliphage, and high densities of Enterococcus bacteria have indicated that a potentially serious public health threat exists. The City Of Santa Monica, with the assistance of the Santa Monica Bay Restoration Project (SMBRP), the United States Environmental Protection Agency (EPA), and the UCLA Laboratory of Biomedical and Environmental Sciences (LBES), recently completed an evaluation of ozone for the treatment of dry-weather storm drain flows. The primary goals of this study were to establish if ozone could be used to disinfect the water that typically flows from the Pico-Kenter storm drain and determine if some known hazardous chemical contaminants were present at significant levels.

Recently, ozone has become renowned in the drinking water industry as an alternative to chlorine that rapidly disinfects water while forming few halogenated by-products. This study demonstrated that ozone was an effective disinfectant, reducing bacterial and viral populations by 3-5 log (99.9 to 99.999% of the microbes killed or inactivated). In many of the 438 effluent samples, coliform concentrations were sufficiently reduced to qualify the water for reclamation projects such as landscape irrigation along the Santa Monica Freeway, suggesting a possible useful role for the treated effluent. Ozonation by-products (aldehydes) were detected in the plant effluent at low (<100 PPB) concentrations. No significant increase in halogenated by-products, or mutagenicity, were observed following ozone disinfection. During a test of the ozonation process, twelve organic chemicals were added to the influent water and the effluent monitored. While some refractory compounds passed through the pilot facility intact, the concentrations of most were reduced.

In comparison to the State Ocean Plan Water Quality Objectives and Federal Drinking Water Maximum Contaminant Levels, the primary hazardous chemical constituents in the influent storm drain water were metals (primarily copper and lead) and polynuclear aromatic hydrocarbons (PAHs). While lead levels were significantly above both standards, the concentration of copper was well under drinking water standards. The mean observed level of six major PAHs were approximately equal to their proposed phase V drinking water MCL standard (100-400 ng/L or PPTr). Isolated samples were found to contain organic contaminants, such as ortho-xylene and the pesticide chlordane. This did not appear to be a pervasive problem and can be attributed to isolated events that cannot be anticipated and will only be prevented through an informed and concerned public.

While the metal content of the water cannot be reduced using ozone, this study found that high concentrations of some organics, including PAHs, can be reduced during the ozonation process. This remediation probably occurs by oxidation and hydroxylation to less hazardous forms. Irregardless of further ozonation investigations, additional more sensitive and definitive PAH analyses are warranted in future studies of the storm drain water and sediments.

Based on the results of this investigation, the City Of Santa Monica is investigating construction of a disinfection facility that would reclaim high quality water for landscape irrigation, use low quality for sewer flushing, and disinfect the remainder prior to releasing it into the Santa Monica Bay. Construction of the proposed facility would be encouraged by the support of the Santa Monica Bay Restoration Project in goal definition and consensus building among the member and non-member agencies.

Summary Conclusions

1) Ozone at moderate doses (10-20 mg/L) was an extremely effective disinfectant of dry-weather storm drain flows.
2) Bacterial and viral levels were reduced 3-5 log (99.9 to 99.999% of the microbes killed or deactivated).
3) Much of the effluent was sufficiently disinfected to meet the landscape irrigation standard of 23 coliforms per 100 ml.
4) Based on California Ocean Plan Water Quality Objectives, heavy metals and polynuclear aromatic hydrocarbons appear to be the primary contaminants of concern in the pilot plant effluent.
5) While ozone disinfection by-products were detected (aldehydes), their concentration was low and, in contrast to what would be expected from disinfection by chlorination, no increase in mutagenicity was observed following ozonation.

Summary Recommendations

1) The SMBRP should encourage further evaluation of the ozone disinfection process, by promoting the City of Santa Monica in its effort to design and construct a full scale facility.
2) Since construction and operation of the proposed facility will require interagency consent and permitting, the City of Santa Monica solicits the continued assistance of the SMBRP in consensus building, policy direction, and technical support.
3) Further investigations into the use of the ozone technology should include provisions for the evaluation of Advanced Oxidation Processes (AOPs), using hydrogen peroxide and ozone, for the control of organic pollutants such as PAHs.

Hampson, P. S. *Effects Of Detention On Water Quality Of Two Stormwater Detention Ponds Receiving Highway Surface Runoff In Jacksonville, Florida.* Geological Survey Water-Resources Investigations Report 86-4151. U.S. Geological Survey, Tallahassee, Florida. 1986.

Abstract. Water and sediment samples were analyzed for major chemical constituents, nutrients, and heavy metals following 10 storm events at a stormwater detention ponds that receive highway surface runoff in the Jacksonville, Florida, metropolitan area. The purpose of the sampling program was to detect changes in constituent concentration with time of detention within the pond system. Statistical inference of a relation with total rainfall was found on the initial concentrations of 11 constituents and with antecedent dry period for the initial concentrations of 3 constituents. Based on graphical examination and factor analysis, constituent behavior with time could be grouped into five relatively independent processes for one of the ponds. The processes were (1) interaction with shallow ground-water systems, (2) solubilization of bottom materials , (3) nutrient uptake, (4) seasonal changes in

precipitation, and (5) sedimentation. Most of the observed water-quality changes in the ponds were virtually complete within 3 days following the storm event.

Harper, H. H. *Effects Of Stormwater Management Systems On Groundwater Quality*. DER Project WM190. Florida Department Of Environmental Regulation, Orlando, Florida. 1988.

Abstract. It has long been recognized that nonpoint sources of pollution contribute significantly to receiving water loadings of both nutrients and toxic elements such as heavy metals (Harper, 1983; Sartor, *et al.*, 1974). As a means of protecting Florida surface waters from the effects of nonpoint source pollution, the Florida Department of Environmental Regulation has established regulations which require new developments or projects to retain or detain specified volumes of runoff water on-site. In most cases runoff is collected in shallow ponds which infiltrate all or part of the retained or detained volumes into groundwaters.

When stormwater management facilities receive inputs of stormwater containing nutrients, heavy metals and other pollutants, processes such as precipitation, coagulation, settling and biological uptake deposit a large percentage of the input mass into the sediments. Recently, concern has been expressed that this continual accumulation of pollutants in the sediments of stormwater management ponds may begin to present a toxicity or pollution potential to underlying groundwaters. Specifically, do these pollutant accumulations cause physical and chemical changes to occur within the sediments of stormwater management facilities which mobilize certain pollutant species from the sediment phase into the water phase.

Hickey, J. J. "Subsurface Injection Of Treated Sewage Into A Saline-Water Aquifer At St. Petersburg, Florida-Aquifer Pressure Buildup." *Ground Water*. V. 22, n. 1. pp. 48-55. 1984.

Abstract. The city of St. Petersburg has been testing subsurface injection of treated sewage into the Floridan aquifer as a means of eliminating discharge of sewage to surface waters and as a means of storing treated sewage for future nonpotable reuse. The injection zone originally contained native saline ground water that was similar in composition to sea water. The zone has a transmissivity of about 1.2 X 10^6 feet squared per day (ft^2/ d) and is within the lower part of the Floridan aquifer.

Treated sewage that had a mean chloride concentration of 170 milligrams per liter (mg/l) was injected through a single well for 12 months at a mean rate of 4.7 X 10^5 cubic feet per day (ft^3/d). The volume of water injected during the year was 1.7 X 10^8 cubic feet.

Pressure buildup at the end of one year ranged from less than 0.1 to as much as 2.4 pounds per square inch (lb/ in^2) in observation wells at the site. Pressure buildup in wells open to the upper part of the injection zone was related to buoyant lift acting on the mixed water in the injection zone in addition to subsurface injection through the injection well.

Calculations of the vertical component of pore velocity in the semiconfining bed underlying the shallowest permeable zone of the Floridan aquifer indicate upward movement of native water. This is consistent with the 200-to 600-mg/l increase in chloride concentration observed in water from the shallowest permeable zone during the test.

Hickey, J. J. and J. Vecchioli. *Subsurface Injection of Liquid Waste With Emphasis on Injection Practices in Florida*. Geological Survey Water-Supply Paper 2281. United States Government

Printing Office, Washington D.C. 1986.

Abstract. Subsurface injection of liquid waste is used as a disposal method in many parts of the country. It is used particularly when other methods for managing liquid waste are either not possible or too costly. Interest in subsurface injection as a waste-disposal method stems partly from recognition that surface disposal of liquid waste may establish a potential for degrading freshwater resources. Where hydrogeologic conditions are suitable and where surface disposal may cause contamination, subsurface injection is considered an attractive alternative for waste disposal. Decisions to use subsurface injection need to be made with care because, where hydrogeologic conditions are not suitable for injection, the risk to water resources, particularly ground water, could be great. Selection of subsurface injection as a waste-disposal method requires thoughtful deliberation and, in some instances, extensive data collection and analyses.

Subsurface injection is a good geological method of waste disposal. Therefore, many State and local governmental officials and environmentally concerned citizens who make decisions about waste-disposal alternatives may know little about it. This report serves as an elementary guide to subsurface injection and presents subsurface injection practices in Florida as an example of how one State is managing injection.

Hickey, J. J. and W. E. Wilson. *Results Of Deep-Well Injection Testing At Mulberry, Florida.* Geological Survey Water-Resources Investigations Report 81-75. U.S. Geological Survey, Tallahassee, Florida. 1982.

Abstract. At the Kaiser Aluminum and Chemical Corporation plant, Mulberry, Florida, high-chloride, acidic liquid wastes are injected into a dolomite section at depths below about 4,000 feet below land surface. Sonar caliper logs made in April 1976 revealed a solution chamber that is about 100 feet in height and has a maximum diameter of 23 feet in the injection zone.

Results of two injection tests in 1972 were inconclusive because of complex conditions and the lack of an observation well that was open to the injection zone. In 1975, a satellite monitor well was drilled 2,291 feet from the injection well and completed open to the injection zone. In April 1975 and September 1976, a series of three injection tests were performed. Duration of the tests ranged from 240 to 10,020 minutes and injection rates ranged from 110 to 230 gallons per minute. Based on an evaluation of the factors that affect hydraulic response, water-level data suitable for interpretation of hydraulic characteristics of the injection zone were identified to occur from 200 to 1,000 minutes during the 10,020-minute test. Test results indicate that leakage through confining beds is occurring.

Transmissivity of the injection zone was computed to be within the range from 700 to 1, 000 feet squared per day and storage coefficient of the injection zone was computed to be within the range from $4x10^{-5}$ to $6x10^{-5}$. The confining bed accepting most of the leakage appears to be the underlying bed. Also, it appears that the overlying beds are probably relatively impermeable and significantly retard the vertical movement of neutralized waste effluent.

Higgins, A. J. "Impacts On Groundwater Due To Land Application Of Sewage Sludge." *Water Resources Bulletin*. V. 20, n. 3. pp. 425-434. 1984.

Abstract. The project was designed to demonstrate the potential benefits of utilizing sewage sludge as a soil conditioner and fertilizer on Sassafras sandy loam soil. Aerobically digested, liquid sewage sludge was applied to the soil at rates of 0, 22.4 and 44.8 Mg of dry solids/ha for three consecutive years

between 1978 and 1981. Groundwater, soil, and crop contamination levels were monitored to establish the maximum sewage solids loading rate that could be applied without causing environmental deterioration. The results indicate that application of 22.4 Mg of dry solids/ha of sludge is the upper limit to ensure protection of the groundwater quality on the site studied. Application rates at or slightly below 22.4 Mg of dry solids/ha are sufficient for providing plant nutrients for the dent corn and rye cropping system utilized in the study.

Horsley, S. W. and J. A. Moser. "Monitoring Ground Water For Pesticides At A Golf Course - A Case Study On Cape Cod, Massachusetts." ***Ground Water Monitoring Review.*** **V. 10. pp. 101-108. 1990.**

Abstract. The town of Yarmouth, Massachusetts, proposed to locate a new municipal golf course within a delineated area of recharge to public water-supply wells. Two concerns of town officials were (1) hydrologic impacts upon downgradient wells; and (2) water- quantity impacts from fertilizers and pesticides. In response to these concerns, a thorough hydrogeologic investigation was made, fertilizer and pesticides management programs were recommended, and a ground water monitoring program was developed.

The golf course parcel was determined to be underlain by a sand and gravel aquifer composed primarily of glacial outwash. Water-table maps confirmed that ground water flow was in the direction of several public water-supply wells. A three-dimensional finite-difference flow model was used to determine the optimum location and pumping rates for irrigation wells. Potential nitrate-nitrogen concentration in the ground water were predicted to range from 5.0 to 7.9 milligrams per liter so slow-release fertilizers were recommended.

With the assistance of the EPA Office of Pesticide Programs, the list of proposed pesticides was reviewed and sorted into three categories based on the known leachability, mobility, and toxicity characteristics of each compound. Specific recommendations were made as to pesticide selection and application rate using that classification.

A monitoring program was developed to provide an on-going assessment of any effects on water quality related to the application of fertilizer or pesticide. The elements of the monitoring program include (1) specifications for monitoring wells and lysimeters, (2) a schedule for sampling and analysis, (3) specific concentrations of nitrates or pesticide compounds that require resampling and analysis, restriction of usage, or remedial action, and (4) regular reports to the Yarmouth Water Quality Advisory Committee and to the Yarmouth Water Department. In a effort to ensure the implementation of this program, a table of responsibilities was prepared, and a Memorandum of Understanding adopting the program was signed by the town agencies interested in water-supply protection and the golf course operation.

The monitoring facilities were installed with minimal problems as part of the golf course construction tasks. However, implementation of the sampling and analysis part of the program was accomplished only after some difficulty and delay. The assistance of the State Pesticide Bureau, the University of Massachusetts Department of Entymology, and the Massachusetts Pesticide Laboratory was enlisted when budgetary problems threatened to prevent implementation. It is apparent from Yarmouth's experience that the mere preparation of a plan is not sufficient by itself. Consultants who prepare the plan should make every possible effort to include implementation in their scope of services.

Hull, R. W. and M. C. Yurewicz. ***Quality Of Storm Runoff To Drainage Wells In Live Oak, Florida, April 4, 1979.*** **Geological Survey Open-File Report 79-1073. U.S. Government Printing**

Office, Washington, D.C. 1979.

Abstract. Water-quality samples of storm runoff to drainage wells were collected during a storm event on April 4, 1979. Two sites in commercial areas and two in residential areas of Live Oak, Florida, were sampled. A composite rainfall sample was collected from these sites, and rainfall quantity data were obtained from two additional sites.

Samples of storm runoff were analyzed for those constituents important to the potability of water. The analyses generally included filtered and unfiltered nutrients, bacteria, trace elements, and organics. Several of the analyses had constituent values which equaled or exceeded maximum containment levels for State primary drinking water standards and Federal proposed secondary drinking water standards.

Ishizaki, K. "Control Of Surface Runoff By Subsurface Infiltration Of Stormwater: A Case Study In Japan." ***Artificial Recharge Of Groundwater.*** **Butterworth Publishers, Boston. pp. 565-575. 1985.**

Abstract. Even though the annual rainfall in Japan is about 1,800 mm, which is twice as much as the average rainfall worldwide, water shortages often occur during the summer months. This is because a large amount of surface water is diverted to flood rice fields and, as a result, river flow is reduced to the minimum.

There have been various long-term national programs for the development and management of water resources. Groundwater provides approximately 16 percent of the water resources requirements in Japan. In some areas, however, the groundwater levels have been lowered by excessive pumping and such problems as land subsidence and seawater intrusion have occurred. There have been many cases, particularly in the coastal regions, where salinity of groundwater has become too high for any significant beneficial uses. In addition, due to the urbanization of river drainage basins in many parts of Japan, the decrease of soil infiltration has caused excessive surface runoff, leading to several serious flooding incidences in the surrounding areas.

To reduce excessive surface runoff and to promote groundwater recharge of stormwater, a number of groundwater recharge methods have been investigated at the Japan Ministry Of Construction's Public Works Research Institute. This report describes the subsurface infiltration of stormwater through culverts and also discusses the effects of the stormwater infiltration experiment at an apartment complex in Tokyo, Japan.

Jansons, J., L. W. Edmonds, B. Speight and M. R. Bucens. "Movement Of Viruses After Artificial Recharge." ***Water Research.*** **V. 23, n. 3. pp. 293-299. 1989a.**

Abstract. Results of human enteric virus movement through soil and groundwater aquifers after artificial recharge using wastewater are presented. The penetration through the recharge soil of indigenous viruses from treatment plant effluent was found to be much greater than that of a seeded vaccine poliovirus. Echovirus type 11 from wastewater was detected at a depth of 9.0 m in groundwater from a bore located 14 m from the recharge basin whereas seed poliovirus was not isolated beyond a depth of 1.5m below the recharge basin. It was concluded that data on enteric virus survival in groundwater were required if safe abstraction distances were to be determined.

Jansons, J., L. W. Edmonds, B. Speight and M. R. Bucens. "Survival Of Viruses In Groundwater." ***Water Research.*** **V. 23, n. 3. pp. 301-306. 1989b.**

Abstract. Survival in groundwater of echovirus types 6, 11 and 24, coxsackievirus type B5 and poliovirus type 1 was determined. Enterovirus survival in groundwater was found to be variable and appeared to be influenced by a number of factors: temperature, dissolved oxygen concentration and possibly the presence of microorganisms. Dissolved oxygen concentration was the most significant factor in loss of virus in groundwater. Poliovirus type 1 incubated in groundwater with a mean dissolved oxygen concentration of 2.0 mg/l decreased in infectivity by 100-fold in 50 days compared with 20 days for a decreases of the same magnitude when incubated in groundwater with a mean dissolved oxygen concentration of 5.4 mg/l. Echovirus type 6 was found to be least stable, and poliovirus type 1 was found to be most stable, although virus stability may have been due to conditions existing in individual groundwater bores.

Johnson, R. B. "The Reclaimed Water Delivery System And Reuse Program For Tucson, Arizona." ***Irrigation Systems For The 21st Century, Portland, Oregon, 1987.*** **(American Society Of Civil Engineers, New York, New York, pp. 344-351). 1987.**

Abstract. The City of Tucson has implemented a reclaimed water reuse program in a community-wide effort to preserve high quality groundwater for potable and other priority uses. presently, the system consists of an 8.2 million gallons per day (mgd) pressure filtration plant (expandable to 25 mgd), a 3 million gallon reservoir, a 12 mgd booster facility, and a significant network of large capacity distribution lines which supply major turf irrigation uses throughout the community. An additional element of the system is a 1.0 mgd aquifer recharge facility which provides cost effective seasonal storage of reclaimed water for subsequent recovery and use during the peak demand season.

The initial system was made operational in February, 1984 with the first deliveries of reclaimed water for turf irrigation. By the end of fiscal year 1986-87, Tucson Water will be providing nearly 5,000 acre feet per year of reclaimed water with the expanding reclaimed water system. It is projected that by 1995, Tucson's reclaimed water delivery system will be serving 35,000 acre feet for turf irrigation, cooling tower and gravel washing uses throughout the metropolitan area. The program has reduced peak demands on the potable water system and represents a major step toward the efficient management of the water resources available to our growing community.

Karkal, S. S. and D. L. Stringfield. "Wastewater Reclamation And Small Communities: A Case History." ***Water Environment Federation 65th Annual Conference & Exposition, New Orleans, Louisiana, 1992.*** **(Water Environment Federation, Alexandria, Virginia, pp. 419-425). 1992.**

Abstract. In California's Central Valley, regulatory requirements and concerns of the local community have led to a unique wastewater reclamation project. The City of Orange Cove owns and operates a 3,785.4 M^3/day(1.0 mgd) treatment plant that uses tertiary treatment to produce a high quality reclaimed water that meets the California Code of Regulations (CCR) Title 22 requirements for unrestricted irrigation use. The water is supplied to the independently own and operated Orange Cove Irrigation District (OCID). This facility is in stark contrast to many reclaimed wastewater irrigation facilities in the Central Valley that use primary or secondary effluents for irrigation. The objective of this paper is to discuss the regulatory requirements leading to this project, and the factors involved in the selection of the treatment processes used to meet these requirements. .

Katopodes, N. D. and J. H. Tang. "Self-Adaptive Control Of Surface Irrigation Advance." *Journal Of Irrigation And Drainage Engineering*. V. 116, n. 5. pp. 696-713. 1990.

Abstract. The controllability of surface irrigation is examined by analytical means and numerical tests based on the linearized zero- inertia model. First, the inflow hydrograph is proved to be identifiable from advance data. Then, it is shown that it is possible to control the advance rate by adjustment of the inflow rate. Field parameter heterogeneities are automatically taken into account, so a predetermined advance trajectory is obtained under arbitrary field conditions. The model utilizes a tentative time increment, during which a trial value for inflow is adopted. The resulting wave advance is simulated by the zero- inertia model. Discrepancies between the actual and desired advance rate are then used to construct an objective function, whose minimization leads to a correction of the inflow rate for the next time increment of inflow. Finally, examples of self- adaptive control are presented, in which an irrigation stream is led into a field of unknown parameters. The model uses real-time information for the identification of the parameters and simultaneous control of the inflow rate to achieve a desired advance rate.

Kaufman, M. I. "Subsurface Wastewater Injection, Florida." *Journal Of Irrigation And Drainage Engineering*. V. 99, n. 1. pp. 53-70. 1973.

Abstract. The Secretary of the Interior directed the U.S. Geological Survey in December, 1969 to begin a research program to evaluate the 'effects of underground waste disposal on the Nation's subsurface environment, with particular attention to ground-water supplies.' The directive noted the complexity of the subsurface environment and emphasized the need to begin collecting pertinent environmental data.

As a direct result, the Survey is engaged in an investigative and research program to develop a scientific basis for assessing the long-term environmental impact of subsurface waste injection. Prediction of movement, chemical interaction, and ultimate fate of injected liquid waste is difficult. As noted by Piper: "Uncritical acceptance (of deep well injection) would be ill advised." The complexity of both the waste and the subsurface environment preclude making generalizations; with the present state of knowledge, a thorough regional and localized study must be made for each proposed waste-injection system.

Extensive areas in Florida are underlain by deep permeable saline-aquifer systems that are separated from overlying freshwater aquifers by low- permeability confining materials consisting of clay, evaporites, or dense carbonate rocks.

To resolve problems of waste disposal and to alleviate deterioration of fresh and estuarine waters, approaches such as deep-well injection of industrial and municipal effluents into these saline-aquifer systems are being actively explored.

The hydrologic and geochemical characteristics of these saline-aquifer systems and their response to waste injection are the subject of current research by the Survey. This information would assist planning-management and regulatory agencies in their evaluation of subsurface injection of liquid wastes, including its potential applicability to regional water and waste management systems.

This paper contains both a summary of data and present status of subsurface waste injection in Florida, including observed hydraulic and geochemical effects and a descriptive regional portrayal of the lithology and hydrogeochemistry of the saline-aquifer system.

Knisel, W. G. and R. A. Leonard. "Irrigation Impact On Groundwater: Model Study In Humid Region ." *Journal Of Irrigation And Drainage Engineering*. V. 115, n. 5. pp. 823-839. 1989.

Abstract. The Groundwater Loading Effects of Agricultural Management Systems (GLEAMS) model was applied to estimate the effects of: (1) Soil; (2) planting date; (3) irrigation level; and (4) pesticide characteristic on pesticide leaching below the root zone of representative coarse-grained soils. Climate/application/pesticide-characteristic interactions are shown to significantly affect pesticide losses, whereas irrigation practice has little effect. Persistent and mobile compounds exhibit the highest losses.

Krawchuk, B. P. and B. G. R. Webster. "Movement Of Pesticides To Ground Water In An Irrigated Soil." *Water Pollution Research Journal Of Canada*. V. 22, n. 1. pp. 129-146. 1987.

Abstract. The movement of pesticide residues to ground water was studied on a commercial farm southwest of Portage la Prairie, Manitoba. The site had sandy soil with low organic matter content, a high water table, a tile drain system and an irrigation system using river water. Records were available from the beginning of commercial operation in 1979 describing pesticide usage on a field by field basis. A total of 21 different pesticide formulations were used in the 5 years of operation.

An initial (1981) random sampling of the tile drain water did not detect any pesticide residues in the outflow at the 0.02 ug/L level. A subsequent extensive sampling (1982) detected residues of chlorothalonil on eight occasions ranging from 0.06 to 3.66 ug/L in the tile drain outflow. Ground water from one of two wells in the northwest quarter was found to contain chlorothalonil at a level of 10.1 to 272.2 ug/L in 1982 and 0.4 to 9.0 ug/L in 1983, carbofuran at a level of 11.5 to 158.4 ug/L in 1982 and <0.5 to 1.0 ug/L in 1983, and carbofuran phenol (not quantified) in 1982 and 1983.

RP-HPLC K_{OW} data indicated that a number of the pesticides used on the farm could be as mobile or more mobile than chlorothalonil which had been detected in the ground water in two consecutive years; however, of the other pesticides only carbofuran was detected in the ground water. With a K_{OW} lower than that of chlorothalonil, carbofuran was expected to be more mobile than chlorothalonil, and to appear in the water sooner, but this was not observed in the field samples.

Ku, H. F. H., N. W. Hagelin and H. T. Buxton. "Effects Of Urban Storm-Runoff Control On Ground-Water Recharge In Nassau County, New York." *Ground Water*. V. 30, n. 4. pp. 507-513. 1992.

Abstract. Before urban development, most ground-water recharge on Long Island, New York, occurred during the dormant season, when evapotranspiration is low. The use of recharge basins for collection and disposal of urban storm runoff in Nassau County has enabled ground-water recharge to occur also during the growing season. In contrast, the use of storm sewers to route storm runoff to streams and coastal waters has resulted in a decrease in ground-water recharge during the dormant season. The net result of the these two forms of urban storm-runoff control has been an increase in annual recharge of about 12 percent in areas served by recharge basins and a decrease of about 10 percent in areas where runoff is routed to streams and tidewater. On a countrywide basis, annual ground-water recharge has remained nearly the same as under predeveloped conditions, but its distribution pattern has changed. Redistribution resulted in increased recharge in the eastern and central parts of the county, and decreased recharge in the western and near shore areas. Model simulation of recharge indicates that the water- table altitude has increased by as much as 5 feet above predevelopment levels in areas served by recharge basins and declined by as much as 3 feet in areas where stormwater is discharged to streams and tidewater.

Ku, H. F. H. and D. L. Simmons. ***Effect Of Urban Stormwater Runoff On Ground Water Beneath Recharge Basins On Long Island, New York.*** **Geological Survey Water-Resources Investigations Report 85-4088. U.S. Geological Survey, Syosset, New York. 1986.**

Abstract. Urban stormwater runoff was monitored during 1980-82 to investigate the source, type, quantity, and fate of contaminants routed to the more than 3,000 recharge basins on Long Island and to determine whether this runoff might be a significant source of contamination to the ground-water reservoir. Forty-six storms were monitored at five recharge basins in representative land-use areas (strip commercial, shopping-mall parking lot, major highway, low-density residential, medium-density residential).

Runoff/precipitation ratios indicate that all storm runoff is derived from precipitation on impervious surfaces in the drainage area except during storms of high intensity or long duration, when additional runoff can be derived from precipitation on permeable surfaces.

Concentrations of most measured constituents in individual stormwater samples were within Federal and State drinking-water standards. The few exceptions are related to specific land uses and seasonal effects. Lead was present in highway runoff in concentrations up to 3,300 micrograms per liter (ug/L), and chloride was found in parking-lot runoff in concentrations up to 1,100 milligrams per liter (mg/L) during winter, when salt is used for deicing.

The load of heavy metals was largely removed during movement through the unsaturated zone, but chloride was not removed. Total nitrogen was commonly found in greater concentrations in ground water than in stormwater; this is attributed to seepage from cesspools and septic tanks and to the use of lawn fertilizers.

In the five composite stormwater samples and nine ground-water grab samples that were analyzed for 113 U.S. Environmental Protection Agency-designated "priority pollutants," four constituents were detected in concentrations exceeding New York State guidelines of 50 ug/L for an individual organic compound in drinking water: p-chloro-m-cresol (79 ug/L in ground water at the highway basin); 2,4-dimethylphenol (96 ug/ L in ground water at the highway basin); 4-nitrophenol (58 ug/L in ground water at the parking-lot basin); and methylene chloride (230 ug/L in stormwater at the highway basin). One stormwater sample and two ground-water samples exceeded New York State guidelines for total organic compounds in drinking water (100 ug/ L). The presence of these constituents is attributed to contamination from point sources rather than to quality of runoff from urban areas.

The median number of indicator bacteria in stormwater ranged from 10^8 to 10^{10} MPN/100 mL (most probable number per 100 milliliter). Fecal coliforms and fecal streptococci increased buy 1 to 2 orders of magnitude during the warm season. Total coliforms concentrations showed no significant seasonal differences.

Low-density residential and nonresidential (highway and parking lot) areas contributed the fewest bacteria to stormwater; medium-density residential and strip commercial areas contributed the most. No bacteria were detected in the ground water beneath any of the recharge basins.

The use of recharge basins to dispose of storm runoff does not appear to have significant adverse effects on ground-water quality in terms of the chemical and microbiological stormwater constituents studied.

Ku, H. F. H., J. Vecchioli and S. E. Ragone. "Changes In Concentration Of Certain Constituents Of Treated Waste Water During Movement Through The Magothy Aquifer, Bay Park, New York." *Journal Research U.S. Geology Survey.* V. 3, n. 1. pp. 89-92. 1975.

Abstract. Approximately 7 million gallons (27 million litres) of tertiary- treated sewage (reclaimed water) was injected by well into the Magothy aquifer and was subsequently pumped out. As the reclaimed water moved through the aquifer, concentrations of certain dissolved constituents decreased as follows: Total nitrogen, 7 percent; methylene blue active substances, 49 percent; chemical oxygen demand, 50 percent; and phosphate, more than 93 percent.

Lauer, D. A. "Vertical Distribution In Soil Of Sprinkler-Applied Phosphorus." *Soil Science Society Of America Journal.* V. 52, n. 3. pp. 862-868. 1988a.

Abstract. Soil-immobile plant nutrients, such as P, accumulate near the soil surface in conservation cropping systems where tillage leaves crop residues on or near the soil surface and limits soil mixing. The objective was to determine, in field and laboratory experiments, the vertical distribution in soil of P applied in sprinkler irrigation water. Following P applications, distribution was determined from depth increment (1 or 2 cm) sampling on a Warden silt loam (coarse-silty, mixed, mesic, Xerollic Camborthids) and a Quincy sand (mixed, mesic, Xeric Torripsamments). The fertilizer materials applied in 10-mm irrigations were: monoammonium phosphate (227g P kg^{-1}), urea phosphate (192g P kg^{-1}), commercial white phosphoric acid (238g P kg^{-1}), and ammonium polyphosphate (149g P kg^{-1}) containing 61g P kg^{-1} as polyphosphate. Application rates ranged from 50 to 400 kg P ha^{-1}. Movement of P was about the same for all P fertilizer materials except ammonium polyphosphate, from which P moved only 60 to 70% of the depth of the other materials. Postapplication irrigation totals up to 160 mm at 10 m d1, which was applied without drying cycles, distributed P more uniformly with depth. The overall mean depths of P penetration across all treatments were 10.4 cm (SD = 4.04 cm) on the Quincy sand and 7.3 cm (SD = 4.93 cm) on the Warden silt loam. Theses depths of penetration and vertical distribution of sprinkler-applied P are probably sufficient to supply the P needs of crop plants under sprinkler irrigation. .

Lauer, D. A. "Vertical Distribution In Soil Of Unincorporated Surface-Applied Phosphorus Under Sprinkler Irrigation." *Soil Science Society Of America Journal.* V. 52, n. 6. pp. 1685-1692. 1988b.

Abstract. Determining vertical distribution of P is important in irrigated conservation cropping systems for evaluation of P fertilization because soil-immobile phosphorus accumulates near the soil surface where limited tillage reduces soil mixing. The objective was to determine in field and laboratory experiments the vertical distribution of P from surface -applied monoammonium phosphate (MAP; 227 g P kg^{-1}), triple superphosphate (TSP; 197 g P kg^{-1}) and ammonium polyphosphate (APP; 149g P kg^{-1}). Following P application, vertical distribution was determined from 2-cm depth increment samples in a Quincy sand (mixed, mesic, Xeric Torripsamments), a Warden silt loam (coarse-silty, mixed, Xerollic Camborthids), and a calcareous subsoil of the Warden. There was little effect on P distribution from antecedent moisture; fertilizer rates at 30, 60, 120, or 240 kg P ha^{-1}; or from preirrigation reaction times of 1, 4, or 16 d. Continuous postapplication irrigation totals of 40 or 160 mm at 10 mm d^{-1} moved P somewhat deeper into the soil, principally at 160 mm on the Quincy sand. Overall mean penetration depths of P were as follows: (i) APP moved the farthest in the Quincy sand (mean = 6.1; SD = 1.05 cm); (ii) penetrations were practically the same for MAP or TSP on the Quincy sand (mean = 5.5; SD = 1.25 cm); (iii) depth of penetration was intermediate for APP on the noncalcareous Warden (mean = 4.0; SD = 0.98 cm); and (iv) downward movement in calcareous Warden of P from all fertilizer P materials was much more restricted (MAP/TSP: mean = 3.1; SD = 0.10 cm and APP: mean = 3.3; SD = 0.52) than on the

two noncalcareous soils. Overall, the most apparent conclusion from this study is that the reactivity of P fertilizer material with the soil is the dominant and overriding determinate of the vertical distribution of surface-applied P.

Lee, E. W. "Drainage Water Treatment And Disposal Options." ***Agricultural Salinity Assessment And Management.*** **American Society Of Civil Engineers. pp. 450-468. 1990.**

Abstract. Treating and disposing of subsurface drainage water from irrigated agricultural lands presents unique technical challenges. A review of the literature reveals limited experiences in the management of such waters. The challenge is made more difficult by the complex chemical characteristics of most drainage water. Drainage usually contains a heavy salt load -- a perennial cause for concern -- and residual pesticides, herbicides, fungicides, fertilizers and toxic trace elements -- a more recent cause for concern. While crop management practices and conventional treatment processes can control salt and residuals to some degree, a new treatment technology needs to be developed to control toxic trace elements. Conventional methods appear to be ineffective in meeting the requirements set by many regulatory agencies.

In this report, the treatment and disposal of subsurface drainage from irrigated lands will be covered, disposal options will be presented, the technology of drainage water treatment and disposal options will be reviewed, and current research on treatment technology will be discussed.

Lloyd, J. W., D. N. Lerner, M. O. Rivett and M. Ford. "Quantity And Quality Of Groundwater Beneath An Industrial Conurbation - Birmingham, UK." ***Hydrological Processes And Water Management In Urban Areas, Duisburg, Federal Republic Of Germany, 1988.*** **(International Hydrological Programme, UNESCO, pp. 445-453). 1988.**

Abstract. Since the 1960's groundwater heads have been rising noticeably beneath Birmingham, principally due to reducing abstraction. Despite the almost complete urbanisation of the aquifer surface, potential recharge is at least as high as it was before the city was built. There is sufficient leakage from water mains and sewers to make up for the reduced infiltration at the surface. The marked change in groundwater conditions has prompted interest in groundwater quality and both inorganic and organic quality of the groundwater are currently being studied. First indications are of widespread worsening inorganic quality, with high nitrates, chlorides and certain trace elements. Chlorinated organic solvents (e.g. trichloroethylene) are widespread, but there is little evidence to date of other organic pollutants.

Loh, P. C., R. S. Fujioka and W. M. Hirano. "Thermal Inactivation Of Human Enteric Viruses In Sewage Sludge And Virus Detection By Nitrose Cellulose-Enzyme Immunoassay." ***Chemical And Biological Characterization Of Sludges, Sediments, Dredge Spoils, And Drilling Muds. ASTM STP 976.*** **American Society For Testing And Materials, Philadelphia, Pennsylvania. pp. 273-281. 1988.**

Abstract. The Zimpro Thermal Sludge Treatment Process installed at the Sand Island Wastewater Treatment Plant, Honolulu, HI, was evaluated for its reliability in disinfecting human enteric viruses and fecal bacteria in the treated sludge. The principle of this process involves grinding the sludge particles to a small size(<4.8 mm) and heating the ground sludge to 193'C under 330 psi pressure for 30 min. Such thermally treated sludge yielded no human enteric viruses and little or no fecal bacteria(<2 to 24 MPN/100g), thus rendering the sludge safe for reuse. In corollary studies, the nitrocelluose-enzyme immunoassay was evaluated as an alternate cost-effective method to augment infectivity assays for the detection of human enteric viruses. The method was found to be rapid, highly sensitive (it can detect picogram quantities), and specific for the detection of human enteric viruses.

Malik, A., M. Stone, F. R. Martinez and R. Paul. "First Wastewater Desalting Plant In Central Coast, California." ***Water Environment Federation 65th Annual Conference & Exposition, New Orleans, Louisiana, 1992.*** **(Water Environment Federation, Alexandria, Virginia, pp. 395-406). 1992.**

Abstract. This paper describes a 144.6 liter/second (L/s) (3.0 million gallon per day (mgd)) water reclamation plant and a 35 L/s (0.8 mgd) reverse osmosis plant (RO). The water reclamation plant treats secondary treated discharged from the Goleta Sanitary District wastewater treatment plant. The RO plant further processes a portion of the effluent that will be produced at the water reclamation plant. RO treatment is needed to : (1) lower the chloride content of the tertiary effluent to less than 300 milligrams per liter (mg/l), for protection of golf course greens and sensitive plants; and (2) to provide water with reduced concentrations of chlorides, sodium, sulfates, and other constituents to agricultural growers.

The installed RO Plant will produce 35 L/s (0.8 mgd) of desalted water. The facility will discharge 9.6 L/s (0.22 mgd) desalted water to the agricultural growers and discharge 25.4 L/s (0.58 mgd) to reclaimed water storage tanks for blending with effluent from the water reclamation plant. 115.7 L/s (2.64 mgd) of blended effluent will be available to distribute to all other reclaimed water users.

Mancini, J. L. and A. H. Plummer Jr. "A Method For Developing Wet Weather Water Quality Criteria for Toxics." ***Water Environment Federation 65th Annual Conference & Exposition, New Orleans, Louisiana, 1992.*** **(Water Environment Federation, Alexandria, Virginia, pp. 15-26). 1992.**

Abstract. Current federal and state water quality programs are focusing on control of toxics and on impacts from diffuse sources. These two elements of regulatory programs can be expected to come together in the future. Regulations will begin to address the effects of toxics from diffuse sources.

Diffuse sources of contaminants such as runoff from urban, industrial, and agricultural sites are associated with wet-weather events. The inputs of toxic materials from these sources are intermittent, and may not occur during all runoff events. Exposure of aquatic organisms to toxicants, from these sources, are often of short duration separated by extended periods which provide opportunities for organism

recovery. The concentrations and exposure patterns of toxicants, which cause impacts on resident aquatic organisms are different, for diffuse wet-weather dischargers and continuous point source inputs.

The potential cost for control of toxics in discharges from diffuse sources is large. Therefore, it is important that water quality criteria properly represents the level of protection needed to address contaminants introduced by diffuse sources. The application of technologically-based modifications to existing water quality criteria which account for the characteristics of diffuse sources (e.g. wet-weather inputs) could produce environmental protection at lower costs.

This paper presents technology which could be used to modify existing EPA numerical criteria for toxics to consider the effects of the variability of concentrations and exposure patterns associated with wet-weather inputs. Illustrations of criteria development, site-specific use of criteria and compliance monitoring are included. The technology can also be used to estimate the impacts of wet-weather discharges on aquatic organisms.

Markwood, I. M. "Waterborne Disease -- Historical Lesson." ***Ground Water.*** **V. 17, n. 2. pp. 197-198. 1979.**

Abstract. While it is true that waterborne diseases are still with us, and probably always will be, we cannot classify them as a current threat in the sense that they were 100 years ago. The discovery that chlorine would disinfect water supplies removed these diseases from a "current threat" to a "historical lesson" category. We are not faced with unknown which we are unable to attack. We have only to look at what others have done to protect themselves and follow the same or improved practices.

If the record of waterborne outbreaks in public water supplies in this country from the end of World War II up to the present is examined, it will be found that all are caused by breakdowns in disinfection procedures or carelessness. The record is replete with statements such as "improper disinfection after repair," "breakdown or lack of disinfecting equipment," "back siphonage," and other similar statements all pointing to failure to follow practices which the history of water treatment has shown to be necessary for protection against waterborne disease. Carelessness allows recurrence of disease outbreaks. If the lessons of history were followed, the conquest of waterborne disease transmission by public water systems could be complete.

Marton J. and Mohler I. "The Influence Of Urbanization On The Quality Of Groundwater." ***Hydrological Processes And Water Management In Urban Areas, Duisburg, Federal Republic Of Germany, 1988.*** **(International Hydrological Programme, UNESCO, pp. 452- 461). 1988.**

Abstract. On the example of the described antropogeneous activities in an urbanized basin we have manifested their influence upon quantitative and qualitative regime of groundwater on the territory of Bratislava and the consequential measures taken to suppress or liquidate their negative effect as well.

Marzouk, Y., S. M. Goyal and C. P. Gerba. "Prevalence Of Enteroviruses In Ground Water Of Israel." ***Ground Water.*** **V. 17, n. 5. pp. 487-491. 1979.**

Abstract. Few studies have been performed on the occurrence of enterovirus contamination of ground water. In this study, 99 ground-water samples were examined for the presence of enteroviruses, total bacteria, fecal coliforms, and fecal streptococci by standard methods. Enteroviruses were isolated from 20% of the samples. Viruses were isolated from 12 samples which contained no detectable fecal

organisms per 100 ml. No statistical correlation between presence of virus and bacteriological indicators could be determined. The widespread failure of current bacteriological standards to indicated the presence of potentially pathogenic enteroviruses in ground water is an area of concern that requires more study.

Merkel, B., J. Grossmann and P. Udluft. "Effect Of Urbanization On A Shallow Quarternary Aquifer." ***Hydrological Processes And Water Management In Urban Areas, Duisburg, Federal Republic Of Germany, 1988.*** **(International Hydrological Programme, UNESCO, pp. 461-469). 1988.**

Abstract. Quantity and quality of groundwater renewal is mainly determined by physico-chemical processes within the soil and the unsaturated zone. Pollution of groundwater from urbanization were brought to light and exemplary pointed out by deposits from precipitation, sodium chloride spreading and leakage from sewerage.

Mossbarger, W. A. Jr. and R. W. Yost. "Effects Of Irrigated Agriculture On Groundwater Quality In Corn Belt And Lake States." ***Journal of Irrigation and Drainage Engineering*****. V. 115, n. 5. pp. 773-789. 1990.**

Abstract. The impact of irrigation on groundwater quality is influenced by climate, topography, geology, soils, geohydrology, crops, and agricultural practices. Since the early 1950s, the irrigated crop acreage in the Corn Belt and Lake States has increased markedly. Irrigation in these regions is concentrated in areas underlain by sandy soils with low moisture-holding capacities, where supplemental moisture and relatively heavy applications of agrichemicals are needed to achieve economically viable crop yields. Due to the high hydraulic conductivities and low attenuation capacities of sandy soils, shallow aquifers underlying these areas are particularly susceptible to contamination with nitrates and stable, soluble pesticides. Present and potential problems associated with irrigation in these states are illustrated by available case studies from the Central Sand Plain of Wisconsin.

Nellor, M. H., R. B. Baird and J. R. Smyth. "Health Aspects Of Groundwater Recharge." ***Artificial Recharge Of Groundwater.*** **Butterworth Publishers, Boston. pp. 329-355. 1985.**

Abstract. Southern California, like many semiarid regions of the United States, does not receive sufficient water from local sources to support the considerable population of the area. Almost two thirds of the water supply is imported 200 to 500 miles from the point of use. The remainder is derived from local groundwater basins. In some areas, the occurrence of overdraft conditions and saltwater intrusion has led to the adjudication of groundwater extractions and/or the implementation of artificial groundwater replenishment. Water sources used for groundwater replenishment include storm runoff, imported water, and, in some cases, treated wastewater (reclaimed water).

There is considerable uncertainty at this time regarding the sufficiency of water supplies for future water needs of the area. Population growth projections coupled with reductions in imported water deliveries indicate that, by the mid-1990s water needs may exceed available supplies. These water shortage predictions have stimulated regional planning activities aimed at optimizing available water supplies through conservation efforts and developing new local sources of supply through conjunctive groundwater storage and water reclamation. Foremost among these planning efforts is the Orange and Los Angeles Counties Water Reuse Study, which has identified the most viable water reclamation projects within the South Coast Region and has developed a financial and institutional scheme for their

implementation. Of all the reclamation projects under consideration, groundwater recharge represents the largest and most economical use of reclaimed water.

Despite these economic incentives, implementation of proposed groundwater recharge projects is constrained by concerns over the potential health impacts of indirect reuse for potable purposes. Health issues associated with groundwater recharge include the acute and chronic effects of trace metals, minerals, pathogens, and organic compounds that, if present in reclaimed water, may ultimately become part of a potable water supply. Available information on existing groundwater recharge projects has never shown any evidence of impaired water quality or health. Yet, it is recognized that this information is insufficient for rigorous evaluation of the possible long-term health implications associated with indirect potable reuse.

The existing groundwater recharge projects in Los Angeles and Orange Counties provided an opportunity to gather the data needed to evaluate the health significance of water reuse by groundwater recharge. Foremost among these is the Whittier Narrows groundwater recharge project located in the Montebello Forebay area of Los Angeles County where planned replenishment using reclaimed water has been practiced since 1962. A work plan was developed by the Los Angeles County Sanitation Districts, which incorporated multidisciplinary research recommendations proposed by a "blue ribbon" panel of experts convened by the California State Water Resources Control Board, the Department of Water Resources, and the Department of Health Services. The work plan formed the basis for the Health Effects Study that formally began in November 1978 and was completed in March 1984.

Nightingale, H. I., J. E. Ayars, R. L. McCormick and D. C. Cehrs. "Leaky Acres Recharge Facility: A Ten-Year Evaluation." ***Water Resources Bulletin.*** **V. 19, n. 3. pp. 429-437. 1983.**

Abstract. From 1971-1980, studies were conducted at Fresno, California, to identify and quantity, where possible, the soil and water chemistry, subsurface geologic, hydrologic, biologic, and operational factors that determine the long term (10 year) effectiveness of basin type artificial ground water recharge through alluvial soils This paper updates previous findings and refers to publication that describe the geology beneath the basins and regional geology that determine the transmission and storage properties for local ground water management and chemical quality enhancement. High quality irrigation water from the Kings River was used for recharge. Construction and land costs for the present expanded facility 83 ha (205.2 ac) using three parcels of land were $1,457,100. The nine-year annual mean costs for only canal water , maintenance, and operation were $110.42/ ha*m ($13.62/ac*ft) based on an average recharge rate of 1338 ha*m/yr (10,848 ac*ft/yr) at 86 percent facility efficiency. The measured end of season recharge rate averaged 14.97 $\pm$ 0.24 cm/ day. The 10-year mean actual recharge rate based on actual water delivered, total ponded area, and total days of recharge was 12.1 cm/day.

Nightingale, H. I. "Accumulation Of As, Ni, Cu, And Pb In Retention And Recharge Basins Soils From Urban Runoff." ***Water Resources Bulletin.*** **V. 23, n. 4. pp. 663-672. 1987a.**

Abstract. The accumulation of arsenic, nickel, copper, and lead in the soil profile was determined beneath five urban storm-water retention/ recharge basins used by the Fresno Metropolitan Flood Control District, California. Soils were sampled from the surface to the first zone of saturation and compared with soils from an adjacent uncontaminated control site. These elements were found to be accumulating in the first few centimeters of basin soil and are important to the effectiveness of a specific best management practice, i.e., the retention and recharge of urban storm water. Study basins in use since 1962, 1965, and 1969 had lead contents in the 0-2 cm soil depth interval of 570, 670, and 1400 mg Pb/kg soil, respectively. The median indigenous soil lead concentration was 4.6 mg/kg soil. The practice of

removing excess flood runoff water from two basins by pumping apparently is a factor in reducing the accumulation rate of these elements in the surface soils of the basins.

Nightingale, H. I. "Water Quality Beneath Urban Runoff Management Basins." ***Water Resources Bulletin.*** **V. 23, n. 2. pp. 197-205. 1987b.**

Abstract. The chemical impact of urban runoff water on water quality beneath five retention/recharge basins was investigated as part of the US EPA's Nationwide Urban Runoff Program in Fresno, California. Soil water percolating through alluvium soils and the ground water at the top of the water table were sampled with ceramic/Teflon vacuum water extractors of depths up to 26m during the two-year investigation. Inorganic and organic pollutants are present in the runoff water delivered to the basins. No significant contamination of percolating soil water or ground water underlying any of the five retention/recharge basins has occurred for constituents monitored in the study. The oldest basins was constructed in 1962. The concentration of selected trace elements in the ground water samples was similar to the levels reported in the regional ground water. None of the pesticides or other organic priority pollutants, for which water samples were analyzed, was detected except diazinon which was found in trace counts (0.3 ug/L or less) in only three soil water samples. These results are important to the continued conservation of storm water and the development of a best management practice for storm-water management using retention/ recharge basins in a semi-arid climate.

Nightingale, H. I. and W. C. Bianchi. "Ground-Water Chemical Quality Management By Artificial Recharge ." ***Ground Water.*** **V. 15, n. 1. pp. 15-22. 1977a.**

Abstract. The effectiveness of basin ground-water recharge at the Leaky Acres Facility in Fresno, California for improving the regional ground-water quality was studied as 65,815,000 m^3 of high-quality surface water was recharged from 1971 through 1975. Observation wells at the facility showed some variability in chemical parameters associated with each recharge period. The long-term decrease in salinity could be described by decay curve fitted by regression analysis.

Without a special network of observation wells outside the facility, scientific evaluation of the enclave of recharged water is not possible. A practical evaluation of water-quality changes is possible from producing water wells around the facility. However, the pumping well discharge-time variations, well depth, aquifer sequence, and prior use of surrounding land must be considered, since all of these factors affect the pumped-water quality and its seasonal variability. Recharge at Leaky Acres had noticeably decreased the ground-water salinity for a distance of up to 1.6 km in the regional ground-water movement.

Nightingale, H. I. and W. C. Bianchi. "Ground-Water Turbidity Resulting From Artificial Recharge." ***Ground Water.*** **V. 15, n. 2. pp. 146-152. 1977b.**

Abstract. Turbid ground water is rarely observed in domestic or public supply aquifers. At the Leaky Acres Recharge Facility at Fresno, California, water of low salinity(<50 umhos/cm) and turbidity (<5 FTU, Formazin turbidity units) is recharged in the spreading basins. Six months after the start of the third (1973) recharge period, the groundwater salinity was decreased to about 100 umhos/cm from the initial mean of 147 umhos/cm and the ground water became visibly turbid (>5 FTU)/ Two months later, some peripheral domestic wells also began to become turbid. After two more recharge periods (1974 and 1975), turbidity at 10 observation wells beneath Leaky Acres averaged 18 FTU and salinity averaged 74 umhos/cm. By this time, ground-water turbidity in peripheral wells near Leaky Acres had decreased to <0.5 FTU. This turbidity was traced to poorly-crystallized and extremely fine colloids, which have leached

from the surface soils because of the low salinity of the recharge water. Laboratory and field studies showed that gypsum application will reverse the phenomena, but such treatment is uneconomical. This phenomenon is a transient one, and now turbidity outside the recharge area is insignificant from a water quality viewpoint. However, the magnitude of the mass of material is transit through the profile if stabilized through flocculation or sieving in soil pore space, could greatly change the water transmission and so recharge project performance. However, we have not yet noted this effect at Leaky Acres.

Norberg-King, T. J., E. J. Durhan, G. T. Ankley and E. Robert. "Application Of Toxicity Identification Evaluation Procedures To The Ambient Waters Of The Colusa Basin Drain, California." ***Environmental Toxicology And Chemistry.*** **V. 10. pp. 891-900. 1991.**

Abstract. Pesticides are applied to the rice fields in the Sacramento Valley to prevent the growth of plants, algae and insects that reduce rice yields. Following the pesticide application, field water is released into agricultural drains that in turn discharge into the Sacramento River and delta. Rice irrigation is the largest single use of irrigation water in the Sacramento Valley, and because the irrigation water (or rice return) flows are the primary source of drain effluent during the spring and summer (up to 33% of the total flow), these discharges can significantly affect drain water quality and resident aquatic organisms. Acute and chronic toxicity to freshwater organisms (*Ceriodaphnia dubia*) was observed in the drain water during the period that coincides with the initial draining of the fields in 1986, 1987 and 1988. In 1988, a toxicity identification evaluation (TIE) was conducted using *Ceriodaphnia dubia* in an effort to identify the cause of toxicity. Both methyl parathion and carbofuran were identified as possible toxicants. Mixture tests and chronic toxicity tests indicated that the concentrations of methyl parathion and carbofuran in the water sample account for the toxicity observed in *Ceriodaphnia dubia*.

Pahren, H. R. "EPA's Research Program On Health Effects Of Wastewater Reuse For Potable Purposes." ***Artificial Recharge Of Groundwater.*** **Butterworth Publishers, Boston. pp. 319-328. 1985.**

Abstract. One of the many objectives of the Office of Research and Development of the U.S. Environmental Protection Agency (EPA) has been to carry out a relatively small research program on the potential health effects associated with the reuse of renovated wastewater for potable purposes. This report reviews the research tasks conducted and the results obtained to date.

Research on potable reuse was initiated in 1974 and the federal program funding averaged about $400,000 annually through 1978. Following the 1977 amendments to the Safe Water Drinking Act, which called for special studies on the health implications involved in the reclamation, recycling, and reuse of wastewaters for drinking, funds for reuse research increased. However, the separate program on wastewater reuse was discontinued in 1981. Any activity in the future will be continued as part of the regular drinking water base research program.

Peterson, D. A. "Selenium In The Kendrick Reclamation Project, Wyoming." ***Planning Now For Irrigation And Drainage In The 21st Century, Lincoln, Nebraska, 1988.*** **(American Society Of Civil Engineers, New York, New York, pp. 678-685). 1988.**

Abstract. Elevated concentrations of selenium in water, bottom sediment, and biota were noted during a reconnaissance investigation of the Kendrick Reclamation Project in central Wyoming. Dissolved-selenium concentrations in 11 of 24 samples of surface or ground water exceeded the national drinking-water standard of 10 micrograms per liter. Bottom-sediment samples contained concentrations of several

elements, including selenium, that were greater than baseline concentrations in soils of western States. Samples of biota from several trophic levels at four wetlands contained selenium at concentrations associated with physiological problems and abnormalities as reported in laboratory studies and previously published literature.

Petrovic, A. M. "The Fate Of Nitrogenous Fertilizers Applied To Turfgrass." ***Journal Of Environmental Quality*****. V. 19, n. 1. pp. 1-14. 1990.**

Abstract. Maintaining high quality surface and groundwater supplies is a national concern. Nitrate is a widespread contaminant of groundwater. Nitrogenous fertilizer applied to turfgrass could pose a threat to groundwater quality. However, a review of the fate of N applied to turfgrass is lacking, but needed in developing management systems to minimize groundwater contamination. The discussion of the fate of N applied to turfgrass is developed around plant uptake, atmospheric loss, soil storage, leaching, and runoff. The proportion of the fertilizer N that is taken up by the turfgrass plant varied from 5 to 74% of applied N. Uptake was a function of N release rate N rate and species of grass. Atmospheric loss, by either NH_3 volatilization or denitrification, varied from 0 to 93% of applied N. Volatilization was generally <36% of applied N and can be reduced substantially by irrigation after application. Denitrification was only found to be significant (93% of applied N) on fine-textured, saturated, warm soils. The amount of fertilizer N found in the soil plus thatch pool varied as a function of N source, release rate, age of site, and clipping management. With a soluble N source, fertilizer N found in the soil and thatch was 15 to 21% and 21 to 26% of applied N, respectively, with the higher values reflecting clippings being returned. Leaching losses for fertilizer N were highly influenced by fertilizer management practices (N rate, source, and timing), soil texture, and irrigation. Highest leaching losses were reported at 53% of applied N, but generally were far less than 10%. Runoff of N applied to turfgrass has been studied to a limited degree and has been found seldom to occur at concentrations above the federal drinking water standard for NO_3^-. Where turfgrass fertilization poses a threat to groundwater quality, management strategies can allow the turfgrass manager to minimize or eliminate NO_3^- leaching.

Phelps, G. G. ***Effects Of Surface Runoff And Treated Wastewater Recharge On Quality Of Water In The Floridan Aquifer System, Gainesville Area, Alachua County, Florida*** **. Geological Survey Water-Resources Investigations Report 87-4099. U.S. Geological Survey, Tallahassee, Florida. 1987.**

Abstract. Rates of recharge to the Floridan aquifer system at four sites in Alachua County were estimated and water samples were analyzed to determine if the recharge water had any effects on the water quality of the aquifer. A total of about 33 million gallons per day recharges the upper part of the aquifer system at Haile Sink, Alachua Sink, and drainage wells near Lake Alice . At the Kanapaha Wastewater Treatment Plant, injection wells recharge an average of 6.1 million gallons per day into the lower zone of the system.

The samples of water entering the aquifer system collected at the four sites generally conformed to the drinking water standards recommended by the U.S. Environmental Protection Agency in 1983. Bacteria and nutrient concentrations were more variable in the recharge water than were other constituents. Organic compounds such as diazinon, lindane, and malathion were occasionally detected in all recharge water, but concentrations never exceeded recommended limits.

Bacteria were detected in most wells sampled near the Gainesville recharge sites. The highest counts were from wells near Alachua Sink. At only one site was there a significant difference between the quality of the recharge water and water from the wells sampled, although the recharge water tended

to be lower in calcium and iron than water from the Floridan aquifer system. A sample from a well about 150 feet downgradient of a drainage well near Lake Alice consisted of turbid water with a total phosphorus concentration of 75 milligrams per liter and a total nitrogen concentration of 57 milligrams per liter. Water flowing into the drainage well from the lake had a total nitrogen concentration of 1.6 milligrams per liter. Apparently, nutrient-rich suspended sediment in inflow to the drainage well settles out of the water and accumulates in the cavities in the limestone.

Estimated loads entering the aquifer include 3,500 kilograms day of chloride, less than 0.43 kilogram per day lead, 310 kilograms per day of nitrogen, and 150 kilograms per day of phosphorus. The effects of the loads were not detected in most monitor wells. Apparently, some of the constituents may settle out, some may be absorbed by the aquifer materials, and the remainder diluted and dispersed by the extremely large volume of water in the aquifer.

Pierce, R. C. and M. P. Wong. "Pesticides In Agricultural Waters: The Role of Water Quality Guidelines." ***Canadian Water Resources Journal.*** **V. 13, n. 3. pp. 33-49. 1988.**

Abstract. Water of good quality is of primary importance to modern agriculture in determining the productivity of crops and the health and marketability of livestock. The quality of water used in agricultural operations can be affected by numerous factors, including pesticide usage. This paper focuses on the relationship between the use of pesticides in Canadian agriculture and the hazards associated with the quality of agricultural waters used in irrigation and livestock watering. The extent and complexity of this problem is assessed initially by examining the overlap between pesticide use and agricultural water use in Canada. The inherent properties of selected pesticides used in Canadian agriculture are highlighted and related to their potential for release to agricultural water supplies. Field and laboratory investigators as related to agricultural water uses are reviewed and a discussion of pesticide water quality guidelines to ensure protection of agricultural water supplies is provided.

Pitt, W. A. J. Jr. ***Effects Of Septic Tank Effluent On Ground- Water Quality, Dade County, Florida: An Interim Report.*** **Geological Survey Open File Report 74010. U.S. Geological Survey, Tallahassee, Florida. 1974.**

Abstract. At each of five sites in Dade County, where individual (residence) septic tanks have been in operation for at least 15 years and where septic tank concentration is less than 5 per acre, a drainfield site was selected for investigation to determine the effects of septic tank effluent on the quality of the water in the Biscayne Aquifer.

At each site two sets of multiple depth wells were drilled. The upgradient wells adjacent to the drainfields in most places, were constructed in such a way that the aquifer could be sampled at 10, 20, 30, 40, and 60 feet below land surface. The down-gradient wells at each site area 35 feet or more from the up-gradient wells in the direction of ground-water flow, and allow the aquifer to be sampled at various depths.

Except at one site, no fecal coliforms were found below the 10-foot depth. Total coliforms exceeded a count of one colony per ml at the 60-fool depth at two sites. At one site a fecal streptococci count of 53 colonies per ml was found at the 60-foot depth and at another a count of seven colonies was found at the 40-foot depth. The three types of bacteria occur in higher concentration in the northern areas of the county than in the south. Bacteria concentrations were also higher where the septic tanks were more concentrated.

Pitt, W. A. J. Jr., H. C. Mattraw and H. Klein. ***Ground-Water Quality In Selected Areas Serviced By Septic Tanks, Dade County, Florida.*** **Geological Survey Open File Report 75-607. U.S. Geological Survey, Tallahassee, Florida. 1975.**

Abstract. During 1971-74, the U.S. Geological Survey investigated the chemical, physical, bacteriological, and virological characteristics of the ground water in five selected areas serviced by septic tanks in Dade county, Florida. Periodic water samples were collected from multiple-depth groups of monitor wells ranging in depth from 10 to 60 ft at each of the five areas. Analyses of ground water from base-line water-quality wells in inland areas remote from urban development indicated that the ground water is naturally high in organic nitrogen, ammonia, organic carbon and chemical oxygen demand. Some enrichment of ground water with sodium provided a possible key to differentiating septic-tank effluent from other urban ground- water contaminant sources. High ammonia nitrogen, phosphorus, and the repetitive detection of fecal coliform bacteria were characteristic of two 10-foot monitor wells that consistently indicated the presence of septic-tank effluent in ground water. Dispersion, dilution, and various chemical processes have presumably prevented accumulation of septic-tank effluent at depths greater than 20 ft, as indicated by the 65 types of water analyses used in the investigation. Fecal coliform bacteria were present on one or two occasions in many monitor wells but the highest concentration, 1,600 colonies/100 ml, was related to storm-water infiltration rather than septic-tank discharge.

Areal variations in the composition and the hydraulic conductivity of the sand and limestone aquifer had the most noticeable influence on the overall ground-water quality. The ground water in the more permeable limestone in south Dade County near Homestead contained low concentrations of septic-tank related constituents, but higher concentrations of dissolved sulfate and nitrate. The ground water in north Dade County, where the aquifer is less permeable, contained the highest dissolved iron, manganese, COD, and organic carbon.

Power, J. F. and J. S. Schepers. "Nitrate Contamination Of Groundwater In North America." ***Agriculture, Ecosystems and Environment.*** **V. 26, n. 3-4. pp. 165-187. 1989.**

Abstract. Groundwater serves as the primary domestic water supply for over 90% of the rural population and 50% of the total population of North America. Consequently, protection of groundwater from contamination is of major concern. This paper reviews the problem of controlling nitrate pollution of groundwater in North America. Nitrates in groundwater originate from a number of non-point sources, including geological origins, septic tanks, improper use of animal manures, cultivation (especially fallowing) precipitation , and fertilizers. Accumulation of nitrate N in groundwater is probably attributed to different regions. Major areas of nitrate pollution often occur under irrigation because leaching is required to control salt accumulation in the root zone. In the last few decades, areas under irrigation and the use of N fertilizers have increased greatly, and both of these have probably contributed to groundwater nitrate problems. Use of known best management practices (irrigation scheduling; fertilization based on calibrated soil tests; conservation tillage; acceptable cropping practices; recommended manuring rates) has been demonstrates to be highly effective in controlling leaching of nitrates. Government policies are needed that will encourage and reward the use of the best management practices that help control nitrate accumulations in groundwater.

Pruitt, J. B., D. E. Troutman and G. A. Irwin. ***Reconnaissance Of Selected Organic Contaminants In Effluent And Ground Water At Fifteen Municipal Wastewater Treatment Plants In Florida.*** **Geological Survey Water-Resources Investigations Report 85-4167. U.S. Geological Survey, Tallahassee, Florida. 1985.**

Abstract. Results of a 1983-84 reconnaissance of 15 municipal wastewater treatment plants in Florida indicated that effluent form most of the plants contains trace concentrations of volatile organic compounds. Chloroform was detected in the effluent at 11 of the 15 plants and its common occurrence was likely the result of chlorination. The maximum concentration of chloroform detected in the effluent sampled was 120 micrograms per liter. Detectable concentrations of selected organophosphorus insecticides were also common. For example, diazinon was detected in the effluent at 12 of the 15 plants with a maximum concentration of 1.5 micrograms per liter. Organochlorine insecticides, primarily lindane, were detected in the effluent at 8 of the 15 plants with a maximum concentration of 1.0 micrograms per liter.

Volatile compounds, primarily chloroform, were detected in water from monitor wells at four plants and organophosphorus insecticides, primarily diazinon, were present in the ground water at three treatment plants. Organochlorine insecticides were not detected in any samples from monitor wells. Based on the limited data available, this cursory reconnaissance suggests that the organic contaminants commonly occurring in the effluent of many of the treatment plants are not transported into the local ground water.

Ragone, S. E. ***Geochemical Effects Of Recharging The Magothy Aquifer, Bay Park, New York, With Tertiary-Treated Sewage.*** **Geological Survey Professional Paper 751-D. U.S. Government Printing Office, Washington, D.C. 1977.**

Abstract. A ground-water deficit of 93.5 to 123 million gallons per day (4.10 to 5.39 cubic meters per second) has been predicted for Nassau County, N.Y., by the year 2000 in a State report. Because of the predicted deficit, the U.S. Geological Survey, in cooperation with the Nassau County Department of Public Works, began an experimental deep-well recharge program in 1968. Thirteen recharge tests using tertiary-treated sewage (reclaimed water) and six tests using water from the domestic supply (city Water) were completed between 1968 and 1973. Recharge was through an 18-inch (46-centimeter) diameter recharge well screened in the Magothy aquifer between depths of 418 and 480 feet (127 and 146 meters) below land surface. Recharge rates ranged from about 200 to 400 gallons per minute (13 to 25 liters per second). In the longest test, reclaimed water was injected during 84.5 days of a 199-day period.

Although the iron concentration of native water in the recharge zone and reclaimed water is less than 0.5 milligrams per liter, the iron concentration of samples collected from observation wells 20, 100, and 200 feet (6.1, 30, and 61 meters) from the recharge well, and screened in the zone of recharge, approached 3 milligrams per liter at times. Iron mass-balance calculations indicate that dissolution of pyrite and marcasite (FeS_2) in the aquifer are the only known sources of iron that could explain the observed increase. Within a 20-foot (6.1-meter) radius of the recharge well, dissolved oxygen in the reclaimed water oxidizes pyrite and release Fe^{+2} (ferrous iron) to solution. However, the amount of iron in water continues to increase with distance from the recharge well even though dissolved oxygen is no longer present in water reaching the 20-foot (6.1 meter) radius; the mechanism by which iron continues to be dissolved in not quantitatively understood.

Some cation exchange also occurs during recharge. Loss of ammonium and potassium cations in the water was balanced by an increase in H^+, which at times caused pH to decrease by more than 1 pH unit.

Tertiary treatment removes 90 to 98 percent of the phosphate, MBAS (methylene blue active substances), and COD (chemical oxygen demand), leaving an average of 0.17, 0.07, and 9 milligrams per liter, respectively. During recharge, phosphate concentrations remain at native-water levels at the 20-, 100-, and 200-foot (6.1-, 30-, and 61-meter) observation wells, which indicates phosphate retention by the aquifer. Some MBAS and COD are retained at the 100-and 200- foot (30-and 61-meter) wells, presumably by adsorption reactions.

Ragone, S. E., H. F. H. Ku and J. Vecchioli. "Mobilization Of Iron In Water In The Magothy Aquifer During Long-Term Recharge With Tertiary-Treated Sewage, Bay Park, New York." *Journal Research U.S. Geological Survey*. V. 3, n. 1. pp. 93-98. 1975.

Abstract. Tertiary-treated sewage (reclaimed water) has been recharged by well into the Magothy aquifer qt Bay Park, N.Y., intermittently since 1968. The longest of 13 recharge tests, the subject of this report, lasted 84.5 days. This was sufficient time for the reclaimed water to reach an observation well 200 ft (61 m) from the recharge well. Although the iron concentrations of the reclaimed water and the native water were less than 0.4 mg/l, the iron concentrations of samples from observation wells 20,000, and 200 ft (6,30, and 61 m) from the recharge well at times approached 3 mg/l. Source of the iron is pyrite that is native to the aquifer.

Ragone, S. E. and J. Vecchioli. "Chemical Interaction During Deep Well Recharge Bay Park, New York." *Ground Water*. V. 13 , n. 1. Reprint. 1975.

Abstract. The U.S. Geological Survey, in cooperation with the Nassau County Department of Public Works, recharged tertia ry-treated sewage (reclaimed water) into the Magothy aquifer in 13 recharge experiments between 1968 and 1973. The recharge resulted in a degradation in water quality with respect to iron concentration and pH. Iron concentration increased from the range 0.14 to 0.30 milligrams per litre to as much as 3 milligrams per litre at the 20-, 100-, and 200-foot or 6.1-, 30-, and 61-metre observation wells as the reclaimed water displaced native water. The increase was presumably a result of pyrite dissolution. The pH of the water decreased from the range 5.22 to 5.72 to a low of about 4.50, predominantly as a result of cation-exchange reactions.

Ramsey, R. H. III, J. Borreli and C. B. Fedler. "The Lubbock, Texas, Land Treatment System." *Irrigation Systems For The 21st Century, Portland, Oregon, 1987*. (American Society Of Civil Engineers, New York, New York, pp. 352-361). 1987.

Abstract. The land treatment system at Lubbock, Texas provides an excellent model for studying the response of a system to growth. It also provides insights and justification for current criteria used to design slow-rate land treatment systems. During the 62 years of operation, the Lubbock Land Treatment System responded to a substantial increase in the volume of the effluent and changes in environmental concern for groundwater pollution. While certain problems persist, they have demonstrated that shortcomings in the system design can be turned into positive assets. Groundwater from beneath the treatment farms is used to provide flat water recreation and for irrigation of city parks and cemeteries.

Razack, M., C. Drogue and M. Baitelem. "Impact Of An Urban Area On The Hydrochemistry Of A Shallow Groundwater (Alluvial Reservoir) Town Of Narbonne, France." ***Hydrological Processes And Water Management In Urban Areas, Duisburg, Federal Republic Of Germany, 1988.*** **(International Hydrological Programme, UNESCO, pp. 487-494). 1988.**

Abstract. The Roman founded urban area of Narbonne in Southern France is built upon a shallow groundwater. This reservoir which thickness ranges from 10 to 30 meters is composed by the packing of varied materials and by quaternary deposits. A hydrochemical survey carried out during the Summer 1984 and the Winter 1985, showed an important impact of the urban activity on the groundwater quality. This impact is expressed through the superimposition beneath the city of a chemistry of exogeneous elements issued from urban activity (SO_4,NO_3) and of a natural chemistry (Na, Cl), both displaying different aerial patterns.

Rea, A. H. and J. D. Istok. "Groundwater Vulnerability To Contamination: A Literature Review." ***Irrigation Systems For The 21st Century, Portland, Oregon, 1987.*** **(American Society Of Civil Engineers, New York, New York, pp. 362-367). 1987.**

Abstract. Methods are needed to allow regulatory agencies and resource managers to predict, from readily available data, the potential for groundwater contamination problems. Regional maps developed from these methods can aid in planning and allocation of resources. The literature was searched for methods capable of filling this need. Six methods were selected and compared using hypothetical hydrogeologic settings. Based on the results obtained, which varied considerably between methods, none of the methods is completely satisfactory. Of the reviewed methods, "DRASTIC" seemed to be most suitable.

Reichenbaugh, R. C. ***Effects On Ground-Water Quality From Irrigating Pasture With Sewage Effluent Near Lakeland, Florida.*** **Geological Survey Water-Resources Investigations 76-108. U.S. Geological Survey, Tallahassee, Florida. 1977.**

Abstract. Since 1969, on the average, 25,000 gallons (94,600 liters per day) of domestic secondary-treated effluent has been used each day to supplement irrigation of 30 acres (12 hectares) of grazed pasture north of Lakeland, in west-central Florida. The U.S. Geological Survey began a study of the site several months after sprinkler application of the effluent to the Myakka sands (well- sorted, fine, acid) was started. The site, on the south shore of Lake Gibson, is underlain by as much as 60 feet (18 meters) of sand, sandy clay, and clay, containing the water-table aquifer, and two relatively unimportant confined aquifers, which in turn are underlain by the confined Floridan aquifer.

Monitor-wells were constructed to various depths in clusters near the effluent- irrigated pasture. The water table in the surficial aquifer varied from 1 to 3.3 feet (0.3 to 1.0 meters) below the land surface. Ground-water quality was evaluated by analysis of water samples collected three times over a 1-year period.

Ground-water beneath the irrigated pasture showed slight increases in cations and anions which are attributed to irrigation with the effluent. The concentration of total nitrogen (predominantly ammonia and organic nitrogen) was reduced to less than 20 percent of that in the upper 8 feet (2.4 meters) of pasture soils, and there was no increase in concentration below 20 feet (6.1 meters), or in downgradient ground water. There was no evidence of phosphorus or carbon contamination of ground water at the site. Though small numbers of bacteria were noted in some samples from nine wells, most were of the coliform

group. Only four wells yielded samples containing bacteria of probable fecal origin--one colony per 100 milliliters in each sample.

There was no detected accumulation of solids at the soil surface. Organic carbon, pH, and Kjeldahl nitrogen concentrations of the soil in the irrigated pasture were only slightly higher when compared to soil outside the pasture. As of 1972, the low-rate application of the effluent to the pasture apparently has had little effect on the soil and ground water.

Reichenbaugh, R. C., D. P. Brown and C. L. Goetz. *Results Of Testing Landspreading Of Treated Municipal Wastewater At St. Petersburg, Florida.* Geological Survey Water-Resources Investigations Report 78-110. U.S. Geological Survey, Tallahassee, Florida. 1979.

Abstract. Chlorinated secondary-treated effluent was used to irrigate a grassed 4-acre site at rates of 2 and 4 inches per week for periods of 11 and 14 weeks, respectively. Part of the site was drained by tile lines 5 feet below land surface. Chemical and bacteriological changes in the acidic ground water in the shallow and aquifer and in the effluent from the drains were studied.

Irrigation of the drained plot resulted in rapid passage of the applied wastewater through the soil and, consequently, poor nitrogen removal. The rapid percolation permitted nitrification but prevented denitrification. Thus, the effluent from the drains contained as much as 5.2 milligrams per liter nitrate-nitrogen. Irrigation of the undrained plot resulted in more extensive nitrogen removal.

Total phosphorus in the shallow ground water at the site increased from a maximum of 1.4 milligrams per liter before irrigation to as much as 5 milligrams per liter in the ground water 5 feet below land surface.

Concentrations of nitrogen and phosphorus did not increase in ground water downgradient from the site, although increased chloride concentrations demonstrated downgradient migration of the applied wastewater.

Prior to irrigation, total coliform bacteria were not detected in ground water at the site. After irrigation, total and fecal coliforms were detected in the ground water at the site and downgradient. The nitrifying bacteria *Nitrosomonas* and *Nitrobacter* at the irrigated site were most abundant at the soil surface; their numbers decreased with depth.

Rein, D. A., G. M. Jamesson and R. A. Monteith. "Toxicity Effects Of Alternative Disinfection Processes." *Water Environment Federation 65th Annual Conference & Exposition, New Orleans, Louisiana, 1992.* (Water Environment Federation, Alexandria, Virginia, pp. 461-470). 1992.

Abstract. Chlorination/dechlorination, ultraviolet irradiation, and ozonation were evaluated in side-by-side pilot/bench scale tests at the Akron, Ohio Water Pollution Control Station. The objective of the evaluation was to investigate the effect of these disinfection Processes on final effluent toxicity.

Six sets of chronic and two sets of acute whole effluent toxicity tests were conducted using *P. promelas* and *C. dubia*. After the first two sets of tests, it became apparent that differences between the processes could only be seen in 100 percent effluent samples. The test protocol was then modified to compare the relative toxic response in terms of survival and reproduction of *C. dubia* in 100 percent effluent samples.

Although very little statistically estimated toxicity was found in any of the process effluents, the chlorination/ dechlorination process effluent consistently produced a greater relative toxic response than either ultraviolet irradiation or ozonation. The chlorination/ dechlorination process produced the greatest relative toxic response for offspring produced and/or survival of *C. dubia* in seven of eight tests sets using 100 percent effluent samples.

Rice, R. C., D. B. Jaynes and R. S. Bowman. "Preferential Flow Of Solutes And Herbicide Under Irrigated Fields." ***Transactions Of The American Society Of Agricultural Engineers.*** **V. 34, n. 2. pp. 914-918. 1991.**

Abstract. Over the past several years, there has been an increasing concern of groundwater contamination from agricultural chemicals. Until recently it was generally believed that pesticides would not move to the groundwater. Starting in the mid-seventies more cases of pesticide contamination were reported. This article discusses recent experiments where accelerated leaching of solutes and a herbicide were observed under intermittent flood and sprinkler irrigation. Preferential flow phenomena resulted in solute and herbicide velocities of 1.6 to 2.5 times faster than calculated by traditional water balance methods and piston flow model. Little preferential flow was observed under continuously flooded conditions on a loam soil. Generally, preferential flow is thought to occur in coarse grained soils , cracked soils or in macro-pores such as root or worm holes. The bypass that we observed was in sandy loam and sandy soils with little or no structure. Understanding the preferential flow phenomena is necessary when predictive flow models are used.

Ritter, W. F., F. J. Humenik and R. W. Skaggs. "Irrigated Agriculture And Water Quality In East." ***Journal of Irrigation and Drainage Engineering.*** **V. 115, n. 5. pp. 807-821. 1989.**

Abstract. The northeastern and Appalachian states have a diverse array of geology, soils, and climate. Irrigation is concentrated in a few states, with the largest irrigation area in the Coastal Plain soils. Most of these soils are sandy and very susceptible to leaching. The groundwater recharge area in the Coastal Plain is directly above the aquifer. Most of the increase in irrigation has been to irrigate corn in Delaware, Maryland, and Virginia. Groundwater studies have been conducted in Delaware, Maryland, and New York in irrigated regions. Nitrate and aldicarb leaching has occurred on Long Island, New York, where potatoes are grown. Poultry manure is the largest source of nitrate contamination of the water table aquifer on the Delmarva Peninsula in Maryland. Both pesticide and nitrate leaching under irrigation have been studied in Delaware. A total water management system that can be used for both drainage and subsurface irrigation has been developed in North Carolina. The system will increase crop yields and has the potential for reducing nitrates by water table control.

Ritter, W. F., R. W. Scarborough and E. M. Chirnside. "Nitrate Leaching Under Irrigation On Coastal Plain Soil." ***Journal of Irrigation and Drainage Engineering.*** **V. 117, n. 4. pp. 490-502. 1991.**

Abstract. The effect of irrigation and nitrogen management on ground-water quality was evaluated for four years on a Sassafras sandy loam Coastal Plain soil. Applying the greatest portion of the nitrogen by side-dressing and by fertigation were compared. Maintaining optimum soil moisture and partial irrigation (applying one half the water as optimum irrigation) were the water management practices investigated. Nitrate concentrations increased in the ground water for all nitrogen and irrigation-management practices. The mass of the nitrate leached was related to the drainage volume. In all but one year the largest mass of nitrate was leached during the fall and winter months, when the largest amount of

recharge occurs. Very little nitrate was leached during the growing season for any nitrogen or irrigation management practice except for one year when 30 cm of rainfall occurred in August. The mass of nitrate leached during that growing season ranged from 33.9 kg/ha for partial irrigation to 139.0 kg/ha for full irrigation.

Robinson, J. H. and H. S. Snyder. "Golf Course Development Concerns In Coastal Zone Management." ***Coastal Zone '91: Proceedings Of The Seventh Symposium On Coastal And Ocean Management, Long Beach, California, 1991.*** **(American Society Of Civil Engineers, New York, New York, pp. 431-442). 1991.**

Abstract. The rapid growth of golf course development in South Carolina's coastal zone presents new challenges in protecting coastal water and wetlands. While filling or dredging of wetland resources for golf courses development is a practice of the past, golf course designers make every effort to minimize their proximity to wetland resource areas. Coastal zone management concerns associated with golf course development include the protection of adjacent wetland resources from (1) nutrient and chemical laden storm water runoff, (2) aerosol from "fertigation," a mixture of fertilizer and irrigation water, and treated effluent irrigation systems, and (3) physical impacts associated with wetland crossings, play-through areas, and player intrusion. This paper first provides a brief overview of current literature associated with the use of chemicals on golf courses and their impacts on man and the coastal environment. This paper then focuses on best management practices which can be utilized in the physical design and management of golf courses to minimize impacts on coastal resources, drawing upon examples from golf courses recently constructed or currently under development in coastal South Carolina.

Rosenshein, J. S. and J. J. Hickey. "Storage Of Treated Sewage Effluent And Storm Water In A Saline Aquifer Pinellas Peninsula, Florida." ***Ground Water.*** **V. 15, n. 4. pp. 284-293. 1977.**

Abstract. The Pinellas Peninsula, an area of 750 square kilometres (290 square miles) in coastal west-central Florida, is a small hydrogeologic replica of Florida. Most of the Peninsula's water supply is imported from wells fields as much as 65 kilometres (40 miles) inland. Stresses on the hydrologic environment of the Peninsula and on adjacent water bodies, resulting from intensive water-resources development and waste discharge, have resulted in marked interest in subsurface storage of waste water (treated effluent and untreated storm water) and in future retrieval of stored water for nonpotable use. If subsurface storage is approved by regulatory agencies, as much as 265 megalitres per day (70 million gallons a day) of waste water could be stored underground within a few years, and more than 565 megalitres per day (150 million gallons a day) could be stored in about 25 years. This storage would constitute a large resource of nearly fresh water in the saline aquifers underlying about 250 square kilometres (200 square miles) of the Peninsula.

The upper 1,060 metres (3,480 feet) of the rock column underlying four test sites on the Pinellas Peninsula have been explored. The rocks consist chiefly of limestone and dolomite. Three moderately to highly transmissive zones, separated by leaky confining beds, (low permeability limestone) from about 225 to 380 metres (740 to 1,250 feet) below mean sea level, have been identified in the lower part of the Floridan aquifer in the Avon Park Limestone. Results of withdrawal and injection tests in Pinellas County indicate that the middle transmissive zone has the highest estimated transmissivity -- about 10 times other reported values. The chloride concentration of water in this zone, as well as in the Avon Park Limestone in Pinellas Peninsula, is about 19,000 milligrams per litre. If subsurface storage is approved and implemented, this middle zone probably would be used for storage of the waste water and the one would become the most extensively used in Florida for this purpose.

Sabatini, D. A. and T. A. Austin. "Adsorption, Desorption And Transport Of Pesticides In Groundwater: A Critical Review." ***Planning Now For Irrigation And Drainage In The 21st Century, Lincoln, Nebraska, 1988.*** **(American Society Of Civil Engineers, New York, New York, pp. 571-579). 1988.**

Abstract. Adsorption and desorption are major mechanisms affecting the transport and fate of pesticides in groundwater. Equilibrium, chemical nonequilibrium and physical nonequilibrium adsorption relationships for predicting pesticide transport are reviewed. Hysteresis of desorption and relationships for predicting linear equilibrium coefficients are discussed.

Sabol, G. V., H. Bouwer and P. J. Wierenga. "Irrigation Effects In Arizona And New Mexico." ***Journal of Irrigation and Drainage Engineering.*** **V. 113, n. 1. pp. 30-57. 1987.**

Abstract. Irrigated agriculture accounts for about 90% of all water consumption in both Arizona and New Mexico. More than 50% of this water is pumped from groundwater sources. Some portion of the applied irrigation water is returned to the groundwater supply through deep percolation. Several field studies have been conducted in these states to measure the quantity and quality of water that is recharging the aquifer. These studies indicate that groundwater quality in Arizona and New Mexico has been deleteriously affected in deep supplies. The magnitude and time rate of groundwater quality changes is a function of irrigation management practice, fertilizer and pesticide applications, quality of irrigation water, rate of groundwater level decline, presence of perched zones that intercept percolating water, proximity to surface water supplies, leakage through and along well casings, and soil salinity.

Salo, J. E., D. Harrison and E. M. Archibald. "Removing Contaminants By Groundwater Recharge Basins." ***Journal Of The American Water Works Association.*** **V. 78, n. 9. pp. 76-81. 1986.**

Abstract. The effects of urban runoff used to recharge groundwater basins in the Fresno, Calif., area are discussed. The study, which was part of the US Environmental Protection Agency's nationwide urban runoff program, was undertaken to determine the environmental effects on groundwater quality and to identify management practices that would mitigate adverse effects. No deterioration of groundwater quality because of recharge with runoff was found, although the authors recommend a more thorough investigation of effects of recharge with runoff from industrial sites.

Schiffer, D. M. ***Effects Of Three Highway-Runoff Detention Methods On Water Quality Of the Surficial Aquifer System In Central Florida.*** **Geological Survey Water-Resources Investigations Report 88-4170. U.S. Geological Survey, Tallahassee, Florida. 1989.**

Abstract. Water quality of the surficial aquifer system was evaluated at one exfiltration pipe, two ponds (detention and retention), and two swales in central Florida, representing three runoff detention methods, to detect any effects from infiltrating highway runoff. Concentrations of major ions, metals, and nutrients were measured in ground water and bottom sediments form 1984 through 1986.

At each study area, concentrations in ground water near the structure were compared to concentrations in ground water from an upgradient control site. Ground-water quality data also were pooled by detention method and statistically compared to detect any significant differences between methods.

Analysis of variance of the rank-converted water-quality data at the exfiltration pipe indicated that mean concentration s of 14 to 26 water-quality variables are significantly different among sampling locations (the pipe, unsaturated zone, saturated zone, and the control well). Most of these differences are between the unsaturated zone and other locations. Only phosphorus is significantly higher in ground water near the pipe than in ground water at the control well.

Analysis of variance of rank- converted water-quality data at the retention pond indicated significantly differences in 14 to 25 water-quality variables among sampling locations (surficial aquifer system, intermediate aquifer, pond, and the control well), but mean concentrations in ground water below the pond were never significantly higher than in ground water from the control well. Analysis of variance results at other study areas indicated few significant differences in water quality among sampling locations.

Values of water-quality variables measured in ground water at all study areas generally were within drinking water standards. the few exceptions included pH (frequently lower than the limit of 6.5 at one pond and both swales), and iron, which frequently exceeded 300 micrograms per liter in ground water at one swale and the detention pond.

Large concentrations of polyaromatic hydrocarbons were measured in sediments at the retention pond, but qualitative analysis of organic compounds in ground water from three wells indicated concentrations of only 1 to 5 micrograms per liter at on site, and below detection level (1 microgram per liter) at the other two sites. This may be an indication of immobilization of organic compounds in sediments.

Significant differences for most variables were indicated among ground-water quality data pooled by detention method. Nitrate nitrogen and phosphorus concentrations were highest in ground water near swales and exfiltration pipe, the Kjeldahl nitrogen was highest near ponds. Chromium, copper, and lead concentrations in ground water were frequently below detection levels at all study areas, and no significant differences among detention methods were detected for any metal concentration with the exception of iron. High iron concentrations in ground water near the detention pond and one swale most likely were naturally occurring and unrelated to highway runoff.

Results of the study indicate that natural processes occurring in soils attenuate inorganic constituents in runoff prior to reaching the receiving ground water. However, organic compounds detected in sediments at the retention pond indicate a potential problem that may eventually affect the quality of the receiving ground water.

Schmidt, K. D. and I. Sherman. "Effect Of Irrigation On Groundwater Quality In California." ***Journal Of Irrigation And Drainage Engineering*****. V. 113, n. 1. pp. 16-29. 1987.**

Abstract. Deep percolation of irrigation return flow is a major source of recharge beneath most irrigated areas in California. Tile drainage, soils, water in the vadose zone, and shallow groundwater have been studied. Nitrate, salinity, and several pesticide have received the most attention. Numerous parts of the San Joaquin Valley have been investigated, as well as parts of the Sacramento Valley, Imperial Valley, Los Angeles Basin, and several other valleys. The results of the studies indicate that irrigation return flow usually exerts a substantial impact on groundwater quality. High nitrate contents in groundwater beneath irrigated areas are often a result of irrigation. In addition, extensive pollution of shallow groundwater in parts of the San Joaquin Valley have been caused by use of the pesticide DBCP.

Schneider, B. J., H. F. H. Ku and E. T. Oaksford. ***Hydrologic Effects Of Artificial-Recharge Experiments With Reclaimed Water At East Meadow, Long Island, New York.*** **Geological Survey Water Resources Investigations Report 85-4323. U.S. Geological Survey, Denver, Colorado. 1987.**

Abstract. Artificial-recharge experiments were conducted at East meadow from October 1982 through January 1984 to evaluate the degree of ground-water mounding and the chemical effects of artificially replenishing the ground-water system with tertiary-treated wastewater. More than 800 million gallons of treated effluent was returned to the upper glacial aquifer through recharge basins and injection wells in the 15-month period.

Reclaimed water was provided by the Cedar Creek advanced wastewater-treatment facility in Wantagh, 6 miles away. The chlorinated effluent was pumped to the recharge facility, where it was fed to basins by gravity flow and to injection wells by pumps. An observation- well network was installed at the recharge facility to monitor both physical and chemical effects of reclaimed water on the ground-water system.

Observations during the recharge tests indicate that the two most significant factors in limiting the rate of infiltration through the basins floor were the recharge- test duration and quality of reclaimed water. Head buildup in the aquifer beneath the basins ranged from 4.3 to 6.7 feet, depending on the quantity and duration of water application. Head buildup near the injection wells within the aquifer ranged from 0.3 to 1.2 feet. The head buildup in the injection wells is attributed to biological, physical, and chemical actions, which can operate separately or together. Recharge basins provided a more effective means of moving large quantities of reclaimed water into the aquifer than injection wells.

Two basins equipped with central observation manholes permit the acquisition of data on the physical and chemical processes that occur within the unsaturated zone during recharge. Results of 3-day and 176-day ponding tests in basins 3 and 2, respectively, indicate that reclaimed water is relatively unchanged chemically by percolation through the unsaturated zone because (1) the sand and gravel of the upper glacial aquifer is unreactive, (2) the water moves to the water table rapidly, and (3) the water is highly treated before recharge.

The quality of water in the aquifer zones affected by recharge improved, on the whole. Ground-water concentrations of nitrate nitrogen and several low-molecular- weight hydrocarbons, although significantly above drinking-water standards before recharge, decrease to well within drinking-water standards as a direct result of recharge. Sodium and chloride concentrations increased above background levels as a result of recharge but remained well within drinking-water standards and the New York State effluent standards established for this ground-water-recharge study.

Seaburn, G. E. and D. A. Aronson. ***Influence Of Recharge Basins On The Hydrology Of Nassau And Suffolk Counties, Long Island, New York.*** **Geological Survey Water Supply Paper 2031. U.S. Government Printing Office, Washington, D.C. 1974.**

Abstract. An investigation of recharge basins on Long Island was made by the U.S. Geological Survey in cooperation with the New York State Department of Environmental Conservation, Nassau County Department of Public Works, Suffolk County Water Authority. The major objectives of the study were to (1) catalog basic physical data on the recharge basins in use on Long Island, (2) measure quality and quantity of precipitation and inflow, (3) measure infiltration rates at selected recharge basins, and (4)

evaluate regional effects of recharge basins on the hydrologic system of Long Island. The area of study consists of Nassau and Suffolk Counties-about 1,370 square miles -in eastern Long Island, N.Y.

Recharge basins, numbering more than 2,100 on Long Island in 1969, are open pits on moderately to highly permeable sand and gravel deposits. These pits are used to dispose of storm runoff from residential, industrial, and commercial areas, and from highways, by infiltration of the water through the bottom and sides of the basins.

The hydrology of three recharge basins on Long Island -- Westbury, Syosset, and Deer Park basins- was studied. The precipitation-inflow relation showed that the average percentage of precipitation flowing into each basin were roughly equivalent to the average percentage of impervious areas in the total drainage areas of the basins. Average percentages of precipitation flowing into the basins as direct runoff were 12 percent at the Westbury basin, 10 percent at the Syosset basin, and 7 percent at the Deer Park basin. Numerous open-bottomed storm-water catch basins at Syosset and Deer Park reduced the proportion of inflow to those basins, as compared with the Westbury basin, which has only a few open-bottomed catch basins.

Inflow hydrographs for each basin typify the usual urban runoff hydrograph- steeply rising and falling limbs, sharp peaks, and short time bases. Unit hydrographs for the Westbury and the Syosset basins are not expected to change; however, the unit hydrograph for the Deer Park basin is expected to broaden somewhat as a result of additional future house construction within the drainage area.

Infiltration rates averaged 0.9 fph (feet per hour) for 63 storms between July 1967 and May 1970 at the Westbury recharge basin, 0.8 fph for 22 storms from July 1969 to September 1970 at the Syosset recharge basin, and 0.2 fph for 24 storms from March to September 1970 at the Deer Park recharge basin. Low infiltration rates at Deer Park resulted mainly from (1) a high percentage of eroded silt, clay, and organic debris washed in from construction sites in the drainage area, which partly filled the interstices of the natural deposits, and (2) a lack of well-developed plant-root system on the younger basin, which would have kept the soil zone more permeable.

The apparent rate of movement of storm water through the unsaturated zone below the unsaturated zone below each basin averaged 5.5 fph at Westbury, 3.7 fph at Syosset, and 3.1 fph at Deer Park. The rates of movement for storms during the warm months (April through October) were slightly higher than average, probably because the recharging water was warmer than it was during the rest of the year, and therefore, was slightly less viscous.

On the average, a 1-inch rainfall resulted in a peak rise of the water table directly below each basin of 0.5 fool; a 2-inch rainfall resulted in a peak rise of about 2 feet. The mound commonly dissipated within 1 to 4 days at Westbury, 7 days to more than 15 days at Syosset, and 1 to 3 days at Deer Park, depending on the magnitude of the peak buildup.

Average annual ground-water recharge was estimated to be 6.4 acre-feet at the Westbury recharge basin, 10.3 acre-feet at the Syosset recharge basin, and 29.6 acre-feet at the Deer Park recharge basin.

Chemical composition of precipitation at Westbury, Syosset, and Deer Park drainage areas was similar: hardness of water ranged from 6 to 56 mg/l (milligrams per liter as calcium and magnesium hardness), dissolved-solids content ranged from 21 to 124 mg/l, and pH ranged from 5.9 to 6.6. Calcium was the predominant cation, and sulfate and bicarbonate were the predominant anions. Atmospheric dust and gaseous sulfur compounds associated with the Northeast urban environment mainly account for this combination of ions in precipitation.

Chemical composition of the inflow to the basins was also similar in each of the three basins. In general, hardness of the water samples collected at Westbury, Syosset, and Deer Park recharge basins in 1970 was less than 50 mg/l (as calcium and magnesium hardness), and dissolved-solids content was less than 100 mg/l. The pH ranged from 6.1 to 7.4. The concentrations of most constituents in inflow were greater than those in precipitation; precipitation contributed 70 to 88 percent of the loads of dissolved constituents in the inflow.

Only three of 11 pesticides sought by chemical analysis were detected. A maximum DDT concentration of 0.08 ug/l (micrograms per liter) was determined for an inflow sample to Westbury recharge basin. Concentrations of other pesticides were 0.02 ug/ l or less.

Total concentration of pesticides detected in the soil layers on the floors of each basin generally ranged from 0.4 to 40 mg/l. The greater organic content of the soil layers, compared with that of the underlying natural deposits, suggests that pesticides as well as other organic material are effectively reduced or removed from the infiltrating water in the soil layer.

Ground-water recharge from precipitation through the total area (73,000 acres) drained by 2,124 recharge basins in operation in 1969 was estimated to be 166,000 acre-feet per year, or about 148 million gallons per day. Ground-water recharge in the areas where recharge basins are used is probably equivalent to or may slightly exceed recharge under natural conditions.

Shirmohammadi, A. and W. G. Knisel. "Irrigated Agriculture And Water Quality In South." *Journal of Irrigation and Drainage Engineering*. V. 115, n. 5. pp. 791-806. 1989.

Abstract. Irrigated agriculture in the humid region has resulted in more intensive management including crop production and associated increase in fertilizer and pesticide use. Multiple cropping in most of the southeast (Alabama, Florida, Georgia, and South Carolina)and Delta (Arkansas, Louisiana, and Mississippi) states increases the demand for water and agricultural chemicals. Pesticide usage in the 48 states and the District of Columbia totaled 299,892,159 kg of active ingredient (AI) by 1982. Agricultural chemicals may percolate to aquifers in some soils and geologic formations resulting in groundwater contamination. Groundwater fluctuations are related to irrigation. Groundwater quality data are used to show the trend in quality related to irrigated agriculture and cropping systems. Areas with specific groundwater problems such as salt-water intrusion and pesticide levels are identified. A total of 17 pesticides have been reported in groundwater in the United States and four of these were found in the southeast and Delta states. Data show that less than 1% of wells sampled in the southeast and Delta states had nitrate concentrations exceeding 10 mg/'L (drinking water standard). Degradation of surface water quality relative to irrigation is discussed.

Smith, S. O. and D. H. Myott. "Effects Of Cesspool Discharge On Ground-Water Quality On Long Island, N.Y." *Journal Of The American Water Works Association*. V. 67, n. 8. pp. 456-458. 1975.

Abstract. Large amounts of household wastes, discharged through cesspools, have resulted in deterioration of groundwater quality on Long Island. Although nitrate pollution poses the greatest threat to the Island's water supplies, other constituents derived from cesspool leachings are increasing. Municipal sewering projects which have been undertaken as a solution are discussed in the following.

Spalding, R. F. and L. A. Kitchen. "Nitrate In The Intermediate Vadose Zone Beneath Irrigated Cropland." *Ground Water Monitoring Review*. V. 8, n. 2. pp. 89-95. 1988.

Abstract. More than 1000 feet of fine-textured, unsaturated zone core beneath nitrogen-fertilized and irrigated farmland was collected, leached and analyzed for nitrate-nitrogen. Fertility plots treated with 200, 300 and 400 lbs N/acre/yr accumulated significant quantities of nitrate-nitrogen in those vadose zone below the crop rooting zone. The average nitrate-nitrogen concentration approximately doubled with each 100 lbs. N/acre/ yr increment above the 100 lbs. N/acre/yr treatment. Nitrate loading estimates for the plots treated with 400 lbs./N/acre/yr indicate that over 1200 lbs. N/acre was in the vadose zone beneath the crop rooting zone. In 15 years, the nitrate moved vertically at least 60 feet through these fine-textured, unsaturated sediments. As much as 600 lbs. N/acre have accumulated in the vadose zone under independent corn producer's fields.

Vadose zone sampling is effective in predicting future non-point nitrate-contaminated areas.

Squires, R. C., G. R. Groves and W. R. Johnston. "Economics Of Selenium Removal From Drainage Water." *Journal of Irrigation and Drainage Engineering*. V. 115, n. 1. pp. 48-57. 1989.

Abstract. A treatment system consisting of biological reactors and microfiltration has been developed to remove soluble selenium species from agricultural drainage water. The process was evaluated over a two-year period, and the reactor configurations and specific removal rates of nitrate and selenium were optimized. Trials on the operation of a pilot solar salt works to concentrate the detoxified water after treatment to recover salts were also carried out. The treatment process reduced the selenium concentration of the drainage water from over 500 ug/L to 10-50 ug/L as Se. Boron in the drainage water was reduced from 6-8 mg/L to 0.5 mg/L by an ion exchange post-treatment. This resin also removed residual selenium to below 10 ug/L. Trials on high-salinity drainage waters, similar to those found in evaporation ponds, were successful and gave enhanced specific selenium removal rates. The costs of removing selenium or selenium and boron from the drainage water were estimated to be $\$0.038\text{-}0.052/m^3$ and $\$0.050\text{-}0.071/m^3$, respectively, after allowance for by-product recovery (boric acid and sodium sulfate) credits.

Squires, R. C. and R. Johnston. "Selenium Removal -- Can We Afford It?" *Irrigation Systems For The 21st Century, Portland, Oregon, 1987*. (American Society Of Civil Engineers, New York, New York, pp. 455-467). 1987.

Abstract. The process of biologically removing the element selenium from agricultural drainage water is discussed and an economic evaluation of the process is presented.

Steenhuis, T., R. Paulsen, T. Richard, W. Staubitz, M. Andreini and J. Surface. "Pesticide And Nitrate Movement Under Conservation And Conventional Tilled Plots." *Planning Now For Irrigation And Drainage In The 21st Century, Lincoln, Nebraska, 1988*. (American Society Of Civil Engineers, New York, New York, pp. 587-595). 1988.

Abstract. Carbofuran, alachlor, atrazine, nitrate and bromide (a tracer) wee applied to plots with conventional and conservation tillage. Conventional tillage consisted of plowing, disking and harrowing. In the conservation tilled plots, the sod was killed with "Roundup" and the corn seeded without any further tillage.

During the early part of the growing season the conservation tilled plots had a higher tile discharge than those under conventional tillage due to dead sod cover that suppressed evapotranspiration. Low concentrations of atrazine and carbofuran were found below the rootzone in the conservation tilled plots starting one month after application. In the conventional tillage it was not until late fall that some atrazine was detected below the rootzone. Dye studies indicated that in the plowed layer of the conventional tilled plots water and solutes were in intimate contact with the soil matrix promoting adsorption of the pesticides. The bromide tracer was not adsorbed and the bromide distribution with depth was similar for both tillage practices. Bromide was, therefore, a poor indicator for predicting potential pesticide losses under different tillage practices. Nitrate was only found in the zone that was never saturated.

Strutynski, B., R. E. Finger, S. Le and M. Lundt. "Pilot Scale Testing Of Alternative Technologies For Meeting Effluent Reuse Criteria." ***Water Environment Federation 65th Annual Conference & Exposition, New Orleans, Louisiana, 1992.*** **(Water Environment Federation, Alexandria, Virginia, pp. 69-79). 1992.**

Abstract. The Municipality of Metropolitan Seattle (Metro) has been investigating the potential for reuse of the effluent from its treatment plant at Renton for the last several years. The City of Seattle's Water Department, a major water supplier for the area, joined with Metro in 1991 in the evaluation and development of reuse options. These options include both nonconsumptive reuse such as heating and cooling and consumptive reuse such as irrigation.

A pilot program was instituted in 1991 to identify a range of technologies capable of producing reuse quality water from secondary effluent. Technologies investigated included additional chlorination of the existing secondary effluent as well as filtration, ultraviolet disinfection without and with prior filtration. All process streams were monitored for variety of parameters in addition to coliform levels. This paper presents the results of this testing.

Tim, U. S. and S. Mostaghimi. "Model For Predicting Virus Movement Through Soils." ***Ground Water.*** **V. 29, n. 2. pp. 251- 259. 1991.**

Abstract. A numerical model, VIROTRANS, is developed for simulating the vertical movement of water and virus through soils treated with waste-water effluents and sewage sludges. The expression describing transient flow of water is coupled with the convective-dispersive equation for subsurface solute transport. The resulting methodology is a coupled set of partial differential equations that describe the transient flow of water and suspended virus particle movement through variably saturated media. Solutions to the partial differential equations are accomplished by a Galerkin finite element method. Several example problems are used to provide a quantitative verification and validation of the model. The model simulations are compared to an analytical solution and to experimental measurements of soil moisture content and poliovirus 1 transport. The comparisons show reasonable agreement between model simulations and measured data. Sensitivity of the model's prediction to variations in pertinent input parameters are also analyzed.

Townley, J. A., S. Swanback and D. Andres. ***Recharging A Potable Water Supply Aquifer With Reclaimed Wastewater In Cambria, California.*** **John Carollo Engineers, Walnut Creek, CA. 1992.**

Abstract. A proposed project in Cambria, a small unincorporated community in San Luis Obispo County, involves recharging one of the community's domestic supply aquifers with reclaimed

wastewater. This paper describes the advance treatment system, regulatory involvement, and public acceptance issues.

Treweek, G. P. "Pretreatment Processes For Groundwater Recharge." ***Artificial Recharge Of Groundwater.*** **Butterworth Publishers, Boston. pp. 205-248. 1985.**

Abstract. Unplanned, indirect wastewater reuse through effluent discharge to streams and groundwater basins for subsequent downstream use by a wide variety of interests -- agricultural, industrial, or domestic -- has been a long-accepted practice throughout the world. Many communities at the end of major waterways, such as New Orleans and London, ingest water that already has been used as many as five times by repeated river withdrawal and discharge. Similarly, rivers or percolation basins may recharge underlying groundwater aquifers with reclaimed wastewater, which is in turn withdrawn by subsequent communities. For example, the effluent from over 140 wastewater treatment plants partially replenishes the groundwater tapped by the water supply system for London. This means effluent disposal, known as unplanned, indirect reuse, has become a generally accepted practice.

Planned, direct reuse is practiced on a smaller scale for a limited number of purposes, primarily agricultural and industrial. The terms 'unplanned' and 'planned' refer to whether the subsequent reuse was an unintentional byproduct of effluent discharge, or was designed as a conscious act following effluent discharge. The planned reuse schemes discussed in this report incorporated wastewater reclamation processes designed to meet not only effluent discharge standards, but also reuse standards promulgated by health authorities.

Troutman, D. E., E. M. Godsy, D. F. Goerlitz and G. G. Ehrlich. ***Phenolic Contamination In The Sand-And-Gravel Aquifer From A Surface Impoundment Of Wood Treatment Wastewaters, Pensacola, Florida.*** **Geological Survey Water-Resources Investigations Report 84-4230. U.S. Geological Survey, Tallahassee, Florida. 1984.**

Abstract. The discharge of creosote and pentachlorophenol wastewaters to unlined surface impoundments has resulted in ground-water contamination in the vicinity of a wood-treatment plant near Pensacola, Florida. Total phenol concentrations of 36,000 micrograms per liter have been detected at a depth 40 feet below land surface in a test hole 100 feet south of overflow impoundment. Phenol concentrations in this same test hole were lest than 10 micrograms per liter at a depth of 90 feet below land surface. Samples collected in test holes 1,350 feet downgradient from the surface impoundments and 100 feet north of Pensacola Bay, above and immediately below a clay lens, indicate that phenol contaminated ground water may not be discharging directly into Pensacola Bay. Phenol concentrations exceeding 20 micrograms per liter were detected in samples from a drainage ditch discharging directly into Bayou Chico.

Microbiological data collected near the wood-treatment site suggest that anaerobic methanogenic ecosystem contributes to reduction in phenol concentrations in ground water. A laboratory study using bacteria isolated from the study site indicates that phenol, 2- methylphenol, and 3-methylphenol are significantly degraded and that methanogenesis reduces total phenol concentrations in laboratory digestors by 45 percent. Pentachlorophenol may inhibit methanogenesis at concentration exceeding 0.45 milligrams per liter.

Data on wastewater migration in ground water from American Creosote Works indicate that the sand-and-gravel aquifer is highly susceptible to contamination from unlined surface impoundments and other surface sources. Groundwater contamination occurs readily in pervious sands and gravel within the

aquifer where the water table is near land surface. Coastal areas and valleys tend to be areas of ground-water discharge, and contamination of ground water in these areas may result in surface-water contamination.

U.S. Environmental Protection Agency Office Of Water, Office of Wastewater Enforcement and Compliance, and Office of Research and Development, Office of Technology Transfer and Regulatory Support. *Manual: Guidelines For Water Reuse.* EPA/625/R-92/004. U.S. Environmental Protection Agency, Washington, D.C. 1992.

Abstract. With many communities throughout the world approaching or reaching the limits of their available water supplies, water reclamation and reuse has become an attractive option for conserving and extending available water supplies. Water reuse may also present communities an opportunity for pollution abatement when it replaces effluent discharge to sensitive surface waters.

Water reclamation and nonpotable reuse only require conventional water and wastewater treatment technology that is widely practiced and readily available in countries throughout the world. Furthermore, because properly implemented nonpotable reuse does not entail significant health risks, it has generally been accepted and endorsed by the public in the urban and agricultural areas where it has been introduced.

Water reclamation for nonpotable reuse has been adopted in the United States and elsewhere without the benefit of national or international guidelines or standards. However, in recent years, many states in the U.S. have adopted standards or guidelines, and the World Health Organization (WHO) has published guidelines for reuse for agricultural irrigation. The primary purpose of this document is to present guidelines, with supporting information, for utilities and regulatory agencies in the U.S. In states where standards do not exist or are being revised or expanded, the Guidelines can assist in developing reuse programs or appropriate regulations. The Guidelines will also be useful to consulting engineers and others involved in the evaluation, planning, design, operation, or management of water reclamation and reuse facilities. In addition, a section on reuse internationally is offered to provide background and discuss relevant issues for authorities in other countries where reuse is being considered. The document does not propose standards by either the U.S. Environmental Protection Agency (EPA) or the U.S. Agency for International Development (AID). In the U.S., water reclamation and reuse standards are the responsibility of state agencies.

These guidelines primarily address water reclamation for nonpotable urban, industrial, and agricultural reuse, about which little controversy exists. Also, attention is give to augmentation of potable water supplies by indirect reuse. Because direct potable reuse is not currently practiced in the U.S., only a brief overview is provided.

Varuntanya, C. P. and D. R. Shafer. "Techniques For Fluoride Removal In Industrial Wastewaters." *Water Environment Federation 65th Annual Conference & Exposition, New Orleans, Louisiana, 1992.* (Water Environment Federation, Alexandria, Virginia, pp. 159-170). 1992.

Abstract. This paper will present data from several laboratory scale treatability studies for fluoride removal from two industrial plant wastewaters. Additionally, limited plant data will be presented from one facility. Production at each facility involves the manufacture of zirconium tubes and the manufacture of semiconductors. The zirconium tube manufacturing plant wastewater contains approximately 15-20 mg/L fluoride before treatment while the semiconductor facility contains

approximately 25 mg/L fluoride. The results of the studies show that fluoride can be reduced to as low as 1 mg/L. The paper will also discuss the effluent concentrations achievable from each treatment scheme, as well as the chemical dosages required, and the process equipment necessary in each scheme. The advantages and disadvantages of the treatment processes will also be evaluated in this paper. The objective of the paper will provide insight for defluoridation of wastewaters for given effluent limitations.

Vaughn, J. M., E. F. Landry, L. J. Baranosky, C. A. Beckwith, M. C. Dahl and N. C. Delihas . "Survey Of Human Virus Occurrence In Wastewater-Recharged Groundwater On Long Island." ***Applied And Environmental Microbiology.*** **V. 36, n. 1. pp. 47-51. 1978.**

Abstract. Treated wastewater effluents and groundwater observation wells from three sewage recharge installations located on Long Island were assayed on a monthly basis for indigenous human enteroviruses and coliform bacteria for a period of 1 year. Viruses were detected in groundwater at sites where recharge basins were located less than 35 feet (ca. 10.6 m) above the aquifer. Results from one of the sites indicated the horizontal transfer of viable viruses through the groundwater aquifer.

Vecchioli, J., G. G. Ehrlich, E. M. Godsy and C. A. Pascale. "Alterations In The Chemistry Of An Industrial Waste Liquid Injected Into Limestone Near Pensacola, Florida." ***Hydrogeology Of Karstic Terrains: Case Histories.*** **International Association Of Hydrogeologists, UNESCO, V. 1. pp. 217-220. 1984.**

Abstract. An industrial waste liquid containing organonitrile compounds and nitrate ions has been injected since June 1975 into the lower limestone of the Floridan aquifer at a site near Pensacola, Florida. Data from inorganic and organic chemicals, dissolved gas, and microbiological analyses of liquid backflowed from the injection well and of liquid sample from a nearby monitor well indicated that the injected waste liquid undergoes substantial chemical changes in the subsurface.

Verdin, J., G. Lyford and L. Sims. ***Application Of Satellite Remote Sensing For Identification Of Irrigated Lands In The Newlands Project.*** **1987.**

Abstract. As one element of Operating Criteria and procedures for the Newlands project in west-central Nevada, the Bureau of Reclamation has compiled an irrigation water rights spatial data base. In 1984, color infrared aerial photography was obtained and used to identify irrigated lands in the project. The photo interpretations were digitized to integrate them with water right maps for the project, which had similarly been digitized. Bench and bottom land designations, a soil type distinction of consequence for legal water entitlements, were recorded from maps as well. The data base was used to calculate and summarize the tables, on a section-by-section basis, acreages of irrigated lands with water rights, irrigated lands without water rights, and non-irrigated water-righted land. For the 1985 and 1986 growing seasons, multispectral digital imagery of the project acquired by the Thermatic Mapper instrument on Landsat-5 was used to update the irrigated lands theme of the data base. Scenes from May and August dates of those seasons, chosen after consideration of the phenologies of the major crops in the project, were co-registered and used to derive multidate vegetation index (Kauth - Thomas "greenness") images. These derivative images were then interpreted at an interactive video display providing a variety of enhancement capabilities, such as zooming and contrast stretching, to identify lands whose irrigation status had changed. Revisions to the irrigation theme of the spatial data base were then made accordingly, as were modifications to the water rights coverage due to transfers between parcels of land. New acreage tabulation s were prepared by digitally overlaying the revised coverages. In 1986, the SPOT-1 satellite was launched, and the higher resolution imagery available from this remote sensing satellite is currently being

evaluated for use in the Newlands Project. Multitemporal greenness images are being processed for crop type identification, and multispectral images are being digitally merged with 10-meter resolution panchromatic images for improved interpretability.

Waller, B. G., B. Howie and C. R. Causaras. *Effluent Migration From Septic Tank Systems In Two Different Lithologies, Broward County, Florida.* Geological Survey Water-Resources Investigations Report 87-4075. U.S. Geological Survey, Tallahassee, Florida. 1987.

Abstract. Two septic tank test sites, one in sand and one in limestone, in Broward County, Florida, were analyzed for effluent migration. Ground water from shallow wells, both in background areas and hydraulically downgradient of the septic tank system, was sampled during a 16-month period from April 1983 through August 1984. Water-quality indicators were used to determine the effluent affected zone near the septic tank systems.

Specific conductance levels and concentrations of chloride, sulfate, ammonium, and nitrate indicated effluent movement primarily in a vertical direction with abrupt dilution as it moved downgradient. Effluent was detected in the sand to a depth more than 20 feet below the septic tank outlet, but was diluted to near background conditions 50 feet downgradient from the tank. Effluent in the limestone was detected in all three observation wells to depths exceeding 25 feet below the septic tank outlet and was diluted, but still detectable, 40 feet downgradient.

The primary controls on effluent movement from septic tank systems in Broward County are the lithology and layering of the geologic materials, hydraulic gradients, and the volume and type of use the system receives.

Wanielista, M., J. Charba, J. Dietz, R. S. Lott and B. Russell. *Evaluation Of The Stormwater Treatment Facilities At The Lake Angel Detention Pond Orange County, Florida.* Report No. FL-ER- 49-91. Florida Department Of Transportation Environmental Office, Tallahassee, Florida. 1991.

Abstract. This is the final report on the use of Granulated Active Carbon (GAC) beds of Filtrasorb 400 in series to reduce the Trihalomethane Formation Potential (THMFP) concentrations at the Lake Angel detention pond, Orange County, Florida. The detention pond accepts runoff from an interstate highway and a commercial area. Breakthrough time was estimated from laboratory analyses and used to design two beds in series at the detention pond. Breakthrough occurred in the first bed after treating 138,000 liters of water. Exhaustion of the first bed was reached after treating 1270 bed volumes with a sorption zone length of 1.70 feet. The TOC adsorbed per gram of GAC was 6.3 mg. The liquid flow rate averaged 0.0011 cfs. Similar breakthrough curves for Total Organic Carbon (TOC) and color were also reported. The used GAC can be disposed of by substituting it for sand in concrete mixes.

An economic evaluation of the GAC system at Lake Angel demonstrated an annual cost of $4.39/1000 gallons to treat the stormwater runoff after detention and before discharge into a drainage well. This cost could be further reduced by using the stormwater to irrigate right-of-way sections of the watershed. An alternative method of pumping to another drainage basin was estimated to be more expensive.

The underdrain network for GAC system initially became clogged with the iron-and sulfur-precipitating bacteria *Leptotrix*, *Gallionella* and *Thiothrix*. These bacteria were substantially reduced by altering the influent GAC system pipeline to take water directly from the lake. An alternate pipe system used a clay layer to reduce ground water inputs and did not exhibit substantial bacterial growth.

Wellings, F. M. "Perspective On Risk Of Waterborne Enteric Virus Infections." ***Chemical And Biological Characterization Of Sludges, Sediments, Dredge Spoils, And Drilling Muds. ASTM STP 976.*** **American Society For Testing And Materials, Philadelphia, Pennsylvania. pp. 257-264. 1988.**

Abstract. A valid perspective on the risk of waterborne enteric virus infections related to land disposal of sludge must incorporate various parameters. It is not enough to accept at face value the predominantly negative findings from the relatively few scientific studies that have purportedly been done to determine the fate of viruses introduced into the environment with the deposition of sludge. Rather, it is incumbent upon interested parties, whether they are regulatory or scientific, to evaluate the whole through a careful examination of the parts. This paper attempts to bring into focus the presently available data on four major virological issues. These are the characteristics of enteric viruses which enable them to survive wastewater treatment processes, problems associated with the accumulation and interpretation of data related to viral contamination of groundwater by sludge disposal practices, problems associated with transfer to the real world of data derived from laboratory- seeded experiments, and problems related to the establishment of the role of enteric viruses in waterborne disease outbreaks. Present data are insufficient for establishing the quantitative risk of waterborne disease because of the land disposal of sludge. However, there is some probability of groundwater contamination sufficient to warrant a cautious approach to land disposal of sludge.

White, E. M. and J. N. Dornbush. "Soil Changes Caused By Municipal Wastewater Applications In Eastern South Dakota." ***Water Resources Bulletin.*** **V. 24, n. 2. pp. 269-273. 1988.**

Abstract. Wastewater from a municipal treatment plant was applied in rapid infiltration basins for four years to determine a poorly drained soils effectiveness in removing influent N and P and the soil changes that might limit their removal. About half the total PO_4-P lost from the influent was sorbed in the upper 91 cm of the soil and the other half was sorbed by the soil below the perforated pipe, which was used to drain the basins and collect the effluent for analysis. Drying of the basin soils converted more sorbed PO_4-P to Ca phosphates but the total sorbed was about the same. The influent N decreased , probably by volatilization, because the two basins with surface soil lost soil N rather than gained soil N. The soil total Ca, Mg, and K contents did not change significantly but Na increased slightly. Changes in the characteristics of the soils were slight and would have little effect on the longevity of a rapid infiltration basin.

Wilde, F. D. ***Geochemistry and Factors Affecting Ground-Water Quality at Three Storm-Water-Management Sites in Maryland: Report of Investigations No. 59.*** **Department of Natural Resources, Maryland Geological Survey, Baltimore, Maryland. (Prepared in Cooperation with the U.S. Department of the Interior Geological Survey, The Maryland Department of the Environment, and The Governor's Commission on Chesapeake Bay Initiatives). 1994.**

Abstract. The effects of infiltration of storm runoff on ground-water chemistry and quality were examined at three suburban storm-water-management impoundments at sites in Annapolis, Greenmount, and Prince Frederick, Maryland. Geochemical and hydrologic data were collected from December 1985 through June 1989. The Annapolis and Prince Frederick sites are in the Coastal Plain physiographic province, and the Greenmount site is in the Piedmont physiographic province. This study

was a cooperative effort of the U.S. Geological Survey, the Maryland Geological Survey, the Maryland Department of the Environment, and the Governor's Council on Chesapeake Bay Initiatives.

The objectives of the study were to determine whether the chemical composition of ground water beneath the impoundments changed as a result of storm-water infiltration, whether ground-water quality was adversely affected, and whether contaminants being sequestered in impoundments could be potentially mobilized to ground water.

Native geographic materials collected from drill cores at each site and bottom materials collected each September from the Annapolis and Greenmount ponds were analyzed for particle size, selected chemical constituents, and the predominant mineralogy. Aqueous solutions were analyzed for major ions, a large suite of trace elements, and volatile and polyaromatic organic compounds; pH, dissolved oxygen, alkalinity, chloride, and specific conductance were measured in the field. Samples of runoff, impoundment water, unsaturated-zone water, and ground water were collected triannually for extensive chemical analyses and at least monthly for field measurements. The results were compared for the two sites with storm-water ponds (Annapolis and Greenmount) and porous-pavement site with a subsurface impoundment (Prince Frederick).

Either primary or secondary maximum contaminant levels established by the U.S. Environmental Protection Agency (USEPA) for aluminum, cadmium, chloride, chromium, and lead in drinking water were exceeded from time to time in ground-water samples collected beneath and downgradient from the impoundments. In addition, uncharacteristically high concentrations of barium, copper, molybdenum, nickel, strontium, vanadium, and zinc occasionally were reported in ground water beneath the impoundments, and median concentrations of barium, cadmium, chloride, copper, nickel, and zinc were elevated in some ground-water samples beneath the study sites. Chromium and lead were rarely detected in ground water. Low concentrations of arsenic were detected sporadically in storm water and ground water. Concentrations of volatile organic compounds were usually below or near detection in storm-water and ground-water samples; small concentrations of polyaromatic organic compounds were detected only in pond-bottom materials.

Pond-bottom materials generally were effective scavengers of trace metals introduced to storm-water impoundments in the runoff. Between 1986 through 1988, concentrations of lead increased from below detection levels to 28 parts per million (ppm), and zinc concentrations increased from 54 to 344 ppm in bottom materials collected from the Annapolis impoundment. In addition, copper concentrations increased from 3.5 to 40 ppm and nickel concentrations increased from 6 to 16 ppm in bottom materials at the Annapolis site. For the same period at the Greenmount impoundment, concentrations of lead increased from 20 to 90 ppm; zinc concentrations increased from 59 to 469 ppm; and nickel concentrations increased from 35 to 48 ppm (there was a net decrease in the copper concentration). Despite this accumulation of metals in bottom materials, concentrations of these and other metals were considerably elevated in ground water beneath and downgradient from the impoundments. Cadmium concentrations did not increase in bottom materials, although cadmium was a common constituent in storm water and sorbed readily to the bottom materials in laboratory tests. Ground-water samples collected from the control wells at each site had concentrations of cadmium that were below or near detection, whereas concentrations were as high as 27, 26, and 8.4 µg/L (micrograms per liter) beneath the impoundments at Annapolis, Greenmount, and Prince Frederick, respectively.

Storm water was the primary source of most contaminants that were found at elevated concentrations in ground-water samples collected beneath impoundments. Contaminants entered ground water as a result of several variables, including direct storm-water infiltration; impoundment-related modifications of pH and redox that periodically favored metal mobilization from pond-bottom or aquifer materials; and formation of anionic or neutral complexes.

Metal mobility in the impoundments was mitigated by ion exchange, sorption, and mineral precipitation; storm water was aerobic and usually had neutral or higher pH that generally did not favor the presence of soluble species of most metals. Nevertheless, cadmium sorption in the impoundments may have been excluded by competing cations. Moreover, conditions for complexing of cadmium with organic compounds and chloride was favorable in impoundments and could have enhanced cadmium transport to ground water.

Algal photosynthesis modified the pond-water chemistry at Annapolis and Greenmount, increasing pH to 9.0 or greater, whereas algal respiration and rainwater dilution decreased pH to 6.5. Algal mediation of the pond-water pH at Greenmount resulted in a median pH of 9.2. Because aluminum solubility increases exponentially at about pH 9.0, aluminum concentrations in pond water at this site exceeded the U.S. Environmental Protection Agency's drinking-water regulation of 50 μg/L in most samples and may have contributed to elevated aluminum concentrations measured in ground water beneath the impoundment. Algal activity was less intense in the Annapolis impoundment, where the median pond-water pH was 7.7 and the median aluminum concentration was 30 μg/L; occasional measurements of aluminum concentrations greater than 50 μg/L in pond water corresponded with pH near or greater than 9.0. In ground water beneath the Annapolis pond, aluminum concentrations were below 50 μg/L in the samples collected, with one exception.

The solubility of most trace metals increases with pH decrease below neutrality. Therefore, the decreases in pond pH below neutral possibly mobilized iron, copper, nickel, and zinc periodically from bottom materials; alternatively, metals dissolved in storm water could have been transported to the ground water because kinetics were unfavorable for sorption to bottom materials.

The pH of ground water tended to keep the metals in solution at each site. Ground-water pH beneath the impoundments was reduced to below background pH; from 5.13 to between 4.18 and 4.94 at Annapolis, from 5.38 to between 4.9 and 5.29 at Greenmount, and from 6.71 to between 4.39 and 4.8 at Prince Frederick. Periodic mobilization of iron from the impoundment to the ground water (and the consequent precipitation of iron hydroxides in the aquifer) has been suggested as a cause of reduced pH in beneath-pond ground water at the Annapolis and Greenmount sites. Lithologic composition is the primary control on order-of-magnitude changes in ground-water pH at Prince Frederick.

With the exception of chloride, ground-water contamination was least at the Prince Frederick site, possibly because of low contaminant concentrations in storm water entering the Prince Frederick impoundment, or because contaminant mobility was restricted by the well-buffered and stable chemical environment in the impoundment. Dissolution of the rock aggregate in the Prince Frederick impoundment buffered impounded water to a pH of about 8.4, but dissolution also released high concentrations of magnesium and low concentrations of nickel and possibly chromium that affected ground-water chemistry.

Chloride contamination was ubiquitous in ground water receiving storm-runoff infiltrate. The ground water beneath the impoundments was modified to a chloride-dominated solution at each site throughout the period of study (native ground waters were mixed cation-mixed anion, magnesium-nitrate/chloride, and calcium-bicarbonate types at respective study sites). The only major source of chloride to ground water was storm-water infiltration during periods of road salting (road salting occurred no more than five time a year during the study period).

Chloride concentrations were measured at least biweekly and before, during and after selected storms. The effect of seasonal and storm-specific recharge on concentrations of chloride in ground water beneath the impoundments monitored was a temporary dilution--usually lasting no longer than several days. Chloride concentrations in ground water beneath impoundments increased whenever rainfall was

low and evapotranspiration rates were high, resulting in highest concentrations during the summer and early autumn at each site. The magnitude and persistence of the chloride contamination indicated that chloride, although a very soluble constituent, was not being flushed readily from the ground-water systems studied. Chloride concentrations in ground water beneath impoundments increased whenever rainfall was low and evapotranspiration rates were high.

Probable factors contributing to the persistent chloride domination of the major-ion chemistry of ground water at each study site were (1) low ground-water flow rates relative to storm-water infiltration rates; (2) limited dilution potential because sites were within a maximum of 300 feet from the inferred ground-water divide; and (3) capillary forces.

The unsaturated-zone chloride data suggest that capillary processes cause retardation of chloride transport and can allow chloride buildup, especially in the zone of tension saturation. This could serve as a model for explaining inhibition of transport of other contaminants. With the exception of chloride concentrations, however, the periods of data collection and (or) sampling frequency generally were insufficient to determine temporal trends in concentrations for trace metals and other constituents.

Wilson, L. G., M.D. Osborn, K. L. Olson, S. M. Maida and L. T. Katz. "The Ground Water Recharge And Pollution Potential Of Dry Wells In Pima County, Arizona." ***Ground Water Monitoring Review.*** **V. 10. pp. 114-121. 1990.**

Abstract. This paper summarizes a study to estimate the potential for dry- well drainage of urban runoff to recharge and pollute ground water in Tucson, Arizona. We selected three candidate dry wells for study. At each site we collected samples of runoff, dry-well sediment, vadose-zone sediment, perched ground water, and ground water. Water content data from vadose-zone samples suggest that dry-well drainage has created a transmission zone for water movement at each site. Volatile organic compounds, while undetected in runoff samples, were present in dry-well sediment, perched ground water at one site, and ground water at two sites. The concentrations of volatile organics (toluene and ethylbenzene) in the water samples were less than the corresponding EPA human health criteria. Pesticides were detected only in runoff and dry-well sediment. Lead and chromium occurred in runoff samples at concentrations above drinking water standards. Nickel, chromium, and zinc concentrations were elevated in vadose-zone samples at the commercial site. Of the metals, only manganese, detected at the residential site, exceeded Secondary Drinking Water Standards in ground water. It is concluded that the three dry wells examined during this study are currently not a major source of ground water pollution.

Wolff, J., J. Ebeling, A. Muller and H. Wacker. "Waste Water Irrigation Suited To The Environment As Shown By The Example Of the 'Abwasserverband Wolfsburg'." ***Hydrological Process And Water Management In Urban Areas, Duisburg, Federal Republic Of Germany, 1988.*** **(International Hydrological Programme, UNESCO, pp. 599-606). 1988.**

Abstract. Changes in the chemistry of ground water by the influences of waste water land treatment will be discussed by the research at the area of the 'Abwasserverband Wolfsburg', south east Lower Saxony. The results of a four-year research programme shows that, under certain conditions, waste water land treatment can be realized in an ecological justifiable way.

Yurewicz, M. C. and J. C. Rosenau. ***Effects On Ground Water Of Spray Irrigation Using Treated Municipal Sewage Southwest Of Tallahassee, Florida.*** **Geological Survey Water-Resources Investigation Report 86-4109. U.S. Geological Survey, Tallahassee, Florida. 1986.**

Abstract. Increases in the concentrations of chloride and nitrate nitrogen in ground water have resulted from land application of secondary- treated municipal sewage southwest of Tallahassee, Florida. The increases occurred predominantly during periods of above normal application rates. This result is based upon a data-collection program which began in 1972, 6 years after the initial application of treated sewage. The data collection period for this report is 1982 through June 1981.

Although an estimated minimum volume of 4,220 million gallons of treated sewage was spray irrigated from July 1966 through June 1981, distortion of the local ground-water flow pattern did not occur because of the high, natural recharge and high permeability of the limestone aquifer. Direct recharge from the land surface to the Floridan aquifer system occurs by rapid infiltration through the sand overburden and a discontinuous clay layer above the limestone formation. Soluble constituents move laterally and vertically with the ground-water flow pattern. Use of chloride as a tracer of water movement indicates that treated sewage occurs at depths greater than 200 feet below land surface below the spray sites. The direction and rate of ground-water movement is southwesterly toward the Gulf of Mexico, at a rate of approximately 5 feet per day, with significant downward movement also occurring.

The most significant effect on ground-water quality has been high nitrate nitrogen concentrations which were detected between 1972 and 1976 when high volumes of treated sewage were applied for experimental purposes. During this period, nitrate nitrogen concentrations in the upper limestones of the Floridan aquifer system exceeded the maximum contaminant level of 10 milligrams per liter established for potable water supplies. Computations indicate that if the monthly load of nitrogen does not exceed 130 to 180 pounds per acre, the concentration of nitrate nitrogen in the upper part of the aquifer will not exceed 10 milligrams per liter.

Other water-quality characteristics were not significantly affected by the application of treated sewage. Concentrations of trace metals including arsenic, cadmium, chromium, copper, iron, lead, manganese, mercury, selenium, and zinc in ground water remained at background levels. Organochlorine insecticides and chlorinated phenoxy acid herbicides were analyzed, but not detected in 18 ground-water samples collected in 1974 and 1978. Concentrations of major inorganic ions in the ground water likely are controlled by equilibrium conditions between the water and the aquifer matrix.

GROUNDWATER CONTAMINATION BIBLIOGRAPHY

Alhajjar, B. J., G. V. Simsiman and G. Chesters. "Fate And Transport Of Alachlor, Metolachlor And Atrazine In Large Columns." *Water Science And Technology: A Journal Of The International Association Of Water Pollution Research*. Vol. 22, No. 6. pp. 87-94. 1990.

American Water Works Association. "Fertilizer Contaminates Nebraska Groundwater." *AWWA Mainstream*. Vol. 34, No. 4. pp. 6. 1990.

Amoros, I., J. L. Alonso and I. Peris. "Study Of Microbial Quality And Toxicity Of Effluents From Two Treatment Plants Used For Irrigation." *Water Science And Technology: A Journal Of The International Association On Water Pollution Research*. Vol. 21, No. 3. pp. 243-246. 1989.

Armstrong, D. E. and R. Llena. *Stormwater Infiltration: Potential For Pollutant Removal.* Project Report To The U.S. Environmental Protection Agency. Wisconsin Department Of Natural Resources, Water Chemistry Program. 1992.

Aronson, D. A. and G. E. Seaburn. *Appraisal Of Operating Efficiency Of Recharge Basins On Long Island, New York, In 1969*. Geological Survey Water-Supply Paper 2001-D. U.S. Government Printing Office, Washington, D.C. 1974.

Asano, T. "Irrigation With Reclaimed Wastewater - Recent Trends." *Irrigation Systems For The 21st Century, Portland, Oregon, 1987*. (American Society Of Civil Engineers, New York, New York, pp. 735-742). 1987.

Bao-rui, Y. "Investigation Into Mechanisms Of Microbial Effects On Iron And Manganese Transformations In Artificially Recharted Groundwater." *Water Science And Technology: A Journal Of The International Association On Water Pollution Research*. Vol. 20, No. 3. pp. 47-53. 1988.

Barraclough, J. T. "Waste Injection Into A Deep Limestone In Northwestern Florida." *Ground Water*. Vol. 3, No. 1. pp. 22-24. 1966.

Boggess, D. H. *Effects Of A Landfill On Ground Water Quality*. Geological Survey Open File Report 75-594. U.S. Geological Survey, Tallahassee, Florida. 1975.

Bouchard, A. B. "Virus Inactivation Studies For A California Wastewater Reclamation Plant." *Water Environment Federation 65th Annual Conference & Exposition, New Orleans, Louisiana, 1992.*

(Water Environment Federation, Alexandria, Virginia). 1992.

Bouwer, E. J., P. L. McCarty, H. Bouwer and R. C. Rice. "Organic Contaminant Behavior During Rapid Infiltration Of Secondary Wastewater At The Phoenix 23rd Avenue Project." *Water Resource*. Vol. 18, No. 4. pp. 463-472. 1984.

Bouwer, H. "Agricultural Contamination: Problems And Solutions." *Water Environment And Technology*. Vol. 1, No. 2. pp. 292-297. 1989.

Bouwer, H. "Effect Of Irrigated Agriculture On Groundwater." *Journal of Irrigation and Drainage Engineering*. Vol. 113, No. 1. pp. 4-15. 1987.

Bouwer, H. and E. Idelovitch. "Quality Requirements For Irrigation With Sewage Water ." *Journal of Irrigation and Drainage Engineering*. Vol. 113, No. 4. pp. 516-535. 1987.

Brown, D. P. *Effects Of Effluent Spray Irrigation On Ground Water At A Test Site Near Tarpon Springs, Florida*. Geological Survey Open-File Report 81-1197. U.S. Geological Survey, Tallahassee, Florida. 1982.

Butler, K. S. "Urban Growth Management And Groundwater Protection: Austin, Texas." *Planning For Groundwater Protection*. Academic Press, New York, New York. pp. 261-287. 1987.

Cavanaugh, J. E., H. S. Weinberg, A. Gold, R. Sangalah, D. Marbury, W. H. Glaze, T. W. Collette, S. D. Richardson and A. D. Thurston Jr. "Ozonation Byproducts: Identification Of Bromohydrins From The Ozonation Of Natural Water With Enhanced Bromide Levels." *Environmental Science & Technology*. Vol. 26, No. 8. pp. 1658-1662. 1992.

Chang, A. C., A. L. Page, P. F. Pratt and J. E. Warneke. "Leaching Of Nitrate From Freely Drained-Irrigated Fields Treated With Municipal Sludges." *Planning Now For Irrigation And Drainage In The 21st Century, Lincoln, Nebraska, 1988*. (American Society Of Civil Engineers, New York, New York, pp. 455-467). 1988.

Chase, W. L. J. "Reclaiming Wastewater In Phoenix, Arizona." *Irrigation Systems For The 21st Century, Portland, Oregon, 1987*. (American Society Of Civil Engineers, New York, New York, pp. 336-343). 1987.

Cisic, S., D. Marske, B. Sheikh, B. Smith and F. Grant. "City Of Los Angeles Effluent - Today's Waste, Tomorrow's Resource." *Water Environment Federation 65th Annual Conference & Exposition, New Orleans, Louisiana, 1992*. (Water Environment Federation, Alexandria, Virginia). 1992.

Close, M. E. "Effects Of Irrigation On Water Quality Of A Shallow Unconfined Aquifer." *Water Resources Bulletin*. Vol. 23, No. 5. pp. 793-802. 1987.

Clothier, B. E. and T. J. Sauer. "Nitrogen Transport During Drip Fertigation With Urea." *Soil Science Society Of America Journal.* Vol. 52, No. 2. pp. 345-349. 1988.

Craun, G. F. "Waterborne Disease - A Status Report Emphasizing Outbreaks In Ground-Water Systems." *Ground Water.* Vol. 17, No. 2. pp. 183-191. 1979.

Crites, R. W. "Micropollutant Removal In Rapid Infiltration." *Artificial Recharge Of Groundwater.* Butterworth Publishers, Boston. pp. 579-608. 1985.

Crook, J., T. Asano and M. Nellor. "Groundwater Recharge With Reclaimed Water In California." *Water Environment & Technology.* Vol. 2, No. 8. pp. 42-49. 1990.

Deason, J. P. "Irrigation-Induced Contamination: How Real A Problem?" *Journal of Irrigation and Drainage Engineering.* Vol. 115, No. 1. pp. 9-20. 1989.

Deason, J. P. "Selenium: It's Not Just In California." *Irrigation Systems For The 21st Century, Portland, Oregon, 1987.* (American Society Of Civil Engineers, New York, New York, pp. 475-482). 1987.

DeBoer, J. G. "Wastewater Reuse: A Resource Or A Nuisance?" *Journal of the American Water Works Association.* Vol. 75, . pp. 348-356. 1983.

Domagalski, J. L. and N. M. Dubrovsky. "Pesticide Residues In Ground Water Of The San Joaquin Valley, California." *Journal Of Hydrology.* Vol. 130, No. 1-4. pp. 299-338. 1992.

Ehrlich, G. G., E. M. Godsy, C. A. Pascale and J. Vecchioli. "Chemical Changes In An Industrial Waste Liquid During Post- Injection Movement In A Limestone Aquifer, Pensacola, Florida." *Ground Water.* Vol. 17, No. 6. pp. 562-573. 1979.

Ehrlich, G. G., H. F. H. Ku, J. Vecchioli and T. A. Ehlke. *Microbiological Effects Of Recharging The Magothy Aquifer, Bay Park, New York, With Tertiary-Treated Sewage.* Geological Survey Professional Paper 751-E. U.S. Government Printing Office, Washington, D.C. 1979.

Elder, J. F., J. D. Hunn and C. W. Calhoun. *Wastewater Application By Spray Irrigation On A Field Southeast Of Tallahassee, Florida: Effects On Ground-Water Quality And Quantity.* Geological Survey Water-Resources Investigations Report 85-4006. U.S. Geological Survey, Tallahassee, Florida. 1985.

Eren, J. "Changes In Wastewater Quality During Long Term Storage." . pp. 1291-1300.

Ferguson, B. K. "Role Of The Long-term Water Balance In Management of Stormwater Infiltration." *Journal Of Environmental Management.* Vol. 30, No. 3. pp. 221-233. 1990.

Ferguson, R. B., D. E. Eisenhauer, T. L. Bockstadter, D. H. Krull and G. Buttermore. "Water And Nitrogen Management In Central Platte Valley Of Nebraska." *Journal Of Irrigation And Drainage*

Engineering. Vol. 116, No. 4. pp. 557-565. 1990.

Gerba, C. P. and S. M. Goyal. "Pathogen Removal From Wastewater During Groundwater Recharge." *Artificial Recharge Of Groundwater*. Butterworth Publishers, Boston. pp. 283-317. 1985.

Gerba, C. P. and C. N. Haas. "Assessment Of Risks Associated With Enteric Viruses In Contaminated Drinking Water." *Chemical And Biological Characterization Of Sludges, Sediments, Dredge Spoils, And Drilling Muds. ASTM STP 976*. American Society For Testing And Materials, Philadelphia, Pennsylvania. pp. 489-494. 1988.

German, E. R. *Quantity And Quality Of Stormwater Runoff Recharged To The Floridan Aquifer System Through Two Drainage Wells In The Orlando, Florida, Area*. Geological Survey Water Supply Paper 2344. U.S. Government Printing Office, Washington, D.C.. 1989.

Goldschmid, J. "Water-Quality Aspects Of Ground-Water Recharge In Israel." *Journal Of The American Water Works Association*. Vol. 66, No. 3. pp. 163-166. 1974.

Goolsby, D. A. *Geochemical Effects And Movement Of Injected Industrial Waste In A Limestone Aquifer*. Memoir No. 18. American Association Of Petroleum Geologists. 1972.

Greene, G. E. *Ozone Disinfection And Treatment Of Urban Storm Drain Dry-Weather Flows: A Pilot Treatment Plant Demonstration Project On The Kenter Canyon Storm Drain System In Santa Monica*. The Santa Monica Bay Restoration Project, Monterey Park, CA. 1992.

Hampson, P. S. *Effects Of Detention On Water Quality Of Two Stormwater Detention Ponds Receiving Highway Surface Runoff In Jacksonville, Florida*. Geological Survey Water-Resources Investigations Report 86-4151. U.S. Geological Survey, Tallahassee, Florida. 1986.

Harper, H. H. *Effects Of Stormwater Management Systems On Groundwater Quality*. DER Project WM190. Florida Department Of Environmental Regulation, Orlando, Florida. 1988.

Hickey, J. J. "Subsurface Injection Of Treated Sewage Into A Saline-Water Aquifer At St. Petersburg, Florida-Aquifer Pressure Buildup." *Ground Water*. Vol. 22, No. 1. pp. 48-55. 1984.

Hickey, J. J. and J. Vecchioli. *Subsurface Injection of Liquid Waste With Emphasis on Injection Practices in Florida*. Geological Survey Water-Supply Paper 2281. United States Government Printing Office, Washington D.C. 1986.

Hickey, J. J. and W. E. Wilson. *Results Of Deep-Well Injection Testing At Mulberry, Florida*. Geological Survey Water-Resources Investigations Report 81-75. U.S. Geological Survey, Tallahassee, Florida. 1982.

Higgins, A. J. "Impacts On Groundwater Due To Land Application Of Sewage Sludge." *Water Resources Bulletin*. Vol. 20, No. 3. pp. 425-434. 1984.

Horsley, S. W. and J. A. Moser. "Monitoring Ground Water For Pesticides At A Golf Course - A Case Study On Cape Cod, Massachusetts." *Ground Water Monitoring Review*. Vol. 10. pp. 101-108. 1990.

Hull, R. W. and M. C. Yurewicz. *Quality Of Storm Runoff To Drainage Wells In Live Oak, Florida, April 4, 1979*. Geological Survey Open-File Report 79-1073. U.S. Government Printing Office, Washington, D.C. 1979.

Ishizaki, K. "Control Of Surface Runoff By Subsurface Infiltration Of Stormwater: A Case Study In Japan." *Artificial Recharge Of Groundwater*. Butterworth Publishers, Boston. pp. 565-575. 1985.

Jansons, J., L. W. Edmonds, B. Speight and M. R. Bucens. "Movement Of Viruses After Artificial Recharge." *Water Research*. Vol. 23, No. 3. pp. 293-299. 1989.

Jansons, J., L. W. Edmonds, B. Speight and M. R. Bucens. "Survival Of Viruses In Groundwater." *Water Research*. Vol. 23, No. 3. pp. 301-306. 1989.

Johnson, R. B. "The Reclaimed Water Delivery System And Reuse Program For Tucson, Arizona." *Irrigation Systems For The 21st Century, Portland, Oregon, 1987*. (American Society Of Civil Engineers, New York, New York, pp. 344-351). 1987.

Karkal, S. S. and D. L. Stringfield. "Wastewater Reclamation And Small Communities: A Case History." *Water Environment Federation 65th Annual Conference & Exposition, New Orleans, Louisiana, 1992*. (Water Environment Federation, Alexandria, Virginia, pp. 419-425). 1992.

Katopodes, N. D. and J. H. Tang. "Self-Adaptive Control Of Surface Irrigation Advance." *Journal Of Irrigation And Drainage Engineering*. Vol. 116, No. 5. pp. 696-713. 1990.

Kaufman, M. I. "Subsurface Wastewater Injection, Florida." *Journal Of Irrigation And Drainage Engineering*. Vol. 99, No. 1. pp. 53-70. 1973.

Knisel, W. G. and R. A. Leonard. "Irrigation Impact On Groundwater: Model Study In Humid Region ." *Journal Of Irrigation And Drainage Engineering*. Vol. 115, No. 5. pp. 823-839. 1989.

Krawchuk, B. P. and B. G. R. Webster. "Movement Of Pesticides To Ground Water In An Irrigated Soil." *Water Pollution Research Journal Of Canada*. Vol. 22, No. 1. pp. 129-146. 1987.

Ku, H. F. H., N. W. Hagelin and H. T. Buxton. "Effects Of Urban Storm-Runoff Control On Ground-Water Recharge In Nassau County, New York." *Ground Water*. Vol. 30, No. 4. pp. 507-513. 1992.

Ku, H. F. H. and D. L. Simmons. *Effect Of Urban Stormwater Runoff On Ground Water Beneath Recharge Basins On Long Island, New York*. Geological Survey Water-Resources Investigations Report 85-4088. U.S. Geological Survey, Syosset, New York. 1986.

Ku, H. F. H., J. Vecchioli and S. E. Ragone. "Changes In Concentration Of Certain Constituents Of Treated Waste Water During Movement Through The Magothy Aquifer, Bay Park, New York." *Journal*

Research U.S. Geology Survey. Vol. 3, No. 1. pp. 89-92. 1975.

Lauer, D. A. "Vertical Distribution In Soil Of Sprinkler-Applied Phosphorus." *Soil Science Society Of America Journal*. Vol. 52, No. 3. pp. 862-868. 1988.

Lauer, D. A. "Vertical Distribution In Soil Of Unincorporated Surface-Applied Phosphorus Under Sprinkler Irrigation." *Soil Science Society Of America Journal*. Vol. 52, No. 6. pp. 1685-1692. 1988.

Lee, E. W. "Drainage Water Treatment And Disposal Options." *Agricultural Salinity Assessment And Management*. American Society Of Civil Engineers. pp. 450-468. 1990.

Lloyd, J. W., D. N. Lerner, M. O. Rivett and M. Ford. "Quantity And Quality Of Groundwater Beneath An Industrial Conurbation - Birmingham, UK." *Hydrological Processes And Water Management In Urban Areas, Duisburg, Federal Republic Of Germany, 1988*. (International Hydrological Programme, UNESCO, pp. 445-453). 1988.

Loh, P. C., R. S. Fujioka and W. M. Hirano. "Thermal Inactivation Of Human Enteric Viruses In Sewage Sludge And Virus Detection By Nitrose Cellulose-Enzyme Immunoassay." *Chemical And Biological Characterization Of Sludges, Sediments, Dredge Spoils, And Drilling Muds. ASTM STP 976*. American Society For Testing And Materials, Philadelphia, Pennsylvania. pp. 273-281. 1988.

Malik, A., M. Stone, F. R. Martinez and R. Paul. "First Wastewater Desalting Plant In Central Coast, California." *Water Environment Federation 65th Annual Conference & Exposition, New Orleans, Louisiana, 1992*. (Water Environment Federation, Alexandria, Virginia, pp. 395-406). 1992.

Mancini, J. L. and A. H. Plummer Jr. "A Method For Developing Wet Weather Water Quality Criteria for Toxics." *Water Environment Federation 65th Annual Conference & Exposition, New Orleans, Louisiana, 1992*. (Water Environment Federation, Alexandria, Virginia, pp. 15-26). 1992.

Markwood, I. M. "Waterborne Disease -- Historical Lesson." *Ground Water*. Vol. 17, No. 2. pp. 197-198. 1979.

Marton J. and Mohler I. "The Influence Of Urbanization On The Quality Of Groundwater." *Hydrological Processes And Water Management In Urban Areas, Duisburg, Federal Republic Of Germany, 1988*. (International Hydrological Programme, UNESCO, pp. 452- 461). 1988.

Marzouk, Y., S. M. Goyal and C. P. Gerba. "Prevalence Of Enteroviruses In Ground Water Of Israel." *Ground Water*. Vol. 17, No. 5. pp. 487-491. 1979.

Merkel, B., J. Grossmann and P. Udluft. "Effect Of Urbanization On A Shallow Quarternary Aquifer." *Hydrological Processes And Water Management In Urban Areas, Duisburg, Federal Republic Of Germany, 1988*. (International Hydrological Programme, UNESCO, pp. 461-469). 1988.

Mossbarger, W. A. Jr. and R. W. Yost. "Effects Of Irrigated Agriculture On Groundwater Quality In Corn Belt And Lake States." *Journal of Irrigation and Drainage Engineering*. Vol. 115, No. 5. pp.

773-789. 1990.

Nellor, M. H., R. B. Baird and J. R. Smyth. "Health Aspects Of Groundwater Recharge." *Artificial Recharge Of Groundwater*. Butterworth Publishers, Boston. pp. 329-355. 1985.

Nightingale, H. I., J. E. Ayars, R. L. McCormick and D. C. Cehrs. "Leaky Acres Recharge Facility: A Ten-Year Evaluation." *Water Resources Bulletin*. Vol. 19, No. 3. pp. 429-437. 1983.

Nightingale, H. I. "Accumulation Of As, Ni, Cu, And Pb In Retention And Recharge Basins Soils From Urban Runoff." *Water Resources Bulletin*. Vol. 23, No. 4. pp. 663-672. 1987.

Nightingale, H. I. "Water Quality Beneath Urban Runoff Management Basins." *Water Resources Bulletin*. V. 23, No. 2. pp. 197-205. 1987.

Nightingale, H. I. and W. C. Bianchi. "Ground-Water Chemical Quality Management By Artificial Recharge ." *Ground Water*. V. 15, No. 1. pp. 15-22. 1977.

Nightingale, H. I. and W. C. Bianchi. "Ground-Water Turbidity Resulting From Artificial Recharge." *Ground Water*. Vol. 15, No. 2. pp. 146-152. 1977.

Norberg-King, T. J., E. J. Durhan, G. T. Ankley and E. Robert. "Application Of Toxicity Identification Evaluation Procedures To The Ambient Waters Of The Colusa Basin Drain, California." *Environmental Toxicology And Chemistry*. Vol. 10. pp. 891-900. 1991.

Pahren, H. R. "EPA's Research Program On Health Effects Of Wastewater Reuse For Potable Purposes." *Artificial Recharge Of Groundwater*. Butterworth Publishers, Boston. pp. 319-328. 1985.

Peterson, D. A. "Selenium In The Kendrick Reclamation Project, Wyoming." *Planning Now For Irrigation And Drainage In The 21st Century, Lincoln, Nebraska, 1988*. (American Society Of Civil Engineers, New York, New York, pp. 678-685). 1988.

Petrovic, A. M. "The Fate Of Nitrogenous Fertilizers Applied To Turfgrass." *Journal Of Environmental Quality*. Vol. 19, No. 1. pp. 1-14. 1990.

Phelps, G. G. *Effects Of Surface Runoff And Treated Wastewater Recharge On Quality Of Water In The Floridan Aquifer System, Gainesville Area, Alachua County, Florida* . Geological Survey Water-Resources Investigations Report 87-4099. U.S. Geological Survey, Tallahassee, Florida. 1987.

Pierce, R. C. and M. P. Wong. "Pesticides In Agricultural Waters: The Role of Water Quality Guidelines." *Canadian Water Resources Journal.* Vol. 13, No. 3. pp. 33-49. 1988.

Pitt, W. A. J. Jr. *Effects Of Septic Tank Effluent On Ground- Water Quality, Dade County, Florida: An Interim Report.* Geological Survey Open File Report 74010. U.S. Geological Survey, Tallahassee, Florida. 1974.

Pitt, W. A. J. Jr., H. C. Mattraw and H. Klein. *Ground-Water Quality In Selected Areas Serviced By Septic Tanks, Dade County, Florida*. Geological Survey Open File Report 75-607. U.S. Geological Survey, Tallahassee, Florida. 1975.

Power, J. F. and J. S. Schepers. "Nitrate Contamination Of Groundwater In North America." *Agriculture, Ecosystems and Environment.* Vol. 26, No. 3-4. pp. 165-187. 1989.

Pruitt, J. B., D. E. Troutman and G. A. Irwin. *Reconnaissance Of Selected Organic Contaminants In Effluent And Ground Water At Fifteen Municipal Wastewater Treatment Plants In Florida.* Geological Survey Water-Resources Investigations Report 85-4167. U.S. Geological Survey, Tallahassee, Florida. 1985.

Ragone, S. E. *Geochemical Effects Of Recharging The Magothy Aquifer, Bay Park, New York, With Tertiary-Treated Sewage*. Geological Survey Professional Paper 751-D. U.S. Government Printing Office, Washington, D.C. 1977.

Ragone, S. E., H. F. H. Ku and J. Vecchioli. "Mobilization Of Iron In Water In The Magothy Aquifer During Long-Term Recharge With Tertiary-Treated Sewage, Bay Park, New York." *Journal Research U.S. Geological Survey*. Vol. 3, No. 1. pp. 93-98. 1975.

Ragone, S. E. and J. Vecchioli. "Chemical Interaction During Deep Well Recharge Bay Park, New York." *Ground Water*. Vol. 13 , No. 1. pp. Reprint. 1975.

Ramsey, R. H. III, J. Borreli and C. B. Fedler. "The Lubbock, Texas, Land Treatment System." *Irrigation Systems For The 21st Century, Portland, Oregon, 1987*. (American Society Of Civil Engineers, New York, New York, pp. 352-361). 1987.

Razack, M., C. Drogue and M. Baitelem. "Impact Of An Urban Area On The Hydrochemistry Of A Shallow Groundwater (Alluvial Reservoir) Town Of Narbonne, France." *Hydrological Processes And Water Management In Urban Areas, Duisburg, Federal Republic Of Germany, 1988*. (International Hydrological Programme, UNESCO). 1988.

Rea, A. H. and J. D. Istok. "Groundwater Vulnerability To Contamination: A Literature Review." *Irrigation Systems For The 21st Century, Portland, Oregon, 1987*. (American Society Of Civil Engineers, New York, New York, pp. 362-367). 1987.

Reichenbaugh, R. C. *Effects On Ground-Water Quality From Irrigating Pasture With Sewage Effluent Near Lakeland, Florida*. Geological Survey Water-Resources Investigations 76-108. U.S. Geological Survey, Tallahassee, Florida. 1977.

Reichenbaugh, R. C., D. P. Brown and C. L. Goetz. *Results Of Testing Landspreading Of Treated Municipal Wastewater At St. Petersburg, Florida*. Geological Survey Water-Resources Investigations Report 78-110. U.S. Geological Survey, Tallahassee, Florida. 1979.

Rein, D. A., G. M. Jamesson and R. A. Monteith. "Toxicity Effects Of Alternative Disinfection Processes." *Water Environment Federation 65th Annual Conference & Exposition, New Orleans, Louisiana, 1992*. (Water Environment Federation, Alexandria, Virginia, pp. 461-470). 1992.

Rice, R. C., D. B. Jaynes and R. S. Bowman. "Preferential Flow Of Solutes And Herbicide Under Irrigated Fields." *Transactions Of The American Society Of Agricultural Engineers*. Vol. 34, No. 2. pp. 914-918. 1991.

Ritter, W. F., F. J. Humenik and R. W. Skaggs. "Irrigated Agriculture And Water Quality In East." *Journal of Irrigation and Drainage Engineering*. Vol. 115, No. 5. pp. 807-821. 1989.

Ritter, W. F., R. W. Scarborough and E. M. Chirnside. "Nitrate Leaching Under Irrigation On Coastal Plain Soil." *Journal of Irrigation and Drainage Engineering*. Vol. 117, No. 4. pp. 490-502. 1991.

Robinson, J. H. and H. S. Snyder. "Golf Course Development Concerns In Coastal Zone Management." *Coastal Zone '91: Proceedings Of The Seventh Symposium On Coastal And Ocean Management, Long Beach, California, 1991*. (American Society Of Civil Engineers, New York, New York, pp. 431-442). 1991.

Rosenshein, J. S. and J. J. Hickey. "Storage Of Treated Sewage Effluent And Storm Water In A Saline Aquifer Pinellas Peninsula, Florida." *Ground Water*. Vol. 15, No. 4. pp. 284-293. 1977.

Sabatini, D. A. and T. A. Austin. "Adsorption, Desorption And Transport Of Pesticides In Groundwater: A Critical Review." *Planning Now For Irrigation And Drainage In The 21st Century, Lincoln, Nebraska, 1988*. (American Society Of Civil Engineers, New York, New York, pp. 571-579). 1988.

Sabol, G. V., H. Bouwer and P. J. Wierenga. "Irrigation Effects In Arizona And New Mexico." *Journal of Irrigation and Drainage Engineering*. Vol. 113, No. 1. pp. 30-57. 1987.

Salo, J. E. ,., D. Harrison and E. M. Archibald. "Removing Contaminants By Groundwater Recharge Basins." *Journal Of The American Water Works Association*. Vol. 78, No. 9. pp. 76-81. 1986.

Schiffer, D. M. *Effects Of Three Highway-Runoff Detention Methods On Water Quality Of the Surficial Aquifer System In Central Florida*. Geological Survey Water-Resources Investigations Report 88-4170. U.S. Geological Survey, Tallahassee, Florida. 1989.

Schmidt, K. D. and I. Sherman. "Effect Of Irrigation On Groundwater Quality In California." *Journal Of Irrigation And Drainage Engineering*. Vol. 113, No. 1. pp. 16-29. 1987.

Schneider, B. J., H. F. H. Ku and E. T. Oaksford. *Hydrologic Effects Of Artificial-Recharge Experiments With Reclaimed Water At East Meadow, Long Island, New York*. Geological Survey Water Resources Investigations Report 85-4323. U.S. Geological Survey, Denver, Colorado. 1987.

Seaburn, G. E. and D. A. Aronson. *Influence Of Recharge Basins On The Hydrology Of Nassau And Suffolk Counties, Long Island, New York*. Geological Survey Water Supply Paper 2031. U.S.

Government Printing Office, Washington, D.C. 1974.

Shirmohammadi, A. and W. G. Knisel. "Irrigated Agriculture And Water Quality In South." *Journal of Irrigation and Drainage Engineering*. Vol. 115, No. 5. pp. 791-806. 1989.

Smith, S. O. and D. H. Myott. "Effects Of Cesspool Discharge On Ground-Water Quality On Long Island, N.Y." *Journal Of The American Water Works Association*. Vol. 67, No. 8. pp. 456-458. 1975.

Spalding, R. F. and L. A. Kitchen. "Nitrate In The Intermediate Vadose Zone Beneath Irrigated Cropland." *Ground Water Monitoring Review*. Vol. 8, No. 2. pp. 89-95. 1988.

Squires, R. C., G. R. Groves and W. R. Johnston. "Economics Of Selenium Removal From Drainage Water." *Journal of Irrigation and Drainage Engineering*. Vol. 115, No. 1. pp. 48-57. 1989.

Squires, R. C. and R. Johnston. "Selenium Removal -- Can We Afford It?" *Irrigation Systems For The 21st Century, Portland, Oregon, 1987*. (American Society Of Civil Engineers, New York, New York, pp. 455-467). 1987.

Steenhuis, T., R. Paulsen, T. Richard, W. Staubitz, M. Andreini and J. Surface. "Pesticide And Nitrate Movement Under Conservation And Conventional Tilled Plots." *Planning Now For Irrigation And Drainage In The 21st Century, Lincoln, Nebraska, 1988*. (American Society Of Civil Engineers, New York, New York, pp. 587-595). 1988.

Strutynski, B., R. E. Finger, S. Le and M. Lundt. "Pilot Scale Testing Of Alternative Technologies For Meeting Effluent Reuse Criteria." *Water Environment Federation 65th Annual Conference & Exposition, New Orleans, Louisiana, 1992*. (Water Environment Federation, Alexandria, Virginia, pp. 69-79). 1992.

Tim, U. S. and S. Mostaghimi. "Model For Predicting Virus Movement Through Soils." *Ground Water*. Vol. 29, No. 2. pp. 251- 259. 1991.

Townley, J. A., S. Swanback and D. Andres. *Recharging A Potable Water Supply Aquifer With Reclaimed Wastewater In Cambria, California*. John Carollo Engineers, Walnut Creek, CA. 1992.

Treweek, G. P. "Pretreatment Processes For Groundwater Recharge." *Artificial Recharge Of Groundwater*. Butterworth Publishers, Boston. pp. 205-248. 1985.

Troutman, D. E., E. M. Godsy, D. F. Goerlitz and G. G. Ehrlich. *Phenolic Contamination In The Sand-And-Gravel Aquifer From A Surface Impoundment Of Wood Treatment Wastewaters, Pensacola, Florida*. Geological Survey Water-Resources Investigations Report 84-4230. U.S. Geological Survey, Tallahassee, Florida. 1984.

U.S. Environmental Protection Agency Office Of Water, O. O. W. E. A. C. *Manual: Guidelines For Water Reuse*. EPA/625/R-92/004. U.S. Environmental Protection Agency, Washington, D.C. 1992.

Varuntanya, C. P. and D. R. Shafer. "Techniques For Fluoride Removal In Industrial Wastewaters." *Water Environment Federation 65th Annual Conference & Exposition, New Orleans, Louisiana, 1992*. (Water Environment Federation, Alexandria, Virginia, pp. 159-170). 1992.

Vaughn, J. M., E. F. Laudry, L. J. Baranosky, Beckwith C.A., M. C. Dahl and Delihas N.C. "Survey Of Human Virus Occurrence In Wastewater-Recharged Groundwater On Long Island." *Applied And Environmental Microbiology*. Vol. 36, No. 1. pp. 47-51. 1978.

Vecchioli, J., G. G. Ehrlich, E. M. Godsy and C. A. Pascale. "Alterations In The Chemistry Of An Industrial Waste Liquid Injected Into Limestone Near Pensacola, Florida ." *Hydrogeology Of Karstic Terrains: Case Histories*. International Association Of Hydrogeologists, UNESCO, Vol. 1. pp. 217-220. 1984.

Verdin, J., G. Lyford and L. Sims. *Application Of Satellite Remote Sensing For Identification Of Irrigated Lands In The Newlands Project.*. 1987.

Waller, B. G., B. Howie and C. R. Causaras. *Effluent Migration From Septic Tank Systems In Two Different Lithologies, Broward County, Florida*. Geological Survey Water-Resources Investigations Report 87-4075. U.S. Geological Survey, Tallahassee, Florida. 1987.

Wanielista, M., J. Charba, J. Dietz, R. S. Lott and B. Russell. *Evaluation Of The Stormwater Treatment Facilities At The Lake Angel Detention Pond Orange County, Florida*. Report No. FL-ER- 49-91. Florida Department Of Transportation Environmental Office, Tallahassee, Florida. 1991.

Wellings, F. M. "Perspective On Risk Of Waterborne Enteric Virus Infections." *Chemical And Biological Characterization Of Sludges, Sediments, Dredge Spoils, And Drilling Muds. ASTM STP 976*. American Society For Testing And Materials, Philadelphia, Pennsylvania. pp. 257-264. 1988.

White, E. M. and J. N. Dornbush. "Soil Changes Caused By Municipal Wastewater Applications In Eastern South Dakota." *Water Resources Bulletin*. Vol. 24, No. 2. pp. 269-273. 1988.

Wilde, F. D. *Geochemistry and Factors Affecting Ground-Water Quality at Three Storm-Water-Management Sites in Maryland: Report of Investigations No. 59*. Department of Natural Resources, Maryland Geological Survey, Baltimore, Maryland. (Prepared in Cooperation with the U.S. Department of the Interior Geological Survey, The Maryland Department of the Environment, and The Governor's Commission on Chesapeake Bay Initiatives). 1994.

Wilson, L. G., Osborn M.D., K. L. Olson, S. M. Maida and L. T. Katz. "The Ground Water Recharge And Pollution Potential Of Dry Wells In Pima County, Arizona." *Ground Water Monitoring Review*. Vol. 10. pp. 114-121. 1990.

Wolff, J., J. Ebeling, A. Muller and H. Wacker. "Waste Water Irrigation Suited To The Environment As Shown By The Example Of the 'Abwasserverband Wolfsburg'." *Hydrological Process And Water Management In Urban Areas, Duisburg, Federal Republic Of Germany, 1988*. (International

Hydrological Programme, UNESCO). 1988.

Yurewicz, M. C. and J. C. Rosenau. *Effects On Ground Water Of Spray Irrigation Using Treated Municipal Sewage Southwest Of Tallahassee, Florida*. Geological Survey Water-Resources Investigation Report 86-4109. U.S. Geological Survey, Tallahassee, Florida. 1986.

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Sanitary wastewater
Sedimentation
Selenium
Septic tanks
Service stations
Sewage
Shallow groundwater
Sheetflow
Shigella
Side-dressing
Silvex
Simazine
Slow infiltration basins
Slow-release fertilizers
Sludge reuse
Snowmelt
Sodium
Sodium adsorption ratio (SAR)
Sodium chloride

Sodium nitrate
Soil matrix
Soil moisture content
Soil permeability
Soil storage
Solubility
Sorption
Steep slopes
Stormwater characteristics
Stormwater infiltration
Stormwater runoff
Straining
Subsurface injection
Sulfate
Sulfur-coated urea
Sumps
Suspended solids
2,4,5-T
Tebruthion
Terbufos
1,1,2,2-tetrachloroethane
Tetrachloroethylene
Thiram
Tile drains
Toluene
Total coliforms
Total Kjeldahl nitrogen (TKN)
Total organic carbon (TOC)
Total phosphorus
Total solids (residue)
Toxicants
Triadimefon
Triallate
1,1,1-trichloroethane
Trichloroethylene
Trifluralin
Trihalomethanes (THMs)
Turf grass
Urban pesticide use
Urban runoff
Urea formaldehyde (UF)
Urine
Vadose zone
Vanadium
Vehicle emissions

Vehicle (automobile) repair shops
Vibrio cholerae
Viral inactivation
Viruses
Volatile organic compounds (VOCs)
Volatilization
Water table
Water table depth
Wet detention ponds
Wettable powder pesticide
Wood preservative
Xylene
Zinc

Effect of Urbanization on Aquifer Recharge in the Santa Clarita Valley

TO: Tom Worthington/Impact Sciences, Inc.

FROM: John Porcello/CH2M HILL

DATE: February 22, 2004

Introduction

In a groundwater basin, the effect of urbanization on recharge to underlying groundwater is dependent on land uses, water uses, vegetative cover, and geologic conditions. Groundwater recharge from undeveloped lands occurs from precipitation alone, whereas areas that are developed for agricultural or urban land uses receive both precipitation and irrigation of vegetative cover. In an urban area, groundwater recharge occurs directly beneath irrigated lands and in drainages whose bottoms are not paved or cemented. This memorandum discusses the general effects of urbanization on groundwater recharge and the specific effects in the Santa Clarita Valley.

Summary of Findings

In the Santa Clarita Valley, stormwater runoff finds its way to the Santa Clara River and its tributaries, whose channels are predominantly natural and consist of vegetation and coarse-grained sediments (rather than concrete). The stormwater that flows across paved lands in the Santa Clarita Valley is routed to stormwater detention basins and to the river channels, where the porous nature of the sands and gravels forming the streambeds allow for significant infiltration to occur to the underlying groundwater.

Increased urbanization in the Valley has resulted in the irrigation of previously undeveloped lands. The effect of irrigation is to maintain higher soil moisture levels during the summer than would exist if no irrigation were occurring. Consequently, a greater percentage of the fall/winter precipitation recharges groundwater beneath irrigated land parcels than beneath undeveloped land parcels. In addition, urbanization in the Santa Clarita Valley has occurred in part because of the importation of State Water Project (SWP) water, which began in 1980. SWP water use has increased steadily, reaching nearly 44,500 acre-feet (AF) in 2003. Two-thirds of this water is used outdoors, and a portion of this water eventually infiltrates to groundwater. The other one-third is used indoors and is subsequently routed to local water reclamation plants (WRPs) and then to the Santa Clara River (after treatment). A portion of this water flows downstream out of the basin, and a portion infiltrates to groundwater.

Records show that groundwater levels and the amount of groundwater in storage were similar in both the late 1990s and the early 1980s, despite a significant increase in the

urbanized area during these two decades. This long-term stability of groundwater levels is attributed in part to the significant volume of natural recharge that occurs in the streambeds, which do not contain paved, urban land areas. On a long-term historical basis, groundwater pumping volumes have not increased due to urbanization, compared with pumping volumes during the 1950s and 1960s when water was used primarily for agriculture. Also, the importation of SWP water is another process that contributes to recharge in the Valley. In summary, urbanization has been accompanied by long-term stability in pumping and groundwater levels, plus the addition of imported SWP water to the Valley, which together have not reduced recharge to groundwater, nor depleted the amount of groundwater that is in storage within the Valley.

Effect of Pavement on Recharge Beneath Specific Land Parcels

The amount of paved cover on the ground affects the degree to which rainfall and outdoor-applied urban water will be able to infiltrate to groundwater. In heavily industrialized areas with high percentages of paved cover, such as exist in portions of the Los Angeles Basin, less rainfall recharge will occur than if the land is in an undeveloped condition. Furthermore, if the bottoms of rivers and other drainages are paved, then the majority of stormwater generated during a rainfall event will be unable to infiltrate to groundwater. In contrast, the amount of recharge to groundwater will be greater in urbanized areas, such as the Santa Clarita Valley, that have natural soils in the bottoms of rivers and local drainages or that have lower percentages of paved cover on the developed areas lying outside the principal drainages. In these areas, the outdoor use of water for irrigation landscape vegetation or agricultural lands can notably increase the amount of groundwater recharge, particularly if the outdoor water is imported from outside the local groundwater basin. This is discussed further below.

Effect of Vegetative Cover and Water Use

From the 1930s through the 1960s, H.F. Blaney and other researchers at the U.S. Department of Agriculture performed numerous studies to measure the amount of infiltration to groundwater that occurs beneath undeveloped lands and irrigated farmlands, and the differences in recharge rates for different types of native vegetation and crops. In California, these studies included a 1933 study by Blaney in Ventura County, a 1963 study by Blaney and others in the Lompoc Uplands, studies by the U.S. Geological Survey and various consultants in the Montecito and Carpenteria groundwater basins, and a groundwater basin study by Santa Barbara County[1] that incorporated the results of these earlier studies.

Together, these studies concluded that deep percolation to groundwater from undeveloped lands occurs only during years of average or above-average precipitation. This occurs because:

1. Southern California's rainfall is highly seasonal in nature, whereupon most rainfall occurs during the relatively cool period November through March, when plant water

[1] See Santa Barbara County Water Agency, December 15, 1977. *Report on Adequacy of the Groundwater Basins of Santa Barbara County.*

requirements are low, and little, if any, rainfall occurs during the remaining (and warmer months) when plant water requirements increase.

2. During the summer, when little or no rainfall occurs, the native vegetation extracts the residual moisture that is present in the soil, which substantially decreases the soil moisture within the root zone of the vegetation. At the end of the dry season, soil moisture levels on undeveloped lands are below the soil's field capacity, which is the amount of moisture that must be present in the soil before free drainage of water can occur below the rooting zone of the native vegetation.

3. When the seasonal rains arrive, the incident rainfall that is not consumed by plants and does not become stormwater runoff must first raise the soil moisture level to the soil's field capacity before any groundwater recharge will occur. The various studies indicate that about 17 inches/year of rainfall is necessary to raise the soil moisture to the field capacity on an undeveloped parcel of land. This is similar to the average annual rainfall in the Santa Clarita Valley and in other lowland coastal and near-coastal valleys in southern California.

On irrigated lands, irrigation occurs during several months of the year, with the exact duration depending on the amount and timing of rainfall and also the crops or type of urban landscaping being irrigated. The principal effect of converting undeveloped land to land that receives agricultural or urban irrigation is to increase the amount of water that is applied to the land during the low-rainfall months. This application of water to the vegetative cover on the surface of the developed land parcel results in the maintenance of higher soil moisture levels during the warm, dry months than would occur without development. This has three effects:

1. Because irrigation will generally be performed in a manner that maintains the health of the vegetative cover, enough water will be applied to maintain the soil moisture at, or close to, the field capacity of the soil. This in turn will allow some deep percolation to occur from the irrigation water itself.

2. When the rainy season begins, because irrigation has maintained soil moisture at or near field capacity, less of the initial rainfall entering the root zone needs to be stored in the soil (to meet soil moisture deficits) beneath an irrigated parcel than in the case of an undeveloped parcel. Therefore, a greater percentage of the initial rainfall and annual rainfall will be able to infiltrate to groundwater. The southern California studies estimated that irrigated land parcels would allow rainfall infiltration to occur in years when annual rainfall is at least 10.5 inches/year. This threshold rainfall value is 6.5 inches less than the threshold rainfall value that the studies estimated to be necessary for generating groundwater recharge beneath undeveloped land parcels.

3. Because the majority of irrigation occurs during the dry (low-rainfall) months, the total annual recharge to groundwater from irrigated developed lands is the sum of: (a) the deep percolation arising from irrigation (during the low-rainfall months); and (b) rainfall (during the months when less irrigation is occurring). Therefore, groundwater recharge beneath developed lands is greater and occurs for a longer period of time each year than in the case of undeveloped lands where no irrigation is occurring.

Historical Observations of Groundwater Conditions in the Santa Clarita Valley

The findings of the studies described above for other groundwater basins in southern California are consistent with observations that have been made in the Santa Clarita Valley, which are based on long-term water level records, water budget analyses, and groundwater modeling. Based on a month-by-month calibration to a 20-year record of historical water level records (throughout the Valley) and stream gaging records (at the Los Angeles – Ventura County line), the model simulates 10 percent of the applied outdoor water as being available for recharge to groundwater in retail and residential areas, with greater percentages infiltrating beneath golf courses and agricultural lands. This is consistent with a 1980 study by DWR of the groundwater resources of the Santee and El Monte hydrologic subareas of San Diego County. In that study, which was performed to evaluate reclaimed water use plans, DWR concluded that approximately 20 percent of the applied outdoor water in municipal areas infiltrates to the water table, with the remaining 80 percent going to evapotranspiration and direct evaporation. DWR also concluded that there would likely be no significant change in these percentages as urbanization continues.[2]

In the Santa Clarita Valley, as in any urbanized area, urbanization increases the paved area and can increase the magnitude and intensity of stormwater runoff from paved land areas. In the Santa Clarita Valley, this stormwater runoff will find its way to the Santa Clara River and its tributaries, whose channels are predominantly natural and consist of vegetation and coarse-grained sediments (rather than concrete). The stormwater that flows across paved lands in the Santa Clarita Valley is routed to stormwater detention basins and to the river channels, where the porous nature of the sands and gravels forming the streambeds allow for significant infiltration to occur to the underlying groundwater. Consequently, for a developed land parcel, the water that runs off of the paved portion of the land parcel will infiltrate to groundwater from a detention basin or a riverbed, rather than infiltrating onsite.

Riverbed infiltration is a significant percentage of total recharge in the Santa Clarita Valley in any given year. Streamflow records and the model calibration process together demonstrate that year-to-year fluctuations in total recharge in the Valley arise not just from year-to-year variations in incident rainfall within the Valley, but also from year-to-year variations in streamflows in the Santa Clara River and its tributaries. Because the areas contributing flow to the rivers are located both within and outside of the Valley, the recharge that occurs from riverbeds is a significant source of groundwater recharge within the Valley.

Evidence that stormwater infiltration to groundwater is not significantly decreased by urbanization comes from long-term water level records at wells completed in the Alluvial aquifer. These records show that groundwater levels and the amount of groundwater in storage were similar in both the late 1990s and the early 1980s, despite a significant increase in the urbanized area during these two decades. This long-term stability is attributed in part to the significant volume of natural recharge that occurs in the streambeds, which do not contain paved, urban land areas. Also, groundwater pumping volumes have not increased

[2] See State of California, Department of Water Resources, Southern District. August 1984, *San Diego County Cooperative Ground Water Studies: Reclaimed Water Use, Phase II*. Pages 40-41.

due to urbanization, compared with pumping volumes during the 1950s and 1960s when water was used primarily for agriculture. Additionally, beginning in 1980, water was imported into the Santa Clarita Valley from the State Water Project (SWP) for urban use, with SWP water use reaching nearly 30,000 acre-feet per year (AF/yr) by the end of the 1990s, and progressively increasing from about 32,500 AF in 2000 to nearly 44,500 AF in 2003. Because two-thirds of the total urban water demand is used outdoors, a substantial portion of the imported SWP water has been and continues to be applied to urban landscaping, thereby increasing the amount of recharge to groundwater. The remaining urban water is used indoors, and is subsequently routed to local water reclamation plants (WRPs) and then to the Santa Clara River (after treatment). A portion of this water flows downstream out of the basin, and a portion infiltrates to groundwater.

In summary, urbanization has been accompanied by long-term stability in pumping and groundwater levels, plus the addition of imported SWP water to the Valley, which together have not reduced recharge to groundwater, nor depleted the amount of groundwater that is in storage within the Valley.

Project Summary, Potential Groundwater Contamination From Intentional and Nonintentional Stormwater Infiltration

United States
Environmental Protection
Agency

Risk Reduction
Engineering Laboratory
Cincinnati, OH 45268

Research and Development

EPA/600/SR-94/051 May 1994

EPA

Project Summary

Potential Groundwater Contamination from Intentional and Nonintentional Stormwater Infiltration

Robert Pitt, Shirley Clark, and Keith Parmer

The research summarized here was conducted during the first year of a 3-yr cooperative agreement to identify and control stormwater toxicants, especially those adversely affecting groundwater. The purpose of this research effort was to review the groundwater contamination literature as it relates to stormwater. Potential problem pollutants were identified, based on their mobility through the unsaturated soil zone above groundwater, their abundance in stormwater, and their treatability before discharge. This information was used with earlier EPA research results to identify the possible sources of these potential problem pollutants. Recommendations were also made for stormwater infiltration guidelines in different areas and monitoring that should be conducted to evaluate a specific stormwater for its potential to contaminate groundwater.

This Project Summary was developed by EPA's Risk Reduction Engineering Laboratory, Cincinnati, OH, to announce key findings of the research project that is fully documented in a separate report of the same title (see Project Report ordering information at back).

Introduction

Before urbanization, groundwater was recharged by precipitation infiltrating through pervious surfaces, including grasslands and woods. This infiltrating water was relatively uncontaminated. Urbanization, however, reduced the permeable soil surface area through which recharge by infiltration could occur. This resulted in much less groundwater recharge and greatly increased surface runoff. In addition, the waters available for recharge generally carried increased quantities of pollutants. With urbanization, waters having elevated contaminant concentrations also recharge groundwater, including effluent from domestic septic tanks, wastewater from percolation basins and industrial waste injection wells, infiltrating stormwater, and infiltrating water from agricultural irrigation. This report addresses potential groundwater problems associated with stormwater toxicants and describes how conventional stormwater control practices can reduce these problems.

Sources of Pollutants

High bacteria populations have been found in sheetflow samples from sidewalks, roads, and some bare ground (collected from locations where dogs would most likely be "walked"). Tables 1 and 2 summarize toxicant concentrations and likely sources or locations having some of the highest concentrations found during an earlier phase of this EPA-funded research. The detection frequencies for the heavy metals are all close to 100% for all source areas, and the detection frequencies for the organics listed on these tables ranged from about 10% to 25%. Vehicle service areas had the greatest abundance of observed organics.

Table 1. *Concentrations of Heavy Metals in Observed Areas (µg/L)*

Toxicant	Highest Median		Highest Observed	
Cadmium	*Vehicle service area runoff*	*8*	*Street runoff*	*220*
Chromium	*Landscaped area runoff*	*100*	*Roof runoff*	*510*
Copper	*Urban receiving water*	*160*	*Street runoff*	*1250*
Lead	*CSO*	*75*	*Storage area runoff*	*330*
Nickel	*Parking area runoff*	*40*	*Landscaped area runoff*	*130*
Zinc	*Roof runoff*	*100*	*Roof runoff*	*1580*

Table 2. *Maximum Concentrations of Toxic Organics from Observed Sources*

Toxicant	Maximum, µg/L	Detection Frequency, %	Significant Sources
Benzo (a) anthracene	*60*	*12*	*Gasoline, wood preservative*
Benzo (b) fluoranthene	*226*	*17*	*Gasoline, motor oils*
Benzo (k) fluoranthene	*221*	*17*	*Gasoline, bitumen, oils*
Benzo (a) pyrene	*300*	*17*	*Asphalt, gasoline, oils*
Fluoranthene	*128*	*23*	*Oils, gasoline, wood preservative*
Naphthalene	*296*	*13*	*Coal tar, gasoline, insecticides*
Phenanthrene	*69*	*10*	*Oils, gasoline, coal tar*
Pyrene	*102*	*19*	*Oils, gasoline, bitumen, coal tar, wood preservative*
Chlordane	*2.2*	*13*	*Insecticide*
Butyl benzyl phthalate	*128*	*12*	*Plasticizer*
Bis (2-chloroethyl) ether	*204*	*14*	*Fumigant, solvents, insecticides, paints, lacquers, varnishes*
Bis (2-chloroisopropyl) ether	*217*	*14*	*Pesticide manufacturing*
1,3-Dichlorobenzene	*120*	*23*	*Pesticide manufacturing*

Stormwater Constituents Having High Potential to Contaminate Groundwater

Nutrients

Nitrates are one of the most frequently encountered contaminants in groundwater. Phosphorus contamination of groundwater has not been as widespread, or as severe, as that of nitrogen compounds. Whenever nitrogen-containing compounds come into contact with soil, a potential exists for nitrate leaching into groundwater, especially in rapid-infiltration wastewater basins, stormwater infiltration devices, and agricultural areas. Nitrate has leached from fertilizers and affected groundwaters under various turf grasses in urban areas, including golf courses, parks, and home lawns. Significant leaching of nitrates occurs during the cool, wet seasons. Cool temperatures reduce denitrification and ammonia volatilization and limit microbial nitrogen immobilization and plant uptake. The use of slow-release fertilizers (including composted organic mulches, urea formaldehyde (UF), methylene urea, isobutylidene diurea (IBDU), and sulfur-coated urea) is recommended in areas having potential groundwater nitrate problems.

Residual concentrations of nitrate in soil vary greatly and depend on the soil texture, mineralization, rainfall and irrigation patterns, organic matter content, crop yield, nitrogen fertilizer/sludge application rate, denitrification, and soil compaction. Nitrate is highly soluble (>1 kg/L) and will stay in solution in the percolation water. If it leaves the root zone without being taken-up by plants, it will readily reach the groundwater.

Pesticides

Urban pesticide contamination of groundwater can result from municipal and homeowner use for pest control and the subsequent collection of the pesticide in stormwater runoff. Pesticides that have been found in urban groundwaters include: 2,4-D, 2,4,5-T, atrazine, chlordane, diazinon, ethion, malathion, methyl trithion, silvex, and simazine. Heavy repetitive use of mobile pesticides (those that are not likely to be retained by various processes in the soil before they reach the groundwater, such as 2,4-D, acenaphthylene, alachlor, atrazine, cyanazine, dacthal, diazinon, dicamba, and malathion) on irrigated and sandy soils will likely contaminate groundwater. Fungicides and nematocides must be mobile to reach the target pest, and hence, they generally have the highest groundwater contamination potential. Pesticide leaching depends on patterns of use, soil texture, total organic carbon content of the soil, pesticide persistence, and depth to the water table.

The greatest pesticide mobility occurs in areas with coarse-grained or sandy soils without a hardpan layer, and with soils that have low clay and organic matter content and high permeability. Structural voids, generally found in the surface layer of finer-textured soils rich in clay, can transmit pesticides rapidly when the voids are filled with water and the adsorbing surfaces of the soil matrix are bypassed. In general, pesticides with low water solubilities, high octanol-water partitioning coefficients, and high carbon partitioning coefficients are less mobile. The slower moving pesticides that may better sorb to soils have been recommended for use in areas of groundwater contamination concern. These include the fungicides iprodione and triadimefon, the insecticides isofenphos and chlorpyrifos, and the herbicide glyphosate.

Pesticides decompose in soil and water, but the total decomposition time can range from days to years. Literature half-lives for pesticides generally apply to surface soils and do not account for the reduced microbial activity found deep in the vadose zone. Pesticides with a 30-day half life can show considerable leaching. An order-of-magnitude difference in half-life results in a five- to ten-fold difference in percolation loss. Organophosphate pesticides are less persistent than organochlorine pesticides, but they also are not strongly adsorbed by the sediment and are likely to leach into the vadose zone and the groundwater.

Other Organics

The most commonly occurring organic compounds found in urban groundwaters include phthalate esters (especially bis(2-ethylhexyl)phthalate) and phenolic compounds. Other, more rarely found, organics include the volatiles: benzene, chloroform, methylene chloride, trichloroethylene, tetrachloroethylene, toluene, and xylene. Polycyclic aromatic hydrocarbons (PAHs) (especially benzo(a)anthracene, chrysene, anthracene, and benzo(b)fluoroanthenene) have also been found in groundwaters near industrial sites.

Groundwater contamination from organics, like that from other pollutants, occurs

more readily in areas with sandy soils and where the water table is near the land surface. Organics can be removed from the soil and recharge water by volatilization, sorption, and degradation. Volatilization can significantly reduce the concentrations of the most volatile compounds in groundwater, but the rate of gas transfer from the soil to the air is usually limited by the presence of soil water. Hydrophobic sorption onto soil organic matter limits the mobility of less soluble base/neutral and acid extractable compounds through organic soils and the vadose zone. Sorption is not always a permanent removal mechanism, however. Organic resolubilization can occur during wet periods following dry periods. Many organics can be degraded by microorganisms, at least partially, but others cannot. Temperature, pH, moisture content, ion exchange capacity of the soil, and air availability may limit the microbial degradation potential for even the most degradable organic compound.

Microorganisms

Viruses have been detected in groundwater where stormwater recharge basins were located short distances above the aquifer. Enteric viruses are more resistant to environmental factors than are enteric bacteria, and they exhibit longer survival times in natural waters. They can occur in potable and marine waters in the absence of fecal coliforms. Enteroviruses are also more resistant to commonly used disinfectants than are indicator bacteria (such as fecal coliforms), and they can occur in groundwater in the absence of indicator bacteria.

The factors that affect the survival of enteric bacteria and viruses in the soil include pH, antagonism from soil microflora, moisture content, temperature, sunlight, and organic matter. The two most important attributes of viruses that permit their long-term survival in the environment are their structure and very small size. These characteristics permit virus occlusion and protection within colloid-size particles. Viral adsorption is promoted by increasing cation concentration, decreasing pH, and decreasing soluble organics. Since the movement of viruses through soil to groundwater occurs in the liquid phase and involves water movement and associated suspended virus particles, the distribution of viruses between the adsorbed and liquid phases determines the viral mass available for movement. Once the virus reaches the groundwater, it can travel laterally through the aquifer until it is either adsorbed or inactivated.

The major bacterial removal mechanisms in soil are straining at the soil surface and at intergrain contacts, sedimentation, sorption by soil particles, and inactivation. Because their size is larger than viruses, most bacteria are retained near the soil surface because of this straining effect. In general, enteric bacteria survive in soil between 2 and 3 mo, although survival times up to 5 yr have been documented.

Metals

From a groundwater pollution standpoint, the metals in stormwater presenting the most environmental concern are aluminum, arsenic, cadmium, chromium, copper, iron, lead, mercury, nickel, and zinc. The majority of these metals (with the common exception of zinc) are, however, mostly associated with the particulate fractions and can be mostly removed by either sedimentation or filtration processes.

In general, studies of recharge basins receiving large metal loads found that most of the heavy metals are removed either in the basin sediment or in the vadose zone. Dissolved metal ions are removed from stormwater during infiltration mostly by adsorption onto the near-surface particles in the vadose zone, and the particulate metals are filtered out at the soil surface. Studies at recharge basins found that lead, zinc, cadmium, and copper accumulated at the soil surface with little downward movement over many years. At a commercial site, however, nickel, chromium, and zinc concentrations have exceeded regulatory limits in the soils below a recharge area. Allowing percolation ponds to go dry between storms can be counterproductive to the removal of lead from the water during recharge. Apparently, the adsorption bonds between the sediments and the metals can be weakened during the drying period.

Similarities in water quality between runoff water and groundwater have shown that there is significant downward movement of copper and iron in sandy and loamy soils. Arsenic, nickel, and lead, however, did not significantly move downward through the soil to the groundwater. The exception to this was some downward movement of lead with the percolation water in sandy soils beneath stormwater recharge basins. Zinc, which is more soluble than iron, has been found in higher concentrations in groundwater than iron. The order of attenuation in the vadose zone from infiltrating stormwater is: zinc (most mobile) > lead > cadmium > manganese > copper > iron > chromium > nickel > aluminum (least mobile).

Salts

Salt applications for winter traffic safety is a common practice in many northern areas, and the sodium and chloride, which are collected in the snowmelt, travel down through the vadose zone to the groundwater with little attenuation. Soil is not very effective at removing salts. Salts that are still in the percolation water after it travels through the vadose zone will contaminate the groundwater. Infiltrating stormwater has increased sodium and chloride concentrations above background concentrations. Fertilizer and pesticide salts also accumulate in urban areas and can leach through the soil to the groundwater.

Studies of depth of pollutant penetration in soil have shown that sulfate and potassium concentrations decrease with depth, whereas sodium, calcium, bicarbonate, and chloride concentrations increase with depth. Once contamination with salts begins, the movement of salts into the groundwater can be rapid. The salt concentration may not lessen until the source of the salts is removed.

Treatment of Stormwater

Table 3 summarizes the filterable fraction of toxicants found in runoff sheet flows from many urban areas found during an earlier phase of this EPA-funded research. Pollutants that are mostly in filterable forms have a greater potential of affecting groundwater and are more difficult to control with the use of conventional stormwater control practices which mostly rely on sedimentation and filtration principles. Luckily, most of the toxic organics and metals are associated with the nonfilterable (suspended solids) fraction of the wastewaters during wet weather. Possible exceptions include zinc, fluoranthene, pyrene, and 1,3-dichlorobenzene, which may be mostly found in the filtered sample portions. Pollutants in dry-weather storm drainage flows, however, tend to be much more associated with filtered sample fractions and would not be as readily controlled with the use of sedimentation.

Sedimentation is the most common fate and control mechanism for particulate-related pollutants. This would be common for most stormwater pollutants, as noted above. Particulate removal can occur in many conventional stormwater control processes, including catchbasins, screens, drainage systems, and detention ponds. Sorption of pollutants onto solids and metal precipitation increases the sedimentation potential of these pollutants and also encourages more efficient bonding of the pollutants in soils to prevent their leaching

Table 3. Reported Filterable Fractions of Stormwater Toxicants from Source Areas

Constituent	Filterable Fraction (%)
Cadmium	20 to 50
Chromium	<10
Copper	<20
Iron	Small amount
Lead	<20
Nickel	Small amount
Zinc	>50
Benzo (a) anthracene	None found in filtered fraction
Fluoranthene	65
Naphthalene	25
Phenanthrene	None found in filtered fraction
Pyrene	95
Chlordane	None found in filtered fraction
Butyl benzyl phthalate	Irregular
Bis (2-chloroethyl) ether	Irregular
Bis (2-chlrorisopropyl) ether	None found in filtered fraction
1,3-Dichlorobenzene	75

to groundwaters. Detention ponds are probably the most common management practice for the control of stormwater runoff. If properly designed, constructed, and maintained, wet detention ponds can be very effective in controlling a wide range of pollutants. The monitored performance of wet detention ponds indicates more than 90% removal for suspended solids, 70% for BOD_5 and COD, about 60% to 70% for nutrients, and about 60% to 95% for heavy metals. Catchbasins are very small sedimentation devices. Adequate cleaning can help reduce the total solids and lead urban runoff yields by between 10% and 25%, and COD, total Kjeldahl nitrogen, total phosphorus, and zinc by between 5% and 10%. Other important fate mechanisms available in wet detention ponds, but which are probably not important in small enclosed sump devices such as catchbasins, include volatilization and photolysis. Biodegradation, biotransformation, and bioaccumulation (into plants and animals) may also occur in larger and open ponds.

Upland infiltration devices (such as infiltration trenches, porous pavements, percolation ponds, and grass roadside drainage swales) are located at urban source areas. Infiltration (percolation) ponds are usually located at stormwater outfalls or at large paved areas. These basins, along with perforated storm sewers, can infiltrate flows and pollutants from all upland sources combined. Infiltration devices can safely deliver large fractions of the surface flows to groundwater, if carefully designed and located. Local conditions that can make stormwater infiltration inappropriate include steep slopes, slowly percolating soils, shallow groundwater, and nearby groundwater uses. Grass filter strips may be quite effective in removing particulate pollutants from overland flows. The filtering effects of grasses, along with increased infiltration/recharge, reduce the particulate sediment load from urban landscaped areas. Grass swales are another type of infiltration device and can be used in place of curb and gutter drainages in most land uses, except possibly strip commercial and high density residential areas. Grass swales allow the recharge of significant amounts of surface flows. Swales can also reduce pollutant concentrations because of filtration. Soluble and particulate heavy metal (copper, lead, zinc, and cadmium) concentrations can be reduced by at least 50%, COD, nitrate nitrogen, and ammonia nitrogen concentrations can be reduced by about 25%, but only inconsistent concentration reductions can be expected for organic nitrogen, phosphorus, and bacteria.

Sorption of pollutants to soils is probably the most significant fate mechanism of toxicants in biofiltration devices. Many of the devices also use sedimentation and filtration to remove the particulate forms of the pollutants from the water. Incorporation of the pollutants onto soil with subsequent biodegradation and minimal leaching to the groundwater is desired. Volatilization, photolysis, biotransformation, and bioconcentration may also be significant in grass filter strips and grass swales. Underground seepage drains and porous pavements offer little biological activity to reduce toxicants.

Results and Conclusions

This entire research project will provide guidance on critical source area treatment, especially for the protection of groundwater quality. Much of the information will also be useful for analyzing stormwater problems and needed controls for surface water discharges.

Table 4 is a summary of the pollutants found in stormwater that may cause groundwater contamination problems for various reasons. This table does not consider the risk associated with using groundwater contaminated with these pollutants. Causes of concern include high mobility (low sorption potential) in the vadose zone, high abundance (high concentrations and high detection frequencies) in stormwater, and high soluble fractions (small fraction associated with particulates that would have little removal potential using conventional stormwater sedimentation controls) in the stormwater. The contamination potential is the lowest rating of the influencing factors. As an example, when no pretreatment is used before percolation through surface soils, the mobility and abundance criteria are most important. When a compound is mobile but in low abundance (such as for volatile organic compounds, VOCs), then the groundwater contamination potential would be low. When the compound is mobile, however, and also in high abundance (such as for sodium chloride, in certain conditions), then the groundwater contamination potential would be high. When sedimentation pretreatment is to be used before infiltration, then some of the pollutants will likely be removed before infiltration. In this case, all three influencing factors (pollutant mobility, pollutant abundance in stormwater, and fraction of the pollutant associated with the filtered sample fraction) would be considered. As an example, chlordane would have a low contamination potential with sedimentation pretreatment, whereas it would have a moderate contamination potential when no pretreatment is used. In addition, when subsurface infiltration/injection is used instead of surface percolation, the compounds would most likely be more mobile, making the abundance criteria the most important, with some regard given to the filterable fraction information for operational considerations.

This table is only appropriate for initial estimates of contamination potential because of the simplifying assumptions made, such as the worst case mobility conditions assumed (for sandy soils having low organic content). When the soil is clayey and has a high organic content, then most of the organic compounds would be less mobile than that shown on this table. The abundance and filterable fraction information is generally applicable for warm weather stormwater runoff in residential and commercial areas. The pollutant concentrations and detection

frequencies, however, would be greater for critical source areas (especially vehicle service areas) and critical land uses (especially manufacturing industrial areas).

The stormwater pollutants of most concern (those that may have the greatest adverse impacts on groundwaters) include:

- Nutrients: nitrate has a low to moderate potential for contaminating groundwater when both surface percolation and subsurface infiltration/injection are used because of its relatively low concentrations in most stormwaters. When the stormwater nitrate concentration is high, then the groundwater contamination potential would likely also be high.
- Pesticides: lindane and chlordane have moderate potentials for contaminating groundwater when surface percolation (with no pretreatment) or when subsurface injection (with minimal pretreatment) are used. The groundwater contamination potentials for both of these compounds would very likely be substantially reduced with adequate sedimentation pretreatment.
- Other organics: 1,3-dichlorobenzene may have a high potential for contaminating groundwater when subsurface infiltration/injection (with minimal pretreatment) is used. It would, however, probably have a lower groundwater contamination potential for most surface percolation practices because of its relatively strong sorption to vadose zone soils. Both pyrene and fluoranthene would also very likely have high groundwater contamination potentials for subsurface infiltration/injection practices, but lower contamination potentials for surface percolation practices because of their more limited mobility through the unsaturated zone (vadose zone). Others (including benzo(a)anthracene, bis (2-ethylhexyl) phthalate, pentachlorophenol, and phenanthrene) may also have moderate groundwater contamination potentials when surface percolation with no pretreatment, or subsurface injection/infiltration, is used. These compounds would have low groundwater contamination potentials when surface infiltration is used with sedimentation pretreatment. VOCs may also have high groundwater contamination potentials if present in the stormwater (which is possible for some industrial and commercial facilities and vehicle service establishments).
- Pathogens: enteroviruses very likely have high potentials for contaminating groundwater when any percolation or subsurface infiltration/injection practice is used, depending on their presence in stormwater (especially if contaminated with sanitary sewage). Other pathogens, including *Shigella*, *Pseudomonas aeruginosa*, and various protozoa, would also have high groundwater contamination potentials when subsurface infiltration/injection practices are used without disinfection. When disinfection (especially by chlorine or ozone) is used, then disinfection by-products (such as trihalomethanes or ozonated bromides) would have high groundwater contamination potentials.
- Heavy Metals: nickel and zinc possibly have high potentials for contaminating groundwater when subsurface infiltration/injection is used. Chromium and lead would have moderate groundwater contamination potentials for subsurface infiltration/injection practices. All metals would possibly have low groundwater contamination potentials when surface infiltration is used with sedimentation pretreatment.
- Salts: chloride would very likely have a high potential for contaminating groundwater in northern areas where road salts are used for traffic safety, irrespective of the pretreatment, infiltration, or percolation practices used.

Pesticides have been mostly found in urban runoff from residential areas, especially in dry weather flows associated with landscaping irrigation runoff. The other organics, especially the volatiles, are mostly found in industrial areas. The phthalates are found in all areas. The PAHs are also found in runoff from all areas, but they are in higher concentrations and occur more frequently in industrial areas. Pathogens are most likely associated with sanitary sewage contamination of storm drainage systems, but several bacterial pathogens are commonly found in surface runoff in residential areas. Zinc is mostly found in roof runoff and other areas where galvanized metal comes into contact with rainwater. Salts are at their greatest concentrations in snowmelt and early spring runoff in northern areas.

The control of these compounds requires various approaches, including source area controls, end-of-pipe controls, and pollution prevention. All dry weather flows should be diverted from infiltration devices because of their potentially high concentrations of soluble heavy metals, pesticides, and pathogens. Similarly, all runoff from manufacturing industrial areas should also be diverted from infiltration devices because of their relatively high concentrations of soluble toxicants. Combined sewer overflows should also be diverted because of sewage contamination. In areas of snow and ice control, winter snowmelt and runoff and early spring runoff should also be diverted from infiltration devices.

All other runoff should include pretreatment using sedimentation processes before infiltration, to both minimize groundwater contamination and to prolong the life of the infiltration device (if needed). This pretreatment can take the form of grass filters, sediment sumps, wet detention ponds, etc., depending on the runoff volume to be treated, treatment flow rate, and other site specific factors. Pollution prevention can also play an important role in minimizing groundwater contamination problems, including reducing the use of galvanized metals, pesticides, and fertilizers in critical areas. The use of specialized treatment devices, such as those being developed and tested during this research, can also play an important role in treating runoff from critical source areas before these more contaminated flows commingle with cleaner runoff from other areas. Sophisticated treatment schemes, especially the use of chemical processes or disinfection, may not be warranted, except in special cases, especially when the potential of forming harmful treatment byproducts (such as THMs and soluble aluminum) is considered.

The use of surface percolation devices (such as grass swales and percolation ponds) that have a substantial depth of underlying soils above the groundwater is preferable to the use of subsurface infiltration devices (such as dry wells, trenches or seepage drains, and especially injection wells), unless the runoff water is known to be relatively free of pollutants. Surface devices are able to take greater advantage of natural soil pollutant removal processes. Unless all percolation devices are carefully designed and maintained, however, they may not function properly and may lead to premature hydraulic failure or contamination of the groundwater.

Recommendations

With a reasonable degree of site-specific design considerations to compensate for soil characteristics, infiltration may be

Table 4. *Potential of Stormwater Pollutants to Contaminate Groundwater*

Compounds		Mobility (sandy/low organic soils)	Abundance in Stormwater	Fraction Filterable	Contamination Potential: Surface Infilt. and No Pretreatment	Contamination Potential: Surface Infilt. with Sedimentation	Contamination Potential: Sub-surface Inj. with Minimal Pretreatment
Nutrients	nitrates	mobile	low/moderate	high	low/moderate	low/moderate	low/moderate
Pesticides	2,4-D	mobile	low	likely low	low	low	low
	γ-BHC (lindane)	intermediate	moderate	likely low	moderate	low	moderate
	malathion	mobile	low	likely low	low	low	low
	atrazine	mobile	low	likely low	low	low	low
	chlordane	intermediate	moderate	very low	moderate	low	moderate
	diazinon	mobile	low	likely low	low	low	low
Other organics	VOCs	mobile	low	very high	low	low	low
	1,3-dichloro-benzene	low	high	high	low	low	high
	anthracene	intermediate	low	moderate	low	low	low
	benzo(a) anthracene	intermediate	moderate	very low	moderate	low	moderate
	bis (2-ethylhexyl) phthalate	intermediate	moderate	likely low	moderate	low	moderate
	butyl benzyl phthalate	low	low/moderate	moderate	low	low	low/moderate
	fluoranthene	intermediate	high	high	moderate	moderate	high
	fluorene	intermediate	low	likely low	low	low	low
	naphthalene	low/inter.	low	moderate	low	low	low
	pentachlorophenol	intermediate	moderate	likely low	moderate	low	moderate
	phenanthrene	intermediate	moderate	very low	moderate	low	moderate
	pyrene	intermediate	high	high	moderate	moderate	high
Pathogens	enteroviruses	mobile	likely present	high	high	high	high
	Shigella	low/inter.	likely present	moderate	low/moderate	low/moderate	high
	Pseudomonas aeruginosa	low/inter.	very high	moderate	low/moderate	low/moderate	high
	protozoa	low/inter.	likely present	moderate	low/moderate	low/moderate	high
Heavy metals	nickel	low	high	low	low	low	high
	cadmium	low	low	moderate	low	low	low
	chromium	inter./very low	moderate	very low	low/moderate	low	moderate
	lead	very low	moderate	very low	low	low	moderate
	zinc	low/very low	high	high	low	low	high
Salts	chloride	mobile	seasonally high	high	high	high	high

very effective in controlling both urban runoff quality and quantity problems. This strategy encourages infiltration of urban runoff to replace the natural infiltration capacity lost through urbanization and to use the natural filtering and sorption capacity of soils to remove pollutants; however, the potential for some types of urban runoff to contaminate groundwater through infiltration requires some restrictions. Infiltration of urban runoff having potentially high concentrations of pollutants that may pollute groundwater requires adequate pretreatment or the diversion of these waters away from infiltration devices. The following general guidelines for the infiltration of stormwater and other storm drainage effluent are recommended in the absence of comprehensive site-specific evaluations:

- Dry weather storm drainage effluent should be diverted from infiltration devices because of their probable high concentrations of soluble heavy metals, pesticides, and pathogenic microorganisms.
- Combined sewage overflows should be diverted from infiltration devices because of their poor water quality, especially their high pathogenic microorganism concentrations and high clogging potential.
- Snowmelt runoff should be diverted from infiltration devices because of its potential for having high concentrations of soluble salts.
- Runoff from manufacturing industrial areas should be diverted from infiltration devices because of its potential for having high concentrations of soluble toxicants.
- Construction site runoff must be diverted from stormwater infiltration devices (especially subsurface devices) because of its high suspended solids concentrations, which would quickly clog infiltration devices.
- Runoff from other critical source areas, such as vehicle service facilities and large parking areas, should at least receive adequate pretreatment to eliminate their groundwater contamination potential before infiltration.
- Runoff from residential areas (the largest component of urban runoff in most cities) is generally the least polluted urban runoff flow and should be considered for infiltration. Very little treat-

ment of residential area stormwater runoff should be needed before infiltration, especially if surface infiltration is through the use of grass swales. When subsurface infiltration (seepage drains, infiltration trenches, dry wells, etc.) is used, then some pretreatment may be needed, such as by using grass filter strips, or other surface filtration devices.

Recommended Stormwater Quality Monitoring to Evaluate Potential Groundwater Contamination

Most past stormwater quality monitoring efforts have not adequately evaluated stormwater's potential for contaminating groundwater. The following list shows the stormwater contaminants that are recommended for monitoring when stormwater contamination potential needs to be considered, or when infiltration devices are to be used. Other analyses are appropriate for additional monitoring objectives (such as evaluating surface water problems). In addition, all phases of urban runoff should be sampled, including stormwater runoff, dry-weather flows, and snowmelts.

- Urban runoff contaminates with the potential to adversely affect groundwater:
  - Nutrients (especially nitrates)
  - Salts (especially chloride)
  - VOCs (if expected in the runoff, such as runoff from manufacturing industrial or vehicle service areas, could screen for VOCs with purgable organic carbon analyses)
  - Pathogens (especially enteroviruses, if possible, along with other pathogens such as *Pseudomonas aeruginosa*, *Shigella*, and pathogenic protozoa)
  - Bromide and total organic carbon (to estimate disinfection by-product generation potential, if disinfection by either chlorination or ozone is being considered)
  - Pesticides, in both filterable and total sample components (especially lindane and chlordane)
  - Other organics, in both filterable and total sample components (especially 1,3 dichlorobenzene, pyrene, fluoranthene, benzo(a)anthracene, bis (2-ethylhexyl) phthalate, pentachlorophenol, and phenanthrene)
  - Heavy metals, in both filterable and total sample components (especially chromium, lead, nickel, and zinc)
- Urban runoff compounds with the potential to adversely affect infiltration and injection operations:
  - Sodium, calcium, and magnesium (to calculate the sodium adsorption ratio to predict clogging of clay soils)
  - Suspended solids (to determine the need for sedimentation pretreatment to prevent clogging)

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***Richard Field** is the EPA Project Officer (see below).*
The complete report, entitled "Potential Groundwater Contamination from Intentional and Nonintentional Stormwater Infiltration," (Order No. PB94-165354AS; Cost: $27.00, subject to change) will be available only from:
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FRESNO NATIONWIDE URBAN RUNOFF PROGRAM PROJECT

FRESNO METROPOLITAN FLOOD CONTROL DISTRICT

FINAL REPORT

MAY 1984

BC BROWN AND CALDWELL

BROWN AND CALDWELL
CONSULTING ENGINEERS

May 11, 1984

Mr. Doug Harrison, General Manager
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017-1206-50/4

Subject: Final Report for Fresno Nationwide Urban Runoff Program Project

Dear Mr. Harrison:

We are pleased to submit the final report for the Fresno Nationwide Urban Runoff Program (NURP) project. This report provides a comprehensive documentation of the work conducted on this project over the past three years. For convenience, Chapter 1 is a summary of the key findings of each of the report chapters. A set of specific management practices to improve the current operation of the retention/recharge system is presented in Chapter 9. These recommendations incorporate the suggestions made by the project team and the technical and citizen committees at our review meetings on April 24, 1984.

We have thoroughly enjoyed participating in the Fresno NURP project. Its success can in large part be attributed to the team approach that has been followed since the outset of the project. We thank you and the other District staff, including Bob Van Wyk and Jerry Lakeman for your guidance and support. The excellent work performed by Rick Oltmann of the U.S. Geological Survey and Harry Nightingale of the U.S. Department of Agriculture form the technical foundation for the final report. The other key individuals who have contributed to the project are identified in the listing following this letter.

Very truly yours,

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CHAPTER 1

SUMMARY

In a report of this magnitude, a summary is essential to provide an overview of the study and its findings. The following sections briefly describe the important points of each chapter of the report.

INTRODUCTION

This study is part of the Nationwide Urban Runoff Program (NURP) initiated by the U.S. Environmental Protection Agency (EPA) in 1978. The Fresno project is one of 28 projects being conducted at locations across the country. The primary objectives of NURP are to determine to what extent urban runoff is contributing to water quality problems and to evaluate various management practices for controlling urban runoff.

The Fresno project was selected as one of the NURP projects for three main reasons. First, the receiving water for urban runoff in the Fresno-Clovis area is the groundwater. Only one other NURP project (Long Island, New York) is addressing impacts on groundwater. Secondly, the Fresno groundwater supply is a sole source aquifer, and the potential for degradation is a matter of significant importance to the local community. Third, the Fresno project can demonstrate the effectiveness of a specific best management practice, i.e., the total retention and recharge of urban storm runoff.

OBJECTIVES AND APPROACH

The Fresno Metropolitan Flood Control District (District) has developed a system of retention/recharge basins to handle runoff during storm periods. The system has a dual purpose: it services urban drainage needs and at the same time recharges the groundwater aquifer. The District currently has a total of 86 recharge basins of which 74 are completed or are in various stages of excavation. These basins have a total area of over 1,000 acres.

The participation of the District in NURP was initiated at the request of the District because of the recognition that urban storm runoff recharged to the groundwater represented a potential source of pollution. Thus, the major objective of the

Fresno NURP project is to determine the environmental impacts of the current practice of retention and recharge of urban storm runoff. The two areas of specific concern are potential impacts on the quality of drinking water which is obtained from the groundwater supply, and recreation, which is permitted during the summer months in the turfed recharge basins.

This project has been conducted over a three-year period. The project was fully authorized in early 1981, and the bulk of the field work was completed in the fall of 1983. The District has utilized three subcontractors. The U.S. Geological Survey (USGS) has conducted the runoff monitoring program. The Water Management Research Unit of the U.S. Department of Agriculture (USDA) conducted the soils and groundwater monitoring program. Brown and Caldwell has been responsible for preparation of the interim and final reports and conducted portions of the laboratory work.

RUNOFF MONITORING PROGRAM

The USGS collected extensive data on the quantity and quality of storm runoff and rainfall and on the quality of dry deposition and street particulate material. Samples were collected from a total of 27 storms over the two-year monitoring program. Runoff samples were collected from four land use types: single-family residential, multiple-family residential, commercial, and industrial. Samples were analyzed for a wide array of constituents, including nutrients, solids, major ions, metals, and pesticides.

The runoff results indicated that urban runoff contains significant levels of many contaminants, including most heavy metals and some organic compounds. Constituents which have runoff concentrations significantly higher than the regional groundwater include lead, zinc, copper, mercury, iron, and manganese. In contrast, runoff is better in quality than the regional groundwater from the standpoint of minerals and nutrients. Rainfall samples contained 14 organic compounds, including 11 pesticides.

Comparison of the runoff data for the four land use types showed that the industrial area had the worst runoff quality. Concentrations in the industrial runoff fluctuated greatly during storms, and numerous unexplained concentration spikes were monitored. Runoff concentrations over the course of a storm event at the non-industrial sites followed the traditional "first flush" concept. The highest concentrations for most constituents occurred during the initial storm runoff and then decreased throughout the remainder of the storm. Contaminant concentrations were also generally highest for the first two or three storms of the year and fairly constant thereafter.

SOILS AND GROUNDWATER MONITORING PROGRAM

The USDA field program consisted of sampling of four major components: soils, soil water, groundwater, and plant tissue. Five of the District's recharge basins were monitored: three turfed basins and two unturfed basins that receive imported surface water for recharge during the summer. Several sets of soil samples were collected between the summer of 1981 and the fall of 1983. Water samples were collected first on a bimonthly then on a monthly basis between January 1982 and July 1983. Water samples were collected from the unsaturated zone and at top of the water table underlying each test basin using vacuum soil water extractors.

Soil results showed that the soils in the recharge basins provide a high degree of removal of storm runoff contaminants, thereby protecting groundwater quality. Although there is some evidence of downward movement of some contaminants in the soil, no contamination of the soil water or groundwater has occurred in any of the five basins studied.

Lead and chlordane were the most commonly found contaminants in the surface soils. Lead is a component of gasoline, brake linings, and rubber tires. Chlordane was first introduced as an agricultural pesticide, but currently its use is restricted to subterranean termite control. The surface distribution of lead was determined through a spatial survey of two recharge basins. The highest concentrations of lead occurred at low spots in the basin and close to the basins outfalls.

The recharge of imported irrigation water appears to have a beneficial impact on groundwater quality, although some leaching of basin soils is occurring. There appears to be a correlation between the degree of removal of metals and the proportion of silt plus clay and organic matter in the surface soils.

SYSTEM ANALYSIS

The data collected in the two main elements of the program (USGS runoff monitoring and USDA soils and groundwater monitoring) were integrated, so that pollutants could be traced through the entire system from rainfall to regional groundwater. The system components included rainfall, dry deposition, street particulate material, runoff, basin soils, soil water, and groundwater. Results for lead, specific conductance, calcium, and nitrate were analyzed to demonstrate changes that occur in the runoff/recharge system for different types of constituents.

For example, lead concentrations were fairly low in rainfall and quite high in runoff, indicating lead comes primarily from ground sources. Lead concentrations in the soil water and groundwater underlying the recharge basins were very comparable to background levels found in the regional groundwater. This shows that the soil layer is an excellent mechanism for removing the lead from the percolating runoff water.

A loading analysis was performed to determine if the pollutant loads can be correlated with the amounts of the pollutants present in the basin soils. Although several variables could not be quantified in the loading analysis, the comparison of runoff loads with soils loads provided some general insights. In most cases, the runoff loads corresponded reasonably well to the soil loads. Although in a few cases the data imply that there may be some loss of lead and other constituents from the basin soils to the groundwater, no increase in constituent levels were observed in the groundwater measurements.

IMPACTS OF RUNOFF ON WATER SUPPLY AND RECREATION

The two areas of primary concern in our evaluation of recharge impacts are water supply and recreation. The groundwater to which storm runoff is being recharged is the drinking water supply for the Fresno area. In addition, 13 of the District's recharge basins are turfed and are used for various forms of recreation during the late spring and summer months. The key findings related to these two primary areas of concern are listed below.

1. Water Supply Impacts--Currently, there are no apparent adverse impacts on the groundwater resulting from recharge of urban storm runoff. Of the metals and organic compounds tested, concentrations in the soil water and groundwater underlying the five test basins are well within the drinking water standards established by the Safe Drinking Water Act. Two of the basins tested have been in operation for over 20 years. It is unlikely that continued recharge to basins similar to those tested in this program will cause adverse impacts on the groundwater in the near future. Continued monitoring of the groundwater underlying the recharge basins would detect changes in groundwater quality well in advance of a problem occurring.

   However, one situation where storm recharge could pose a potential threat to the groundwater was not evaluated in this program: a basin serving an area that has a significant amount of industrial development.

We are recommending that additional monitoring be conducted to cover this particular situation.

2. Recreation Impacts--Lead levels, and to a lesser extent chlordane levels, in the surface soils of localized areas in some of the recharge basins exceed the California Department of Health Services (DHS) soil criteria. The primary public health concern for lead is ingestion of soil. The opportunity for soil ingestion in the District's recreational basins is limited, since the recreational basins are entirely turfed with the exception of the baseball diamonds in three basins. These violations of the soil criteria are of concern, but appear to be manageable through management practices. The impact of inhalation of dust particles containing lead was preliminarily assessed and this does not appear to be a problem based on comparison with the lead criterion for worker exposure.

   Although there are no identified health problems associated with current basin operation, the potential for future impacts does exist. Thus, the District should continue to manage and operate the basins in a manner that minimizes the risk to both groundwater quality and recreation.

BEST MANAGEMENT PRACTICES

The current operation of the District's retention/recharge system is the best management practice for stormwater management that has been the focus of this study. The results show that the current system is basically a sound methodology for meeting its two goals: stormwater management and recharge of the groundwater supply. The fact that the system has operated successfully with proven water quality and recreation benefits for over 20 years is a credit to the original design concept.

Since our analysis indicated that there is some potential for future impacts, certain modifications to the District's current procedures are warranted to insure a future which continues to be free of adverse impacts. Basin management practices that have been considered include: providing additional low-flow basins, removing basin soils, modifying pumpout methods, turfing unturfed areas, and long-term monitoring. Two source control measures have also been evaluated: street sweeping and upstream controls at industrial areas.

CONCLUSIONS AND RECOMMENDATIONS

Conclusions from the Fresno NURP project and specific recommendations to improve the retention/recharge system operation are delineated in Chapter 9. Most of the key conclusions have been cited in the previous sections of this summary. Specific recommended management practices are summarized in Table 1-1.

Table 1-1. Recommended Management Practices

1.	Maintain the basic practice of retention and recharge of urban storm runoff subject to certain modifications.
2.[a]	Provide low-flow basins for all recreational basins and evaluate low-flow basins for basins serving industrial areas. Periodically remove solids from the bottom of low-flow basins and from basins serving principally industrial areas.
3.[a]	Remove the portion of the turf and upper soil layer from the recreational basins as necessary.
4.[a]	Monitor soil from unturfed areas in recreational basins and remove as necessary.
5.	Consider having industrial developments contain or pretreat runoff from portions of their site that may contain toxic material.
6.	Have the District work together with other local agencies to be certain that water quality aspects are adequately considered in the review process for future industrial developments.
7.	Develop a management plan to determine the best means of disposing of hazardous soil removed from the basins.
8.	Continue the practice of recharging high quality imported surface water.
9.	Implement a long-term monitoring program of basin soils and groundwater.

[a]The need for soil removal should be based on further soils monitoring and contaminant buildup curves relative to public contact and drinking water standards.

The recommended practices listed in Table 1-1 involve physical improvements to some basins, additional operational measures, and changes in District policy. In the case of some of the recommendations, a detailed course of action cannot be implemented without further research or engineering. Such additional engineering and research needs include: a detailed determination of soil conditions in the recreational basins, a determination of specific runoff quality from existing industrial sites, and a determination of the quality and downstream impacts of runoff water pumped from recharge basins into the irrigation canals. It is also recommended that an evaluation of the engineering design standards for all future storm drainage retention basins be performed. Ongoing monitoring work is recommended in order to develop a continuing record of soil and groundwater conditions, to evaluate some situations not covered by this project, and to assess the effectiveness of recommended control measures.

CHAPTER 2

INTRODUCTION

urban runoff study being conducted in Fresno County of the Nationwide Urban Runoff Program (NURP). This describes the study area, purpose and scope of NURP, the on of Fresno as one of the projects, initial planning for sno NURP project, and the organization of this report.

STUDY AREA

s study deals with recharge of stormwater runoff in the ovis metropolitan area of Fresno County, California. sno-Clovis area is located about 160 miles southeast of ncisco and lies within the highly agricultural San Valley (Figure 2-1). The study area contains over 166 les and includes a population of about 350,000 people.

n the study area, the climate is generally mild and Summers are hot and dry, while winter is marked by temperatures and relatively light precipitation. est daytime highs occur in July and pass 100 degrees fall quickly to night lows of 65 degrees F. Major ement follows the major axis of the valley from st to southeast and humidity is low. The winter ures are mild between infrequent cold periods. The days usually occur in December and January with the aximum over 50 degrees F. and the normal minimums at es F.

study area is subject to winter storms that move on om Pacific low pressure systems, dropping rain in the nd generous amounts of snow at higher elevations in the evada. The Coast Range insulates the valley from the ects of the Pacific Ocean. The rainfall in the valley from north to south. The average annual rainfall in area is about ten inches, falling primarily between nd April.

Topography & Soils

eological composition of the area is characteristic of Joaquin Valley, being comprised of recent aluvium fans sediment deposition from streams flowing from the evada mountains. The vast majority of the geologic ent consists of materials of granitic origin. Both old granitic alluvium, as well as granitic parent rock d. The young alluvium generally consists of deep of silts and sands, while the older deposits are of consolidated and cemented substratums.

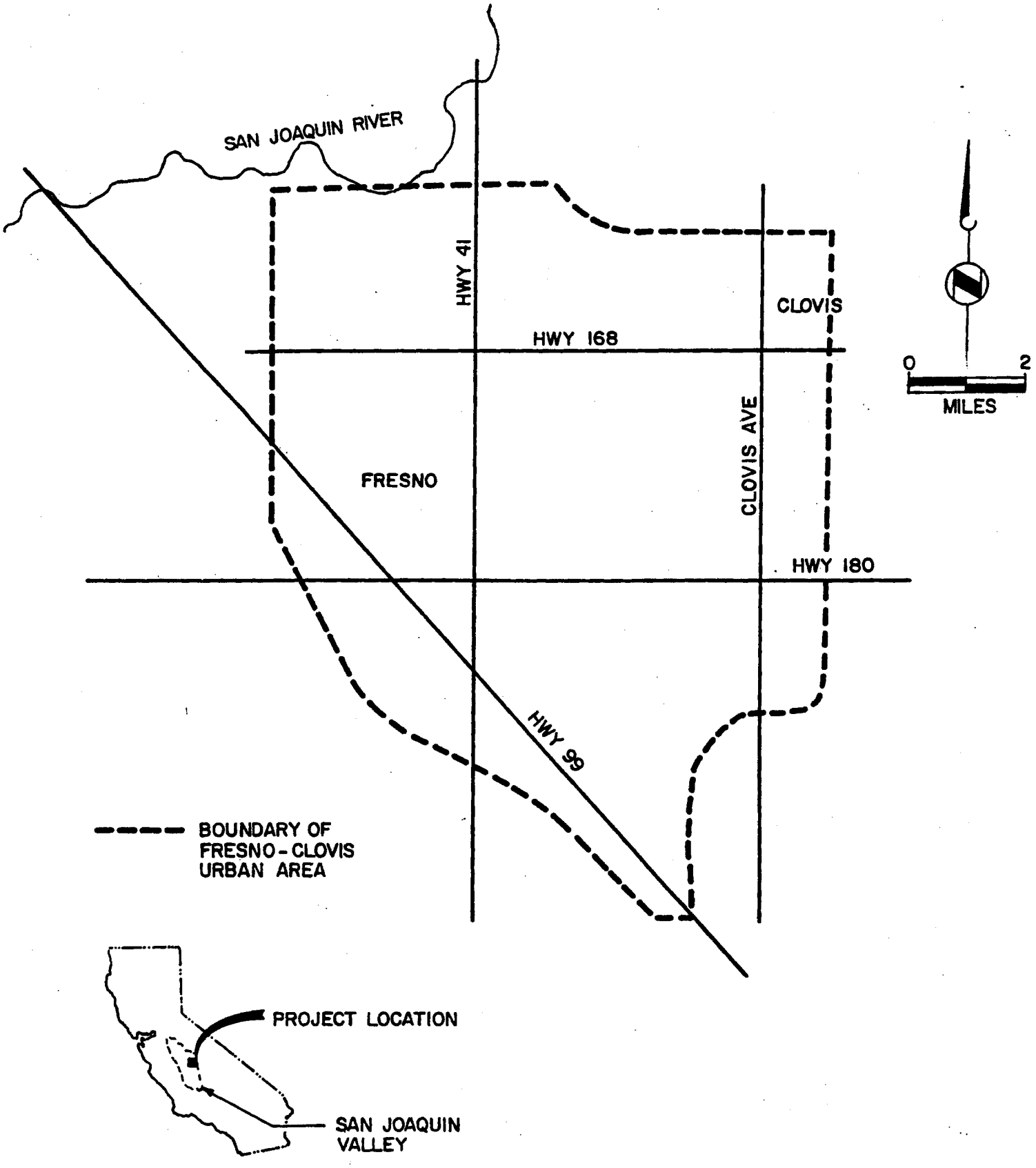


Figure 2-1 Location Map

The topography of the study area is similar to the balance of the San Joaquin Valley, essentially flat with no distinguishable land forms. Only slight changes in elevations occur across the entire study area. Older alluvial terraces east of Fresno develop an undulating relief of rounded hills; while the granitic and metamorphic rocks of the Sierra Nevada foothills develop moderate to steep slopes.

The soils of Fresno County are noted for being among the richest and most productive in the world. Soil types which occur in the vicinity of the study area are generally level, well drained and have a surface layer of loam or sandy loam.

Hydrology and Water Supply

The study area is traversed by several low-elevation streams which drain a portion of the western slope of the Sierra Nevada mountains. The drainage basins of these streams lie between the San Joaquin River on the north and the Kings River on the south. Streamflow in these low-elevation streams is at a very low level during the summer months and increases in the late fall in response to precipitation.

Although surface water (from the Kings and San Joaquin Rivers) is used to meet some of the agricultural water needs of the region, potable water for the metropolitan area is obtained exclusively from groundwater underlying the area. There are hundreds of wells operated by various water purveyors in the area. The aquifer covering the study area is part of the much larger Tulare Lake Basin. Groundwater generally flows from the northeast to the southwest with a large cone of depression in the central area. The water table has gradually dropped over time due to the high degree of groundwater pumping. In 1978, the depth to groundwater ranged from about 40 feet in the southern portion of the urban area to more than 110 feet in the northern portion of the urban area.

The recharge occurring in the storm runoff retention basins serves an important role in mitigating the groundwater overdraft. The basins are used to replenish the groundwater supply through the retention and recharge of the storm runoff itself and through the recharge of high quality imported surface waters delivered to the basins through connections to the irrigation canal system. The use of the basins has become a major water supply management practice which will be expanded as facilities become available as the community continues to grow.

NATIONWIDE URBAN RUNOFF PROGRAM

The water quality effects of nonpoint sources in general, and urban runoff in particular, were recognized by PL 92-500, the Water Pollution Control Act Amendments of 1972. An

assessment of urban runoff was included as a study element in 93 of the Section 208 Areawide Waste Management Plans being conducted across the nation. In 1978, the U.S. Environmental Protection Agency (EPA) reviewed the results of these 208 urban runoff evaluations and determined that additional, consistent data were needed to obtain an adequate understanding of the pollution effects of urban runoff. In response, EPA initiated NURP to build upon pertinent prior work, to provide additional practical information and to create a basis for future policy and program development and implementation. The five-year program is intended to answer three broad questions:

1. To what extent is urban runoff a contributor to water quality problems across the nation?
2. What is the effectiveness of controls, short of treatment, in reducing water quality problems where they exist?
3. Are best management practices for control of urban runoff cost-effective in comparison to alternative options?

NURP consists of 28 projects at locations distributed throughout the country (Table 2-1). It represents a federal commitment of nearly $20 million, together with local resources amounting to an additional $7.5 million. The NURP projects are being managed by either state, county, city, or regional governments. The Water Planning Division of EPA in Washington, D.C. has coordination responsibility for the individual projects and provides technical assistance. EPA is utilizing the data from the projects to prepare a national assessment of urban runoff. EPA completed a final draft of their final report in September 1983.

Table 2-1. Nationwide Urban Runoff Program Project Locations

1. Durham, New Hampshire	15. Ann Arbor, Michigan
2. Lake Quinsigamond, Massachusetts	16. Champaign-Urbana, Illinois
3. Mystic River, Massachusetts	17. Chicago, Illinois
4. Long Island, New York	18. Milawukee, Wisconsin
5. Lake George, New York	19. Austin, Texas
6. Irondequoit Bay, New York	20. Little Rock, Arkansas
7. Metro Washington, D.C.	21. Kansas City, Kansas
8. Baltimore, Maryland	22. Denver, Colorado
9. Myrtle Beach, South Carolina	23. Salt Lake City, Utah
10. Winston-Salem, North Carolina	24. Rapid City, South Dakota
11. Tampa, Florida	25. Castro Valley, California
12. Knoxville, Tennessee	26. Fresno, California
13. Lansing, Michigan	27. Bellevue, Washington
14. Oakland County, Michigan	28. Eugene, Oregon

PROJECT SELECTION

NURP projects were selected from among the original 93 areawide agencies that had identified urban runoff as one of their significant problems. The selection criteria used to screen the agencies included: existence of a water quality problem, type of receiving water, hydrologic characteristics, urban characteristics, and beneficial use of the receiving water. An effort was made to select projects which collectively represented a wide range of characteristics. EPA utilized a matrix analysis to be sure that all of the major types of urban runoff situations were covered by at least one project.

The Fresno-Clovis metropolitan area was selected as one of the NURP projects for several reasons:

1. The receiving water for urban runoff in the Fresno-Clovis area is the groundwater. Only one other NURP project (Long Island, New York) is addressing impacts on groundwater.

2. The groundwater reservoir underlying the Fresno-Clovis area has been designated by EPA as a sole source aquifer. The potential for degradation of such a reservoir is a matter of significant importance to the local community.

3. The Fresno project can demonstrate the effectiveness of a specific best management practice, i.e., the total retention and recharge of urban storm runoff. This practice has potential application in a number of other locations. For example, many communities rely on groundwater as the principal source of their drinking water supply. Data from the Fresno project will be directly applicable to those communities who are considering or practicing retention and recharge of urban runoff.

INITIAL PLANNING

Because of the sole reliance on groundwater as a water supply for the Fresno-Clovis area, water quality protection has been an important matter for local authorities. Groundwater-related issues have been the subject of a number of studies.

The 208 Water Management Plan for the Fresno-Clovis area evaluated water quantity and water quality issues. The plan identified some existing groundwater quality problems in

specific areas, including high nitrate, hardness, salinity, and chloride levels. A number of potential pollution sources were also identified: industrial wastes, septic tanks, agricultural nonpoint sources, and storm runoff. Storm runoff was included as a potential pollution source because by design, virtually all storm runoff in the metropolitan area is recharged to the groundwater aquifer. There are no significant watercourses passing through the area to which storm runoff can be discharged. Thus, the Fresno Metropolitan Flood Control District (District) has developed a system of retention/recharge basins to handle runoff during storm periods. Presently, there are over 1,000 acres of basins. Trace elements and organic chemicals were considered to be the largest sources of pollution in storm runoff. Although domestic supply wells in the urban area had generally shown no noticeable impact resulting from recharge of urban storm runoff, the 208 plan indicated that there was a need for more comprehensive monitoring in the vicinity of the recharge basins. More specifically, the Interim Best Management Plan of June 1979 recommended that the District develop a monitoring program to determine the impact of stormwater recharge on groundwater.

Detailed planning for a monitoring program was initiated in mid-1979. Discussions were held with EPA officials about including such a study for Fresno in NURP. With assistance from various water quality experts, the District prepared a work plan entitled "Determination of Potential Adverse Environmental Impacts Associated with the Retention and Recharge of Urban Storm Runoff". The work plan was originally submitted to EPA and the State Water Resources Control Board (State Board) in October 1979 and was revised in November 1979. EPA conditionally approved the work plan in December 1979, subject to certain modifications to the proposed program. A 208 grant of $796,000 was authorized for the three-year study.

Data gathering was scheduled to begin in the fall of 1980. However, due to the late entry of the State of California into the project, the time required to prepare and execute contracts, make funding arrangements, and refine work plans to the satisfaction of all participants was much greater than anticipated. The transfer of the 208 program authority from EPA to the State Board further complicated contract arrangements. The Technical Advisory Resource Group met in March and October 1980 to review the work plan and to discuss monitoring program details such as sampling sites and procedures. The master contract among the State Board, County of Fresno, and the District, and the individual contracts between the District, the U.S. Department of Agriculture (USDA) and the U.S. Geological Survey (USGS), were not executed until the spring of 1981, although these contracts were all technically effective October 31, 1980.

Because of the time needed to finalize contract arrangements and the subsequent time needed to obtain and calibrate equipment, the monitoring program was delayed about one year from the original work plan. USDA began their monitoring work in July 1981 and USGS initiated monitoring in October 1981. The delays in initiating the monitoring program created corresponding delays throughout the entire project, although efforts were continually made to complete the project within the "contract limits". The schedule of the various elements included in the monitoring program is contained in Chapter 3.

REPORT ORGANIZATION

The Fresno NURP project has had extensive reporting requirements. A series of 12 quarterly reports were prepared over the course of the project. The quarterly reports summarized work progress to date, provided preliminary conclusions, identified problems, and compiled data. Two annual reports were prepared. The First Annual Report (October 1982) served primarily as a vehicle for defining changes in the study design for the second year of monitoring and for reporting early runoff quality data. The Second Annual Report (September 1983) summarized most of the data collected in the monitoring program and made an initial assessment of the impacts of recharging urban runoff.

Both USGS and USDA have prepared individual project reports covering their portion of the study. USDA and USGS issued their draft reports in September 1983 and November 1983, respectively. These reports, together with supporting appendices, contain the complete data tabulations and statistical analysis for the project.

This final report for the Fresno NURP project is intended to be a comprehensive report in that it contains the key features of the previous reports. However, because of the large amount of data collected in this program, data are generally presented in summary form in this report. For example, maximum, minimum, and median values are often reported for a particular data set rather than tabulating individual data points. The complete data tabulation is contained in the USGS and USDA final reports, appendices, and quarterly reports. In addition, most of the USGS data can be accessed from WATSTORE, their data management system.

This final report contains a total of nine chapters. Chapter 1 is a summary of the key points of each of the following chapters. Chapter 2 provides background information on the project, and Chapter 3 describes the project objectives and approach. The results of the USGS runoff monitoring program

and the USDA soils and groundwater monitoring program are contained in Chapters 4 and 5, respectively. Chapter 6 is a system overview of the key results from the USGS and USDA programs. Chapter 7 is an assessment of the impacts of recharging urban storm runoff. Chapter 8 analyzes various management practices that can be implemented to minimize adverse environmental impacts. Specific conclusions and recommendations are identified in Chapter 9.

CHAPTER 3

OBJECTIVES AND APPROACH

The work plan for the Fresno Nationwide Urban Runoff Program (NURP) project (October 1979) set forth the objectives and general approach for the study. These objectives and the specific tasks required to meet these objectives have subsequently been refined and described in more detail by the Fresno Metropolitan Flood Control District (District) staff and their subcontractors. This chapter presents the objectives, organization, scope of work, and schedule for the Fresno NURP project. A brief description of the District's retention/recharge system is initially presented so the objectives of the project can be beter understood.

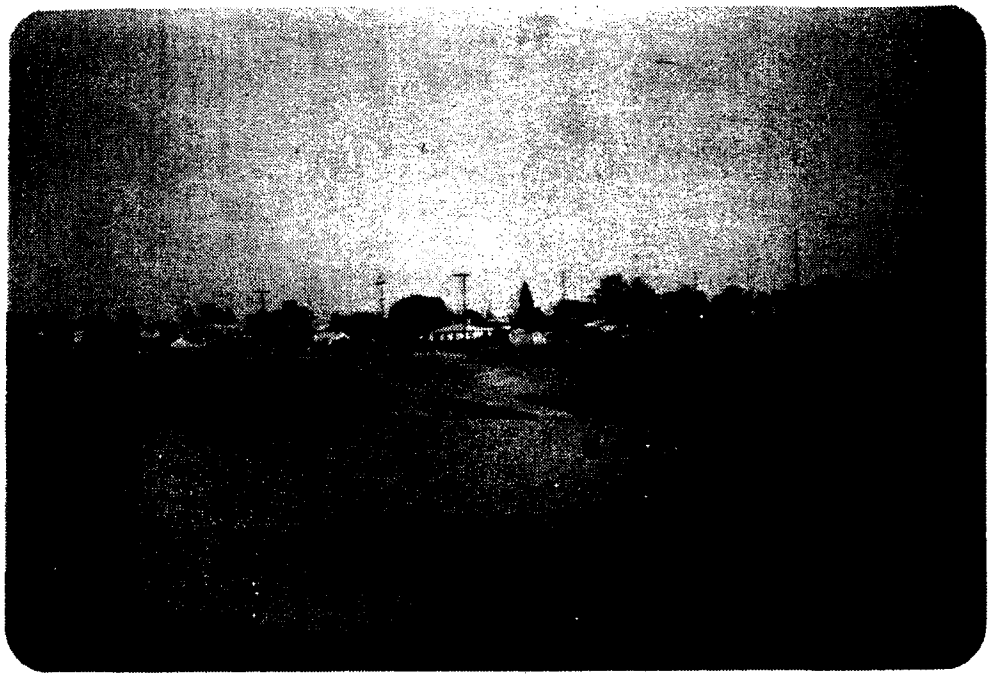
RETENTION/RECHARGE SYSTEM

Stormwater management in the Fresno metropolitan area is complicated by the fact that there are no significant watercourses passing through the area to which storm runoff can be discharged. Therefore, the District has developed a system of retention/recharge basins to handle runoff during storm periods. The system has a dual-purpose: it serves urban drainage needs and at the same time recharges the groundwater aquifer, which is the sole water supply for the region.

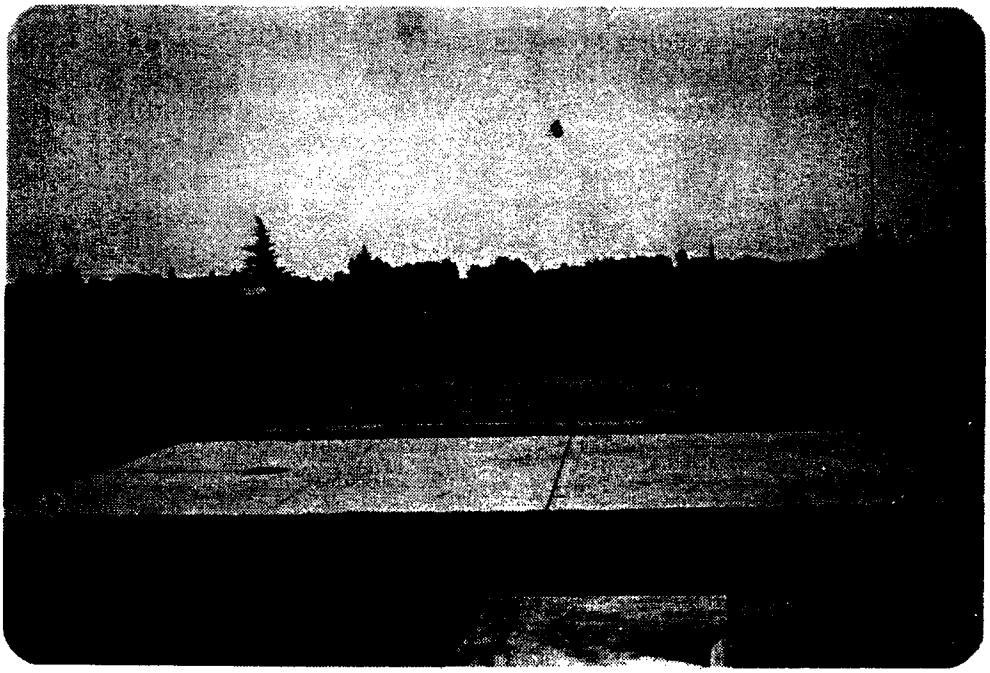
The District currently has a total of 86 recharge basins of which 74 are completed or are in various stages of excavation (Figure 3-1). The basins have a total area of over 1,000 acres. Fourteen of the basins are turfed or partially turfed, with 13 of these used for recreation during the dry weather season. Three of the turfed basins have improved baseball diamonds (Figure 3-1), while the other turfed basins are used for soccer and passive recreation. In order to maximize the recharge of the groundwater aquifer, a number of the basins receive irrigation water for recharge during the summer. Irrigation water is diverted into these basins from the canal system that passes through the Fresno area.

OBJECTIVES

The Fresno NURP project was developed because of the District's recognition that urban storm runoff recharged to the groundwater represented a potential source of pollution. Thus,



UNTURFED BASIN USED FOR RECHARGE OF STORM RUNOFF AND IMPORTED SURFACE WATER BASIN EE



MULTIPLE USE BASIN WITH BASEBALL DIAMOND BASIN B/E

Figure 3-1 Photographs of Recharge Basins

the major objective of the project is to determine the environmental impacts of the current practice of retention and recharge of urban storm runoff. The subobjectives of the project are described below and their interrelationships are graphically shown on Figure 3-2.

The first subobjective is to characterize the chemical composition of runoff, soils, and groundwater. Before any conclusions can be drawn about the potential impacts of recharge, the water quality of the urban runoff that occurs during storm events must be clearly defined. The physical and chemical properties of the runoff have been evaluated, with particular emphasis on toxic pollutants, such as metals and pesticides. The runoff percolates down through the soils and eventually reaches the water table which is generally located about 100 feet below the ground surface. Some compounds are altered or partially removed as a result of various physical, chemical, and biochemical processes occurring in the soil. Thus, it is necessary to determine the chemistry of the soils, as well as the quality of the water located in the unsaturated zone above the water table. Finally, measurements need to be made of the groundwater itself.

The second subobjective is to determine whether there is currently or there is a future potential for adverse impacts associated with the recharge of urban runoff. The primary issue of concern is protection of the area's groundwater supply. A secondary concern is the potential for impacts on recreational use that occurs in some of the recharge basins during non-winter periods; for example, does a potential hazard exist when dust is stirred up on the basin baseball diamonds and is inhaled or when basin soil is ingested by a child?

The third subobjective is to identify and evaluate management practices that can be used to alleviate adverse impacts, if any are found to exist. Management practices will fall into two categories:

1. Changes in the way the recharge basins are designed and operated to minimize impacts.

2. Source controls to change the quality of runoff before it reaches the basins.

ORGANIZATION

Several organizations have been involved in the Fresno NURP project (Figure 3-3). The project is part of a nationwide program initiated by the U.S. Environmental Protection Agency (EPA). EPA has provided a 208 grant, which is one of the

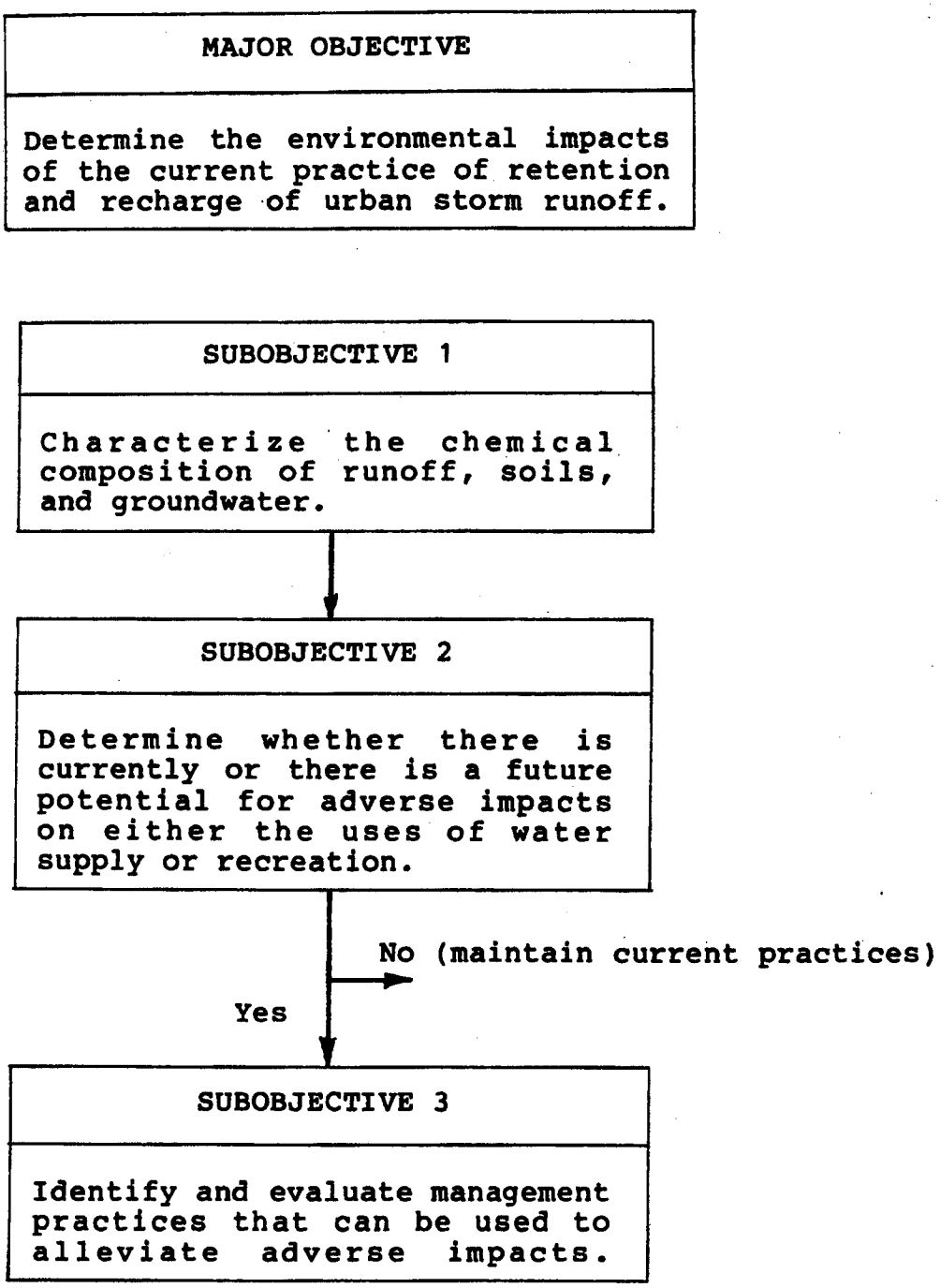


Figure 3-2. Objectives of Fresno Nationwide Urban Runoff Program Project

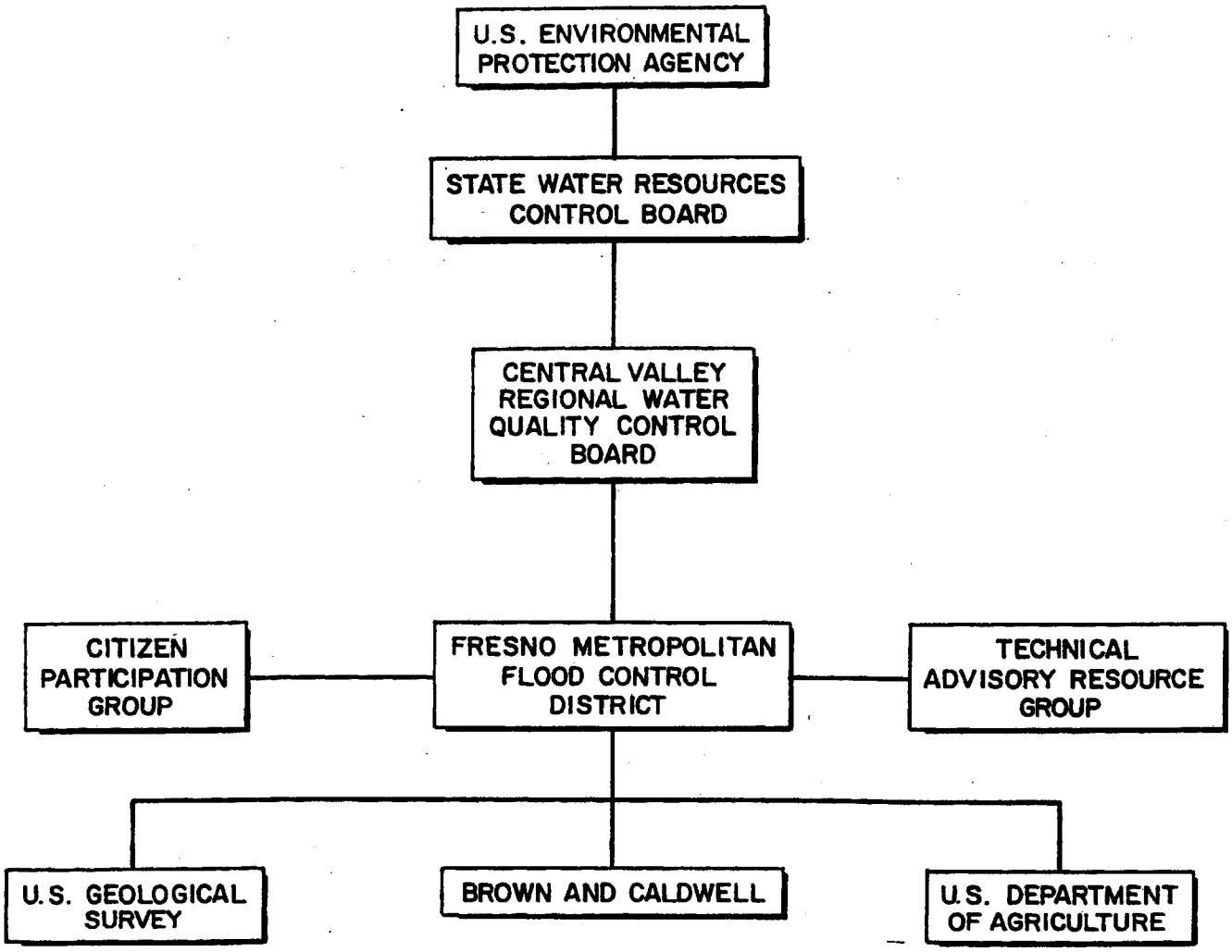


Figure 3-3 Organization Chart for Fresno NURP Project

primary sources of funding for the study. The District provided the remainder of the direct funding, and in-kind services were provided by several other agencies. EPA has delegated contract administration responsibilities for the project to the California State Water Resources Control Board. These duties are actually carried out through the Central Valley Regional Water Quality Control Board in Fresno. The project has been directed by the District. The District utilized three primary subcontractors: U.S. Geological Survey (USGS), U.S. Department of Agriculture (USDA), and Brown and Caldwell Consulting Engineers. USGS conducted the runoff monitoring program. The Water Management Research Unit of the USDA conducted the soils and groundwater monitoring program. Brown and Caldwell assisted the District in coordinating the program, was responsible for preparation of the interim and final reports, and conducted portions of the laboratory work.

Two advisory groups have been organized for the project. The Citizen Participation Group consists of about 20 individuals from the community who have an interest in groundwater quality and management practices that could be instituted. The Citizen Participation Group has met several times over the course of the study to review work progress and to assist in the finalization of study recommendations. The Technical Advisory Resource Group consists of technical representatives from various local and state governmental agencies. The Technical Group was formed in early 1980 after the project work plan had been approved. The Technical Group reviewed the work plan, project design, testing locations and criteria, and data station design at the outset of the project and has reviewed study reports and provided technical guidance throughout the study.

SCOPE OF WORK AND SCHEDULE

The Fresno NURP project has been conducted over a three-year period. The project was fully authorized in early 1981, and the bulk of the field work was completed in the fall of 1983. Major elements of the project and their individual schedules are shown on Figure 3-4 and are briefly described below.

U.S. Geological Survey Work

The main objective of the USGS work was to characterize the quality of urban storm runoff from various land uses. USGS conducted all of the aboveground sampling, which consisted of samples of storm runoff, rainfall, dry deposition (dust fall), and material from street surfaces. Samples were collected from drainage areas that represent four different types of land use: industrial, commercial, multiple-family residential, and single-family residential.

Data were collected during two wet weather seasons (1981-82 and 1982-83). The results of the USGS work are summarized in Chapter 4 of this report. A complete discussion of the USGS results is included in the USGS project report. A draft of the USGS report was issued in November 1983, and the report is in the process of being finalized.

U.S. Department of Agriculture Work

The two main objectives of the USDA work were: (1) determine the physical, chemical, hydraulic, and biological properties of the soils that could influence the rate of percolation (recharge) and the deposition of runoff pollutants on or within the soils and (2) determine the quality of water in the soil and in the groundwater underlying each test basin. As shown on Figure 3-4, the USDA data collection work consisted of four main sampling components: soils, soil water, groundwater, and plant tissue. Five recharge basins were sampled.

Soils samples were collected in 1981, 1982, and 1983. Water sampling covered a 19-month period from January 1982 through July 1983. The results of the USDA work are summarized in Chapter 5 of this report. A complete discussion of the USDA results is included in the final USDA project report completed in September 1983.

Brown and Caldwell Work

Brown and Caldwell has been responsible for preparing interim reports and the overall final report for the project. Interim reports have been prepared quarterly and incorporate the quarterly technical reports submitted by USGS and USDA. The quarterly reports were also intended to summarize work progress to date, provide preliminary conclusions, and identify problems. Twelve quarterly reports were prepared; the first five were prepared by the District staff. Brown and Caldwell prepared the First and Second Annual Reports which were completed in October 1982 and September 1983, respectively. Brown and Caldwell also conducted the laboratory testing for metals and organics on soils and ground water samples.

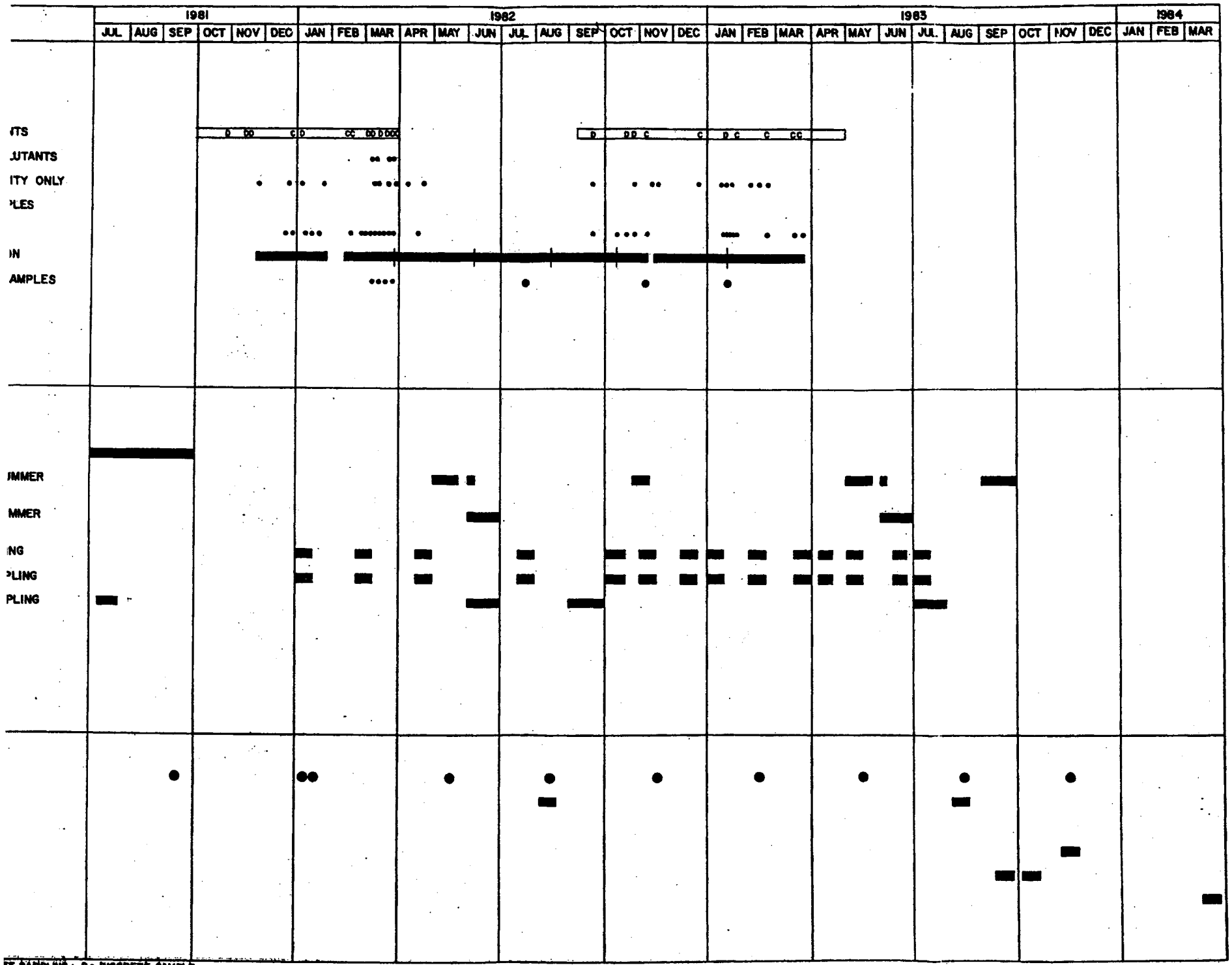


Figure 3-4 Data Collection and Report Status (As of March 1984)

CHAPTER 4

RUNOFF MONITORING PROGRAM

During the Fresno Nationwide Urban Runoff Program (NURP) project, a major effort was made to gather data on the quality and quantity of storm runoff, rainfall, and dry deposition. An extensive sampling program was conducted by the U.S. Geological Survey (USGS). The program, the data gathered by the USGS, and an analysis of the data are described in this chapter.

DESCRIPTION OF MONITORING PROGRAM

Extensive data were collected on the quantity and quality of storm runoff and rainfall and the quality of dry deposition and street particulate material. The USGS also collected a limited amount of data on the quality of dry weather runoff. Several runoff samples collected by USGS in 1982 were analyzed for the priority pollutants by the U.S. Environmental Protection Agency (EPA). The U.S. Department of Agriculture (USDA) collected data on the quality of summer recharge water, in addition to the soils, soil water, and groundwater data described in Chapter 5. Figure 4-1 shows the location of the USGS and USDA sampling sites. A wide range of water quality constituents were measured by USGS. Data were collected on the concentrations of conventional constituents such as nutrients, solids, and major ions; metals; and organic pesticides. A complete list of the constituents measured by USGS is presented in Appendix B. Samples were collected at one location from four land use types (single-family residential, multiple-family residential, commercial, and industrial) to characterize the pollutant concentrations and loads from these typical land uses in the Fresno area. The characteristics of the drainage areas sampled by USGS are presented in Table 4-1. The runoff coefficients for each drainage area are also shown in Table 4-1. The runoff coefficients were calculated for each storm by dividing the amount of runoff at the sampling points by the amount of precipitation that fell on the drainage area. The arithmetic average coefficients were determined by calculating the average of all storms. The average coefficients were also calculated by weighting each storm's runoff coefficient by the amount of runoff that occurred. Using this method, a storm with a large volume of runoff received more weight than a low-volume storm. These coefficients are used later in this chapter. It should be noted that the runoff coefficients for the industrial area are quite low since the street system and drainage system for this particular area are not complete.

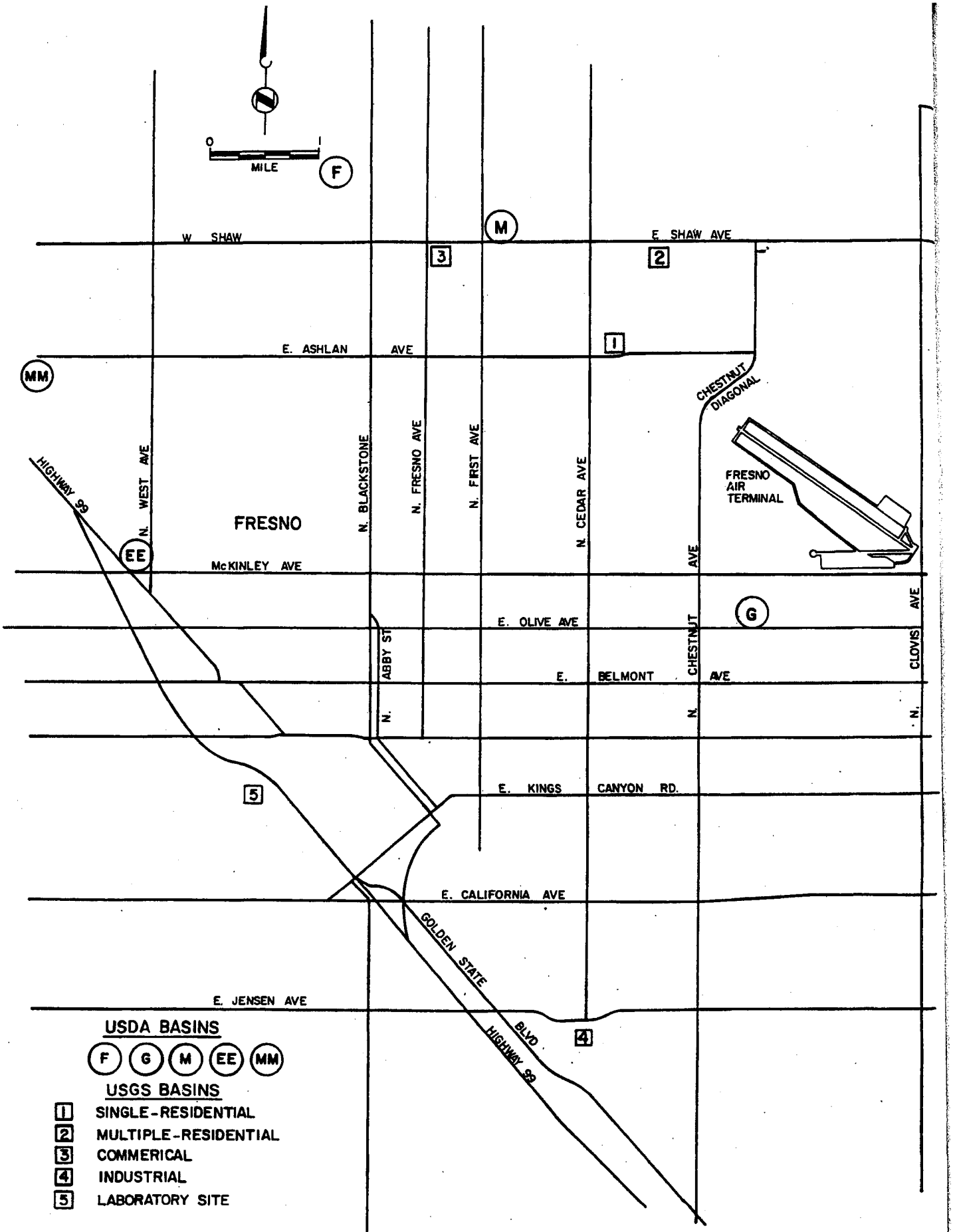


Figure 4-1 Location of Sampling Sites

Table 4-1. Key Characteristics of USGS Drainage Areas

Characteristic	Land use			
	Single-family residential	Multiple-family residential	Commercial	Industrial
Drainage area, square miles	0.15	0.07	0.09	0.43
Land use, percent of drainage area				
Low-density residential	9.0	0	0	0
Medium-density residential	87.3	0	0	0
High-density residential	0	87.0	0	0
Commercial	0	0	100	0
Industrial	0	0	0	65.8
Idle or vacant	3.7	13.0	0	34.2
Population density, persons/square mile	7,700	16,400	0	0
Runoff coefficient				
Arithmetic average				
1981-82	0.19	0.29	0.93	0.18
1982-83	0.21	0.51	—	0.16
Both years	0.21	0.39	0.93	0.18
Flow-weighted average				
1981-82	0.22	0.38	1.05	0.24
1982-83	0.25	0.69	—	0.23

Detailed descriptions of the sampling programs are contained in reports prepared by USGS and USDA. The programs are summarized in this section.

Rainfall

The rainfall monitoring program was initiated in December 1981 and continued through March 1983. Eight samples were analyzed from each of the single-family residential and industrial sites in the 1981-82 rain season. During the 1982-83 rain season, eight samples were analyzed from three sites: the single-family residential and industrial sites and an additional site at the project laboratory. The laboratory site

was established for additional data to determine if the single-family residential site rainfall quality was affected by its proximity to the flight path from the Fresno Airport, and if the industrial site quality was influenced by the adjacent environment. If these concerns were valid, data from the laboratory site might provide data more representative of the rainfall quality for the majority of the Fresno urban area. The samples were analyzed for nutrients, major ions, pesticides, and heavy metals. The rainfall and dry deposition samples were collected with a wet/dry sampler which allows collection of rain samples and dry fallout samples in separate buckets. A lid that is activated by a precipitation sensor moves to cover the "dry" collection bucket during storms. The "wet" bucket is covered between storms. Chemical analyses were conducted separately on the two kinds of samples.

Storm Runoff

The storm runoff sampling program was started in October 1981 and continued through March 1983. Samples were collected from the four land use types and analyzed for numerous physical, inorganic, organic, and biological constituents. During the first year of the sampling program, 16 storms were sampled. Flow-weighted composite samples were collected during 5 of the 16 storms. During the other 11 storms, discrete grab samples were collected and analyzed. The number of samples collected varied from storm to storm, but generally about 5 samples were collected. Flow, pH, and specific conductance were measured during an additional 18 storms. During the second year of the program, 11 storms were sampled. Composite samples were collected during 6 of the 11 storms and discrete samples were collected during the other 5 storms. Flow, pH, and specific conductance were measured during an additional 21 storms.

Dry Deposition

Dry deposition samples were collected at the single-family residential and industrial sites and routinely analyzed for nutrients, major ions, and lead. During the second year of the sampling program, the samples were also analyzed for other metals and one sample was analyzed for pesticides. A total of 19 samples were analyzed between November 1981 and March 1983.

Street Particulate Material

The street particulate data program was conducted between March 1982 and January 1983. Six samples were collected from the commercial site and five samples were collected from the other three sites. All of the streets in each of the four drainage areas were divided into 200-foot sections. Each section was assigned to a category as follows:

A--Residential Street
B--Intersection
C--Major Street

The entire street area in each drainage zone was broken into these three categories to determine the number of sections in each drainage zone. A total of 20 to 25 sections were sampled in each land use drainage area. The number of sections sampled in each of the three categories was based on the relative proportion of the number of sections in a particular category to the total number of sections in the drainage area. A commercial vacuum cleaner was used to collect a sample by vacuuming a 6-inch strip across the street from one curb to the other curb. The samples from the 20 to 25 sites in each drainage area were composited to produce one sample for analysis. The samples were analyzed for major ions, nutrients, metals, and organics.

Dry Weather Runoff

During August and September 1982, stage records of dry weather runoff were periodically collected at the two residential sites to estimate the "nuisance" runoff volume (i.e., runoff from lawn irrigation, car washing, and other activities during the summer months). Grab samples were collected from the residential sites on September 3, 1982, and analyzed for physical constituents, nutrients, major ions, metals, and pesticides.

Imported Recharge Water

Canal water from Fresno Irrigation District is used as recharge water in Basins MM and EE during the summer months. The USDA collected a limited amount of data on the quality of this recharge water during the summer of 1982. Samples were collected 24 times between June 22 and September 27, 1982, and analyzed for specific conductance, turbidity, and suspended solids. An additional sample was collected on July 15, 1982, and analyzed for specific conductance, pH, major ions, and nitrate. One sample was analyzed for metals and organics.

EPA Metals and Organics

EPA conducted two studies as part of the NURP project, using runoff samples collected by USGS during some of the storms.

1. Special Metals Project--EPA contract laboratories analyzed two grab samples from each of the four land use sites during a storm on January 4, 1982. The samples were analyzed for 29 metals. Total, total recoverable, and dissolved fractions were measured.

2. Priority Pollutant Sampling Program--EPA contract laboratories analyzed samples from each of the four land use sites collected by USGS during four storms during March 1982. The samples were analyzed for all of the 129 priority pollutants except asbestos.

RESULTS

A summary of the results of the runoff monitoring program is presented in this section. A detailed discussion of the data is contained in the USGS project report. Table 4-2 presents a summary of the metals and organics data. The table indicates if each constituent was detected in precipitation, dry deposition, street particulate material, and storm runoff. The conventional constituents (nutrients, major ions, physical parameters) are not shown in the table because they were detected in each component of the study. The conventional constituents are identified later in this chapter. The metals were generally detected in all four components of the study. Lindane, chlordane, DDE, diazinon, and malathion were detected in all four components. Most of the organics listed in Table 4-2 were detected in runoff. Many were detected in rainfall and street particulates. Most of the organics were not detected in dry deposition. The data collected for each of the study components are presented in this section. The USGS collected an extensive amount of data on a great number of constituents. All of the data are not presented in this section. Data are presented on the constituents that are most important in terms of the potential for contamination of the water supply and the potential for health hazards associated with recreational activities within the basins.

Storm Characteristics

There was a total of 123 storms in the Fresno area during the rain seasons (September to April) of 1981-82 and 1982-83. Seventy-eight storms produced 0.10 inch or more of rain. According to the 104-year rainfall record collected by the National Weather Service, the average annual rainfall at the Fresno Air Terminal is 10.24 inches with 9.84 inches falling between September and April. During the study period, the rainfall was 110 percent of normal (10.79 inches) for the 1981-82 rain season and 240 percent of normal (23.56 inches) in the 1982-83 rain season. Information on the storm sampling program is presented in Table 4-3.

Multiple-linear regression was used to develop relationships between rainfall and the amount of runoff. The total amount

Table 4-2. Metals and Organics Detected in Fresno NURP Project

Constituent	Component[a]			Runoff
	Rainfall	Dry deposition	Street particulates	
Priority pollutant metals				
Antimony	-	-	-	X
Arsenic	O	X	X	X
Beryllium	X	-	-	-
Cadmium	-	-	X	X
Chromium	X	X	X	X
Copper	X	X	X	X
Cyanide	-	-	-	X
Lead	X	X	X	X
Mercury	X	X	O	X
Nickel	X	X	X	X
Zinc	X	X	X	X
Other metals				
Aluminum	X	X	X	X
Barium	X	-	-	X
Boron	-	-	-	X
Cobalt	-	-	-	X
Iron	X	X	X	X
Lithium	X	-	-	X
Manganese	X	X	X	X
Molybdenum	-	-	-	X
Strontium	X	-	-	X
Titanium	-	-	-	X
Vanadium	-	-	-	X

Constituent	Component[a]			Runoff
	Rainfall	Dry deposition	Street Particulates	
Priority pollutant organics[b]				
Aldrin	O	O	O	X
Anthracene	-	-	-	X
Benzo(a) pyrene	-	-	-	X
Benzo(b) fluoranthene	-	-	-	X
α-BHC	-	-	-	X
γ-BHC (lindane)	X	X	X	X
Butyl benzyl phthalate	-	-	-	X
Chlordane	X	X	X	X
Chrysene	-	-	-	X
DDD	O	O	X	O
DDE	X	X	X	X
DDT	O	O	X	X
Dieldrin	X	O	X	X
Di-n-octyl phthalate	-	-	-	X
Endosulfan	X	O	X	X
Endrin	O	O	O	X
Fluoranthene	-	-	-	X
Heptachlor	O	O	X	X
Heptachlor epoxide	O	O	X	X
4-nitrophenol	-	-	-	X
Total PCB	X	O	X	X
Pentachlorophenol	-	-	-	X
Phenol	X	-	-	X
Pyrene	-	-	-	X
Other organics[c]				
Diazinon	X	X	X	X
Dibromochloropropane	-	-	-	X
Ethion	X	O	O	O
Malathion	X	X	X	X
Methoxychlor	X	X	O	X
Methyl parathion	X	O	O	X
Parathion	X	O	X	X
Silvex	O	O	-	X
Trithion	O	O	X	X
2,4-D	X	O	O	X

[a]Table symbols : X indicates detected; O indicates not detected; - indicates not measured.
[b]The runoff samples were analyzed for the complete list of priority pollutants. Those pollutants not listed in the table were not detected in any of the samples.
[c]The samples were analyzed for the following additional organics but concentrations were always less than the analytical detection limit: perthane, methomyl, propham, polychlorinated napthalenes, 2,4,5-T, sevin, mirex, methyl trithion, and 2,4-DP.

Table 4-3. Storm Summary

Storm characteristic	Rain season[a]		
	1981-82	1982-83	Total
Amount of rain, inches			
Produced by storms ≥0.1 inch	10.3	19.95	30.25
Produced by storms <0.1 inch	0.49	3.61	4.10
Total	10.79	23.56	34.35
Number of storms			
Storms ≥0.1 inch	34	44	78
Storms <0.1 inch	22	23	45
Total	56	67	123
Number of storms sampled			
Storms ≥0.1 inch			
All constituents			
Runoff	15	8	23
Rain	13	16	29
Specific conductance and pH			
Runoff	12	18	30
Rain	5	8	13
Storms <0.1 inch			
All constituents			
Runoff	1	3	4
Rain	0	1	1
Specific conductance and pH			
Runoff	6	3	9
Rain	0	0	0
Total			
Runoff	34	32	66
Rain	18	25	43

[a]Does ... storms which occurred between May and August of the ...

of rainfall in each storm, the number of dry hours since the last storm, and the maximum 20-minute rainfall intensity were regressed against the amount of runoff in each land use drainage area. The total amount of rainfall for each storm was the only significant variable at the 0.05 level for the commercial site. All three variables were significant for the multiple-family residential site. The total amount of rainfall and the number of dry hours since the last storm were significant for the single-family residential and industrial sites. The total amount of rainfall was probably the only significant variable at the commercial site because the drainage area is 98.9 percent impervious. There are no large areas of exposed soil where runoff can vary with the degree of soil saturation and infiltration rate. If the number of hours since the last storm is a significant variable, it indicates that there are exposed soil areas in the drainage area that must reach saturation before runoff occurs. If the maximum 20-minute rainfall intensity is a significant variable, it indicates that the drainage area soils have a high infiltration rate, and the rainfall rate must exceed the infiltration rate before runoff occurs from these pervious soil areas.

The rainfall-runoff coefficients were determined for each storm by dividing the runoff volume by the rainfall volume falling on the drainage area. The average rainfall-runoff coefficients for each drainage area during the study period are listed in Table 4-1.

Rainfall

Rainfall quality samples were collected during 18 storms in the 1981-82 season and 25 storms in the 1982-83 season. During 30 of these storms, the samples were analyzed for all of the constituents. During the remaining 13 storms, only specific conductance and pH were measured.

Conventional Constituents. Table 4-4 presents the ranges and mean concentrations of conventional constituents at the three sampling sites (single-family residential, industrial, and laboratory). Conventional refers to those constituents which are not metals or organics and consist of physical properties, cations, and anions. The data show that the rainfall quality was generally similar at the three stations. The concentrations of most constituents were lowest at the single-family residential and laboratory sites and highest at the industrial site. Statistical testing conducted by USGS showed that there were statistically significant differences at the 0.05 level in the concentrations of dissolved ammonia and pH between the single-family residential and industrial sites. The differences could be due to the discharge of industrial plant emissions into the atmosphere near the sampling site. The statistical

testing showed that there were no differences at the 0.05 significance level in constituent concentrations at the single-family residential site between the two rain seasons. At the industrial site, only dissolved phosphorus and dissolved organic carbon were significantly different in the two rain seasons.

Table 4-4. Ranges and Mean Concentrations of Conventional Constituents in Rainfall

Constituent	Units	Concentration								
		Single-family residential			Industrial			Laboratory		
		N[a]	Range	Mean	N[a]	Range	Mean	N[a]	Range	Mean
Specific conductance	umhos/cm	32	2.4-57	13.8	36	3.0-52	13.9	16	4.0-30	11.8
pH	standard units	33	4.7-7.7	5.9	37	5.0-7.7	6.4	16	4.7-7.4	6.0
Alkalinity	mg/l as $CaCO_3$	16	3.0-9.0	7.2	15	4.0-10.0	7.5	3	5.0-7.0	6.3
COD	mg/l	15	7.0-30	14.5	14	<10-27	16	5	<10-23	16.4
Dissolved nitrogen	mg/l as N	10	0.4-10	2.0	10	5.0-7.7	6.4	6	0.7-2.6	1.3
Dissolved organic nitrogen	mg/l as N	10	0.1-0.99	0.43	9	0.08-2.7	0.70	4	0.1-0.74	0.49
Dissolved ammonia	mg/l as N	13	0.1-0.74	0.37	12	0.19-1.3	0.70	7	0.2-0.76	0.46
Dissolved nitrite	mg/l as N	13	<0.02-0.04	0.02	12	<0.02-0.04	0.02	7	<0.02-0.05	0.02
Dissolved nitrate + nitrite	mg/l as N	16	<0.01-0.60	0.22	15	<0.09-0.96	0.25	8	<0.1-0.56	0.23
Dissolved phosphorus	mg/l as P	16	<0.01-0.14	0.03	15	0.01-0.26	0.08	7	<0.01-0.04	0.02
Dissolved orthophorphorus	mg/l as P	13	<0.01-0.04	0.01	12	<0.01-0.06	0.02	8	<0.01-0.07	0.02
Dissolved organic carbon	mg/l	13	2.1-6.2	3.6	14	0.3-6.2	3.8	7	1.8-16	6.9
Dissolved calcium	mg/l	16	0.1-1.3	0.48	15	0.1-1.5	0.60	3	0.2-0.92	0.47
Dissolved magnesium	mg/l	16	<0.01-0.18	0.08	15	<0.01-0.24	0.09	3	<0.01-0.08	0.06
Dissolved sodium	mg/l	16	<0.2-1.1	0.47	15	0.2-1.2	0.50	3	0.2-0.7	0.43
Dissolved potassium	mg/l	16	<0.10-0.30	0.14	15	0.10-0.60	0.24	3	0.20-0.30	0.23
Dissolved chloride	mg/l	16	0.10-1.2	0.46	15	0.20-1.0	0.53	3	0.30-1.2	0.60
Dissolved sulfate	mg/l	14	<0.50-5.0	3.4	12	0.60-5.0	3.3	3	1.1-1.4	1.2
Dissolved silica	mg/l	8	<0.01-0.60	0.25	7	0.01-0.60	0.29	0		

[a]N = number of samples.

Metals. The ranges and median concentrations of metals at the three sites are presented in Table 4-5. For some metals, the median concentrations were similar at the three sites. Only aluminum, copper, zinc, lead, and iron concentrations varied appreciably among the three sites. The lowest concentrations were generally found at the laboratory site and the highest concentrations were found at the industrial site. Statistical testing conducted by USGS showed that there were no statistically significant differences in the concentrations between the three sites.

Table 4-5. Ranges and Median Concentrations of Metals in Rainfall

Constituent	Total recoverable metal concentrations, ug/l								
	Single-family residential			Industrial			Laboratory		
	N[a]	Range	Median	N[a]	Range	Median	N[a]	Range	Median
Priority pollutant metals									
Arsenic[b]	7	<1.0	<1.0	7	<1.0	<1.0	5	<1.0-1.0	<1.0
Chromium	3	<1.0	<1.0	4	<1.0-1.0	<1.0	3	<1.0	<1.0
Copper	3	<1.0-6	4.0	4	1.0-12	6.0	3	<2.0-8.0	2.0
Cyanide[b]	1		0.01	1		0.01	1		<0.01
Lead	16	<1.0-61	8.0	15	<1.0-51	7.0	6	2.0-44	5.0
Mercury	7	<0.1-0.1	0.1	7	<0.1-0.2	<0.1	5	<0.1-0.1	<0.1
Nickel	9	<1.0-12	5.0	9	<1.0-11	5.0	6	2.0-9.0	5.0
Zinc	3	30-60	60	4	30-90	55	3	20-30	20
Other metals									
Aluminum	3	30-80	50	4	60-580	100	3	60-90	80
Iron	9	10-1,400	90	9	10-2,800	130	6	40-1,300	80
Manganese	9	<10-60	10	9	<10-80	10	6	<10-40	10

[a]N = number of samples.
[b]Total arsenic and total cyanide.

Organics. The rainfall samples were analyzed for 32 organic constituents including many of the pesticides commonly used in the agricultural areas surrounding Fresno. Only 14 of these constituents were found at concentrations exceeding the analytical detection limit in at least one sample. The ranges and median concentrations of these 14 organic constituents are presented in Table 4-6. The organics detected in rainfall were generally found at all three sites. Statistical testing conducted by USGS showed that there were no statistically significant differences in the constituent concentrations at the three sampling sites except for total phenol. The median concentrations of most constituents were less than the detection limit (0.01 to 0.1 ug/l) at each of the three sites. The organophosphorus compounds, parathion, malathion, and diazinon, were the most prevalent pesticides detected in rainfall. Chlordane, lindane, methoxychlor, endosulfan, and 2,4-D were also found in rainfall. Their presence in rainfall is probably due to their use in the agricultural area around Fresno. Parathion and diazinon are insecticides used in the San Joaquin Valley primarily as dormant sprays on fruit trees. They are commonly applied with a truck-mounted sprayer that tends to suspend large quantities of spray in the air. Lindane is commonly applied by aerial spraying from an airplane. The USGS project report further discusses the occurrence of pesticides in rainfall and runoff.

Table 4-6. Ranges and Median Concentrations of Organics in Rainfall

Constituent[b]	Concentration,[a] ug/l					
	Single-family residential		Industrial		Laboratory	
	Range	Median	Range	Median	Range	Median
Priority pollutant organics						
Chlordane	<0.10-0.40	<0.10	<0.10-0.40	<0.10	<0.10	<0.10
DDE	<0.01-0.01	<0.01	<0.01-0.02	<0.01	<0.01-0.02	<0.01
Dieldrin	<0.01-0.01	<0.01	<0.01-0.01	<0.01	<0.01-0.01	<0.01
Endosulfan	<0.01-0.04	<0.01	<0.01-0.08	<0.01	<0.01-0.07	<0.01
Lindane	<0.01-0.02	0.01	<0.01-0.04	0.01	<0.01-0.01	0.01
Total PCB	<0.10	<0.10	<0.10-0.10	<0.10	<0.10	<0.10
Phenol	1.0-25	8.0	2.0-15	4.0	2.0-14	6.0
Other organics						
Diazinon	0.01-0.42	0.08	0.01-0.93	0.14	0.01-0.26	0.11
Ethion	<0.01	<0.01	<0.01	<0.01	<0.01-0.01	<0.01
Malathion	<0.01-0.11	0.03	<0.01-0.11	0.02	0.01-0.10	0.03
Methoxychlor	<0.01-0.05	<0.01	<0.01-0.12	<0.01	<0.01-0.04	<0.01
Methyl parathion	<0.01-0.07	<0.01	<0.01	<0.01	<0.01	<0.01
Parathion	<0.01-0.86	0.20	<0.01-1.0	0.16	<0.01-0.66	0.16
2,4-D	<0.01-0.04	<0.01	<0.01-0.08	<0.01	<0.01-0.04	<0.01

[a]The median concentrations are based on 20 samples collected at the single-family residential and industrial sites and 10 samples collected at the laboratory site.

[b]The samples were analyzed for the following organics but concentrations were always less than the analytical detection limit: methomyl, propham, polychlorinated napthalenes, aldrin, DDT, DDD, endrin, toxaphene, heptachlor, heptachlor epoxide, 2,4,5-T, sevin, mirex, perthane, silvex, trithion, methyl trithion, and 2,4-D.

Storm Runoff

Storm runoff quality and quantity were measured at the single-family residential, multiple-family residential, commercial, and industrial sites. Storm runoff quality samples were collected during 34 storms in the 1981-82 rain season and 32 storms in the 1982-83 rain season. During 27 of these storms, the samples were analyzed for all of the constituents listed in Appendix B. During the remaining 39 storms, only specific conductance and pH were measured. The tabulations in this section include all the discrete sample data, but do not include the results from the several composite samples.

Conventional Constituents. Table 4-7 presents the ranges and mean concentrations of conventional constituents at the four sampling sites. Statistical testing showed that the concentrations of most of the conventional constituents were significantly higher at the industrial site than at the other three sites. The concentrations at the other three sites were generally similar. The lowest concentrations were generally found at the single-family residential site. The runoff concentrations of conventional constituents were higher than the concentrations in rainfall. Most concentrations were an order of magnitude higher in runoff than in rainfall.

Table 4-7. Ranges and Mean Concentrations of Conventional Constituents in Runoff

Constituent	Units	Concentration											
		Single-family residential			Multiple-family residential			Commercial			Industrial		
		N[a]	Range	Mean	N[a]	Range	Mean	N[a]	Range	Mean	N[a]	Range	Mean
Turbidity	NTU	49	1.7-900	57	72	2.0-320	49	71	1.6-300	31	83	1.0-800	160
Specific conductance	umhos/cm	121	15-222	56	230	17-606	66	256	8.0-808	90	285	96-9,960	404
pH	Standard units	97	6.5-8.3	7.2	169	6.4-8.8	7.1	203	6.1-8.9	6.9	221	4.9-7.5	6.7
Hardness	mg/l as $CaCO_3$	62	4.0-70	20	85	6.0-230	30	95	3.0-330	49	101	17-410	65
Alkalinity	mg/l as $CaCO_3$	65	7.0-73	19	89	5.0-150	25	96	1.0-257	36	101	5.0-221	84
Oil and grease	mg/l	11	1.0-8.0	3.0	17	0-5.0	1.5	18	0-26	4.2	15	0-80	11
Suspended solids	mg/l	64	9.0-1,540	246	86	8.0-4,300	634	94	2.0-3,720	264	100	51-2,770	684
Dissolved solids	mg/l	64	9.0-224	63	81	14-775	104	87	1.0-1,010	143	93	77-5,870	423
BOD-ultimate	mg/l	22	2.3-81	21	45	5.2-150	23	44	3.4-64	13	42	39-830	189
BOD-5-day	mg/l	22	2.1-53	15	45	3.1-110	15	44	2.7-30	8.4	42	30-330	149
COD	mg/l	34	27-290	106	58	31-1,400	157	50	12-460	95	56	150-2,580	620
Dissolved nitrogen	mg/l as N	64	0.63-21	4.8	86	0.8-33	5.5	83	0.7-66	8.1	79	4.0-54	20
Dissolved organic nitrogen	mg/l as N	62	0.19-12	2.6	84	0.10-25	3.0	85	0.01-27	3.6	86	0.01-38	12
Dissolved ammonia	mg/l as N	65	0.12-6.4	1.4	83	<0.01-7.3	1.4	87	0.22-17	2.2	86	0.90-20	6.6
Dissolved nitrite	mg/l as N	31	0.02-0.13	0.05	53	0.01-0.41	0.05	45	0.02-0.56	0.05	53	0.01-0.55	0.21
Dissolved nitrate	mg/l as N	25	0.18-2.1	0.75	45	0.10-6.6	0.89	39	0.14-4.5	0.78	42	0.01-3.3	1.2
Total phosphorus	mg/l as P	65	0.10-2.4	0.63	89	0.01-5.0	0.81	87	0.03-9.1	0.63	90	0.90-20	5.6
Dissolved phosphorus	mg/l as P	65	0.09-1.6	0.37	87	0.01-4.7	0.58	87	0.02-8.0	0.45	89	0.40-11	4.9
Dissolved orthophorphorus	mg/l as P	64	0.09-1.6	0.31	88	0.01-2.1	0.38	87	<0.02-4.8	0.28	66	0.60-9.0	3.7
Dissolved organic carbon	mg/l	36	4.4-550	75	58	4.6-460	64	47	4.4-260	54	56	20-2,300	190
Suspended organic carbon	mg/l	33	0.8-17	3.2	54	1.3-15	3.7	46	0.90-10	2.5	54	5.8-41	25
Dissolved calcium	mg/l	65	1.3-18	5.8	87	2.0-65	8.3	96	0.80-100	13.6	101	4.0-120	15
Dissolved magnesium	mg/l	65	0.01-6.2	1.3	87	0.20-16	2.1	96	0.10-22	3.5	101	1.6-26	6.4
Dissolved sodium	mg/l	65	0.70-18	3.9	87	1.0-49	6.8	96	0.60-37	6.8	102	5.7-1,800	74
Dissolved potassium	mg/l	65	0.80-9.8	3.3	87	0.8-19	3.4	96	0.30-15	2.9	99	5.2-62	24
Dissolved chloride	mg/l	64	0.60-14	3.4	88	0.60-65	5.1	95	0.20-31	5.5	102	4.8-3,000	112
Dissolved sulfate	mg/l as SO_4	61	4.2-27	8.3	88	3.6-76	12.2	95	3.1-190	21	102	<5.0-110	25
Dissolved silica	mg/l as SiO_2	44	0.34-27	3.0	68	1.5-25	4.7	64	0.50-44	3.2	74	1.6-30	5.4

[a]N = number of samples.

Metals. The ranges and median concentrations of metals in runoff at the four sites are presented in Table 4-8. Cyanide was the only constituent which was consistently below the analytical detection limit. All of the other metals were present at concentrations that exceeded the detection limit in at least one sample. For most metals, the median concentrations were similar at the two residential and commercial sites and considerably higher at the industrial site. The concentrations of iron, aluminum, and manganese at the multiple-family residential site were statistically significantly higher than at the single-family residential site. The higher concentrations may be due to soil erosion from undeveloped land in the multiple-family residential drainage area and not to differences in urban runoff. The arsenic and zinc concentrations were higher at the industrial site than the other sites. The lead concentrations were highest at the residential sites. The runoff concentrations of metals were generally 2 to 70 times higher than the concentrations in rainfall.

Table 4-9 presents the median concentrations of total recoverable and dissolved metals at each of the four sampling sites. The particulate fraction of most metals was much larger than the dissolved fraction. Less than 25 percent of the aluminum, chromium, iron, and lead was in the dissolved form at all four sites. Arsenic was the only metal which was predominantly in the dissolved form at all sites.

Organics. The runoff samples were analyzed for 34 organic constituents. Only 19 of these constituents were found at concentrations exceeding the analytical detection limit in at least one sample. The ranges and median concentrations of these 19 organic constituents are presented in Table 4-10. The organics detected in runoff were generally found at all four sites. The median concentrations of most constituents were less than the detection limit (0.01 to 0.1 ug/l) at each of the four sites. The median concentrations of lindane, phenol, diazinon, malathion, parathion, and 2,4-D exceeded the detection limits at all four sites. All of these constituents were also found in the precipitation samples. Chlordane and DDE were also found at some of the sampling sites. Chlordane occurred more frequently in runoff than in rainfall. The highest concentrations of chlordane and DDE were found at the single-family residential site and the industrial site, while the lowest concentrations were found at the commercial site. This is probably due to the use of pesticides in landscaping and gardens in residential areas and the manufacturing, storage, transport, or handling of pesticides in industrial areas. There is minimal landscaping in the commercial area, so it is not surprising to find low levels of pesticides in commercial runoff.

Table 4-8. Ranges and Median Concentrations of Metals in Runoff

Metals	Total recoverable metal concentration, ug/l											
	Single-family residential			Multiple-family residential			Commercial			Industrial		
	N[a]	Range	Median	N[a]	Range	Median	N[a]	Range	Median	N[a]	Range	Median
Priority pollutant metals												
Arsenic[b]	64	<1.0-8.0	1.0	87	<1.0-16	2.0	95	<1.0-17	2.0	16	1.0-67	14
Cadmium	31	<1.0-4.0	1.0	53	<1.0-6.0	1.0	49	<1.0-12	1.0	70	<1.0-4.0	1.0
Chromium	48	<1.0-40	8.5	70	1.0-62	15	68	1.0-37	11	86	<1.0-51	14
Copper	47	4.0-180	14	70	7.0-270	22	68	6.0-380	18	86	30-400	66
Cyanide[b]	5	<0.01	<0.01	5	<0.01	<0.01	6	<0.01	<0.01	3	<0.01	<0.01
Lead	63	15-2,100	170	91	25-940	170	95	9.0-1,200	100	107	16-360	74
Mercury	64	<0.10-8.6	0.10	88	<0.10-1.6	0.20	95	<0.10-0.50	0.10	107	<0.10-2.5	0.10
Nickel	62	1.0-85	11	91	2.0-310	19	94	1.0-120	10	107	4.0-98	24
Zinc	47	30-1,300	90	70	60-1,800	170	68	50-3,400	150	86	280-3,100	535
Other metals												
Aluminum	17	530-20,000	3,400	17	1,600-37,000	6,300	19	120-45,000	3,400	16	3,000-18,000	7,000
Iron	64	160-29,000	1,700	91	450-72,000	5,600	95	140-57,000	1,600	107	480-62,000	9,000
Manganese	32	20-480	110	38	40-1,600	200	46	30-1,700	280	37	170-1,600	360

[a]N = number of samples.
[b]Total arsenic and total cyanide.

Table 4-9. Total Recoverable and Dissolved Metals Concentrations in Runoff

Metals	Median concentration, ug/l							
	Single-family residential		Multiple-family residential		Commercial		Industrial	
	Total recoverable	Dissolved	Total recoverable	Dissolved	Total recoverable	Dissolved	Total recoverable	Dissolv
Aluminum	3,400	50	6,300	195	3,400	75	7,000	150
Arsenic[a]	1.0[a]	1.0	2.0[a]	1.0	2.0[a]	1.0	14[a]	9.0
Cadmium	1.0	2.0	1.0	<1.0	1.0	<1.0	1.0	<1.0
Chromium	8.5	<1.0	15	<1.0	11	<1.0	14	<1.0
Copper	14	5.0	22	5.0	18	4.0	66	15
Cyanide[a]	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Iron	1,700	91	5,600	150	1,600	89	9,000	370
Lead	170	25	170	12	100	12	74	9.0
Manganese	110	23	200	56	280	105	360	130
Mercury	0.1	<0.1	0.2	<0.1	0.1	<0.1	0.1	0.1
Nickel	11	4.0	19	5.0	10	4.0	24	8.0
Zinc	90	43	170	50	150	80	535	190

[a]Total arsenic and total cyanide.

Table 4-10. Ranges and Median Concentrations of Organics in Runoff

Constituent[a]	Concentration, ug/l											
	Single-family residential			Multiple-family residential			Commercial			Industrial		
	N[b]	Range	Median	N[b]	Range	Median	N[b]	Range	Median	N[b]	Range	Median
Priority pollutant organics												
Aldrin	16	<0.1	<0.01	27	<0.01-0.02	<0.01	24	<0.01	<0.01	19	<0.01	<0.01
Chlordane	16	0.10-0.30	0.10	26	<0.10-1.2	0.10	23	<0.10-0.30	0.10	19	<0.10-0.30	<0.10
DDE	16	<0.01-0.01	<0.01	27	<0.01-0.06	<0.01	24	<0.01-0.01	0.01	19	<0.01-0.03	0.01
DDT	16	<0.01-0.01	<0.01	27	<0.01-0.01	<0.01	24	<0.01	<0.01	19	<0.01	<0.01
Dieldrin	16	<0.01-0.01	<0.01	27	<0.01-0.02	<0.01	24	<0.01-0.01	<0.01	19	<0.01-0.02	<0.01
Endosulfan	16	<0.01-0.01	<0.01	27	<0.01	<0.01	24	<0.01	<0.01	19	<0.01-0.02	<0.01
Endrin	16	<0.01-0.01	<0.01	27	<0.01	<0.01	24	<0.01	<0.01	19	<0.01	<0.01
Lindane	16	0.01-0.06	0.03	27	<0.01-0.03	0.01	24	0.01-0.03	0.01	19	0.01-0.27	0.03
PCB	16	<0.10	<0.10	27	<0.10	<0.01	24	<0.10	<0.01	19	<0.10	<0.10
Phenol	5	13-35	18	9	6.0-41	16	9	6.0-52	17	5	8.0-500	20
Other organics												
Diazinon	16	0.11-1.1	0.27	27	0.06-8.1	0.22	24	0.13-18	0.39	18	0.14-3.3	0.53
Dibromochloropropane	4	<0.003-0.003	<0.003	7	<0.003-0.004	<0.003	8	<0.003-0.01	<0.003	7	<0.003-0.005	<0.003
Malathion	16	0.19-13	0.99	27	0.08-14	0.49	24	0.08-1.4	0.23	18	0.20-3.0	0.44
Methoxychlor	16	<0.01-0.19	<0.01	27	<0.01-0.02	<0.01	24	<0.01	<0.01	19	<0.01-0.03	<0.01
Methyl parathion	16	<0.01-0.03	<0.01	27	<0.01	<0.01	24	<0.01-0.03	<0.01	18	<0.01	<0.01
Parathion	16	<0.01-0.92	0.13	27	<0.01-2.5	0.06	24	<0.01-0.90	0.09	18	<0.01-0.38	<0.01
Silvex	16	<0.01-0.03	<0.01	26	<0.01	<0.01	23	<0.01	<0.01	19	<0.01-0.07	<0.01
2,4-D	16	<0.01-1.7	0.07	26	<0.01-3.7	0.08	23	<0.01-0.63	0.01	19	<0.01-3.2	0.03
Trithion	16	<0.01	<0.01	27	<0.01	<0.01	24	<0.01	<0.01	19	<0.01-0.10	<0.01

[a]The samples were analyzed for the following organics but concentrations were always less than the analytical detection limit: polychlorinated napthalenes, DDD, heptachlor, heptachlor epoxide, mirex, perthane, toxaphene, ethion, methyl trithion, methomyl, propham, sevin, 2,4-DP, 2,4,5-T.

[b]N = number of samples.

Dry Deposition

Dry deposition samples were collected at the single-family residential and industrial sites between storms for ten periods during the study period. The samples were analyzed for all of the constituents listed in Table B-1 in Appendix B. It is difficult to collect dry deposition data that are representative of a large area. The amount of material collected in a dry deposition collector bucket is influenced by the location of the bucket with respect to the ground, wind conditions, and the activity in the surrounding area. The two deposition collectors for this study were mounted in similar positions approximately 3 meters above the ground on the roof of the study's instrumentation shelters. They were located about 10 to 20 meters from light traffic-density streets.

Conventional Constituents. Table 4-11 presents the ranges and mean concentrations of conventional constituents at the single-family residential and industrial sites. The dry deposition quality was generally similar at the two sites. The nitrogen concentrations were higher at the residential site and the phosphorus concentrations were higher at the industrial site.

Table 4-11. Ranges and Mean Concentrations of Conventional Constituents in Dry Deposition

Constituent	Concentration, mg/kg					
	Single-family residential			Industrial		
	N[a]	Range	Mean	N[a]	Range	Mean
Total solids	9	20-527	135	10	41-856	211
Total organic nitrogen	7	10,300-70,000	24,357	9	12,400-129,000	52,133
Total ammonia	9	<114-82,800	13,729	10	1,050-46,800	11,989
Dissolved nitrite + nitrate	9	1,890-295,000	41,263	10	1,200-42,200	9,328
Total phosphorus	9	588-6,900	2,479	10	1,290-10,600	5,156
Total orthophosphorus	9	304-5,860	1,504	10	553-25,800	4,489
Dissolved organic carbon	7	30,400-266,000	118,357	10	10,100-390,000	117,700
Dissolved calcium	9	3,770-121,000	24,440	10	2,760-31,100	12,419
Dissolved magnesium	9	638-13,800	5,005	10	780-21,000	5,949
Dissolved sodium	9	<4,260-55,200	16,011	10	1,380-21,000	9,068
Dissolved potassium	9	1,890-24,100	8,034	10	2,760-74,200	18,466
Dissolved chloride	9	498-58,600	14,965	10	2,300-25,800	9,364
Dissolved sulfate	9	4,260-250,000	79,232	10	<922-178,000	63,777
Dissolved silica	4	3,430-24,100	12,605	5	1,050-7,320	3,000

[a]N = number of samples.

Metals. The ranges and median concentrations of metals at the two sites are presented in Table 4-12. Based on the limited data collected, the median concentrations of most metals were similar at the two sites. The lead and mercury concentrations were higher at the single-family residential site, and the chromium concentration was higher at the industrial site. The USGS estimated the deposition rates and found that the rates for most constituents were fairly constant throughout the year.

Table 4-12. Ranges and Median Concentrations of Metals in Dry Deposition

Constituent	Total recoverable metal concentration, mg/kg					
	Single-family residential			Industrial		
	N[a]	Range	Median	N[a]	Range	Median
Priority pollutant metals						
Arsenic[b]	5	4.5-50	19	5	4.6-24	14
Chromium	5	57-250	85	5	28-289	143
Copper	5	91-1,950	481	5	115-689	443
Lead	9	304-8,280	1,640	10	140-1,610	592
Mercury	5	0.91-10	3.9	5	0.74-4.4	1.8
Nickel	5	21-350	94	5	28-329	100
Zinc	5	543-4,000	2,340	5	369-2,440	1,760
Other metals						
Aluminum	5	9,950-40,500	12,300	5	8,290-33,300	10,400
Iron	5	15,200-50,000	17,500	5	11,100-42,400	15,600
Manganese	5	362-1,500	385	5	276-1,330	444

[a]N = number of samples.
[b]Total arsenic.

Organics. One dry deposition sample from each site was analyzed for 31 organic constituents but only 6 were found at concentrations exceeding the analytical detection limit. These data are presented in Table 4-13. The organics concentrations of chlordane, DDE, lindane, diazinon, malathion, and methoxychlor were higher at the single-family residential site than at the industrial site. All of the pesticides detected in dry deposition were also detected in precipitation and runoff.

Table 4-13. Concentrations of Organics in Dry Deposition

Constituent[b]	Concentration,[a] ug/kg	
	Single-family residential	Industrial
Priority pollutant organics		
Chlordane	610	270
DDE	30	13
Lindane	30	13
Other organics		
Diazinon	180	120
Malathion	850	200
Methoxychlor	30	<0.01

[a]Based on one sample.

[b]The samples were analyzed for the following organics, but concentrations were less than the analytical detection limit: aldrin, DDD, DDT, dieldrin, endosulfan, endrin, ethion, PCB, polychlorinated napthalenes, heptachlor, heptachlor epoxide, methyl parathion, methyl trithion, mirex, parathion, perthane, silvex, toxaphene, trithion, 2,4-D, 2,4-DP, 2,4,5-T, methomyl, propham, and sevin.

Street Particulate Material

Street particulate samples were collected from each of the four land use types from March 1982 through January 1983. Six samples were collected in the commercial drainage area and five samples were collected in each of the other drainage areas. The initial objectives of the sampling program were to determine a particulate buildup curve for each land use, to determine which constituents were present, and to determine the concentrations of those constituents on the street surfaces. Due to problems with data collection, it was not possible to determine buildup curves.

Conventional Constituents. Table 4-14 presents the ranges and mean concentrations of conventional constituents at the four sampling sites. The concentrations of most constituents were highest at the commercial site and lowest at the multiple-family residential site. The high concentrations at the commercial site may be due to construction activities in the drainage basin. The street particulate concentrations of conventional constituents were consistently one to two orders of magnitude lower than the concentrations in dry deposition; however, the quantity of street particulate material greatly exceeded the amount of dry deposition material.

Table 4-14. Ranges and Mean Concentrations of Conventional Constituents in Street Particulates

Constituent	Concentration, mg/kg											
	Single-family residential			Multiple-family residential			Commercial			Industrial		
	N[a]	Range	Mean	N[a]	Range	Mean	N[a]	Range	Mean	N[a]	Range	Mean
COD	5	44,000-66,000	52,400	5	25,000-49,000	36,200	6	91,000-150,000	123,500	5	30,000-65,000	40,800
Volatile solids	5	38,100-98,000	62,540	5	19,600-53,200	27,720	6	41,200-98,300	73,168	5	19,900-31,100	26,300
Total nitrogen	4	507-1,210	878	4	255-580	429	6	643-1,910	1,202	3	347-574	453
Total ammonia	5	19-64	35	5	22-38	30	6	24-100	49	5	5.8-80	38
Total nitrite	3	<2.0->2.0	2.0	3	<2.0->2.0	2.0	4	<2.0->2.0	2.0	3	<2.0	<2.0
Total nitrite + nitrate	5	<2.0-12	5.8	5	<2.0-15	7.3	6	6.6-42	16	5	<2.0-7.4	4.4
Total phosphorus	5	220-1,200	450	5	160-300	206	6	180-450	327	5	120-250	202
Total inorganic carbon	5	<100-700	240	5	<100-200	120	6	<100-800	380	5	<100-200	140
Total carbon	5	13,000-25,000	2,080	5	11,000-14,000	12,000	6	29,000-55,000	45,000	5	9,800-17,000	12,500
Calcium	3	30-110	67	3	30-40	33	4	70-120	90	3	30-40	37
Magnesium	3	20	20	3	10-20	17	4	30-50	43	3	20-40	33
Sodium	3	<10	<10	3	<10	<10	4	<10	<10	3	<10	<10
Potassium	3	690-800	763	3	460-640	533	4	500-1,400	950	3	310-420	347

[a]N = number of samples.

Metals. The ranges and median concentrations of metals at the four sites are presented in Table 4-15. Cadmium was the only metal which was consistently at the detection limit. For most metals, the concentrations were similar at the two residential sites and the industrial site and considerably higher at the commercial site. This difference may be due to the fact that the commercial site is the only one of the four sites that receives regular street sweeping. The residual material after sweeping is the finer particles, which have more surface area per weight allowing them to adsorb more contaminants. Concentrations at the multiple-family residential site were generally lower than the other sites. The concentrations of metals in street particulates were generally an order of magnitude lower than the concentrations in dry deposition; however, the quantity of street particulate material greatly exceeded the amount of dry deposition material.

Organics. The street particulate samples were analyzed for 25 organic constituents. As shown in Table 4-16, the concentrations of 14 of these constituents were generally below the analytical detection limits. The highest concentrations of many of the remaining organics were found at the commercial site, and the lowest concentrations were found at the industrial site. The concentrations of organics were generally quite low in runoff from the commercial site. The higher concentrations in the street particulate material at the commercial site may be related to the routine street sweeping that this drainage area receives. The routine street sweeping tends to pick up the larger sediment particles and leave the smaller particles. The smaller particles tend to have more organics per unit weight (ug/kg) than the larger particles. Since the other drainage areas are not routinely swept, the samples collected in this study were a mixture of large and small particles, so the organics content was lower on a unit weight basis. Only 6 organic constituents exceeded the detection limit in dry deposition samples, whereas 11 constituents were found in street particulates at concentrations greater than the detection limits. With the exception of methoxychlor, the concentrations in dry deposition were considerably larger than the concentrations in street particulates; however, the quantity of street particulate material greatly exceeded the amount of dry deposition material. All pesticides detected in street particulates were also detected in rainfall and runoff.

Dry Weather Runoff

On September 3, 1982, USGS collected grab samples of dry weather runoff from the single-family and multiple-family residential sites. The dry weather concentrations of several conventional, metal, and organic constituents are compared to the mean wet weather runoff concentrations in Table 4-17.

Table 4-15. Ranges and Median Concentrations of Metals in Street Particulates

Constituent	Total recoverable metal concentration, ug/g											
	Single-family residential			Multiple-family residential			Commercial			Industrial		
	N[a]	Range	Median	N[a]	Range	Median	N[a]	Range	Median	N[a]	Range	Median
Priority pollutant metals												
Arsenic[b]	5	2.0–3.0	2.0	5	1.0–2.0	2.0	6	1.0–7.0	4.0	5	2.0–4.0	3.0
Cadmium	3	<1.0–<10	<1.0	3	<1.0–<10	<1.0	4	1.0–<10	2.0	3	<1.0–<10	1.0
Chromium	3	4.0	4.0	3	3.0–4.0	3.0	4	20	20	3	10–30	10
Copper	5	<10–18	12	5	5.0–17	10	6	12–50	34	5	27–54	40
Lead	5	500–790	562	5	200–430	400	6	280–1,000	770	5	100–300	150
Mercury	5	0.01–0.05	0.03	5	0.02–0.04	0.03	6	0.05–0.13	0.07	5	0.01–0.03	0.02
Nickel	5	<10–<100	10	5	8.0–<100	<10	6	10–<100	26	5	20–<100	20
Zinc	5	59–300	85	5	40–150	49	6	130–1,300	240	5	49–120	70
Other metals												
Aluminum	2	1,100–1,400	1,250	2	720–1,700	1,210	2	1,200–1,900	1,550	2	780–830	805
Iron	5	2,100–3,600	3,200	5	1,200–3,000	2,400	6	2,500–7,000	5,000	5	2,000–3,700	2,300
Manganese	2	43–65	54	2	31–60	46	2	61–110	86	2	34–46	40

[a]N = number of samples.
[b]Total arsenic.

Table 4-16. Ranges and Median Concentrations of Organics in Street Particulates

Constituent	Concentration, ug/kg											
	Single-family residential			Multiple-family residential			Commercial			Industrial		
	N[a]	Range	Median	N[a]	Range	Median	N[a]	Range	Median	N[a]	Range	Median
Priority pollutant organics												
Aldrin	5	<0.50-<1.0	<1.0	5	<0.50-<1.0	<0.5	3	<0.50-<4.0	<1.0	5	<0.50-<4.0	<1.0
Chlordane	5	170-470	290	5	57-160	110	3	280-3,400	420	5	69-260	110
DDD	5	<0.50-<4.0	<1.0	5	<0.20-<1.0	<0.50	3	<1.0-7.9	<4.0	5	<0.50-<4.0	<0.50
DDE	5	3.3-11	6.0	5	3.1-10	4.5	3	<0.50-<4.0	<1.0	5	8.1-15	12
DDT	5	11-31	15	5	<0.50-15	4.4	3	<1.0-19	3.3	5	7.4-33	21
Dieldrin	5	0.70-5.2	3.7	5	0.30-2.8	1.2	3	1.2-89	6.8	5	0.20-2.3	1.2
Endosulfan	5	<0.50-<4.0	<1.0	5	<0.20-6.7	<0.50	3	<0.50-<4.0	<1.0	5	<0.50-<4.0	<0.50
Endrin	5	<0.50-<1.0	<1.0	5	<0.10-<1.0	<0.50	3	<0.50-<4.0	<1.0	5	<0.50-<1.0	<0.50
Heptachlor epoxide	5	<0.50-1.2	<1.0	5	<0.10-2.2	<0.50	3	2.4-35	9.9	5	<0.50-2.8	<0.50
Heptachlor	5	1.0-2.2	1.4	5	<0.80-1.9	1.2	3	0.70-3.0	2.2	5	0.20-<4.0	<0.50
Lindane	5	1.5-26	2.8	5	0.60-3.3	1.5	3	1.7-4.8	4.1	5	2.0-4.6	2.1
PCB	5	10-51	13	5	30-49	38	3	220-860	820	5	23-37	33
Toxaphene	5	<50-<400	<100	5	<20-<100	<50	3	<50-<400	<100	5	<50-<400	<50
Other organics												
Diazinon	5	3.0-18	6.0	5	1.8-25	3.9	3	16-80	26	5	<0.10-20	<1.0
Ethion	5	<0.10-<1.0	<1.0	5	<0.10-<1.0	<0.10	3	<0.10-<1.0	<1.0	5	<0.10-<1.0	<1.0
Malathion	5	<1.0-10	2.9	5	<0.10-8.7	2.1	3	4.4-17	15	5	<0.10-2.1	<1.0
Methoxychlor	5	<0.50-<8.0	<1.0	5	<0.50-<8.0	<2.5	3	<0.50-<8.0	<1.0	5	<0.50-<8.0	<2.5
Methyl parathion	5	<0.10-<1.0	<1.0	5	<0.10-<1.0	<0.10	3	<0.10-<1.0	<1.0	5	<0.10-<1.0	<1.0
Methyl trithion	5	<0.10-<1.0	<1.0	5	<0.10-<1.0	<0.10	3	<0.10-<1.0	<1.0	5	<0.10-<1.0	<1.0
Mirex	5	<0.50-<1.0	<1.0	5	<0.50-<1.0	<0.50	3	<0.50-<4.0	<1.0	5	<0.50-<4.0	<1.0
Parathion	5	<0.10-29	<1.0	5	<0.10-36	1.0	3	<0.10-38	<1.0	5	<0.10-16	<1.0
Polychlorinated napthalenes	2	<10	<10	2	<5.0	<5.0	0	-	-	2	<10	<10
Perthane	5	<5.0-<40	<10	5	<2.0-<10	<5.0	3	<5.0-<40	<10	5	<5.0-<40	<5.0
Trithion	5	<0.10-<1.0	<1.0	5	<0.10-<1.0	<0.10	3	<0.10-<1.0	<1.0	5	<0.10-<1.0	<1.0
2,4-D	2	<0.50	<0.50	2	<0.50	<0.50	2	<0.50	<0.50	2	<0.50	<0.50

[a]N = number of samples.

Table 4-17. Comparison of Wet and Dry Weather Runoff Concentrations of Conventional Constituents, Metals, and Organics

Constituent	Units	Mean concentration			
		Single-family residential		Multiple-family residential	
		Wet	Dry	Wet	Dry
Specific conductance	umhos/cm	56	266	66	291
Dissolved nitrate	mg/l as N	0.75	0.93	0.89	1.5
Total phosphorus	mg/l as P	0.63	1.0	0.81	0.45
Dissolved calcium	mg/l	5.8	21	8.3	22
Dissolved chloride	mg/l	3.4	18	5.1	10
Arsenic	ug/l	2.1	4.0	2.7	6.0
Cadmium	ug/l	1.5	<1.0	1.5	1.0
Chromium	ug/l	9.3	2.0	16	4.0
Copper	ug/l	32	13	39	11
Lead	ug/l	353	93	225	6.0
Mercury	ug/l	0.60	0.10	0.33	0.10
Nickel	ug/l	14	12	40	12
Zinc	ug/l	211	70	290	20
Iron	ug/l	4,594	2,000	10,877	540
Chlordane	ug/l	0.16	0.10	0.25	<0.10
Lindane	ug/l	0.03	0.03	0.01	0.01
Diazinon	ug/l	0.36	1.1	0.70	2.1
Malathion	ug/l	2.2	5.7	1.3	2.1
Parathion	ug/l	0.21	<0.01	0.20	<0.01
2,4-D	ug/l	0.26	0.04	0.36	0.20

The dry weather concentrations of all of the conventional constituents except total phosphorus were greater than the wet weather concentrations. With the exception of arsenic, the wet weather concentrations of metals were greater than the dry weather concentrations. This may be due to the fact that metals adsorb to sediment particles, and wet weather storms are able to suspend sediment particles that are not moved by dry weather runoff. The concentrations of chlordane, parathion, and 2,4-D were greater in the wet weather samples and the concentrations of diazinon and malathion were greater in the dry weather samples. Diazinon and malathion are pesticides which are commonly used by homeowners.

Imported Recharge Water

The conventional constituent data collected by USDA on the quality of imported canal water used for recharge in Basins MM and EE are presented in Table 4-18. The data from samples collected from the canals show that the imported water is of excellent quality. All of the major anions and cations were found at low concentrations. Table 4-19 presents the concentrations of metals in the one sample that was collected. All of the metals concentrations are considerably lower than the concentrations in runoff. One sample was analyzed for 28 organic constituents. The concentrations were all less than the analytical detection limits, which ranged from 0.01 to 0.10 ug/l.

EPA Metals and Organics

The EPA conducted a supplemental analysis on several samples collected by USGS. Two grab samples were collected from each land use type on January 4, 1982, and analyzed for metals. Four samples were collected in March 1982 and analyzed for all of the priority pollutant metals and organics. Most of the organics were found at levels near or below the analytical detection limits. Table 4-20 presents the median concentrations of metals that were sampled by EPA but not sampled by USGS. The EPA analytical detection limits were much higher than the USGS limits, so most of the metals concentrations are reported as less than the detection limit. The concentrations of barium, boron, strontium, and titanium exceeded the detection limits. The highest concentrations of these four metals were found at the industrial site. The concentrations at the other three sites were similar. The concentrations of most of the priority pollutant organics were less than the detection limits of 1 to 25 ug/l.

ANALYSIS

The concentrations of various constituents measured in the runoff monitoring program were presented in the previous section of this chapter. Variations in the concentrations of key constituents during storm events and over the rain season are described in this section. The annual runoff and rainfall loads and unit runoff load factors for each land use type are also presented.

Water Quality Variations with Time

An analysis of the data collected in the Fresno NURP project showed that the runoff concentrations of many constituents varied during the storm events and seasonally.

Table 4-18. Concentrations of Conventional Constituents in Imported Recharge Water

Constituent	Units	Concentration[a] Basin MM	Basin EE
Specific conductance	umhos/cm	35.6	31.9
pH	Standard units	6.6	7.7
Turbidity	NTU	2.8	3.0
Suspended solids	mg/l	5.2	3.3
Calcium	mg/l	1.6	1.9
Magnesium	mg/l	0.20	0.20
Sodium	mg/l	1.0	1.1
Potassium	mg/l	0.13	0.13
Carbonate	mg/l	0	0
Bicarbonate	mg/l	25	24
Sulfate	mg/l	3.7	4.0
Chloride	mg/l	2.3	2.2
Nitrate	mg/l as N	0	0

[a]Mean concentrations of 24 samples are shown for specific conductance, turbidity, and suspended solids. All other concentrations are based on one sample collected on July 15, 1982.

Table 4-19. Concentrations of Metals in Imported Recharge Water

Constituent	Concentration, ug/l
Arsenic	<1
Cadmium	<1
Chromium	4
Copper	2
Iron	160
Lead	1.0
Mercury	0.1
Nickel	3.0
Zinc	10

Table 4-20. Median Concentrations of Metals Analyzed by EPA

Constituent	Total recoverable metal—median concentration, ug/l			
	Single-family residential	Multiple-family residential	Commercial	Industrial
Priority pollutant metals				
Antimony	<5	<5	<5	8
Beryllium	<1	<1	<1	<1
Selenium	<25	<25	<25	<25
Silver	<0.5	<0.5	<0.5	<0.5
Thallium	<10	<10	<10	<10
Other metals				
Barium	15	35	20	160
Boron	20	25	15	150
Cobalt	<10	<10	<10	10
Lithium	<10	<10	<10	15
Molybdenum	<10	<10	10	<10
Strontium	15	25	15	175
Tin	<50	<50	<50	<50
Titanium	70	230	65	790
Vanadium	<10	10	<10	35
Yttrium	<10	<10	<10	<10

Storm Event Variations. The USGS collected discrete grab samples during a number of storms monitored during the two years of the project. The number of samples analyzed varied from 2 to 17 depending on the length of the storm, and averaged about 5. The concentrations of most constituents were higher in the initial runoff samples than in samples collected later in the storms at the residential and commercial sites. Pollutants that have collected in the drainage area since the previous storm are washed off by the initial storm runoff. Therefore, the initial runoff results in high constituent concentrations because of the low runoff volumes that transport the collected constituents.

Constituent concentrations vary differently during a runoff event depending upon the type of constituent. Figures 4-2 and 4-3 show the concentrations of several key constituents at the multiple-family residential and commercial sites during several storms. Nutrient concentrations are generally highest at the beginning of storm runoff and then steadily decrease throughout the storm, independent of flow variations. Chemical oxygen demand (COD), biochemical oxygen demand (BOD), and specific conductance show the same pattern as nutrients. Metal concentrations are also generally higher at the beginning of runoff, but vary thereafter depending on velocity. This is probably due to the adsorption of metals to sediment particles. Larger sediment particles are moved by higher velocities; therefore, higher metal concentrations are generally found on the rising limb of a hydrograph.

There was no definite pattern in constituent concentrations at the industrial site during a storm. Figure 4-4 shows typical constituent concentrations throughout a storm at this site. The highest dissolved phosphorus and COD concentrations unexpectedly occur in the middle of the hydrograph and are not associated with a peak flow. Numerous specific conductance spikes were recorded at the industrial site during the study period, the largest of which occurred October 25, 1982, when the specific conductance rose from 666 umhos/cm to 9,960 umhos/cm in 8 minutes, and then receded to 1,025 umhos/cm 24 minutes later. These types of random concentration spikes were very common at this site.

Rain Season Variations. To determine if there were any seasonal variations in constituent concentrations, the USGS related the event mean concentration (EMC) of various constituents at each land use sampling site to the time in days since the first storm of the rain season. These relationships for various constituents are shown on Figure 4-5. The highest EMCs occur during the first two or three storms of the year and then become almost constant for the remainder of the rain season at the residential and commercial sites. This indicates

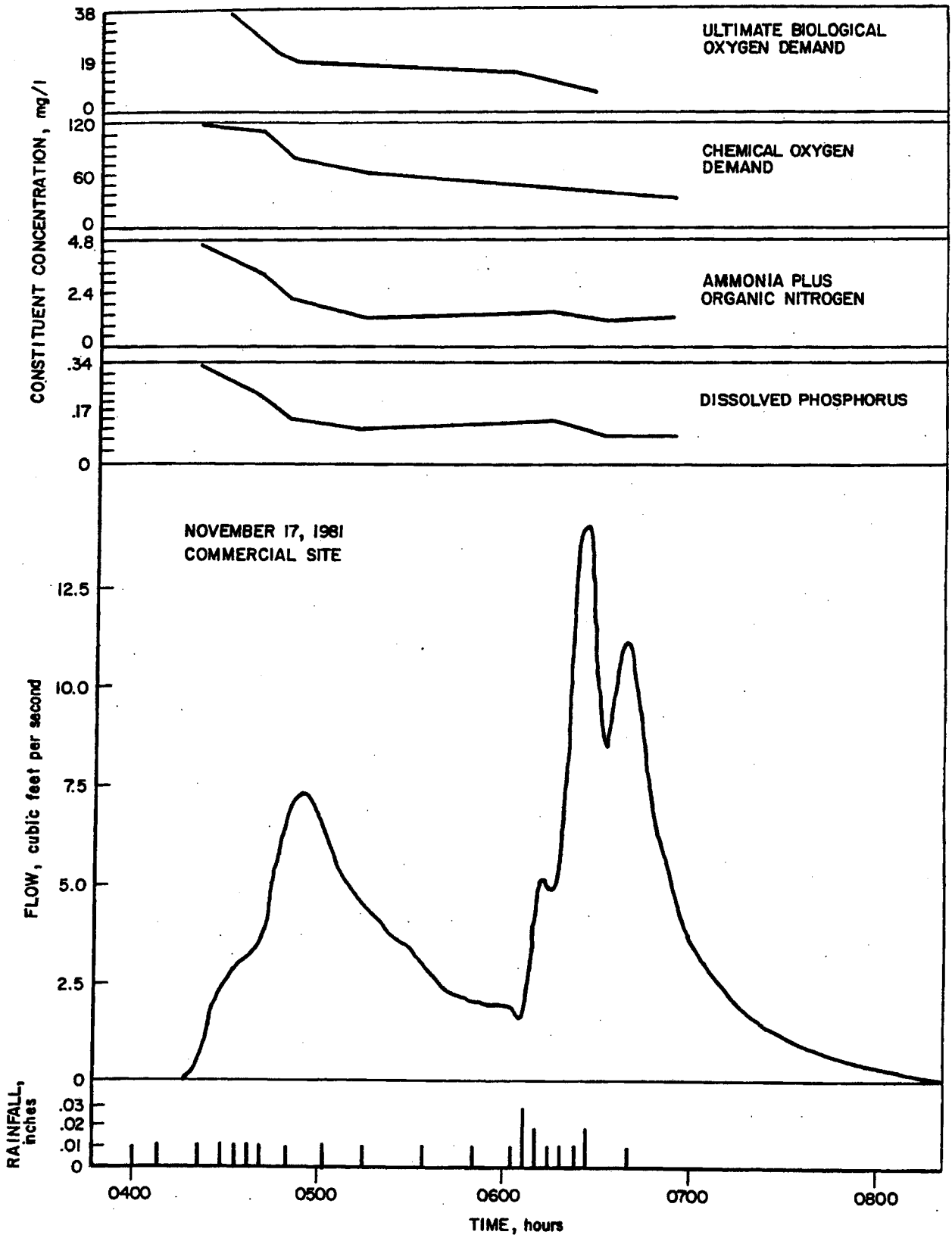


Figure 4-2 Water Quality Variations in Conventional Constituents During a Storm

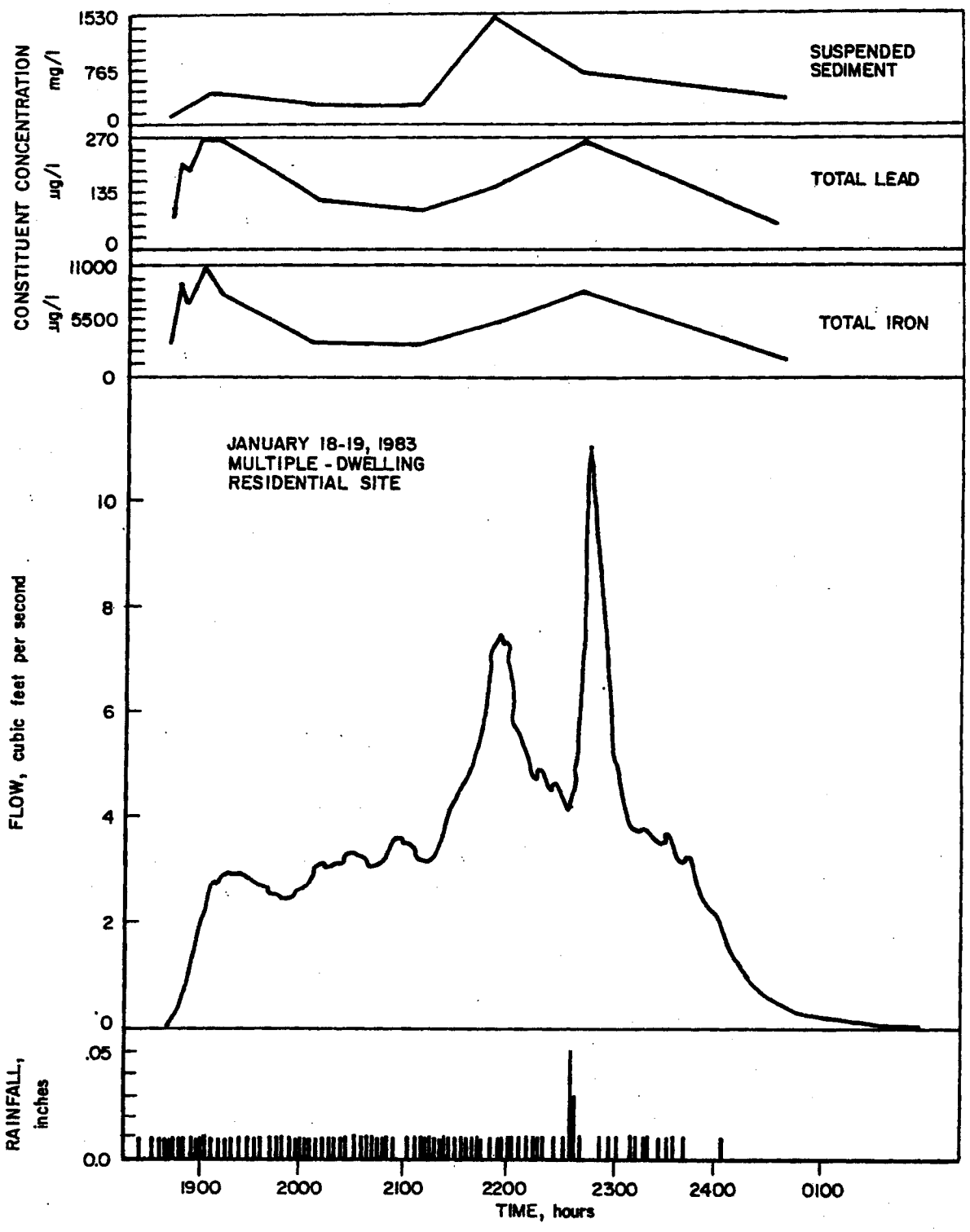


Figure 4-3 Water Quality Variations in Suspended Sediment and Metals During a Storm

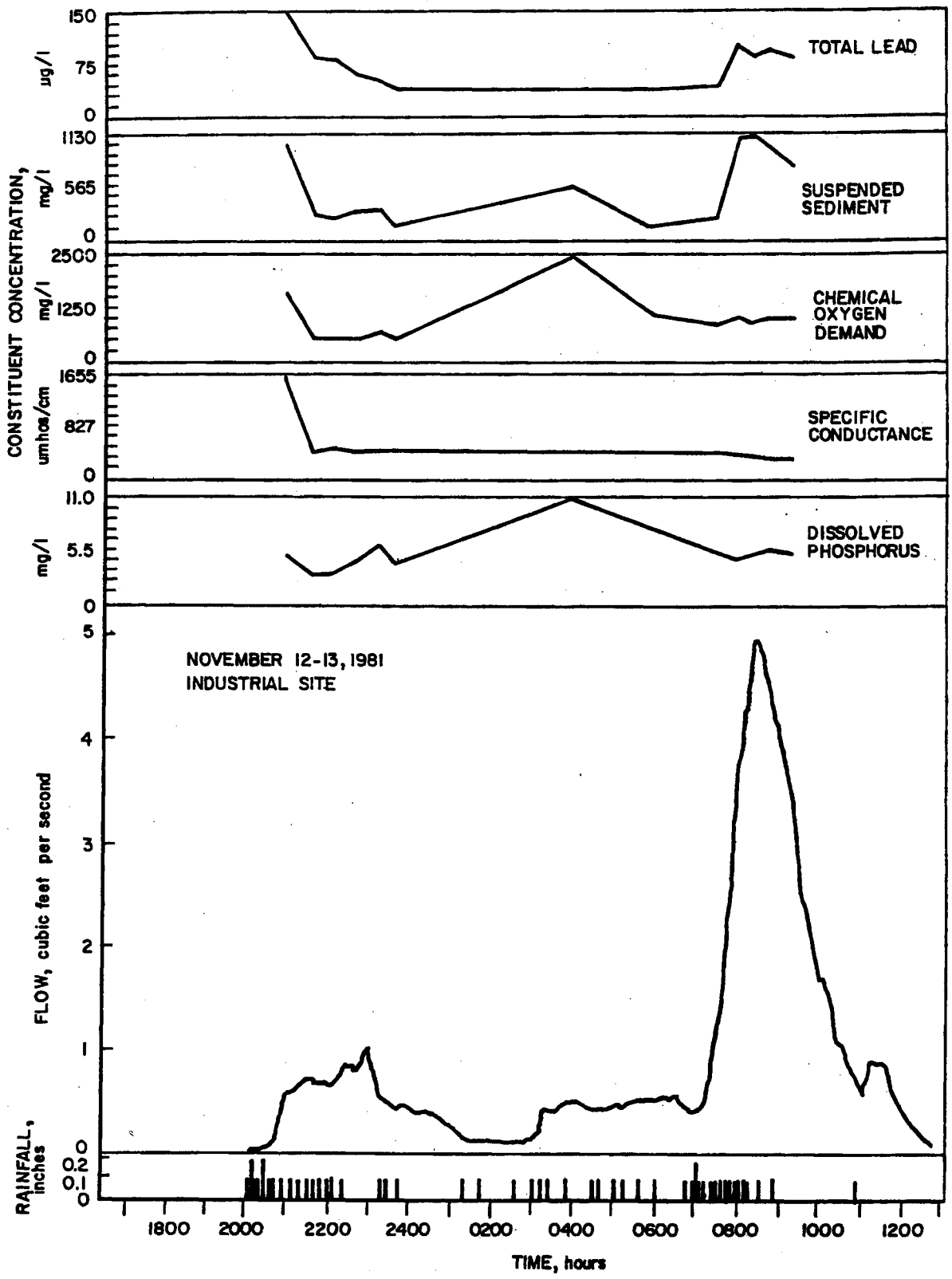
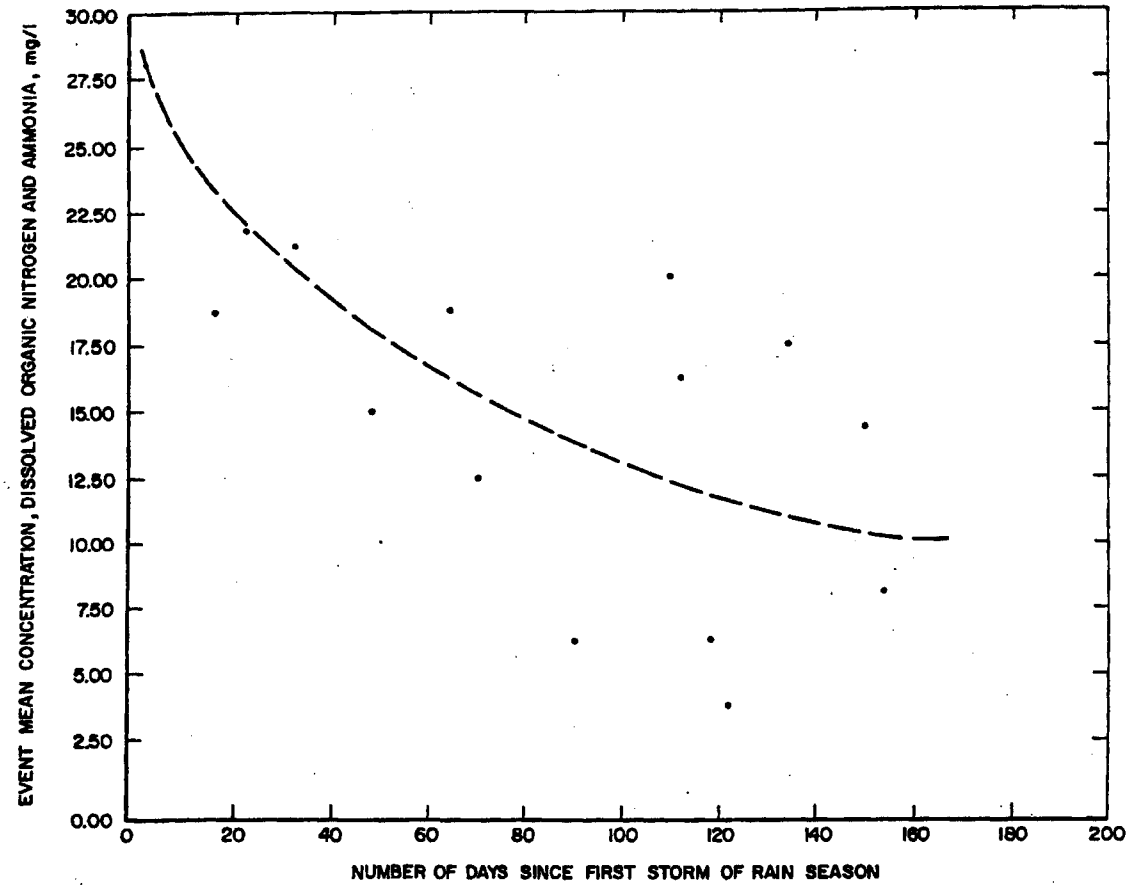


Figure 4-4 Water Quality Variations at the Industrial Site During a Storm



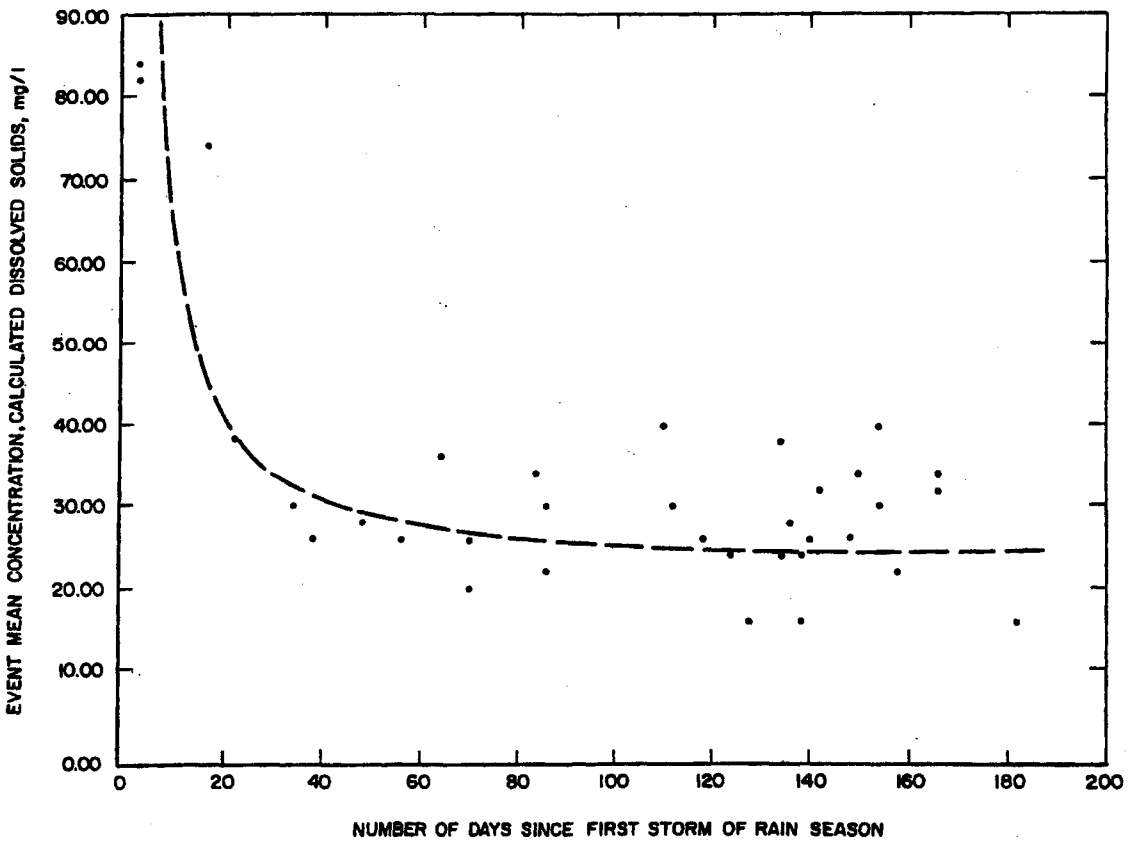
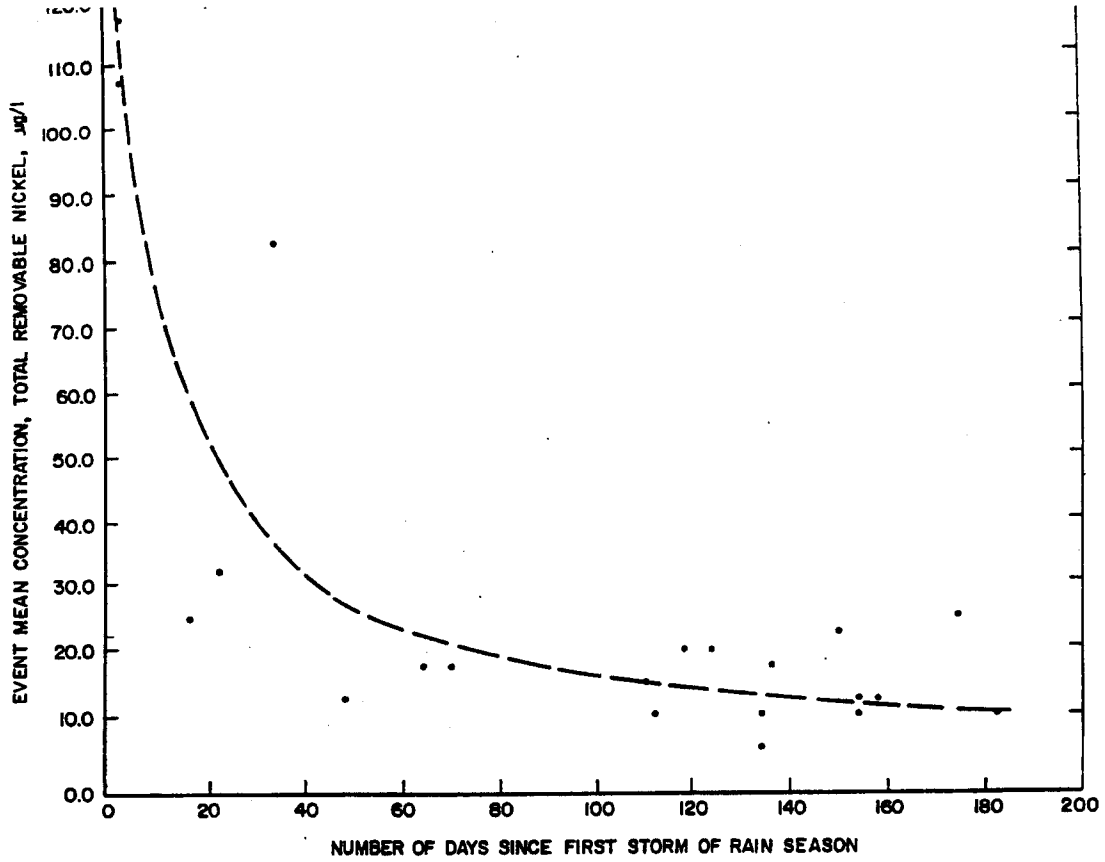


Figure 4-5 Relationships Between Event Mean Concentrations and Number of Days Since the First Storm of the Season



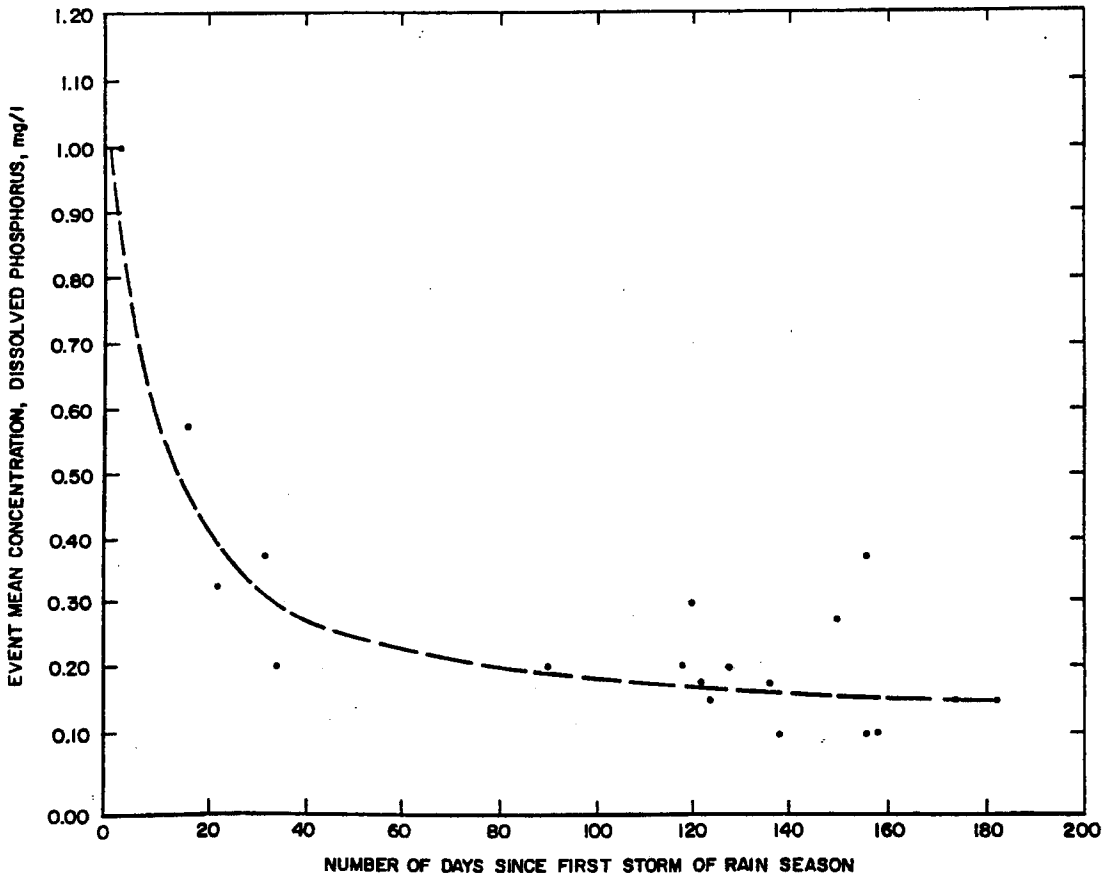


Figure 4-5 Relationships Between Event Mean Concentrations and Number of Days Since the First Storm of the Season (continued)

that at least two or three storms are necessary to wash off the pollutants that have accumulated in the drainage area throughout the dry months (usually May through September). Some constituent EMCs for the industrial catchment tend to decline uniformly throughout the entire rain season while other constituents showed no pattern at all. The constituent EMCs which did not show any pattern with the time since the first storm of the rain season at any of the land use types include dissolved and suspended organic carbon, total recoverable chromium, arsenic, and mercury. The remaining metal EMCs also did not show any pattern for the commercial and industrial catchments.

After this early rain season wash off, the EMC is influenced by the number of dry hours since the last storm and the storm runoff volume. Immediately after a storm, the drainage area begins accumulating atmospheric dry deposition along with vehicular deposition and other sources of constituents. Therefore, the longer the time since the last storm, the more material available to be washed off.

Upon wash off, the volume of runoff influences the constituent EMCs. If a small storm occurs and only washes off a part of the accumulated pollutants, the EMC will be higher than if a large storm occurs washing off all the available pollutants because of a greater degree of dilution. This is particularly true in the case of a highly impervious drainage area such as the commercial site where the pollutants are rapidly washed off, and as the storm progresses, the constituent concentrations approach the concentrations of the rain.

Annual Loads

Based on data collected by USGS, it was possible to determine the annual loads of several key constituents in rainfall and runoff. Key constituents are those constituents which were detected in soil or groundwater or are of concern in drinking water. The loads are based on a large amount of data collected during two wet seasons, 1981-82 and 1982-83. The rainfall during the 1981-82 season was 10.79 inches, which is 110 percent of normal. This rain season was not entirely normal since 40 percent of the rain fell in one month. The rainfall during the 1982-83 season was 23.56 inches, which is 240 percent of normal. The annual loads calculated for the 1981-82 season are, therefore, more representative of normal annual loads. The loads from dry deposition are based on less data and are not as accurate due to problems in gathering dry deposition data. It was not possible to calculate loads from street particulates. The methods used to calculate the loads are presented in this section. The loads are presented later in this chapter in the quasi mass balance section.

Rainfall. The annual loads of several key constituents in precipitation were calculated by determining the average EMC for each year at each site and then multiplying the EMC by the amount of rainfall in each year and by the drainage area of the single-family and industrial catchments. Since a single precipitation sample was collected over the duration of a storm, the concentration measured in this "composite" sample is considered the EMC for that storm. The average annual EMC is the mean of the individual storm EMCs. The loads of several constituents were calculated on a "flow-weighted" basis. The individual storm EMCs were weighted by the amount of precipitation that occurred. The flow-weighted loads were similar to the other loads.

Storm Runoff. The average EMC for each year was calculated to determine the annual loads from storm runoff. An EMC was calculated for each storm. For many storms, several discrete samples were collected and analyzed. For these storms, runoff loads were calculated and the EMC was determined by dividing the total storm load by the total storm runoff volume. During other storms, flow-weighted discrete samples were composited and analyzed as one sample. The EMC was equal to the concentration of that sample.

The annual runoff loads were calculated by determining the arithmetic average EMC for each year and multiplying it by the amount of precipitation, the drainage area of each land use catchment, and the flow-weighted runoff coefficients of each land use. The loads of several key constituents were calculated on a "flow-weighted" basis. The annual average EMC was calculated by weighting the individual storm EMCs by the amount of runoff that occurred in the storm. The arithmetic mean and flow-weighted loads are compared later in this chapter.

Dry Deposition. As discussed in the USGS report, it is extremely difficult to collect accurate dry deposition data. Extrapolating a limited amount of data collected at one site to the entire drainage area is questionable; however, it does allow a comparison of the dry deposition loads to the loads from other sources. The nutrient and metal loads are based on nine samples and the organic loads are based on one sample.

Street Particulate Material. It was not possible to calculate annual loads of constituents collected on street surfaces due to problems in collecting the data. According to USGS, the 20 to 25 curb-to-curb samples that were collected for each drainage area represent only about 0.1 percent of the street surface area in the drainage area. The multiple-dwelling residential and industrial drainage areas often had sand and silt deposits in the gutters due to erosion from adjacent

slopes. When this material was accidentally collected along with the sample, it heavily influenced the results. Due to these types of problems, street particulate loads were not calculated.

Quasi-Mass Balance. To determine the relative contributions of rain and dry deposition to runoff, a mass balance of several key constituents was calculated. Table 4-21 presents the annual loads of several key constituents from runoff, precipitation, and dry deposition at the single-family residential and industrial sites. The average loads using both years of data are shown for the conventional constituents. Since less data were collected on the metals and organics, it was only possible to show the loads from 1982-83. The actual pollutant loads from precipitation were multiplied by the flow-weighted runoff coefficients for the single-family residential site and the industrial site, since these coefficients represent the proportion of rainfall that runs off the drainage area at the runoff sampling sites. The remaining rainfall and the associated pollutant load never reach the runoff sampling site. The following runoff coefficients were used:

Conventional constituents (1981-82 and 1982-83)	
Single-family residential	0.24
Industrial	0.23
Metals and organics (1982-83)	
Single-family residential	0.25
Industrial	0.23

There is no rigorous method for estimating the amount of dry deposition that ends up in runoff. The amount of dry deposition that is picked up by runoff and carried to a recharge basin is dependent on rain intensity and the scouring velocity of the runoff water, as well as the type of ground surface. For purposes of this balance, the runoff coefficients used to estimate the portion of rainfall that runs off the drainage area were also used for estimating the portion of dry deposition that ends up in runoff.

The pollutant loads from rainfall and dry deposition should be less than the pollutant loads in runoff. This is because there are other sources of these pollutants in the drainage area which could not be quantified. For example, cars contribute metals, particularly lead, to the drainage areas. Homeowners contribute pesticides to the drainage area when they spray lawns and gardens. Animal wastes and fertilizer contribute nutrients to the drainage areas. As shown in Table 4-21, the runoff loads of many constituents at

Table 4-21. Mass Balance of Contaminant Sources to Urban Runoff

Constituent	Loads, lbs/year per drainage area[a]							
	Single-family residential				Industrial			
	Rainfall[b]	Dry deposition[b]	Atmospheric total	Runoff	Rainfall[b]	Dry deposition[b]	Atmospheric total	Runoff
Dissolved nitrate + nitrite	19	160	180	86	63	170	230	600
Total phosphorus	1	9	10	78	23	87	110	1,700
Dissolved calcium	43	85	130	400	140	200	340	4,500
Dissolved chloride	43	53	96	160	130	150	280	44,000
Arsenic[c]	0.14	0.10	0.24	0.19	0.36	0.20	0.56	3.6
Chromium[c]	0.14	0.50	0.64	0.70	0.36	2.7	3.1	4.0
Copper[c]	0.48	3.0	3.5	1.1	2.9	6.9	9.8	17
Lead	1.1	9.1	10.2	21	3.9	10.4	14.3	21
Mercury[c]	0.014	0.018	0.032	0.13	0.045	0.037	0.082	0.20
Iron[c]	44	95	139	518	240	341	581	3,389
Manganese[c]	2.3	2.5	4.8	13	9.6	10.1	19.7	119
Chlordane[c]	0.014	0.002	0.016	0.019	0.039	0.004	0.043	0.037
DDT[c]	0.001	0	0.001	0.001	0.004	0	0.044	0.004
Diazinon[c]	0.011	0.0007	0.012	0.037	0.043	0.003	0.046	0.23

[a]The characteristics of the single-family residential and industrial drainage areas are presented in Table 4-1.

[b]The annual rainfall and dry deposition loads were multiplied by the flow-weighted runoff coefficients for the single-family residential site and the industrial site to correct for the amount of pollutants that never reach the runoff sampling sites.

[c]Loads for these constituents are based on 1982-83 data only. Loads for all other constituents are the average load for 1981-82 and 1982-83.

the single-family residential site and most constituents at the industrial site were considerably higher than the sum of rainfall and dry deposition loads, indicating a significant contribution from other sources. Over 50 percent of the load of total phosphorus, calcium, mercury, iron, manganese, and diazinon at the single-family residential and industrial sites is from other sources. In addition, over 50 percent of the nitrate-nitrite, chloride, and arsenic loads at the industrial site are from other sources. The majority of the atmospheric load of most constituents came from dry deposition. The majority of the arsenic, chlordane, DDT, and diazinon loads came from rainfall; however, only one dry deposition sample was analyzed for organics so it is difficult to compare these data.

Although the mass balance is not precise, it does give a good indication of the relative sources of several key constituents. The mass balance is fairly good considering the problems involved in collecting dry deposition data and the fact that street particulate loads could not be included in it.

Unit Runoff Load Factors. Unit runoff loads in pounds per acre per year (lbs/acre/year) were calculated for the key constituents at each land use site. Although unit loads were not calculated for rainfall and dry deposition, it is possible to calculate these loads from the data presented in Table 4-21. The unit loads presented in Table 4-22 are based on the 1981-82 runoff loads, since 1981-82 was closer to a normal rainfall year in Fresno than was 1982-83. Some of the unit loads presented in Table 4-22 differ from those presented in the USGS report because they were calculated differently. The unit loads in the USGS report were based on loads from both years of the project and excluded some of the fall storms.

In general, the highest unit load factors were found at the commercial site and the lowest were found at the single-family residential site. The runoff load factors for suspended solids ranged from 51 lbs/acre/year at the single-family residential site to 280 lbs/acre/year at the industrial site. The high suspended solids factors at the multiple-family residential and industrial sites are probably due to erosion from vacant land in these two drainage areas. The unit loads of major ions and nutrients were all lowest at the single-family residential site and highest at the commercial and industrial sites. The unit loads of major ions and nutrients were generally less than 10 lbs/acre/year at all sites. The unit loads of metals were generally less than 0.1 lb/acre/year at all sites. The lowest metal unit loads were generally found at the single-family residential site and the highest unit loads were found at the commercial site. The unit loads of organics were generally less than 0.001 lb/acre/year at all sites.

Table 4-22. Annual Loads of Key Constituents in Runoff

Constituent	Load, lbs/year											
	Single-family residential			Multiple-family residential			Commercial			Industrial		
	1981-82	1982-83	Mean	1981-82	1982-83	Mean	1981-82	1982-83	Mean	1981-82	1982-83	Mean
Suspended solids	4,900	23,000	14,000	9,500	94,000	52,000	7,700	160,000	84,000	77,000	211,000	144,000
Dissolved solids	3,500	7,400	5,500	3,500	23,000	13,000	5,800	85,000	45,000	41,000	249,000	145,000
Dissolved nitrate + nitrite	42	130	86	35	270	150	120	1,200	660	190	1,000	600
Total phosphorus	46	110	78	23	190	110	59	300	180	1,100	2,200	1,700
Dissolved calcium	230	560	400	310	1,600	960	670	8,000	4,300	1,900	7,000	4,500
Dissolved chloride	93	230	160	200	920	560	440	2,800	1,600	5,700	83,000	44,000
Arsenic	0.10	0.19	0.15	0.12	0.30	0.21	0.42	1.6	1.0	3.5	3.6	3.6
Chromium	0.48	0.70	0.59	0.71	1.7	1.2	1.5	4.1	2.8	3.7	4.0	3.9
Copper	1.2	1.1	1.2	1.2	1.8	1.5	2.0	5.2	3.6	12	17	15
Lead	8.8	33	21	8.9	30	19	16	89	53	13	29	21
Mercury	0.005	0.13	0.068	0.017	0.039	0.028	0.026	0.049	0.038	0.041	0.20	0.12
Iron	80	518	299	361	1,668	1,015	167	2,726	1,447	1,835	3,389	2,612
Manganese	-	13	-	-	39	-	-	87	-	-	119	-
Chlordane	0.008	0.019	0.014	0.006	0.048	0.027	0.017	0.040	0.029	0.016	0.037	0.027
DDT	0.0005	0.001	0.0008	0.0004	0.002	0.001	0.001	0.003	0.002	0.001	0.004	0.003
Diazinon	0.025	0.037	0.031	0.062	0.058	0.06	0.11	0.66	0.39	0.15	0.23	0.19

A sensitivity analysis was conducted to determine if unit loads calculated from an arithmetic average EMC differed from loads calculated from a flow-weighted EMC. The 1981-82 data were used since the amount of precipitation during that year was more normal than during 1982-83. The loads of lead, copper, iron, and arsenic were calculated with both methods. The flow-weighted loads were calculated from a flow-weighted EMC. The EMC was determined by weighting the individual storm EMCs by the amount of runoff that occurred during the storm. The EMCs and unit loads calculated with both methods are shown in Table 4-23. Most of the flow-weighted unit loads at the single-family residential and commercial sites are 10 to 20 percent lower than the arithmetic unit loads. The exceptions are arsenic and lead at the single-family residential site. The lower flow-weighted loads are due to the occurrence of one large storm that had low concentrations of metals.

When the loads are calculated on a flow-weighted basis, this method significantly reduces the unit load factors. The flow-weighted unit loads at the multiple-family residential and industrial sites were 10 to 20 percent higher than the arithmetic unit loads. There were two large storms that had high metals concentrations at these sites. When the loads are calculated on a flow-weighted basis, these storms increase the unit load factors.

Table 4-23. Comparison of Arithmetic and Flow-Weighted EMCs and Loads

Land use/constituent	Arithmetic basis		Flow-weighted basis	
	EMC, ug/l	Unit load, lbs/acre/yr	EMC, ug/l	Unit load, lbs/acre/yr
Single-family residential				
Lead	170	0.092	100	0.054
Copper	22	0.013	16	0.009
Iron	1,538	0.83	1,225	0.66
Arsenic	2.0	0.0010	2.1	0.0011
Multiple-family residential				
Lead	212	0.20	245	0.23
Copper	29	0.027	32	0.030
Iron	8,616	8.0	10,072	9.4
Arsenic	2.8	0.0027	3.1	0.0030
Commercial				
Lead	103	0.28	90	0.24
Copper	13	0.034	12	0.031
Iron	1,091	2.9	951	2.5
Arsenic	2.7	0.0072	2.1	0.0056
Industrial				
Lead	86	0.047	99	0.054
Copper	72	0.044	77	0.047
Iron	11,396	6.7	14,173	8.3
Arsenic	21	0.013	23	0.014

CHAPTER 5

SOILS AND GROUNDWATER MONITORING PROGRAM

To evaluate the effect of recharging urban storm runoff, the soils and groundwater underlying several recharge basins were monitored. This portion of the Fresno Nationwide Urban Runoff Program (NURP) project was conducted by the U.S. Department of Agriculture (USDA), Agricultural Research Service's Water Management Research Unit in Fresno, California. Data gathered by USDA are presented and analyzed in this chapter. A more detailed presentation and statistical analysis of the data are contained in the project report prepared by USDA.

DESCRIPTION OF MONITORING PROGRAM

The field program consisted of sampling of four major components: soils, soil water, groundwater, and plant tissue. The investigation was conducted at five of the District's recharge basins. Test basin locations are shown on Figure 4-1. The principal characteristics of these basins are listed in Table 5-1. Samples were analyzed for a wide range of constituents, including physical properties, minerals, metals, and organics. A complete list of the constituents measured in this portion of the program is presented in Appendix B Detailed descriptions of the sampling programs are contained in the USDA project report. The programs are briefly described in this section.

Table 5-1. Key Characteristics of USDA Test Basins

Characteristic	Basin name				
	F	G	M	EE	MM
Size, acres	6.0	8.5	9.0	10.0	8.5
Depth, feet	9.0	6.0 to 8.0	10.0	29.0	21.0
Drainage area, acres	475	403	620	2,314	895
Storage capacity, cubic feet	1,768,500	1,546,400	4,310,300	8,716,400	5,131,900
Vegetation	Fully turfed	Fully turfed	Fully turfed	Unturfed	Unturfed
Availability of canal water for artificial recharge	Yes	No	No	Yes	Yes
Completion year	1965	1962	1969	1977	1978

Soils

Initial soils samples were collected at all five sites during the summer of 1981. Samples were then collected in the spring of 1982 and 1983 after each wet weather season. In addition, the basins that receive summer irrigation water for recharge were sampled at the end of the irrigation season in both 1982 and 1983. The technique for collecting soils samples varied with depth. The surface soil layer was sampled at several depths to a maximum of 0.3 meter (m) with a hand core sampler. The soil layer from the surface to 3 m was sampled every 0.3 m with a bucket auger. The soil layer from 3.0 m to the top of the water table was core sampled (0.8m long core) every 1.5 m with a hollow-stem flight auger. Soil samples were also collected at "uncontaminated" control sites near each test basin to determine background conditions. About 1,550 soil samples were collected for analysis.

Soil Water and Groundwater

Obtaining a suitable (0.5 to 1.5 liter) sample of percolating runoff water in the unsaturated zone is difficult under the best of subsurface stratification conditions. Vacuum ceramic-Teflon soil water extractors were used in this project. Extractors were placed on top of a soil layer known to have a lower hydraulic conductivity than the soil just above that layer. This was done with the hope that soil water would be more available in these locations than elsewhere in the unsaturated zone. Soil water was collected at two or three depths in each basin. The very top zone of the water table or deep perched water table was sampled in each basin since, if runoff pollutants are moving downward, they should most easily be detected at the top of the water table. The volume of water extracted from the soil in the unsaturated zone was variable and depended on soil physical properties and availability of water resulting from the recharge taking place. Water samples were collected on a bimonthly basis between January and September 1982, and on a monthly basis between October 1982 and July 1983. A total of 334 water samples were collected for chemical analysis.

Plant Tissue

Plant tissue samples were collected to evaluate the uptake of certain metals by vegetation covering the surface of some of the basins. Two locations were sampled within each of the three turfed basins. One location was in a deeper portion of the basin where pollutants tend to accumulate. The second was above the high-water line in an area that should not be directly affected by runoff water. Four sets of plant tissue samples were collected during the two-year study producing a total of 61 samples.

RESULTS

A summary of the results of the soils and groundwater monitoring program is presented in this section. All of the data are not presented, since this report focuses on the constituents that are most important in terms of the potential contamination of the water supply and the potential for health hazards associated with recreational activities within the basins. A more complete presentation and discussion of the data are contained in the USDA project report.

Soils

Soils data results are divided into three groups: physical properties, metals, and organics.

Physical Properties. The soil texture (sand, silt, and clay content) and cation exchange capacity help define the stratigraphy of each basin in relation to its recharge potential. Soil texture and cation exchange capacity profiles are presented on Figure 5-1. The upper half of each figure is for the 0-to-30-centimeter (cm) soil samples and the bottom half is the 0-to-3 m bucket auger samples, plus the flight auger cores below 3 m. There are significant variations among recharge capabilities of the five basins:

1. Basin F--The first 3 m of the profile is sandy followed by a silt loam layer from about 3 to 10.5 m, then a loamy sand layer to 15 m, followed by a second silt loam layer to 19.5 m, then into sandy loam and first zone of water saturation. Basin F has a profile that is fairly good for recharge in spite of the two silt loam layers.

2. Basin G--The major clay layer extends from 7.5 to 13 m and silty layer from 13 to 18 m. The soil profile for Basin G has a poorer recharge potential compared to Basin F because of the higher clay content.

3. Basin M--There is a sandy loam layer extending from about 4 to 9 m, but below this the soils are loamy sands. The soil profile for Basin M has greater recharge potential than Basins F and G.

4. Basin EE--There is a very tight clay layer extending from 1 to 3 m below the basin floor, which has the highest cation exchange capacity of any of the five main basins sampled. Below the clay layer there are some sands, but at 4.5 m there is a second clayey layer. Below about 6 m, the silt content increased. The first zone of saturation encountered was at 10 m below the

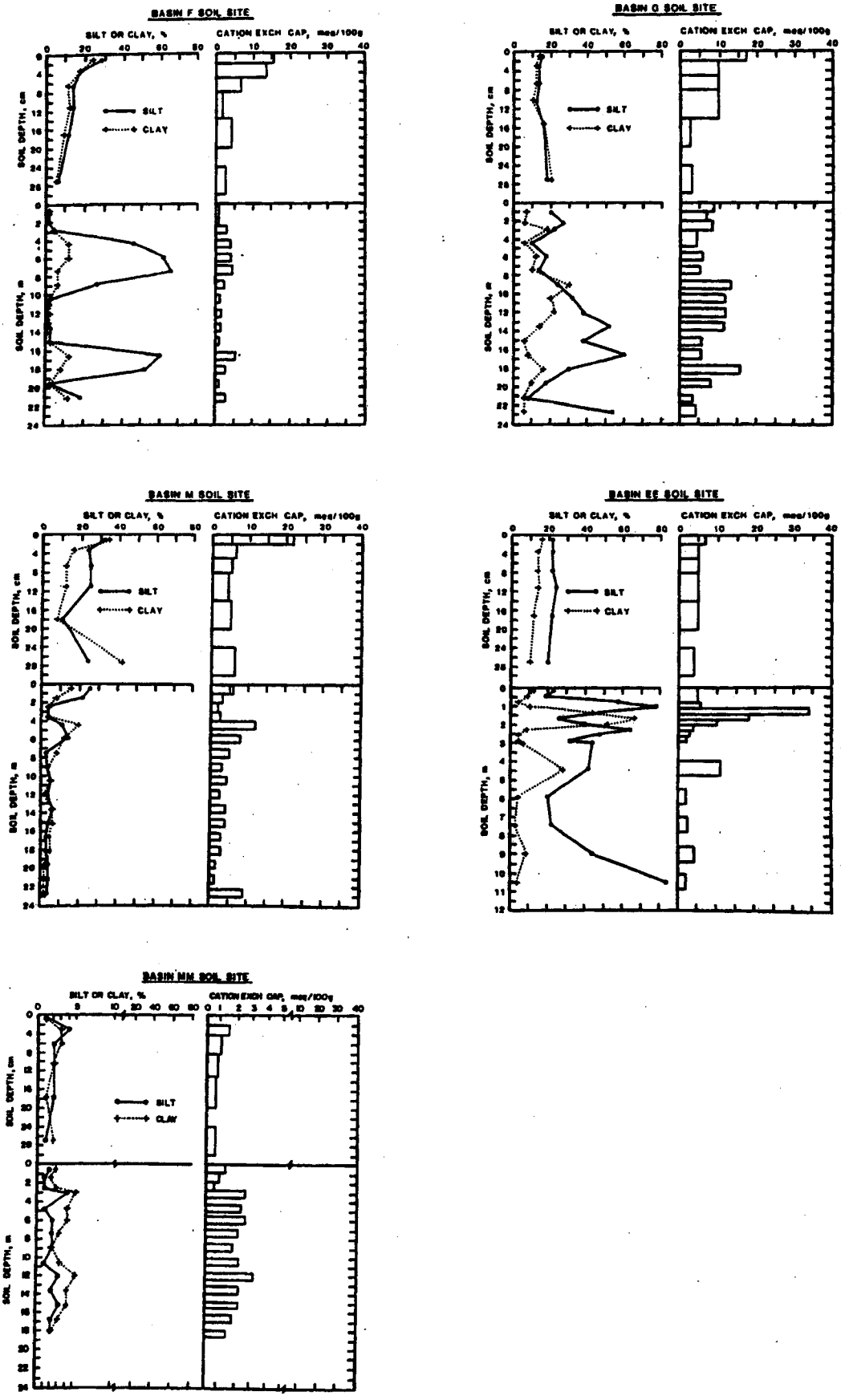


Figure 5-1 Silt, Clay, and Cation Exchange Capacity Profiles in Basin Soils

asin floor and is believed to be a perched water able. Basin EE has the poorest recharge potential of y of the five basins.

asin MM--The entire soil profile is loamy sand to sands d consequently has the highest recharge potential of l the five basins.

. The metals of primary interest in this study were opper, and lead. Arsenic was also included in this oncentrations of these elements detected in the soil each test basin are listed in Table 5-2. The mean ion of each metal for each soil horizon are presented ased on three samplings: summer 1981, spring 1982, and 83. Concentrations decrease rapidly with depth. For the maximum lead concentration of 1,600 milligrams/ (mg/kg) was measured in the surface layer (0.00 to f Basin M. However, within 0.14 m or about 6 inches, concentrations had decreased to 15 mg/kg or less. some differences among the metal concentrations ins. Concentrations tend to be highest in Basin M and Basin MM. Differences may be caused by several including the type and amount of runoff received, soil s, and whether the basin receives summer recharge ome of these factors will be analyzed later in this d in Chapter 6.

resence of mercury in basin soils was investigated with samples from Basins G and EE, after mercury was in several runoff samples. Mercury was detected e upper 0.14 m of soil. The maximum concentrations sured at the surface (0.00 to 0.02 m) and were 0.07 0.10 mg/kg in Basins G and EE, respectively.

nics. Soils samples were regularly tested for numerous organic compounds, including chlorinated pesticides, osphorus pesticides, chlorophenoxy herbicides, and compounds. Specific constituents for which analyses ducted are listed in Appendix B. Several samples o analyzed for semivolatile organics and purgeable by gas chromatography/mass spectrometry in accordance ronmental Protection Agency (EPA) Methods 625 and 624. constituents covered by these methods are also listed ix B. Organics results are briefly described below.

hlorinated pesticides--Only four of the chlorinated esticides were detected in at least one soil sample. he most prevalent compound was chlordane, which was

Table 5-2. Mean Concentrations of Arsenic, Nickel, Copper, and Lead in Basin Soils

Depth, m	Basin F				Basin G				Basin M			
	Mean concentration, mg/kg				Mean concentration, mg/kg				Mean concentration, mg/kg			
	Arsenic	Nickel	Copper	Lead	Arsenic	Nickel	Copper	Lead	Arsenic	Nickel	Copper	Lead
0.00 to 0.02	20.0	32.0	37.0	713.0	7.4	37.0	25.0	487.0	31.0	53.0	55.0	1,333.0
0.02 to 0.05	16.0	26.0	27.0	370.0	9.9	37.0	19.0	467.0	5.8	20.0	16.0	283.0
0.05 to 0.08	10.0	16.0	9.2	73.0	8.8	37.0	15.0	184.0	6.7	14.0	11.0	37.0
0.08 to 0.14	7.8	15.0	7.3	27.0	7.2	33.0	16.0	39.0	6.1	13.0	8.7	22.0
0.14 to 0.20	4.4	15.0	5.2	17.0	4.3	29.0	15.0	26.0	4.3	13.0	7.4	7.2
0.24 to 0.30	2.3	9.1	3.8	13.0	6.3	30.0	9.5	7.5	6.9	16.0	8.1	10.0
0.30 to 0.60	2.3	7.3	5.3	3.6	7.2	71.0	11.0	9.1	10.0	19.0	8.3	9.1
0.90 to 1.20	1.5	8.0	4.5	2.8	9.2	37.0	14.0	5.2	6.4	16.0	9.5	4.6
1.50 to 1.80	1.4	6.0	4.8	2.4	3.0	22.0	12.0	4.0	6.7	17.0	7.6	4.6
2.10 to 2.40	1.7	6.8	5.3	2.8	3.5	18.0	7.8	4.3	4.9	13.0	7.6	3.7
2.70 to 3.00	1.7	5.7	2.1	2.8	10.0	87.0	21.0	5.3	2.2	9.1	6.5	2.4

Depth, m	Basin EE				Basin MM			
	Mean concentration, mg/kg				Mean concentration, mg/kg			
	Arsenic	Nickel	Copper	Lead	Arsenic	Nickel	Copper	Lead
0.00 to 0.02	4.8	22.0	25.0	297.0	4.5	11.0	9.5	93.0
0.02 to 0.05	6.4	16.0	20.0	250.0	3.5	8.6	5.8	34.0
0.05 to 0.08	4.7	13.0	15.0	160.0	1.8	5.4	2.0	12.0
0.08 to 0.14	3.6	11.0	7.7	87.0	2.4	6.6	1.9	4.5
0.14 to 0.20	4.1	9.8	5.8	11.0	2.3	6.2	1.4	2.5
0.24 to 0.30	2.2	10.0	6.7	3.4	2.3	4.2	1.8	1.7
0.30 to 0.60	11.0	11.0	5.6	4.8	2.1	6.0	2.1	4.3
0.90 to 1.20	7.6	11.0	8.6	5.4	1.9	4.9	1.5	1.9
1.50 to 1.80	11.0	14.0	17.0	7.2	1.2	4.3	1.8	2.1
2.10 to 2.40	4.7	10.0	6.2	3.0	2.9	6.6	2.7	2.0
2.70 to 3.00	3.1	10.0	5.5	2.2	2.9	7.3	3.0	1.9

consistently detected in all five basins. Table 5-3 indicates the concentration of chlordane found in the soil profile in 1981, 1982, and 1983. Chlordane was present in the highest concentrations in the surface soil of the older, turfed basins (F, G, and M). Maximum concentration detected was 2.7 mg/kg in Basins G and M in 1982. Concentrations rapidly decreased with depth and concentrations were generally less than detection limits within 24 cm (10 inches).

In addition, three other chlorinated organics were occasionally detected: lindane, DDT, and DDE. Table 5-4 lists the concentrations of these three compounds for samples when they were detected. Lindane was detected only in Basin F at concentrations between 0.01 and 0.02 mg/kg in a total of five samples, which were near the surface. DDT was detected at the surface in four of the five basins in a total of seven samples. DDE was detected in three of five basins in a total of ten samples. The maximum penetration of any of these three chlorinated organics was 0.20 m (8 inches).

2. Organophosphorus pesticides--The organophosphorus pesticides searched for in selected soil depth intervals from the surface to the first zone of saturation were: diazinon, ethion, malathion, methylparathion, and parathion. None of these pesticides were detected in any of the soil samples. Detection limit for these constituents was 0.003 mg/kg (or three parts per billion).

3. 2,4-D--Soil samples collected in 1982 were analyzed for the herbicide 2,4-D. The herbicide was not detected in any of the samples. Detection limit was 0.02 mg/kg.

4. Phenolic compounds--Total phenol was detected in the surface soils in several samples. Total phenol was detected in all five basins. The maximum concentration encountered was 0.17 mg/kg in Basin MM. Phenol concentrations decreased with depth and below 1.5 m concentrations were less than the detection limit of 0.005 mg/kg, except for Basin MM. Phenol was detected in sandy Basin MM down to 3 m. Specific phenols searched for were: pentachlorophenol, 2,4-dimethylphenol, 4-nitrophenol. These compounds were not detected in any of the soil samples.

5. Semivolatile and purgeable priority pollutants--Several samples were analyzed for the semivolatile and purgeable priority pollutants in accordance with EPA methods 625 and 624. These tests covered over 110 individual organic compounds. A complete listing of these

Table 5-3. Chlordane Concentrations in Basin Soil Samples

Sampling year	Soil depth, m	Concentration, mg/kg				
		Basin F	Basin G	Basin M	Basin EE	Basin MM
1981	0.00-0.02	1.30	0.22	2.00	0.76	<0.03
	0.02-0.05	0.80	0.16	0.66	1.10	<0.03
	0.05-0.08	0.04	<0.03	0.05	0.74	<0.03
	0.08-0.14	<0.03	<0.03	<0.03	1.20	<0.03
	0.14-0.20	<0.03	0.51	<0.03	<0.03	<0.03
	0.24-0.30	<0.03	<0.03	<0.03	<0.03	<0.03
	0.30-0.60	<0.03	<0.03	<0.03	<0.03	0.04
	0.60-0.90	<0.03	<0.03	<0.03	<0.03	<0.03
	0.90-Sz[a]	<0.03	<0.03	<0.03	<0.03	<0.03
1982	0.00-0.02	1.10	2.70	2.70	0.07	0.63
	0.02-0.05	1.10	2.40	0.27	0.67	0.08
	0.05-0.08	0.11	0.47	0.03	0.63	<0.03
	0.08-0.14	0.07	0.08	<0.03	0.28	<0.03
	0.14-0.20	<0.03	0.04	<0.03	<0.03	<0.03
	0.24-0.30	<0.03	<0.03	<0.03	<0.03	<0.03
	0.30-Sz[a]	<0.03	<0.03	<0.03	<0.03	<0.03
1983	0.00-0.02	1.40	1.50	<0.13	<0.13	<0.13
	0.02-0.05	0.94	1.80	<0.13	<0.13	<0.13
	0.05-0.08	0.14	0.90	<0.13	<0.13	<0.13
	0.08-0.14	0.067	<0.13	<0.13	<0.13	<0.13
	0.14-0.20	0.061	<0.13	<0.13	<0.13	<0.13
	0.24-0.30	<0.03	<0.13	<0.13	<0.13	<0.13
	0.30-Sz[a]	<0.03	<0.13	<0.13	<0.13	<0.13

[a]First "Saturated Zone"

Table 5-4. Lindane, DDT, and DDE Concentrations in Basin Soil Samples

Constituent	Date	Concentration, mg/kg	Basin	Depth, m
Lindane (Gamma BHC)	6-24-81	0.02	F	0.00-0.02
	6-22-81	0.01	F	0.00-0.02
	6-22-81	0.01	F	0.02-0.05
	6-22-81	0.02	F	0.05-0.08
	6-22-81	0.01	F	0.08-0.14
DDT	6-8-82	0.47	G	0.00-0.02
	6-8-82	0.48	G	0.02-0.05
	6-8-82	0.10	G	0.05-0.08
	6-16-82	0.46	M	0.00-0.02
	6-16-82	0.05	M	0.02-0.05
	5-26-82	0.06	EE	0.00-0.02
	5-5-82	0.06	MM	0.00-0.02
DDE	6-10-81	0.04	G	0.00-0.30
	6-8-81	0.03	G	0.02-0.05
	6-8-81	0.03	G	0.14-0.20
	6-8-82	0.05	G	0.00-0.02
	6-8-82	0.06	G	0.02-0.05
	6-8-82	0.02	G	0.05-0.08
	6-17-81	0.02	M	0.00-0.02
	6-16-82	0.04	M	0.00-0.02
	7-31-81	0.01	EE	0.02-0.05
	7-31-81	0.01	EE	0.05-0.08

Note: Concentrations of these three constituents were less than detection limits in all other soil samples.

compounds and their detection limits are included in Appendix B. None of the semivolatile organics were detected in any of the samples. Two of the purgeable organics were detected in one sample (5 to 8 cm depth) in Basin F--toluene at 0.007 mg/kg and methyl cyclohexane at 0.0005 mg/kg. None of the other purgeable organics were detected in any of the samples.

6. Polychlorinated biphenyl (PCB)--PCB was not included in the regular analytical program. However, in the process of running other organics tests, PCB was detected. Thus, several other samples were tested for PCB. Aroclor 1260 was detected in four of eleven samples. Aroclors 1016 through 1262 were not detected. Detection limit for PCB was 0.10 mg/kg. Aroclor 1260 results are listed in Table 5-5.

Table 5-5. Concentrations of Polychlorinated Biphenyl (Aroclor 1260) in soils

	Concentration, mg/kg		
Depth, cm	Basin F	Basin M	Basin MM
0-2	0.18	0.43	ND[a]
2-5	0.22	ND[a]	ND[a]
5-8	0.13	ND[a]	ND[a]
8-14	ND[a]	—	ND[a]

[a]ND = Not detected.

Groundwater

Groundwater data results are divided into three groups: cations and anions, metals, and organics.

Cations and Anions. Soil water and groundwater samples were analyzed for electrical conductivity, cations, and anions to define general mineral quality. These results are summarized in Table 5-6 for samples collected in 1982 and 1983. Soil water samples include all samples collected in the unsaturated zone. There were two or three different sampling depths locations in the unsaturated zone. The groundwater samples were collected at the top of the zone of saturation.

Table 5-6. Concentration of Selected Cations and Anions in Soil Water and Groundwater

Constituent[a]	Location	Basin F			Basin G			Basin H			Basin EE			Basin MM		
		N[b]	Range	Mean	N	Range	Mean	N	Range	Mean	N	Range	Mean	N	Range	Mean
Electrical conductivity	SW[c]	28	54-260	115	2	119-541	330	9	112-294	170	25	46-209	120	13	37-80	52.5
	GW[d]	18	85-377	153	16	595-843	744	12	82-180	109	14	122-246	175	8	37-89	61
Calcium	SW	24	3.7-26.7	9.4	2	8-38	23	8	11-37	18.4	23	3.8-22	11	12	3.0-7.1	4.6
	GW	18	5.9-27	11.1	16	42-64	55	12	5.1-13	8.3	14	8.7-23	15	8	2.8-8	4.5
Magnesium	SW	24	1.0-6.6	3.1	2	3-141	72	8	3.9-7.2	5.5	23	0.45-11	4.2	12	0.76-1.7	1.2
	GW	18	2.5-12	4.7	16	23-45	36	12	2.6-6.3	3.9	14	5.1-12	8.1	8	0.85-3.1	1.9
Sodium	SW	24	2.3-16.6	7.5	2	14.5-70	42	8	5.3-13	8.5	23	2.2-9.2	5.4	12	1.8-4.9	2.6
	GW	18	6.3-17	9.4	16	45-80	55	12	4.9-11	7.2	14	4.7-11	7.4	8	2.4-5.6	3.3
Potassium	SW	24	1.4-4.7	2.4	2	1.2-2.1	1.7	8	2-3.2	2.5	23	1.7-3.8	2.6	12	0.35-1.5	1.1
	GW	18	1.8-4.1	2.4	16	7.4-13	11	12	1.8-3.6	2.4	14	1.7-2.6	2.3	8	1.1-2.4	1.7
Bicarbonate	SW	13	34-131	57	2	34.2-54	44.1	6	84-171	105	20	4-149	67.2	11	16-39	26
	GW	17	37-64	52	13	293-414	356	11	35-104	58	13	64-128	94	7	18-41	29
Sulfate	SW	16	1.6-14.6	5.2	2	5.6-7.2	6.4	6	3.2-14	5.9	20	1-19	4.9	12	0.9-3.3	2.4
	GW	17	2.7-13.8	5.3	14	4-51	36	11	1.3-6.9	4.1	13	1.1-7.1	3.6	7	1.8-4.4	3.1
Chloride	SW	18	1.42-18	6.6	2	1.6-17	9.3	6	0.9-6.1	4.1	20	0.64-10	3.6	12	0.38-5.7	3.6
	GW	17	3.4-53.9	13	16	18-36	28	11	0.89-4.7	2.7	13	1.3-7.3	4.1	7	0.62-4.3	2.7
Nitrate as N	SW	20	0.05-5.9	1.1	2	0.25-0.75	0.50	6	0.12-1.8	1.0	21	0.11-1.8	0.80	11	0.08-0.98	0.26
	GW	17	0.69-13.2	2.8	15	0.83-11	5.6	11	0.11-2.2	0.45	14	0.10-2.6	1.1	7	0.07-1.3	0.44
Phosphate as P	SW	12	0.101-0.20	0.15	2	0.078-0.11	0.094	6	0.173-0.258	0.19	20	0.04-0.202	1.12	9	0.04-0.36	0.15
	GW	13	0.068-0.56	0.174	10	0.026-0.271	0.075	8	0.082-0.40	0.165	11	0.039-0.30	0.126	6	0.02-0.248	0.177

[a]Concentrations are in mg/l, except electrical conductivity which is in umho/cm.
[b]N = Number of samples.
[c]SW = Soil water.
[d]GW = Groundwater.

In comparing the results for the five basins, it is clear that Basin G samples have higher concentrations of most constituents than the other four basins. The area where Basin G is located was previously unsewered and septic tanks and leach pits were used for sewage disposal. This area has been known to have high nitrate concentrations. Table 5-6 indicates that the mean concentration of nitrate in the groundwater samples was 5.6 milligrams per liter (mg/l). Water samples collected beneath Basin MM, the basin with the sandy profile and best permeability, consistently had the lowest mineral concentrations.

Metals. Water samples were regularly analyzed for arsenic and the heavy metals nickel, copper, iron, and lead. Several water samples were tested for the other priority pollutant metals. Detection limits varied because of varying sample size (see Appendix B for detection limits). Results for arsenic, nickel, copper, iron, and lead are summarized in Table 5-7 and described below.

Table 5-7. Range and Median Concentration of Metals in Soil Water and Groundwater

Constituent[a]	Location	Basin F			Basin G			Basin H			Basin EE			Basin MM		
		N[b]	Range	Median	N	Range	Median	N	Range	Median	N	Range	Median	N	Range	Median
Arsenic	SW[c]	22	<1-4	<1	0	—	—	3	<1-5	<1	22	<1-4	<1	10	<1-5	<1
	GW[d]	14	<1-6	<1	15	<1-9	<1	10	<1-8	<1	12	<1-10	<1	6	<1-2	<1
Nickel	SW	22	<1	<1	0	—	—	3	<1	<1	22	<1-11	<1	10	<1-2	<1
	GW	14	<1-1	<1	15	<1	<1	10	<1-1	<1	12	<1	<1	6	<1-1	<1
Copper	SW	16	<1-81	6.4	0	—	—	1	—	42	17	0.1-30	7.9	8	0.5-60	18
	GW	12	<1-16	3.0	12	1.3-75	20	8	0.2-23	2.8	8	0.2-11	2.0	5	2.1-21	3
Iron	SW	16	<1-15	4.0	0	—	—	1	—	<6	17	<1-60	6.5	8	<1-11	3.5
	GW	12	<1-19	3.5	12	<1-21	4	8	<1-9	4.5	8	<1-15	7.0	5	<1-7	1
Lead	SW	16	<1-6	<1	0	—	—	1	—	<2	17	<1-3	<1	8	<1-4	2
	GW	12	<1-1	<1	12	<1-2	<1	8	<1-6	<1	8	<1-2	<1	5	<1	<1

[a] = Concentrations are in ug/l.
[b]N = Number of samples.
[c]SW = Soil water.
[d]GW = Groundwater.

1. Arsenic--Median concentrations of arsenic in both soil water and groundwater were less than detection limits in all basins. The maximum concentration measured was 10 micrograms per liter (ug/l).

2. Nickel--Median concentrations of nickel in both soil water and groundwater were less than detection limits in all basins. Whenever nickel was detected, it was only measured at a concentration of 1 or 2 ug/l.

3. Copper--Copper was detected in most all samples. The highest median concentration in the groundwater was 20 ug/l in Basin G. Median concentrations in the groundwater in the other four basins were 3 ug/l or less.

4. Iron--Iron was also detected in most samples. Highest concentrations were found in Basin EE, while the lowest concentrations were found in Basin MM.

5. Lead--Median concentrations of lead in both soil water and groundwater were less than detection limits in all basins except Basin MM. The median concentration of lead in the soil water in Basin MM was 2 ug/l, only slightly above the detection limit. The lead concentration never exceeded 6 ug/l.

Several water samples were tested for the nine priority pollutant metals not included in the regular testing program. Results are contained in Table 5-8. Antimony, beryllium,

cadmium, selenium, silver, and thallium were not detected. Chromium was detected in most samples at a concentration of 0.5 ug/l or less. Mercury was detected in five of eight samples, with the highest concentration being 1.0 ug/l in the groundwater at Basin G. The source of the mercury is unknown, although it was also detected in the runoff samples from all four land use types. Zinc, common to nearly all alluvium, was detected in at least one sample from each basin. The maximum zinc concentration was 90 ug/l in a soil water sample in Basin MM.

Table 5-8. Concentration of Priority Pollutant Metals in Soil Water and Groundwater

	Concentration, ug/l							
	Basin F				Basin G	Basin M	Basin MM	
Constituent	SW1a	SW2	SW3	GWb	GW	GW	SW2	GW
Antimony	<1	<1	<1	<1	<1	<1	<1	<1
Beryllium	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Cadmium	<1	<1	<1	<1	<1	<1	<1	<1
Chromium	<0.1	0.5	0.3	0.5	0.3	0.3	0.4	0.1
Mercury	<0.2	0.2	0.2	0.2	1.0	<0.2	<0.2	0.4
Selenium	<1	<1	<1	<1	<1	<1	<1	<1
Silver	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Thallium	<1	<1	<1	<1	<1	<1	<1	<1
Zinc	<10	<10	10	<10	20	20	90	20

[a]SW = Soil water. Samples were collected at one or more locations in the unsaturated zone.

[b]GW = Groundwater. Samples were collected at the top of the water table.

Organics. Water samples were regularly analyzed for chlorinated pesticides, organophosphorus pesticides, chlorophenoxy herbicides, and phenolic compounds. Specific constituents for which analyses were conducted are listed in Appendix B. Two water samples from Basins F and G were also tested for semivolatile organics using EPA Method 625. It was not possible to analyze for the purgeable priority pollutants, since water samples are collected by vacuum. Detection limits for the organics are listed in Appendix B and vary with the size of the available water sample. Results of the testing for organics are described below.

1. Chlorinated pesticides--None of the ten chlorinated pesticides were detected. Detection limits ranged from 0.02 to 1.4 ug/l.

2. Organophosphorus pesticides--Diazinon was the only organophosphorus pesticide detected. It was detected in three soil water samples (once in Basin F and twice in Basin EE) at a concentration of 0.3 ug/l or less. None of the other organophosphorus pesticides were detected. Detection limits ranged from 0.02 to 1.0 ug/l.

3. 2,4,-D--The chlorophenoxy herbicide 2,4-D was not detected in any water sample. The detection limit ranged from 0.25 to 2.2 ug/l.

4. Phenolic compounds--In all samples, total phenols and the specific phenols (pentachlorophenol; 2,4-dinitrophenol; and 4 nitrophenol) were less than the detection limit of 25 ug/l.

5. Semivolatile organics--None of the 59 semivolatile organics covered by EPA Method 625 were detected. Detection limits for most of the constituents were between 10 and 25 ug/l.

Plant Tissue

It was believed that the presence of metals in the surface 30 cm of soil might be reflected in the uptake of these metals by grasses present in the turfed basins. Thus, sets of leaf samples of bermudagrass, dallisgrass, and crabgrass were collected from each of the three turfed basins in 1981, 1982, and 1983. These samples were analyzed for arsenic, nickel, copper, and lead. Mean concentration of these constituents are presented in Table 5-9 for samples collected from the three test basins and nearby control sites.

Although the amount of plant tissue data collected was limited, some general trends are apparent. The data indicated that for bermudagrass and dallisgrass, the range of increase in nickel content was from 0 to 125 percent of that observed in leaves from the control sites. Copper increased from 20 to 90 percent in the turfed basins. Lead showed the greatest increases, which ranged from 110 to 1,300 percent, excluding crabgrass because of only one sample. These results indicate that these plants do take up nickel, copper, and lead that are present in the turfed basins. Statistical tests performed by USDA indicated that the correlation between lead content of grass leaves and lead content of soil is positive but low. Poor correlation is likely due to the fact that the root-density distribution with depth is not the same as for the soil lead

distribution with depth, especially for bermudagrass which is deep-rooted. Crabgrass, which is shallow-rooted, could take up more lead, but it grows best near sprinkler heads where excess leaching would be expected.

Table 5-9. Mean Concentration of Metals in Plant Tissue

Sample location	Constituent	Concentration, mg/kg								
		Bermudagrass			Crabgrass			Dallasgrass		
		N	CSS[a]	BSS[b]	N	CSS	BSS	N	CSS	BSS
Basin F	Arsenic	5	<0.1	<0.1	1	<0.1	<0.03	4	<0.2	<0.1
	Nickel	5	2.6	3.5	1	2.9	5.9	4	3.6	8.1
	Copper	5	9.3	11.0	1	13.0	31.0	4	8.8	17.0
	Lead	5	0.31	5.5	1	0.69	14.0	4	1.4	3.0
Basin G	Arsenic	5	<0.2	<0.02	2	<0.3	<0.3	3	<0.2	<0.2
	Nickel	5	4.2	5.4	2	2.5	4.4	3	7.0	6.6
	Copper	5	8.9	13.0	2	7.1	12.0	3	15.0	15.0
	Lead	5	2.1	15.0	2	0.43	1.4	3	1.5	8.0
Basin M	Arsenic	5	<0.1	<0.1	1	<0.1	<0.1	4	<0.1	<0.1
	Nickel	5	2.8	4.6	1	2.1	8.7	4	4.7	6.2
	Copper	5	9.0	13.0	1	15.0	14.0	4	12.0	18.0
	Lead	5	1.3	18.0	1	0.97	6.2	4	1.5	15.0

[a]CSS = Control sampling site.
[b]BSS = Basin sampling site.

ANALYSIS

In this section, the results presented in the previous section are analyzed to determine the effect of various factors on the recharge of stormwater runoff and summer recharge water. The analysis is divided into two main parts: soil profiles and water quality data. In addition, a final section is included that summarizes the mechanisms affecting movement of contaminants in soils.

Soil Profile Comparisons

The following aspects of the soil profile data have been evaluated.

1. Basin samples versus control samples.

2. Effects of storm recharge.

3. Effects of recharge with imported irrigation canal water.

4. Turfed versus unturfed basins and variation with soil type.

5. Spatial distribution of contaminant concentrations.

Basin Samples Versus Control Samples. Comparison of results from basin soil samples and control soil samples is one indicator of the effect of recharge on the soil profile. USDA analyzed the chemical data to determine if the differences between test sites and control sites can be statistically established. By dividing the data into upper soil profile (0 to 3 m) and deeper soil profile (greater than 3 m), it was also possible to evaluate leaching effects. A summary of the USDA statistical analyses is contained in Table 5-10. In this case differences are assumed to be statistically significant if the confidence coefficient is 90 percent or greater.

These statistical results show that runoff water has leached the basin soils to some degree in all five basins. In all basins except Basin G, the electrical conductivity and most of the soluble cations are lower at the test site than in the control. In the deeper soils in Basin F some of the cations are higher in the test basin than in the controls, indicating movement from the surface soils to the deeper soils. The most intensive leaching has occurred in Basin MM, which has a very sandy profile and the greatest permeability.

The concentrations of metals in the basin test site soils have been compared with concentrations in the control test sites. To facilitate the comparison, a background concentration for each metal has been calculated. All of the data collected at the control sites at depths greater then 3 m were used to determine the background concentration, which is assumed to be free of urban runoff pollutants. The median background concentrations of arsenic ranged from 1.7 to 5.9 mg/kg with an overall median of 2.7 mg/kg. Nickel ranged from 5.9 to 25 mg/kg with an overall median of 12.0 mg/kg. Copper ranged from 4.3 to 15 mg/kg with an overall median of 10.0 mg/kg. Lead ranged from 2.0 to 4.9 mg/kg with an overall median of 3.4 mg/kg. A comparison of lead concentration in the test sites with the median background level of 3.4 mg/kg is provided in Table 5-11. Both the maximum and median levels of lead are shown and are expressed as a percentage of the background concentration. In all five basins the median concentrations of lead are greater

Table 5-10. Differences Between Control Soil Sites (CSS) and Basin Soil Sites (BSS) for Selected Chemical Properties

	Basin F		Basin G		Basin M		Basin EE		Basin MM	
Constituent	0-3 m	>3 m	0-3 m	>3 m	0-3 m	>3m	0-3 m	>3 m	0-3 m	>3m
Soluble sodium	-	+		+	-	-	-	-	-	-
Soluble potassium				-		-	-			-
Soluble calcium		+			-	-	-		-	-
Soluble magnesium	-			-	-	-	-		-	-
Exchangeable sodium percentage	+		+							+
Exchangeable potassium percentage	+	+			-	+			+	+
Exchangeable calcium percentage		+	-	+		-			+	+
Exchangeable magenesium percentage	-	-	+			+			-	-
Nitrate nitrogen			+	-		-		-	-	-
Phosphate	-				+		-		-	
Electrical conductivity	-	+			-	-	-	-	-	-
pH				+		-			+	
Soluble chloride		+								
Cation exchange capacity	-	-			-	-		-	-	-

Key: m = meters.
+ indicates BSS mean is greater than CSS mean at 90 percent confidence level.
- indicates CSS mean is greater than BSS mean at 90 percent confidence level.
Blank = No statistically significant difference at 90 percent confidence level.

Table 5-11. Soil Lead Concentration with Depth Expressed as a Percentage of Soil Background Concentration

Soil depth, meters	Concentration as percent of background level[a]									
	Basin F		Basin G		Basin M		Basin EE		Basin MM	
	Maximum level	Median level	Maximum level	Median level	Maximum level	Median level	Maximum level	Median level	Maximum level	Median level
0.00-0.02	24,118	19,706	19,188	16,764	47,059	41,176	10,294	9,118	4,118	3,824
0.02-0.05	14,412	10,588	18,529	17,941	12,059	9,412	10,882	7,941	1,059	971
0.05-0.08	2,529	2,382	8,824	6,471	1,706	1,029	5,882	5,000	706	244
0.08-0.14	1,088	912	2,118	1,147	1,235	471	3,235	2,559	253	88
0.14-0.20	599	500	1,147	853	294	232	500	353	94	88
0.24-0.30	824	179	268	238	441	294	112	100	53	38
0.30-0.60	135	126	382	232	382	229	165	141	232	91
0.90-1.20	112	79	215	150	197	106	206	147	65	44
1.50-1.80	88	62	179	115	197	115	353	147	97	26
2.10-2.40	94	91	215	100	138	126	150	59	68	59
2.70-3.00	106	82	262	126	91	71	88	59	59	50

[a]Background concentration of lead is 3.4 mg/kg soil.

than the background level to a depth of about 3 m. Below 3 m, the median concentrations decrease to background levels. The highest lead concentrations were found in Basin M and the lowest were found in Basin MM. Levels of arsenic, nickel, and copper in the surface soils of the test sites (Table 5-2) are also considerably higher than background levels.

Short-Term Effects of Storm Recharge. The short-term effects of storm recharge on basin soils can be demonstrated by looking at concentration profiles before and after the wet weather period. Figure 5-2 shows lead profiles for Basins EE and MM for 1981-82 and 1982-83. Data are plotted from the fall sampling prior to the wet weather period and in the spring after the wet weather period. Both basins had been scraped prior to the fall sample to improve percolation. In Basin EE the spring profile is distinctly higher down to about 0.1 m in 1981-82 and 0.17 m in 1982-83. In Basin MM the increase due to storm recharge is confined to the near surface; below 0.05 m (2 inches) the spring and fall profiles are comparable. In Chapter 6, as part of the loading synthesis, the increases in lead in the soil will be quantitatively compared to runoff loads for that time period.

Another way of estimating the potential effect of recharging storm runoff on the groundwater supply is to compare runoff quality with the regional groundwater quality. Recent groundwater data from 46 municipal supply wells operated by the City of Fresno have been compiled to characterize the regional groundwater quality. These wells are distributed throughout the metropolitan area and provide a reasonable representative of the groundwater quality of the Fresno area. Table 5-12 compares runoff quality at the single-family residential site with the regional groundwater quality.

Table 5-12. Comparison of Runoff and Regional Groundwater Quality

Constituent	Units	Runoff quality at single-family residential site		Regional groundwater quality of 46 wells	
		Mean	Range	Mean	Range
Specific conductance	umhos/cm	56	15-222	308	95-681
pH	Standard units	7.2	6.5-8.3	7.6	7.3-8.1
Alkalinity	mg/l as $CaCO_3$	19	7.0-73	129	40-320
Nitrate	mg/l as N	0.75	0.18-2.1	3.8	1.0-8.4
Calcium	mg/l	5.8	1.3-18	25	6-55
Magnesium	mg/l	1.3	0.01-6.2	14.5	3.5-38
Sodium	mg/l	3.9	0.70-18	21	10-42
Chloride	mg/l	3.4	0.60-14	11.3	2.6-50
Sulfate	mg/l	8.3	4.2-27	8	<1-25
Arsenic	ug/l	1.5	<1.0-8.0	2	<1-4
Cadmium	ug/l	2.0	<1.0-4.0	1	<1-4
Chromium	ug/l	1.4	<1.0-40	3	<1-6
Copper	ug/l	6.1	4.0-180	<50	<50
Lead	ug/l	42	15-2,100	5	<1-8
Mercury	ug/l	0.10	<0.10-8.6	<0.1	<0.1
Zinc	ug/l	70	30-1,300	20	<10-50
Iron	ug/l	188	160-29,000	<20	<20-170
Manganese	ug/l	50	20-480	5	<5-15

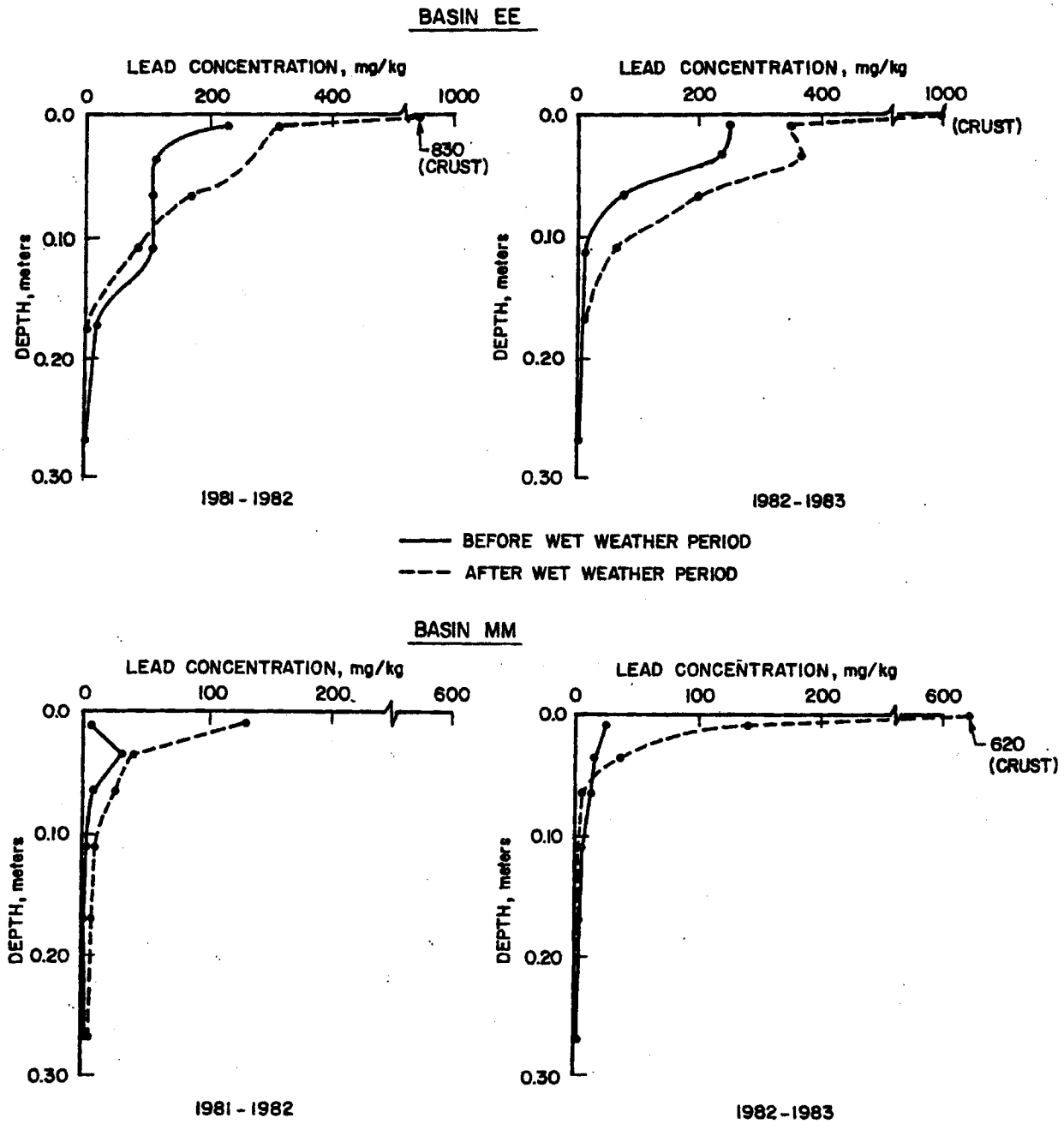


Figure 5-2 Lead Profiles Before and After the Wet Weather Period

The specific conductance of the regional groundwater is several times greater than the level measured in runoff. The concentrations of most of the individual cations and anions are also much higher than concentrations in the runoff. Thus, from the standpoint of mineral quality, storm runoff can improve the regional groundwater quality. In contrast, most of the metal concentrations are significantly higher in the runoff, particularly lead, zinc, iron, and manganese.

Effects of Imported Water. One of the objectives of the Fresno NURP project was to determine the effect of recharging imported irrigation water during the summer. Two of the test basins (EE and MM) receive summer recharge water. The other three basins (F, G, and M) do not. Three areas have been analyzed in trying to determine the effects of summer recharge:

1. Evaluate the quality of imported recharge water.

2. Compare the soil properties of basins with and without imported water recharge.

3. Analyze the results of soils samples collected before and after the imported water recharge period.

The quality of the imported recharge water was presented in Chapter 4. These data indicate that the irrigation water is of high quality. None of organic priority pollutants were detected and metal concentrations were very low. The electrical conductivity of the irrigation water averages from 30 to 35 umhos/cm, compared to an electrical conductivity of over 300 umhos/cm in the regional groundwater. Major cations and anions in the imported recharge water are also much lower than the levels found in the regional groundwater. Thus, the imported recharge water itself has a very favorable effect on the receiving groundwater, by diluting the existing mineral levels.

The remaining concern about imported water recharge is whether the movement of the large volumes of water could be leaching any stormwater-produced compounds from the soils that could adversely affect the groundwater. USDA statistically analyzed the differences in soil chemical properties between the basins with and without imported water recharge. For most of the cations and anions, concentrations tended to be slightly less in the basins receiving imported water recharge, possibly indicating some leaching due to the additional recharge during the summer. However, the magnitude of the differences is generally quite small. Thus, as far as the common cations and anions are considered, imported water recharge is not having a significant adverse impact on the receiving groundwater.

Part of the testing program included collecting soil samples in the spring prior the the imported water recharge period and in the fall after imported water recharge. Prior to collecting the spring samples, 1 to 2 inches of soil was scraped from the basin surface to improve percolation. Lead profiles for Basin EE and Basin MM are presented in Table 5-13 for 1982 and 1983.

Table 5-13. Comparison of Lead Concentrations Before and After Imported Water Recharge

Year	Depth, meters	Lead Concentration, mg/kg			
		Basin EE		Basin MM	
		Before	After	Before	After
1982	0.0-0.3	46.0	55.0[a]	6.2	7.2[a]
	0.3-0.6	2.7	8.8	3.2	7.7
	0.9-1.2	4.1[b]	13.0	1.5[b]	2.1
	1.5-1.8	4.6[b]	3.4	0.9[b]	2.2
	2.1-2.4	2.0[b]	6.3	1.6[b]	1.8
	2.7-3.0	1.5[b]	3.4	1.7[b]	2.4
1983	0.00-0.05	160.0	103.0[a]	16.0	15.0[a]
	0.05-0.08	—	6.5	—	6.6
	0.08-0.14	—	5.3	—	5.6
	0.14-0.20	—	3.1	—	3.2
	0.3-0.6	7.3	—	3.4	—

[a]Computed from individual samples collected over the 0.0 to 0.3-meter depth.

[b]Based on data collected before the basin was scraped.

During 1982, the lead concentration in the upper 0.3 m showed no appreciable increase in either basin. However, in the 0.3 to 0.6 m depth in Basin MM and in both the 0.3 to 0.6 m and 0.9 to 1.2 m depths in Basin EE, lead concentrations were higher after imported water recharge. This indicates that there may be some leaching of lead due to the imported water recharge. Below 1.5 m, lead levels before and after imported water recharge are comparable and are in the range of the background lead concentration found in the control sites which is about 3 mg/kg. During 1983, no soil samples were collected below 0.2 m after imported water recharge, so it is not possible to determine if a similar leaching effect was occurring. Additional data should be collected to confirm whether leaching is occurring.

Turfed Versus Unturfed Basins. Another objective of the project was to determine if there are differences between turfed and untrufed recharge basins. This comparison is complicated by two factors: (1) the two unturfed basins (EE and MM) are the ones that receive summer recharge, while the three unturfed basins (F, G, and M) do not receive summer recharge and (2) the turfed basins are considerably older than the unturfed basins and thus have received a greater accumulation of runoff loads. These two variables make it difficult to focus on just differences due to presence of turfing, but some general comparisons can still be made.

Figure 5-3 shows the median profiles of lead and nickel for all five basins. The turfed basin data are connected with a solid line, while the unturfed basin data are connected with a dashed line.

The surface levels (0.02 m to 0.05 m) of lead are higher in the three older, turfed basins. Of the two unturfed basins, Basin MM with the sandy profile has considerably lower lead concentrations. Since the two unturfed basins are similar in age, this raises the question of whether less of the lead input to Basin MM is being removed in the surface soil layer, as compared to Basin EE. This issue is further evaluated in Chapter 6, when runoff loads are considered. The effect of disking of the surface soils in Basin EE is apparent in the profile; the Basin EE profile is relatively constant between the surface and 0.08 m due to the mixing of the surface soils. In the past, the District has periodically disked surface soils to improve recharge.

The nickel profiles shown on Figure 5-3 also indicate that Basin MM has the lowest concentrations. The nickel profile for the other unturfed basin (Basin EE) is very similar to the profiles for two of the turfed basins (Basins F and G). Disking did not have the effect on the nickel profile as it had on the lead profile.

Two important factors that may be influencing the removal of contaminants in the soil are soil texture and the extent of organic matter. Soils with a higher proportion of silt and clay than sand generally have higher cation exchange capacities and can better attenuate migrating contaminants. Organic matter also adds to the cation exchange capacity of the soil. Table 5-14 shows the levels of silt plus clay and organic matter in the surface soils of the five basins. Basin MM has the lowest levels of silt plus clay and organic matter by a substantial margin. The second unturfed basin (Basin EE) also exhibits a much lower amount of organic matter than the turfed basins. The higher levels of silt plus clay and organic matter in the turfed basins are likely to be contributing to the higher removal of lead and nickel that appears to be occurring on Figure 5-3.

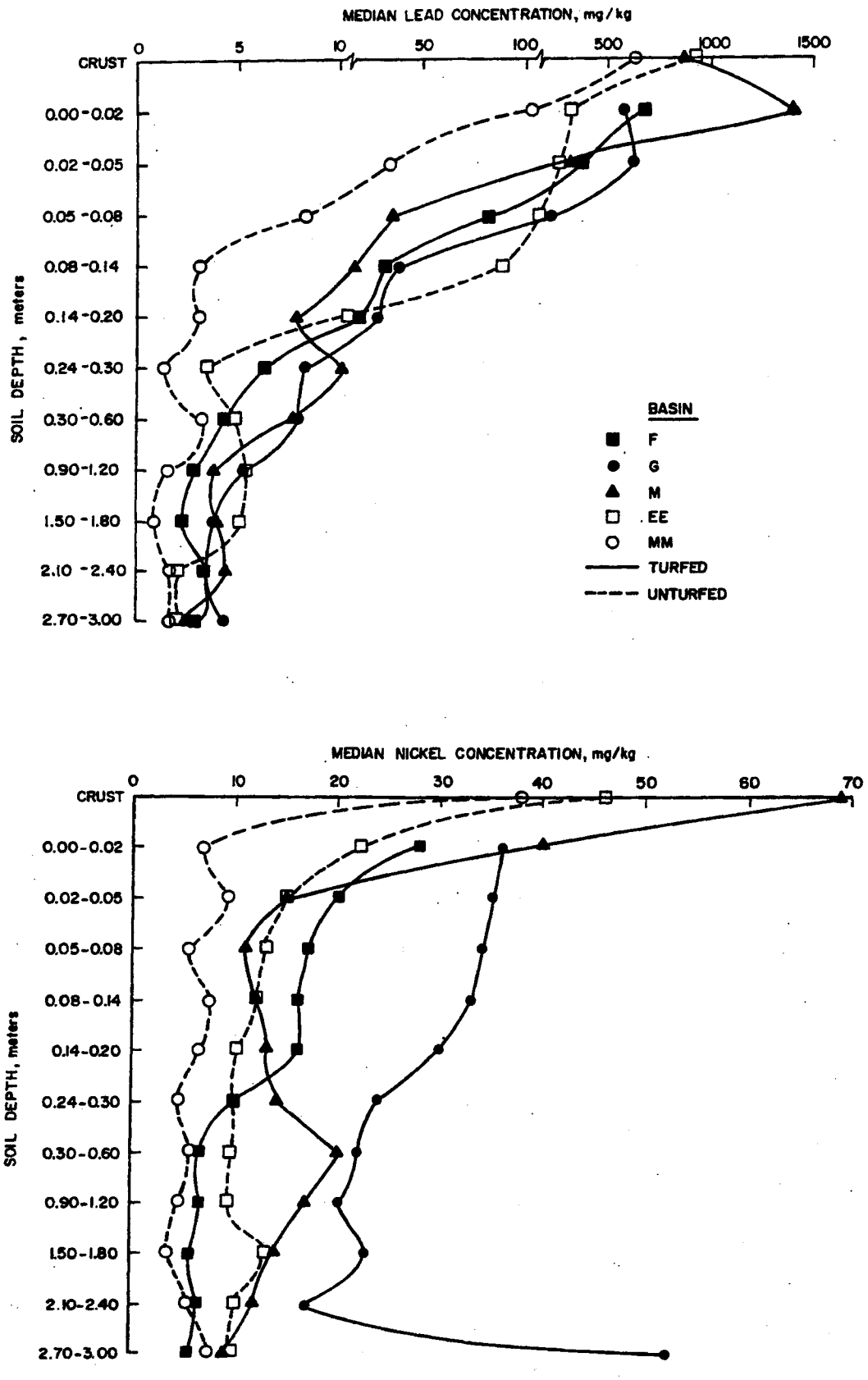


Figure 5-3 Median Lead and Nickel Concentrations in Basin Soils

Table 5-14. Concentrations of Silt Plus Clay and Organic Matter in Surface Soils

Basin	Silt plus clay,[a] g/100 g		Organic matter,[a] g/100 g	
	0.0-0.3 meters	0.3-0.6 meters	0.0-0.3 meters	0.3-0.6 meters
F	22	5	1.06	0.03
G	31	29	1.14	0.11
M	46	44	1.44	0.16
EE	35	28	0.49	0.01
MM	5	4	0.05	0.03

[a]Data are from 1981 basin soil site profiles.

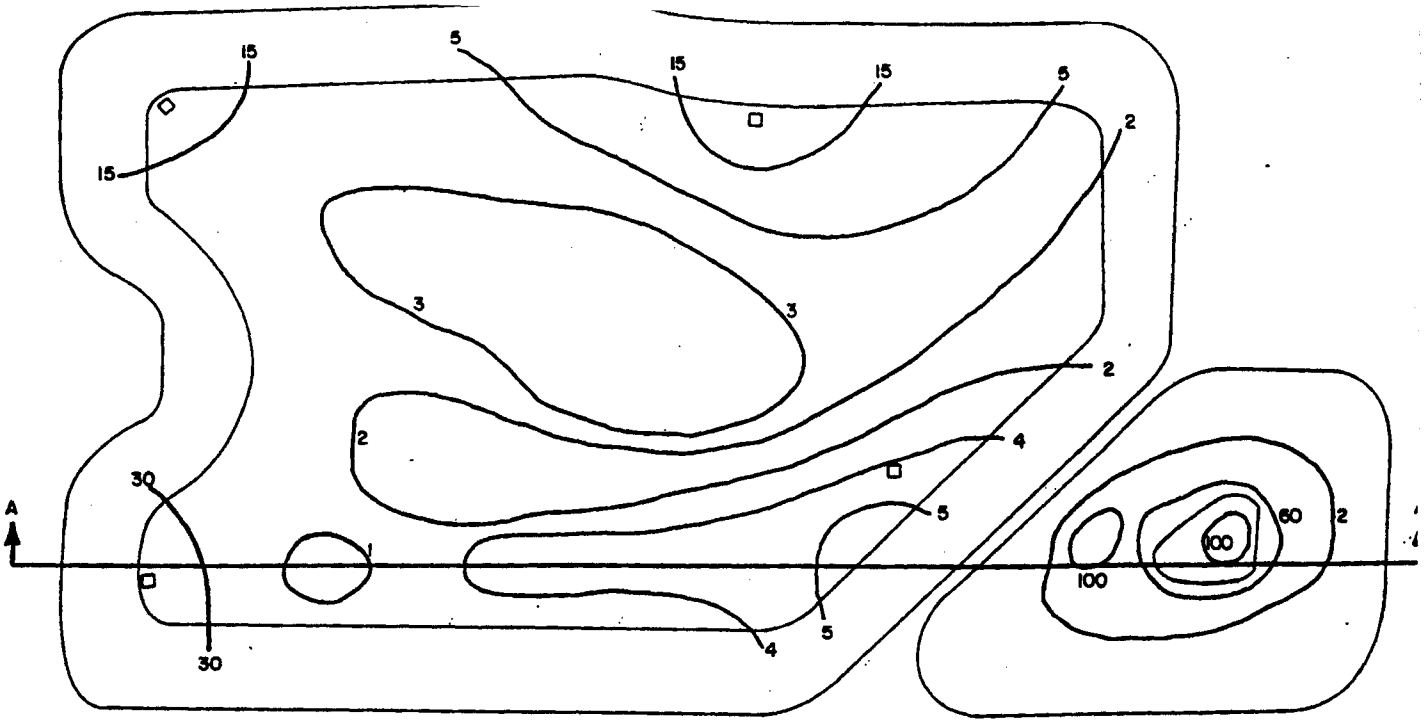
Spatial Distribution of Lead. This section presents the results of a special survey conducted to determine the variation in contaminant concentrations over the surface of the recharge basins. All of the other soils data presented in this report were collected at a single location in each basin. The spatial data are useful for three purposes:

1. Help assess the representativeness of the regular sampling location.

2. Identify differences between the deeper low-flow portion of the basin and the shallower recreational area of the basin.

3. Show spatial distribution needed in analyzing management practices (Chapter 8).

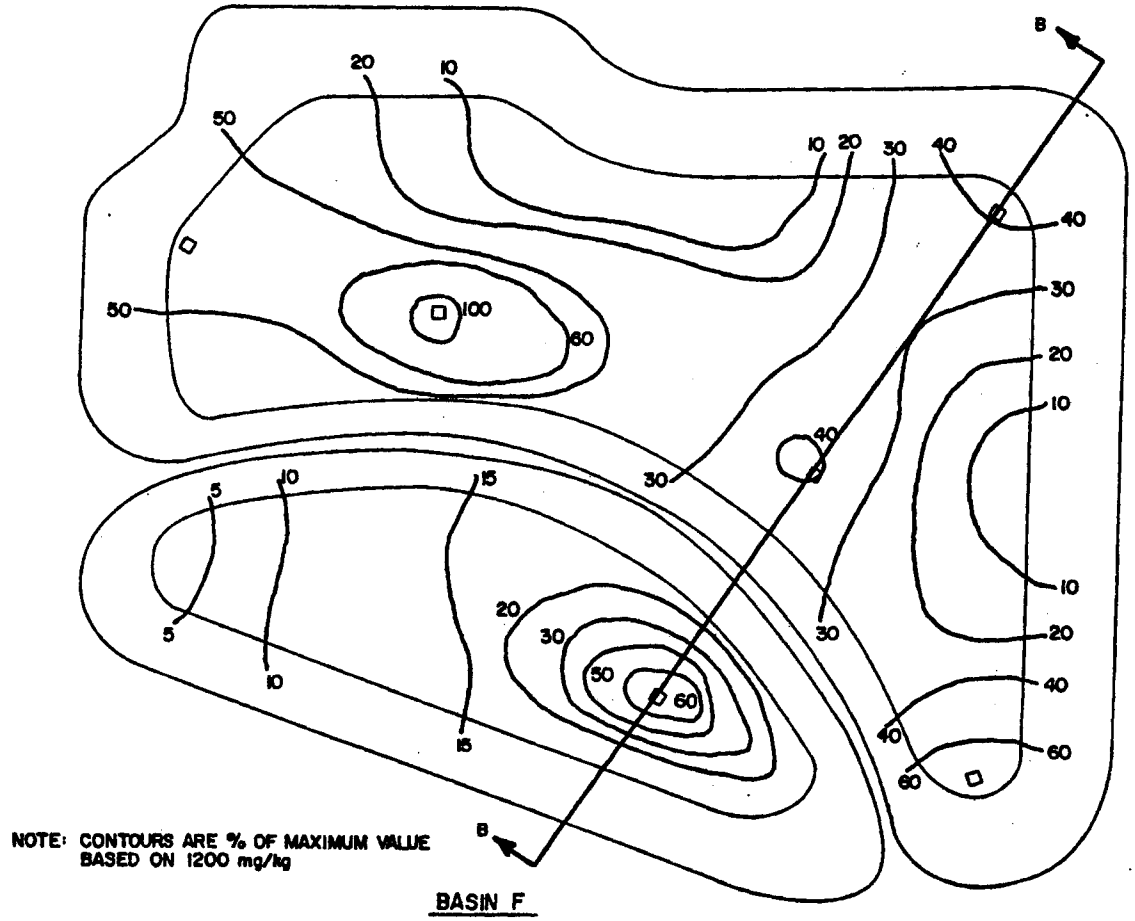
Two basins were used in the spatial survey: Basin B/E and Basin F. Cores of the upper 8 cm of soil were collected on January 3, 1984 for analysis. The samples were taken along basic directions of flow of water within the basins to assess the degree of lead buildup as a function of distance from outfalls. The results are presented on Figure 5-4. The data are plotted as contours which are based on the percentage of the maximum concentration measured. Basin B/E had a maximum



NOTE: CONTOURS ARE % OF MAXIMUM VALUE BASED ON 3300 mg/kg

□ OUTFALLS

BASIN B/E



NOTE: CONTOURS ARE % OF MAXIMUM VALUE BASED ON 1200 mg/kg

BASIN F

□ OUTFALLS

Figure 5-4 Spatial Distribution of Lead in Basin Soils

concentration of 3,300 mg/kg, which occurred in the lower basin. Basin F had a maximum concentration of 1,200 mg/kg which occurred in the upper basin. Elevation profiles for the two basins are shown on Figure 5-5.

The analysis of these results tends to show the following: (1) High levels of lead are deposited near the outfalls. At outfalls for Basin B/E, lead levels were between 15 and 30 percent of the maximum, while the levels in interior areas only ranged from 1 to 5 percent. Basin F outfall areas had levels ranging between 40 and 60 percent, while levels in the remainder of the basin were only 10 to 30 percent. (2) Basin topography and distance from outfalls mutually affect distribution. By plotting the surface elevation along the sampling lines, it is evident that soil concentrations are highest at low spots and gradually fall off at locations farther from the source. (3) The elevation relationship between the shallower recreation area of the basin and the recharge area affects lead buildup in the recreation area. The difference in elevation between B/E basins is roughly 20 feet. The lead levels are about one magnitude higher in the recharge area. At Basin F the difference is only about 2 feet and the lead levels are about the same in the two basins.

From these results, it is apparent that there are three major factors affecting the spatial distribution of lead:

1. Number and location of basin outfalls.
2. Basin topography.
3. Elevation difference between deeper and shallower areas of the basins.

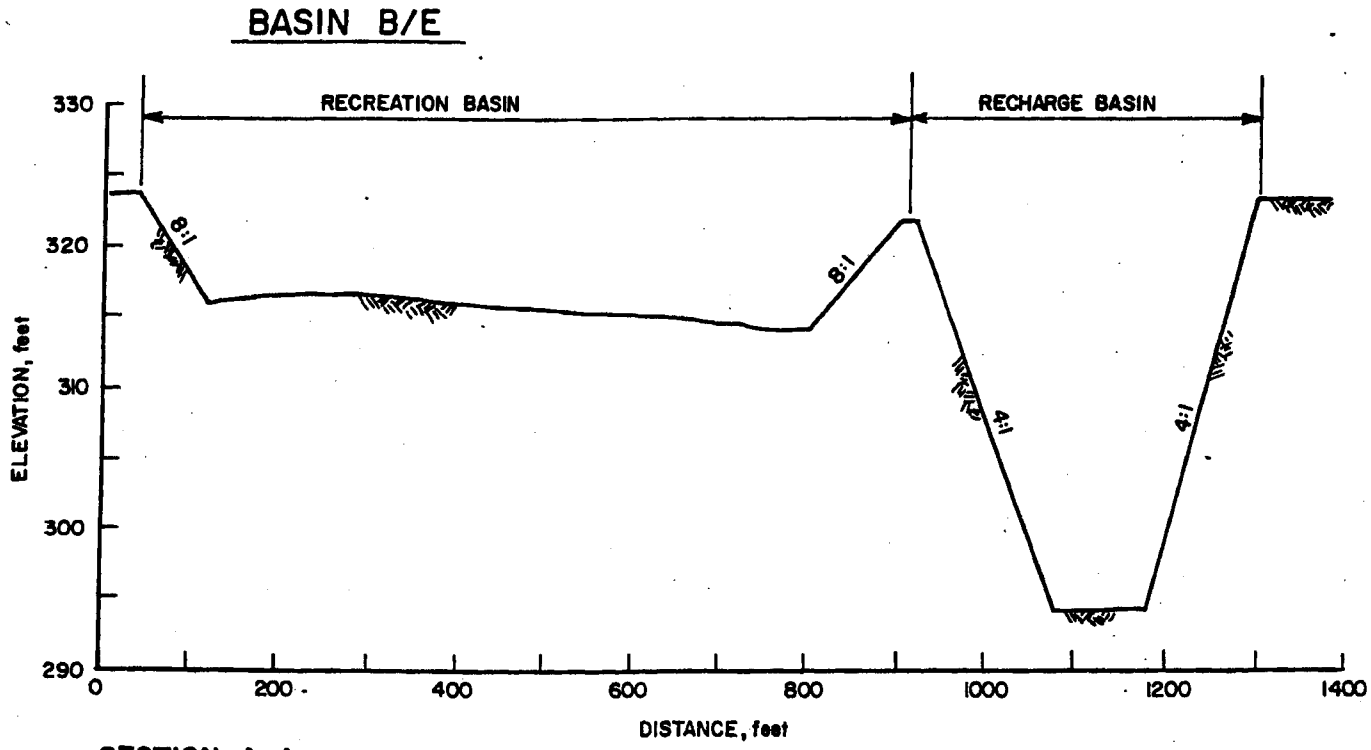
The spatial lead data will be further used in Chapter 6 in developing the loading synthesis; in Chapter 7 in assessing impacts on recreation; and in Chapter 8 in analyzing management practices.

Water Quality Variations

The results from soil water and groundwater samples have been analyzed from two primary viewpoints:

1. Variations with depth.
2. Variations with time.

Variations with Depth. Water samples were collected at two or three sampling depths in the unsaturated zone and at the top of the saturated zone in each basin. The results for the samples were tabulated previously in this chapter (Tables 5-6, 5-7, and 5-8). To determine if there are any trends with depth,



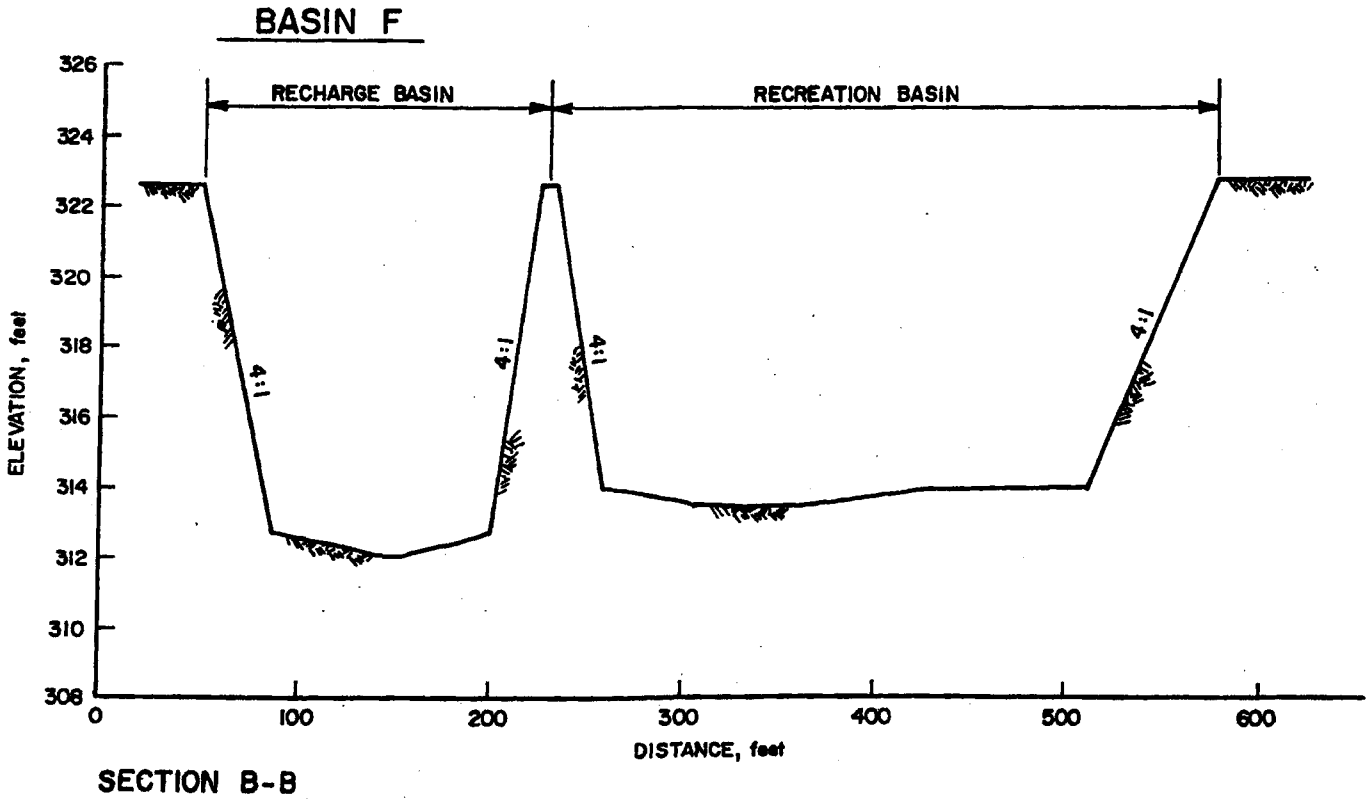


Figure 5-5 Basin Elevation Profiles

the data for nitrate and lead have been plotted (Figure 5-6). The concentrations of nitrate and lead in the runoff and the regional groundwater are shown, as well as the soil water and groundwater concentrations.

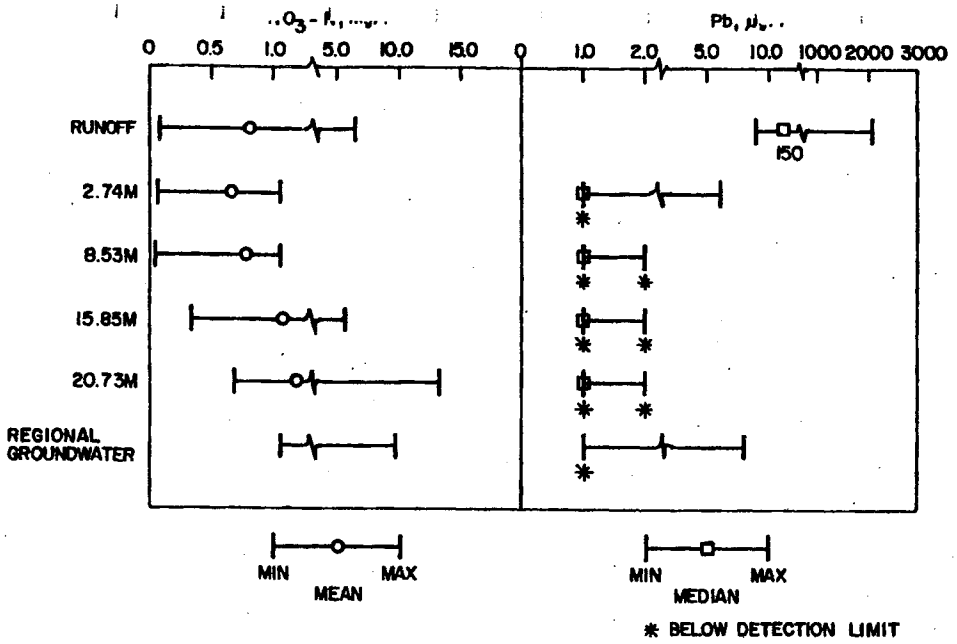
Nitrate levels in the soil water and groundwater are comparable to the levels detected in runoff in Basins F, M, and EE, indicating minimal removal of nitrate as recharge water percolates through the soil. This is not surprising since nitrate is negatively charged and thus is quite mobile in soil. It is unclear as to why nitrate levels in the soil water and groundwater in Basin MM are considerably lower than the concentration of nitrate in the runoff. This basin receives canal water during the summer months. The canal water recharge may be improving the quality of the soil water and groundwater in this basin. The mean concentration of nitrate in the regional groundwater is about 4 mg/l, which is significantly higher than the concentration of nitrate in runoff.

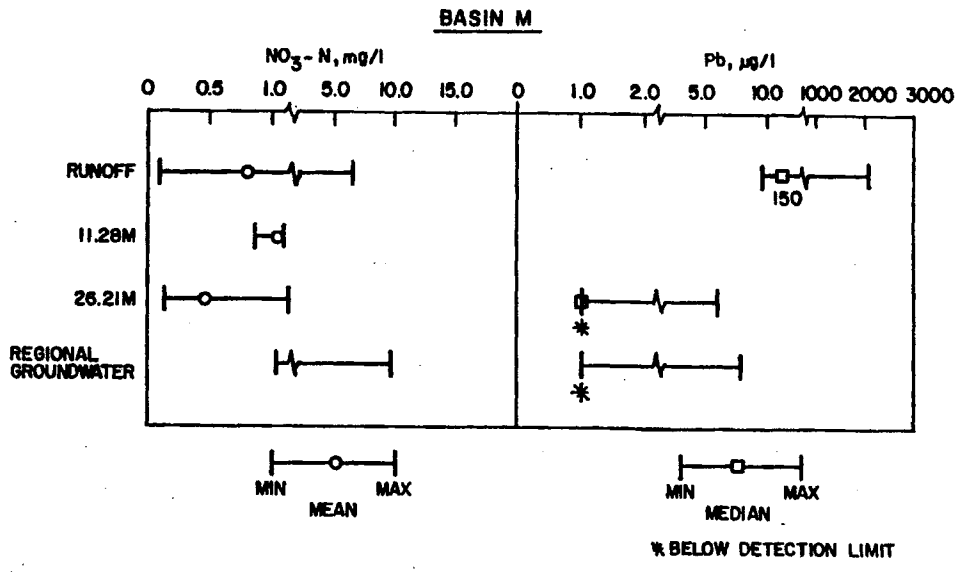
Changes in lead concentration with depth are also shown on Figure 5-6. In contrast to nitrate, there is a dramatic reduction in the lead concentration found in runoff. Concentrations in the soil water and groundwater range between less than 1 ug/l and 8 ug/l compared to median level of 150 ug/l in the runoff. It is also important to note that the levels of lead in the soil water and groundwater are generally lower than the concentration of lead in the regional groundwater. It is difficult to discern any consistent trends in the variation of lead in the unsaturated zone, since the concentrations are so low. However, it does appear that in Basin MM and Basin F, lead concentrations are decreasing with depth.

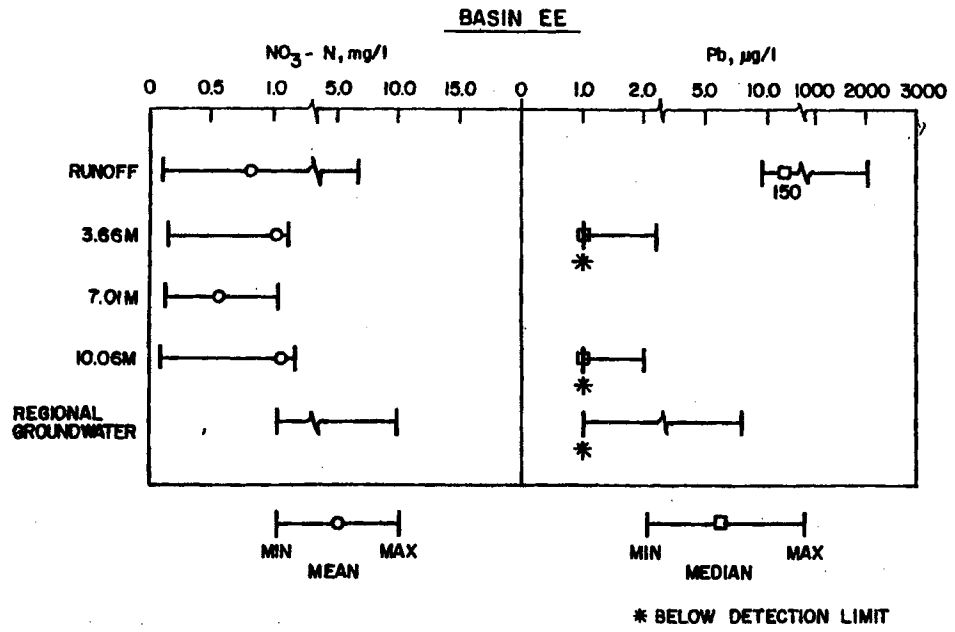
Variations with Time. Water samples were collected on a bimonthly basis between January and September 1982 and on a monthly basis between October 1982 and July 1983. Figure 5-7 shows the time variation of lead and iron in the soil water and groundwater. Data are shown for one basin that received summer recharge (Basin EE) and one basin that did not receive summer recharge (Basin F).

Iron concentrations were quite variable in both the soil water and groundwater. In Basin F, the highest concentrations were measured during December and January, which is the heaviest storm recharge period. Concentrations generally dropped off in the spring, although there is a rise in the groundwater iron concentration in June and July 1984 for Basin F. In Basin EE, the iron concentration was consistently higher in the soil water than in the groundwater.

Lead concentrations were relatively constant in both Basin F and Basin EE. The only time that concentrations were greater than the detection limit was in late spring and early summer, after the winter recharge period.







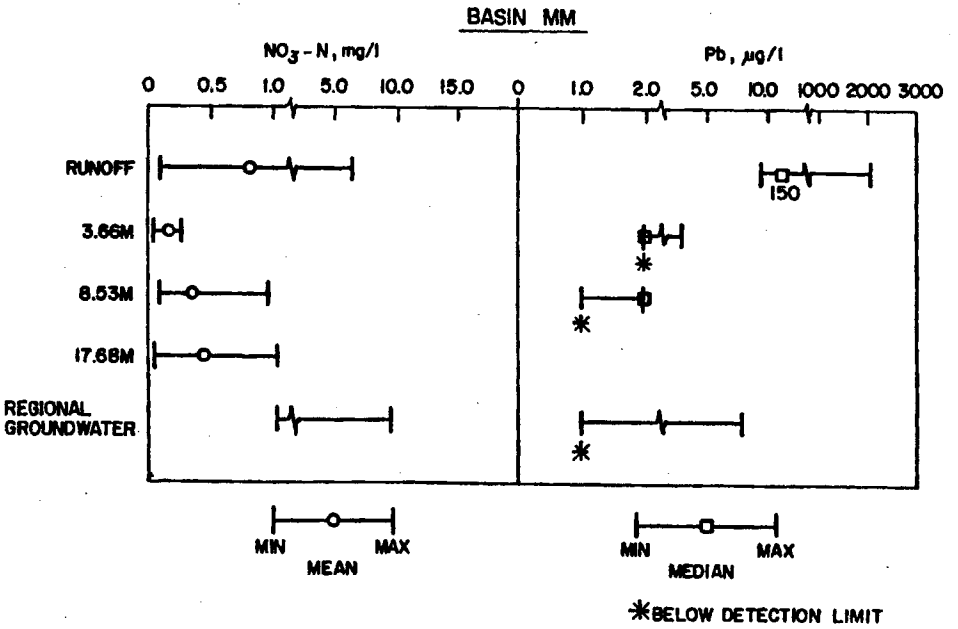


Figure 5-6 Variances in Water Quality with De

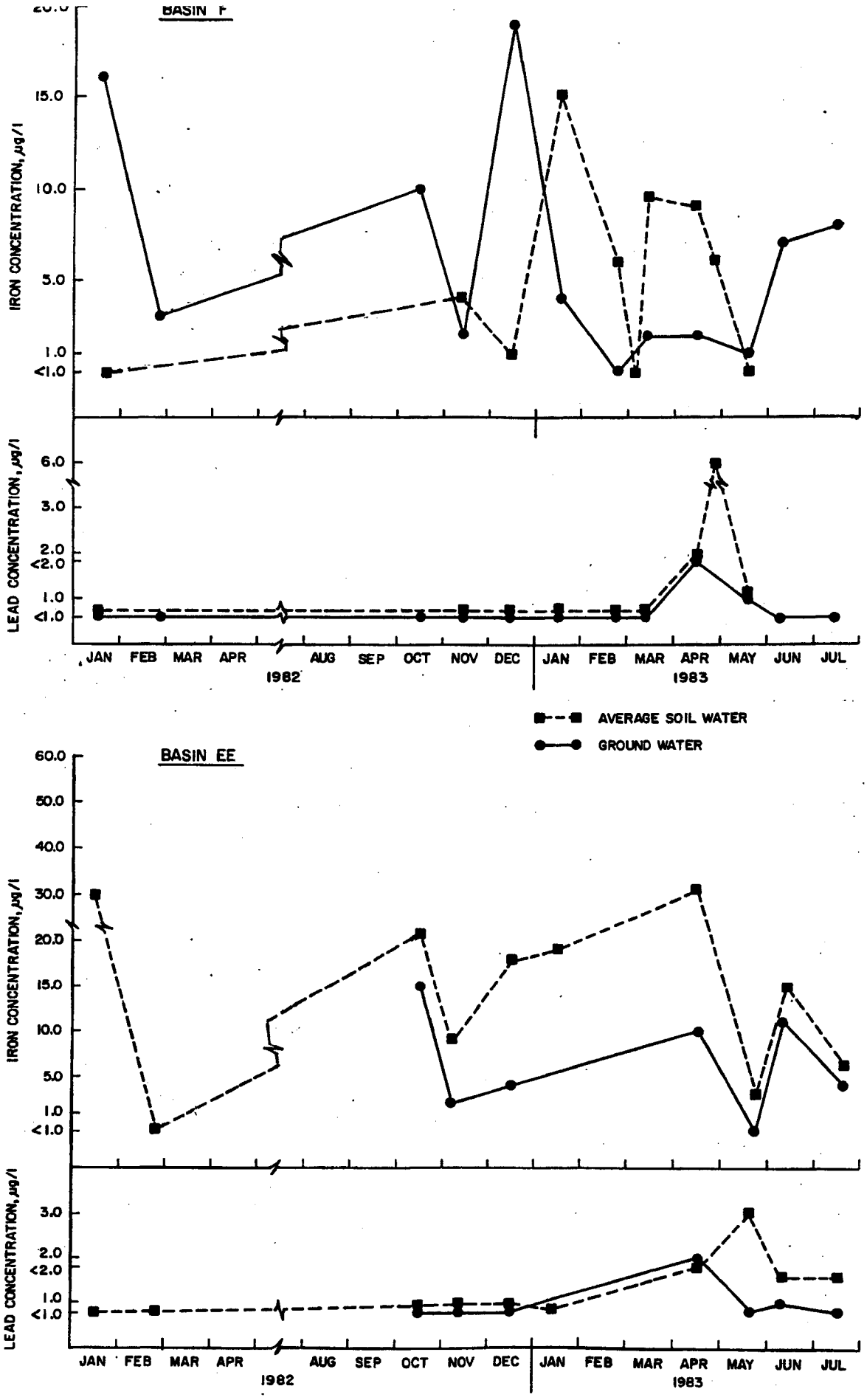


Figure 5-7 Iron and Lead Concentrations in Soil Water and Groundwater

Contaminant Migration in Soils

The data and analyses presented in this chapter have dealt specifically with the soils and groundwater monitoring program conducted in Fresno. The following discussion provides a general explanation of the mechanisms affecting movement of contaminants in soils. This discussion is intended to help further explain the significance of the Fresno data previously presented and to provide some background for the discussions of impacts and management practices in Chapters 7 and 8. The discussion focuses primarily on metals.

The migration of contaminants through the soil has been studied by numerous people over the years. The soil has been referred to as the living filter because of its ability to retain, modify, or decompose a wide variety of organic and inorganic contaminants. Relatively little investigative work has been done directly on groundwater recharge of urban runoff, but extensive work has been done on renovation of municipal sludges and effluents. This research in most cases is applicable to the question of contaminant migration in the soils underlying urban runoff retention basins.

Land Disposal of Wastewater Effluents. Land treatment and disposal of wastewater effluents has been successfully practiced for many years. Unfortunately, limited metals data are available in many cases, since metals in treated municipal effluents are often present in very low concentrations which are less than the detection limits of normal metal analyses. Table 5-15 presents selected metal data from the Central Treatment Plant in Sacramento, California. Although this effluent is not used for irrigation of crops, it is of a suitable quality. Table 5-15 also presents comparable data on Sacramento River water. The metals level in the Central Plant effluent, Sacramento River water, and runoff samples collected as a part of the NURP study are at comparable levels for arsenic and copper. Lead is significantly higher in the Fresno runoff, while nickel is somewhat higher in the effluent. The Sacramento River is used directly for irrigation throughout the Central Valley and provides natural recharge for groundwater aquifers.

Metals occur in runoff and wastewaters in the soluble and insoluble form. Insoluble material is in the form of precipitates or is attached to colloidal material in the wastewater. In aquatic systems, the soluble form of the metal often has the greatest toxic effect on aquatic organisms. The insoluble form is relatively less toxic, presumably due to reduced availability, unless it is converted to the soluble form. However, when the runoff percolates in the soil, the difference between the soluble and insoluble forms become much less significant. Once the runoff becomes a part of the

soil solution, the soluble and insoluble metals participate in a wide variety of physical, chemical, and biochemical reactions. These reactions are discussed in more detail in the following sections.

Table 5-15. Comparison of Runoff to Municipal Effluent and River Water

Source	Constituent			
	Arsenic	Copper	Lead	Nickel
Fresno urban runoff average of residential and commercial land use	2	18	150	13
Secondary treated municipal effluent,[a] Sacramento, California	19	22	8	90
Sacramento River[a]	<10	5	<2	35

[a]"Toxicant Monitoring Program," Sacramento Regional Wastewater Management Plan, Sacramento Area Consultants, March 1980.

Factors Affecting Contaminant Migration. Urban runoff temporarily stored or disposed of in the runoff retention basins contains a wide variety of organic and inorganic contaminants. Some of the contaminants are at levels that could be harmful if it were possible for them to directly enter the groundwater. As discussed previously most of the contaminants are removed from the water by the near surface soils resulting in a relatively clean leachate that will ultimately reach the groundwater. The metals that have been regularly monitored in the soil are arsenic, copper, lead, and nickel. This section discusses the various organic and inorganic processes responsible for removing these contaminants from the runoff.

Numerous physical, chemical, and biochemical processes influence the mobility of these elements in the soil. These proccesses in turn are based on certain characteristics of the soil. The following key soil characteristics and their effect on contaminant migration are described in this section.

1. Soil texture
2. Cation exchange capacity
3. pH
4. Oxygen
5. Organic matter

Physical factors include soil texture and particle size and soil pore space distribution. Soil texture, which is the relative quantity of sand, silt, and clay, combined with the amount of pore space, has a major influence on the rate of water movement through the soil. Reducing the rate of water movement allows other time-dependent processes to remove these elements from the runoff. In some instances the soil actually filters out larger particulate contaminants such as asbestos or large precipitates of ionic elements, such as iron and manganese.

Cation exchange capacity (CEC) has been identified as having a major influence on soil contaminant migration. CEC refers to the negative charge that exists on most soil particles which then attract and temporarily retain positively charged ions in the soil solution. Most of the metals of concern in this study, including copper, lead, and nickel are positively charged. Arsenic is the only element studied which is found most often in a negatively charged form. Soils with high CEC tend to be more effective at removing positively charged contaminants from leachates. The ion exchange reactions that occur between positively charged ions and negatively charged soil particles play an important part in delaying migration, but usually do not inhibit the ion from eventually being leached downward. In a soil with a high CEC, numerous processes will attenuate the migration of ions. As a contaminant moves through the soil, it will participate in other physical, chemical, and biochemical processes that will more permanently inhibit its migration. The significance of these processes in a soil tends to increase in proportion to the CEC and surface area of a soil. Thus, soils with high CEC such as silty and clayey soils provide greater opportunities for attenuation of migrating contaminants.

Hydrogen ion activity (pH) has been shown to have a significant effect on ion migration. In a well buffered calcareous soil (containing calcium carbonate), most heavy metals and arsenic will form relatively insoluble precipitates which are resistent to leaching. In acid soils or in poorly buffered soils which may become acidified due to leaching, these precipitates will not form, or previously precipitated ions may be dissolved thus making contaminants available for leaching. The effect of pH changes is most pronounced in sandy soils which have little or no calcareous materials and are thus easily acidified by leaching or addition of acidifying materials such as some nitrogenous fertilizers or organic wastes that upon decomposition release organic acids. The effects of calcareous soil materials on the mobility of various contaminants varies from one heavy metal to another. In general though, a soil with a pH of 7 or greater is more effective in controlling metal migration than the same soil with a low pH. The Central Valley Regional Water Quality Control Board requires that soils used for disposal of reclaimed wastewater and sludges be maintained

at a pH of 6.5 or greater. Many soils will naturally maintain this level; if not, limestone materials can be added to maintain the pH at 6.5 or above.

The pH levels for soils in the retention basins are generally at pH 7 or above, except for some of the profiles for Basins F, EE, and MM. None of the basin soil samples contained free lime. The soils are non-calcareous. Basin EE shows the most dramatic reduction in soil pH between the 1981 and fall 1982 sampling data. The pH values dropped from near neutral to less than pH 5. The pH in the sandy surface soil of Basin MM with its low buffering capacity also dropped during the same period. Both of these basins received irrigation canal water for recharge during the summer of 1982. The pH in Basin F was only less than 7 in the near surface soil. The lowered pH in these basins could be the result of chemical additions possible from fertilizer. The pH of the runoff from the residential and commercial areas is above pH 7. This water would not tend to lower the soil pH. The pH in the runoff from the industrial areas is sometimes less than pH 7. If this low pH water were consistently drained into one basin, it could over a period of years, lower the pH of the surface soils. Periodic monitoring will determine if this is occurring.

The amount of oxygen in a soil affects the migration of metals. The microorganisms in the soil have a major impact on the mobility of metals. The organisms exist in a complex food chain whereby organic matter is converted into other organic compounds with the releasing of mineral elements into the soil. The amount of oxygen in the soil influences the type of organisms that will thrive and the biochemical reactions that will occur.

Aerobic or oxidizing conditions favor attenuation of contaminants, while anaerobic or reducing conditions favor accelerated migration of contaminants. Water logging of soils, as would occur temporarily under the retention basins, would tend to favor contaminant migration if the oxygen content decreases. However, if the basins are drained in between storms, the frequent wetting and drying that occurs would favor attenuation. It also temporarily favors an increase in the permeability of the surface soil layer.

Organic matter in the soil has a generally decelerating influence on trace contaminant mobility. Soil organic matter, like silt and clay particles, increases the cation exchange capacity of the soil and favors the mechanisms which retain metals. Through biochemical processes involving soil organic matter and soil microorganisms, organic colloids are formed which will retain many metals and result in the formation of insoluble precipitates. The presence of organic chelators

(humic and fuluic acids) can promote the formation of chelated metals. Chelated metals are bound into organic complexes, which are mobile in certain soil conditions such as alkaline or very permeable soils. This is not expected to be a problem in neutral soils such as those found in the Fresno basins which were tested.

As discussed above, there are a wide range of processes that affect contaminant mobility. The relative mobility of 13 metals is listed in Table 5-16. This table presents the relative mobilities under aerobic or nonwaterlogged conditions. Under anaerobic conditions, the mobility of most of these ions would be increased. Those tending to form the most insoluble precipitates such as cadmium would still be the least mobile under anaerobic conditions.

Organic Pesticides. The soils data showed little or no migration of the organochlorine or organophosphorus pesticides below the top 24 cm of soil. Many of the mechanisms that retain metals in the soil also retain or cause the retention of pesticides. In addition, many of the pesticides are oxidized or decomposed by soil bacteria.

Chlordane was detected up to the 24 cm depth and lindane, DDT, and DDE were detected, down to a depth of 5 cm. These three pesticides are relatively immobile in the soil and will probably not migrate any deeper. Soil adsorption is probably the most important process affecting the migration of all pesticides and, in particular the organochlorine pesticides. Adsorption occurs as a result of contact of the pesticide with clay or organic substances in the soil. The relative lack of mobility suggests that the organochlorine pesticides may be so tightly adsorbed that they do not participate in exchange reactions. This is unlike the metallic ions which may be adsorbed onto the clay but still be available for exchange reactions, especially if there is a change in solution equilibrium as a pH change.

The organophoshorus pesticides were not detected in any of the soils. This is probably due to their relative short life in the soil. Organophosphorous pesticides are typically decomposed in the soil in less than 12 weeks.

Table 5-16. Relative Mobility of Selected Elements in Soil

Mobility class	Element	Comments
Relatively mobile	Cyanide	Not strongly retained by the soil.
	Selenium	Not strongly retained by the soil, at normal pH levels.
Moderately mobile	Iron Zinc Nickel Lead Copper	Absorbed more strongly by the soil in the order of $Cu^{++}>Pb^{++}>Ni^{++}>Zn^{++}>Fe^{++}$. Stability for complexes of any given type should be increasing in the order of Fe>Zn>Ni>Pb>Cu.
	Beryllium	(Chemistry in soils probably similar to aluminum.)
Slowly mobile	Arsenic	Mobility similar to phosphorus.
	Cadmium	Forms insoluble precipitates in oxidizing conditions.
	Chromium	Forms insoluble precipitates in oxidizing conditions.
	Mercury	Retained in the surface layer of most aerated soils.
	Asbestos (< 2um)	Particles less than 2um, are retained in surface layer of soils like clay.
Immobile	Asbestos (> 2um)	Particles >2um, or greater than clay size are retained on the surface of soils.

CHAPTER 6

SYSTEM ANALYSIS

The Fresno Nationwide Urban Runoff Program (NURP) project consisted of two main data collection programs. Extensive data were collected by the U.S. Geological Survey (USGS) on the concentrations and loads of pollutants in urban runoff. These data are discussed in Chapter 4. Chapter 5 contains a discussion of the soils and groundwater data collected by the U.S. Department of Agriculture (USDA). In this chapter, the data are integrated and pollutants are traced through the entire system from rainfall to regional groundwater.

SYSTEM COMPONENTS

There are seven major system components that were studied in the Fresno NURP project: rainfall, dry deposition, street particulate material, runoff, basin soils, soil water, and groundwater. Table 6-1 shows which metals and organics were detected in each component. As shown in the table, not every constituent was analyzed in every component. Copper, lead, nickel, and iron were detected in all components of the system. Arsenic was detected in every component except rainfall and mercury was detected in every component except street particulates. Although not analyzed in every component, chromium, zinc, aluminum, and manganese were detected in every component in which they were analyzed. Many organics were not analyzed in all system components. A number of organics were detected in runoff, but not in soils, soil water, or groundwater. Lindane, chlordane, DDE, and DDT were found in soils, but not in soil water or groundwater.

The system components are shown on Figure 6-1. Pollutants in dry deposition accumulate on the ground surface until a rainstorm occurs. Pollutants in rainfall, the accumulated dry deposition pollutants, and pollutants from other sources that have accumulated on street surfaces are transported to the storm drainage system. These pollutants are then measured in the storm runoff. The storm runoff is transported via the drainage system to the recharge basins. The recharge water percolates through the basin soils, eventually reaching the shallow and then the deep groundwater.

The ranges and mean values of lead, specific conductance, calcium, and nitrate in each of the system components are shown in Table 6-2 to demonstrate changes that occur in the

Table 6-1. Metals and Organics Detected in Fresno NURP Project

Constituent	Component						
	Rainfall	Dry deposition	Street particulates	Runoff	Basin soils	Soil water	Groundwater
Priority pollutant metals							
Antimony	-	-	-	X	-	O	O
Arsenic	O	X	X	X	X	X	X
Beryllium	X	-	-	-	-	O	O
Cadmium	-	-	X	X	-	O	O
Chromium	X	X	X	X	-	X	X
Copper	X	X	X	X	X	X	X
Cyanide	-	-	-	X	-	-	-
Lead	X	X	X	X	X	X	X
Mercury	X	X	O	X	X	X	X
Nickel	X	X	X	X	X	X	X
Zinc	X	X	X	X	-	X	X
Other metals							
Aluminum	X	X	X	X	-	-	-
Barium	X	-	-	X	-	-	-
Boron	-	-	-	X	-	-	-
Cobalt	-	-	-	X	-	-	-
Iron	X	X	X	X	X	X	X
Lithium	X	-	-	X	-	-	-
Manganese	X	X	X	X	-	-	-
Molybdenum	-	-	-	X	-	-	-
Strontium	X	-	-	X	-	-	-
Titanium	-	-	-	X	-	-	-
Vanadium	-	-	-	X	-	-	-
Priority pollutant organics							
Aldrin	O	O	O	X	O	O	O
Anthracene	-	-	-	X	O	O	O
Benzo(a) pyrene	-	-	-	X	O	O	O
Benzo(b) fluoranthene	-	-	-	X	O	O	O
∠-BHC	-	-	-	X	-	-	-
ϒ-BHC (lindane)	X	X	X	X	X	O	O
Butyl benzyl phthalate	-	-	-	X	O	O	O
Chlordane	X	X	X	X	X	O	O
Chrysene	-	-	-	X	O	O	O
DDD	O	O	X	O	O	O	O
DDE	X	X	X	X	X	O	O
DDT	X	O	X	X	-	-	-
Dieldrin	X	O	X	X	-	-	-
Di-n-octyl phthalate	-	-	-	X	O	O	O
Endosulfan	X	O	X	X	O	O	O
Endrin	O	O	O	X	-	-	-
Fluoranthene	-	-	-	X	O	O	O
Heptachlor	O	O	X	X	-	-	-
Heptachlor epoxide	O	O	X	X	-	-	-
4-nitrophenol	-	-	-	X	O	O	O
Total PCB	X	O	X	X	X	-	-
Pentachlorophenol	-	-	-	X	O	O	O
Phenol	X	-	-	X	X	O	X
Pyrene	-	-	-	X	O	O	O
Other organics							
Diazinon	X	X	X	X	O	X	O
Dibromochloropropane	-	-	-	X	-	-	-
2,4-D	X	O	O	X	O	O	O
Ethion	X	O	O	O	O	-	O
Malathion	X	X	X	X	O	O	O
Methoxychlor	X	X	O	X	O	O	O
Methyl parathion	X	O	X	X	O	O	O
Parathion	X	O	X	X	O	O	O
Silvex	O	O	-	X	-	-	-
Trithion	O	O	X	X	-	-	-

[a]Table symbols: X indicates detected; O indicates not detected; - indicates not measured.

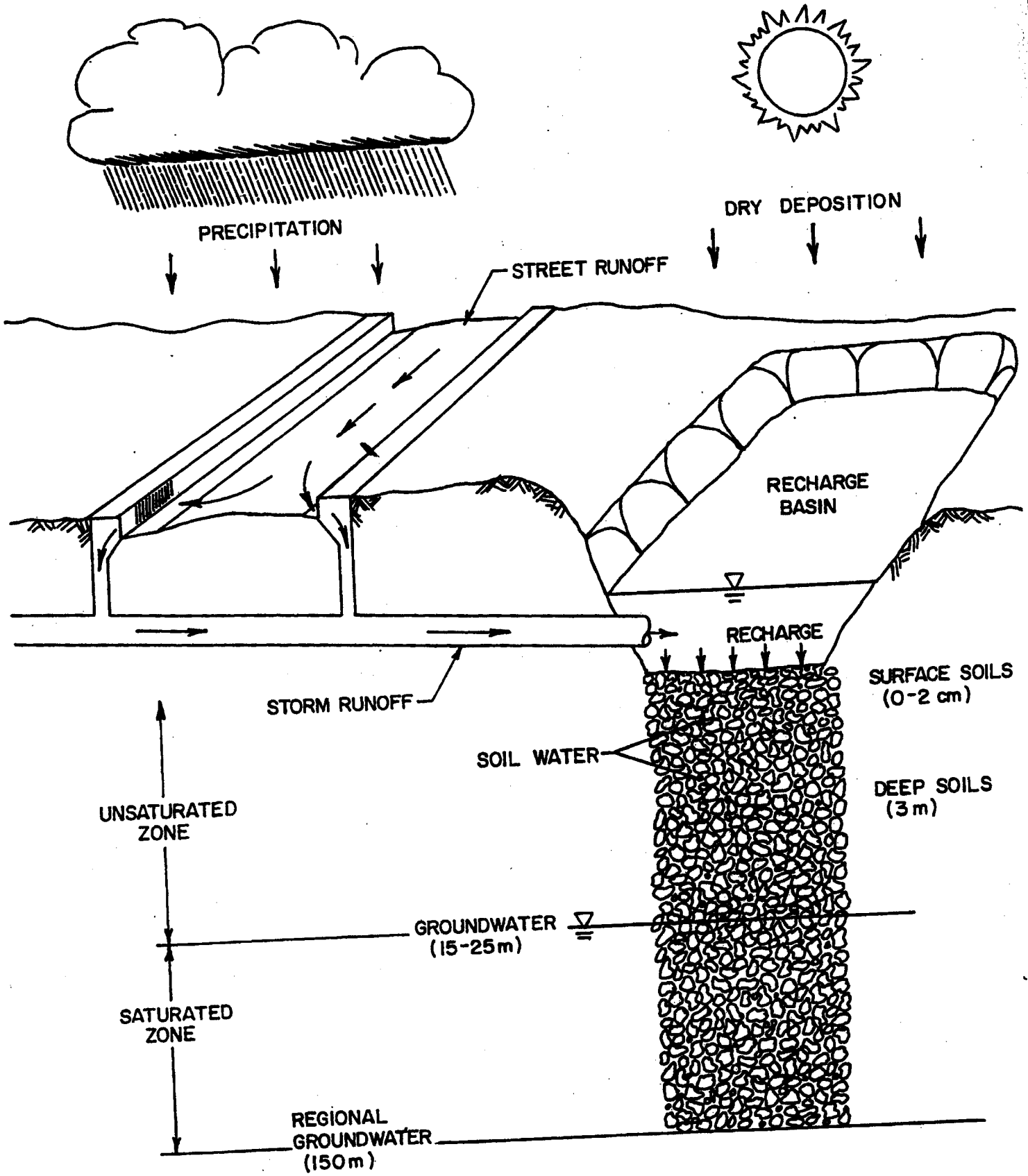


Figure 6-1 Schematic of System Components

Table 6-2. System Concentrations

Constituent	Rainfall	Dry deposition	Street particulates	Runoff	Surface soil	Soil water	Deep soil	Groundwater	Regional groundwat
Lead									
Wet phase, ug/l	<1-61 (11.2)[a]			9-2,100 (204)		<1-6 (1.5)		<1-6 (1.3)	<1-8 (5)
Dry phase, mg/kg		140-8,280 (1,464)	100-1,000 (500)		8.7-1,600 (585)		<2-8.9 (2.9)		
Specific conductance									
Wet phase, umhos/cm[b]	3-57 (14)			8-9,960 (199)		37-541 (118)		37-843 (278)	131-443 (308)
Dry phase, umhos/cm		No data	No data		1,519-4,031 (2,239)		78-204 (114)		
Calcium									
Wet phase, mg/l	0.1-1.5 (0.5)			0.8-120 (11)		3.0-38 (11)		2.8-64 (21)	6-55 (25)
Dry phase, mg/kg		2,760-121,000 (18,113)	30-120 (59)		54-299 (183)		1.2-3.5 (2.0)		
Nitrate									
Wet phase, mg/l	0-0.96 (0.23)			0-6.6 (0.9)		0.05-5.9 (0.8)		0.07-13.2 (2.4)	1.0-8.3 (3.8)
Dry phase, mg/kg		1,200-295,000 (24,455)	<2-42 (8.7)		1.9-101 (52)		0.18-1.1 (0.68)		

[a]Numbers in parentheses are mean values.
[b]umhos/cm = Micromhos per centimeter.

runoff/recharge system for different types of constituents. The data from each land use type and each recharge basin have been grouped together to show the overall ranges and mean values. Concentrations for the regional groundwater quality are also contained in Table 6-2, based on the data presented previously in Table 5-12.

The lead concentrations were fairly low in rainfall [mean = 11.2 micrograms per liter (ug/l)] and quite high in runoff (mean = 204 ug/l), indicating that lead comes primarily from ground sources. The concentrations decreased to about 1.5 ug/l in soil and groundwater. The mean lead concentration in the regional groundwater is higher than the mean levels in the soil water and groundwater underlying the recharge basins. In the dry phase, the highest lead concentrations were found in dry deposition [mean = 1,464 milligrams per kilogram (mg/kg)]. The mean concentrations of 585 mg/kg in surface soil and 2.9 mg/kg in deep soil indicate that the lead generally is attenuated in the surface soil layer and does not migrate to the deep layers of soil. The lead in the runoff is reduced to background levels by the time the runoff water reaches the water table.

The specific conductance and concentrations of calcium and nitrate in both the wet and dry phases show similar patterns. In the wet phase, the concentrations are low in rainfall, somewhat higher in runoff and soil water, even higher in the groundwater, and highest in the regional groundwater. For example, the mean concentrations of calcium were 0.5 mg/l in rainfall, 11 mg/l in runoff and soil water, 21 mg/l in groundwater, and 25 mg/l in the regional groundwater. In the dry phase, the concentrations were highest in dry deposition, lower in street sweepings, slightly higher in surface soil, and lowest in deep soil. The mean calcium concentrations were 18,113 mg/kg in dry deposition, 59 mg/kg in street sweepings, 183 mg/kg in surface soil, and 2 mg/kg in deep soil. The high concentrations of these constituents in dry deposition combined with the concentrations in rainfall and street particulates result in the high runoff concentrations.

The soil water concentrations of calcium and nitrate were essentially equal to the runoff concentrations, indicating that the soil layer has minimal effect on these particular constituents. However, it is also important to note that the concentrations of calcium and nitrate in the runoff are lower than in the regional groundwater. Thus, as discussed in Chapter 5, the runoff water being recharged is tending to improve the quality of the regional groundwater for calcium and nitrate, as well as most of the other cations and anions.

LOADING ANALYSIS

The effects of urban runoff on the recharge basin soils can be further assessed by performing a loading analysis. The purpose of the loading analysis is to determine if the pollutant loads from runoff and other sources can be correlated with the amounts of these pollutants present in the basin soils. The USDA soil profile data can be used to compute the amount of various pollutants in the basin soils. The runoff monitoring program was conducted on a different set of basins, so actual runoff loads for the USDA basins are not available. However, runoff loads to the USDA basins can be "synthesized" using the unit load factors for different land use types from the USGS data. The loading analysis was developed for both a short-term period (i.e., the two years of this study program) and a long-term period.

Short-Term Analysis

Basins EE and MM were chosen for the short-term loading analysis because data on pollutant concentrations in the soil were collected before and after the wet weather season in 1981-82 and 1982-83. Thus, it is possible to calculate a mass balance for each year. Samples were not collected in the fall for the other three test basins. The results of the short-term loading analysis are described below.

Runoff Load. The loads of lead, copper, iron, and arsenic in runoff from the drainage areas of Basins EE and MM were synthesized using the USGS runoff data. USGS collected runoff quality data from single-family residential, multiple-family residential, commercial, and industrial land uses. Unit runoff load factors in pounds per acre per year were calculated for each land use type in the 1981-82 and 1982-83 rain seasons. The unit runoff load factors were based on flow-weighted runoff coefficients and flow-weighted event mean concentrations (EMCs). The unit runoff load factors were multiplied by the number of acres of land in each land use type in the drainage areas of Basins EE and MM to calculate the annual runoff load for each of the two years.

A small amount of runoff water is pumped out of Basins EE and MM each year to prevent flooding. It was estimated that 5 percent of the water was pumped out of Basin EE and 1 percent of the water was pumped out of Basin MM. Typically, the pumps are turned on as soon as the basins begin to fill with runoff water, so it was assumed that there was minimal sedimentation of particulates in the runoff water prior to pumping. Based on this assumption, the runoff loads to Basins EE and MM were reduced by 5 percent and 1 percent, respectively, to account for the pollutant loads that are pumped out of the basins and never reach the basin soils.

Rainfall and Dry Deposition Loads. There is rainfall and dry deposition directly on the basins. The loads of lead, copper, iron, and arsenic in this direct rainfall and dry deposition were calculated. USGS measured the concentrations of these constituents in rainfall and dry deposition at the single-family residential and industrial sites. Based on these concentration data, unit load factors in pounds per acre per year were calculated for both sites. The mean unit load factors for rainfall and for dry deposition were multiplied by the surface areas of Basins EE and MM to determine the pollutant loads from direct rainfall and dry deposition. The runoff and rainfall-dry deposition loads are shown in Table 6-3. The loads of each constituent in rainfall and dry deposition are negligible in comparison to the runoff loads.

Table 6-3. Runoff, Rainfall, and Dry Deposition Loads to Basins EE and MM

	Annual loads, pounds					
	Basin EE			Basin MM		
Constituent	Runoff	Rainfall and dry deposition	Total	Runoff	Rainfall and dry deposition	Total
Lead						
81-82	183	1	184	75	1	76
82-83	648	2	650	251	1	252
Copper						
81-82	30	1	31	10	1	11
82-83	46	1	47	17	1	18
Iron						
81-82	4,503	47	4,550	1,945	29	1,974
82-83	20,238	37	20,275	9,182	22	9,204
Arsenic						
81-82	5	0	5	1	0	1
82-83	8	0	8	3	0	3

Soil Loads. USDA measured the concentrations of lead, copper, iron, and arsenic at 2-to-6-centimeter (cm) depth intervals in the soil column. The soil content or load of each of these constituents in the upper 14 cm of the soil column was calculated at the following times:

Fall 1981--soil load at beginning of study.

Spring 1982--soil load after 1981-82 rain season.

Fall 1982--soil load before 1982-83 rain season.

Spring 1983--soil load after 1982-83 rain season.

If there was no loss of pollutants from the basin soils, the spring 1982 soil loads in Basins EE and MM would equal the fall 1981 soil loads, plus the loads from runoff, rainfall, and dry deposition occurring during the 1981-82 wet weather season. Similarly, the spring 1983 soil loads would equal the fall 1982 soil loads, plus the loads from runoff, rainfall, and dry deposition occurring during the 1982-83 wet weather season. The loads are compared in Table 6-4. In most cases, the calculated loads are within 30 percent of the measured soil loads. The exceptions are lead in Basin MM in both years, copper in Basin EE in 1981-82 and in Basin MM in both years, and arsenic in Basin EE in 1982-83. In four of these cases, the actual load measured in the basin was less than the calculated load. This would imply that all of the load contributed by runoff does not remain in the basin soils. In Basin MM the actual loads of lead and copper were greater than the calculated loads in 1981-82. This implies that the runoff load was overestimated or the soil load was underestimated. There are no consistent differences between the results in Basins EE and MM. For example, in some cases, Basin MM soil loads accounted for less of the runoff load than Basin EE (1982-83 lead and copper). The opposite was true for the 1981-82 lead and copper data and the 1982-83 arsenic data, with Basin MM soil loads accounting for more of the runoff load than Basin EE.

Factors Affecting Short-Term Loading Analysis. There are a number of factors which affect the results of the loading analysis that were not included in the calculations. It was not possible to quantify them and include them in the analysis, but they can be qualitatively considered and are briefly described below.

1. Estimates of amount of runoff water pumped out of the basins--There are no measurements of the amount of water pumped out of the two basins. The figures of 5 percent and 1 percent are simply estimates. If more volume was pumped out than these estimates, the runoff load would be overestimated. In addition, it was assumed that all of the pollutants in the pumped runoff water were pumped out of the basins and that there was no settling of particulate pollutants in the basins. This assumption would tend to underestimate the load to the basins.

Table 6-4. Comparison of Actual and Calculated Soil Loads

Time	Constituent load, pounds							
	Lead		Copper		Iron		Arsenic	
	Basin EE	Basin MM	Basin EE	Basin MM	Basin EE	Basin MM	Basin EE	Basin MM
1981-82								
Fall soil load	1,409	78	218	24	141,000	46,100	72	18
Runoff load[a]	184	76	31	11	4,500	2,000	5	1
Calculated spring soil load	1,593	154	249	35	145,500	48,100	77	19
Actual spring soil load	1,925	253	111	56	111,000	35,700	63	16
Actual load as percent of calculated load	121	164	45	160	76	74	82	84
1982-83								
Fall soil load	1,434	106	152	41	159,000	50,100	185	39
Runoff load[a]	650	252	47	18	20,200	9,200	8	3
Calculated spring soil load	2,084	358	199	59	179,200	39,500	193	42
Actual spring soil load	2,586	245	177	39	No data	No data	41	39
Actual load as percent of calculated load	124	68	89	66	—	—	21	93

[a]Runoff load is actually the load from runoff, rainfall, and dry deposition.

2. Representativeness of USDA sampling sites--USDA sampled at one site in Basins EE and MM. Spatial sampling was not conducted in these two basins to determine if the sampling sites were generally representative of the basins. Spatial data collected in Basin F showed that highest concentrations were found near the inlets and in low spots on the basin floor. Based on this information, the sampling sites in Basins EE and MM appear to be fairly representative of average conditions.

3. Basin floor surface area--The surface area used to calculate the amount of each pollutant in the basin soil was based on an estimate of the average water depth in the basins during the rain seasons. District staff estimate that the average water depth was as follows: Basin EE, 10-feet in 1981-82 and 15 feet in 1982-83; and Basin MM, 8-feet in 1981-82 and 12-feet in 1982-83. The basin floors are not entirely flat, so there are low areas that fill with water more often. The depth of water in the basins varies with the duration and intensity of each rainstorm.

Long-Term Analysis

A long-term mass balance of lead, copper, iron, and arsenic in Basin F was calculated. Basin F was chosen because data were available on the development of the watershed during the 19 years since the basin was constructed and USDA conducted an intensive survey of lead concentrations throughout the basin. From the intensive survey, the representativeness of the study sampling site could be determined.

Runoff Load. The loads of lead, copper, iron, and arsenic in runoff from the drainage area of Basin F were calculated for the period from 1965, when the basin was constructed, to 1983. The acres of land in each land use type in 1965, 1970, 1975, and 1981 were determined. These figures were multiplied by the flow-weighted unit runoff load factors to produce annual loads. The unit runoff load factors from 1982-83 were used for 1969 and 1978 because the rainfall amounts in these two years were significantly above normal, as was the rainfall in 1983. The unit load factors from 1981-82 were used for all of the other years between 1969 and 1983. The annual loads from 1969 to 1983 were summed to produce the accumulated runoff load. The accumulated loads are presented in Table 6-5.

Table 6-5. Accumulated Runoff Loads to Basin F

Constituent	Accumulated runoff load, pounds			
	Before pumping	After pumping	Recharge basin	Recreation basin
Lead	720	576	167	409
Iron	15,081	12,065	3,499	8,566
Copper	85	68	20	48
Arsenic	13.1	10.5	3.0	7.5

Approximately 20 percent of the runoff water is pumped out of Basin F each year to prevent flooding. Since the pump is turned on as soon as the basin begins to fill with water, it was assumed that there was no settling out of particulates, so 20 percent of the pollutant load is pumped out of the basin. The accumulated loads of each pollutant were reduced by 20 percent to account for the pollutant loads that are pumped out of the basin and never reach the basin soils. These adjusted loads are also shown in Table 6-5.

Basin F consists of two basins; a small (1.16-acre) recharge basin and a larger (2.82-acre) recreation basin. The runoff water enters the recharge basin and then overflows to the recreation basin. Since there are no data on the amount of water stored in each basin during a typical year, it was assumed that the amount of water and pollutant loads were directly proportional to the surface areas of the two basins. Based on this assumption, 29 percent of the accumulated load was distributed in the recharge basin and 71 percent was distributed in the recreation basin. These loads are shown in Table 6-5.

Rainfall and Dry Deposition Loads. The loads of lead, copper, iron, and arsenic in the rainfall and dry deposition falling directly on the surface of Basin F are included in the background soil load which is discussed in the following section. These loads were less than 5 percent of the runoff load.

Soil Loads. The loads of lead, copper, iron, and arsenic in the soil of Basin F were calculated by using the average concentration of each constituent in each layer of soil measured by USDA during the study. The soil background concentrations of lead, copper, iron, and arsenic were subtracted from the soil concentrations before the soil load was calculated. The

background concentrations were based on data collected at the control site in 1981. These soil loads are presented in Table 6-6.

Table 6-6. Soil Loads in Basin F

Constituent	Soil load based on long-term sampling site, pounds		Soil load based on average data, pounds	
	Recharge basin	Recreation basin	Recharge basin	Recreation basin
Lead	329	799	194	751
Iron	120,992	294,136	71,385	276,488
Copper	1.9	4.5	1.1	4.2
Arsenic	4.7	11.4	2.8	10.7

In January 1984, USDA conducted an intensive sampling program in Basin F to determine the spatial variability in the basin. These data are useful in determining if the long-term sampling site is representative of average conditions in the basin. In the recharge basin, the average lead concentration in the upper 8 cm of soil was 204 mg/kg. The average concentration in the upper 8 cm of soil at the long-term sampling site during the study period was 344 mg/kg. Thus, the average concentration in the recharge basin during the intensive survey was 59 percent of the average at the long-term sampling site. The average concentration in the recreation basin during the intensive survey was 322 mg/kg, which is 94 percent of the average long-term sampling site. Since intensive data were not collected on the concentrations of copper, iron, and arsenic, it was assumed that the long-term sampling data overestimated the average concentrations by the same percentages. The soil loads, based on data collected at the long-term sampling site, were multiplied by 59 percent for the recharge basin and 94 percent for the recreation basin to obtain estimates of the average soil loads. These loads are also presented in Table 6-6.

If there were no loss of pollutants from the basin soils, the soil load of each constituent should approximately equal the load from runoff since the basin was constructed. Table 6-7 presents the soil loads as a percent of the accumulated runoff load. The soil loads presented are based on the adjustment to reflect average conditions. The lead and arsenic soil loads based on the average data are fairly close to the accumulated

runoff loads. The recharge basin loads are slightly lower than the loads from runoff and the recreation basin loads are higher. This indicates that proportioning the runoff load between the two basins based on surface areas, may have underestimated the load to the recharge basin and overestimated the load to the recreation basin. If the two basins are combined, the soil loads of lead and arsenic are 164 and 129 percent of the runoff load, respectively. The soil loads of iron were much greater than the runoff loads and the soil loads of copper were much lower than the runoff loads.

Table 6-7. Comparison of Soil Loads to Runoff Loads

Constituent	Soil load as percent of runoff load based on average data	
	Recharge basin	Recreation basin
Lead	116	184
Iron	2,040	3,228
Copper	6	9
Arsenic	93	143

Factors Affecting Long-Term Loading Analysis. As in the case of the short-term analysis, there are several factors that influence the long-term loading analysis that cannot be quantified. However, these factors can be qualitatively considered and are described below.

1. Estimate of amount of runoff water pumped out of the basin--As described in the short-term analysis, this assumption could either underestimate or overestimate the runoff load.

2. Estimate of surface area of basin routinely covered with water--As described in the short-term analysis, there is no clear basis for judging the effect of this assumption on the loading analysis.

3. Applicability of study period data to previous years--The data collected during 1981-82 and 1982-83 were used to estimate loads from 1965 through 1983. Differences in land use over the 19-year period were accounted for in the synthesis, as discussed previously. Differences in rainfall amounts were only partially incorporated into the synthesis. The annual rainfall for each year

since 1965 was obtained. The unit load factors, in pounds per acre per year, from 1981-82 were used for years in which the rainfall was less than 17 inches. The unit load runoff factors from 1982-83 were used for years in which the rainfall exceeded 17 inches. The unit load factors may vary with changes in rainfall, but it was not possible to predict the relationship between rainfall amount and runoff factors with only two years of data.

4. Changes in cultural practices--Since the analysis of Basin F extends over a 19-year period, it is likely that there have been cultural changes during this time that may influence unit runoff loads. The best example is the effect of the reduction in leaded gasoline use. The use of leaded gasoline has changed dramatically since the basin was completed in 1965. Figure 6-2 shows the amount of leaded gasoline consumed in Fresno County since 1960 and projections for future consumption. The consumption of leaded gasoline increased steadily from 1960 to 1973. It has decreased steadily since then, due mainly to the introduction of unleaded gasoline cars in 1975. Chevron Oil Company has projected that it will continue to decrease in the future. The runoff lead load was based on data collected from 1981 to 1983, a period when leaded gasoline usage was lower than in any of the years since 1965 when Basin F was completed. Historic runoff loads of lead were likely much higher than the current loads used in our analysis. Thus, the cumulative lead runoff load is significantly underestimated.

   Changes in street sweeping practices could also influence the magnitude of runoff loads. For example, there was a significant reduction in street sweeping after the passage of Proposition 13 in 1978.

Summary of Loading Analysis

Both the short-term and long-term loading analyses are influenced by several important variables that could not be quantified. Thus, the comparison of runoff loads with soil loads does not represent a complete mass balance. However, some general insights can still be obtained from the evaluation.

In the short-term loading analysis, the loads present in the basin soils were comparable to the runoff loads in the majority of cases. However, there were four cases in which the actual load measured in the basin was substantially less than the incoming runoff load. Three of the four cases occurred in

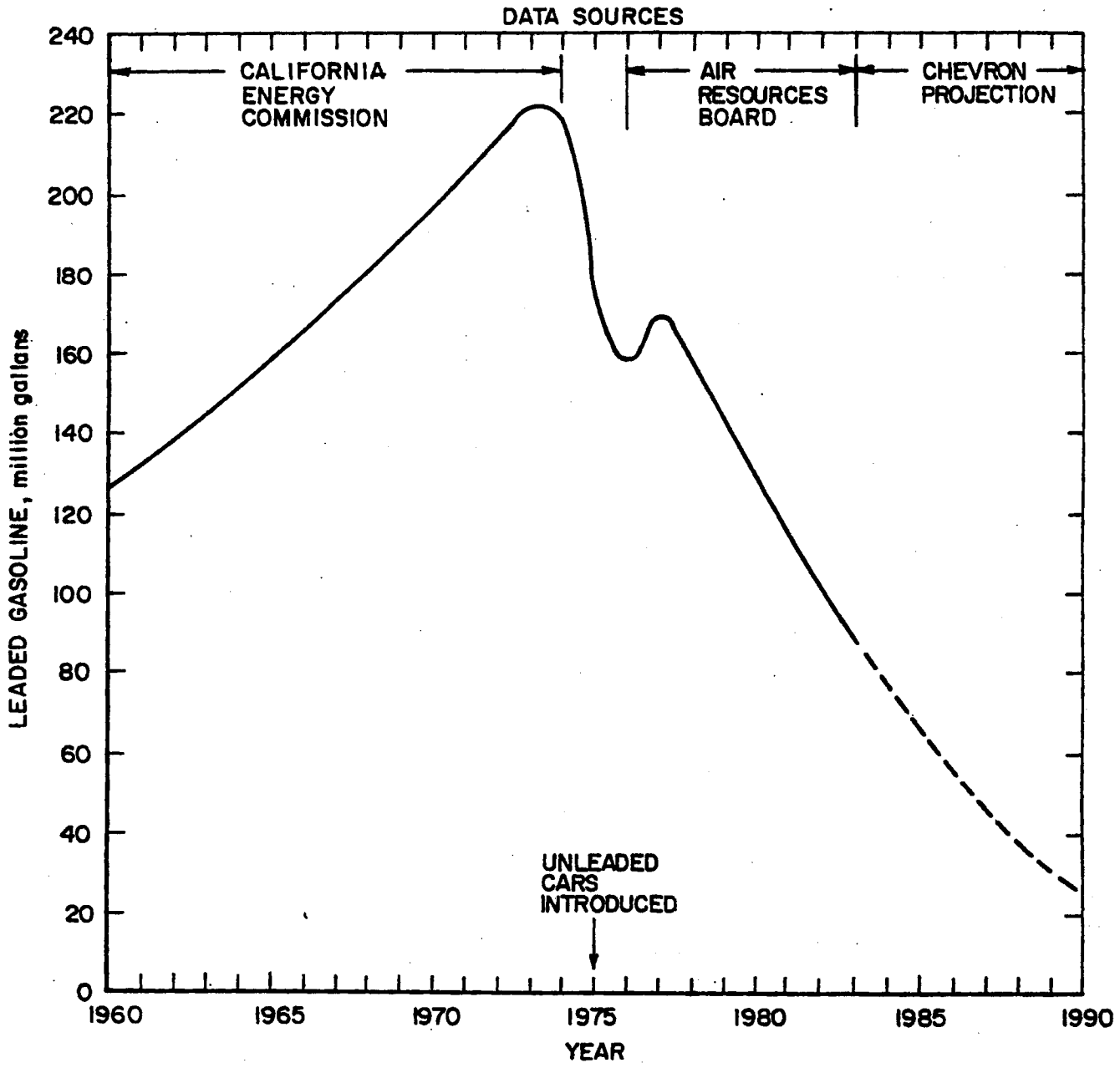


Figure 6-2 Leaded Gasoline Consumption in Fresno County, 1960-1990

1982-83, which was an extremely wet year. These results imply that some of the lead, copper, and arsenic in the runoff may have moved through the soil to the groundwater. However, there was no evidence of an increased level of these contaminants in the groundwater underlying the basins.

It is more difficult to judge exactly what is happening in Basin F, because a 19-year period is covered. Many variables exist which may contribute to the wide discrepancies in the iron and copper results. The accumulated soil load of lead was comparable to the runoff load based on current unit factors. However, due to the more prevalent use of leaded gasoline in the past, historic runoff loads were probably much higher than current levels. If the cumulative runoff load is being substantially underestimated, this would indicate that there may be considerable loss of lead from the basin soils. Loss could be due to both movement through the soil layer to the groundwater and uptake of lead by the vegetation covering this turfed basin.

CHAPTER 7

IMPACTS OF RUNOFF ON WATER SUPPLY AND RECREATION

The effects of the retention of urban storm runoff in recharge basins on groundwater and soils in the Fresno area are discussed in this chapter. The runoff data from the four land use types, rainfall data, and the soil water and groundwater data are compared to the Safe Drinking Water Act (SDWA) criteria and drinking water criteria developed by the California Department of Health Services (DHS) and the Environmental Protection Agency (EPA). The concentrations of several metals and organics in the soil samples are compared to soil criteria for hazardous materials developed by DHS. These comparisons are one method of determining if recharge of urban runoff is adversely affecting groundwater quality underlying the basins and surface soils in the basins used for recreational purposes.

DRINKING WATER IMPACTS

The effects of the retention of urban storm runoff in recharge basins on the quality of the drinking water supply are discussed in this section. The runoff, rainfall, soil water, and groundwater data are compared to drinking water criteria.

Drinking Water Criteria

There are a number of state and federal criteria for metals and organics. The data collected during this program have been compared to the drinking water quality criteria or maximum contaminant levels pursuant to the SDWA. These SDWA criteria are generally similar to the criteria used by the State of California in evaluating water supplies. The data are also compared to DHS Action Levels and EPA Suggested No Adverse Response Levels (SNARLs). These Action Levels and SNARLs are not legally enforceable criteria, but are simply DHS and EPA recommendations on safe levels for drinking water supplies.

Runoff Data. Comparing the quality of urban runoff to the drinking water criteria is not a direct indicator of water supply impacts. The concentrations of most contaminants found in storm runoff will be reduced as the runoff water percolates through the soil layer. Most municipal and industrial water supplies are extracted from depths of up to 400 feet below ground surface. Thus, comparing runoff quality to drinking

water criteria represents a "worst case" and is intended primarily to determine what constituents in urban runoff are of potential concern to the groundwater supply.

Table 7-1 presents the SDWA criteria, DHS Action Levels, and EPA SNARLs for parameters that were measured by the U.S. Geological Survey (USGS) or EPA. The maximum and median concentrations of the metals and organics at the industrial site are compared to the criteria in this table. The data from the single-family residential, multiple-family residential, and commercial sites were combined and the maximum and median concentrations were determined. Since the EPA priority pollutant program consisted of only four organics samples and six metals samples at each site, the more comprehensive USGS data are compared to the criteria. In the few cases where parameters were not measured by USGS, the EPA data are presented.

The metals can be divided into several groups:

1. Maximum and median concentrations lower than SDWA criteria: cadmium, copper, zinc, and silver at the industrial site; arsenic, copper, zinc, and silver at the other sites. Since the detection limit for selenium in testing done by the EPA contract laboratories (25 ug/l) exceeds the criterion (10 ug/l), it is not possible to determine if selenium meets the criterion.

2. Median concentration lower than SDWA criterion, but maximum concentration exceeds criterion: arsenic, chromium, and mercury at the industrial site; cadmium, chromium, and mercury at the other sites.

3. Maximum and median concentrations exceed the SDWA criteria: lead, iron, and manganese at the industrial and other sites.

Most of the metals exceed the SDWA criteria by a small amount; however, iron, manganese, and lead significantly exceed the criteria. The criteria for iron and manganese are based on taste and odor concerns, while the criterion for lead is based on health effects. The EPA is currently in the process of reviewing the SDWA criteria. They are considering revising the cadmium and lead criteria downward. The maximum concentration of cadmium at the residential and commercial sites exceeds the current criterion. The maximum and median lead concentrations at all sites exceed the current criterion. When the cadmium and lead criteria are revised, they should be compared to lead and cadmium groundwater concentrations to reassess the potential impact of these metals on the drinking water supply.

Table 7-1. Comparison of Runoff Quality with Drinking Water Criteria and Action Levels

Constituent	Data source	Criterion ug/l	Industrial site concentration, ug/l			Other sites concentration, ug/l		
			N[a]	Maximum	Median	N[a]	Maximum	Median
SDWA constituents[b]								
Arsenic	USGS	50	107	67	14	246	17	2
Cadmium	USGS	10	70	4	1	133	12	1
Chromium	USGS	50	86	51	14	186	62	10
Copper	USGS	1,000	86	400	66	185	380	18
Lead	USGS	50	107	360	74	249	2,100	140
Mercury	USGS	2	107	2.5	0.1	247	8.6	0.1
Zinc	USGS	5,000	86	3,100	535	185	3,400	150
Iron	USGS	300	107	62,000	9,000	250	72,000	2,900
Manganese	USGS	50	37	1,600	360	116	1,700	190
Selenium	EPA	10	6	<25	<25	18	<25	<25
Silver	EPA	50	6	<10	<0.5	18	<10	<0.5
Lindane	USGS	4	19	0.27	0.03	67	0.06	0.01
Endrin	USGS	0.2	19	0.01	<0.01	67	0.01	<0.01
Methoxychlor	USGS	100	19	0.04	<0.01	67	0.19	<0.01
Silvex	USGS	10	19	0.07	<0.01	65	0.03	<0.01
Toxaphene	USGS	5	19	1.0	<0.01	67	1.0	<1.0
2,4-D	USGS	100	19	3.2	0.03	65	3.7	0.04
DHS action level constitutents[c]								
DBCP	USGS	1.0	7	0.005	<0.003	19	0.01	<0.003
Carbon tetrachloride	EPA	5.0	4	<10	<10	12	<10	<10
Tetrachloroethylene	EPA	4-40	4	<10	<10	12	<10	<10
Trichloroethylene	EPA	5-50	4	<10	<10	12	<10	<10
EPA SNARL constituents[d]								
Carbon tetrachloride	EPA	200/—[e]	4	<10	<10	12	<10	<10
Tetrachloroethylene	EPA	2,300/20[e]	4	<10	<10	12	<10	<10
Trichloroethylene	EPA	2,000/75[e]	4	<10	<10	12	<10	<10
1,1-Dichloroethylene	EPA	1,000/70[e]	4	<10	<10	12	<10	<10
Trans-1,2-dichloroethylene	EPA	2,700/—[e]	4	<10	<10	12	<10	<10
Chlordane	USGS	63/8[e]	19	0.3	<0.1	65	1.2	0.1
1,1,1-Trichloroethane	EPA	—/3,300[e]	4	<10	<10	12	<10	<10
Dichloromethane	EPA	13,000/150[e]	2	<10	<10	5	<10	<10

[a]N is the number of samples analyzed.

[b]SDWA = Safe Drinking Water Act.

[c]DHS = California Department of Health Services.

[d]SNARL = Suggested No Adverse Response Level.

[e]The first number represents a one-day average concentration and the second number represents a long-term average concentration.

All measurements of lindane, endrin, methoxychlor, silvex, toxaphene, and 2,4-D were substantially less than the SDWA criteria. Similarly, all measurements of DBCP were substantially less than the DHS Action Level. It is not possible to determine if the DHS Action Levels for carbon tetrachloride, tetrachloroethylene, and trichloroethylene are met because the action levels are lower than the detection limits for these constitutents in testing done by the EPA contract laboratories. For example, the detection limit for tetrachloroethylene is 10 ug/l, which is higher than the low end of the criterion range. None of the EPA SNARLs are exceeded at any of the sites.

Rainfall Data. Table 7-2 compares rainfall data with SDWA criteria. The maximum and median concentrations of the metals and organics which were tested are presented for the three precipitation sites. As in the case of runoff, these comparisons are not a direct indicator of water supply impacts. However, these comparisons are useful in identifying constituents of potential concern.

None of the median metal concentrations exceeded SDWA criteria. However, the maximum concentrations of lead and manganese exceeded the SDWA criteria at the single-family residential and industrial sites, and the maximum concentrations of iron exceeded the SDWA criterion at all three sites. The concentrations of lindane, methoxychlor, and 2,4-D were less than the SDWA criteria.

Soil Water and Groundwater Data. Table 7-3 presents the SDWA criteria for eight metals and the maximum and median concentrations of these constituents in the soil water and groundwater at the five recharge test basins. Approximately 10 to 20 samples were analyzed for arsenic, copper, iron, and lead. One to three samples were analyzed for the other metals. The median and maximum concentrations of these metals in both the soil water and the groundwater at the five sites are substantially less than the criteria. The maximum concentration of arsenic was 10 ug/l compared to the criterion of 50 ug/l. The maximum concentration of copper was 81 ug/l compared to the criterion of 1,000 ug/l. The maximum concentration of iron was 60 ug/l compared to a criterion of 300 ug/l. The maximum concentration of lead was 6 ug/l compared to a criterion of 50 ug/l. Based on the limited data collected, the maximum concentrations of the other metals were significantly lower than the criteria, with the exception of mercury, which was measured at a concentration half the criterion. Additional mercury monitoring should be conducted. Even if the SDWA criteria for cadmium and lead are revised downward, the concentrations in soil water and groundwater will likely still be lower than the criteria.

Table 7-2. Comparison of Precipitation Quality with Drinking Water Criteria

Constituent	SDWA criterion,[a] ug/l	Concentration, ug/l					
		Single-family residential		Industrial		Laboratory	
		Maximum	Median	Maximum	Median	Maximum	Median
Arsenic	50	<1	<1	<1	<1	1	<1
Cadmium	10	1	<1	1	<1	—	—
Chromium	50	<1	<1	<1	<1	<1	<1
Copper	1,000	6	4	12	6	8	2
Lead	50	61	8	51	7	44	5
Mercury	2	0.1	0.1	0.2	<0.1	0.1	<0.1
Zinc	5,000	60	60	90	55	30	20
Iron	300	1,400	90	2,800	130	1,300	80
Manganese	50	60	10	80	10	40	10
Lindane	4	0.02	0.01	0.04	0.01	0.01	0.01
Methoxychlor	100	0.05	<0.01	0.12	<0.01	0.04	<0.01
2,4-D	100	0.04	<0.01	0.08	<0.01	0.04	<0.01

[a]SDWA = Safe Drinking Water Act.

Table 7-3. Comparison of Soil Water and Groundwater Quality with Drinking Water Criteria

Constituent	SDWA criterion, ug/l	Sampling medium	Concentration, ug/l									
			Basin F		Basin G		Basin M		Basin EE		Basin MM	
			Maximum	Median	Maximum	Median	Maximum	Median	Maximum	Median	Maximum	Median
Arsenic	50	Soil water	4.0	<1	—	—	5.0	<1	4.0	<1	5.0	<1
		Groundwater	6.0	<1	9.0	<1	8.0	<1	10	<1	2.0	<1
Copper	1,000	Soil water	81	6.4	—	—	42	42	30	7.9	60	18
		Groundwater	16	3.0	75	20	23	2.8	11	2.0	21	3.0
Iron	300	Soil water	15	4.0	—	—	<6.0	<6.0	60	6.5	11	3.5
		Groundwater	19	3.5	21	4.0	9.0	4.5	15	7.0	7.0	1.0
Lead	50	Soil water	6.0	<1	—	—	<2	<2	3.0	<1	4.0	2.0
		Groundwater	1.0	<1	2.0	<1	6.0	<1	2	<1	<1	<1
Cadmium	10	Soil water	<1	<1	—	—	—	—	—	—	<1	<1
		Groundwater	<1	<1	<1	<1	<1	<1	—	—	<1	<1
Chromium	50	Soil water	0.5	0.3	—	—	—	—	—	—	0.4	0.4
		Groundwater	0.5	0.5	0.3	0.3	0.3	0.3	—	—	0.1	0.1
Mercury	2	Soil water	0.2	0.2	—	—	—	—	—	—	<0.2	<0.2
		Groundwater	0.2	0.2	1.0	1.0	<0.2	<0.2	—	—	0.4	0.4
Zinc	5,000	Soil water	10	<10	—	—	—	—	—	—	90	90
		Groundwater	<10	<10	20	20	20	20	—	—	20	20

As discussed in Chapter 5, soil water and groundwater samples were analyzed extensively for numerous pesticides. Diazinon was the only pesticide that was detected. Three samples of approximately a total of 80 had concentrations that were 0.3 ug/l or less. At this time, a drinking water criterion for diazinon has not been established. A few water samples were also analyzed for semi-volatile organics using EPA method 625. None of semi-volatile organics were at concentrations greater than the detection limits which ranged between 10 and 25 ug/l.

Impacts on Drinking Water

The main objective of the Fresno NURP project has been to determine the present impact of recharge of urban runoff on the quality of the groundwater supply. Future impacts have also been addressed, but at the outset of the project it was recognized that projecting future impacts would be difficult due to the complex factors influencing contaminant migration. Existing and future impacts are decribed in this section.

Present Impacts. Currently, there are no adverse impacts on the groundwater resulting from recharge of urban storm runoff to the five basins tested. Concentrations of all metals and organic compounds in the soil water and groundwater underlying the five test basins are within the SDWA criteria. It is expected that similar conditions would be found in the groundwater underlying most of the other recharge basins in the District. However, basins serving areas with considerable industrial development may pose a greater threat to the groundwater. While runoff quality was tested by this project at such a site, the basin soils, soil water, and groundwater were not tested and should be the object of future monitoring.

The analysis of data presented in Chapter 5 indicated the possibility that some contaminants may be migrating through the soil layer, particularly in Basin MM with its sandy profile. However, there is no evidence of any accumulation of these compounds in the underlying groundwater. From the standpoint of mineral quality (common cations and anions), recharge of urban storm runoff and summer irrigation water is improving the regional groundwater quality, since the mineral quality of the water being recharged is better than the regional groundwater quality.

Future Impacts. The two main factors that will influence the future effects of recharging storm runoff are (1) changes in the volume and quality of urban runoff and (2) changes in contaminant reduction mechanisms now occurring in the soil layer. Each of these key factors is discussed below.

The recharge basins will continue to receive a load of each constituent each year when the storm runoff enters the basins during the rain season. If soil is not removed from the basins, the accumulated load will increase each year. For example, about 18 percent of the Basin F watershed is currently undeveloped so there is some potential for increased annual loads to this basin. Other watersheds served by District recharge basins are also undergoing development and new areas are being provided with drainage and recharge facilities.

There may also be changes in the quality of runoff water due to changes occurring at the contaminant source. Lead is the best example and is an important issue, since lead is one of the contaminants of most potential concern. Based on the data presented on Figure 6-2, it is clear that the runoff loading rate of lead will continue to decrease in the future as the number of cars which use leaded gasoline decreases. Changes in pesticide use practices may also alter runoff quality. For example, there are now restrictions on the use of some pesticides such as chlordane, which will decrease the amount of these pesticides reaching the recharge basins. Currently, chlordane is used exclusively for subterranean termite control by licensed pest control operators. According to the California Department of Food and Agriculture records, chlordane use in Fresno County is less than 10 percent of that used during the 1970s.

The various mechanisms affecting contaminant migration in soils were reviewed in Chapter 5. Numerous physical, chemical, and biochemical processes influence the contaminant mobility. These processes are affected by certain soil properties, including soil texture, cation exchange capacity, pH, oxygen, and organic matter. These properties are unlikely to change unless modifications are made either to the basins or to current operating practices. However, the key question is whether the removal capabilities of the soil layer will become depleted over time, if current basin operations are maintained. The fact that some of the District's basins (e.g., Basins F and G) have been operated for about 20 years provides some perspective on this question. A reduction in contaminant removal capability, if it occurs at all, will happen gradually. Levels of lead and the other metals in the basins tested are currently several times less than SDWA criteria. None of the organics for which criteria exist have even been detected. Thus, there is a significant margin of safety at present. It is unlikely that recharge will cause adverse impacts on the groundwater supply in the near future for the type of recharge basins evaluated in this study. Continued monitoring of the groundwater underlying the recharge basins would detect changes in groundwater quality well in advance of a problem occurring. However, the potential impacts on groundwater underlying basins serving industrial areas may be somewhat greater.

Because of the importance of protecting the sole source aquifer in the Fresno area, present operational practices of the retention/recharge system should be carefully reviewed to be certain that the risk of adversely affecting the groundwater supply continues to be minimized. Operational and management practices are reviewed in Chapter 8.

RECREATIONAL IMPACTS

Presently 13 of the District's 74 completed basins are available for recreation. Three of these basins have improved baseball diamonds, while the other nine are used for soccer and passive recreation. During these activities, contact with basin soils can occur. Thus, the potential for adverse impacts on recreation has been evaluated. Criteria for various contaminants in soils have been considered in assessing impacts on recreational use.

Soil Criteria

Criteria have been developed by the DHS, Hazardous Waste Management Branch, to determine whether or not waste materials containing metal and organic contaminants are hazardous. They are documented in "A Summary of the Draft California Regulatory Wastes", October 1982. We have discussed with DHS the applicability of these criteria to stormwater recharge basins. DHS staff members indicated that since accumulation of contaminants in recharge basins is not being caused by any specific source and is really a nonpoint source situation, it does not fall under their toxics enforcement program. However, if the material in the recharge basins were to be removed and disposed of, the hazardous waste regulations would then be applicable. DHS staff also stated that if there are levels of contaminants in the basin soils that exceed DHS criteria, DHS would be concerned about potential health impacts and would encourage reasonable management practices to alleviate the potential problem. Based on this guidance received from DHS, we believe it is appropriate to use DHS criteria as a basis for assessing the conditions in the recharge basins.

The DHS soil criteria are presented for soluble materials, expressed as a Soluble Threshold Limit Concentration (STLC), and for solid materials, expressed as a Total Threshold Limit Concentration (TTLC). Because of the nature of soil and plant tissue samples analyzed in this study, and the complete digestion method of analysis used to determine contaminant concentrations in the samples, the TTLC values established by the DHS are appropriate to use for initial evaluations. Data on metal and organic concentrations from regular samples for the

five test basins summarized in Chapter 5 are presented in Table 7-4 along with TTLC values for comparison. The following observations can be made:

1. Maximum lead and chlordane concentrations measured in the soil surface (0.00 to 0.02 m) were above TTLC values. Median concentrations were less than TTLC values.

2. Maximum and median surface concentrations of the other metals and organic contaminants were less than TTLC values.

3. Concentrations of all metal and organic contaminants averaged over the surface 0.3 m of the soil column were well below TTLC values (on the order of 1/100th of TTLC values).

The data contained in Table 7-4 are based on soil sampling at a single point in each of the five test basins. The data collected in the spatial survey for lead conducted in Basins F and B/E (see Figure 5-4) provides an indication of how concentrations vary over the entire basin surface. The highest lead concentrations occurred in low spots or close to the outfalls. Cores of the upper 8 cm of soil were collected in the spatial survey. Concentrations for the 0 to 2 cm depth can be estimated using soil profile data collected in this project. It is estimated that the mean and maximum lead concentrations in the 0 to 2 cm depth for the spatial survey would be as follows:

	Lead concentration, mg/kg	
Basin	Mean	Maximum
Basin F		
Upper recreation basin	670	2,500
Lower recharge basin	420	1,600
Basin B/E		
Upper recreation basin	210	2,300
Lower recharge basin	3,500	6,800

The spatial survey data clearly show that there are localized areas within the recreation basins that significantly exceed the TTLC for lead. The highest lead concentration occurred in the low-flow basin in Basin B/E. The low-flow areas in both basins are fenced off and are not used for recreational purposes.

Table 7-4. Comparison of Toxic Constituent Concentrations in Soil Samples with Hazardous Wastes Criteria

Constituent	Sample depth, meters	Concentration[a], mg/kg				TTLC,[b] mg/kg
		Control samples		Basin samples		
		Median	Maximum	Median	Maximum	
Arsenic	0.00 - 0.02	5.4	12.0	11.5	48.0	500
	0.24 - 0.30	2.0	3.2	3.4	8.4	
	2.7 - 3.0	2.5	4.9	2.6	28.0	
Nickel	0.00 - 0.02	20.0	35.0	35.5	83.0	2,000
	0.24 - 0.30	10.0	45.0	10.5	42.0	
	2.7 - 3.0	9.2	23.0	8.2	190.0	
Copper	0.00 - 0.02	16.0	49.0	26.5	79.0	250
	0.24 - 0.30	8.2	25.0	5.4	15.0	
	2.7 - 3.0	13.0	17.0	6.1	49.0	
Lead	0.00 - 0.02	37.0	107.0	740.0	1,600.0	1,000
	0.24 - 0.30	5.1	5.6	6.2	28.0	
	2.7 - 3.0	2.9	6.7	2.6	8.9	
Mercury	0.00 - 0.02	—	—	0.07	0.10	20
Chlordane	0.00 - 0.02	<0.03	<0.03	0.93	2.90	2.5
	0.24 - 0.30	<0.03	0.04	<0.03	<0.03	
	2.7 - 3.0	<0.03	<0.03	<0.03	<0.03	
Lindane	0.00 - 0.02	<0.01	<0.01	<0.01	0.02	4.0
	0.24 - 0.30	<0.01	<0.01	<0.01	<0.01	
	2.7 - 3.0	<0.01	<0.01	<0.01	<0.01	
DDT,DDE	0.00 - 0.02	<0.03	<0.03	<0.03	0.47	1.0
	0.24 - 0.30	<0.03	<0.03	<0.03	<0.03	
	2.7 - 3.0	<0.03	<0.03	<0.03	<0.03	
PCB	0.00 - 0.02	—	—	0.30	0.43	50

[a]Based on samples from all five test basins.
[b]Total threshold limit concentration.

The TTLC of 1,000 mg/kg for lead is for inorganic lead. Apparently, organic lead is much more toxic and thus has a much lower TTLC, 13 mg/kg. Several samples in the spatial survey were checked for organic lead. All samples were less than 1 mg/kg.

Soils samples were not collected from any basins that receive significant drainage from industrial areas. In the runoff monitoring program, USGS did monitor runoff from an industrial area. As reported in Chapter 4, runoff concentrations of several of the heavy metals were higher at the industrial site than the other three sites. It is likely that the concentrations of these metals in the basin soils would be similarly higher.

Impacts on Recreation

Assessing the impacts of contaminated surface soils in recharge basins on recreation is considerably more difficult than assessing the impacts of runoff on groundwater. The drinking water criteria have evolved through extensive research conducted over the past few decades. The DHS soils criteria have been developed quite recently as part of the program to manage hazardous wastes and are continuing to be refined as further research is conducted. Although DHS soil criteria do not directly apply to the recharge basin situation, they are a useful means for judging the relative magnitude of the problem.

Present Impacts. Of all the constituents evaluated, the only two constituents of any real concern are lead and to a lesser degree, chlordane. The primary health impact of these contaminants is through ingestion of soil by children. The potential for soil ingestion during activities in the recreational basins is quite limited, since most of the area is turfed. The infield area in the baseball diamonds is the only significant unturfed area and this soil is periodically removed as part of park maintenance. There are children's playgrounds at some of the recreational basin sites. However, these facilities are located along the outer perimeter of the basin which does not normally receive recharge water.

A second method by which health effects could occur is through dust inhalation. Discussions with DHS staff indicate that inhalation of contaminants such as lead in this situation is of less concern than ingestion. It is difficult to quantitatively estimate the concentrations of contaminants that would be present in the air if the soil in a recharge basin is disturbed. Using a set of fairly conservative assumptions, we have computed the potential atmospheric lead level. Using the maximum lead soil concentration of 1,600 mg/kg, we estimated that dust created from disturbing bare soil would contain a lead

concentration in the air of 16 ug/m^3. The OHSA standard for lead exposure for an eight hour occupational exposure is 50 ug/m^3. Thus, the estimated lead level is well within the standard that OSHA uses for worker exposure. The potential risk would be further reduced due to the much shorter exposure period that would occur during recreational activities as compared to continuous worker exposure.

The comparison of soil contaminant concentrations with the soil criteria indicates some potential concern with lead levels. The potential for significant ingestion of soil is remote given the relatively small unturfed area in the recreational basins and the fact that the unturfed areas are not normally used by small children. However, a potential problem does exist, and the District should manage and operate the basins in a manner that minimizes the health risk. These issues are further discussed in Chapter 8.

Future Impacts. Future impacts on recreational use will be affected by runoff loading changes, as discussed in the section on drinking water impacts. The runoff concentrations of the two constituents of primary concern to recreation, lead and chlordane, have been decreasing and will continue to decrease in the future. A reduction in the number of automobiles using unleaded gasoline will reduce lead concentrations in runoff. The restricted use of chlordane will similarly reduce chlordane concentrations in runoff as compared to historic levels. Thus, the impacts of soil contaminants on recreation are not likely to increase in the future.

CHAPTER 8

MANAGEMENT PRACTICES

The Nationwide Urban Runoff Program (NURP) was designed to evaluate a range of best management practices for dealing with stormwater runoff. Each NURP project analyzed one or more specific management practices. Several projects evaluated the effectiveness of street sweeping. Other projects investigated catch basin cleaning, detention basins, grassed swales, overland flow wetlands, and other treatment methods. The management practice being tested in the Fresno NURP project is the use of recharge basins as a method for management of stormwater. Thus, the existing system of retention/recharge basins has served as a management practice, in contrast to many of the other projects where special facilities were constructed and operated or where drainage and runoff conditions were controlled to test a particular methodology.

This chapter evaluates the current operation of the retention/recharge system in view of the results found in this investigation. Since our assessment concluded that there is some potential for adverse environmental impacts, several modifications to the present operation and some source control methods are also discussed.

CURRENT PRACTICE

Stormwater management in the Fresno metropolitan area is complicated by the fact that there are no significant watercourses passing through the area to which storm runoff can be discharged. Therefore, the Fresno Metropolitan Flood Control District (District) has developed a system of retention/recharge basins to handle runoff during storm periods. The system has a dual purpose: it services drainage needs, and at the same time water is recharged to the groundwater, which is the sole source of water supply for the region.

The District currently has 74 basins that are completed or are in various stages of excavation. The land has been purchased for twelve additional basins. More basins will be added to the system as new areas develop. Key features of the existing basins are summarized in Table 8-1. The table includes all acquired basin sites that will, in the future, be used for recreation, have a low-flow area, or have on-peak pumping relief.

Table 8-1. Features of Existing Retention/Recharge Basins

Basin feature	Number of basins[a]			
	Existing recreation	Future recreation	Non-recreation	Total
All basins	13	37	36	86
Existing turfed basins	13	0	1	14
Low-flow area				
Existing	10	13	2	25
Future	0	23	3	26
Existing pumpout capability[b]				
To canal	5	2	3	10
To another basin	3	2	2	7
Proposed pumpout capability				
To canal	(1)[c]	2	4	5
To another basin	4	3	7	14
More than half of drainage area is zoned industrial	1	5	15	21

[a]Includes all basins acquired to date of this report.

[b]Pumpout capability refers only to those basins requiring on-peak pumping.

[c]The water from one basin that is currently pumped to a canal will be pumped to another basin when construction of the basin is completed.

There are two primary types of basins: turfed and unturfed basins. There are 14 turfed basins, and 13 of these basins are used for recreation during the dry weather season. Three of the turfed basins have improved baseball diamonds, while the other turfed basins are used for soccer and passive recreation. The remaining 73 basins are currently unturfed and are used strictly for recharge. A number of the non-recreational basins also receive irrigation water from the Kings River during the summer for recharge. Kings River water is diverted into the Fresno Irrigation District canal system and is then conveyed into the recharge basins that are located adjacent to the irrigation canals. As much as 12,000 acre-feet of irrigation water is recharged annually.

There are two particular features of some of the recharge basins that significantly affect system operation and in turn have important water quality implications: the low-flow basin and pumpout capability.

Low-Flow Basin

Twenty-five basins now have a low-flow basin at the recharge site. There are plans to provide an additional 26 basins with a low-flow area. The low-flow basin is generally at least 10 feet below the elevation of the upper basin. The low-flow basin concept was primarily developed for use with the recreational basins. During the summer, runoff water from lawn sprinkling, or nuisance runoff, that enters the drainage system can be contained in the small low-flow basin. Thus, it is possible to keep the upper basin dry and available for recreation.

During the winter, the low-flow basin receives runoff water first. As the low-flow basin fills, the influent drainage pipe will surcharge and water will eventually back-up and flow into the upper basin. Thus, in small winter storms, the low-flow basin may capture a large portion of the storm volume. The exact volume that the low-flow basin can handle will depend on the recharge characteristics as well as the design size of the specific basin.

The low-flow basin is very important from a water quality standpoint. As discussed in Chapter 4, many contaminants in storm runoff are at their highest concentrations during the beginning of a storm when the "first flush" occurs. Thus, the most concentrated material is contained in the low-flow basin, while the flow reaching the upper recreation basin is considerably less contaminated.

In Chapter 4, a tabulation of the portion of the metals in runoff occurring in the particulate and dissolved forms was developed (Table 4-9). The particulate fraction of most metals was generally much larger than the dissolved fraction. For example, more than 75 percent of the aluminum, chromium, iron, and lead was in the particulate form at all four sampling sites. Thus, it would be expected that metals concentrations in the surface soils in the low-flow basin would be higher than the levels found in the upper basin. The results of the spatial lead survey presented on Figure 5-4 confirm this relationship. In Basin B/E, lead concentrations in the soil of the low-flow basin were at least several times higher than the concentrations in the upper basin. This difference in lead concentration did not occur in Basin F, probably because there is only a 2-foot differential in elevation between the upper and lower basins.

Some of the low-flow basins, as well as other recharge basins in the system, have man-made sandy recharge areas. These areas were added to increase the recharge rate. However, these sandy soils are less capable of removing most contaminants than soils with a higher proportion of silt and clay or soils with more organic material.

Pumpout Capability

Fifteen basins now have, or there are plans to provide, capability to pump runoff water on peak from the basin into a nearby irrigation canal. For 21 other basins, on-peak runoff can now be pumped, or will be able to be pumped in the future, to another recharge basin. Pumping has been provided to improve flood control capability and facilitate dewatering. The extent of pumping is limited by the available capacity in irrigation canals and other District basins to which flow can be transferred. Generally, pumps are activated as soon as runoff reaches the basin. There are no records of the pumping volumes, but District staff indicate that the portion of the runoff that is pumped out can range from as little as 1 percent in Basin MM to as much as 20 percent in Basin F.

Like the low-flow basin, on-peak pumping has significant water quality implications. If pumping is initiated when runoff first occurs, the "first flush" material with the highest contaminant concentrations is being removed, although some material may settle to the basin bottom. This material is either being transferred to another basin or is being conveyed to irrigation canals. The potential impact of the water pumped from the recharge basins to the irrigation canal system has not been evaluated as part of the Fresno NURP project.

Other Operational Practices

The District now removes deposited material from the basins on an as-needed basis. A number of the basins have periodically had material removed primarily for the purpose of improving the recharge rate. For example, the low-flow area in Basin M has been dewatered and cleaned out on two occasions during the 15 years it has been in operation. The material removed has generally been used for fill on site in the freeboard area or on nearby lands.

The unturfed basins that receive summer irrigation water have sometimes been subject to surface sealing of the basin bottom due to erosion of fine material from the side slopes. Therefore, these basins are scraped approximately once per year to improve percolation. In addition, the side slopes are disked for weed control.

MODIFIED PRACTICES

The impacts of the current operation of the retention/recharge system were discussed in Chapter 7. In terms of the groundwater underlying the five basins tested, stormwater recharge has had no adverse effects. All measurements of soil

water and groundwater were within the drinking water standards. However, no groundwater measurements were made at basins receiving a significant amount of drainage from industrial areas. Runoff in these two cases theoretically would pose a greater threat to the groundwater than the five basins which were sampled.

In terms of recreational uses of the basins, quantifying impacts are difficult. The Department of Health Services (DHS) soil criteria for hazardous wastes can be used as a general guideline. Comparison of surface soil concentrations with these soil criteria indicates that in localized areas (low spots, near outfalls, and in the low-flow basins) there are some surface soils that exceed the DHS criteria for lead and chlordane. The significance of these concentrations is uncertain, since exposure is minimal due to the turf layer in the recreational basin.

Although there are no apparent impacts on water supply and the significance of the limited violations of the soil criteria are uncertain, some modifications to the District's current system procedures are warranted to insure a future which continues to be free of impacts. Certain operational modifications and management practices can be implemented to minimize the risk of future impacts. This section describes modifications to current practices, and the next section describes source controls.

Table 8-2 summarizes the management practices that have been evaluated. The following basin modifications have been considered:

1. Providing additional low-flow basins.
2. Removing basin soils.
3. Providing additional pumpout capability.
4. Turfing unturfed areas.

The need for continued monitoring is identified in Table 8-2. Recommended areas of future monitoring are delineated in Chapter 9.

Low-Flow Basins

The low-flow basin concept provides an excellent means of containing the "first flush" from urban runoff. Twenty-five recharge sites now have low-flow basins. Additional low-flow facilities should be provided in two particular situations. First, any recreational basins that do not currently have a low-flow basin should be provided with one. This will provide considerable protection for the portion of the basin that is

Table 8-2. Alternative Management Practices

Practice	Needed to protect: Drinking water	Needed to protect: Recreation	Purpose	Advantages and disadvantages	Recommendation
I. Basin Modifications					
A. Add low-flow basin to all present and future recreation basins.		X	"First flush" will go to low-flow basin. Thus, contaminant concentration in recreational basin will be lower.	Practical to provide since low-flow basins are also desirable to prevent summer irrigation runoff from entering recreational basin.	This measure is highly cost-effective and should be implemented.
1. Periodically cleanout solids accumulation.	X		Cleaning will reduce potential leaching of concentrated material to groundwater.	Material will have to be hauled to hazardous waste disposal area.	Periodic basin cleaning should be done on a frequency dictated by periodic sampling and buildup curve data.
B. Provide low-flow basin for areas with significant industrial development.			Provide means of containing potentially hazardous material.	These measures are highly desirable to protect against a significant potential hazard.	Implement.
1. Periodically cleanout solids accumulation.	X		Prevent percolation of hazardous material.	These measures are highly desirable to protect against a significant potential hazard.	Implement.
2. Line low-flow basin if warranted based on soil and water sampling data.	X		Prevent percolation of hazardous material.	Expensive, so should be based on sampling results and compared to upstream source controls.	Assess the need on a case-by-case basis
C. Seal off recharge wells located in low-flow basins.	X		Prevent percolation of hazardous material.	Some loss in recharge capability. Desirable to protect water supply.	Implement.
D. Periodically remove surface soils from all basins.	X	X	Remove contaminants that may leach to groundwater.	High cost (approximately $50,000 per basin). May be removing organic material that helps remove contaminants.	Implement for recreational basins only in accordance with additional soils sampling.
E. Periodically remove solids that deposit near outfalls in recreation basins.	X	X	Remove material that is likely to have highest contaminant levels.	Could be easily added to annual maintenance of basins, although disposal would be to hazardous waste disposal site.	Implement.

Table 8-2. Alternative Management Practices, continued

Practice	Needed to protect: Drinking water	Needed to protect: Recreation	Purpose	Advantages and disadvantages	Recommendation
F. Provide ability to pump out low-flow basin to irrigation canal where location allows.	X	X	Prevent "first flush" material from accumulating in recharge basins.	Not desirable to pump out "first flush" material since this would just move the material to downstream waters.	Evaluate ways of modifying pumping operation to minimize "first flush" pumpout.
G. Turf all unturfed basins.	X		Improve contaminant removal capability.	Cost would be significant. There may be some reduction in percolation rate.	Not justified at this time.
H. Turf unturfed areas of recreational basins or remove soil regularly.		X	Minimize opportunity for solids ingestion and inhalation.	Minimal cost. Turfing baseball diamonds would lessen desirability to play.	Implement regular soil removal based on contaminant buildup curve.
II. Source Controls					
A. Late summer street sweeping.	X	X	Remove street accumulation prior to initial fall storms.	Other NURP projects had mixed opinions of effectiveness of street sweeping. Current sweeping in the metropolitan area is quite limited.	Not recommended except as an incremental benefit of any sweeping done for aesthetic purposes.
B. Have industry contain and/or pretreat runoff from portions of their site that may contain toxic material.	X		Remove contaminants at the point of origination.	Requires monitoring to be sure upstream controls are working.	This approach should be adopted as a policy, but implemented on a case-by-case basis in accordance with sampling data.
III. Monitoring					
A. Long-term monitoring of basin soils and groundwater.	X	X	Early detection of contaminant buildup.	Essential to environmental protection.	Implement.
B. Hazardous spills.	X	X	Prevent contaminants from reaching basins.	Highly desirable to protect against potential health hazard.	Participate in county spill control program.

used for recreation. Secondly, a low-flow facility should be provided or more frequent basin cleaning should be implemented in drainage areas where a significant amount of the contributing area will be developed for heavy industrial purposes (e.g., chemical storage or transfer, petroleum, and some manufacturing operations). In terms of existing basins serving industrial areas, the need for a low-flow basin should be assessed by either a detailed field inspection of the land area or a runoff monitoring program. In some industrial situations, it may be necessary to provide the low-flow basin with a protective lining, so industrial contaminants will not percolate into the groundwater. The need for lining should be based on runoff monitoring.

The solids accumulations in the bottom of the low-flow basins should be periodically removed to prevent the leaching of this concentrated material into the deeper soils and ultimately to the groundwater. It is likely that concentrations of some constituents in the soil will exceed DHS soil criteria and, therefore, the soil will have to be hauled to a hazardous waste disposal site. Alternatively, the material could be removed and used as fill material before it reaches hazardous levels. Consideration should also be given to sealing off recharge wells in low-flow basins.

Removing Basin Soils

The sampling conducted in this project showed that many of the metals and organic compounds present in urban runoff were detected in the surface soil layer in the recharge basins. Lead and chlordane were the only two constituents that were found to exceed the DHS soil criteria in a limited number of samples. The spatial survey performed in Basin F gives a good indication of the distribution of lead in the surface soils. Figure 8-1 denotes the areas within the basin where the lead concentration exceeded the DHS total threshold limit concentration (TTLC) for lead. Approximately 1 acre or about 16 percent of the combined area of the upper and lower basins had lead concentrations that exceeded the TTLC. An elevation profile for this basin was presented in Chapter 5.

Based on the lead distribution on Figure 8-1, a preliminary estimate of the cost to remove the contaminated soil has been prepared to illustrate the range of cost for this management practice. Costs were developed for two alternative methods of soil removal. The first alternative deals only with the affected areas down to the depth where the lead exceeds 1,000 mg/kg. Costs include excavation, hauling, disposal (as hazardous waste), refill, leveling, sprinkler installation, and revegetation. Construction cost by this method would be about $20,000. It is probably not practical to excavate such exact

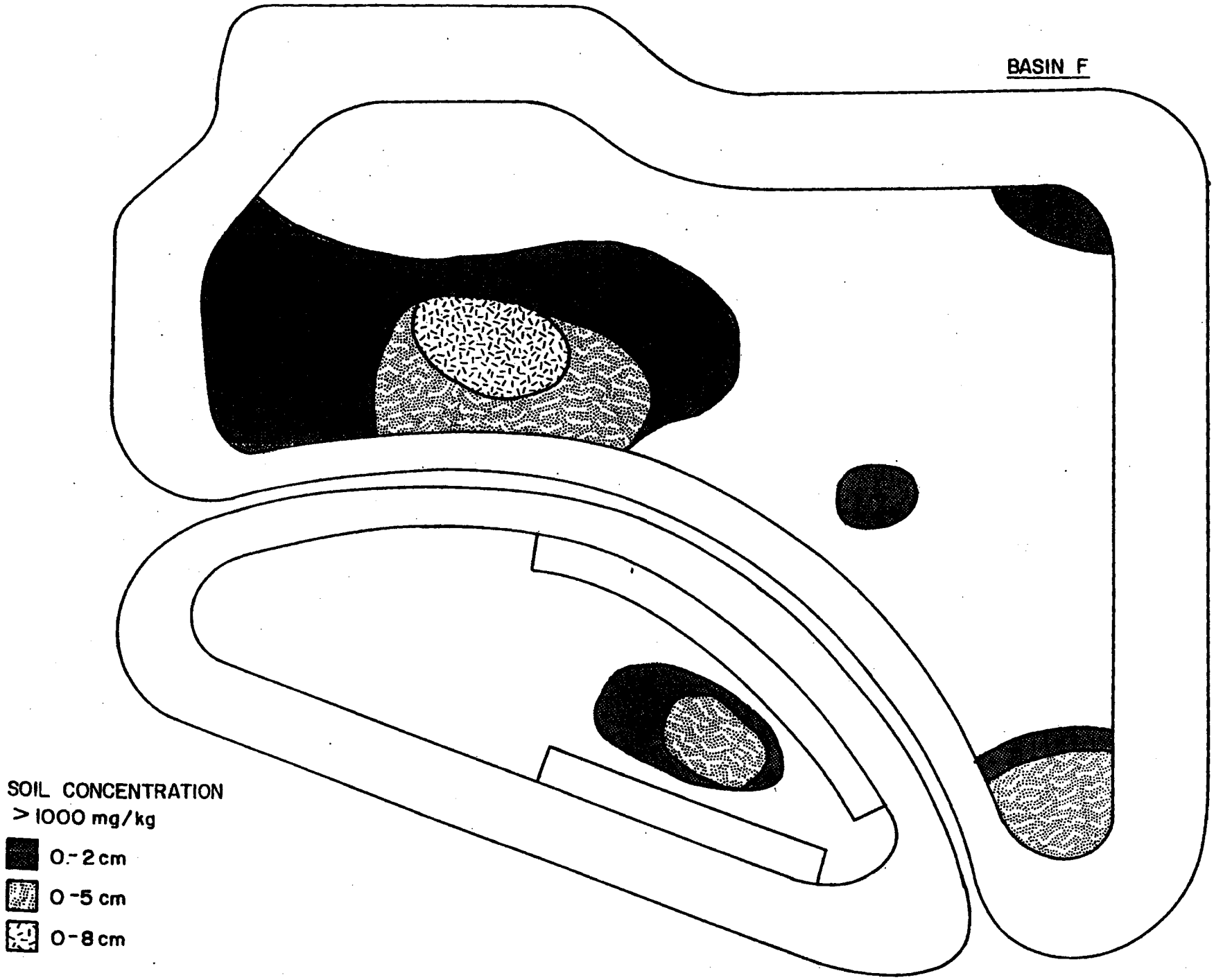


Figure 8-1 Comparison of Lead Concentration with Soil Criterion

volumes, so a second approach was considered. This approach is similar to the first, except that 1 inch is removed from the entire site in addition to the affected areas. This alternative produces a construction cost of approximately $75,000. In both cases, the disposal cost of contaminated soil is over 50 percent of the total construction cost.

Based on the spatial survey results for Basin F and Basin B/E, it is likely that there are at least some limited areas where lead exceeds the TTLC in the other recreational basins. Thus, it is recommended that the turf and upper soil layer from the recreation basins be removed as required to maintain soil standards. Spatial sampling of the type conducted in Basin F and Basin B/E should be performed to define the extent of soil removal required. Basins with the highest contaminant levels should be dealt with first. It is expected that the greatest amount of material will have to be removed from the oldest recreational basins that do not have a low-flow area. Newer recreational basins that have a low-flow area will likely have the smallest areas of soil contamination. Based on the sharp reduction in the use of chlordane and the amount of lead in gasoline, the two elements of most concern, it is possible that removal of surface soils may not be required again in the future. It would be prudent to study basin maintenance practices to determine which scraping techniques are most effective in removing basin contaminants, and which are best able to remove silts, and, thus, improve percolation.

We do not believe removal of surface soils from non-recreation basins need be mandatory at this time. There has been no deterioration of groundwater quality underlying any of the recharge basins tested. If future monitoring indicates a downward trend in groundwater quality, removal of surface soils could be considered at that time.

Pumping Capability

The pumpout capability that now exists in some basins provides a means of removing "first flush" runoff material from those basins. This is a positive step in terms of minimizing impacts on both water supply and recreation. However, the material pumped out of the basin eventually reaches the San Joaquin River. The possible impacts of urban runoff on the San Joaquin River have not been evaluated as part of this study.

From a standpoint of managing stormwater runoff contaminants, containment of "first flush" materials in low-flow basins is better than discharging the materials to the river system. However, pumping capability is very important to the District for drainage control purposes. There are a number

of ways that current pumping operations could be modified to reduce potential downstream impacts. The pump intake could be raised or pump settings could be adjusted, so that the first flush material is not pumped. A dual-compartment basin could be designed in future basins. Flow would enter the first basin and then overflow into the second basin. "First flush" solids would accumulate in the first basin, and runoff water could be pumped out of the second basin. Further evaluation of the engineering design features of future recharge basins is needed before specific modifications can be recommended.

Additional Turfing

Turfing over unturfed areas at recreational basins would reduce the potential for public contact with contaminants present in surface soils. Alternatively, the surface soil layer could be periodically removed, since the unturfed areas are quite small. The frequency of removal should be based on periodic monitoring to define contaminant buildup curves.

SOURCE CONTROLS

There are two source control measures that have been considered: street sweeping and upstream controls at industrial areas.

Street Sweeping

Street sweeping was not evaluated as part of the Fresno NURP project. Limited street particulate data were collected at the four U.S. Geological Survey (USGS) sites which indicated the presence of most heavy metals and several organic constituents. Five of the 28 NURP projects had the evaluation of street sweeping as a central element of their work plans. These projects were at the following locations: Castro Valley, California; Milwaukee, Wisconsin, Champaign-Urbana, Illinois; Winston-Salem, North Carolina; and Bellevue, Washington. Four of these projects concluded that street sweeping was not effective as a management practice to control pollutants in urban runoff. The fifth project (Castro Valley), which has pronounced wet and dry seasons, showed that sweeping just prior to the rainy season could produce some benefit. However, the Final NURP Report by the U.S. Environmental Protection Agency cautions that even in areas with distinct wet and dry seasons, the effectiveness of street sweeping should be closely evaluated on a case-by-case basis.

Since Fresno does have distinct wet and dry seasons, street sweeping in the late summer or early fall could possibly provide some benefit. The current street sweeping program in the

Fresno-Clovis metropolitan area is fairly limited. Because of the uncertainties of street sweeping effectiveness, it would probably not be worthwhile to expand the existing street sweeping program in Fresno for the sole purpose of urban runoff pollutant control. Current sweeping done for aesthetic purposes in the late summer or early fall may provide some limited water quality benefit.

Industrial Controls

The runoff sampling conducted by USGS indicated that for many constituents the concentrations were highest in the runoff from the industrial site. This is not surprising since there are numerous potential contaminant sources in this industrial area which included cotton mills, food processing, petroleum operations, chemical storage, carpet manufacturing, and light trucking. Without additional monitoring, it is impossible to determine the exact source of the various contaminants detected in the runoff.

Industrial areas, such as the one studied in this program, are the most significant potential source of urban runoff contaminants. As recommended previously, the District should provide a low-flow basin at all recharge sites that receive a significant amount of industrial drainage, or existing basins should have soils regularly removed. In addition, consideration should be given to having industries contain or pretreat runoff from portions of their site that may contain toxic material. Decisions to have upstream source control provided at industrial sites need to be developed on a case-by-case basis, since the types and magnitude of contaminants from industrial sites can vary widely. Additional runoff monitoring at existing industrial sites should be conducted cooperatively between the District and the Central Valley Regional Water Quality Control Board.

With regard to future industrial development, the District should work together with other local agencies (e.g., planning and building departments) to be certain that water quality aspects are adequately considered in the review process for industrial developments. In this way, provisions can be made to control potential runoff contaminants at the source.

CHAPTER 9

CONCLUSIONS AND RECOMMENDATIONS

The following conclusions and recommendations are based on the work conducted for the Fresno Nationwide Urban Runoff Program (NURP) project.

CONCLUSIONS

Conclusions are presented in three groups: urban runoff, soils and groundwater, and impacts on water supply and recreation.

Urban Runoff

The following conclusions are based on the results presented in Chapter 4.

1. Urban storm runoff contains significant levels of many contaminants including most heavy metals and some organic compounds.

   All of the priority pollutant metals except cyanide and 19 of the 34 organic constituents tested were detected in at least one runoff sample. Constituents which have runoff concentrations significantly higher than the regional groundwater include lead, zinc, copper, mercury, iron, and manganese.

2. Urban storm runoff is better in quality than the Fresno regional groundwater for some constituents, particularly minerals and nutrients.

   The runoff concentrations of most of the common cations and anions that were measured are less than the concentrations in the regional groundwater. For example, the mean specific conductance in runoff from the residential and commercial sites is about 70 umhos/cm compared to a mean of over 300 umhos/cm in 46 city of Fresno wells. Thus, from the standpoint of mineral quality, recharge of urban storm runoff is improving the regional groundwater quality.

3. Rainfall contributes a significant portion of the pesticides measured in runoff.

   Fourteen organic compounds, including 11 pesticides, were detected in rainfall samples. The most prevalent pesticides were parathion, malathion, and diazinon. Their presence in rainfall is probably due to their use in the agricultural area around Fresno. These pesticides are present in low concentrations and none of them have shown up in the groundwater underlying the recharge basins, except traces of diazinon in a few samples.

4. The industrial area had the worst runoff quality of the four land use types evaluated.

   For the 62 non-pesticide constituents monitored, concentrations were statistically highest in runoff from the industrial site for all but 10 constituents. Concentrations in the industrial runoff fluctuated greatly during storms, and numerous unexplained concentration spikes were monitored. Concentrations at the other three sites (single-family residential, multiple-family residential, and commercial) were very similar for most constituents.

5. Runoff concentrations over the course of a storm event at the non-industrial sites followed the traditional "first flush" concept.

   The highest concentrations for most constituents from the non-industrial sites occurred during the initial storm runoff and then decreased throughout the remainder of the storm, independent of hydraulic conditions. Metal concentrations were also high during initial runoff, but also increased as flow increased.

6. There are significant seasonal variations in runoff quality that must be considered in developing management practices.

   The event mean concentration (EMC) for most constituents for all but the industrial site was highest for the first two or three storms of the year. The EMC was then relatively constant for the remainder of the rain season. (The term EMC refers to either a flow-weighted composite sample or a flow-weighted calculation of sequential discrete samples.) The EMCs at the industrial site were generally high for the first storm, but then declined uniformly throughout the rain season. This seems to indicate that an entire rain season is required to wash off dry season pollutant buildup from the industrial site, while wash off occurs during the first two or three storms at the other sites.

Soils and Groundwater

The following conclusions are based on the results presented in Chapter 5.

1. During recharge, basin soils provide a high degree of removal of storm runoff contaminants, thus protecting groundwater quality.

   Heavy metals and organic compounds present in runoff appear to be removed by basin soils, although there is some limited evidence of migration of some metals to deeper soils. No contamination of soil water or groundwater underlying the recharge basins has occurred in any of the five basins studied. The concentrations of all heavy metals in groundwater samples were similar to the levels found in the regional groundwater quality. None of the pesticides and other organic compounds, for which water samples were analyzed, were detected except diazinon which was found in trace amounts in three samples. This means that any other organic compounds, if they were present at all, were present at levels less than the analytical detection limits employed. Detection limits for specific compounds are listed in Appendix B.

2. Contaminants accumulate in the surface soils and lead concentrations vary spatially as a function of basin topography and outfall locations.

   The surface distribution of lead was determined through a spatial survey of two recharge basins. The highest lead concentrations occurred at low spots in the basin close to the basin outfalls. In the basin that has a low-flow area located 20 feet lower than the upper basin, lead concentrations in the soil were several times higher in the lower basin. Spatial surveys of other metals were not conducted.

3. Recharge of imported surface water is not presently having any adverse effect on groundwater quality, although some leaching of the basin soils is occurring.

   Imported surface water from the Kings River, which is recharged in a number of basins during the spring and summer months, is of excellent quality and thus improves the regional groundwater quality. The soil data were analyzed to determine whether the movement of large volumes of water could be leaching any compounds from the soils. For most of the cations and anions, concentrations tended to be slightly less in basins

receiving summer recharge, possibly indicating some leaching. Comparison of soils samples collected before and after the summer recharge period indicates the possibility of some slight downward migration of lead due to summer recharge. Additional data are needed to confirm whether this is true.

4. There appears to be a correlation between the degree of removal of metals and the proportion of silt plus clay and organic matter in the surface soils.

   Soils containing a higher percentage of silt plus clay and organic matter have higher cation exchange capacities and should be able to better attenuate migrating contaminants. This appears to be true in the basins studied, although it cannot be conclusively proven because of variations in basin age and the fact that the two unturfed basins evaluated are the ones that receive summer irrigation water.

Impacts of Runoff

The following conclusions are based on the results presented in Chapter 7.

1. Currently, there are no apparent adverse impacts on the groundwater resulting from recharge of urban storm runoff.

   Concentrations of all metals and pesticides in the soil water and groundwater underlying the five test basins are within the Safe Drinking Water Act criteria. Two of the basins tested have been in operation for more than 20 years. Similar water quality conditions are probably present in most of the other recharge basins operated by the Fresno Metropolitan Flood Control District (District). However, one situation where storm recharge could pose a potential threat to the groundwater was not evaluated in this program: a basin serving an area that has a significant amount of industrial development.

2. It is unlikely that recharge to basins similar to those tested in this program will cause adverse impacts on the groundwater supply in the near future.

   Levels of heavy metals are currently several times less than SDWA criteria, and none of the organics for which criteria exist were ever detected. Thus, there is a significant margin of safety at present. Continued monitoring of the groundwater underlying the recharge basins would detect changes in groundwater quality well in advance of a problem occurring.

3. Lead levels in the surface soils of localized areas in some of the recharge basins exceed Department of Health Services (DHS) soil criteria and thus require appropriate management in basins used for recreation.

   In low spots in the basins close to outfalls, lead concentrations in the surface soils (upper 1 to 2 inches) exceed the DHS criteria of 1,000 mg/kg for lead. For the two recreational basins in which spatial testing was done, the maximum lead concentration was between 1,600 and 2,300 mg/kg. Lead concentrations throughout most of the recreational basins are well under 1,000 mg/kg. The primary public health concern for lead is ingestion of soil. The opportunity for soil ingestion in the District's recreational basins is limited, since the recreational basins are entirely turfed with the exception of the baseball diamond infields in three basins. Also, the maximum concentration areas are not in the high exposure area of the infield. The impact of inhalation of dust particles containing lead was preliminarily assessed and this does not appear to be a problem based on comparison with the worker exposure criterion for lead.

4. Certain modifications to the District's current procedures are warranted to insure a future which continues to be free of adverse impacts.

   Although there are no identified health problems associated with current basin operation, the potential for future impacts does exist provided there is an absence of appropriate system management. Thus, the District should continue to manage and operate the basins in a manner that minimizes the risk to both groundwater quality and recreation. Certain suggested modifications to current practices can improve the degree of protection provided. Specific recommendations are developed in this next section.

RECOMMENDATIONS

Recommendations have been developed based on the conclusions just described. Our recommendations include several specific modifications to current operation of the retention/recharge system. There are some areas where a firm course of action cannot be recommended until further research or engineering is conducted.

Recommended Management Practices

A range of management practices were evaluated in Chapter 8. Specific recommendations are summarized in Table 9-1 and are briefly described below.

Table 9-1. Recommended Management Practices

1.	Maintain the basic practice of retention and recharge of urban storm runoff subject to certain modifications.
2.[a]	Provide low-flow basins for all recreational basins and evaluate low-flow basins for basins serving industrial areas. Periodically remove solids from the bottom of low-flow basins and from basins serving principally industrial areas.
3.[a]	Remove the portion of the turf and upper soil layer from the recreational basins as necessary.
4.[a]	Monitor soil from unturfed areas in recreational basins and remove as necessary.
5.	Consider having industrial developments contain or pretreat runoff from portions of their site that may contain toxic material.
6.	Have the District work together with other local agencies to be certain that water quality aspects are adequately considered in the review process for future industrial developments.
7.	Develop a management plan to determine the best means of disposing of hazardous soil removed from the basins.
8.	Continue the practice of recharging high quality imported surface water.
9.	Implement a long-term monitoring program of basin soils and groundwater.

[a]The need for soil removal should be based on further soils monitoring and contaminant buildup curves relative to public contact and drinking water standards.

1. <u>The District should maintain its system of retention and recharge of urban storm runoff and make certain modifications to minimize health risks</u>.

   The current system of retention and recharge is basically a very sound methodology for meeting its two

goals: stormwater management and recharge of the groundwater supply. The fact that the system has operated successfully with proven water quality and recreational benefits for over 20 years is a credit to original design concept. The Fresno NURP project has enabled the operation to be scrutinized to assure that maximum protection to the groundwater supply and recreational uses of the basins is maintained in the future.

2. Low-flow basins should be provided for all recreational basins and for drainage areas where a significant amount of the contributing area will be developed for heavy industrial use.

   The low-flow basin concept that the District currently uses to contain summer runoff water from lawn sprinkling is an excellent means of containing the "first flush" of runoff and can thereby reduce the contaminant load that reaches the upper recreational basin, or the larger recharge basin in the industrial situation. In terms of existing basins serving industrial areas, the need for a low-flow basin should be assessed by either a detailed field inspection or a runoff monitoring program. The solids accumulations in the bottom of the low-flow basin should be periodically removed to prevent the leaching of this concentrated material into the deeper soils and ultimately to the groundwater. An alternative to a low-flow basin would be regular removal of existing basin soils.

3. A program to periodically remove the turf and upper soil layer from the recharge basins used for recreation should be initiated.

   At a minimum, the portions of the basin area that exceed the DHS soil criterion for lead should be periodically removed. The basin should then be returfed. Spatial sampling of the type conducted in this study for Basin F and Basin B/E should be performed to define the extent of soil removal requirements. Regular monitoring should be conducted to help define contaminant buildup curves. This program does not require urgent implementation, so it can be incorporated into the District's maintenance operations over the next few years. Basins with the highest contaminant levels should be dealt with first.

4. Unturfed areas at the recreational basins should be turfed over or alternatively the surface soil layer could be periodically removed.

   The unturfed portions of the recreational basins offer the greatest chance of public contact with the soil. Turfing or periodic soil removal, will minimize the potential problem.

5. Consideration should be given to having industrial developments contain or pretreat runoff from portions of their site that may contain toxic material.

   Industrial areas, such as the ones studied in this program, are the most significant potential source of urban runoff contaminants. Decisions to have upstream source control provided at existing industrial sites need to be developed on a case-by-case basis, since the types and magnitude of contaminants from industrial sites can vary widely.

6. The District should work together with other pertinent local agencies (e.g., planning and building departments) to be certain that water quality aspects are adequately considered in the review process for future industrial developments.

   Through this approach, provisions can be made during the design of industrial developments to control potential runoff contaminants at the source.

7. Develop a management plan to determine the best means of disposing of soil removed from the basins.

   Theoretically, soil that is removed from the basins that contains contaminants at concentrations exceeding DHS soil criteria will need to be hauled to a hazardous waste landfill. Disposal costs will be very expensive. Alternatives such as removing the soil before it reaches criteria levels or mixing contaminated soil with clean soil need to be evaluated.

8. Continue the practice of recharging high quality imported surface water.

   Recharge of high quality surface water has a beneficial effect on the regional groundwater quality. Although the imported water may gradually leach storm-produced pollutants from the soil, the large volumes of high quality water should adequately dilute contaminants to background levels. Also, periodic removal of surface soils will reduce the amount of contaminants that could be leached.

Areas Requiring Additional Work

The Fresno NURP project has met its primary objective of determining whether recharge of urban runoff is adversely affecting the groundwater supply. The secondary objective of assessing the impacts on recreational uses of the basins has

also been addressed, although the recreational impacts are more difficult to define. The work conducted in this project has provided a basis for developing several recommendations. In the case of some of the recommendations, a detailed course of action cannot be implemented without further research or engineering. Also, some future monitoring is recommended in order to develop a continuing record of soil and groundwater quality and to assess the effectiveness of recommended control measures. Additional work requirements are listed below.

1. Long term annual soil and groundwater monitoring utilizing vacuum extractors at two or more of the existing test sites.

2. Long term soils and groundwater monitoring at a recharge basin serving an industrial area.

3. Continuing spatial surveys of the surface soils of the recreational basins to provide a basis for determining the timing and extent of soil removal.

4. Field inspection and/or runoff monitoring program of existing industrial sites (conducted cooperatively with the Central Valley Regional Water Quality Control Board).

5. Continuing assessment of downstream impacts of runoff water discharged into the San Joaquin River.

6. Evaluation of the engineering design standards of future recharge basins to consider pumpout arrangements, dual-compartment low-flow basins, bottom lining requirements, hydraulic controls for containment of chemical spills, etc.

APPENDIX A

REFERENCES

REFERENCES

1. California Department of Health Services. A summary of the Draft California Regulatory Criteria for Identification of Hazardous and Extremely Hazardous Wastes. October 1982.

2. County of Fresno. Interim Best Management Plan for Water Quality Fresno-Clovis Urban and Northeast Fresno County. June 1979.

3. Fresno Metropolitan Flood Control District. Work Plan for Determination of the Potential Adverse Environmental Impacts Associated with the Retention and Recharge of Urban Storm Runoff. October 1979.

4. Oltmann, Richard N. and Shulters, Michael V. Rainfall and Runoff Characteristics of Four Urban Land Use Catchments in Fresno, California, October 1981 - April 1983. U.S. Geological Survey. November 1983.

5. U.S. Department of Agriculture--Water Management Research Laboratory. Final Report for Fresno Nationwide Urban Runoff Program. September 1983.

6. U.S. Environmental Protection Agency. Final Report of the Nationwide Urban Runoff Program. September 1983.

APPENDIX B

CONSTITUENT LIST

AND ANALYTICAL DETECTION LIMITS

Table B-1. USGS Constituent List

	Runoff	Rainfall	Atmospheric dry deposition[a]	Street particulates[b]	Dry weather runoff
INORGANICS					
Field Measurements					
Specific conductance	X	X	X	-	3
pH	X	X	X	-	3
Major Ions					
Alkalinity (Bicarbonate and Carbonate	X	X	X	-	3
Sulfate, dissolved	X	X	X	-	3
Chloride, dissolved	X	X	X	-	3
Silica, dissolved	X	X	X	-	3
Calcium, dissolved	X	X	X	X	3
Magnesium, dissolved	X	X	X	X	3
Sodium, dissolved	X	X	X	X	3
Potassium, dissolved	X	X	X	X	3
Nutrients					
Nitrogen, Nitrite, dissolved (as N)	1	1	1	X	3
Nitrogen, Nitrite + Nitrate, dissolved (as N)	X	X	X	X	3
Phosphorus, dissolved (as P)	X	X	-	-	3
Phosphorus, total (as P)	X	-	X	X	3
Phosphorus, Orthophosphate, dissolved (as P)	X	X	-	-	3
Phosphorus, Orthophosphate, total (as P)	X	-	X	-	3
Nitrogen, Ammonia, dissolved, (as N)	X	X	X	X	3
Nitrogen, Ammonia + Organic, dissolved (as N)	X	X	X	-	3
Nitrogen, Ammonia + Organic, total (as N)	X	-	-	X	3
Metals					
Aluminum, dissolved and total	2	2	2	2	-
Arsenic, dissolved and total	X	2	2	X	3
Cadmium, dissolved and total	1	-	-	1	3
Chromium, dissolved and total	X	2	2	X	3
Copper, dissolved and total	X	2	2	X	3
Cyanide, dissolved and total	2	-	-	-	-
Iron, dissolved and total	X	2	2	X	3
Lead, dissolved and total	X	X	X	X	3
Manganese, dissolved and total	2	2	2	2	-
Mercury, dissolved and total	X	2	2	X	3
Nickel, dissolved and total	X	2	2	X	3
Zinc, dissolved and total	X	2	2	X	3
BIOLOGICAL					
Fecal coliform bacteria	X	-	-	-	3
OXYGEN DEMAND					
Five-day biochemical oxygen demand (B.O.D.)	X	-	-	-	-
Ultimate biochemical oxygen demand	1	-	-	-	-
Chemical Oxygen Demand (C.O.D.)	X	X	X	X	3
PHYSICAL PROPERTIES					
Turbidity	X	-	-	-	3
Solids, dissolved (180°C.)	X	-	-	-	3
Solids, total (105-110°C.)	-	-	X	-	-
Suspended sediment	X	-	-	-	3
Paricle size analysis	1	-	-	-	-

Table B-1. USGS Constituent List, continued

	Runoff	Rainfall	Atmospheric dry deposition[a]	Street particulates[b]	Dry weather runoff
ORGANICS					
Gross Measures					
Dissolved organic carbon	X	X	X	-	3
Suspended organic carbon	X	-	-	-	3
Oil and grease, total	X	-	-	-	-
Polychlorinated biphenyls, total	X	X	2	X	3
Polychlorinated napthalenes, total	X	X	2	X	3
Dibromochloropropane (DBCP)	1	-	-	-	-
Phenols, total recoverable	2	2	-	-	-
Volatile Organics					
Benzene, total recoverable	2	-	-	-	-
Chlorobenzene, total recoverable	2	-	-	-	-
Ethylbenzene, total recoverable	2	-	-	-	-
Organochlorine Compounds					
Aldrin, total	X	X	2	X	3
Chlordane, total	X	X	2	X	3
DDD, total	X	X	2	X	3
DDE, total	X	X	2	X	3
DDT, total	X	X	2	X	3
Dieldrin, total	X	X	2	X	3
Endosulfan, total	X	X	2	X	3
Endrin, total	X	X	2	X	3
Heptachlor, total	X	X	2	X	3
Heptachlor epoxide, total	X	X	2	X	3
Lindane, total	X	X	2	X	3
Methoxychlor, total	X	X	2	X	3
Mirex, total	X	X	2	X	3
Perthane, total	X	X	2	X	3
Toxaphene, total	X	X	2	X	3
Organophosphorus Compounds					
Diazinon, total	X	X	2	X	3
Ethion, total	X	X	2	X	3
Malathion, total	X	X	2	X	3
Methyl parathion, total	X	X	2	X	3
Methyl trithion, total	X	X	2	X	3
Parathion, total	X	X	2	X	3
Trithion, total	X	X	2	X	3
Carbamate Insecticides					
Methomyl, total	1	1	-	-	-
Propham, total	1	1	-	-	-
Sevin, total	1	1	-	-	-
Chlorophenoxy Acid Herbicides					
2,4-D, total	X	X	2	X	3
2,4-DP, total	X	X	2	-	3
2,4,5-T, total	X	X	2	-	3
Silvex, total	X	X	2	-	3

[a]Dry deposition material is washed from collection bucket with deionized water and then analyzed as a water sample.

[b]All constituents are total recoverable from a dry sample, therefore, disregard "dissolved" notation after constituent name.

Chart Symbols

X - Analyzed for during both rain seasons.
1 - Analyzed for during 1981-82 rain season only.
2 - Analyzed for during 1982-83 rain season only.
3 - Analyzed for September 3, 1982 samples.

Table B-2. Detection Limits for Various Organic Constituents in Water Samples (USGS Laboratory)

Constituent	Detection limit,[a] ug/l
Aldrin	0.01
Chlordane	0.1
Diazinon	0.01
Dieldrin	0.01
DDD	0.01
DDE	0.01
DDT	0.01
Endosulfan	0.01
Endrin	0.01
Ethion	0.01
Heptachlor	0.01
Heptachlor epoxide	0.01
Lindane	0.01
Malathion	0.01
Methomyl	0.5-2
Methoxychlor	0.01
Methyl parathion	0.01
Methyl trithion	0.01
Mirex	0.01
Parathion	0.01
Perthane	0.1
Phenol	2
Polychlorinated naphthalenes	0.1
Propham	0.5-2
PCB	0.1
Sevin	0.5-2
Silvex	0.01
Toxaphene	1
Trithion	0.01
2,4-D	0.01
2,4-DP	0.01
2,4,5-T	0.01

[a]Detection limit varies with the size of available water sample.

Table B-3. Detection Limits for Various Organic Constituents in Soils and Groundwater Samples (Brown and Caldwell Laboratory)

Constituent	Detection limit	
	Water,[a]ug/l	Soil, mg/kg
Aldrin	0.05 - 0.22	0.01
Chlordane	0.11 - 1.4	0.03
DDT (mixed isomers)	0.1 - 0.50	0.03
DDE (mixed isomers)	0.05 - 0.22	0.01
DDD (mixed isomers)	0.05 - 0.22	0.01
Endosulfan I and II	0.05 - 0.22	0.01
Endosulfan sulfate	0.02 - 0.50	0.03
Gamma BHC (lindane)	0.05 - 0.22	0.01
Methoxychlor	0.2 - 1.0	0.07
2,4-D	0.25 - 2.2	0.02
Diazinon	0.02 - 0.5	0.02
Malathion	0.03 - 1.0	0.04
Parathion	0.02 - 1.0	0.04
Methyl parathion	0.03 - 1.0	0.04
Semivolatiles[b]		
Hexachlorocyclopentadiene	200	0.05
2,4-dinitrophenol	200	0.05
4-chlorophenylphenyl ether	400	0.20
All others	10 - 25	0.04
Purgeables[c]	-	0.001

[a]Detection limit varies with the size of available water sample.
[b]Complete list shown in Table B-4.
[c]Complete list shown in Table B-5.

Table B-4

SEMIVOLATILE PRIORITY POLLUTANTS - EPA METHOD 625

Group I: Base Neutrals	Characteristic Ions
D_8-Naphthalene (I.S.)	136
N-Nitrosodimethylamine	42, 44, 74
bis-(2-chloroethyl)ether	63, 93, 95
1,3-Dichlorobenzene	113, 146, 148
1,4-Dichlorobenzene	113, 146, 148
1,2-Dichlorobenzene	113, 146, 148
bis-(2-chloroisopropyl)ether	45, 77, 79, 121
Hexachloroethane	117, 199, 201
n-Nitroso-di-n-propylamine	42, 70, 101, 130
Nitrobenzene	65, 77, 123
Isophorone	82, 95, 138
bis(2-chloroethoxy)methane	93, 95, 123
1,2,4-Trichlorobenzene	145, 180, 182
Naphthalene	127, 128, 129
Hexachlorobutadiene	223, 225, 227
Hexachlorocyclopentadiene	235, 237, 239, 272
2-Chloronaphthalene	127, 162, 164
Acenaphthylene	151, 152, 153
Dimethylphthalate	163, 164, 194
2,6-Dinitrotoluene	63, 165, 121
D_{10}-Anthracene (I.S.)	80, 94, 188
Acenaphthene	152, 153, 154
2,4-Dinitroltoluene	89, 163, 165
Fluorene	165, 166, 167
Diethylphthalate	149, 150, 177
4-Chlorophenylphenyl ether	141, 204, 206
n-Nitrosodiphenylamine	167, 168, 169
1,2-Diphenylhydrazine	77, 93, 105
4-Bromophenoxybenzene	141, 248, 250
Hexachlorobenzene	142, 249, 284

Group I (continued)	Characteristic Ions
Butylbenzylphthalate	91, 149
Benzo(a)anthracene	226, 228, 229
3,3-Dichlorobenzidine	126, 252, 254
Chrysene	226, 228, 229
bis(2-ethylhexyl)phthalate	149, 167, 279
di-n-octyl phthalate	149
Benzo(b)fluoranthene	125, 252, 253
Benzo(k)fluoranthene	125, 252, 253
Benzo(a)pyrene	125, 252, 253
Indeno(1,2,3-cd)pyrene	138, 276, 277
Dibenzo(ah)anthracene	139, 278, 279
Benzo(ghi)perylene	138, 276, 277
Benzidine	92, 184, 185
Pyrene	100, 101, 202
Fluoranthene	100, 101, 202
di-n-butylphthalate	104, 149, 150
Anthracene	176, 178, 179
Phenanthrene	176, 178, 179

Group II: Acids	
2-Chlorophenol	64, 128, 130
2-Nitrophenol	65, 109, 139
Phenol	65, 66, 94
2,4-Dimethylphenol	107, 121, 122
2,4-Dichlorophenol	98, 162, 164
2,4,6-Trichlorophenol	196, 198, 200
4-Chloro-3-methylphenol	107, 142, 144
2,4-Dinitrophenol	63, 154, 184
2-Methyl-4,6-dinitrophenol	77, 182, 198
Pentachlorophenol	264, 266, 268
4-Nitrophenol	65, 109, 139

I.S. = Internal Standard.

Table B-5

PURGEABLE PRIORITY POLLUTANTS - EPA METHOD 624

Compound	Characteristic Ions
Bromochloromethane (I.S.)	49, 51, 130, 128
Chloromethane	50, 52
Dichlorodifluoromethane	85, 87
Bromomethane	94, 96
Vinyl chloride	62, 64
Chloroethane	64, 66
Methylene chloride	49, 51, 84, 86
Trichlorofluoromethane	101, 103
1,1-Dichloroethylene	61, 96, 98
1,1-Dichloroethane	63, 65, 83
trans-1,2-Dichloroethylene	61, 96, 98
Chloroform	83, 85
1,2-Dichloroethane	62, 64, 98, 100
1,1,1-Trichloroethane	97, 99, 117, 119
Carbon tetrachloride	117, 119, 121
Bromodichloromethane	83, 85, 127, 129
1,4-Dichlorobutane (I.S.)	55, 90, 92
1,2-Dichloropropane	63, 65, 112, 114
trans-1,3-Dichloropropene	75, 77
Trichloroethylene	95, 97, 130, 132
Benzene	78
cis-1,3-Dichloropropene	75, 77
Dibromochloromethane	129, 127, 208, 206
Bromoform	171,173,175,250,252,254,256
1,1,2,2-Tetrachloroethylene	129, 131, 164, 166
1,12,2-Tetrachloroethane	83, 85, 131, 133, 166, 168
Toluene	91, 92
Chlorobenzene	112, 114
Ethylbenzene	91, 106
2-Bromo-1-chloropropane (I.S.)	77, 79, 156
2-Chloroethylvinyl ether	63, 65, 106
Xylene	91, 106
Xylene	91, 106
n-Butyl acetate*	56, 73
Bromochloromethane (I.S.)	49, 130, 128, 51
Acrolein	55, 56
Acrylonitrile	50, 51, 32, 53
Acetone*	58
Acetonitrile*	41, 42, 38, 39, 30
Isopropanol*	45, 43, 59
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)*	151
Methyl ethyl ketone*	43, 57, 72
Ethyl acetate*	43, 88, 70, 73, 61
1,1,2-Trichloroethane	83, 85, 97, 99, 132, 134

*Not a priority pollutant or an internal standard. Included due to interest by some California regulatory authorities. The underlined characteristic ions are used for quantitation.

I.S. = Internal Standard.

APPENDIX C

SUPPORTING DOCUMENTS

SUPPORTING DOCUMENTS

A very large data base was developed as part of the Fresno NURP project. These data were compiled in the following supporting documents:

Quarterly Report No. 6, May 18, 1982

Quarterly Report No. 7, August 20, 1982

Quarterly Report No. 8, November 22, 1982

Quarterly Report No. 9, March 8, 1983

Quarterly Report No. 10, May 31, 1983

Quarterly Report No. 11, August 9, 1983

First Annual Report, October 20, 1982

Second Annual Report, September 20, 1983

U.S. Geological Survey draft NURP report entitled "Rainfall and Runooff Characteristics of Four Urban Land Use Catchments in Fresno, California, October 1981 to April 1983", dated November 1983 (the final report is in preparation).

U.S. Department of Agriculture, Water Management Research Laboratory Final NURP Report and Appendices, September 1983.

These reports are all available through the Fresno Metropolitan Flood Control District, Rowell Building, Suite 300, 2100 Tulare Street, Fresno, California, 93721. The USGS and USDA final reports are also available directly from those agencies: USGS, 2800 Cottage Way, Sacramento, California, 95825; USDA, 5544 East Air Terminal Drive, Fresno, California, 93727.

APPENDIX 4.9
Solid Waste Disposal Data

CALIFORNIA INTEGRATED WASTE MANAGEMENT BOARD

MODEL ORDINANCE

RELATING TO AREAS FOR COLLECTING AND LOADING RECYCLABLE MATERIALS IN DEVELOPMENT PROJECTS

MARCH 31, 1993

SECTION I

PURPOSE

Cities and counties must divert 50 percent of all solid waste by January 1, 2000, through source reduction, recycling, and composting activities.

Diverting 50 percent of all solid waste requires the participation of the residential, commercial, industrial, and public sectors.

The lack of adequate areas for collecting and loading recyclable materials that are compatible with surrounding land uses is a significant impediment to diverting solid waste and constitutes an urgent need for state and local agencies to address access to solid waste for source reduction, recycling, and composting activities. This ordinance has been developed to meet that need.

SECTION II

DEFINITIONS

The following definitions shall apply to the language contained in this ordinance:

A. **DEVELOPMENT PROJECT** - Means any of the following:

1) A project for which a building permit is required for a commercial, industrial, or institutional building, marina, or residential building having five or more living units, where solid waste is collected and loaded and any residential project where solid waste is collected and loaded in a location serving five or more living units.

2) Any new public facility where solid waste is collected and loaded and any improvements for areas of a public facility used for collecting and loading solid waste.

3) The definition of development project only includes subdivisions or tracts of single-family detached homes if, within such subdivisions or tracts there is an area where solid waste is collected and loaded in a location which serves five or more living units. In such instances, recycling areas as specified in this ordinance are only required to serve the needs of the living units which utilize the solid waste collection and loading area.

B. **IMPROVEMENT** - An improvement adds to the value of a facility, prolongs its useful life, or adapts it to new uses. Improvements should be distinguished from repairs. Repairs keep facilities in good operating condition, do not materially add to the value of the facility, and do not substantially extend the life of the facility.

C. **FLOOR AREA OF A MARINA** - The floor area of a marina shall be defined as the space dedicated to the docking or mooring of marine vessels.

D. **PUBLIC FACILITY** - The definition of public facility includes, but is not limited to buildings, structures, marinas, and outdoor recreation areas owned by a local agency.

E. **RECYCLING AREA (AREAS FOR RECYCLING)** - Space allocated for collecting and loading of recyclable materials. Such areas shall have the ability to accommodate receptacles for recyclable materials. Recycling areas shall be accessible and convenient for those who deposit as well as those who collect and load any recyclable materials placed therein.

SECTION III

GENERAL REQUIREMENTS

A. Any new development project for which an application for a building permit is submitted on or after September 1, 1994, shall include adequate, accessible, and convenient areas for collecting and loading recyclable materials.

B. Any improvements for areas of a public facility used for collecting and loading solid waste shall include adequate, accessible, and convenient areas for collecting and loading recyclable materials.

C. Any existing development project for which an application for a building permit is submitted on or after September 1, 1994 for a single alteration which is subsequently performed that adds 30 percent or more to the existing floor area of the development project shall provide adequate, accessible, and convenient areas for collecting and loading recyclable materials.

D. Any existing development project for which an application for a building permit is submitted on or after September 1, 1994 for multiple alterations which are conducted within a twelve month period which collectively add 30 percent or more to the existing floor area of the development project shall provide adequate, accessible, and convenient areas for collecting and loading recyclable materials.

E. Any existing development project for which multiple applications for building permits are submitted within a twelve month period beginning on or after September 1, 1994 for multiple alterations which are subsequently performed that collectively add 30 percent or more to the existing floor area of the development project shall provide adequate, accessible, and convenient areas for collecting and loading recyclable materials.

F. Any existing development project occupied by multiple tenants, one of which submits on or after September 1, 1994, an application for a building permit for a single alteration which is subsequently performed that adds 30 percent or more to the existing floor area of that portion of the development project which said tenant leases shall provide adequate, accessible, and convenient areas for collecting and loading recyclable materials. Such recycling areas shall, at a minimum be sufficient in capacity, number, and distribution to serve that portion of the development project which said tenant leases.

G. Any existing development project occupied by multiple tenants, one of which submits on or after September 1, 1994 an application for a building permit for multiple alterations which are conducted within a twelve month period which collectively add 30 percent or more to the existing floor area of that portion of the development project which said tenant leases shall provide adequate, accessible, and convenient areas for collecting and loading recyclable materials. Such recycling areas shall, at a minimum be sufficient in capacity, number, and distribution to serve that portion of the development project which said tenant leases.

H. Any existing development project occupied by multiple tenants, one of which submits within a twelve month period beginning on or after September 1, 1994 multiple applications for building permits for multiple alterations which are subsequently performed that collectively add 30 percent or more to the existing floor area of that portion of the development project which said tenant leases shall provide adequate, accessible, and convenient areas for collecting and loading recyclable materials. Such recycling areas shall, at a minimum be sufficient in capacity, number, and distribution to serve that portion of the development project which said tenant leases.

I. Any costs associated with adding recycling space to existing development projects shall be the responsibility of the party or parties who are responsible for financing the alterations.

SECTION IV

GUIDELINES FOR ALL DEVELOPMENT PROJECTS

A. Where local standards exist, recycling areas should be designed to be architecturally compatible with nearby structures and with the existing topography and vegetation, in accordance with such standards.

B. The design and construction of recycling areas shall not prevent security of any recyclable materials placed therein.

C. The design, construction, and location of recycling areas shall not be in conflict with any applicable federal, state, or local laws relating to fire, building, access, transportation, circulation, or safety.

D. Recycling areas or the bins or containers placed therein must provide protection against adverse environmental conditions, such as rain, which might render the collected materials unmarketable.

E. Driveways and/or travel aisles shall, at a minimum, conform to local building-code requirements for garbage collection access and clearance. In the absence of such building-code requirements, driveways and/or travel aisles should provide unobstructed access for collection vehicles and personnel.

F. A sign clearly identifying all recycling and solid waste collection and loading areas and the materials accepted therein shall be posted adjacent to all points of direct access to the recycling areas.

G. Developments and transportation corridors adjacent to recycling areas shall be adequately protected for any adverse impacts such as noise, odor, vectors, or glare through measures including, but not limited to maintaining adequate separation, fencing, and landscaping.

SECTION V

ADDITIONAL GUIDELINES FOR SINGLE TENANT DEVELOPMENT PROJECTS

A. Areas for recycling shall be adequate in capacity, number, and distribution to serve the development project.

B. Dimensions of the recycling area shall accommodate receptacles sufficient to meet the recycling needs of the development project.

C. An adequate number of bins or containers to allow for the collection and loading of recyclable materials generated by the development project should be located within the recycling area.

SECTION VI

ADDITIONAL GUIDELINES FOR MULTIPLE TENANT DEVELOPMENT PROJECTS

A. Recycling areas shall, at a minimum be sufficient in capacity, number, and distribution to serve that portion of the development project leased by the tenant(s) who submitted an application or applications resulting in the need to provide recycling area(s) pursuant to Section III of this ordinance.

B. Dimensions of recycling areas shall accommodate receptacles sufficient to meet the recycling needs of that portion of the development project leased by the tenant who submitted an application or applications resulting in the need to provide recycling area(s) pursuant to Section III of this ordinance.

C. An adequate number of bins or containers to allow for the collection and loading of recyclable materials generated by that portion of the development project leased by the tenant(s) who submitted an application or applications resulting in the need to provide recycling area pursuant to Section III of this ordinance should be located within the recycling area.

SECTION VII

LOCATION

A. Recycling areas shall not be located in any area required to be constructed or maintained as unencumbered, according to any applicable federal, state, or local laws relating to fire, access, building, transportation, circulation, or safety.

B. Any and all recycling area(s) shall be located so they are at least as convenient for those persons who deposit, collect, and load the recyclable materials placed therein as the location(s) where solid waste is collected and loaded. Whenever feasible, areas for collecting and loading recyclable materials shall be adjacent to the solid waste collection areas.

SECTION VIII

DECLARATION OF SEVERABILITY

All provisions of this Ordinance are severable and, if for any reason any sentence, paragraph, or section of this Ordinance shall be held invalid, such decision shall not affect the validity of the remaining parts of the Ordinance.

Riverpark Solid Waste - Existing

Land Use	Quantity	Units	Generation Rate		Total Waste Generated	
			(tpy) (1)	(lbs./day)	(tpy)	(lbs./day)
Commercial Office	5,566	sq. ft.	0.0014	0.01	8	43
				Totals	**8**	**43**

sq.ft. - square feet; tpy = tons per year; lbs. = pounds

(1) The solid waste daily generation rates in tons per year are derived from the Ventura County Solid Waste Management Department's Guidelines for Preparation of Environmental Assessments for Solid Waste Impacts,

Santa Clarita Valley
Solid Waste Generation
(No Recycling) Impact Analysis

Rivepark Solid Waste - Project Only

Land Use	Quantity	Units	Generation Rate (tpy) (1)	Generation Rate (lbs./day)	Total Waste Generated (tpy)	Total Waste Generated (lbs./day)
Residential Units:						
Single-Family Detached	439	du	2.0400	11.18	896	4,907
Multi-Family or Attached	744	du	1.1700	6.41	870	4,770
Commercial						
Commercial Retail	40,000	sq. ft.	0.0024	0.01	96	526
				Totals	**1,862**	**10,203**

du = dwelling unit; sq.ft. - square feet; tpy = tons per year; lbs. = pounds

(1) The solid waste daily generation rates in tons per year are derived from the Ventura County Solid Waste Management Department's Guidelines for Preparation of Environmental Assessments for Solid Waste Impacts. These figures do not reflect any recycling activities on the part of the generator.

Riverpark Solid Waste = Cumulative + Project

Land Use	Quantity	Units	Generation Rate (tpy) (1)	Generation Rate (lbs./day)	Total Waste Generated (tpy)	Total Waste Generated (lbs./day)
Residential Units:						
Single Family Detached	93,720	du	2.0400	11.18	191,189	1,047,610
Multi-Family or Attached	48,747	du	1.1700	6.41	57,034	312,515
Mobile Home	2,699	du	1.1700	6.41	3,158	17,303
Commercial/Industrial						
Commercial Retail	19,899,030	sq. ft.	0.0024	0.01	47,758	261,686
Sit Down Restaurant	283,790	sq. ft.	0.0108	0.06	3,065	16,794
Fast Food Restaurant	23,600	sq. ft.	0.0108	0.06	255	1,397
Car Dealership	411,000	sq. ft.	0.0051	0.03	2,096	11,485
Hotel	2,071	sq. ft.	0.0053	0.03	11	60
Movie Theater (2)	3,300	seats	0.2000	1.10	660	3,616
Health Club (2)	54,000	sq. ft.	0.0056	0.03	302	1,657
Medical Offices	133,730	sq. ft.	0.0027	0.01	361	1,978
Hospital	247,460	sq. ft.	0.0055	0.03	1,361	7,458
Business Park	8,424,330	sq. ft.	0.0014	0.01	11,794	64,625
Commercial Office	6,380,520	sq. ft.	0.0014	0.01	8,933	48,946
Elem./Middle Schools (3)	279,340	students	0.1090	0.60	30,448	166,839
High School (3)	12,958	students	0.1090	0.60	1,412	7,739
College (3)	29,948	students	0.1090	0.60	3,264	17,887
Day Care	785,000	sq. ft.	0.0013	0.01	1,021	5,592
Trans., Comm., Utilities	1,150,240	sq. ft.	0.0079	0.04	9,087	49,791
Special Generator (4)	413	sq. ft.	0.0079	0.04	3	18
Golf Course	1,209	acres	0.2000	1.10	242	1,325
Parkland	493	acres	0.2000	1.10	99	541
Library (5)	171,790	sq. ft.	0.0014	0.01	241	1,318
Manufacturing/Warehouse	3,932,470	sq. ft.	0.0050	0.03	19,662	107,739
Church (5)	501,190	sq. ft.	0.0014	0.01	702	3,845
Industrial Park (6)	501,190	sq. ft.	0.0010	0.01	501	2,746
Undeveloped Parkland	1,000	acres				
				Totals	**393,455**	**2,155,919**

du = dwelling unit; sq.ft. - square feet; tpy = tons per year; lbs. = pounds

(1) The solid waste daily generation rates in tons per year are derived from the Ventura County Solid Waste Management Department's Guidelines for Preparation of Environmental Assessments for Solid Waste Impacts, unless otherwise noted. These figures do not reflect any recycling activities on the part of the generator.

(2) California Integrated Waste Management Website, November 2002, which cites SWANA Technical Bulletin 85-6, Recovery Sciences 1987 and Santa Clarita SRRE, 1990.

(3) California Integrated Waste Management Website, November 2002, which cites SWANA Technical Bulletin 85-6, Recovery Sciences 1987 and Matrix Management Group "Best Management Practices Analysis for Solid Waste."

(4) Conservatively assumes same generation rate as utilities.

(5) Assumes same generation rate as for office.

(6) California Integrated Waste Management Website, November 2002, which cites City of Los Angeles Bureau of Solid Waste 1989.

APPENDIX 4.10

Student Generation Calculations and School Facilities Funding Agreements

Santa Clarita Valley
Net Increase in
Student/Classroom/School Generation Using
Theoretical Student Generation Rates
River Park EIR

District	Housing Units by Type			Student Generation Rate			Class Size	School Size	Students	Classes	Schools
	Single Fam.	Multi-Fam.	Apartment	Single Fam.	Multi-Fam.	Apartment					
Saugus Union Elementary	439		744	0.431	0.0556	0.1326	30	770	288	9.60	0.37
Hart Junior High	439		744	0.104	0.037	0.038	32	930	74	2.31	0.08
Hart High School	439		744	0.179	0.064	0.054	32	2,764	119	3.71	0.04
								Totals	**481**	**15.62**	**0.50**

Prepared By Impact Sciences, Inc.
S. Tebo
12/16/03

William S. Hart Union High School District
January 2003

Existing Schools	Location	Enrollment Capacity Permanent	Enrollment Capacity Temporary	Enrollment Capacity Total	Classrooms Permanent	Classrooms Temporary	Classrooms Total	Oct. 2002 Enrollment	Capacity Minus Enrollment
Arroyo Seco JHS (7-8)	27171 Vista Delgado Dr., Valencia 91354	930	659	1,589	35	26	61	1,568	21
La Mesa JHS (7-8)	26623 May Way, Santa Clarita, 91351	1,026	368	1,394	37	20	57	1,568	-174
Placerita JHS (7-8)	25015 N. Newhall Ave., Newhall 91321	846	390	1,236	34	25	59	1,601	-365
Sierra Vista JHS (7-8)	19425 West Stillmore St., Cyn Country 91351	916	305	1,221	35	25	60	1,572	-351
Canyon HS (9-12)	19300 West Nadel St., Cyn Country 91351	1,604	934	2,538	63	32	95	2,825	-287
W.S. Hart HS (9-12)	24825 N. Newhall Ave., Newhall 91321	1,392	923	2,315	55	40	95	2,900	-585
Saugus HS (9-12)	21900 Centurion Way, Saugus 91350	1,624	649	2,273	63	26	89	2,683	-410
Valencia HS (9-12)	27801 N. Dickason Dr., Valencia 91355	1,924	840	2,764	74	32	106	3,253	-489
Future Schools									
Rio Norte JHS (7-8)	28771 Rio Norte Dr., Valencia 91354 (opening Fall 2003)	1,200		1,200	29		29		
Golden Valley HS (9-12)	20501 Golden Valley Road, Sta Clarita 91321 (opening Fall 2004)	2,600		2,600	59		59		
Rancho Pico JHS (7-8)	Valencia Blvd w/o I-5 (opening Fall 2005)	1,200		1,200	29		29		
West Ranch HS (9-12)	Valencia Blvd w/o I-5 (opening Fall 2006)	2,600		2,600	63		63		
	Totals - Existing	10,262	5,068	15,330	396	226	622	17,970	-2,640
	Totals - Future	17,862		22,930	576		802		

Source: Baril, Lorna. William S. Hart Union High School District, Santa Clarita, California. Correspondence to Impact Sciences, Inc., January 20, 2003.

Impact Sciences, Inc.
Prepared by R. Mamaghani
3/25/03

River Park
Student Generation Under the DMS Scenario

		District Bldout Without Project		
Land Use	Project	Saugus	Hart Jr.	Hart Sr.
Single Family Residential (SFD)	439	10,437	18,594	23,343
Multi-Family Residential (SFA)				
Apartments (MF)	744	4,087	9,440	12,196

Student Generation Without Project

	Generation Rates			Students			Total
	SFD	SFA	MF	SFD	SFA	MF	Students
Saugus Union School District (1)	0.4982	0.0556	0.1326	5,200	0	542	5,742
W.S. Hart (Junior High School) (3)	0.1671	0.0311	0.0137	3,107	0	129	3,236
W.S. Hart (High School) (3)	0.2426	0.0789	0.0315	5,663	0	384	6,047
						Total	**15,025**

Student Generation With Project

	Generation Rates			Students			Total
	SFD	SFA	MF	SFD	SFA	MF	Students
Saugus Union School District (1)	0.4982	0.0556	0.1326	219	0	99	6,059
W.S. Hart (Junior High School) (2)	0.0980	0.0370	0.0380	43	0	28	3,308
W.S. Hart (High School) (2)	0.1710	0.0640	0.0540	75	0	40	6,162
						Total	**15,529**

(1) Harold J. Pierre, P.E., Saugus Union School District, correspondence to Impact Sciences, Inc., 30 October 2002.
(2) Davis Demographics and Planning (December 12, 1995). These represent actual student generation rates and are from the October 1998 School Facilities Funding Agreement between The Newhall Land and Farming Company and the Hart District.
(3) David Taussig & Associates, Inc. School Facilities Needs Analysis for Consideration of Alternative School Facility Fees. David Taussig & Associates, Inc.: Newport Beach, California, March 8, 2002. P. 7.

Impact Sciences, Inc.
Prepared by R. Mamaghani
3/25/03

School Facilities Funding Agreement Between
The Saugus Union School District and
The Newhall Land and Farming Company

SCHOOL FACILITIES FUNDING AGREEMENT BETWEEN THE SAUGUS UNION SCHOOL DISTRICT AND THE NEWHALL LAND AND FARMING COMPANY

This School Facilities Funding Agreement ("Agreement") is made at Valencia, California, as of February 18, 1997, between the **SAUGUS UNION SCHOOL DISTRICT** ("District"), a school district organized and existing under the laws of the State of California, on the one hand, and **THE NEWHALL LAND AND FARMING COMPANY** ("NLF"), a California limited partnership, on the other hand, with respect to the following facts:

A. NLF, the owner, has been developing and continues to develop the master planned Valencia Community ("Valencia"), which is located in part within the District's boundaries, a portion of which is subject to the provisions of this Agreement ("NLF Property"). The NLF Property, which is described in Exhibit"A," attached and herein incorporated to this Agreement, excluding those areas depicted as exclusions ("Excluded Areas") as described in Exhibit "A," attached and herein incorporated to this Agreement. The Excluded Areas are further identified and described in Exhibit "B" which is attached and herein incorporated to this Agreement.

B. NLF Property is a mixed use development which will include approximately fifteen thousand (15,000) dwelling units in addition to commercial facilities. Total buildout of the NLF Property will take approximately ten (10) more years and the final details of development of the NLF Property, including the location and extent of land uses, the number and product mix of dwelling units is expected to change over time to meet the needs of the market. Corresponding changes in governmental approvals are also expected.

C. Historically, the State of California has provided a substantial portion of the money necessary to build new School Facilities ("State Funding"). However, over the last several years sufficient funds have not been available from the State for this purpose and the District does not believe that sufficient funds will be available from the State for this purpose in the near future.

D. The District and NLF have estimated the amount of money which would be necessary to completely mitigate the impacts of the development of the NLF Property on the District's educational facilities in the absence of State funding ("Mitigation Payments").

E. Both the District and NLF desire to provide a financing schedule ("Financing Schedule") and a financing plan ("Financing Plan"), as set out in this Agreement, in lieu of Mitigation Payments, which will provide permanent School Facilities, including land, buildings, furnishings and equipment ("School Facilities"), to house the NLF K-6 Students who will be generated by the development of the NLF Property, including those students from NLF Property which may attend District School Facilities pursuant to paragraph 1 of this Agreement ("NLF Students"), and which will completely mitigate the direct and cumulative impacts on the District's educational facilities. Temporary facilities to house NLF Students inclusive of Castaic

NLF Students as hereinafter defined, while new School Facilities are being constructed, will be provided, and paid for, by the District. School Facilities will be constructed in accordance with the requirements and specifications contained in the Education Code and the Applicant Handbook for State School Building Lease-Purchase Program put out by the Office of Public School Construction as those requirements and specifications exist at any given time ("State Requirements and Specifications"). A copy of the State Requirements and Specifications as they exist on the date of this Agreement is attached as Exhibit "C" and herein incorporated to this Agreement.

F. The construction of School Facilities will be accomplished through the use of funds advanced by NLF in response to requests from the District, hereinafter defined as Construction Draws. The Financing Schedule will ensure that the District will always have sufficient capacity to house every NLF student. The Financing Plan is intended to minimize the financial impacts on NLF while at the same time maximizing the opportunity to obtain State Funding for School Facilities or the repayment, without interest, from State Funding of the funds advanced by NLF for the cost of School Facilities necessary to house NLF Students.

G. The Financing Schedule and the Financing Plan will ensure that the development of the NLF Property, either individually or cumulatively with other projects within the District's boundaries, will have no adverse impacts on the District's ability to provide adequate educational opportunities to every student in the District. In particular, the Financing Schedule and the Financing Plan guarantee to the District that there will be adequate School Facilities available to house every NLF Student.

H. The District has determined that the development of the NLF Property, as a part of the planned community of Valencia, presents a unique opportunity for the District to provide for complete mitigation of the impact that this development is likely to have on the District's educational facilities, that the Financing Schedule and the Financing Plan will provide all of the land and money necessary to provide all needed School Facilities without the need to collect any fees which might otherwise be available to the District in connection with the construction of commercial or industrial buildings within the NLF Property. The District has also determined that the number of additional students who might be entitled to attend the District's schools because of their parents' or guardians' employment in those buildings is less than, or equal to, the number of NLF Students who will not attend the District's schools because they will be attending schools in other districts or private schools. The District's determination is limited to the NLF Property and does not represent a precedent applicable to any other property within the District.

I. Each future permanent elementary school to house NLF Students will be built to the State Requirements and Specifications and will contain at least 30% relocatable classrooms, which, together with permanent School Facilities, will house seven hundred seventy-five (775) students on a traditional, single track, nine month school schedule and that each represents the appropriate size elementary school to house NLF Students ("New Elementary School"). The

District will operate each New Elementary School to house nine hundred thirty (930) NLF Students by housing the additional one hundred fifty-five (155) NLF Students at any New Elementary School or at any other District school by either, in its sole discretion, adding relocatable classrooms or, without adding relocatable classrooms, by operating any New Elementary School on a multi-track, year-round schedule.

J. Each New Elementary School will be built on a net (10) ten acre school site exclusive of slope areas in excess of two percent (2%) ("Slope Areas") or, in NLF's sole discretion, on a net six and one-half (6.5) acre school site exclusive of Slope Areas for joint use with an adjoining local public park containing at least a net of five (5) acres exclusive of Slope Areas ("New Elementary School Site"), provided the District has entered into a joint use agreement ("JUA") acceptable to the District. The operation and relationship of the joint use school and park shall be contained in such JUA. Any adjoining local park shall be improved and available as provided in the JUA for use by the District at the time the adjoining New Elementary School is open for operation and for as long afterwards as the New Elementary School remains in operation.

IN LIGHT OF THE FOREGOING FACTS, IT IS MUTUALLY AGREED THAT:

1. The District shall use its best efforts to enter into an agreement with the Castaic Union School District ("Castaic") whereby District can provide classrooms and educational services to the students from that portion of the NLF Property anticipated to be developed, consisting of approximately 200 dwelling units which presently are within the boundaries of Castaic. This area, hereinafter defined as the Castaic Area ("Castaic Area"), is depicted in Exhibit "A" to this Agreement. This shall occur, if at all, through an interdistrict transfer agreement or some similar agreement to the mutual satisfaction of the District and Castaic. The District also shall not withhold its reasonable cooperation and consent to a reorganization and transfer of that portion of the District's boundaries that are currently in NLF's Westridge project so that the Westridge portion of District will become part of the Newhall School District ("Newhall") and within Newhall's boundaries. The terms of this Agreement shall apply to those portions of the NLF Property which are within the District's boundaries regardless of the outcome of District's best efforts to successfully complete the annexation or reorganization set forth in this Paragraph 1.

2. NLF shall advance all of the funds needed by the District to build the New Elementary Schools pursuant to the terms of this Agreement and the District shall build the New Elementary Schools necessary to house all NLF Students pursuant to the terms of this Agreement.

3. The District shall provide NLF with written notice ("District Notice") for the first New Elementary School when the District reasonably determines that at least three hundred (300) NLF Students, including any NLF students from the Castaic Area ("Castaic NLF Students"), are estimated to exist for the next succeeding school year and that a New Elementary School is

reasonably required to house NLF Students, including any Castaic NLF Students. Thereafter the District shall provide NLF with a District Notice whenever it reasonably determines that all existing New Elementary Schools will house at least nine hundred thirty (930) NLF Students, including Castaic NLF Students, except when the last constructed new elementary school which will house at least seven hundred seventy-five (775) NLF students, including Castaic NLF Students, in the next succeeding school year and when at least three hundred ninety (390) additional NLF Students including Castaic NLF Students are reasonably estimated by the District to exist for the next two succeeding school years. The District Notice shall contain a description of the New Elementary School and a schematic footprint showing the location of all proposed buildings, parking lots, and other improved areas ("Project Layout") and shall state the District's estimated cost to construct the New Elementary School and the amount needed for the first Construction Draw.

4. The District shall use its best efforts to provide each New Elementary School, open for operation, at the time when four hundred fifty (450) additional NLF Students including any Castaic NLF Students are available to be housed in the New Elementary School. NLF shall advance to the District the funds required to construct each New Elementary School to a maximum of Six Million Nine Hundred Sixty-Seven Thousand Two Hundred Ninety Dollars ($6,967,290.00) (as shown on Exhibit D) adjusted beginning on January 1, 1998 and annually thereafter on January 1st to account for inflation based on the statewide cost index for Class D construction as determined by the State Allocation Board at its quarterly meetings ("Index"), which adjustment shall be effective as of the date of each meeting ("Maximum Construction Cost"). If the State Allocation Board stops determining the adjustments, the adjustments shall be made using the Marshall & Swift Class D Wood Frame Cost Index for the Western United States, or another mutually agreed upon index. NLF may, in its sole discretion, post an improvement bond, or a letter of credit in favor of the District in a form and from a source reasonably acceptable to the District, in the lesser of the amount of the cost of construction set forth in the District Notice or the Maximum Construction Cost and shall advance the funds required for the first Construction Draw to the District within sixty (60) calendar days of receipt of the District Notice. Thereafter, the District shall submit subsequent written Construction Draw requests to NLF and NLF shall advance the funds required by each subsequent Construction Draw request to the District within thirty (30) calendar days of receipt of the Construction Draw request up to the lesser of the amount of the Construction Draw or Maximum Construction Cost set forth in the District Notice, plus any change orders or actual reasonable extra costs. The District shall confer with NLF as to any change orders involving extra costs in excess of five percent (5%) of the Maximum Construction Cost.

5. The District shall be responsible for obtaining, paying for, and installing any permanent or temporary relocatable classrooms which are to be used to house NLF Students inclusive of any Castaic NLF Students while a New Elementary School is being built.

6. The District and NLF shall consult with each other on the planning, design, layout, and grading of each New Elementary School and each New Elementary School Site to maximize architectural compatibility with surrounding development and to minimize construction and maintenance costs to the District to the greatest extent possible while still conforming to the State Requirements and Specifications. All decisions regarding the planning, design, layout, and grading of New Elementary Schools and New Elementary School Sites shall be in the District's sole discretion and it is not intended that the District be required to do anything that will increase its current or future costs of operation or maintenance.

7. NLF shall provide each New Elementary School Site to the District in a construction ready condition within one hundred eighty (180) calendar days of receipt of the District Notice. It is the intent of the District and NLF that plans, drawings, and construction documents will have been prepared and approved by the Office of the State Architect and the State Allocation Board and that a construction contract will be concurrently awarded upon completion of a New Elementary School Site by NLF in the herein described construction ready condition, so that construction of each New Elementary School can begin at the time each New Elementary School Site is provided to the District.

8. Each New Elementary School Site shall be provided to the District in a construction ready condition with all-weather access to public roads and utilities, including storm water and drainage facilities. This shall consist of one (1) potable water line, one (1) fire water line, one (1) electrical line, one (1) natural gas line, one (1) telephone line, and up to two (2) sewer lines, stubbed to the hook-up location indicated for each utility on pages 3-B-40-41 of The State Requirements and Specifications attached as Exhibit "C", and shown on the Project Layout, sufficient to service a New Elementary School, in place. Each New Elementary School Site shall have no more than two (2) pads with no more than a two percent (2%) grade as to each pad. The Maximum Construction Cost shall be increased by any additional costs of service-site development over that which would otherwise be incurred if the difference in elevation of two pads on a New Elementary School Site exceeds four (4) feet. Every pad shall be compacted to the degree required by a geotechnical engineer to support the uses shown on the Project Layout without additional cost to the District.

9. NLF shall provide, a maximum of four (4) New Elementary Schools and four (4) New Elementary School Sites, pursuant to paragraph 13 below, which shall be funded by NLF pursuant to this Agreement. The location of each New Elementary School Site is to be reasonably determined by NLF subject to the consent of the District, which consent shall not be unreasonably withheld, the concurrence of the State Department of Education and, if required, the County of Los Angeles or a successor City.

10. NLF shall lease New Elementary School Sites to the District as needed by the District on the terms and conditions of this Agreement. Each lease shall commence sixty (60) calendar days after receipt of the District Notice. Each net five (5) acre local public park,

exclusive of Slope Areas, adjacent to a net six and one half (6.5) acre, exclusive of Slope Areas, New Elementary School Site, shall be improved and available for joint use in connection with the operation of the New Elementary School at the time that it opens for operation and shall remain available for as long afterwards as it remains in operation. NLF shall make all reasonable efforts to place the landscaped area, if any, on the frontage of the New Elementary School Sites within the boundary of a landscaping and lighting maintenance district. Each lease for a New Elementary School Site shall be for a period of thirty (30) years ("Lease Term") at a rental of One Dollar ($1) per year. Each lease shall terminate if the New Elementary School is not open for operation within five (5) years of the commencement of the lease, provided that NLF has advanced all required funds for the New Elementary School to the District, or if, after the New Elementary School has opened for operation, it fails to operate as an elementary school for five (5) years in any seven (7) year period. The District, upon termination of any lease, shall, at the District's sole expense, demolish all improvements constructed by it on the New Elementary School Site and return it to the condition it was in at the commencement of the lease and shall refund to NLF any funds advanced to the District, together with interest actually earned by the District, for the construction of the New Elementary School which have not been paid, irrevocably committed, or required to terminate any applicable contract.

11. Each lease shall contain an option which allows the District to purchase the New Elementary School Site and which the District shall exercise immediately if the District is able to obtain money for construction or land acquisition from any State or federal agency. The purchase price shall be the appraised value at the time of the exercise of the option or at such other time as required by applicable State or federal law and shall be determined in accordance with applicable policies and regulations of the office of Public School Construction and the State Allocation Board. If the money received from any State or federal agency is less than the purchase price, then the District shall pay NLF the amount received and any additional amounts received for the New Elementary School Site from any State or federal agency thereafter. If the District is unable to exercise the purchase option during Lease Term, the District shall purchase the New Elementary School Site for One Dollar ($1) at the end of the Lease Term. Any purchase of a New Elementary School Site which does not include the payment of the full amount of the appraised value shall be subject to a power of termination, as that term is defined in Civil Code 885.010, in favor of NLF which will require the District to deed all improvements constructed by it on the New Elementary School Site, and to return it to the condition it was in at the commencement of the lease if the New Elementary School fails to operate as an elementary school for five (5) years in any seven (7) year period. Upon exercise of the power of termination, NLF shall pay the District the amount of the purchase price, without interest, paid to NLF. The power of termination shall become ineffective at such time as NLF receives the full amount of the appraised value of a New Elementary School Site.

12. If the District determines that a fourth New Elementary School Site and a New Elementary School is needed by District, then NLF shall provide the fourth New Elementary School Site pursuant to the provisions set out in Paragraphs 10 and 11 above.

13. The District shall state in the District Notice for the last school needed to house NLF Students including Castaic NLF Students ("Last School") the number of NLF Students that exceed two thousand seven hundred ninety (2,790) that will be housed in the Last School.

a. If the District reasonably determines that the Last School will house less than nine hundred thirty (930) NLF Students, including Castaic NLF Students, but more than four hundred sixty-five (465) NLF Students, including Castaic NLF Students, then the District shall build the Last School on a New Elementary School Site to be provided by NLF. The Last School shall be built to the State Requirements and Specifications and shall be large enough to house the number of NLF Students, including Castaic NLF Students, if the school were operated on a multi-track, year round schedule. NLF shall only be required to advance funds to the District equal to the construction cost of the Last School up to the Maximum Construction Cost. Alternatively, the District, in its sole discretion, may build a New Elementary School in which case NLF shall be required to advance funds to the District equal to the lesser of the construction cost of the New Elementary School multiplied by the ratio of the number of NLF Students and Castaic NLF Students to be housed to the nine hundred thirty (930) or the Maximum Construction Cost multiplied by the ratio of the number of NLF Students and Castaic NLF Students to be housed to nine hundred thirty (930).

b. If the District determines that the Last School will house four hundred sixty-five (465) NLF Students, including Castaic NLF Students, or less, then the District shall not be required to build the Last School and NLF shall only be required to advance funds to the District equal to the construction cost of a school large enough to house such number of NLF Students, including Castaic Students. This amount, shall be equal to the construction cost of a New Elementary School, up to the Maximum Construction Cost, to be adjusted by the Index, multiplied by the ratio of the number of NLF Students, including Castaic NLF Students, to be housed to nine hundred thirty (930). Alternatively, the District, in its sole discretion, may build the Last School in which case it shall be large enough to house a minimum of seven hundred seventy-five (775) students if operated on a traditional, single track, nine month school schedule and shall be built to the State Requirements and Specifications. If the District constructs the Last School and if it becomes obligated to purchase land for the Last School within five (5) years of the time that NLF advances the funds called for under this subparagraph, then NLF shall advance additional funds to the District equal to the construction cost of the Last School plus the District's actual out-of-pocket purchase price of the land . This amount shall be multiplied by the ratio determined by dividing the number of NLF Students, including Castaic NLF Students to be housed, by the number of students that the Last School will be able to house if the Last School were to operate on a multi-track, year round schedule. This amount shall not exceed the Maximum Construction Cost, less the amount of funds previously advanced for the Last School. The District shall reimburse NLF for the funds advanced for the purchase of the land for the Last School if the District later receives funds for the purchase of the land from any State or federal agency. NLF shall have no obligation to advance additional funds for the construction cost or the purchase of the land for the Last School if the District does not become obligated to purchase the

land within five (5) years of the time that NLF advances the funds called for under this subparagraph.

c. If the District determines that the total number of NLF Students, including Castaic NLF Students, generated by the NLF Property will be greater than three thousand seven hundred twenty (3,720), i.e. the number of students that would be in four (4) New Elementary Schools, then District shall notify NLF at such time. Beginning at such time that there are three thousand seven hundred twenty-one (3,721) NLF Students, including Castaic NLF Students, in four (4) New Elementary Schools, then NLF shall be required to pay a mitigation fee to District for each single family and multi-family dwelling unit at the time of issuance of a building permit for each such unit. The mitigation fee shall be calculated by multiplying the student generation rate ("SGR") of a single family and/or multi-family dwelling unit times the Maximum Construction cost of a New Elementary School and the cost of land acquisition of ten (10) net acres, at the then appraised value and dividing that amount by nine hundred thirty (930) students. The SGRs shall be calculated by dividing the actual total number of District students from each of the two types of dwelling units by the actual total number of the respective type of dwelling units within the District.

14. The District shall use its best efforts to maximize its eligibility to obtain funding for each New Elementary School and each New Elementary School Site from any State or federal agency and shall take all reasonable efforts to obtain such funding. Toward this end, the District and NLF may, upon NLF's request, revise this Agreement to provide a different procedure, including design/build and Public/Private Partnership concepts which will increase the opportunity to obtain funding from any State or federal agency as long as there is no increased cost to either the District or NLF. The District shall, in any event, use its best efforts to ensure that NLF receives any funds received from any State or federal agency in connection with the acquisition of a New Elementary School Site or the construction of a New Elementary School. The District shall be entitled to retain funds received from any State or federal agency up to the cost of five (5) permanent relocatable classrooms for each New Elementary School. If the law is changed to allow local bond issues to be approved by a majority of the voters, the District shall use its best efforts to put a local bond issue on the ballot and have it approved. District shall not be obligated to put a local bond issue on the ballot in those areas of the District in which a Community Facilities District (Mello-Roos) has been or will be established to fund School Facilities. If such a local bond issue passes, then NLF shall be reimbursed for the appraised value of the New Elementary School Sites before the District retains funds received from the State or any federal agency for permanent relocatable classrooms.

15. The District shall provide the County of Los Angeles with information for the County's Development Monitoring System based on a capacity of nine hundred thirty (930) students for each New Elementary School.

16. To the extent that the dwelling units in Tentative Tract Maps of the County of Los Angeles designated as Tentative Tract Map Nos. 46389-07, 46389-08, 46389-09, 46389-10, 46389-11, 46389-12, 46389-13 and 52206, designated in Exhibit "A" to this Agreement, are constructed and pay school fees or other amounts pursuant to the Joint Valley-Wide Agreement to District for School Facilities, the District shall credit against the first Construction Draw for any New Elementary School such school fees or other amounts received by District pursuant to any Joint Valley-Wide Agreement entered into within the District. Such amounts may be used for architectural and additional costs preliminary to commencement of construction of the First New Elementary School.

17. Provided, NLF is not in default hereunder, the District shall not, under any circumstances:

a. Exercise any power or authority under current or future law without the consent of NLF to levy or impose an exaction of land, goods, money or services, whether denominated a fee, charge, dedication, or tax, against any development of the NLF Property except as to any District-wide general tax, special tax, or assessment for School Facilities;

b. Require, request, or cooperate with the County of Los Angeles, the City of Santa Clarita, or any other governmental entity to exercise its power or authority to levy or impose an exaction of land, goods, money, or services, whether denominated a fee, charge, dedication, or tax as to the NLF Property, for the benefit of the District;

c. Oppose the development of the NLF Property, any governmental approval, whether legislative or administrative, of these projects, or any change in any governmental approval of these projects on any basis whatsoever; or

d. Sponsor, or require the formation of, a Communities Facilities District which includes the NLF Property, except on a District-wide basis, without the express, written consent of NLF which consent may be given or withheld in NLF's sole discretion. The District shall not unreasonably refuse to act as sponsor for a Community Facilities District if requested to do so by NLF.

18. The funds and land to be provided to the District by NLF pursuant to the terms of this Agreement constitute the entire extent of NLF's obligation to provide School Facilities for development of the NLF Property. The District shall not require or accept any fees, except as provided for in Paragraph 16 above, in connection with the development of the NLF Property which might otherwise be available to it under current or future State law, the Joint Valley-Wide ~~Joint School Fee Resolution~~ AGREEMENT (which the District is no longer a party to), or by any other means. The District shall inform the William S. Hart Union High School District that the amount of any such fees that would be otherwise available to the District shall not be collected.

19. The District shall provide written certification upon written request from NLF that adequate School Facilities for the District's K-6 needs either exist, or that the Financing Schedule and the Financing Plan provided by this Agreement guarantee their availability as needed, to house NLF Students from the NLF Property. This written certification shall be given to the County of Los Angeles, the City of Santa Clarita, or any other governmental entity which may have development approval authority over the NLF Property as requested by NLF.

20. Provided NLF is not in default under this Agreement, no development, change of development, governmental approval, nor change in any governmental approval of the NLF Property shall constitute the basis for any change or termination of this Agreement because this Agreement provides for the complete mitigation of all impacts, direct and cumulative, of the NLF Property on the District's ability to provide adequate educational opportunities to every student in the District.

21. The District, immediately upon request by NLF, shall provide any written certification required to obtain building permits or other development approvals for development of the NLF Property. The written certifications shall be provided for whatever number of residential dwelling units or commercial or industrial buildings are requested by NLF at any time.

22. NLF shall have the right, in its sole discretion, to sell or encumber the NLF Property, improved or unimproved and in whole or in part, by any deed, mortgage, deed of trust, or other security device. No sale, transfer, or encumbrance of the NLF Property shall affect NLF's obligations under this Agreement. Neither this Agreement nor any breach of this Agreement shall defeat, invalidate, diminish, or impair the lien or priority of any deed, mortgage, deed of trust, or other security device.

23. The District and NLF, within thirty (30) calendar days of the written request, shall perform any acts and prepare, sign, deliver, file, and record any documents reasonably required to obtain the goals, and to satisfy the conditions, contained in this Agreement. This includes, but is not limited to, providing the requesting party with a written statement certifying that:

a. This Agreement is unmodified and in full force and effect or, if there have been modifications, that this Agreement, as modified, is in full force and effect, stating the date and nature of any modifications; and

b. There are no current uncured defaults under this Agreement or, if there are any, the dates and natures of the defaults.

24. Any District Notice, request for a Construction Draw or other document which would impose a duty on NLF or change the extent of NLF's obligations under this Agreement shall be accompanied by reasonable supporting documentation at the time that it is provided to NLF by the District.

25. This Agreement is entered into solely for the benefit of the District and NLF and their successors, transferees, and assigns. Other than the District and NLF and their successors, transferees and assigns, no third person shall be entitled, directly or indirectly, to base any claim or to have any right arising from, or related to, this Agreement.

26. This Agreement contains the entire agreement and understanding concerning the funding of School Facilities to house NLF Students and except as to the portion of the NLF Property described in Paragraph 16 of this Agreement supersedes and replaces all prior negotiations and reposed agreements, written or oral. The District and NLF acknowledge that neither the other party nor its agents or attorneys have made any promise, representation, or warranty whatsoever, express or implied, not contained herein to induce the execution of this Agreement and acknowledges that this Agreement has not been executed in reliance upon any promise, representation, or warranty not contained herein.

27. This Agreement may not be amended except in writing and signed by the District and NLF.

28. The District and NLF acknowledge that each has conducted an independent investigation of the facts concerning the development of the NLF Property, the impact that NLF Students will have on the District's educational facilities, and the costs of housing NLF Students.

29. The District and NLF desire to resolve any disputes as to the meaning of any portion of this Agreement or the rights or obligations of the District or NLF under it as quickly as possible. Therefore any such disputes shall be resolved by binding arbitration conducted by a mutually agreed upon retired judge of the Los Angeles Superior Court. If the District and NLF are unable to agree on the arbitrator within thirty (30) calendar days of the receipt of a request for arbitration, they shall request that the presiding judge of the Los Angeles Superior Court designate one. The District and NLF shall each pay half of the cost of the arbitration and each shall be responsible for its own costs as to any such arbitration.

30. Except as provided in paragraph 29, if it becomes necessary to enforce any of the terms of this Agreement, the prevailing party shall be entitled to reasonable attorneys' fees and other costs of litigation in addition to any other relief to which it may be entitled.

31. In interpreting this Agreement, it shall be deemed that it was prepared by the parties jointly and no ambiguity shall be resolved against either party on the premise that it or its attorneys was responsible for drafting this Agreement or any provision hereof.

32. Each individual signing this Agreement warrants and represents that he or she has been authorized by appropriate action of the party which he or she represents to enter into this Agreement on behalf of the party.

33. All notices, demands, and communications between the District and NLF shall be given by personal delivery, registered or certified mail, postage prepaid, return receipt requested, Federal Express or other reliable private express delivery, or by facsimile transmission. Such notices, demands, or communications shall be deemed received upon delivery if personally served or sent by facsimile or after three business days if given by other approved means as specified above. Notices, demands, and communications shall be sent:

To the District:

Saugus Union School District
24930 Avenue Stanford
Santa Clarita, CA 91355
Fax No.: (805) 295-7525

With a copy to:

Alexander Bowie, Esq.
BOWIE, ARNESON, KADI, WILES & GIANNONE
4920 Campus Drive, Suite A
Newport Beach, CA 92660
Fax No.: (714) 851-2014

To NLF:

The Newhall Land and Farming Company
Attention: President
23823 Valencia Blvd.
Valencia, CA 91355
Fax No.: (805) 255-3960

With a copy to:

Steven D. Zimmer
RUPP, HOLMBERG & ZIMMER
P. O. Box 1426
Oxnard, CA 93032
Fax No.: (805) 385-8891

The foregoing names, addresses and fax numbers may be changed at any time by a written notice given as provided above.

34. This Agreement and all rights and obligations arising out of it shall be construed in accordance with the laws of the State of California.

35. Any litigation arising out of this Agreement shall be conducted only in Los Angeles County, California.

36. This Agreement may be signed in one or more counterparts at which, taken together, shall constitute one original documents.

37. Recitals A through J are true and correct and are hereby incorporated.

38. The terms and conditions of this Agreement shall be incorporated in every environmental impact report, environmental monitoring program, general plan amendment, specific plan, and tentative subdivision map approval given by Los Angeles County for NLF Property .

DATED: February 18, 1997

BOARD OF TRUSTEES OF THE SAUGUS UNION SCHOOL DISTRICT

By: _____
PRESIDENT OF THE BOARD OF TRUSTEES OF THE SAUGUS UNION SCHOOL DISTRICT

ATTEST:

_____
CLERK OF THE BOARD OF TRUSTEES OF THE SAUGUS UNION SCHOOL DISTRICT

Newhall/Saugus Union School District

DATED: February 18, 1997

THE NEWHALL LAND AND FARMING COMPANY (A California Limited Partnership)

By: NEWHALL MANAGEMENT LIMITED PARTNERSHIP

Managing Partner

By: NEWHALL MANAGEMENT CORPORATION

Managing General Partner

By: _____
Its: President

By: _____
Its: SR. V.P.

APPROVED AS TO FORM: BOWIE, ARNESON, KADI, WILES & GIANNONE

By: _____
Alexander Bowie
Attorneys for THE SAUGUS UNION SCHOOL DISTRICT

RUPP, HOLMBERG& ZIMMER

By: _____
Steven D. Zimmer
Attorneys for THE NEWHALL LAND AND FARMING COMPANY

Exhibit B

Excluded Areas

Northbridge

MAP 1		MAP 2	MAP 3
TM44481	TM44488	TM44689	TM44695
TM44482	TM44489	TM44690	TM44696
TM44483	TM44490	TM44691	TM44697
TM44484	TM44491	TM44692	TM44698
TM44485	TM44687	TM44693	TM44699
TM44486	TM44688	TM44694	TM44821
TM44487			TM44823
			TM44823-01
			TM44848
			TM44849
			TM44850
			TM44851

Northpark I and II

TM45440
TM45440-02
TM46389-01
TM46389-02
TM46389-03
TM46389-04
TM46389-05
TM46389-06
TM51874
TM51875

School Facilities Funding Agreement Between
The William S. Hart Union High School District and
The Newhall Land and Farming Company

SCHOOL FACILITIES FUNDING AGREEMENT BETWEEN

THE WILLIAM S. HART UNION HIGH SCHOOL DISTRICT AND

THE NEWHALL LAND AND FARMING COMPANY

This School Facilities Funding Agreement ("Agreement") is made as of Dec. 16, 1997, between the WILLIAM S. HART UNION HIGH SCHOOL DISTRICT ("Hart"), a school district organized and existing under the laws of the State of California, on the one hand, and THE NEWHALL LAND AND FARMING COMPANY ("Newhall"), a California limited partnership, on the other hand, with respect to the following facts:

RECITALS:

A. Newhall is the owner of the following projects located within Hart's district boundaries:

1. Vesting Tentative Tract Map No. 51931, currently pending before the City of Santa Clarita ("City") ("North Valencia Annexation Project");

2. Vesting Tentative Tract Map No. 48202, currently pending before the County of Los Angeles ("County") ("Decoro Highlands Project");

3. Tentative Tract Map Nos. 46389-07 through -16 inclusive, pursuant to a parent map approved by the County on January 3, 1996 ("North Park Project"); and

4. Tentative Tract Map No. 44374, approved by the City on February 4, 1997 ("Woodlands Project");

collectively referred to herein as the "Projects" or, individually, a "Project".

The Projects are being developed or are planned for development by Newhall or, after sale, by one or more merchant builders.

B. Newhall is the owner also of an approximately thirty-four and two-tenths (34.2) acre unimproved site, located at the northwest corner of Newhall Ranch Road and McBean

Parkway, as generally described in Exhibit "A" attached hereto and incorporated herein ("Newhall Ranch Road/McBean Site"). For purposes of this Agreement, the Newhall Ranch Road/McBean Site is divided for reference into two (2) separate parcels which are: a portion of a proposed junior high school site of twenty (20) acres ("Parcel A"); and an approximately fourteen and two-tenths (14.2) acre park site ("Parcel B") to be dedicated to the City, subject to a deed restriction providing that the conveyance of Parcel B is conditioned upon the City concurrently conveying five (5) acres of Parcel B ("Parcel C") to Hart, reserving to the City a perpetual easement for purposes of park and recreation, all as generally described in Exhibit "A." Exhibit "A" is intended only to generally describe such property. The exact locations, boundaries, and sizes of Parcel A, Parcel B and Parcel C shall be formally depicted on a separate Exhibit "B" which will be incorporated into the Agreement by amendment subsequent to execution of this Agreement. Newhall is willing to consent to annex the Newhall Ranch Road/McBean Site to the City.

C. Newhall and the County are party to the North River Park and Trail Agreement, entered into on June 2, 1992, providing a master plan for parks in the approximately two thousand three hundred (2,300) acre North River Community as defined in that agreement ("County Parks Agreement"). Pursuant to Section 1.B of the County Parks Agreement, Newhall is obligated to dedicate approximately twenty (20) acres of park area within Tentative Tract No. 44831 and Tentative Tract 45440, respectively, in some instances referred to as Duplex I and Duplex II. Newhall desires to satisfy a portion of its obligations to the County as set forth in the County Parks Agreement, by conveying Parcel B to the City.

D. Hart and Newhall recognize that the planned development of residential units of the Projects will generate additional grades 7 through 12 students ("Project Students") within Hart which will, in turn, require additional junior high and senior high school capacity. Newhall and Hart desire to enter into this Agreement for the purpose of setting forth Newhall's obligations to mitigate the impact of the development of the Projects on the school facilities of Hart, and the obligations of Hart relative to school facilities for the Project Students.

E. Performance by Newhall of the provisions set forth in this Agreement satisfy all of Newhall's obligations to Hart with respect to the impacts of the development of the Projects, and insure that, either individually or cumulatively with other development projects within Hart, the Projects will have no adverse impacts on Hart's ability to provide adequate school facilities for Project Students.

IN LIGHT OF THE FOREGOING FACTS, IT IS MUTUALLY AGREED THAT:

NEWHALL OBLIGATIONS

1. Newhall, on or before February 1, 1998, or such later date as the parties may agree, shall convey Parcel A to Hart in fee and Hart shall accept the conveyance of Parcel A from Newhall. Concurrent with the conveyance of Parcel A from Newhall to Hart, Newhall shall convey Parcel B to the City in fee, subject to a deed restriction providing that the conveyance is conditioned upon the City concurrently conveying in fee five (5) acres of Parcel B, previously defined herein as Parcel C, to Hart, reserving to the City a perpetual easement for purposes of park and recreation use which will be operated pursuant to a duly executed joint use agreement between Hart and the City. The form of the deeds for Parcel A to Hart, and Parcel B to the City are as set forth on Exhibits "C" and "D."

2. Newhall further, at its own expense, shall grade and improve Parcel A and Parcel C (collectively referred to as the "Proposed Junior High School Site"), to a construction ready condition consisting of a graded pad with dedicated and improved public roads and utilities, including storm drainage facilities, stubbed into the Proposed Junior High School Site, and with a cross-fall of no more than two percent (2%) and within one (1) foot of the elevation shown on grading plans to be approved by both parties ("Site Improvements"), all as generally provided for in the Applicant Handbook for the State School Building Lease Purchase Program promulgated by the Office of Public School Construction ("OPSC"). Newhall, subsequent to conveyance of Parcel A to Hart and the concurrent conveyance of Parcel C by the City to Hart, shall initiate and diligently pursue to completion the Site Improvements and shall make all reasonable efforts necessary to complete the Site Improvements by September 30, 1998, subject, however, to the provisions of Section 4, below.

3. If any one of the following events occurs prior to Newhall's conveyance of Parcel A to Hart and the conveyance of Parcel C by the City to Hart, Newhall shall, subject to the terms of this Agreement, identify and dedicate to Hart another mutually acceptable junior high school site, in the same general vicinity and of equivalent value, consisting of twenty (20) net usable acres, and identify and dedicate to the City a contiguous parcel consisting of a minimum of five (5) net usable acres, subject to a deed restriction as provided in Section 1 of this Agreement, instead of the dedication of Parcel A and Parcel B:

a. The State Department of Education fails to approve Parcel A for use as a junior high school site or to approve Parcel C for recreational, athletic field, open space, park, landscaping, parking, and like uses in conjunction with a school on the adjacent Parcel A;

b. After an environmental analysis conducted pursuant to the California Environmental Quality Act, Public Resources Code Section 21000 et seq., the Proposed Junior High School Site is deemed infeasible for purposes of school facilities;

c. After an environmental analysis conducted pursuant to Education Code Section 39001 et seq., Education Code Section 39101 et seq. and Title 5 of the California Code of Regulations, the Proposed Junior High School Site is deemed infeasible for purposes of school facilities; or

d. Hart fails to obtain the requisite local land use approvals or concurrence from the City or County pursuant to Government Code Section 65402 and Public Resources Code Section 21151.2 or the City or County disputes any action taken by Hart pursuant to Section 53094 of the Government Code.

4. Newhall shall deliver to Hart and its legal counsel, Bowie, Arneson, Kadi, Wiles & Giannone ("Legal Counsel") within twenty (20) calendar days after the opening of an escrow to consummate the transfer of Parcel A to Hart and Parcel B to the City, subject to the terms of this Agreement, a Preliminary Title Report covering Parcel A and Parcel B issued by Chicago

Title Insurance Company ("Title Insurer"), together with complete and legible copies of all underlying documents referred to in the Title Report as evidencing exceptions to title, and a complete map plotting all such exceptions and easements disclosed in the Title Report (collectively "PTR").

Hart shall have twenty (20) calendar days following receipt of the PTR within which to notify Newhall in writing of Hart's approval or disapproval of any exception to title disclosed in the PTR. In the event the PTR is supplemented ("Supplemental PTR"), Hart shall have twenty (20) calendar days after its receipt by Hart and Legal Counsel of such Supplemental PTR, and complete and legible copies of all additional documents described therein, and a plotting thereof, within which to approve or disapprove of any new matters disclosed in such Supplemental PTR.

Hart's failure to approve or disapprove of a matter by a writing delivered to Newhall within the time periods specified above shall be deemed to be Hart's disapproval of the PTR or Supplemental PTR, in which case all dates for performance of Newhall's obligations and duties under this Agreement shall be suspended and tolled for a period of time equal to the number of calendar days between the date that is twenty (20) days after the PTR or Supplemental PTR, as the case may be, is delivered to Hart and the date that Hart delivers to Newhall in writing specific disapproval or approval of title exceptions.

In the event Hart specifically disapproves a matter disclosed in the PTR or any Supplemental PTR, Newhall shall have twenty (20) calendar days from receipt of Hart's written notice of disapproval to inform Hart in writing whether Newhall will use its best efforts to remove such disapproved exception. In the event Newhall agrees that it shall use its best efforts to remove a disapproved exception prior to the conveyance of Parcel A to Hart and Parcel B to the City, such removal shall be a condition to the "Closing," as that term is defined in the escrow agreement, and the condition of title as disclosed in the PTR and Supplemental PTR otherwise shall be deemed to be approved by Hart. In the event Newhall gives notice that it will not cause the removal of a disapproved matter or fails to give timely notice of its election to correct a disapproved matter, and if Hart thereupon shall fail to waive its disapproval of the matter within twenty (20) calendar days after receipt of Newhall's written notice that it will not correct the

disapproved matter (or the expiration of Newhall's twenty (20) calendar day period for response to Hart's disapproval in the event Newhall has failed to make a timely response), then either Hart or Newhall may terminate this Agreement.

All matters shown in the PTR and any Supplemental PTR which are not disapproved by Hart (or as to which Hart waives its disapproval) or are otherwise approved by Hart prior to the conveyances of Parcel A and Parcel B shall be deemed to be "Permitted Exceptions." Newhall shall convey Parcel A to Hart in fee simple and Parcel B to the City in fee simple subject to a deed restriction providing that the conveyance is conditioned upon the City concurrently conveying Parcel C to Hart, excepting mineral and water rights, free and clear of all mortgages, liens, charges, encumbrances, encroachments, easements, conditions, exceptions and other defects of title, except for the Permitted Exceptions.

5. Newhall agrees to consent to and support annexation of Parcel A and Parcel B to the City. If the annexation is not completed, it shall not affect the terms of this Agreement. Hart as the owner of Parcel A and (when subsequently conveyed by the City) Parcel C agrees to affirmatively support the annexation of Parcel A and Parcel B to the City. All out-of-pocket costs of the annexation of Parcel A and Parcel B, if any, shall be borne or satisfied by Newhall and Hart in equal shares.

6. Newhall and Hart shall equally share in all costs of escrow; provided, however, that Hart's share of such closing costs shall not exceed one thousand five hundred dollars ($1,500.00) and any escrow costs in excess of three thousand dollars ($3,000.00) shall be the sole responsibility of Newhall.

HART OBLIGATIONS

7. In consideration of the dedications and other obligations of Newhall in the Agreement, Hart agrees that the Projects shall be deemed to have fully mitigated their impacts or to have fully satisfied their obligations or requirements for development, as to school facility construction pursuant to State School Facilities Act (Government Code sections 53080 et seq. and 65995 et seq.), the California Environmental Quality Act (Public Resources Code

section 21000 et seq.), the Planning and Zoning Law (Government Code sections 65000 et seq.), the Subdivision Map Act [Government Code section 66410], the County general plan (including without limitation the County Development Monitoring System ("DMS")) and any other applicable County plans, ordinances, or regulations, as well as the City general plan and any other applicable City plans, ordinances, or regulations, and any other law or policy which would otherwise require Newhall to pay fees or incur obligations with respect to Hart concerning the following specified dwelling units ("Dwelling Units") in the Projects, specifically as follows:

	Total	Single Family	Multi-Family
North Valencia Annexation (Lago de Valencia and South River)	2,000	750	1,250
Decoro Highlands	460	301	159
Woodlands	335	265	70
North Park III & IV/ (Tentative Tract 46389-07 through -16, inclusive)	240	240	———
	3,035	**1,556**	**1,479**

a. The location, number and types of units in each individual Project and the timing of development in the Projects are subject to change. In the event that one (1) or more of the Projects, as actually built, consists of more residential units in a given category (single family ("SF") or multi-family ("MF")) than specified above ("Additional Units"), Newhall may reallocate the herein specified Dwelling Unit credits among the above-described individual Projects as set forth in subsection 7(b) below. If the total number of Dwelling Units in the Projects exceeds the total credits provided under this Agreement ("Excess Units"), then Newhall shall pay mitigation payments to Hart in an amount to be determined by Newhall and Hart to reasonably mitigate the impacts of the Excess Units. If the parties cannot agree on the amount of reasonable mitigation, the dispute will be resolved pursuant to the provisions of Section 24 below.

b. In the event one (1) or more of the Projects as actually built consists of fewer Dwelling Units in a given category (i.e., SF or MF) than specified in this section, Newhall shall have the right to transfer credits for such unbuilt Dwelling Units to another

category (i.e., SF or MF) for that individual Project, to other Projects as specified in this Agreement or to other future residential developments of Newhall within the boundaries of Hart. The number of unbuilt Dwelling Units for which such credit will be given shall be based upon the difference between the total number of Dwelling Units per category (i.e., SF or MF) as specified in this section and the number of Dwelling Units actually built in the Projects. For purposes of such transfers of credits, each credit given for a SF Dwelling Unit shall be considered equivalent to 2.745 credit for MF Dwelling Units and each MF Dwelling Unit credit shall be equivalent to 0.364 SF Dwelling Unit credits.

8. Upon performance of Newhall's obligations as set forth in Sections 1-6 of this Agreement, Hart, for each residential unit in the Projects, shall provide any written certification required to obtain building permits or other development approvals from the County, the City, or any other governmental entity which requires such certification. The certification shall be in writing and shall be provided for whatever number of residential units are requested, as provided in this Agreement, by Newhall or any assignee of Newhall at any time.

9. Upon performance of Newhall's obligations as set forth in Sections 1-6, Hart shall, immediately upon request by Newhall or any of its assignees and without the payment of any fees whatsoever, provide any written certification required to obtain building permits or other development approvals for the construction of commercial/retail or industrial/business park buildings in the Projects to the County, the City, or any other governmental entity which requires such certification. The certification shall be in writing and shall be provided for whatever number of commercial or industrial buildings within the Projects are requested by Newhall or any of its assignees at any time.

STATE FUNDING PROVISIONS

10. Hart, if it has not already done so, shall submit to OPSC, within thirty (30) days of the signing of this Agreement, applications for State funding for the new junior high school to be constructed on the Proposed Junior High School Site ("New Junior High School"). In consideration of Newhall's obligations provided for in the Agreement, Hart shall take all reasonable steps to maximize its priorities for obtaining State and federal funding for school

facility construction necessary to accommodate Project Students. In particular, Hart under existing applicable law and procedures, shall maintain an active, up-to-date "Priority One" application with OPSC for the New Junior High School pursuant to the Leroy F. Greene State School Building Lease - Purchase law (Education Code Section 17700 et. seq.). Further, Hart shall obtain any interim or temporary school facilities, including, but not limited to, relocatable and portable classrooms in such manner so as not to jeopardize or reduce its State funding priority at any time. The costs of interim or temporary school facilities to house Project Students will be funded from Hart's new capital facilities construction account.

11. In the event Hart qualifies for and receives State funding for all or any portion of the construction costs of the New Junior High School and the first new senior high school, Hart shall credit Newhall for Newhall's pro-rata share of such State funding, which shall be 17.3% for the New Junior High School and 14.8% for the first new senior high school ("State Funding Credit"). Upon receipt of State funding by Hart, the amount of such State Funding Credit due to Newhall shall be increased annually on the anniversary date of the receipt of such funds by an amount equal to the annual percentage increase in the Marshall and Swift Class D Wood Frame Index. Newhall may apply such State Funding Credit to any future school facilities mitigation obligation owed to Hart.

12. If an agreement is reached by Newhall and Hart prior to July 1, 1999 concerning the mitigation of school facilities impacts on Hart for those residential development projects proposed by Newhall and which are the subject of current negotiation between Newhall and Hart, as described on Exhibit "E" attached hereto and incorporated herein, such agreement shall provide that Newhall, notwithstanding any other provision of the Agreement, shall not receive State Funding Credits for its pro-rata share of State funding for the New Junior High School and the first new senior high school.

HART COOPERATION

13. Upon performance of Newhall's obligations as set forth in Sections 1-6, Hart shall, within twenty (20) days of receipt of written request from Newhall, support, orally and in writing, any request for a land use approval, whether legislative or administrative, sought for the

development of any portion of the Projects from the County, the City, or any other governmental entity which has the right to grant such an approval.

14. Upon performance of Newhall's obligations as set forth in Sections 1-6, Hart shall thereafter, for purposes of state reporting or funding applications, reporting under the County DMS, comments on future Environmental Impact Reports, or any calculation of school capacity in any context, designate the capacity of the New Junior High School as one thousand two hundred (1200) students and designate the capacity of the first new senior high school as two thousand four hundred students (2400).

15. Upon satisfaction of Newhall's obligations herein, Hart shall not, under any circumstances:

a. Exercise any power or authority under current or future law to levy or impose an exaction of land, goods, money, or services, whether denominated a fee, charge, dedication, or tax, against any Project except for any general tax, special tax, or assessment for educational facilities levied against all of the land within Hart's boundaries or a school facilities improvement district ("SFID") to finance additional facilities at the New Junior High School provided that such SFID does not affect Hart's "Priority One" status;

b. Require, request, or cooperate with the County, the City, or any other governmental entity to exercise any power or authority to levy or impose an exaction of land, goods, money, or services, whether denominated a fee, charge, dedication, or tax, for Hart's benefit;

c. Oppose the development of any portion of the Projects or any governmental approval, whether legislative or administrative, or any change in any governmental approval on any basis whatsoever; or

d. Sponsor, or require the formation of, a Community Facilities District, except for one which includes all of the land within the boundaries of Hart, for any of the Projects without the express, written consent of Newhall which consent may be given or

withheld in Newhall's sole discretion. Hart shall not unreasonably refuse to act as a sponsor for a Community Facilities District or similar public financing procedure if requested to do so by Newhall.

e. Initiate, participate, cooperate with, or support any legal action brought to challenge governmental approvals of the Projects.

GENERAL PROVISIONS

16. No development, change of development, governmental approval, nor change in any governmental approval of any portion the Projects shall constitute the basis for any change or termination of this Agreement.

17. Newhall shall have the right, in its sole discretion, to sell or encumber the Projects, improved or unimproved and in whole or in part, by any deed, mortgage, deed of trust, or other security device. No sale, transfer, or encumbrance of any portion of the Projects shall affect Newhall's obligations under this Agreement. Neither this Agreement nor any breach of this Agreement shall defeat, invalidate, diminish, or impair the lien or priority of any deed, mortgage, deed of trust, or other security device.

18. Unless this Agreement provides to the contrary, Hart and Newhall shall, within twenty (20) days of receipt of a written request from the other party, perform any acts and prepare, sign, deliver, file and record any documents reasonably required to obtain the goals, and to satisfy the conditions, contained in this Agreement. This includes, but is not limited to, providing the requesting party with a written statement certifying that:

a. This Agreement is unmodified and in full force and effect, or, if there have been modifications, this Agreement, as modified, is in full force and effect, stating the date and nature of any modification; and

b. There are no current uncured defaults under this Agreement or, if there are any, the dates and nature of the defaults.

19. Newhall is acting as the master developer of the Projects and intends to sell portions of the Projects to builders who will construct and sell residential, commercial, and industrial buildings to the public. Newhall shall have the unconditional right to assign any right or obligation under this Agreement to anyone at any time. Whenever this Agreement provides Newhall with a right, that right may be exercised by an assignee of that right to the same extent that Newhall could have exercised that right. Newhall shall determine and advise Hart in writing as to the number of credits by housing product type assigned to any such assignee and the resulting remaining credits existing under this Agreement after such assignment. This shall occur prior to each assignment by Newhall under this Agreement. The assignment of any right or obligation under this Agreement shall be in writing and a copy of the assignment shall be provided to Hart. No such assignments shall relieve Newhall of any of its obligations under this Agreement without Hart's written consent which consent shall not unreasonably be withheld.

20. This Agreement is entered into solely for the benefit of Hart and Newhall and their successors, transferees, and assigns. Other than Hart and Newhall and their successors, transferees, and assigns, no third person shall be entitled, directly or indirectly, to base any claim or to have any right arising from, or related to, this Agreement.

21. This Agreement contains the entire agreement and understanding concerning the funding of school facilities to house Project Students and supersedes and replaces all prior negotiations and proposed agreements, written or oral with respect to the Projects. Hart and Newhall acknowledge that neither the other party nor its agents nor attorneys has made any promise, representation, or warranty whatsoever, express or implied, not contained herein to induce the execution of this Agreement and acknowledge that this Agreement has not been executed in reliance upon any promise, representation, or warranty not contained herein.

22. This Agreement may not be amended except by a writing signed by Hart and Newhall.

23. Hart and Newhall acknowledge that each has conducted an independent investigation of the facts concerning the development of the Projects, the impacts that Projects Students will have on Hart's educational facilities, and the costs of housing Project Students.

24. Hart and Newhall desire to resolve any disputes as to the meaning of any portion of this Agreement, the validity of any determination or calculation, or the rights or obligations of Hart or Newhall under it as quickly as possible. Therefore, except as provided in Section 25, any such disputes shall be resolved by binding arbitration conducted by a mutually agreed upon retired judge of the Los Angeles Superior Court. If Hart and Newhall are unable to agree on the arbitrator within twenty (20) days of the receipt of a request for arbitration, they shall request that the presiding judge of the Los Angeles Superior Court designate one. Hart and Newhall shall each pay one-half (½) the cost of the arbitration and each shall be responsible for its own attorneys' fees and costs as to any such arbitration.

25. Notwithstanding any other provision of this Agreement, either party shall be entitled to seek declaratory and injunctive relief in any court of jurisdiction to enforce the terms of this Agreement, or to enjoin the other party from an asserted breach thereof, pending arbitration as provided in Section 24, on a showing that the moving party would otherwise suffer irreparable harm.

26. If it becomes necessary to enforce any of the terms of this Agreement by actions as provided in Section 25, the prevailing party shall be entitled to reasonable attorneys' fees and other costs of litigation in addition to any other relief to which it may be entitled.

27. In interpreting this Agreement, it shall be deemed that it was prepared by the parties jointly and no ambiguity shall be resolved against either party on the premise that it or its attorneys was responsible for drafting this Agreement or any provision hereof.

28. Each individual signing this Agreement warrants and represents that he or she has been authorized by appropriate action of the party which he or she represents to enter into this Agreement on behalf of the party.

29. All notices, demands, and communications between Hart and Newhall shall be given by personal delivery; registered or certified mail, postage prepaid, return receipt requested; Federal Express or other reliable private express delivery; or by facsimile transmission. Such notices, demands, or communications shall be deemed received upon delivery if personally

served or sent by facsimile or after three (3) business days if given by other approved means as specified above. Notices, demands, and communications shall be sent:

To Hart:	William S. Hart Union High School District Attn: Superintendent 21515 Redview Drive Santa Clarita, CA 91350 Fax No.: (805) 254-8635
With a copy to:	Alexander Bowie, Esq. Bowie, Arneson, Kadi, Wiles & Giannone 4920 Campus Drive, Suite A Newport Beach, CA 92660 Fax No.: (714) 851-2014
To Newhall:	The Newhall Land and Farming Company Attn: President 23823 Valencia Boulevard Valencia, CA 91355 Fax No.: (805) 255-3960
With a copy to:	Robert I. McMurry, Esq. Nossaman, Guthner, Knox & Elliott, LLP 18101 Von Karman Avenue, Suite 1800 Irvine, CA 92612 Fax No.: (714) 833-7878

The foregoing names, addresses, and fax numbers may be changed at any time by a written notice given as provided above.

30. This Agreement and all rights and obligations arising out of it shall be construed in accordance with the laws of the State of California.

31. Any arbitration or litigation arising out of this Agreement shall be conducted only in Los Angeles County, California.

32. This Agreement may be signed in one or more counterparts which, taken together, shall constitute one original document.

33. Recitals A through E are true and correct and are hereby incorporated.

34. All Exhibits attached hereto are incorporated into this Agreement.

35. The terms of this Agreement shall be incorporated in every environmental impact report, environmental monitoring program, report provided to the County for inclusion in its DMS, general plan amendment, specific plan, and tentative subdivision map approval given by the County, the City, or any other governmental entity responsible for the approval of the development of the Projects.

DATED: Dec. 17, 1997

BOARD OF TRUSTEES OF THE
WILLIAM S. HART UNION HIGH
SCHOOL DISTRICT

By: _____

President of the Board of Trustees of the
WILLIAM S. HART UNION HIGH
SCHOOL DISTRICT

Attest:

_____

Superintendent
WILLIAM S. HART UNION HIGH
SCHOOL DISTRICT

DATED: Dec 16, 1997

THE NEWHALL LAND AND FARMING COMPANY (A California Limited Partnership)

By: NEWHALL MANAGEMENT LIMITED PARTNERSHIP
Managing General Partner

By: NEWHALL MANAGEMENT CORPORATION
Managing General Partner

By: _____
Its: President

By: _____
Its: Senior Vice President

APPROVED AS TO FORM:

BOWIE, ARNESON, KADI, WILES & GIANNONE

By: _____
ALEXANDER BOWIE, ESQ.
Attorneys for the WILLIAM S. HART UNION HIGH SCHOOL DISTRICT

NOSSAMAN, GUTHNER, KNOX & ELLIOTT, LLP

By: _____
ROBERT I. McMURRY
Attorneys for THE NEWHALL LAND AND FARMING COMPANY

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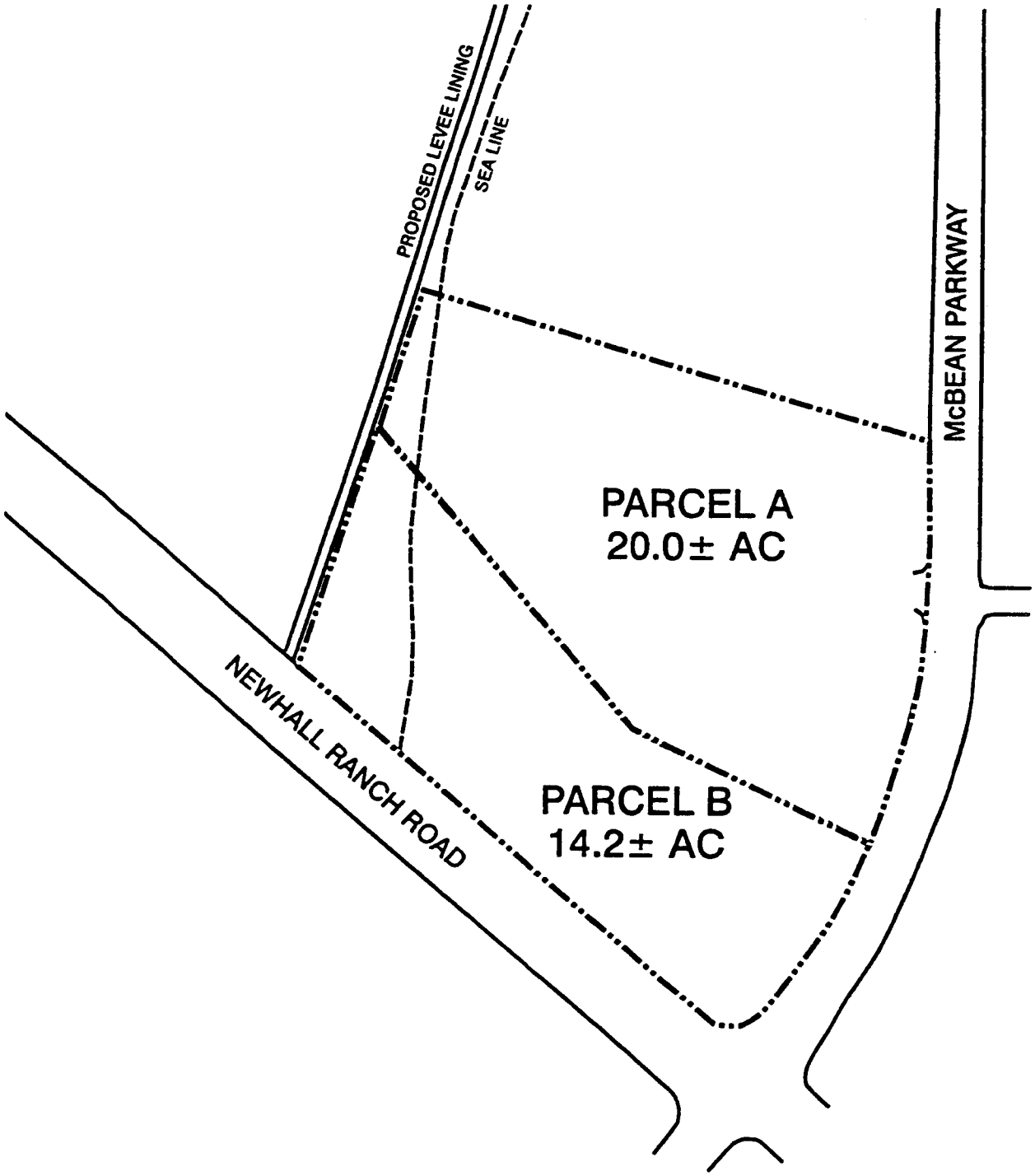
EXHIBIT A



Note: Exhibit A is intended only to generally describe such property.

Exhibit A

EXHIBIT B

EXHIBIT B
TO BE SUPPLIED LATER PURSUANT TO THE AGREEMENT.

EXHIBIT C

RECORDING REQUESTED BY AND
RETURN TO:

WILLIAM S. HART UNION HIGH SCHOOL
DISTRICT
21515 Redview Drive
Santa Clarita, CA 91350
Attn: Superintendent

(Space Above for Recorder's Use)

NO RECORDING FEE AND NO DOCUMENTARY
TRANSFER TAX DUE PURSUANT TO GOVERNMENT CODE
SECTION 6103 AND REVENUE AND TAX CODE SECTION 11922.

PARTNERSHIP GRANT DEED

FOR GOOD AND VALUABLE CONSIDERATION, the receipt and sufficiency of which is hereby acknowledged, THE NEWHALL LAND AND FARMING COMPANY (A CALIFORNIA LIMITED PARTNERSHIP), a limited partnership ("Grantor"), hereby grants to WILLIAM S. HART UNION HIGH SCHOOL DISTRICT, a school district organized and existing under the laws of the State of California ("Grantee"), that certain real property in the County of Los Angeles, State of California, more particularly described in Exhibit "A" attached hereto and incorporated herein by this reference ("Property").

EXCEPTING AND RESERVING UNTO GRANTOR, its successors and assigns, together with the right to grant and transfer all or a portion of the same, as follows:

A. All oil, oil rights, minerals, mineral rights, natural gas rights and other hydrocarbons by whatsoever name known, geothermal steam and all products derived from any of the foregoing, that may be within or under the parcel of Property hereinabove described, together with the perpetual right of drilling, mining, exploring and operating therefor and storing in and removing the same from said Property or any other property, including the right to whipstock or directionally drill and mine from properties other than those hereinabove described, oil or gas wells, tunnels and shafts into, through or across the subsurface of the Property hereinabove described, and to bottom such whipstocked or directionally drilled wells, tunnels and shafts under and beneath or beyond the exterior limits thereof, and to redrill, retunnel, equip, maintain, repair, deepen and operate any such wells or mines without, however, the right to drill, mine, store, explore or operate through the surface or the upper 500 feet of the subsurface of the Property hereinabove described.

B. The right to place on, under or across the Property conveyed hereby, transmission lines and other facilities for a community antenna television system and thereafter

to own and convey such lines and facilities and the right to enter upon said Property to service, maintain, repair, reconstruct and replace said lines and facilities; provided, however, that the exercise of such rights shall be as least intrusive upon Grantee's proposed development and use of the Property for school facilities purposes as practicable and not unreasonably interfere with Grantee's reasonable use and enjoyment of said Property conveyed hereby for school facilities purposes.

C. Any and all water, water rights or interests therein appurtenant or relating to the Property hereinabove described or owned or used by Grantor in connection with or with respect to said Property (no matter how acquired by Grantor), whether such water rights shall he riparian, overlying appropriative, littoral, percolating, prescriptive, adjudicated, statutory or contractual, together with the right and power to explore, drill, redrill, remove and store the same from or in the Property hereinabove described or to divert or otherwise utilize such water, rights or interests on any other property owned or leased by Grantor; but without, however, any right to enter upon the surface or upper fifty (50) feet of the subsurface of the Property described herein in the exercise of such rights.

D. Easements over the Property conveyed hereby for the construction, installation and maintenance of electric, gas, telephone, water, sewer and drainage facilities, provided that the construction and installation of such facilities shall not unreasonably interfere with Grantee's development and use of the Property conveyed hereby for school facilities purposes.

SUBJECT TO:

1. Nondelinquent general, special and supplemental real property taxes and assessments, if any, for the current fiscal year.

2. All other covenants, conditions, restrictions, reservations, rights, rights-of-way, dedications, offers of dedication, easements and other matters of record or otherwise known to Grantee as of the date hereof.

[signature page follows]

IN WITNESS WHEREOF, the Grantor has executed this Partnership Grant Deed as of the date written below.

Dated: _____

GRANTOR:

THE NEWHALL LAND AND FARMING COMPANY (A CALIFORNIA LIMITED PARTNERSHIP), a limited partnership

By: NEWHALL MANAGEMENT LIMITED PARTNERSHIP, a California limited partnership
Its managing general partner

By: NEWHALL MANAGEMENT CORPORATION, a California corporation
Its managing general partner

By: _____
Its: _____
By: _____
Its; _____

EXHIBIT "A"

LEGAL DESCRIPTION

STATE OF CALIFORNIA)
) ss.
COUNTY OF _____)

On _____ before me, _____, a Notary Public, personally appeared _____ personally known to me or proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

WITNESS my hand and official seal.

_____
Signature of Notary

[Seal]

EXHIBIT D

RECORDING REQUESTED BY AND
RETURN TO:

CITY OF SANTA CLARITA

Santa Clarita, CA 91350
Attn: _____

(Space Above for Recorder's Use)

NO RECORDING FEE AND NO DOCUMENTARY
TRANSFER TAX DUE PURSUANT TO GOVERNMENT CODE
SECTION 6103 AND REVENUE AND TAX CODE SECTION 11922.

PARTNERSHIP GRANT DEED

FOR GOOD AND VALUABLE CONSIDERATION, the receipt and sufficiency of which is hereby acknowledged, THE NEWHALL LAND AND FARMING COMPANY (A CALIFORNIA LIMITED PARTNERSHIP), a limited partnership ("Grantor"), hereby grants to THE CITY OF SANTA CLARITA, a municipal corporation ("Grantee"), that certain real property in the County of Los Angeles, State of California, more particularly described in Exhibit "A" attached hereto and incorporated herein by this reference ("Property").

EXCEPTING AND RESERVING UNTO GRANTOR, its successors and assigns, together with the right to grant and transfer all or a portion of the same, as follows:

A. All oil, oil rights, minerals, mineral rights, natural gas rights and other hydrocarbons by whatsoever name known, geothermal steam and all products derived from any of the foregoing, that may be within or under the parcel of Property hereinabove described, together with the perpetual right of drilling, mining, exploring and operating therefor and storing in and removing the same from said Property or any other property, including the right to whipstock or directionally drill and mine from properties other than those hereinabove described, oil or gas wells, tunnels and shafts into, through or across the subsurface of the Property hereinabove described, and to bottom such whipstocked or directionally drilled wells, tunnels and shafts under and beneath or beyond the exterior limits thereof, and to redrill, retunnel, equip, maintain, repair, deepen and operate any such wells or mines without, however, the right to drill, mine, store, explore or operate through the surface or the upper 500 feet of the subsurface of the Property hereinabove described.

B. The right to place on, under or across the Property conveyed hereby, transmission lines and other facilities for a community antenna television system and thereafter to own and convey such lines and facilities and the right to enter upon said Property to service, maintain, repair, reconstruct and replace said lines and facilities; provided, however, that the

exercise of such rights shall be as least intrusive upon Grantee's proposed development and use of the Property for park and recreation and school facility purposes as practicable and not unreasonably interfere with Grantee's reasonable use and enjoyment of said Property conveyed hereby for park and recreation and school facility purposes.

C. Any and all water, water rights or interests therein appurtenant or relating to the Property hereinabove described or owned or used by Grantor in connection with or with respect to said Property (no matter how acquired by Grantor), whether such water rights shall he riparian, overlying appropriative, littoral, percolating, prescriptive, adjudicated, statutory or contractual, together with the right and power to explore, drill, redrill, remove and store the same from or in the Property hereinabove described or to divert or otherwise utilize such water, rights or interests on any other property owned or leased by Grantor; but without, however, any right to enter upon the surface or upper fifty (50) feet of the subsurface of the Property described herein in the exercise of such rights.

D. Easements over the Property conveyed hereby for the construction, installation and maintenance of electric, gas, telephone, water, sewer and drainage facilities, provided that the construction and installation of such facilities shall not unreasonably interfere with Grantee's development and use of the Property conveyed hereby for park and recreation and school facility purposes.

E. A power of termination and right of re-entry in favor of the County of Los Angeles, should the Property ever cease to be used for park and recreation purposes as further provided herein.

SUBJECT TO:

1. Nondelinquent general, special and supplemental real property taxes and assessments, if any, for the current fiscal year.

2. All other covenants, conditions, restrictions, reservations, rights, rights-of-way, dedications, offers of dedication, easements and other matters of record or otherwise known to Grantee as of the date hereof.

The grant of the Property by Grantor to Grantee is further subject to the following express covenants, conditions and restrictions:

a. By acceptance of the grant of the Property pursuant to this Partnership Grant Deed, City covenants and agrees, on behalf of itself and its successive owners and assigns, that the Property is being granted to the City pursuant to the dedication requirements of Government Code section 66477 of the Subdivision Map Act, and shall be operated consistent with such dedication requirements and only for park and recreation purposes ("Conditions"), which Conditions shall inure to the benefit of and be enforceful by the County of Los Angeles and Grantor as against the City or any successive owners and assigns, the covenants and the Conditions as set forth herein being for the benefit of the County of Los Angeles and Grantor and all property owned by the County of Los Angeles and Grantor within the County of Los Angeles.

The Property shall only be used for park and recreation purposes, and shall be open and available without discrimination as to all residents of the incorporated and unincorporated territory of the County of Los Angeles without discrimination against, or preference, gratuity or bonus or other benefit given to residents of incorporated areas not equally given to residents of unincorporated territory ("Non-Discrimination Covenant"). If for any reason Grantee fails to operate the Property for park and recreational purposes pursuant to the Conditions and other restrictions set forth herein, then the County of Los Angeles shall have the power to terminate the interests of Grantee or any successor in interest thereto and a right to re-enter and take possession of the Property.

b. Concurrent with the recordation of this Partnership Grant Deed, Grantee shall convey to the William S. Hart Union High School District ("Hart") by Grant Deed an approximate five (5) acre parcel as more particularly shown and described on Exhibit "B", attached hereto and incorporated herein by this reference ("Five Acre Parcel"), but reserving therefrom unto Grantee a nonexclusive perpetual easement for park and recreation purposes, and to be operated pursuant to that certain Joint Use Agreement between Grantee and Hart dated _____, 199__ ("Joint Use Agreement"). The Grant Deed conveying the Five Acre Parcel shall also incorporate the Non-Discrimination Covenant set forth above, shall acknowledge that the Conditions are for the benefit of Grantee, Grantor and the County of Los Angeles, shall acknowledge the power of termination and right of re-entry in favor of the County of Los Angeles, and shall separately provide for a power of termination and right of re-entry by City if Hart ceases to use the Five Acre Parcel for park and recreation and school facility purposes.

[signature page follows]

IN WITNESS WHEREOF, the Grantor and Grantee have executed this Partnership Grant Deed as of the date written below.

Dated: _____ **GRANTOR:**

THE NEWHALL LAND AND FARMING COMPANY (A CALIFORNIA LIMITED PARTNERSHIP), a limited partnership

By: NEWHALL MANAGEMENT LIMITED PARTNERSHIP, a California limited partnership
Its managing general partner

By: NEWHALL MANAGEMENT CORPORATION, a California corporation
Its managing general partner

By: _____
Its: _____
By: _____
Its; _____

Dated: _____ **GRANTEE:**

CITY OF SANTA CLARITA, a California municipal corporation

By: _____
Mayor

ATTEST:

By: _____

APPROVED AS TO FORM:

By: _____

EXHIBIT "A"

LEGAL DESCRIPTION

EXHIBIT "B"

FIVE ACRE PARCEL

STATE OF CALIFORNIA)
) ss.
COUNTY OF _____)

On _____ before me, _____, a Notary Public, personally appeared _____ personally known to me or proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

WITNESS my hand and official seal.

_____
Signature of Notary

[Seal]

STATE OF CALIFORNIA)
) ss.
COUNTY OF _____)

On _____ before me, _____, a Notary Public, personally appeared _____ personally known to me or proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

WITNESS my hand and official seal.

_____
Signature of Notary

[Seal]

EXHIBIT E

Exhibit E

Residential development projects which are the subject of current negotiation and which are referred to in Paragraph 11 of the Agreement are those properties owned by The Newhall Land and Farming Company shown on the attached Exhibits E-1 (Valencia), E-2 (Newhall Ranch Specific Plan) and E-3 (Castaic area), not including the Projects as defined in the Agreement and the following excluded areas:

Excluded Areas:

Northbridge

TM44481
TM44482
TM44483
TM44484
TM44485
TM44486
TM44487
TM44488
TM44489
TM33390
TM44491
TM44687
TM44688
TM44689
TM44690
TM44691
TM44692
TM44693
TM44694
TM44695
TM44696
TM44697
TM44698
TM44699
TM44821
TM44823
TM44823-01
TM44848
TM44849
TM44850
TM44851

Northpark I and II

TM45440
TM45440-02
TM46389-01
TM46389-02
TM46389-03
TM46389-04
TM46389-05
TM46389-06
TM51874
TM51875

Other

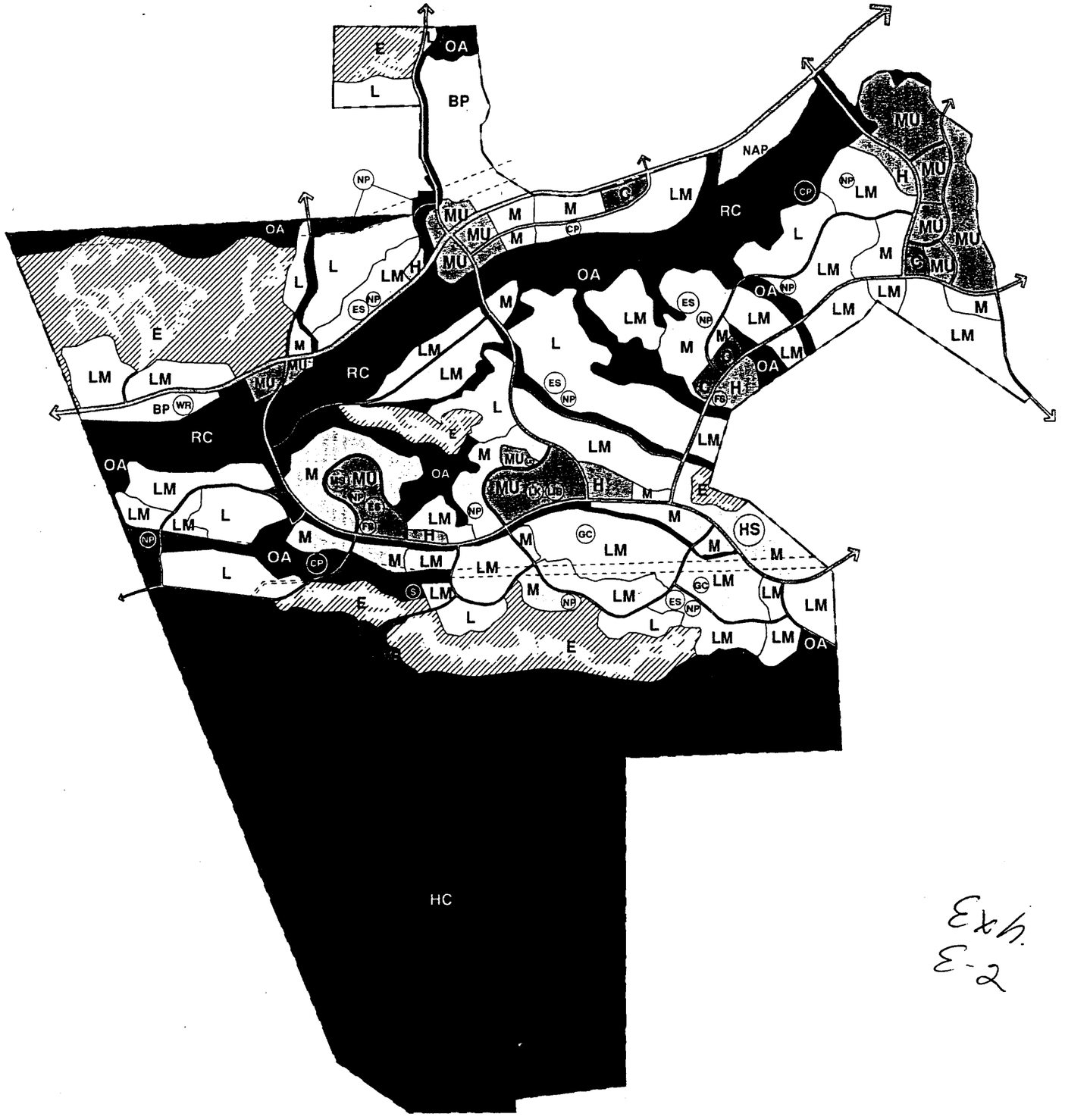
TM36668 (Hasley)
TM44800 (Hasley)
TM44800-01 (Hasley)
TM44800-02 (Hasley)
TM44800-03 (Hasley)
TM45084 (Hasley)
TM52206 (Avignon)

EXHIBIT E-3

"Castaic area"

NLF Common Name	APN
Teardrop parcel	2865-17-1
Van Gorder	2865-3-23
	2865-3-27
Castaic Lagoon	2865-3-11
Mesa	2865-4-1
	2865-5-12
	2865-5-13
	2865-5-14
	2865-7-8
	2865-7-9
	2865-11-15
Lelles	2865-5-23
	2865-4-14
	2865-4-15
	2865-4-16
	2865-4-17
Castaic Commercial	2865-36-29
	2865-36-33
	2865-36-34
	2865-36-35
	2865-36-36
	2865-36-37
	2865-36-38

The attached map shows their approximate locations.



Exh. E-2

NEWHALL RANCH™
SPECIFIC PLAN
Prepared For: Newhall Ranch Company

- E — ESTATE RESIDENTIAL
- L — LOW RESIDENTIAL
- LM — LOW-MEDIUM RESIDENTIAL
- M — MEDIUM RESIDENTIAL
- H — HIGH RESIDENTIAL
- MU — MIXED USE
- C — COMMERCIAL (RETAIL/OFFICE)
- BP — BUSINESS PARK
- VS — VISITOR SERVING
- OA — OPEN AREA
- RC — RIVER CORRIDOR
  SPECIAL MANAGEMENT AREA (SEA #23)
- HC — HIGH COUNTRY
  SPECIAL MANAGEMENT AREA (SEA #20)
- ROADS
- SCE/UTILITY EASEMENTS

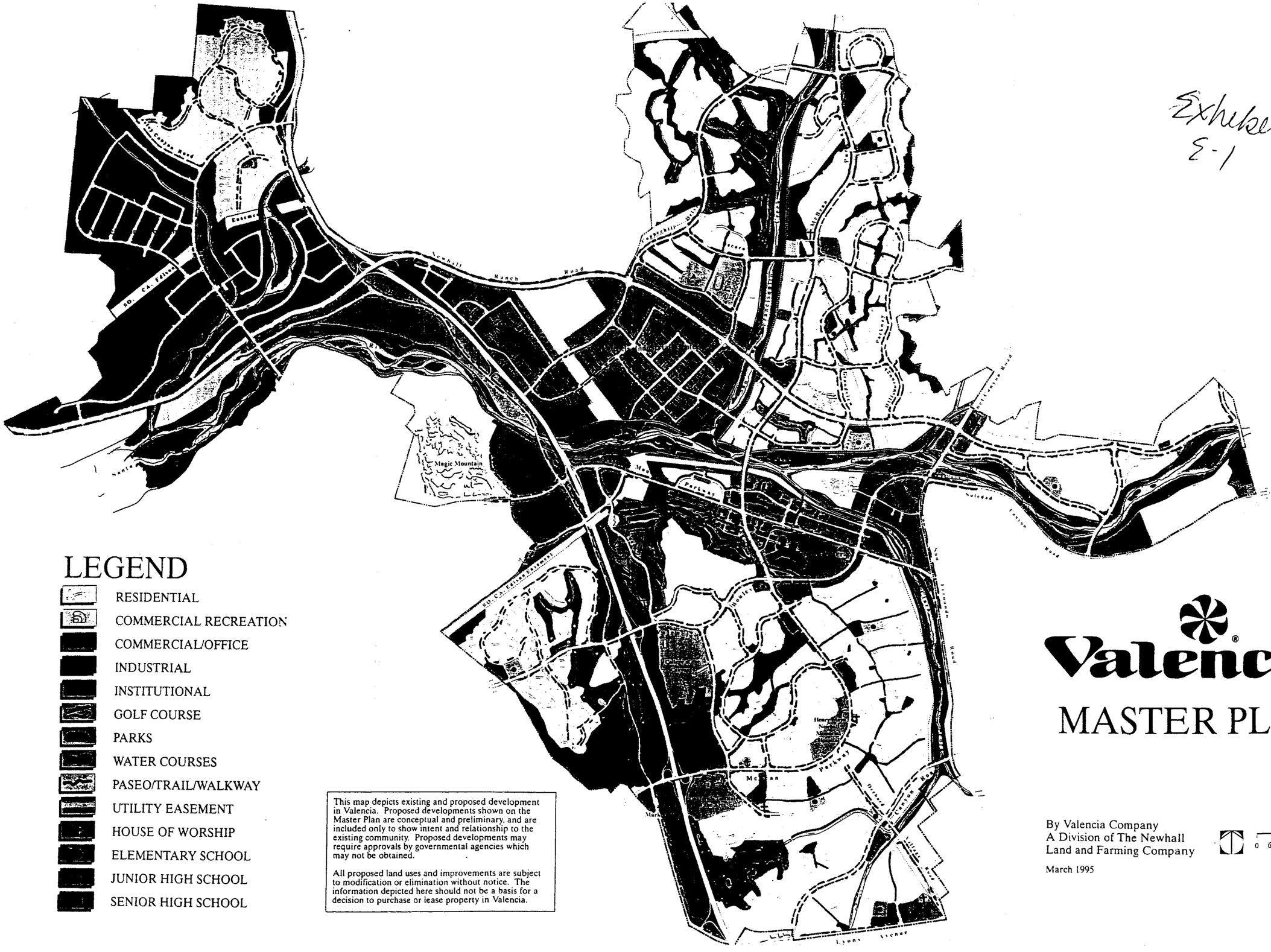
LAND USE OVERLAYS (POTENTIAL LOCATIONS):

- (CP) COMMUNITY PARK
- (NP) NEIGHBORHOOD PARK
- (ES) ELEMENTARY SCHOOL
- (MS) MIDDLE SCHOOL
- (HS) HIGH SCHOOL
- (GC) GOLF COURSE
- (LK) COMMUNITY LAKE
- (FS) FIRE STATION
- (S) ELECTRICAL SUBSTATION
- (LIB) LIBRARY
- (WR) WATER RECLAMATION PLANT

English 0 1000' 2000'
Metric 0 225m 450m 900m
NORTH
10 ACRES 40 ACRES
Computer Mapping by FORMA Systems

EXHIBIT 2.3-1
LAND USE PLAN

Exhibit E-1



LEGEND

- RESIDENTIAL
- COMMERCIAL RECREATION
- COMMERCIAL/OFFICE
- INDUSTRIAL
- INSTITUTIONAL
- GOLF COURSE
- PARKS
- WATER COURSES
- PASEO/TRAIL/WALKWAY
- UTILITY EASEMENT
- HOUSE OF WORSHIP
- ELEMENTARY SCHOOL
- JUNIOR HIGH SCHOOL
- SENIOR HIGH SCHOOL

This map depicts existing and proposed development in Valencia. Proposed developments shown on the Master Plan are conceptual and preliminary, and are included only to show intent and relationship to the existing community. Proposed developments may require approvals by governmental agencies which may not be obtained.

All proposed land uses and improvements are subject to modification or elimination without notice. The information depicted here should not be a basis for a decision to purchase or lease property in Valencia.

Valencia®

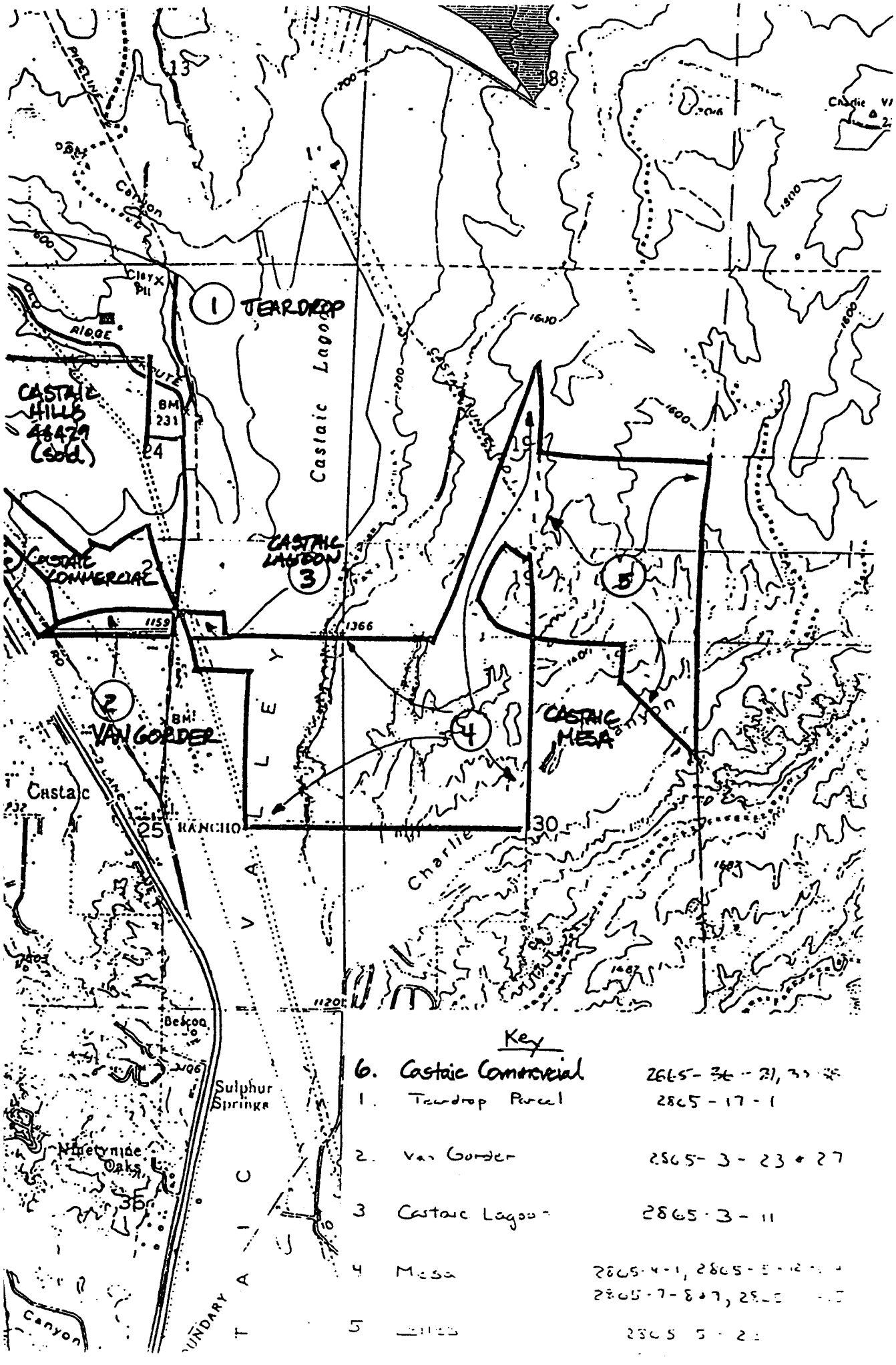
MASTER PLAN

By Valencia Company
A Division of The Newhall
Land and Farming Company

0 600 1200 2400

March 1995

EXHIBIT E-4


1 TEARDROP
2 VAN GORDER
3 CASTAIC LAGOON
4
5
CASTAIC COMMERCIAL
CASTAIC HILLS 48479 (sold)
CASTAIC MESA
Castaic Lagoon
RANCHO
Castaic
Charlie
Sulphur Springs
Newhall Ranch
Canyon
VALLEY
RIDGE
ROUTE
PIPELINE
CANYON
BM 231
1159
1366
1120
1600
1610
1800
1603
1402
2406
Key
6. Castaic Commercial 2865-36-21, 33
1. Teardrop Parcel 2865-17-1
2. Van Gorder 2865-3-23 & 27
3 Castaic Lagoon 2865-3-11
4 Mesa 2865-4-1, 2865-5-12, 2865-7-8 & 9, 2865-
5 Hills 2865-5-2

23920 Valencia Blvd.
Suite 300
Santa Clarita
California 91355-2196

Phone
(805) 259-2489
Fax
(805) 259-8125

City of
Santa Clarita

December 10, 1997

Mr. Robert Lee
Superintendent
William S. Hart Union High School District
21515 Redview Drive
Santa Clarita, CA 91350-2948

Re: North Valencia Annexation Project

Dear Mr. Lee:

As you know, the City is processing development approvals, including a General Plan Amendment, a Specific Plan, an Annexation and Development Agreement, a tentative tract map and oak tree permit for a proposed development known as the North Valencia Annexation Project ("Project"). The developer of the Project, the Newhall Land and Farming Company ("Newhall") has negotiated with the William S. Hart Union High School District ("Hart"), with the assistance of the City, a School Facilities Funding Agreement ("Agreement"). The Agreement has been negotiated between Newhall and Hart, with the assistance of the City, based upon certain understandings with respect to the intentions of the City to convey certain property to Hart after it has been dedicated to the City by Newhall in partial satisfaction of Newhall's park dedication requirements in connection with the Project, together with a portion of Newhall's park dedication requirements under the North River Park and Trail Agreement, a master plan for parks in the entire North River community.

The property proposed for conveyance by the City to Hart consists of a five (5) acre parcel, which is identified in the Agreement as "Parcel C" and is a portion of the fourteen and two-tenths (14.2) acre park site to be dedicated to the City, identified in the Agreement as "Parcel B," which is adjacent to the proposed junior high school site of twenty (20) acres, identified in the Agreement as "Parcel A."

It is the City's understanding that in the partial discharge of Newhall's obligations under the Agreement, Newhall will dedicate to the City for park purposes the fourteen and two-tenths (14.2) acre property, identified in the Agreement as "Parcel B," which will include the five (5) acre parcel, identified in the Agreement as "Parcel C." The dedication by Newhall to

PRINTED ON RECYCLED PAPER

the City of "Parcel B" in fee will be subject to a deed restriction providing that the conveyance is conditioned upon the City concurrently conveying the five (5) acre parcel, "Parcel C," to Hart in fee, reserving to the City a perpetual easement for park and recreation purposes, and that said "Parcel C" will be operated pursuant to a joint use agreement to be entered into between Hart and the City.

The foregoing conveyance by the City to Hart of the five (5) acre parcel, "Parcel C," in fee, reserving a perpetual easement for park and recreation purposes is consistent with the City's understanding and intention in connection with the proposed processing and approval of the Project and the implementation of the Agreement between Newhall and Hart. It is further the City's understanding that said "Parcel C" will be the subject matter of a joint use agreement to be entered into between the City and Hart subsequent to the conveyances mentioned above.

If the foregoing intentions and understandings of the City confirmed in this letter are consistent with the intentions and understandings of Hart, please confirm that by signing a copy of this letter and returning a copy to me.

If you have any further questions relative to this matter, please don't hesitate to contact me.

Sincerely,

George A. Caravalho
City Manager

cc: Carl K. Newton, Esq., City Attorney
Robert I. McMurry, Esq., of Nossaman, Guthner, Knox & Elliot, LLP
Alexander Bowie, Esq., of Bowie, Arneson, Kadi, Wiles & Giannone

Confirmed and Approved:

By_____
Robert Lee
Superintendent, William S. Hart Union High School District

APPROVED AS TO FORM:

NOSSAMAN, GUTHNER, KNOX & ELLIOT, LLP

By:_____
Robert I. McMurry
Attorneys for THE NEWHALL LAND AND FARMING COMPANY

BOWIE, ARNESON, KADI, WILES & GIANNONE

By:_____
Alexander Bowie
Attorneys for WILLIAM S. HART UNION HIGH SCHOOL DISTRICT

SCHOOL FACILITIES FUNDING AGREEMENT BETWEEN THE WILLIAM S. HART UNION HIGH SCHOOL DISTRICT AND THE NEWHALL LAND AND FARMING COMPANY

This School Facilities Funding Agreement ("Agreement") is made as of October ____, 1998, between the WILLIAM S. HART UNION HIGH SCHOOL DISTRICT ("Hart"), a school district organized and existing under the laws of the State of California, on the one hand, and THE NEWHALL LAND AND FARMING COMPANY ("Newhall"), a California limited partnership, on the other hand, with respect to the following facts:

RECITALS

A. Newhall is the owner of approximately seventeen thousand (17,000) acres of land, as shown on Exhibit "A", ("Newhall Land") located within Hart's boundaries some of which is located in the City of Santa Clarita ("City") and all of which is in the County of Los Angeles ("County"), which Newhall currently is in the process of master planning for development and obtaining land use Entitlements either by itself or by others.

B. The current plans for development of Newhall Land envision the construction of an estimated thirty five thousand (35,000) residential dwelling units ("DU") and an estimated twenty seven million (27,000,000) square feet of commercial and industrial development ("Commercial/Industrial Development") over approximately thirty (30) years.

C. The provisions herein are applicable to whatever development occurs on Newhall Land, including the proposed Westridge Project (Tentative Map 45433) of County and the Newhall Ranch Project as described in the Specific Plan ("Newhall Ranch Project Specific Plan") now being considered therefor by the County. Subject to the provisions of Section 15 of this Agreement, development which occurs on the Newhall Land in the projects listed on Exhibit "B" ("Excluded Development") are subject to the agreements or conditions of approval or

mitigation measures applicable thereto and are excluded from the obligations herein provided as to Fair Share School Impact Mitigation Payments as hereinafter defined.

D. Hart and Newhall recognize that the planned development of DU on Newhall Land will generate additional junior high and senior high school students (collectively, "Newhall Students") which in turn, will require the construction of new junior high schools ("JHS") and senior high schools ("SHS").

E. Historically, the State of California ("State") has provided a substantial portion of the funds necessary to build additional school facilities needed by school districts. However, over the last several years the amount of funds available from the State for the construction of new school facilities has been limited. The method of apportioning such funds to Hart and other school districts has been varied and uncertain, and it is unclear what amount of funds, if any, will be available to Hart in the future from the State for such purposes.

F. Hart does not have school facility capacity to accommodate the Newhall Students. Accordingly, Hart will require, as applicable, substantial additional grade 7-12 interim and permanent school facilities, including land, buildings, furnishings and equipment, as well as interim classrooms, permanent classrooms, central and administration facilities, including such facilities to accommodate students considered as being accommodated in lieu of using the school facilities of Hart on a year-round multi-track ("YRE") basis which presently is required to obtain funding for school facilities from the State ("School Facilities"). Newhall and Hart desire to enter into this Agreement to set forth Newhall's obligations to mitigate the development of Newhall Land as to Hart, and the respective obligations of Hart relating to the provision of additional School Facilities for Newhall Students.

G. Hart and Newhall agree that the present anticipated development of the Newhall Land will result in a need for an estimated three (3) additional JHS and two (2) additional SHS. If, and only if, funding from the State ("State Funding") is received by Hart for the cost of the additional School Facilities to accommodate Newhall Students, the parties intend that Newhall, as herein provided, shall receive reimbursement without interest to the extent provided in this Agreement to be paid only from the herein specified portion of State Funding for a portion of

Newhall's herein specified payment to Hart per DU ("Fair Share School Impact Mitigation Payments") as defined in Section 3 of this Agreement. Newhall hereby assumes the risk that State Funding will not be available to assist in funding School Facilities necessary to mitigate the impact of development of Newhall Land. In such case, Newhall will have contributed one hundred percent (100%) of the cost to mitigate the impact of development of the Newhall Land on the School Facilities of Hart. In consideration of Newhall's obligations provided for in this Agreement, to the extent herein specified, Hart will take all reasonable actions to seek to maximize its priorities for obtaining State Funding for needed School Facilities. If Hart determines that it would be advantageous to do so in order to obtain State Funding for additional School Facilities, Hart may request that Newhall advance funds to Hart but Newhall shall have no obligation to advance such funds.

H. Hart has determined that the Fair Share School Impact Mitigation Payments which Newhall will pay to Hart pursuant to this Agreement will allow Hart to fully mitigate any adverse impacts which might otherwise result from the development of Newhall Land. Hence, except as to Excluded Development, there will be no need to collect any fees from development of the Newhall Land which might otherwise be collected by Hart in connection with the construction of DU which meet the requirements of Government Code §65995.1 ("Age-Restricted DU") or Commercial/Industrial Development.

I. The procedure set forth in this Agreement will ensure that the development of Newhall Land, either individually or cumulatively with other projects within Hart's boundaries, will have no adverse impacts on Hart's ability to provide adequate School Facilities to all students of Hart.

IN LIGHT OF THE FOREGOING FACTS, IT IS MUTUALLY AGREED THAT:

1. ***Incorporation of Recitals.*** Recitals A through I are hereby incorporated in this Agreement.

2. ***Mitigation Requirements.*** The cost of Hart's School Facilities as of January 1, 1997, calculated on a per student basis, is estimated to be as set forth in Exhibit "C". The cost of Hart's School Facilities as of January 1, 1997, through December 31, 1998, as calculated on per DU basis, is set forth in Exhibit "D".

3. ***Mitigation Obligation.*** The Fair Share School Impact Mitigation Payment determined by the impact of future development on the School Facilities of Hart, calculated on a per DU basis as shown on Exhibit "D" as of January 1, 1997, in current dollars, are $5,600 for each such single-family detached DU, ("SFDU") and $2,100 for each multi-family attached DU ("MFDU") located within the boundaries of Hart but outside of the boundaries of the Castaic Union School District ("CUSD"). A SFDU is any DU which is a single family residence with no common walls. A MFDU (including apartments) is a DU in a building or buildings in which all of the DU have one or more supporting, above-ground vertical common walls establishing a substantial connectivity between two (2) or more DU, or a second unit ("Second Unit"). A Second Unit may be either detached or attached construction but shall be only those DUs specified and defined in the Newhall Ranch Project Specific Plan, as the proposed terms thereof exist on the date of this Agreement. All Second Units shall be located within the Newhall Ranch Project portion of the Newhall Land as shown in Exhibit "A." A Second Unit constructed on an attached basis to what otherwise would be a SFDU does not recategorize the basic SFDU as a MFDU by reason of a Second Unit being constructed on an attached basis as to what otherwise would be a SFDU. As to SFDU and MFDU, or a Second Unit, located in the CUSD portion of Hart where Hart provides educational facilities for grades 9-12, the Fair Share School Impact Mitigation Payment as of January 1, 1997, through December 31, 1998, shall be $3,640 for each SFDU and $1,360 for each MFDU and Second Unit.

As previously described herein, Hart intends to seek State Funding for future School Facilities that, prospectively, may allow repayment as a special fund obligation of Hart to Newhall only from such funding as is received by Hart and allocated to Newhall as herein provided as to a portion of the Fair Share School Impact Mitigation Payments required by reason of the residential development of Newhall Land. Newhall acknowledges that Hart has entered,

and will enter, into similar agreements with others ("Fair Share Mitigation Payment Participants"). Newhall acknowledges that there is no assurance that such State Funding will be received by Hart and available for allocation to Newhall and other Fair Share Mitigation Payment Participants as provided for in this Agreement. Accordingly, Newhall will be responsible for paying to Hart the entire amount of the Fair Share School Impact Mitigation Payment relative to development of the Newhall Land on the basis provided for in this Agreement. The Fair Share School Impact Mitigation Payment shall be paid to Hart prior to the time that an application for a building permit for the construction of a DU, other than an Age-Restricted DU, a DU in an Excluded Development or a DU subject to the provisions of the Annexation Agreement, as that term is defined in Section 6.c of this Agreement, is submitted to the County, the City, or any other governmental entity which has the authority to issue building permits for the development of Newhall Land.

4. ***Adjustments To Mitigation Obligation***. The Fair Share School Impact Mitigation Payment shall be reviewed and, if appropriate, increased or decreased by Hart, from the base date, at the times, and in accordance with the methodologies set forth in this Section 4. The adjustments shall be based on variations in student generation factors ("SGF"), land value of school sites ("Land Value Component") and costs of construction, furnishings, equipment and related costs ("Non-Land Value Component") as follows:

a. *Student Generation Factors.* As set forth in Exhibit "E", certain initial SGF have been used in determining the initial amounts of the Fair Share School Impact Mitigation Payment. The SGF to be used until January 1, 1999, shall be: 0.171 SHS students for each SFDU, 0.064 SHS students for each MFDU or Second Unit, 0.098 JHS students for each SFDU, and 0.037 JHS students for each MFDU or Second Unit. Effective each January 1, commencing January 1, 1999, as provided in this Section 4, the amount of Fair Share School Impact Mitigation Payments shall be increased or decreased based upon the recalculation of the SGF for Hart determined in accordance with the methodology set forth in Exhibit "E" and the other provisions of this Section 4 of this Agreement, all as set forth in Exhibit "F".

b. *Land Value Component.* A Land Value Component of Three Hundred Seventy-five Thousand Dollars ($375,000) per net usable acre, as of January 1, 1997, assuming a construction-ready condition, with dedicated and improved public roads and utilities, including storm drainage facilities, has been used in calculating the initial Fair Share School Impact Mitigation Payment as of January 1, 1997. The parties acknowledge this value per acre may vary as the Newhall Land is developed. Consequently, effective each January 1st, commencing January 1, 1999, the Fair Share School Impact Mitigation Payment shall be increased or decreased based upon the Land Value Component determined as of a valuation date of the preceding October 15th. This adjustment shall be determined by the appraised per acre value of the sites then under consideration by Hart for the next JHS site and the next SHS site ("Proposed Sites"). If Hart identifies more than one (1) JHS Proposed Site or more than one (1) SHS Proposed Site, the Land Value Components for the JHS and for the SHS shall be based on the average of the appraised per acre values of all JHS Proposed Sites and the average of the appraised per acre values of all SHS Proposed Sites.

Appraisals at Hart's cost payable from Fair Share School Impact Mitigation Payment or interest earned thereon shall be conducted by a member of the Appraisal Institute ("AI") which person shall be selected by Hart ("Hart Appraiser"). The Proposed Sites shall be appraised on the basis that each Proposed Site satisfies the site requirements set forth in Section 7.b. of this Agreement and shall be on the basis of the highest and best use of the Proposed Sites as determined by the Hart Appraiser. If Newhall does not concur as to the Hart Appraiser, or its opinion of value, Newhall may designate, at its own expense, an appraiser that is currently a member of the AI ("Developer Appraiser") to independently appraise the Proposed Sites and prepare a report establishing and supporting the Developer Appraiser's opinion of the fair market value of each of the Proposed Sites. If the opinions of value of the Hart Appraiser and the Developer Appraiser differ by ten percent (10%) or less from each other, the appraised fair market value of the Proposed Sites shall be deemed to be the average of the two (2) appraisals as to each of the Proposed Sites. If the opinions of value of the Hart Appraiser and the Developer Appraiser differ by more than ten percent (10%), the Hart Appraiser and the Developer Appraiser

shall be instructed to agree upon a third appraiser who shall be a member of the AI ("Supplemental Appraiser"). The cost of the Supplemental Appraiser shall be shared equally by Hart and Newhall. The Supplemental Appraiser also shall independently appraise the Proposed Sites and prepare a report establishing and supporting his or her opinion of the fair market value of each of the Proposed Sites. In that event, the appraised fair market value of each of the Proposed Sites shall be deemed to be the average of the two (2) appraisals having the closest opinions of value. In the event the appraisal of each of the Proposed Sites conducted by the Supplemental Appraiser equals the average of the Hart Appraiser and the Developer Appraiser, then the appraised fair market value of each of the Proposed Sites shall be deemed to be the value determined by the Supplemental Appraiser. In the event other Fair Share Mitigation Payment Participants also desire to designate a Developer Appraiser, such appraiser shall be the appraiser designated by a majority of Newhall and the other Fair Share Mitigation Payment Participants whose mitigation agreements contain a Land Value Component adjustment substantially similar to the provisions of this Agreement. Newhall agrees to bear its pro rata share of the cost of the Developer Appraiser and the Supplemental Appraiser designated by a majority of the parties executing such mitigation agreements with Hart. If the parties are unable to agree on the Developer Appraiser, Hart shall designate the Developer Appraiser from a list of appraisers submitted by Newhall and other Fair Share Mitigation Payment Participants.

c. *Non-Land Value Component.* Effective January 1, 1999, the Non-Land Value Component shall be increased or decreased based upon the percentage change in the Marshall & Swift Class D Wood Frame Index for the Western United States ("Index"), for the period of November 1, , 1996 to October 31, 1998. Each January 1st subsequent to January 1, 1999, the Non-Land Value Component shall be increased or decreased based on the percentage change in the Index for the prior twelve (12) month period ending on the preceding October 31st. If the Index is no longer published, an equivalent index shall be reasonably determined by Hart.

d. *Adjustment Process.* The annual adjustment of the Fair Share School Impact Mitigation Payment shall be accomplished in the manner set forth in Exhibit "F" and in accordance with the procedure set forth in this Section 4.d.

Not later than November 15th of each year, Hart shall prepare and submit to Newhall an analysis of the proposed Fair Share School Impact Mitigation Payment adjustments described in Subsections (a) through (c) above ("Annual Adjustment Analysis") and Hart shall provide Newhall with all supporting documentation used for the Annual Adjustment Analysis. Hart shall therein state the proposed revised Fair Share School Impact Mitigation Payment to be applicable for the next succeeding calendar year effective on the next January 1st. Hart shall meet with Newhall to review and discuss the Annual Adjustment Analysis not later than December 10th of each year. Hart shall take into account any information provided by Newhall with respect to the Annual Adjustment Analysis, either before or after completion of the Annual Adjustment Analysis, in determining adjustment of the Fair Share School Impact Mitigation Payment. Any disputes between Newhall and Hart with respect to the Annual Adjustment Analysis not resolved to each party's satisfaction shall be resolved in accordance with Section 24 of this Agreement, but only after either Hart or Newhall determine no other alternative is feasible. Pending such resolution, any revised Fair Share School Impact Mitigation Payments that becomes due may be paid under protest and, if any amount subsequently is determined to have been improperly applied by Hart, such additional amount shall be returned by Hart to Newhall with interest at the average rate paid by the Los Angeles County Local Agency Investment Fund accruing from the date of payment to the date of repayment by Hart to Newhall.

5. ***Notice of Annual Adjustment.*** No later than November 15th of each year, Hart shall forward to Newhall the Annual Adjustment Analysis provided for in Section 4.d of this Agreement. The Adjustment Analysis shall serve as notice from Hart as to any determination of the Student Generation Rate, Land Value Component, Non-Land Value Component, Fair Share School Impact Mitigation Payment, or any other determination or document which would impose a duty on Newhall or change the extent of Newhall's obligations under this Agreement.

6. ***Reimbursement From State Funding.*** Prior to any allocation of State Funding to Newhall as provided for in this Agreement, Hart shall have received State Funding for a JHS and a SHS. This amount as to such JHS and SHS shall be equal to at least one hundred percent (100%) of fifty percent (50%) of the cost of site acquisition and improvement, design inspection,

construction, furnishing and equipment of a JHS and of a SHS for which State Funding is received by Hart. State Funding presently is provided, when available, for site acquisition and planning ("Phase P") and construction ("Phase C") of School Facilities. If only Phase P or Phase C, or however such funding is subsequently designated, is funded by the State, but not both, as to a given JHS or SHS, to be allocated to Hart as herein provided the unfunded portion of Phase P or Phase C, or if a JHS or SHS is designed and constructed at a lesser capacity than designated in Exhibit "C", such unfunded minimum amount as to a JHS or SHS shall carry forward as to State Funding and be reserved for Hart pursuant to this Agreement to the next JHS or SHS for which State Funding is received by Hart, prior to any allocation of State Funding to Newhall. The total amount of State Funding for a JHS and for a SHS to be allocated pursuant to the terms of this Agreement shall be determined on the basis equal to what would be apportioned and funded by the State for the actual completed total cost of such JHS or SHS based on a JHS of 1,000 students and a SHS of 2,000 students on a traditional school year calendar. This amount is not intended to include any cost for accommodating students in lieu of operating such JHS or SHS on a YRE. Subject to the foregoing, State Funding for future JHS and SHS, shall be apportioned to Newhall as follows:

a. Hart shall keep a cumulative total, which shall be adjusted as set forth herein, of JHS and SHS Newhall Students resulting from DU constructed as the result of building permits issued after Hart has received the Fair Share School Mitigation Payments provided for in this Agreement beginning on the day after this Agreement becomes effective based on the SGF in effect at the time each Fair Share School Impact Mitigation Payment for a SFDU, MFDU or Second Unit is paid to Hart ("Newhall Reimbursable Students").

i. If the total number of Newhall Reimbursable Students and students generated by DU subject to agreements with Fair Share Mitigation Payment Participants for a new JHS or SHS, as the case may be, is less than the design capacity of such JHS or SHS herein assumed to be 1,200 for a JHS or 2,400 for a SHS ("Capacity"), Hart shall divide the number of Newhall Reimbursable Students by the Capacity of that school ("Newhall Reimbursement Fraction"). Hart shall then pay an amount equal to the Newhall Reimbursement Fraction times

the amount of State Funding received by Hart to Newhall within thirty (30) days of Hart's receipt of such State Funding. Upon payment, Hart shall reduce the number of JHS or SHS Newhall Reimbursable Students, as the case may be, by a number equal to the Capacity of the applicable JHS or SHS multiplied by the Newhall Reimbursement Fraction.

ii. If the total number of Newhall Reimbursable Students and students generated by DUs subject to agreements with Fair Share Mitigation Payment Participants ("Total Number of Reimbursable Students") for a New JHS or SHS, as the case may be, is equal to or exceeds the Capacity of the school, Hart shall divide the number of Newhall Reimbursable Students by the Total Number of Reimbursable Students ("Newhall Adjustment Fraction"). Hart shall then pay an amount equal to the Newhall Adjustment Fraction times the amount of State Funding received by Hart to Newhall within thirty (30) days of Hart's receipt of such State Funding. Upon payment, Hart shall reduce in its records the number of JHS or SHS Newhall Reimbursable Students, as the case may be, by a number equal to the Capacity of that school multiplied by the Newhall Adjustment Fraction.

b. If Hart has requested and received advanced funds from Newhall, Newhall shall designate those funds as advance payment of Fair Share School Impact Mitigation Payments for SFDU, MFDU or Second Unit as it determines in its sole discretion. The number of Newhall Reimbursable Students associated with the number and type of DU specified by Newhall shall be increased immediately upon receipt by Hart of the advanced funds and Newhall shall be credited as herein provided in Section 6c with having paid the Fair Share School Impact Mitigation Payments for the number and type of DU specified.

c. Hart has entered into a school facilities funding agreement with Newhall, dated December 16, 1997, a copy of which is attached as Exhibit "G", which governs the school impact mitigation measures required for land designated therein that is to be annexed to the City ("Annexation Agreement"). At the time that the Proposed Junior High School Site, as that term is defined in the Annexation Agreement, is transferred to Hart and all required improvements completed on a lien-free basis, Newhall shall specify the number and type of DU as to which it will be deemed to have paid the Fair Share School Impact Mitigation Payments. In determining

the number of Newhall Reimbursable Students, Hart shall apply the initial SGF set forth on Exhibit "E" to this Agreement and the SFDU or MFDU designated by Newhall at the time of such payment to Hart. The number of Newhall Reimbursable Students associated with the number and type of DU specified by Newhall shall be increased immediately upon receipt by Hart of the Proposed JHS Site provided for in the Annexation Agreement and Newhall shall be credited with having paid the Fair Share School Impact Mitigation Payments for the number and type of DU specified by Newhall.

d. Attached as Exhibit "H" are examples of some possible scenarios of the foregoing which are attached only as explanatory material and are not intended to and do not affect or change any of the provisions of this Section 6 of this Agreement.

7. ***New School Facilities.***

a. *School Size.* Each additional JHS will be considered to have been designed and constructed to accommodate approximately one thousand two hundred (1,200) students on a traditional, single track, nine month school schedule and each additional SHS will be considered to have been designed and constructed to accommodate approximately two thousand four hundred (2,400) students, on a traditional, single track, nine month school schedule.

b. *Site Requirements.* Each additional JHS will be built on a site containing approximately twenty five (25) net usable acres, and each additional SHS will be built on a site containing approximately forty five (45) net usable acres. Net useable acres shall be exclusive of slopes which exceed two percent (2%) assuming a construction-ready condition.

c. *Construction of New Schools.* Hart, subject to availability of funds for such purposes, will build as many additional JHS and SHS as are necessary to house Newhall Students. Hart will use its best efforts to locate only two (2) additional JHS and one (1) additional SHS on Newhall Land. Hart, on a best efforts basis, will seek to locate such additional JHS and SHS as shown on Exhibit "A." The precise location of such JHS and SHS to be built on Newhall Land will be mutually agreed upon between Hart and Newhall and acceptable to the State. In the absence of such mutual agreement, the precise location of such

JHS or SHS shall be determined by Hart subject to approval by the State. In the event Hart reasonably determines that additional JHS or SHS should be located on Newhall Land, it may acquire the sites for the additional schools either through negotiations or by means of an eminent domain action. Hart shall pay Newhall the fair market price for all school sites it acquires from Newhall except for the JHS site transferred to Hart pursuant to the Annexation Agreement as to which the fair market value has been agreed upon and the consideration therefor is as provided for in the Annexation Agreement.

8. ***Certification of Mitigation.***

a. Immediately upon receipt from Newhall or any of its assignees of the required school impact mitigation fee or mitigation payment in the required amount for each DU and Commercial/Industrial Development in an Excluded Development or the Fair Share School Impact Mitigation Payment for each DU subject to this Agreement, Hart shall provide any written certification required to obtain building permits or other approvals for the construction of DU from the County, the City, or any other governmental entity which requires such certification. The certification shall be in writing and shall be provided for whatever number of DU are requested and paid for by Newhall or by any assignee of Newhall at any time.

b. As to the Newhall Land, immediately upon request by Newhall or any of its assignees without the payment of any fees whatsoever, Hart shall provide any written certification required to obtain building permits or other development approvals for the construction of Age-Restricted DU, or Commercial/Industrial Development and the construction of DU subject to the Annexation Agreement specified by Newhall from the County, the City, or any other governmental entity which requires such certification. The certification shall be in writing and shall be provided for whatever number of Age-Restricted DU, or Commercial/Industrial Development and DU subject to the Annexation Agreement are requested by Newhall or any of its assignees at any time. The foregoing is not applicable to the Excluded Development portion of the Newhall Land which is subject to the obligations and requirements applicable thereto .

9. ***Maximization of Priorities to Receive State Funding.*** If it has not already done so, Hart shall submit applications for State Funding for a JHS and for a SHS to the Office of Public School Construction within thirty (30) days of the signing of this Agreement. Hart shall thereafter take all reasonable steps available to Hart to pursue and obtain State Funding and federal funding, if any, for a JHS and a SHS. Hart may pursue such funding on the basis of what is presently designated as Priority Two for one hundred percent (100%) funding or Priority One for fifty percent (50%) funding of State eligible area and costs of a JHS or SHS. Pending legislation may be enacted providing only for fifty percent (50%) of such funding except for greater amounts under specified circumstances. If Hart elects to not pursue the highest priority for the first JHS or the first SHS for State Funding and the greater amount based on what presently is a Priority Two or hardship basis is not received by Hart and the lesser amount, herein assumed fifty percent (50%), would have been received by Hart on the basis of a Priority One application, such amount, if not received, will be credited against and reduce the priority allocation of State Funding to Hart provided for in Section 6 of this Agreement. As to any subsequent JHS or SHS, Hart shall pursue the highest priority for State Funding unless otherwise agreed by the Parties. Neither Party shall unreasonably withhold such consent. Hart shall take no actions which would deny or delay obtaining State Funding as provided for in this Agreement. Provided Hart has the local matching funds or, as provided for herein, Newhall, in its sole discretion, has advanced the necessary funds, Hart, subject to the foregoing, shall maintain an active, up-to-date application for the first available State Funding. Hart shall pursue similar appropriate action if State law or policy changes in regard to future State Funding. Hart shall not acquire other chargeable space which substantially adversely affects its eligibility for future State Funding except as provided in this Agreement (i.e., facilities for students in lieu of YRE as referred to in Recital F). Newhall and Hart acknowledge that leases of portable classrooms for less than five (5) years prior to an application for State Funding are not existing school building capacity under Chapter 407 of the 1998 Statutes (Section 17071.30(a) of the Education Code) if existent and applicable to Hart at any point in time relevant to the Newhall Land. Further, Hart shall obtain any interim or temporary school facilities, including, but not limited to, relocatable

and portable, classrooms in such manner so as not to unreasonably reduce the number of unhoused students relative to Hart's eligibility for future State Funding. Except as set forth herein, this Agreement shall not in any manner be asserted by Newhall to interfere in any way with, or to limit, Hart's Board of Trustees in determining what educational and school facilities policies will best further the interests of Hart's students or the construction or operation of its educational facilities.

10. ***Support of Land Use Applications***. Hart shall, within ten (10) days of receipt of written request from Newhall as to adequacy of School Facilities for development of the Newhall Land, express, orally and in written form, its support for any request for a land use approval, whether legislative or administrative, sought for the development of any portion of Newhall Land from the County, the City, or any other governmental entity which has the right to grant such an approval. Such action by Hart shall relate only to the adequacy of school facilities for such development and not the desirability or undesirability of approval except as related to adequacy of School Facilities for such proposal.

11. ***Certification of Adequacy of Mitigation***. Hart shall provide written certification within ten (10) days of receipt of a written request from Newhall or any Newhall assignee that adequate educational facilities exist, or that the financing provided by this Agreement guarantees their availability as needed, to house Newhall Students. This written certification shall be given to the California Department of Real Estate, the County, the City, or any other governmental entity which may have development approval authority over any portion of Newhall Land. Each such certification shall be based on each JHS having the capacity to serve the needs of 1200 students and each SHS having the capacity to serve the needs of 2400 students.

12. ***Equal Treatment Provisions***. Not later than November 15th of each year, or upon Newhall's written request at any other time, Hart shall provide Newhall with copies of all mitigation agreements entered into with other developers or landowners that have not previously been provided to Newhall. Hart shall, at the same time, provide any analyses of such agreements prepared by Hart or its consultants and all other materials in Hart's possession reasonably

necessary for the evaluation of the economic terms of such agreements to the extent such documents are not subject to the attorney-client privilege.

If Hart enters into any such agreement which is more economically advantageous than this Agreement, as agreed upon by parties or as determined pursuant to Section 24 of this Agreement, this Agreement shall be modified to make the obligations of this Agreement consistent with, and no greater than, the obligation imposed by any such agreement. Any such modification shall not require an amendment to this Agreement but may be described in an addendum signed by Hart and Newhall. Any modification to the obligations imposed on Newhall by this Agreement shall be effective as of the date of Hart's approval of any such agreement and Newhall shall be entitled to a refund of the amount of the Fair Share School Impact Mitigation Payments in excess of the modified amount plus interest on the refunded amount at the average interest rate paid by the Los Angeles County Local Agency Investment Fund accruing from the date of each payment to the date of refund.

An agreement requiring a lesser mitigation payment per DU, but requiring other consideration of equal or greater value, such as land, shall not be considered a more economically advantageous agreement. A subsequent agreement shall not be deemed more economically advantageous if it is the result of a condition of approval imposed prior to the effective date of this Agreement which explicitly limits the amounts payable to Hart imposed by a prior action of a public agency (other than Hart) or due to a change in applicable law including but not by way of limitation Chapter 407 of the Statutes of 1998.

13. ***No Further Exactions***. Hart shall not, under any circumstances:

a. Exercise any power or authority under current of future law to levy or impose an exaction of land, goods, money, or services, whether denominated a fee, charge, dedication, or otherwise, against any development of Newhall Land;

b. Require, request, or cooperate with the County, the City, or any other governmental entity to exercise any power or authority to levy or impose an exaction of land, goods, money, or services, whether denominated a fee, charge, dedication, or otherwise, for Hart's benefit;

c. Oppose the development of any portion of Newhall Land or any governmental approval, whether legislative or administrative, or any change in any governmental approval on any basis whatsoever; or

d. Sponsor or require the formation of a Communities Facilities District ("CFD"), except for a CFD or multiple CFDs which together include all of the land within Hart's boundaries, for any of Newhall Land without the express, written consent of Newhall which consent may be given or withheld in Newhall's sole discretion. Hart shall not unreasonably refuse to act as a sponsor for a CFD or similar public financing procedure if requested to do so by Newhall. Hart may accomplish any general obligation bond election that it desires on a District-wide basis or by one or more school facilities improvement districts.

14. ***Adequacy of Newhall's Mitigation Obligation.*** The school fees and payments as well as the Fair Share School Impact Mitigation Payments to be provided to Hart by Newhall pursuant to the terms of this Agreement constitute the entire extent of Newhall's obligation to provide the funds necessary for Hart to obtain the School Facilities needed to house Newhall Students.

15. ***Changes in Excluded Developments.*** If the number or type of DU, other than Age-Restricted DU, in an Excluded Development is changed ("Changed Project") so that the total number of Newhall Students from a Changed Project is increased, the number of JHS and SHS students generated by the Excluded Development then under consideration, without taking into consideration the Changed Project, shall be determined using the then existing SGF ("Excluded Development Students"). Thereafter, the number of JHS and SHS students from the Changed Project shall be determined by using the then existing SGF ("Changed Project Students"). The difference shall be determined between the total number of Changed Project Students and the Excluded Development Students for both JHS students and SHS students ("Additional JHS Students" and "Additional SHS Students", collectively "Additional Students"). The cost of School Facilities for the Additional Students shall be determined as provided in Exhibit "D" adjusted as provided for in this Agreement. Such cost shall be apportioned proportionately to all DU in the Changed Project in addition to whatever obligation is otherwise

applicable to each such DU. Attached as Exhibit "I" are examples of some possible scenarios of the foregoing which are attached only as explanatory material and are not intended to and do not affect or change any provisions of this Section 15 of this Agreement.

16. ***Agreement Not Terminated By Change In Law.*** No development, change of development, governmental approval, nor change in any governmental approval of any portion of Newhall Land shall constitute the basis for any change or termination of this Agreement because this Agreement provides for the complete mitigation of all impacts, direct and cumulative, to the development of Newhall Land on Hart's ability to provide adequate educational opportunities to every student within Hart's boundaries. The provisions of this Agreement shall not be affected by any existing applicable law or subsequent legislation enacted by the State of California acting through the legislative or initiative process, or any subsequent judicial decisions relating to the matters provided for in this Agreement. The Fair Share School Impact Mitigation Payments provided for in this Agreement are hereby appropriated and dedicated to the costs related to future acquisition, construction and financing of the School Facilities and other such related costs of Hart for purposes of housing Newhall Students.

17. ***Transfer and Encumbrance.*** Newhall shall have the right, in its sole discretion, to sell or encumber Newhall Land, improved or unimproved and in whole or in part, by any deed, mortgage, deed of trust, or other security device. No sale, transfer, or encumbrance of any portion of Newhall Land shall affect Newhall's obligations under this Agreement. Neither this Agreement nor any breach of this Agreement shall defeat, invalidate, diminish, or impair the lien or priority of any deed, mortgage, deed of trust, or other security device.

18. ***Mutual Cooperation.*** Unless this Agreement provides to the contrary, Hart and Newhall shall, within ten (10) days of receipt of a written request from the other party, perform any acts and prepare, sign, deliver, file, and record any documents reasonably required to obtain the goals, and to satisfy the conditions, contained in this Agreement. This includes, but is not limited to, providing the requesting party with a written statement certifying that:

a. This Agreement is unmodified and in full force and effect, or, if there have been modifications, this Agreement, as modified, is in full force and effect, stating the date and nature of any modification; and

b. There are no current uncured defaults under this Agreement or, if there are any, the dates and natures of the defaults.

19. ***Assignability of Agreement.*** Newhall is acting as the master developer of Newhall Land and intends to sell portions of Newhall Land to builders who will construct and sell residential, commercial, and industrial buildings to the public. Newhall shall have the unconditional right to assign any right or obligation under this Agreement to anyone at any time which assignee shall proportionally assume all applicable provisions of this Agreement. Whenever this Agreement provides Newhall with a right, that right may be exercised by an assignee of that right to the same extent that Newhall could have exercised that right. The assignment of any right or obligation under this Agreement shall be in writing and a copy of the assignment shall be provided to Hart. No such assignment shall relieve Newhall of any of its obligations under this Agreement without Hart's written consent which consent shall not unreasonably be withheld.

20. ***No Third Party Beneficiaries.*** This Agreement is entered into solely for the benefit of Hart and Newhall and their successors, transferees, and assigns. Other than Hart and Newhall and their successors, transferees, and assigns, no third person shall be entitled, directly or indirectly, to base any claim or to have any right arising from, or related to, this Agreement.

21. ***Entire Agreement.*** Except as to the Excluded Development this Agreement contains the entire agreement and understanding concerning the funding of School Facilities as to the Newhall Land as described on Exhibit "A" and supersedes and replaces all prior negotiations and proposed agreements, written or oral, except as they are included in this Agreement. Excluded Development, except as herein specified in Section 15 of this Agreement, shall be subject to the applicable fees or Mitigation Payments identified in Exhibit "B". Hart and Newhall acknowledge that neither the other party nor its agents nor attorneys has made any promise, representation, or warranty whatsoever, express or implied, not contained herein to

induce the execution of this Agreement and acknowledge that this Agreement has not been executed in reliance upon any promise, representation, or warranty not contained herein.

22. ***Amendments Must Be In Writing.*** This Agreement may not be amended except by a writing signed by Hart and Newhall.

23. ***Acknowledgment of Independent Investigation.*** Hart and Newhall acknowledge that each has conducted an independent investigation of the facts concerning the development of Newhall Land (including the development of the Excluded Projects), the impacts that Newhall Students will have on Hart's educational facilities, and the costs of housing Newhall Students.

24. ***Disputes To Be Arbitrated.*** Hart and Newhall desire to resolve any disputes as to the meaning of any portion of this Agreement, the validity of any determination or calculation, or the rights or obligations of Hart or Newhall under it as quickly as possible. Therefore, any such disputes shall be resolved by binding arbitration conducted by a mutually agreed upon retired judge of the Los Angeles Superior Court. If Hart and Newhall are unable to agree on the arbitrator within thirty (30) days of the receipt of a request for arbitration, they shall request that the presiding judge of the Los Angeles Superior Court designate one. Hart and Newhall shall each pay one-half the cost of the arbitration and each shall be responsible for its own attorneys' fees and costs as to any such arbitration.

25. ***Recovery Of Litigation Expenses.*** Except as provided in Section 24 above, if it becomes necessary to enforce any of the terms of this Agreement, the prevailing party shall be entitled to reasonable attorneys' fees and other costs of litigation in addition to any other relief to which it may be entitled.

26. ***Venue for Resolving Disputes.*** Any arbitration or litigation arising out of this Agreement shall be conducted only in Los Angeles County, California.

27. ***Interpretation Guides.*** In interpreting this Agreement, it shall be deemed it was prepared by the parties jointly and no ambiguity shall be resolved against either party on the premise that it or its attorneys was responsible for drafting this Agreement or any provision hereof.

28. ***Due Authority of Signatories.*** Each individual signing this Agreement warrants and represents that he or she has been authorized by appropriate action of the party which he or she represents to enter into this Agreement on behalf of the party.

29. ***Notices.*** All notices, demands, and communications between Hart and Newhall shall be given by personal delivery; registered or certified mail, postage prepaid, return receipt requested; Federal Express or other reliable private express delivery; or by facsimile transmission. Such notices, demands, or communications shall be deemed received upon delivery if personally served or sent by facsimile or after three business days if given by other approved means as specified above. Notices, demands, and communications shall be sent:

To Hart:	William S. Hart Union High School District Attn: Superintendent 21515 Redview Drive Santa Clarita, CA 91350 Fax No. (805) 254-8653
With a copy to:	Alexander Bowie, Esq. Bowie, Arneson, Wiles & Giannone 4920 Campus Drive Newport Beach, CA 92660 Fax No. (949) 851-2014
To Newhall:	The Newhall Land and Farming Company Attn: President 23823 Valencia Boulevard Valencia, CA 91355 Fax No. (805) 255-3960
With a copy to:	Kenneth B. Bley, Esq. Cox, Castle & Nicholson LLP 2049 Century Park East, 28th Floor Los Angeles, CA 90067 Fax No. (310) 277-7889

The foregoing names, addresses, and fax numbers may be changed at any time by a written notice given as provided above.

30. ***California Law Governs.*** This Agreement and all rights and obligations arising out of it shall be construed in accordance with the laws of the State of California.

31. ***Counterparts.*** This Agreement may be signed in one or more counter-parts which, taken together, shall constitute one original document.

32. ***Exhibits.*** All Exhibits attached hereto are incorporated into this Agreement.

33. ***Incorporation Into Subsequent Approvals.*** These obligations shall be deemed to be obligations that relate to the Newhall Land Development Entitlements and shall run with the land as obligations of its future development, including all provisions and requirements hereof relating to any SRDU. This Agreement shall be included in the technical appendices of the EIRs for the Westridge Project and Newhall Ranch Project, and be included in the mitigation measures and monitoring programs of the EIRs for both such projects.

34. ***Effective Date.*** This Agreement shall become effective on the date of the last signature by a party.

DATED: October 15, 1998

BOARD OF TRUSTEES OF THE WILLIAM S. HART UNION HIGH SCHOOL DISTRICT

By: Paula C. Olivas

President of the Board of Trustees of the WILLIAM S. HART UNION HIGH SCHOOL DISTRICT

[Signatures continued on following page.]

[Signatures continued from previous page.]

Attest:

_____

Clerk of the Board of Trustees of the WILLIAM S. HART UNION HIGH SCHOOL DISTRICT

DATED: October _____, 1998

THE NEWHALL LAND AND FARMING COMPANY (a California Limited Partnership)

By: NEWHALL MANAGEMENT LIMITED PARTNERSHIP Managing General Partner

By: NEWHALL MANAGEMENT CORPORATION
Managing General Partner

By: Mary M Cusumano
Its: President
By: James M. Hoffman
Its: Sr. V.P.

[Signatures continued on following page.]

[Signatures continued from previous page.]

APPROVED AS TO FORM:

DATED: October 12, 1998

BOWIE, ARNESON, WILES & GIANNONE

By: _____
ALEXANDER BOWIE, ESQ.
Attorneys for the WILLIAM S. HART UNION HIGH SCHOOL DISTRICT

APPROVED AS TO FORM:

DATED: October 13, 1998

COX, CASTLE & NICHOLSON LLP

By: _____
KENNETH B. BLEY
Attorneys for THE NEWHALL LAND AND FARMING COMPANY

copy of KBBLEY 22932 409981
AB/pks/50016 v17
8028 B65 - 10/09/98

APPENDIX 4.11

Libraries Data and Correspondence

County of Los Angeles Public Library
7400 East Imperial Hwy., P.O. Box 7011, Downey, CA 90241-7011
(562) 940-8461, TELEFAX (562) 803-3032

Library

MARGARET DONNELLAN TODD
COUNTY LIBRARIAN

November 26, 2002

IMPACT SCIENCES
Attn: Julie Berger, Project Planner
30343 Canwood Street, Suite 210
Agoura Hills, CA 91301

DRAFT ENVIRONMENTAL IMPACT REPORT
River Park Project, Santa Clarita, CA

Dear Ms. Berger:

This is in response to your request for information on the above-referenced project. Following are our responses to your questions:

1. **Would you please describe staffing (paid and volunteer, full time and part time) at the Valencia, Newhall, Canyon Country, and mobile libraries? Please provide information about location, hours, size and holdings.**

   Currently, the following is staffing information for the Valencia, Canyon Country and Newhall libraries:

Valencia Library	13 full time employees 40 part time employees 10 volunteers - 35 hrs. per week
Canyon Country Library	5 full time employees 20 part time employees 5 volunteers - 26 hrs. per week
Newhall Library	4 full time employees 11 part time employees 4 volunteers - 21 hrs. per week

The following table provides information about each facility's location, hours, size and holdings:

LIBRARY	LOCATION	HOURS	SIZE (SQ. FT.)	HOLDINGS
Valencia	**23743 W. Valencia Blvd. Santa Clarita, 91355**	**Mon-Thurs: 10 am - 9 pm Friday: 10 am - 6 pm Saturday: 10 am - 5 pm Sunday: 1 pm - 5 pm**	**23,966 sq. ft.**	**272,809**
Newhall	**22704 W. Ninth St. Santa Clarita, 91321**	**Mon-Wed: 10 am - 8 pm Thurs - Fri: 10 am - 6 pm Saturday: 10 am - 5 pm Sunday: Closed**	**4,842 sq. ft.**	**77,693**
Canyon Country	**18601 Soledad Cyn. Rd. Santa Clarita, 91351**	**Mon-Wed: 10 am - 8 pm Thurs - Fri: 10 am - 6 pm Saturday: 10 am - 5 pm Sunday: Closed**	**5,050 sq. ft.**	**91,534**
Santa Clarita Bookmobile	**Various service points. Please see attached**	**Mon-Wed: 9 am - 5 pm Thursday: Closed Friday: 9 am - 5 pm Sat - Sun: Closed**	**N/A**	**15,452**
			33,858	457,488

2. **Are there any plans for other facilities in the service area? Would you please describe the facility and the estimated opening date?**

Currently, there are no plans for other facilities in this service area.

3. **What are the Library's planning standards for service? Are they adopted County standards or an internal Library planning guide? How many books and square feet of library space per capita does the Library set as its standard? What is the current number of books and square feet of library space per capita in the Santa Clarita Valley?**

The Public Library has adopted a planning standard of 0.5 gross sq. ft. and 2.0 books and other materials per capita. In the Santa Clarita Valley (excluding the bookmobile) the current number of books and other materials per capita is 2.47 and the number of square feet per capita is 0.23.

4. **Does the Library consider the Santa Clarita Valley adequately served?**

Based of the County Library's planning standards, the Santa Clarita Valley has an adequate supply of books and other materials, yet is inadequate with regards to library facility space to serve both the present population and increased population generated from this project.

5. **Is the following still accurate? Funding for the County Public Library comes directly from the County General Fund which, in turn, is funded by various forms of taxes(e.g., property taxes, its share of sales taxes, etc.). General Fund dollars are allocated by the County Board of Supervisors annually to all County-funded public services, including the Public Library. Does this funding address library operations, construction of new libraries, and the purchase of new items (books, periodicals, audio cassettes, videos, etc.)?**

   Funding sources for the Public Library consists in descending proportions, property taxes, County General Fund allocation, a special tax, and revenue from fines, fees and other miscellaneous sources. The Board of Supervisors has for several years, made an allocation from the County General Fund. However, there is no guarantee of ongoing funding from the County General Fund as a specific budget allocation. Decisions on funding for the Public Library are made on an annual basis by the Board of Supervisors based on total available funding for all County services. The funding in the Public Library's operating budget does not provide for replacement or the expansion of library facilities.

   Currently, the only funding available for the replacement or expansion of library facilities is that generated from the developer fee program. At the present time the developer fee funds collected in the Santa Clarita planning area to date are insufficient for the construction of new facilities.

6. **Would the revenues collected adequately cover all the costs of serving the project? If not, would there be a significant impact on the Library system if library facilities construction and items are not provided for? Would payment of the library fee of $569.87 per unit of residential development mitigate potentials new development impacts from the proposed project on the County Public Library to a less than significant level?**

   Impact on library services would be significant, unless mitigated. Payment of the current library fee of $640 per residential unit would mitigate the impact on library services as a result of this project. Service impacts would then be reduced to a less than significant level. Please note that the Public Library's mitigation fee is subject to an annual Consumer Price Index (CPI) adjustment.

7. Is there anything else I should know about the Department or the Department's ability to serve the project?

No, there is no additional information to provide.

Thank you for the opportunity to answer your questions regarding this project and its impact on library services. If you have any questions or need additional information please contact me at (562) 940-9455.

Sincerely,

Michele Mathieu

Michele Mathieu
Administrative Assistant

:mm

c: Margaret Donnellan Todd, County Librarian
David Flint, Assistant Director
Josie Reyes, Regional Administrator

River Park EIR

Santa Clarita Valley
Library Impact Analysis

Land Use	Number of Units	Persons/ Household	Library (Sq. Feet)	Library Books
Single Family Res'l	439	3.06	470	2,683
Multi-Family Res'l	744	3.06	796	4,547
Mobile Homes		2.55	0	0
		Totals	**1,265**	**7,230**

L.A. County Public Library Standard: 0.35 s.f./capita
L.A. County Public Library Standard: 2.0 books/capita

Prepared by Impact Sciences, Inc.
S. Tebo
12/16/03

Cumulative = SCV + Project				
	Number	Persons/	Library	Library
Land Use	of Units	Household	(Gross Square Feet)	Books
Single Family Residential	93,720	3.023	141,658	566,631
Multi-Family/Attached Residential	48,757	3.023	73,696	294,785
mobile home	2,699	3.023	4,080	16,318
			0	0
		Totals	**219,434**	**877,734**
L.A. County Public Library Standard: 0.50 g.s.f./capita				
L.A. County Public Library Standard: 2.0 books/capita				

APPENDIX 4.13
Fire Data and Correspondence

December 4, 2002

TO: DAVID LEININGER, ACTING CHIEF
FORESTRY DIVISION

FROM: DEBRA S. AGUIRRE, SUPERVISING ANALYST
PLANNING DIVISION

REQUEST FOR INFORMATION:
RIVER PARK PROJECT, SANTA CLARITA
EIR #1517

The information about fire protection service appearing in the Sand Canyon Joint Venture EIR, which you faxed us on 11/22/02, is still largely valid. Some additions and clarifications are noted below.

- New Fire Station 126 is now in operation. (The first paragraph on page 4.13-4 speaks of it in the future.) It is temporarily located at 27400 Tourney Rd., Valencia, CA 91355 until Spring, 2003, when the permanent fire station will be opened on Citrus Street at Magic Mountain Parkway. Fire Station 126 is staffed by a 4-person engine company. Fire Station 73 now has one 3-person engine company as well as the truck company. All other stations' resources in the Santa Clarita Valley are the same as they were at the time of the Sand Canyon Joint Venture EIR. Station 124 has been relocated to 25870 Hemingway Avenue, Stevenson Ranch, CA 91381.

- The terms "first alarm fire response" (in the Summary) and "primary fire protection service" (page 4.13-2) are undefined and should be avoided. Different kinds of incidents receive different numbers and types of response units in the first alarm. It is not quite accurate to identify specific stations as the ones that will "serve" the project site. The closest available District response units are dispatched as needed to an incident anywhere within the District's territory. It is more accurate to identify certain stations as the closest, and therefore most likely to respond to an incident at the site.

- The information you provided on funding methods of service expansion to new development is correct. Please note that the developer fee is calculated to cover the *full* cost of equipment as well as construction and land for new stations (page 4.13-4). This fee, or an in-lieu donation, constitutes mitigation in full of growth impacts.

The jurisdictional station for this project is Station 111. It is approximately 0.6 miles or 1.7 minutes from the intersection of Bouquet Canyon Road and Newhall Ranch Road. Dependent upon access and estimated response times, the Fire Department may require a site within this tract for fire station at the east-end of their project to adequately protect this tract and the surrounding community. The Fire Department has an existing need for an additional fire

station in this area, and this project would exacerbate this need. We would need a detailed map showing the location of proposed land uses and existing and proposed roads to calculate response distances/times from existing stations for a full analysis of impacts.

Nationally recognized response time targets for urban areas are five minutes for a basic life support unit (e.g., engine company) and eight minutes for an advanced life support unit (e.g., paramedic squad). The Fire Department is currently meeting these standards. The average response time in the city of Santa Clarita during 2001 was 5 minutes 40 seconds. It should be noted that the city encompasses rural and undeveloped areas as well as urban areas.

Any development would increase service demand on the existing fire protection resources in the general area. Additional manpower, equipment, and facilities are needed in the area now. Mitigation of this increase in service would be met through the city of Santa Clarita's developer fee program for fire protection facilities and equipment, [redacted].

The Fire Department does not compute ratios of fire fighters to residents or building area.

DSA:DK:fd

EIR-1517

COUNTY OF LOS ANGELES
FIRE DEPARTMENT

5823 Rickenbacker Road
Commerce, California 90040

CONDITIONS OF APPROVAL FOR SUBDIVISIONS - INCORPORATED

ubdivision No: **53425** Map Date **Fire Dept. 09/03/03**

.U.P. _____ City **Santa Clarita**

] **FIRE DEPARTMENT HOLD** on the tentative map shall remain until verification from the Los Angeles County Fire Dept. Plannin Section is received, stating adequacy of service. Contact (323) 881–2404.

] Access shall comply with Section 902 of the Fire Code, which requires all weather access. All weather access may require paving.

] Fire Department Access shall be extended to within 150 feet distance of any exterior portion of all structures.

] Where driveways extend further than 300 feet and are of single access design, turnarounds suitable for fire protection equipment use shall be provided and shown on the final map. Turnarounds shall be designed, constructed and maintained to insure there integrity for Fire Department use. Where topography dictates, turnarounds shall be provided for driveways that extend over 150 feet in length.

] Private driveways shall be indicated on the final map as "Private Driveway and Firelane" with the widths clearly depicted and shall be maintained in accordance with the Fire Code. All required fire hydrants shall be installed, tested and accepted prior to construction.

] Vehicular access must be provided and maintained serviceable throughout construction to all required fire hydrants. All required fire hydrants shall be installed, tested and accepted prior to construction.

] This property is located within the area described by the Fire Department as "Very High Fire Hazard Severity Zone" (formerly Fire Zone 4). A "Fuel Modification Plan" shall be submitted and approved prior to final map clearance. (Contact Fuel Modification Unit, Fire Station #32, 605 North Angeleno Avenue, Azusa, CA 91702-2904, Phone (626) 969-5205, for details).

] Provide Fire Department or City approved street signs and building access numbers prior to occupancy.

] Additional fire protection systems shall be installed in lieu of suitable access and/or fire protection water.

] The final concept map, which has been submitted to this department for review, has fulfilled the conditions of approval recommended by this department for access only.

] These conditions shall be secured by a C.U.P. and/or Covenant and Agreement approved by the County of Los Angeles Fire Department prior to final map clearance.

] The Fire Department has no additional requirements for this division of land.

omments: **REVISED CONDITIONS. A second means of access is required prior to the construction of the 501st dwelling unit. The number of dwelling units includes all single family homes, and all the units within the apartments and town-homes. Please refer to page 3 for additional conditions for access. No fire station is required for development mitigation for th project.**

ISPECTOR **Wally Collins** DATE **September 3, 2003**

COUNTY OF LOS ANGELES
FIRE DEPARTMENT

5823 Rickenbacker Road
Commerce, California 90040

WATER SYSTEM REQUIREMENTS – INCORPORATED

ubdivision No: **53425** Map Date **Fire Dept. 09/03/03**

.U.P. _____ City **Santa Clarita**

] Provide water mains, fire hydrants and fire flows as required by the County of Los Angeles Fire Department, for all land shown on map which shall be recorded.

] The required fire flow for public fire hydrants at this location is **5000** gallons per minute at 20 psi for a duration of **5** hours, over anc above maximum daily domestic demand. **3** Hydrant(s) flowing simultaneously may be used to achieve the required fire flow.

] The required fire flow for private on-site hydrants is **2500** gallons per minute at 20 psi. Each private on-site hydrant must be capable of flowing **2500** gallons per minute at 20 psi with two hydrants flowing simultaneously, one of which must be the furthest from the public water source.

] Fire hydrant requirements are as follows:

Install **79** public fire hydrant(s). Upgrade / Verify ____ existing Public fire hydrant(s).
Install **24** private on-site fire hydrant(s).

] All hydrants shall measure 6"x 4"x 2-1/2" brass or bronze, conforming to current AWWA standard C503 or approved equal. All on-site hydrants shall be installed a minimum of 25' feet from a structure or protected by a two (2) hour rated firewall.

☒ Location: As per map on file with the office.
☒ Other location: **Please refer to the attached Tentative Tract Map for hydrant locations.**

] All required fire hydrants shall be installed, tested and accepted or bonded for prior to Final Map approval. Vehicular access must be provided and maintained serviceable throughout construction.

] The County of Los Angeles Fire Department is not setting requirements for water mains, fire hydrants and fire flows as a condition of approval for this division of land as presently zoned and/or submitted.

] Additional water system requirements will be required when this land is further subdivided and/or during the building permit process.

] Hydrants and fire flows are adequate to meet current Fire Department requirements.

] Upgrade not necessary, if existing hydrant(s) meet(s) fire flow requirements.

UBMIT COMPLETED (ORIGINAL ONLY) FIRE FLOW AVAILABILITY FORM TO THIS OFFICE FOR REVIEW.

OMMENTS: **REVISED CONDITIONS. Please refer to page 3 for additional water system requirements.**

l hydrants shall be installed in conformance with Title 20, County of Los Angeles Government Code and County of Los Angeles Fire Code, or appropriate City regulations. iis shall include minimum six-inch diameter mains. Arrangements to meet these requirements must be made with the water purveyor serving the area.

y Inspector **Wally Collins** Date **September 3, 2003**

COUNTY OF LOS ANGELES
FIRE DEPARTMENT

5823 Rickenbacker Road
Commerce, California 90040

SUBDIVISION, WATER AND ACCESS REQUIREMENTS

ADDITIONAL PAGE

SUBDIVISION NO. **53425** PAGE NO. **3**

REVISED CONDITIONS

ADDITIONAL ACCESS REQUIREMENTS FOR PUBLIC STREETS:

1. Street widths for this project shall conform to the widths indicated on the cross-sections on this Tract Map. All street widths shall be measured from the curb flow line to curb flow line.

2. Temporary turn-arounds are required for the end of Newhall Ranch Road and end of Santa Clarita Parkway. The turn-arounds shall be either a cul-de-sac bulb with a 32-foot center line or a hammer-head design, which would be posted and red curbbed "NO PARKING - FIRE LANE". These temporary turnarounds are required to stay in place until the bridges have been completed and are opened to an existing street.

3. All streets with center medians shall have a minimum paved width of 20 feet on each side of the median, with street posted and red curbed "NO PARKING - FIRE LANE".

4. The traffic circle at the end of "N" Street is approved. The area surronding the traffic circle shall posted and red curbed "NO PARKING -FIRE LANE".

5. If gates are installed, provide 4 sets of gate detail plans to the Department's Land Development Unit prior to any approvals for this Tract Map, and the construction of any dwelling unit. Gates shall conform to the Department's Regulation #5.

6. Due to "N" Street extending greater than 700 feet in length, "N" Street shall a minimum street width of 36 feet, curb-flow-line to curb-flow-line, not 34 feet as indicated on the map. Provide four (4) revised copies of this page only of the Tract Map indicating this correction. This is required to be submitted to the Land Development Unit prior to any approvals of this Tract Map.

ADDITIONAL ACCESS REQUIREMENTS FOR ON-SITE ACCESS FOR AREA "C" & AREA "D":

1. Provide a minimum unobstructed driveway width of 28 feet, clear-to-sky to posted and red curbed "NO PARKING - FIRE LANE". Each turning radius shall be 42 feet from the center-line.

2. If gates are installed, provide 4 sets of gate detail plans to the Department's Land Development Unit prior to any approvals for this Tract Map, and the construction of any dwelling unit. Gates shall conform to the Department's Regulation #5. Gates shall be the same width as the driveway (28 feet), with all gate acessory hardware out of the accessway when the gate is in the fully open position.

ADDITIONAL WATER SYSTEM REQUIREMENTS:

1. The required fire flow for nineteen (20) public fire hydrants located on Newhall Ranch Road, adjacent to Area "C" and Area "D", is 5000 gpm at 20 psi for 5 hours with 3 fire hydrants flowing.

2. Fifty-eight (59) public fire hydrants are required to be installed on all other streets, including Newhall Ranch Road, as indicated on the tract map. The required fire flow is 1250 gpm at 20 for 2 hours with one (1) fire hydrant flowing.

3, Twenty-two (24) on-site fire hydrants are required within Area "C" & Area "D". The required fire flow is 2500 gpm at 20 psi for 2 hours with two (2) fire hydrants flowing.

y Inspector: **Wally Collins** Date: **September 3, 2003**

Land Development Unit – Fire Prevention Division – (323) 890-4243, Fax (323) 890-9783

Subject: FW: Proposed Fire Station to serve River Park Project
Date: Monday, June 16, 2003 8:09 AM
From: Susan Tebo <stebo@impactsciences.com>
To: julie berger <julie@impactsciences.com>

FYI...we are meeting with the City of Santa Clarita tomorrow--be sure that something to the effect of what is written below is included in the revisions. Thanks.

Susan

From: Glenn Adamick <gadamick@newhall.com>
Date: Fri, 13 Jun 2003 09:51:43 -0700
To: "Susan Tebo (E-mail)" <stebo@impactsciences.com>
Cc: Keith Herren <kherren@newhall.com>, Kevin Farr <kfarr@newhall.com>, Ross Pistone <rpistone@newhall.com>
Subject: FW: Proposed Fire Station to serve River Park Project

FYI

Glenn

-----Original Message-----
From: Debbie Aguirre [mailto:DAguirre@lacofd.org]
Sent: Friday, June 13, 2003 9:45 AM
To: gadamick@newhall.com
Cc: Barbara Herrera; Larry Hambleton
Subject: Proposed Fire Station to serve River Park Project

Glenn,

We've reviewed both the River Park Project, and a possible fire station site located in PM 20838 offered by Newhall Land.

While we are concerned about the response times into the easterly side of the River Park Project, this project is not an ideal location for a fire station site. Likewise, the site offered in PM 20838 would be located too close to our new Fire Station 126. The Fire Dept has elected to wait until a site more easterly on Soledad becomes available. Until then, our Fire Stations 111, 126 and temp 104's (which we hope to have operational by the end of the year) will provide service to River Park.

I do want to express my appreciation to you and Newhall Land for being proactive in planning for fire station sites. If you have any questions or need anything further, please don't hesitate to call.

Debbie Aguirre
Planning Division
Los Angeles County Fire Department
(323) 881-2404

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Subject: RIVER PARK EIR
Date: Tuesday, July 22, 2003 5:09 PM
From: Loretta Bagwell <LBagwell@lacofd.org>
To: <julie@impactsciences.com>
Cc: Debbie Aguirre <DAguirre@lacofd.org>
Category: Junk

Julie,

Hope this helps, if you have any more questions, please let me know.

1) Where is Los Angeles County Fire Station 104 temporarily located? (address/intersection) In what City/area?

In the City of Santa Clarita on Golden Valley Road (please see attached map)

2) How many miles is the temporary station from the intersection of Bouquet Canyon and Newhall Ranch Roads?

3.4 miles

3) Is the station currently under construction? When will it be completed?

No. Completion is expected within one year.

4) Where will the station be relocated? (address/intersection) In what City/area?

Currently there is no site for the permanent station. Temporary Fire Station 104 is the result of a land-lease agreement recently approved by the City of Santa Clarita. The Fire Department will continue to look for a site for the permanent fire station within the same vicinity as the temporary station.

5) How many miles is it from the intersection of Bouquet Canyon and Newhall Ranch Roads? What is the anticipated response time to the intersection of Bouquet Canyon and Newhall Ranch Roads?

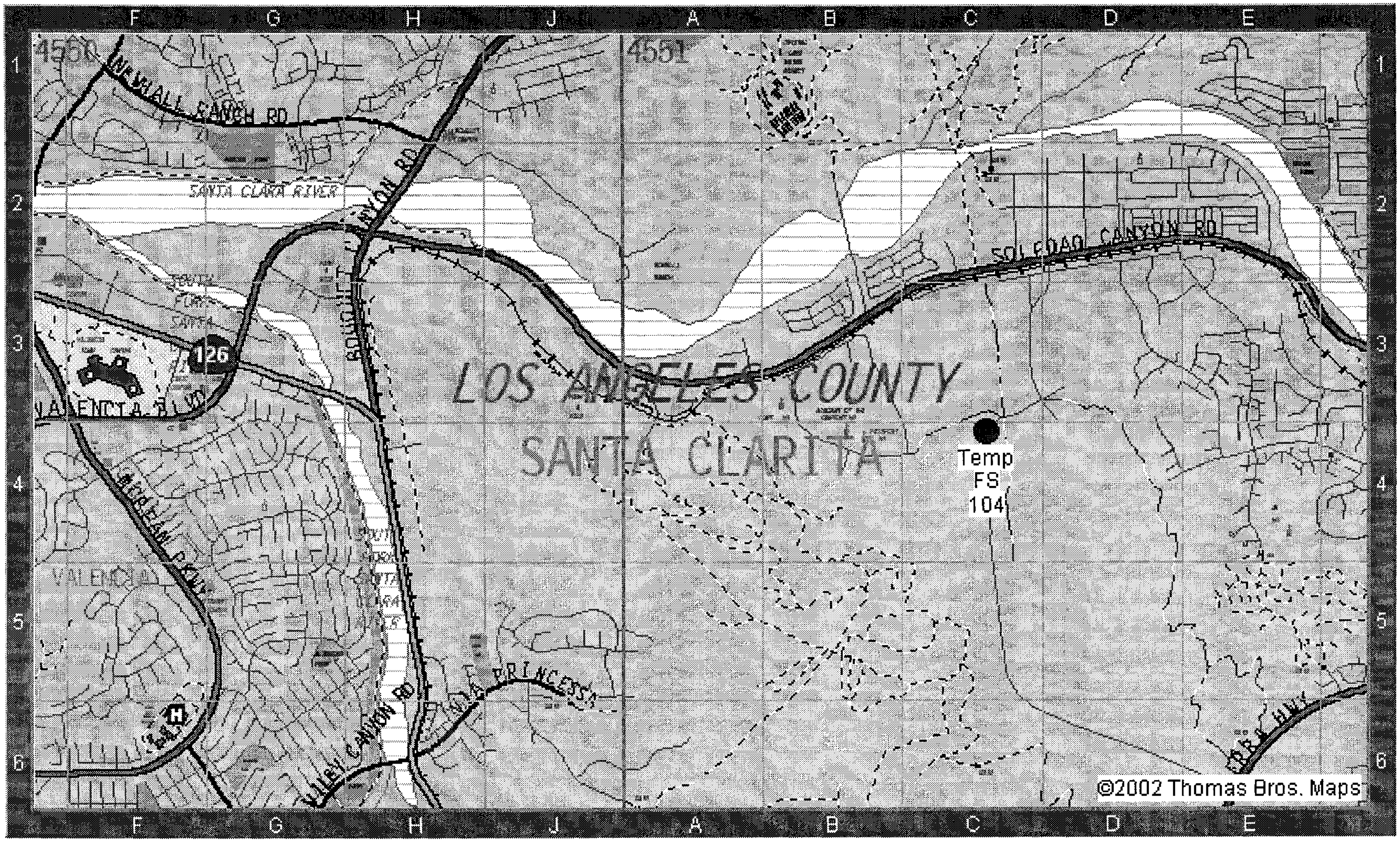
From temporary Fire Station 104 it is 3.4 miles and the response time is 11 minutes.

6) How many fire engines and firefighters will there be? Will there be

paramedics?

Minimum 3-person engine. Actual staffing will be determined when the fire station is under construction.

7) Is there anything else I should know about the station?



4550
4551
NEWHALL RANCH RD
SANTA CLARA RIVER
SOLEDAD CANYON RD
126
VALENCIA BLVD
LOS ANGELES COUNTY
SANTA CLARITA
Temp
FS
104
VALENCIA
VIA PRINCESSA
©2002 Thomas Bros. Maps

Subject: Re: River Park EIR (one more thing)
Date: Tuesday, August 5, 2003 4:41 PM
From: Loretta Bagwell <LBagwell@lacofd.org>
To: <julie@impactsciences.com>
Category: Junk

Currently Fire Station 126 is staff with a 3-man engine and a 4-man truck/quint.

FYI, the Deputy Fire Chief and the Battalion Chief is also housed at Fire Station 126.

>>> Julie Berger <julie@impactsciences.com> 08/05/03 03:22PM >>>
Loretta,

One more thing.....

Will the permanent Station 126 maintain one fire engine and be supported by four firefighters, as the temporary station did? If not, what will the permanent station support?

Thanks again,

Julie

From: Julie Berger <julie@impactsciences.com>
Date: Tue, 05 Aug 2003 15:16:55 -0700
To: Loretta Bagwell <LBagwell@lacofd.org>
Subject: River Park EIR

Loretta,

I've another question I hope you can help me with.

I heard that Fire Station 126 is now permanently located and operational on Citrus Street near Magic Mountain Parkway and that the temporary Station 126 at 27400 Tourney Road is closed. Is this true? If so, what is the exact address on Citrus Street.

Thank you,

Julie

APPENDIX 4.14

Sheriff's Data and Correspondence

County of Los Angeles
Sheriff's Department Headquarters
4700 Ramona Boulevard
Monterey Park, California 91754-2169
(661) 255-1121

Leroy D. Baca, Sheriff

November 21, 2003

Mr. Jeff Hogan, Associate Planner
City of Santa Clarita
23920 Valencia Boulevard, Suite 300
Santa Clarita, California 91355

RECEIVED
PLANNING DIVISION

NOV 2 4 2003

PLANNING AND BUILDING SERVICES
CITY OF SANTA CLARITA

Dear Mr. Hogan:

RIVERPARK PROJECT
MASTER CASE # 02-175

The proposed Project consisting of 1,183 dwelling units located at the terminus of Newhall Ranch Road, east of Bouquet Canyon between the Castaic Lake Water Agency property and the Santa Clara River, north of Soledad Canyon Road, is within the jurisdiction of the Los Angeles County Sheriff's Department, Santa Clarita Valley Station, 23740 Magic Mountain Parkway, Valencia, California. The station is located approximately 3 to 4 miles from the project site.

It is anticipated that the non-emergent response time to a request for service would be approximately 40-50 minutes. The priority response time would be approximately 8-10 minutes and the response time under emergent circumstances would be approximately 5-8 minutes. All response times are approximations, only, and would be dependent on both the deployment of area radio cars and traffic conditions.

This station serves an area of 656 square miles, which is made up of the City of Santa Clarita and unincorporated County area between the Los Angeles City Limits to the South, the Kern County Line to the North and involving all area between the Ventura County Line to the West and the township of Agua Dulce to the East. The population served by our station is approximately 200,000 residents.

Our ideal officer to population ratio is one deputy per 1,000 residents and with our current staffing of 161 sworn deputies currently assigned, our ratio is less than ideal at one deputy per every 1,243 residents. According to the figures released by the Department of Finance as of January, 1998, residential density is 3.011 persons per dwelling unit. This proposed project will generate a population increase of 3,562. Based on the above, the project would require 3 additional deputies to the station complement.

Our primary concern is our ability to provide an adequate level of protection and service to all areas we police. Due to the rapidly expanding population of the Santa Clarita Valley and its record-setting home building, it is difficult to project the impact of this project on law enforcement.

Adding this project and other projects in progress, either proposed, approved or committed, it is certain they will all significantly strain our resources to the breaking point. Additionally, the increase in required field personnel for this project alone, will necessitate a concomitant increase in support resources such as detectives, complaint desk officers, vehicles and portable radios. While not directly a builder's matter, our ability to provide a sufficient level of law enforcement services must be considered when applications for new projects such as these are considered.

It is suggested, for the security and safety of the residents, that the builder apply defensible space concepts in its construction designs, and the following crime prevention measures be implemented during site and building layout design:

- Provide lighting in open areas and parking lots;
- Ensure the visibility of doors and windows from the street and between buildings;
- Provide adequate parking spaces in the parking lots to accommodate shoppers, employees and residents;
- Ensure that the required building address numbers are lighted and readily apparent from the street for emergency response agencies.

Should you have further questions, please feel free to call me at (661) 255-1121 extension 5102, or Deputy Patrick Rissler at extension 5159.

Sincerely,

LEROY D. BACA, SHERIFF

Patti A. Minutello, Captain
Santa Clarita Valley Station

PAM:par

State of California—Business, Transportation and Housing Agency GRAY DAVIS, Governor

DEPARTMENT OF CALIFORNIA HIGHWAY PATROL
28648 The Old Road
Valencia, CA 91355
(661) 294-5540
(800) 735-2929 (TT/TDD)
(800) 735-2922 (Voice)

November 15, 2002

File No.: 540.11583.9320

Ms. Julie Berger
Impact Sciences
30343 Canwood Street, Suite 210
Agoura Hills, CA 91301

Re: River Park Project - Environmental Impact Report

Dear Ms. Berger:

This letter is to address the Environmental Impact Report for the proposed River Park project in Santa Clarita. The 664 acre project will consist of a 29 acre park, apartments, townhouses and single family homes totaling 1,099 dwelling units. Even though the project will be developed within the city limits of Santa Clarita, the California Highway Patrol (CHP), Newhall Area, believes this project will have a significant impact on our operations.

In response to your request, the following are the answers to the questions addressed in your letter dated October 25, 2002:

1. What is the current staffing level at the Newhall CHP Area?

   The Newhall CHP Area is staffed by 73 uniform and 9 non uniform personnel.

2. Are there any planned upgrades to the Newhall CHP Station?

   None.

3. How many and what type of calls did the Newhall CHP Area respond to last year in the service area?

   None, the service area is within the city limits of Santa Clarita. Los Angeles Sheriff's Department has a contract with the city for law and traffic enforcement.

Flex your POWER
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BE ENERGY EFFICIENT

4. Is the station still served by a patrol helicopter from the Burbank CHP facility?

   The area is serviced on a limited basis by a helicopter and a fixed wing aircraft based at Fullerton Airport. In mid 2003, there are plans to centrally base two helicopters to service the Los Angeles County basin.

5. Is the following true?

   a. The primary funding source for CHP facilities and staffing is the State Motor Vehicle Registration Fees.

      Yes.

   b. The allocation of these fees to each service area is determined by CHP Headquarters in Sacramento, which bases its decision on an area's service needs (e.g., traffic levels, accident statistics, population, etc.), and not necessarily by the revenues that are generated in that area.

      The Newhall CHP Area's budget is determined by the headquarters' staff in Sacramento. The CHP does not receive or base its deployment on the revenues that may be generated within its service area.

   c. Under this present form of funding, are CHP facilities and staffing adequate to meet current and future demands in this service area?

      The service area for this project is within the city limits of Santa Clarita. This project, in conjunction with the numerous other projects slated to be developed in the Santa Clarita Valley, will place an increasing demand for service on existing CHP resources. There is an identified need for additional resources to address the ever-increasing demand for service.

   d. Will the CHP be able to serve the proposed project?

      The service area for this project is within the city limits of Santa Clarita, which is serviced by the Los Angeles County Sheriff's Department, Santa Clarita Station.

   e. How will the proposed project affect the CHP's ability to serve the community?

      The CHP will continue to provide service to the best of our ability, regardless of whether or not staffing levels are increased.

6. Is the following true?

    a. No long range planning document or uniform staffing requirements exist that the CHP uses to project future need within each service area. Rather, each station determines its own staffing needs based on the service area's unique requirements and budget constraints.

        The long range planning for the CHP is handled by the headquarters' staff in Sacramento and future staffing needs are based on the needs of the entire state and budget constraints.

    b. Does the Newhall CHP Area have projections for its future staffing needs?

        The Newhall CHP Area has submitted requests for future staffing, however, there are no immediate plans to increase its personnel.

7. Is there anything else I should know about the CHP or the CHP's ability to serve the project.

    This construction plan is just one of many planned developments which makes the Santa Clarita Valley one of the fastest growing communities in California. The CHP will continue to provide the best possible service to meet the needs of the public.

Sincerely,

FOR
B. M. KILMER, Captain
Commander

APPENDIX 4.15
Phase I Site Assessment

APPLIED ENVIRONMENTAL TECHNOLOGIES INC.
4561 Market St., Suite B • Ventura, CA 93003 • Phone: (805) 650-1400 Fax: (805) 650-1576

Phase I Environmental Site Assessment
664 Acre Riverpark Project, Tract No. 53425
Located East of Bouquet Canyon Road and North of Soledad Canyon Road
Santa Clarita, Los Angeles County, California

Prepared for:

Impact Sciences Inc.
30343 Canwood Street, Suite 210
Agoura Hills, California 91301

Prepared by:

Applied Environmental Technologies, Inc.
4840 Market Street, Suite B
Ventura California 93003
(805) 650-1400

Ref. No. 0161-19P

November 7, 2002

Phase I Environmental Site Assessment
664 Acre Riverpark Project, Tract No. 53425
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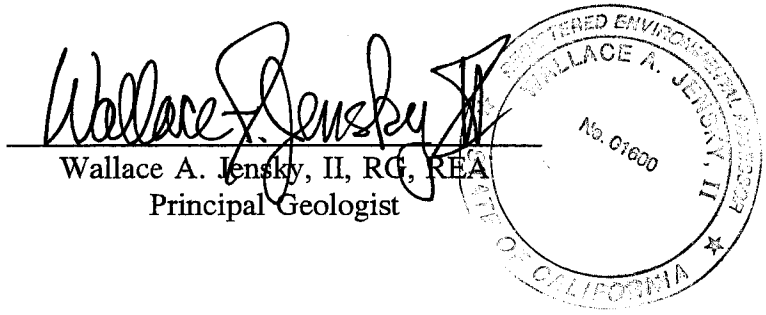

Wallace A. Jensky, II, RG, REA
Principal Geologist

Ref. No. 0161-19P

November 7, 2002

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1.0 INTRODUCTION

This report provides the results of a Phase I Environmental Site Assessment (ESA) performed by Applied Environmental Technologies, Inc., (AET) of an approximate 664 acre, irregular shaped, parcel of land (Tentative Tract No. 53425) extending eastward from Bouquet Canyon Road for approximately 2 miles along the north side of Soledad Canyon Road, Santa Clarita, Los Angeles County, California (Site, Plate 1). The ESA was performed for Impact Sciences of Agoura Hills, California.

The objective of the Phase I ESA is to identify recognized environmental conditions at the Site. As defined in the American Society for Testing and Materials (ASTM) Designation E 1527-00, recognized environmental conditions include "the presence or likely presence of any hazardous substances or petroleum products on a property under conditions that indicate an existing release, a past release, or a material threat of a release of any hazardous substances or petroleum products into structures on the property or into the ground, groundwater, or surface water of the property. The term includes hazardous substances or petroleum products even under conditions in compliance with laws. The term is not intended to include de minimis conditions that generally do not present a material risk of harm to public health or the environment and that generally would not be the subject of an enforcement action if brought to the attention of appropriate government agencies. Conditions determined to be de minimis are not recognized environmental conditions."

The ESA was performed in accordance with the scope of work provided in AET's proposal dated September 4, 2002, and with the scope of work for Phase I Environmental Site Assessments provided in the ASTM Designation E 1527-00. The Phase I ESA was performed under the direction of a California State Registered Environmental Assessor qualified to perform the work. In general, the investigation included: a review of current federal, state and county databases of known and potential environmentally impacted properties; a review of reasonably available county records; a review of available historical aerial photographs and historical maps; a review of Newhall Land & Farming (NL&F) documents and reports provided to Impact Sciences; interviews with persons familiar with the Site; and, a Site reconnaissance to observe current conditions at the Site. Details of the methods of investigation, findings, and conclusions are provided herein.

2.0 SITE DESCRIPTION

2.1 Property Description

The Site is an irregular shaped parcel of land consisting of approximately 664 acres. The southern portion of the Site extends from Bouquet Canyon Road on the west approximately 2 miles eastward on the north side of Soledad Canyon Road to a right-of-way for electric transmission towers on the east. The Site extends northward from Soledad Canyon Road approximately 0.5 mile on the east and west portions of the Site and approximately 0.75 mile in the central portion of the Site. The south half of the Site includes the Santa Clara River bed and flood plain. The northern half of the Site includes a south facing hillside, with generally steep topography on the east and west and with a sloping terrace divided by a small valley in the central portion.

The small valley between the terrace was historically developed as a Los Angeles County Fire Camp (Camp 4) since at least 1941. The camp buildings were last occupied by the Saugus Unified School District until the buildings were demolished in 1995. Two underground storage tanks (USTs) and asbestos containing building materials (ACBM) and lead based paint were removed during demolition of the buildings (further discussed in Sections 3.3.2 and 3.3.3, below). The address for the parcel where the camp and school buildings had been located is 22211 Newhall Ranch Road. The parcel is currently occupied by a construction company office, mobile storage buildings, a maintenance building, and a storage yard. Photographs showing the current development of the Site and vicinity are provided in Appendix A.

2.2 Physiographic Description

The Site is located on the northeast flank of the San Gabriel Mountains within the central Transverse Ranges physiographic province of southern California. The Site elevation ranges from approximately 1,150 feet above mean sea level (msl) in the southwest portion of the Site in the Santa Clara River to approximately 1,400 feet above msl in the northeast portion of the Site as measured from the United States Geological Survey, Newhall, California 7.5 Minute Topographic Quadrangle Map, 1952, (Photorevised, 1988). The topographic gradient is approximately 60 feet per mile (0.001-feet per foot) toward the west along the Santa Clara River. The topography rises approximately 200 feet above the river bed toward the north. The nearest surface water drainage is the Santa Clara River on the south portion of the Site. The Santa Clara River flows westerly to the Pacific Ocean.

2.3 Geology/Hydrogeology

The Site is located in the Santa Clara River Hydrologic Unit. The southern portion of the Site is underlain by Recent to Quaternary age river and alluvium deposits consisting of silts, sands and gravels. The alluvium overlies sedimentary rocks of the Pliocene age Saugus formation at depth. The Saugus formation crops out in hills in the northern portion of the Site. According to the Valencia Water Company, there are two groundwater wells (Well Nos. T2 and T4), located on the Site along the north bank of the Santa Clara River. The depth to static water level in Well T4, measured in October 2002, was 50.2 feet. The regional groundwater gradient is expected to be toward the west along the Santa Clara River valley.

3.0 INVESTIGATION METHODOLOGY AND FINDINGS

3.1 Federal and State Database Review

A government database report, prepared by Environmental Data Resources (EDR) of Southport, Connecticut of available federal, state and county agency databases was reviewed to identify government regulated properties having known recognized environmental conditions and potential environmental concerns within the vicinity of the Site. Because of the size of the Site, the radii of investigation for the Federal and State agency lists were extended up to 1.5 miles in accordance with the ASTM Standards for Environmental Site Assessments (E-1527-00). A description of the government databases reviewed are detailed in the EDR report. Also included in the EDR report are maps illustrating the location of listed properties relative to the location of the Site. A complete copy of the EDR report, dated September 25, 2002, is provided in Appendix B.

A summary of properties that could not be mapped by EDR but were identified as potentially within the Site vicinity (orphan properties) is also included in the EDR reports. Of the listed unmappable properties, a number are identifiable as being located south of Soledad Canyon Road in the Site vicinity; however, most are listed as generators of hazardous wastes and have a low probability to impact the Site. The pertinent findings of the government database review are summarized below.

- The Site is not identified in the EDR report:

- The Site is not located with 1.0 mile of a federal Superfund property.

- There are numerous properties within 0.25 mile of the southern Site boundary identified in the EDR Report. Most of the properties are located on Golden Triangle Road, southeast of the Site and parallel to Soledad Canyon Road, several properties are listed on Soledad Canyon Road. Most of the properties are listed on the HAZNET or Los Angeles Co. HMS Lists as waste generators. Being a generator of hazardous waste does not indicate that a release has occurred. One property is listed on the leaking underground storage tank list (LUST and Ca-SLIC List); however, the case was closed by the regulatory agency in 1995.

- There are numerous properties within 0.25 mile of the western and northwestern Site boundary identified in the EDR Report. These properties are located generally down gradient or flank gradient of the Site and have a low probability to impact the Site.

- There are two properties listed in the EDR Report located south of Soledad Canyon Road that are listed on a number of lists: American Cyanamid, 21444 Golden Triangle Road; and Bermite Division of Whittaker at 22116 West Soledad Canyon Road. The American Cyanamid property has been occupied by Simply Discount Furniture since 1995. The Bermite property is located in the hills south of Soledad Canyon Road. Based on their regulatory status, distance from the Site and their generally flank gradient locations, there is low probability that the properties have impacted the Site.

Based on the database review, there is a low probability that the listed off-site properties in the Site vicinity have impacted the Site.

3.2 Oil and Gas Development

The Munger Map Book of California-Alaska Oil and Gas Fields, 1990 Edition, was reviewed to assess the presence of known active or abandoned oil and gas wells within the Site vicinity. Based on the review, an oil field with one well (Bouquet Canyon Field, now abandoned) was located near the northern Site boundary in the western portion of the Site. Three dry holes were also drilled on the Site. According to the California Division of Oil and Gas Publication No. TR-12, California Oil and Gas Fields, Volume II, 1982) the Edward Lustgarten "Lucky Lusty" No. 1 Well was completed in 1958 in the Mint Canyon formation at a depth of approximately 2,340 feet below ground surface (bgs). The well initially produced 29 barrels of oil per day and produced a total of only 8,528 barrels of oil prior to being abandoned. The well location was in the vicinity of a water tank currently located on the top of a hill just beyond the Site boundary (Plate 1).

Two dry holes were drilled near the Lucky Lusty No. 1 well on the Site: the Union Oil Company Bonelli No. 1 located approximately 300 feet west-northwest of the Lucky Lusty No. 1 Well near the top of the hill; and the Lucky Lusty Well No. 3 located approximately 800 feet south of the Lucky Lusty No. 1 Well near the base of the hill (Plate 1). Neither well produced oil and were abandoned. A third oil well (Texaco Inc. NL&F No. H-1) was drilled in 1963 to a depth of 1,700 feet bgs at a location on the north side of the Santa Clara River in the south-central portion of the Site. Based on the lack of significant oil production from the Lucky Lusty Well No. 1 and the three dry holes (no oil production) on the Site, there is low probability that the Site has been impacted by oil and gas production.

3.3 Agency Records Review and Interview

3.3.1 County of Los Angeles Building Department

The County of Los Angeles Building Department maintains building permit records for structures located within the unincorporated portions of the County. Due to the lack of permanent structures on the Site (except for the buildings at the Fire Camp No 4, later Saugus Unified School District, which have all been removed), building records were not requested.

3.3.2 Newhall Land & Farming File Review at Impact Sciences Offices

September 7, 2002, AET reviewed reports and documents provided to Impact Sciences by NL&F. According to a report prepared by State Environmental Management, Inc. (SEM) of Ontario, California, two USTs (one 2,000 gallon capacity gasoline tank and one 2,000 gallon capacity diesel tank) were removed from 22211 Newhall Ranch Road (formerly occupied by Los Angeles County Camp 4 and the Saugus Unified School District) in June 1995. The file contained tank removal documents for the parcel. Groundwater was encountered in the tank pit at approximately 10 feet below ground surface (bgs) and a sheen of petroleum hydrocarbons was observed on the water in the pit. Soil samples collected from the sidewalls of the pit did not

contain petroleum hydrocarbons. Following removal of the USTs, three 25-foot deep groundwater monitoring wells were installed and sampled. The groundwater did not contain detectable petroleum hydrocarbons.

A document contained disposal records prepared by Crawford Risk Control Service of Long Beach, California, for bins of roofing material and floor tile and other debris containing lead and asbestos. Also reviewed were an Inspection Report for the Saugus School District Buildings 1 through 6 and a Post Job Submittal for asbestos and lead based paint abatement prepared by The Environmental Group (TEG) dated October 3, 1995 for 22211 Newhall Ranch Road. Based on the documents reviewed, asbestos and lead based paint were identified and abated prior to demolition of the permanent buildings formerly occupied by Camp 4 and the Saugus School District.

3.3.3 County of Los Angeles Department of Public Works

The County of Los Angeles Department of Public Works (DPW) maintains records regarding industrial waste, UST permits and LUST cases. On September 24, 2002, AET reviewed the Site files at the DPW for information concerning the former USTs at 22211 Newhall Ranch Road. The former USTs were removed by the Saugus School District and were located northeast of a metal building and west of the creek in the southern portion of the small valley. The file contained the Tank Closure Report prepared by SEM and three quarterly groundwater monitoring reports (First Quarter through Third Quarter, 1996). No petroleum hydrocarbons were detected in the groundwater during the first and second quarterly events. The groundwater elevation had declined to below the bottom of the wells during the third quarter 1996 monitoring event. On July 12, 1997, SEM abandoned the three wells by pressure grouting in accordance with DPW and state requirements. The file contained a letter from SEM (and a record of a payment for agency time to review the file) requesting a closure letter for the Site; however, no letter was present in the file. AET requested additional information from one of the secretaries at the counter concerning the closure letter. The secretary checked the computer for information, and stated that, due a change in personnel, a closure letter was inadvertently not issued.

Based on the file review at the DPW, it appears that the Site was eligible for closure but a closure letter was not issued.

3.3.4 Valencia Water Company

The Valencia Water Company (VWC) has two groundwater production wells on the Site. AET contacted Mr. Keith Abacrombe of the VWC. The two wells are identified as Wells T4 and T2 and are located on the north side of the Santa Clara River in the central portion of the Site. The wells are accessed on the dirt road extension of Newhall Ranch Road. Well T2 is currently not pumping. The depth to groundwater in the wells in 2001 was approximately 34.8 feet bgs. The depth to water in Well T4 was measured in October 2002 at 50.2 feet bgs. Mr. Abacrombe indicated that the current wells would likely be abandoned and new wells drilled when the Site is developed in the future. He confirmed that the Castaic Lake Water Company had performed hillside grading and installed underground pipes on the northern portion of the

Site and constructed the Rio Vista Treatment Plant north of the Site (former Bouquet Canyon Boys Camp property).

3.4 Aerial Photograph Review

Copies of aerial photographs for the years 1928, 1947, 1952, 1968, 1976, 1989 and 1994 and Historical Topographic Maps for the years 1900 - 1903, and 1940 - 1941 available through EDR, were reviewed by AET for historical land use identification. Three individual photographs for each year were provided to cover the Site. Based on the review of available aerial photographs and maps, the historical development of the Site and vicinity was evaluated and is summarized below.

The 1900 San Fernando and 1903 Santa Susana 15-Minute Topographic Quadrangle Maps show the Site to be undeveloped land. The Southern Pacific Railroad track and a road that predated Soledad Canyon Road are present south of the Site. Bouquet Canyon Road is present west of the Site. A dirt road extends east from Bouquet Canyon Road part way onto the Site.

The 1928 aerial photographs (Fairchild, 1″ = 500′) show the Site to be undeveloped land. The generally flat area north of the Santa Clara River in the western portion of the Site appears to be cultivated, possibly with hay. The area southeast of the Site along the north side of Soledad Canyon Road is also cultivated. A dirt road is present on the north side of the River extending from Bouquet Canyon Road. The rest of the Site is brush covered hillsides and river bottom. Soledad Canyon Road has been realigned to it current location. The Saugus Motor Speedway, a dirt-oval cart race track, is present south of the Soledad Canyon Road. A large above ground pipe (Los Angeles Aqueduct) crosses the eastern portion of the Site from north to south. A dirt road runs parallel to the aqueduct across the Site.

The 1940 San Fernando and 1941 Santa Susana 15-Minute Topographic Quadrangle Maps show the Site to be little changed since the 1928 photograph, except for the presence of six buildings identified as Camp No. 4 in the small valley in the central portion of the Site. The southern portion of the Site appears to be part of the Bonelli Ranch. A line of electrical transmission towers is present at the east boundary of the Site.

The 1947 aerial photographs (Tubis, 1″ = 666′) show buildings of Camp 4 in the small canyon with a well graded road from Bouquet Canyon Road to the camp. The area south of the road and north of the Santa Clara River appears to be planted with row crops. Three areas of the terrace east of the small valley has been plowed, apparently for hay. Row crops are present of the flat land north of the Site. The eastern portion of the Site, from the aqueduct to the east boundary is little changed since the 1928 photograph.

The 1952 aerial photographs (Pacific Air, 1″ = 555′) show the Site and Site vicinity to be little changed since the 1947 photograph.

The 1968 aerial photographs (Teledyne, 1"=666') show the Site to be little changed since the 1952 photograph. The terrace area appears to be fallow. A drive-in movie theater is present southeast of the Site between Soledad Canyon Road and the Santa Clara River and between the aqueduct and the electrical transmission towers. A commercial building is present south of the Soledad Canyon Road, south of the drive-in theater. The Saugus Motor Speedway is configured with the oval track with a figure-8 track inside. The dirt road (Newhall Ranch Road) to Camp 4 appears to be paved. A residential neighborhood has been developed northwest of the Site, east of Bouquet Canyon Road. The area north of the central portion of the Site has been developed with a cluster of rectangular buildings identified on the topographic map as Bouquet Canyon Boys Camp (Plate 1). A dirt road and pad area are present just off-Site along the west portion of the northern Site boundary when the location of the "Lucky Lusty" No. 1 oil well may have been.

The 1976 aerial photographs (Teledyne, 1"=1,000') show the Site to be little changed since the 1968 photograph. The intersection of Soledad Canyon Road and Bouquet Canyon Road is developed with at least 3 gasoline stations and other small commercial buildings.

The 1989 aerial photographs (USGS, 1"= 666') show little change to the Site since the 1976 photograph except for the presence of an area of L shaped asphalt pavement located on the terrace in the central portion of the Site, east of the small valley. The east-west pavement section is approximately 400 feet long and the north-south pavement section is approximately 250 feet long. The pavement has the appearance of a landing strip, but due to its short length it may have been used for model aircraft. There are no structures visible near the pavement. There is continued development in the Site vicinity. A shopping center is present at the northwest corner of the Site along the east side of Bouquet Canyon Road. Newhall Ranch Road has been improved along the south side of the shopping center. A large water tank is present on the ridge north of the Site (where the oil well may have been located). The flat land southeast of the Site and north of Soledad Canyon Road (area of the former drive-in movie theater) has been developed as a mobile home park.

The 1994 aerial photographs (USGS, 1"=666') show significant grading of the hill side along the northern portion of the Site and in the west central portion of the Site south of Newhall Ranch Road and north of the Santa Clara River. The northern hill side has been benched and a wide, east to west trace of flat ground is present at the base of the cut (current location of the Castaic Lake Water Agency underground pipeline and future alignment of Newhall Ranch Road). The buildings in the small valley are still present. Dirt roads are present on the terraces east of the small valley near the L-shaped area of pavement. The area north of the Site (former Bouquet Canyon Boys Camp) is being graded and new construction is evident (Castaic Lake Water Agency treatment plant). Two dirt side roads are present off the main dirt road that access the two groundwater production wells on the north side of the Santa Clara River (Valencia Water Company Wells T2 and T4).

Based on the historic aerial photograph and topographic map review, a camp with at least 6 buildings and support equipment has been located in the small valley in the central portion of the Site since at least 1941. There are two groundwater production wells and possibly three abandon, dry oil wells on the Site. The Los Angeles Aqueduct and electrical transmission towers are present in the eastern portion of the Site. Except for major Site grading for water utilities between 1989 and 1994, the majority of the Site has been generally undeveloped land until today.

3.5 Site Reconnaissance

On October 11 and 23, 2002, an AET representative visited the Site to observe Site conditions. The Site was accessed from Newhall Ranch Road from Bouquet Canyon Road and from the aqueduct road from Soledad Canyon Road. All portions of the Site were observed from existing paved and dirt roads on the Site. The Santa Clara River bed, location along the southern portion of the Site north of Soledad Canyon Road, is environmentally unremarkable consisting of braided stream deposits of silt, sand, gravel and cobbles with scattered vegetation.

The middle portion of the Site consists of flat land along the north bank of the Santa Clara River and gently south sloping terraces with a small valley in the central portion of the Site (Photographs 1 and 2, Attachment A). A pile of asphalt was observed on the edge of the east terrace (Photograph 3). The asphalt is likely from the former L-shaped pavement observed on the terrace in the 1989 aerial photograph. At the time of the Site visit the terrace was plowed fallow land. Paddle signs marking several buried water pipelines were observed in the middle portion of the Site. Two groundwater production wells were observed on the north bank of the Santa Clara River (VWC Wells T2 and T4) in the central portion of the Site. In the eastern one-third of the Site, the terrace is narrow or non-existent and the hills slope to the Santa Clara River flood plain. A large above-ground pipe (approximately 12 feet in diameter) crosses the Santa Clara River on concrete piers. The pipe, which carries water, is a section of the Los Angeles Aqueduct. Electric transmission towers were observed along the east Site boundary.

The northern portion of the Site consists of south facing hills, steep in part. In the northwest corner of the Site, the hills from a ridge with a north facing slope down a residential neighborhood north of the Site boundary. Significant hillside grading was observed along the north Site boundary. Utility vaults and paddle signs for a buried water pipe were observed in the "road cut" through the hills (Photograph 4). The water pipe is owned by the Castaic Lake Water Company and runs west across the northern portion of the Site of the water treatment plant located north of the Site.

The small valley in the central portion of the Site (Photograph 5), the only developed portion of the Site, was the former location of Los Angeles County Fire Camp 4, later occupied by the Saugus School District. At least 6 permanent buildings and two USTs were removed from the valley in 1995 through 1996. Staats Construction Company is the current tenant on the parcel. The office is located in a trailer (Photograph 6) in the central portion of the valley. A metal shed (maintenance shop) and a red wooden building are the only permanent structures currently on the parcel. The red wooden building is used for storage of Mr. Staats personal items such as a camp trailer, dirt bikes and classic motor cycles. An air compressor is located at the rear of the building. No staining was observed around the compressor.

The metal shed (Photograph 7) is used for equipment maintenance. The mechanic provided access to the shed. The shed contained a bead-blaster, a parts' washer, approximately 20 cases of quart cans of new motor oil and various parts stored on shelves. A waste storage area was observed on the south side of the shed (Photograph 8). The storage area had a concrete secondary containment, a metal roof and contained 12 55-gallon drum for storage of used oil, used antifreeze and used oil filters. The wastes are recycled on an as need basis by licensed waste haulers. According to the mechanic, maintenance on the large equipment is generally performed in the field at various job sites.

The valley currently contains remnants of concrete building pads from the former buildings, concrete foundations for above ground propane and diesel tanks, and out-of-service utility posts with water and electric service connections. Construction materials such as clay and steel pipes and valves are stored on the ground or on the concrete pads at various location in the northern portion of the valley. Three empty 55-gallon trash drums were stored up-side-down in one of the areas. Two portable sheds, 3 truck-trailer containers, and a house trailer (vacant mobile home) were observed along the east side of the valley. The sheds were observed to contain construction supplies, such as pipe-flange gaskets, large bolts, fire plugs, PVC and black plastic pipes. No liquids were observed in the sheds.

Ms. Judy Forbes of Staats Construction provided access to the waste hauler records for the Site. On September 6, 2002, Safety-Kleen recycled 50-gallons of used antifreeze and 200-gallons of used motor oil. On November 20, 2001, Benny's Oil Filter Service recycled 2 drums of used oil filters and 2 drums of floor sweep absorbent. Based on the waste hauler records, Staats Construction is disposing of wastes properly.

At the time of the Site visit no underground storage tanks, pits, ponds, stressed vegetation, significant debris or significantly stained soil were observed on the Site. Except for the portion of the Site occupied by Staats Construction (former Camp 4), no buildings were observed on the Site.

3.6 Adjacent Property Reconnaissance

Adjacent properties around the Site were observed by AET for evidence of recognized environmental conditions. West of the Site, along Bouquet Canyon Road at Soledad Canyon Road on the south and at Newhall Ranch Road on the north, are commercial/retail centers. The Santa Clara River flows under the Bouquet Canyon Road bridge. Northwest of the Site, on the north side of a topographic ridge, is a residential neighborhood. Further east, along the north side of the Site are: a water tank; undeveloped land; the Castaic Lake Water Company Rio Vista Water Treatment Plant; and more undeveloped land. East of the Site is undeveloped hill side and the Santa Clara River. South of the Site is Soledad Canyon Road and scattered commercial properties including the Saugus Motor Speedway. Further east, between Soledad Canyon Road and the Santa Clara River is a large mobile home park. No recognized environmental conditions were observed on the adjacent properties.

4.0 SUMMARY AND CONCLUSIONS

The following is a summary of the findings presented in this report.

- Based on historical aerial photographs and maps, the Site has been generally undeveloped land since prior to 1900. A small valley in the central portion of the Site was developed with Los Angeles County Fire Camp 4 prior to 1941 and last occupied by the Saugus School District. The structures in the small valley were demolished in 1996.

- Two USTs were removed from the small valley by the Saugus School District in 1995. Three groundwater monitoring wells were installed and monitored for three quarters. The wells were properly in 1997. A closure letter for the Site was requested from the DPW; however, due a change in personnel, a closure letter was inadvertently not issued. Based on the data in the file at the DPW, the Site was eligible for closure.

- The Site is not within 1.0 mile of a state or federal Superfund property (NPL).

- Properties listed on agency databases with environmental conditions within the Site vicinity have a low probability of having impacted the Site.

- AET personnel observed the Site on October 11 and 23, 2002. The Santa Clara River bed, location along the southern portion of the Site north of Soledad Canyon Road, is environmentally unremarkable consisting of braided stream deposits of silt, sand, gravel and cobbles with scattered vegetation. The middle portion of the Site consists of flat land along the north bank of the Santa Clara River and gently south sloping terraces with a small valley in the central portion of the Site. A pile of asphalt was observed on the edge of the east terrace that is likely from the former L-shaped pavement observed on the terrace in the 1989 aerial photograph. Two groundwater production wells were observed on the north bank of the Santa Clara River (VWC Wells T2 and T4) in the central portion of the Site. In the eastern one-third of the Site, the terrace is narrow or non-existent and the hills slope to the Santa Clara River flood plain. A large above-ground pipe, a section of the Los Angeles Aqueduct, crosses the eastern portion of the Site. Electric transmission towers were observed along the east Site boundary. The northern portion of the Site consists of south facing hills, steep in part. Significant hillside grading was observed along the north Site boundary. Utility vaults and paddle signs for a buried water pipe were observed in a number of locations on the Site. The small valley in the central portion of the Site, the only developed portion of the Site, was the former location of Los Angeles County Fire Camp 4, later occupied by the Saugus School District. Staats Construction Company is the current tenant on the parcel. The office is located in a trailer in the central portion of the valley. A metal shed (maintenance shop) and a red wooden building are the only permanent structures currently on the parcel. The metal shed is used for equipment maintenance. A waste storage area was observed on the south side of the shed that had concrete secondary containment, a metal roof and contained 12 55-gallon drum for storage of used oil, used antifreeze and used oil filters. The wastes are recycled on an as need basis by licensed waste haulers. Construction materials such as clay and steel pipes and valves are stored on the ground or on the concrete pads at

various location in the northern portion of the valley. Two portable sheds, 3 truck-trailer containers, and a house trailer (vacant mobile home) were observed to contain construction supplies, such as pipe-flange gaskets, large bolts, fire plugs, PVC and black plastic pipes. No liquids were observed in the sheds. Based on the waste hauler records, Staats Construction is disposing of wastes properly. At the time of the Site visit no underground storage tanks, pits, ponds, stressed vegetation, significant debris or significantly stained soil were observed on the Site. At the time of the Site visit, no significant environmental conditions were observed on adjacent properties.

Areas of potential concern (APCs) include the presence of three abandoned oil wells (dry holes) and a pile of asphalt fragments on the south edge of the central terrace. Because the oil wells were dry holes and did not produce oil, there is low probability that they impacted Site soil. However, the California Division of Oil, Gas and Geothermal Resources (DOGGR) regulates the development over abandoned oil wells. Prior to grading or construction, the well casings should be located and exposed for inspection by DOGGR personnel. If grading plans lower the ground elevation over the abandoned wells, the developer is responsible to reabandon the well to the appropriate elevation with DOGGR oversight. The pile of broken asphalt should remain segregated and be recycled for road base when construction begins, or be disposed off-Site.

It is AET's opinion that the identified APCs have not significantly impacted the Site. The asphalt is stockpile on the ground surface and can be easily recycled or disposed. Any soil impacted with petroleum hydrocarbons, if any, that may be encountered near the abandoned oil wells during grading operations can be properly handled at the time by following the procedures set out in a subsurface Workplan.

Based on the information presented above, it is AET's opinion that there are no recognized environmental conditions, as defined above, at the Site.

5.0 LIMITATIONS

This report has been prepared for Impact Sciences on behalf of Newhall Land and Farming, as a Phase I Environmental Site Assessment of a 664 acre property extending 0.3 mile to 0.9 mile north of Soledad Canyon Road between Bouquet Canyon Road on the west and electric transmission towers on the east, in the City of Santa Clarita, Los Angeles County, California. Parties not designated by Impact Sciences should not rely on the information in this report without the written consent of AET. In performing the professional services, AET applied present engineering and scientific judgement and used a level of effort consistent with the standard of practice measured on the date of this report and in the locale of the project Site for similar type studies. Applied Environmental Technologies, Inc., makes no warranty, expressed or implied, in fact or by law, whether of merchantability, fitness for any particular purpose, or otherwise, concerning any of the materials or "services" furnished by Applied Environmental Technologies, Inc., to the client.

Inferences with respect to potential subsurface contamination are based on a review of readily available government and historical records and Site reconnaissance. The findings and interpretations in this report have been developed based on the review of existing information pertaining to the subject Site. It should be recognized that subsurface contamination can vary laterally and with depth below a given Site.

References

The following resources and agencies were reviewed or contacted for information pertaining to the subject property:

Environmental Data Resources, Inc., Historical Aerial Photographs dated 1928, 1947, 1952, 1968, 1976, 1989 and 1994.

Environmental Data Resources, Inc., Historical Topographic Maps dated 1900 - 1901 and 1940 - 1941.

Environmental Data Resources, Inc., Radius Map Report, September 25, 2002.

Los Angeles County Department of Public Works, Underground Storage Tank File Review, September 2002.

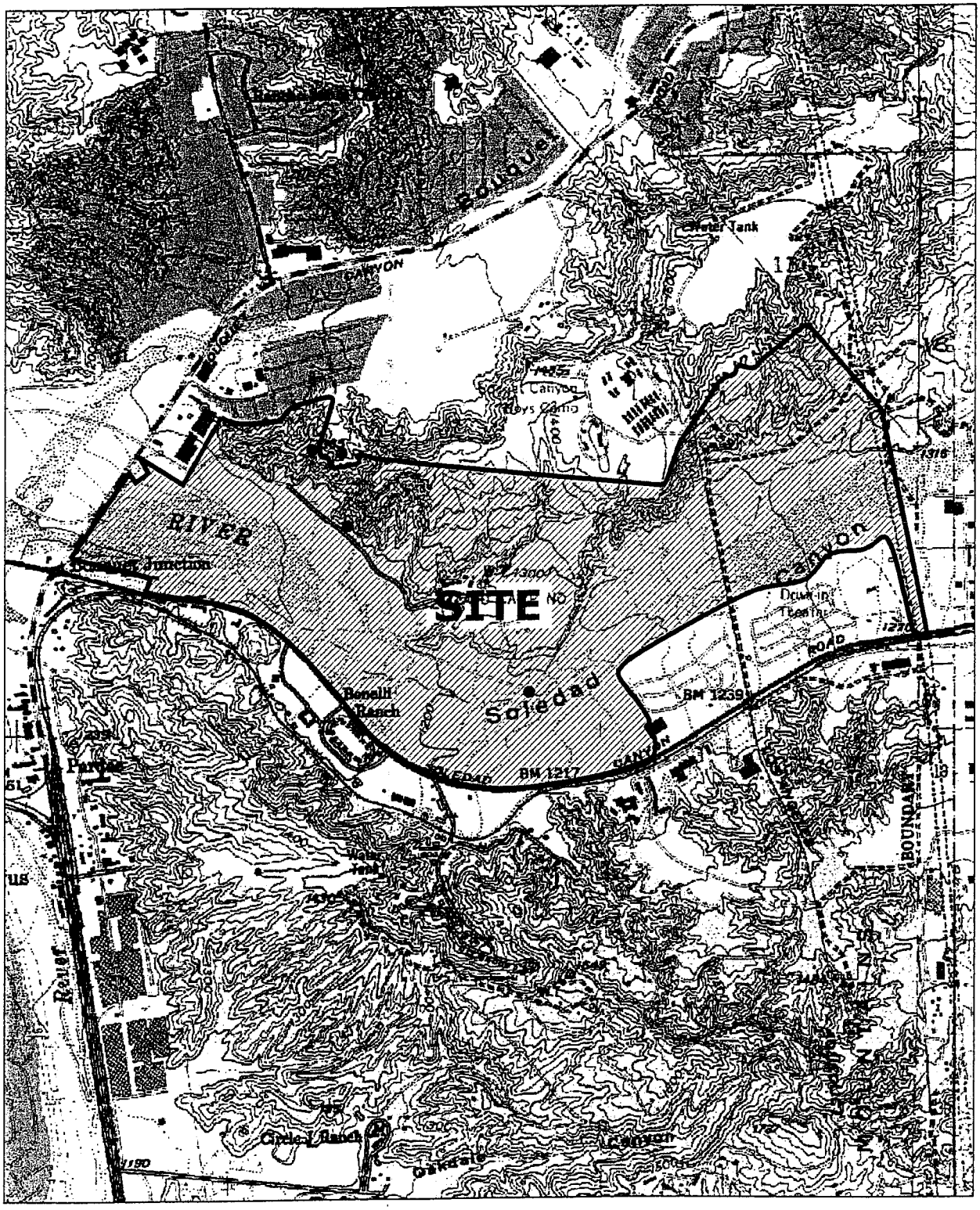
Newhall Land and Farming, File Review, September 2002.

Munger Map Book of California-Alaska Oil and Gas Fields, May 1990 Edition.

U. S. Geological Survey, 7.5-Minute Topographic Map Series, Newhall, California Quadrangle, 1952, revised 1988.

Valencia Water Company, personal communication, October 2002.

Plate



0' 2000' 1 MILE

SCALE - 1" = 2000' AT 8.5" x 11"

LEGEND

● ABANDONED OIL WELLS

Applied Environmental Technologies, Inc.
4561 Market Street, Suite B • Ventura, California 93003
Phone (805)650-1400 Fax (805)650-1576

SITE LOCATION MAP

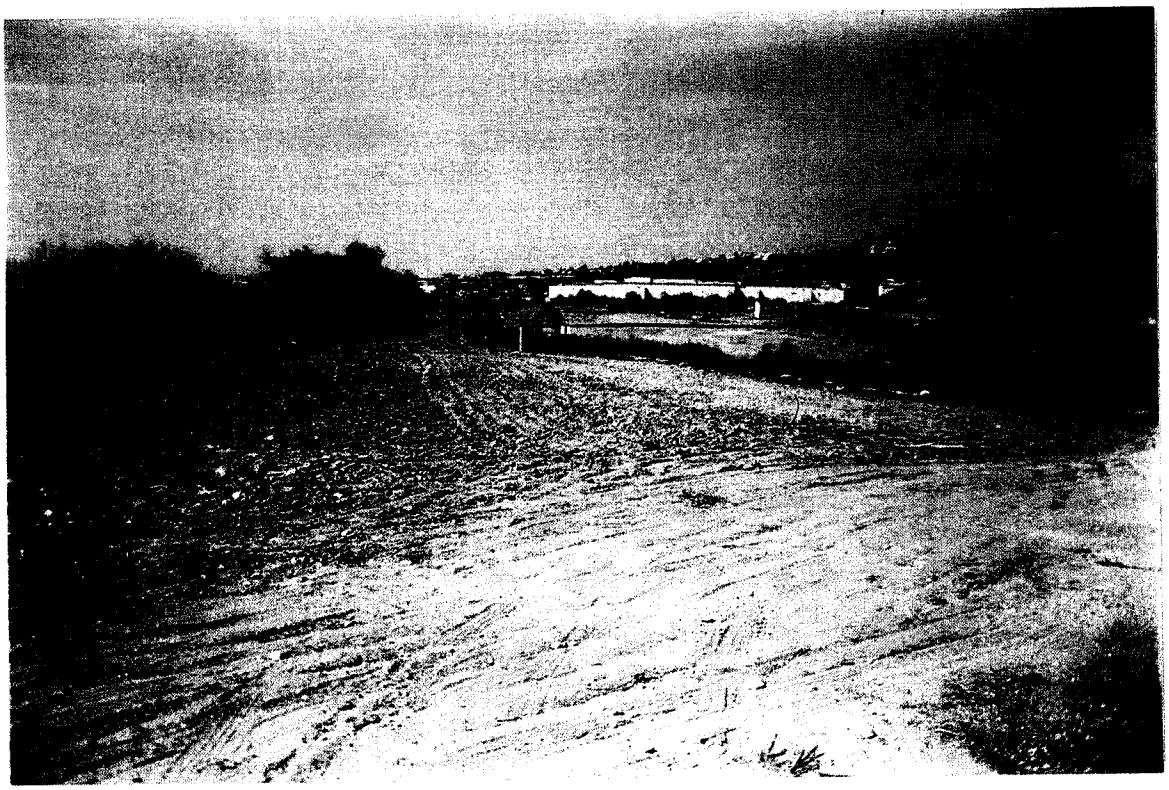
664 ACRE RIVERPARK PROJECT TRACT 53425
SANTA CLARITA, CALIFORNIA

PLATE REFERENCE 016119P1A	NOVEMBER 7, 2002	PROJECT NUMBER 0161-19

PLATE 1

Appendix A

Representative Photographs

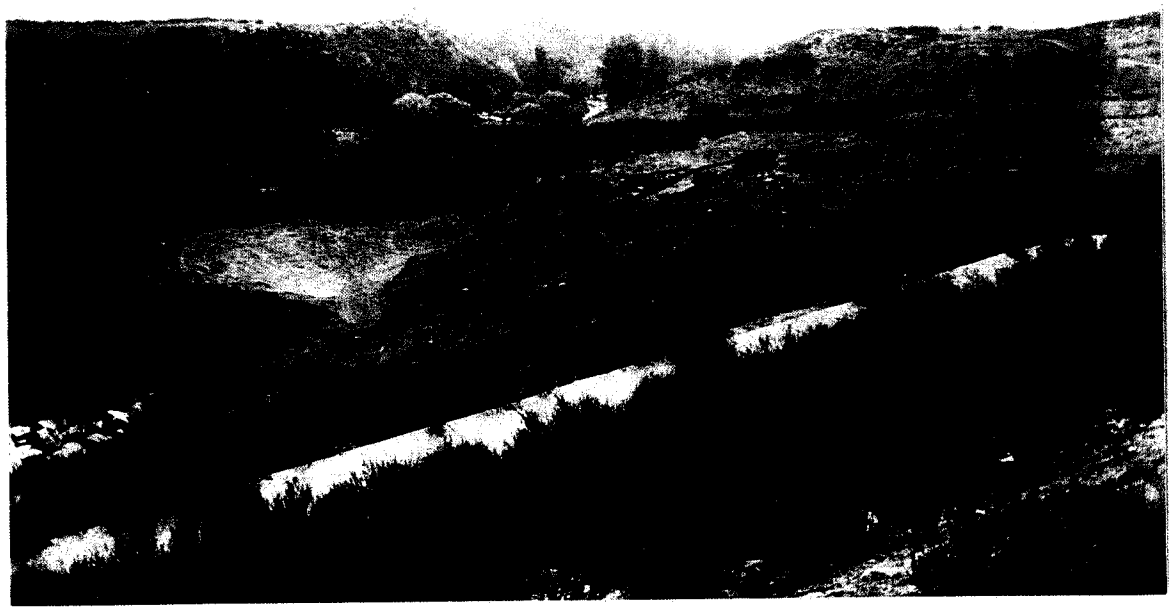


PHOTOGRAPH 1 - View looking west from the central portion of the Site. The rear of the shopping center on Bouquet Canyon Road is seen in the center of view (white buildings). Newhall Ranch Road is along the base of the hill on the right and the Santa Clara River is to the left of the view. The area in the foreground has been graded and a buried water pipeline is identified by warning posts as seen in the center of the view.

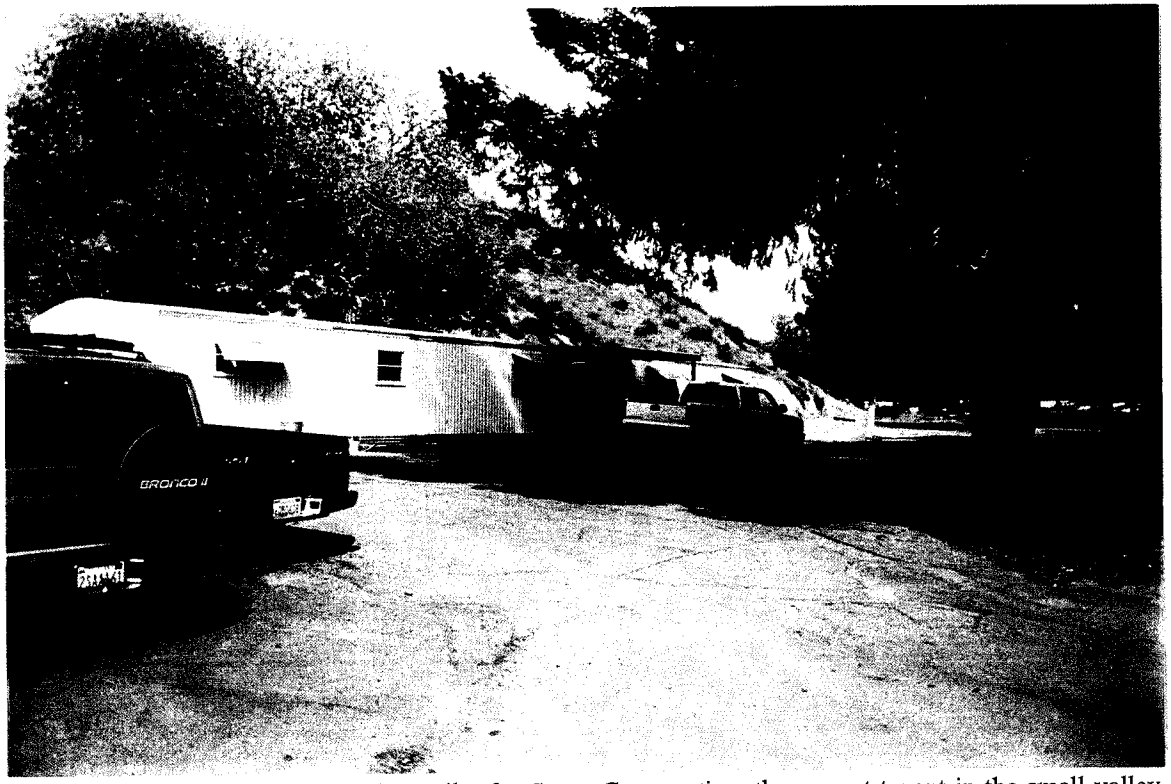
PHOTOGRAPH 2 - View to the west from the southeast corner of the terrace east of the small valley. The water tank in the foreground was formerly used by Camp 4 and is not in use Site. The large water tank on the skyline is just off-site near the location of former oil well. An L-shaped area of asphalt (small landing strip) was to the right of the view.

PHOTOGRAPH 3 - View looking northward from the top of a pile of asphalt located at the south edge of the terrace (likely the asphalt from the former landing strip).

PHOTOGRAPH 4 - View looking westward along the northern Site boundary. The large water tank is on the top of the hill. Castaic Lake Water Company utility vaults are in the foreground. The buried pipeline extends to the west beneath the road cut (future Newhall Ranch Road alignment).



PHOTOGRAPH 5 - View looking southward from the top of the road cut down the small valley in the central portion of the Site where the former Los Angeles County Camp 4 was located. The old water tank can be seen on the ridge line of the terrace (near tank in Photograph 2).



PHOTOGRAPH 6 - View of the office trailer for Staats Construction, the current tenant in the small valley (former Camp 4 and Saugus School District area). Staats uses the parcel for a storage yard for construction materials and equipment.

PHOTOGRAPH 7 - View looking southward from Staats office trailer. The metal building is used for equipment maintenance and storage. The former gasoline and diesel tanks removed in 1995 where located to the left of the building along the dirt berm of the creek where the trucks are currently parked.

PHOTOGRAPH 8 - View of the waste oil, antifreeze and used oil filter drum storage area south of the maintenacne building. The area has secondary containment and is covered. Wastes are manifested and recycled by a licensed contract waste-hauler on an as need basis. Most equipment maintenance is performed in the field at the various job sites.

Appendix B

EDR-Radius Map Report

The EDR Radius Map

Riverpark-Valencia
664 Acre Bonelli Ranch
Santa Clarita, CA 91350

Inquiry Number: 851417.3s

September 25, 2002

Environmental Data Resources, Inc.

The Source For Environmental Risk Management Data

3530 Post Road
Southport, Connecticut 06890

Nationwide Customer Service

Telephone: 1-800-352-0050
Fax: 1-800-231-6802
Internet: www.edrnet.com

FORM-ACP

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Thank you for your business.
Please contact EDR at 1-800-352-0050
with any questions or comments.

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EXECUTIVE SUMMARY

A search of available environmental records was conducted by Environmental Data Resources, Inc. (EDR). The report meets the government records search requirements of ASTM Standard Practice for Environmental Site Assessments, E 1527-00. Search distances are per ASTM standard or custom distances requested by the user.

TARGET PROPERTY INFORMATION

ADDRESS

664 ACRE BONELLI RANCH
SANTA CLARITA, CA 91350

COORDINATES

Latitude (North):	34.421200 - 34° 25' 16.3"
Longitude (West):	118.518500 - 118° 31' 6.6"
Universal Tranverse Mercator:	Zone 11
UTM X (Meters):	360456.6
UTM Y (Meters):	3809709.0

USGS TOPOGRAPHIC MAP ASSOCIATED WITH TARGET PROPERTY

Target Property:	2434118-D5 NEWHALL, CA
Source:	USGS 7.5 min quad index

TARGET PROPERTY SEARCH RESULTS

The target property was not listed in any of the databases searched by EDR.

DATABASES WITH NO MAPPED SITES

No mapped sites were found in EDR's search of available ("reasonably ascertainable ") government records either on the target property or within the ASTM E 1527-00 search radius around the target property for the following databases:

FEDERAL ASTM STANDARD

NPL ---------- National Priority List
Proposed NPL ---------- Proposed National Priority List Sites
CERCLIS ---------- Comprehensive Environmental Response, Compensation, and Liability Information System

STATE ASTM STANDARD

Notify 65 ---------- Proposition 65 Records
Toxic Pits ---------- Toxic Pits Cleanup Act Sites
WMUDS/SWAT ---------- Waste Management Unit Database
CA BOND EXP. PLAN ---------- Bond Expenditure Plan

FEDERAL ASTM SUPPLEMENTAL

CONSENT ---------- Superfund (CERCLA) Consent Decrees
ROD ---------- Records Of Decision
Delisted NPL ---------- National Priority List Deletions

EXECUTIVE SUMMARY

HMIRS..... Hazardous Materials Information Reporting System
MLTS..... Material Licensing Tracking System
MINES..... Mines Master Index File
NPL Liens..... Federal Superfund Liens
PADS..... PCB Activity Database System
FTTS..... FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)

STATE OR LOCAL ASTM SUPPLEMENTAL

DEED..... List of Deed Restrictions
AOCONCERN..... San Gabriel Valley Areas of Concern

EDR PROPRIETARY HISTORICAL DATABASES

See the EDR Proprietary Historical Database Section for details

SURROUNDING SITES: SEARCH RESULTS

Surrounding sites were identified.

Elevations have been determined from the USGS 1 degree Digital Elevation Model and should be evaluated on a relative (not an absolute) basis. Relative elevation information between sites of close proximity should be field verified. EDR's definition of a site with an elevation equal to the target property includes a tolerance of +/- 10 feet. Sites with an elevation equal to or higher than the target property have been differentiated below from sites with an elevation lower than the target property (by more than 10 feet). Page numbers and map identification numbers refer to the EDR Radius Map report where detailed data on individual sites can be reviewed.

Sites listed in ***bold italics*** are in multiple databases.

Unmappable (orphan) sites are not considered in the foregoing analysis.

FEDERAL ASTM STANDARD

CERCLIS-NFRAP: As of February 1995. CERCLIS sites designated "No Further Remedial Action Planned" (NFRAP) have been removed from CERCLIS. NFRAP sites may be sites where, following an initial investigation, no contamination was found, contamination was removed quickly without the need for the site to be placed on the NPL, or the contamination was not serious enough to require Federal Superfund Action or NPL consideration. EPA has removed approximately 25,000 NFRAP sites to lift the unintended barriers to the redevelopment of these properties and has archived them as historical records so EPA does not needlessly repeat the investigations in the future. This policy change is part of the EPA's Brownfields Redevelopment Program to help cities, states, private investors and affected citizens to promote economic redevelopment of unproductive urban sites.

A review of the CERC-NFRAP list, as provided by EDR, and dated 05/15/2002 has revealed that there are 4 CERC-NFRAP sites within approximately 1.5 miles of the target property.

Equal/Higher Elevation	Address	Dist / Dir	Map ID	Page
GLASS SEAL CORPORATION	21516 WEST GOLDEN TRIAN	1/2 - 1 SE	C14	10
AMERICAN CYANAMID	***21444 GOLDEN TRIANGLE R***	***1/2 - 1 SE***	***D25***	***13***
Lower Elevation	**Address**	**Dist / Dir**	**Map ID**	**Page**
HASA CHEM INC	***23119 DRAYTON ST***	***1 - 2 WSW***	***AY324***	***187***

Lower Elevation	Address	Dist / Dir	Map ID	Page
KEYSOR-CENTURY CORP.	*26000 SPRINGBROOK AVE.*	*1 - 2 SW*	*BA342*	*200*

CORRACTS: CORRACTS is a list of handlers with RCRA Corrective Action Activity. This report shows which nationally-defined corrective action core events have occurred for every handler that has had corrective action activity.

A review of the CORRACTS list, as provided by EDR, and dated 05/02/2002 has revealed that there are 2 CORRACTS sites within approximately 1.5 miles of the target property.

Equal/Higher Elevation	Address	Dist / Dir	Map ID	Page
AMERICAN CYANAMID	*21444 GOLDEN TRIANGLE R*	*1/2 - 1 SE*	*D25*	*13*
Lower Elevation	**Address**	**Dist / Dir**	**Map ID**	**Page**
BERMITE DIVISION	*22116 WEST SOLEDAD CANY*	*1/2 - 1 SW*	*E34*	*21*

RCRIS: The Resource Conservation and Recovery Act database includes selected information on sites that generate, store, treat, or dispose of hazardous waste as defined by the Act. The source of this database is the U.S. EPA.

A review of the RCRIS-TSD list, as provided by EDR, and dated 07/10/2002 has revealed that there are 2 RCRIS-TSD sites within approximately 1.5 miles of the target property.

Equal/Higher Elevation	Address	Dist / Dir	Map ID	Page
AMERICAN CYANAMID	*21444 GOLDEN TRIANGLE R*	*1/2 - 1 SE*	*D25*	*13*
Lower Elevation	**Address**	**Dist / Dir**	**Map ID**	**Page**
BERMITE DIVISION	*22116 WEST SOLEDAD CANY*	*1/2 - 1 SW*	*E34*	*21*

RCRIS: The Resource Conservation and Recovery Act database includes selected information on sites that generate, store, treat, or dispose of hazardous waste as defined by the Act. The source of this database is the U.S. EPA.

A review of the RCRIS-LQG list, as provided by EDR, and dated 07/10/2002 has revealed that there is 1 RCRIS-LQG site within approximately 1.5 miles of the target property.

Equal/Higher Elevation	Address	Dist / Dir	Map ID	Page
AMERICAN CYANAMID	*21444 GOLDEN TRIANGLE R*	*1/2 - 1 SE*	*D25*	*13*

RCRIS: The Resource Conservation and Recovery Act database includes selected information on sites that generate, store, treat, or dispose of hazardous waste as defined by the Act. The source of this database is the U.S. EPA.

A review of the RCRIS-SQG list, as provided by EDR, and dated 07/10/2002 has revealed that there are 46 RCRIS-SQG sites within approximately 1.5 miles of the target property.

Equal/Higher Elevation	Address	Dist / Dir	Map ID	Page
CASTAIC LAKE WATER AGNCY	*27234 BOUQUET CANYON RD*	*1 - 2 N*	*L68*	*46*

EXECUTIVE SUMMARY

Equal/Higher Elevation	Address	Dist / Dir		Map ID	Page
MARANATHA CHEVROLET	*26770 OAK AVE*	*1 - 2*	*E*	*M78*	*49*
PACIFIC EXPO	*26776 OAK AVE*	*1 - 2*	*E*	*M79*	*50*
VON CO TOOL	*26778 OAK AVE*	*1 - 2*	*E*	*M81*	*51*
NATIONAL METAL STAMPINGS INC	*26796 OAK AVENUE*	*1 - 2*	*E*	*M86*	*53*
HONDA OUTPOST	*26724 OAK AVE UNIT C*	*1 - 2*	*E*	*K91*	*56*
WM S HART UNIFIED SCHOOL DIST	*21429 REDVIEW DR*	*1 - 2*	*SE*	*P95*	*58*
STUDIO CITY SPORTS CARS	*26846 OAK AVE BLDG 5*	*1 - 2*	*E*	*O100*	*60*
G W FRANZ GRINDING	*26818 OAK AVE UNIT L*	*1 - 2*	*E*	*O102*	*61*
D K TRUCKING	*20811 SANTA CLARA ST*	*1 - 2*	*ENE*	*Q107*	*64*
ADROS CUSTOM WOOD FINISHING	*26524 GOLDEN VALLEY*	*1 - 2*	*ESE*	*AA158*	*91*
INLAND PACIFIC MTR	*26502 GOLDEN VALLEY RD*	*1 - 2*	*ESE*	*AA159*	*91*
BENS TEK	*26536 GOLDEN VALLEY RD*	*1 - 2*	*ESE*	*AA160*	*91*
RUSSELL DUNN AUTOMOTIVE	*26821 RUETHER UNIT G*	*1 - 2*	*E*	*AD184*	*106*
POINTS WEST	*20727 SANTA CLARA ST*	*1 - 2*	*ENE*	*AE195*	*112*
SOUTHWEST INDUSTRIES	*26911 RUETHER AVE STE S*	*1 - 2*	*E*	*AC197*	*114*
NATIONAL READY MIX	27050 RUETHER AVE	1 - 2	ENE	AE206	119
DISCOUNT TIRE CENTERS	*20737 SOLEDAD CANYON RD*	*1 - 2*	*E*	*AD210*	*120*
IMPORT AUTO CARE	*20723 SOLEDAD CANYON RD*	*1 - 2*	*E*	*AI215*	*124*
R C ACRYLICS	*20665 SANTA CLARA*	*1 - 2*	*ENE*	*AL239*	*140*
HI-SHEAR TECHNOLOGY CORP	*26413 N GOLDEN VALLEY R*	*1 - 2*	*SE*	*AM251*	*145*
BLUE CROSS LABORATORIES	*26411 N GOLDEN VALLEY R*	*1 - 2*	*SE*	*AM253*	*146*
EDS CLEANERS	*20655 SOLEDAD CANYON RD*	*1 - 2*	*E*	*AO259*	*150*
BROWN AUTO BODY	*26935 FURNIVALL*	*1 - 2*	*E*	*AO268*	*155*
EUROPEAN AUTO CENTER	*27134 FURNIVALL AVE*	*1 - 2*	*ENE*	*AR289*	*169*
MIKES TIREMAN	*20529 SOLEDAD CANYON RD*	*1 - 2*	*E*	*AZ338*	*197*
JERRY AUTOMATIC TRANSMISSIONS	*20501 SOLEDAD CYN ROAD*	*1 - 2*	*E*	*AZ356*	*210*
JIM DANDY	*27600 BOUGUET CYN RD*	*1 - 2*	*NNE*	*BD362*	*215*
WM S HART USD SAUGUS HS	*21900 W CENTURION WY*	*1 - 2*	*N*	*364*	*216*

Lower Elevation	Address	Dist / Dir		Map ID	Page
BERMITE DIVISION	*22116 WEST SOLEDAD CANY*	*1/2 - 1*	*SW*	*E34*	*21*
RITE AID NO 5555	*26825 BOUQUET CYN RD*	*1 - 2*	*NW*	*U117*	*68*
SHELL SERVICE STATION	26801 BOQUET CANYON ROA	1 - 2	NW	U121	71
CLARKS DRUGS 21	*26550 BOUQET CANYON RD*	*1 - 2*	*WNW*	*W129*	*76*
FLAMINGO CLEANERS	*26512 BOQUET CYN RD*	*1 - 2*	*WNW*	*Z144*	*85*
CHEVRON STN 9 2437	*26753 BOUQUET CANYON RD*	*1 - 2*	*NW*	*X147*	*86*
SECO ONE HOUR MARTINIZING	*26830 SECO CYN RD*	*1 - 2*	*NW*	*AF190*	*109*
TEAM ENTERPRISES INC	26830 SECO CYN RD	1 - 2	NW	AF192	111
CHEVRON STATION 97436	*23055 SOLEDAD CYN RD*	*1 - 2*	*W*	*AK236*	*137*
GLORY CLEANERS	*23142 VALENCIA*	*1 - 2*	*W*	*AT301*	*173*
VALENCIA DODGE	*26011 BOQUET CANYON RD*	*1 - 2*	*WSW*	*AX318*	*184*
HASA CHEM INC	*23119 DRAYTON ST*	*1 - 2*	*WSW*	*AY324*	*187*
KEYSOR-CENTURY CORP.	*26000 SPRINGBROOK AVE.*	*1 - 2*	*SW*	*BA342*	*200*
HI TECH TRANSMISSION	*25845 SAN FERNANDO RD*	*1 - 2*	*WSW*	*BB346*	*204*
VALENCIA AUTOMOTIVE CENTER MD	*25835 SAN FERNANDO RD*	*1 - 2*	*WSW*	*BC351*	*206*
A & K BODY & FENDER	*25834 SPRINGBROOK AVE*	*1 - 2*	*SW*	*BE375*	*221*
MIDAS MUFFLER	*25745 SAN FERNANDO RD*	*1 - 2*	*SW*	*BG381*	*225*

ERNS: The Emergency Response Notification System records and stores information on reported releases of oil and hazardous substances. The source of this database is the U.S. EPA.

A review of the ERNS list, as provided by EDR, and dated 12/31/2001 has revealed that there are 12 ERNS sites within approximately 1.5 miles of the target property.

Equal/Higher Elevation	Address	Dist / Dir		Map ID	Page
21444 GOLDEN TRIANGLE RD	21444 GOLDEN TRIANGLE R	1/2 - 1	SE	D17	12

EXECUTIVE SUMMARY

Equal/Higher Elevation	Address	Dist / Dir	Map ID	Page
21444 GOLDEN TRIANGLE	21444 GOLDEN TRIANGLE	1/2 - 1 SE	D18	12
21444 GOLDEN TRIANGLE	21444 GOLDEN TRIANGLE	1/2 - 1 SE	D20	12
21444 GOLDEN TRIANGLE RD	21444 GOLDEN TRIANGLE R	1/2 - 1 SE	D21	12
21444 GOLDEN TRIANGLE RD	21444 GOLDEN TRIANGLE R	1/2 - 1 SE	D23	12
21444 GOLDEN TRIANGLE RD	21444 GOLDEN TRIANGLE R	1/2 - 1 SE	D24	13
21361 SOLEDAD CANYON RD.	21361 SOLEDAD CANYON RD	1/2 - 1 ESE	41	29
26417 GOLDEN VALLEY RD	26417 GOLDEN VALLEY RD	1 - 2 SE	AM250	145
22520 BARBACOA DR.	22520 BARBACOA DR.	1 - 2 NNW	345	204

Lower Elevation	Address	Dist / Dir	Map ID	Page
22211 W. NEWHALL RANCH RD	22211 W. NEWHALL RANCH	1 - 2 WNW	N73	47
23119 DRAYTON ST.	23119 DRAYTON ST.	1 - 2 WSW	AY326	190
CORNER SAN FERNANDO RD. AND DR	CORNER SAN FERNANDO RD.	1 - 2 WSW	BC365	218

STATE ASTM STANDARD

AWP: California DTSC's Annual Workplan, formerly known as BEP, identifies known hazardous substance sites targeted for cleanup. The source is the California Environmental Protection Agency.

A review of the AWP list, as provided by EDR, and dated 07/05/2002 has revealed that there is 1 AWP site within approximately 1.5 miles of the target property.

Lower Elevation	Address	Dist / Dir	Map ID	Page
WHITTAKER/BERMITE FACILITY	***22116 WEST SOLEDAD CANY***	***1/2 - 1 SW***	***E28***	***18***

CAL-SITES: Formerly known as ASPIS, this database contains both known and potential hazardous substance sites. The source is the California Department of Toxic Substance Control.

A review of the Cal-Sites list, as provided by EDR, has revealed that there are 5 Cal-Sites sites within approximately 1.5 miles of the target property.

Equal/Higher Elevation	Address	Dist / Dir	Map ID	Page
WILLIAM S. HART UNION SCHOOL D	21469 REDVIEW DRIVE	1/2 - 1 SE	53	35
MERLE NORMAN COSMETICS, INC.	26407 N. GOLDEN VALLEY	1 - 2 SE	AM278	161

Lower Elevation	Address	Dist / Dir	Map ID	Page
WHITTAKER BERMITE/RAIL STATION	22116 WEST SOLEDAD CANY	1/2 - 1 SW	E27	17
WHITTAKER/BERMITE FACILITY	***22116 WEST SOLEDAD CANY***	***1/2 - 1 SW***	***E28***	***18***
KEYSOR-CENTURY CORPORATION	26000 SPRINGBROOK ROAD	1 - 2 SW	BA339	197

CHMIRS: The California Hazardous Material Incident Report System contains information on reported hazardous material incidents, i.e., accidental releases or spills. The source is the California Office of Emergency Services.

A review of the CHMIRS list, as provided by EDR, and dated 12/31/1994 has revealed that there are 9 CHMIRS sites within approximately 1.5 miles of the target property.

Equal/Higher Elevation	Address	Dist / Dir	Map ID	Page
Not reported	26477 GOLDEN TRIANGLE R	1/2 - 1 SE	C38	27

EXECUTIVE SUMMARY

Equal/Higher Elevation	Address	Dist / Dir	Map ID	Page
Not reported	21361 SOLEDAD CNY RD	1/2 - 1 ESE	F39	27
Not reported	SOLEDAD CANYON/REUTHER	1 - 2 E	116	67
Not reported	***26477 GOLDEN VALLEY RD***	***1 - 2 SE***	***AB164***	***94***
Not reported	20988 GOLDEN TRIANGLE	1 - 2 E	AG217	125
Not reported	26411 GOLDEN VALLEY RD	1 - 2 SE	AM254	148

Lower Elevation	Address	Dist / Dir	Map ID	Page
Not reported	***23119 DRAYTON***	***1 - 2 WSW***	***AY325***	***189***
Not reported	23119 DRAYTON ST	1 - 2 WSW	AY329	192
Not reported	25848 SPRINGBROOK RD	1 - 2 SW	BE369	218

CORTESE: This database identifies public drinking water wells with detectable levels of contamination, hazardous substance sites selected for remedial action, sites with known toxic material identified through the abandoned site assessment program, sites with USTs having a reportable release and all solid waste disposal facilities from which there is known migration. The source is the California Environmental Protection Agency/Office of Emergency Information.

A review of the Cortese list, as provided by EDR, has revealed that there are 15 Cortese sites within approximately 1.5 miles of the target property.

Equal/Higher Elevation	Address	Dist / Dir	Map ID	Page
GLASS SEAL CORPORATION	***21516 GOLDEN TRIANGLE R***	***1/2 - 1 SE***	***C8***	***8***
AMERICAN CYANAMID	***21444 GOLDEN TRIANGLE R***	***1/2 - 1 SE***	***D25***	***13***
NATIONAL READY MIXED CONCRETE	***27050 RUETHER AVE***	***1 - 2 ENE***	***AE204***	***116***
PACIFIC BELL	***26971 FURNIVALL AVE***	***1 - 2 E***	***AP275***	***158***

Lower Elevation	Address	Dist / Dir	Map ID	Page
BERMITE, DIVISION OF WHIT	22116 SOLEDAD CNYN	1/2 - 1 SW	E29	19
WHITTAKER BERMITE/RAIL ST	22116 SOLEDAD CNYN	1/2 - 1 SW	E30	19
WHITTAKER/BERMITE FACILIT	22116 SOLEDAD CNYN	1/2 - 1 SW	E32	20
SHELL	26801 BOUQUET CANYON RD	1 - 2 NW	U120	71
LA CO FIRE STATION #111	26829 SECO CANYON RD	1 - 2 NW	AF186	106
UNOCAL #5518	26279 BOUQUET CANYON RD	1 - 2 W	AJ221	129
CHEVRON #9-7436 (FORMER)	23055 SOLEDAD CANYON RD	1 - 2 W	AK234	136
SANTA CLARITA CAR WASH INC	***23105 VALENCIA BLVD***	***1 - 2 W***	***AQ281***	***164***
WORTMANN OIL CO	26954 SECO CANYON RD	1 - 2 NW	AU302	175
Not reported	***23119 DRAYTON***	***1 - 2 WSW***	***AY325***	***189***
KEYSOR-CENTURY CORPORATIO	***26000 SPRINGBROOK***	***1 - 2 SW***	***BA340***	***198***

SWF/LF: The Solid Waste Facilities/Landfill Sites records typically contain an inventory of solid waste disposal facilities or landfills in a particular state. The data come from the Integrated Waste Management Board's Solid Waste Information System (SWIS) database.

A review of the SWF/LF list, as provided by EDR, has revealed that there is 1 SWF/LF site within approximately 1.5 miles of the target property.

Equal/Higher Elevation	Address	Dist / Dir	Map ID	Page
MIKE'S TIREMAN INC	***20529 SOLEDAD CANYON RD***	***1 - 2 E***	***AZ336***	***196***

EXECUTIVE SUMMARY

LUST: The Leaking Underground Storage Tank Incident Reports contain an inventory of reported leaking underground storage tank incidents. The data come from the State Water Resources Control Board Leaking Underground Storage Tank Information System.

A review of the LUST list, as provided by EDR, and dated 07/11/2002 has revealed that there are 15 LUST sites within approximately 1.5 miles of the target property.

Equal/Higher Elevation	Address	Dist / Dir		Map ID	Page
GLASS SEAL CORPORATION	***21516 GOLDEN TRIANGLE R***	***1/2 - 1***	***SE***	***C8***	***8***
NATIONAL READY MIXED CONCRETE	***27050 RUETHER AVE***	***1 - 2***	***ENE***	***AE204***	***116***
PACIFIC BELL	***26971 FURNIVALL AVE***	***1 - 2***	***E***	***AP275***	***158***

Lower Elevation	Address	Dist / Dir		Map ID	Page
BERMITE DIVISION	***22116 WEST SOLEDAD CANY***	***1/2 - 1***	***SW***	***E34***	***21***
SHELL	***26801 BOUQUET CANYON RD***	***1 - 2***	***NW***	***U122***	***72***
LA CO FIRE STATION #111	26829 SECO CANYON RD	1 - 2	NW	AF187	107
LA CO FIRE STATION #111	26829 SECO CANYON RD	1 - 2	NW	AF188	108
UNOCAL	***502 BEAUMONT AVE***	***1 - 2***	***W***	***200***	***115***
UNOCAL #5518	26279 BOUQUET CANYON RD	1 - 2	W	AJ223	129
CHEVRON STATION 97436	***23055 SOLEDAD CYN RD***	***1 - 2***	***W***	***AK236***	***137***
EXXON #7-3550 (FORMER)	23060 SOLEDAD CANYON RD	1 - 2	W	AK245	143
ARCO #1974	23105 VALENCIA BLVD	1 - 2	W	AQ283	165
WORTMANN OIL CO	26954 SECO CANYON RD	1 - 2	NW	AU304	175
P & M #987/TEXACO (FORMER)	26015 BOUQUET CANYON RD	1 - 2	WSW	AX315	181
HASA CHEM INC	***23119 DRAYTON ST***	***1 - 2***	***WSW***	***AY324***	***187***

UST: The Underground Storage Tank database contains registered USTs. USTs are regulated under Subtitle I of the Resource Conservation and Recovery Act (RCRA). The data come from the State Water Resources Control Board's Hazardous Substance Storage Container Database.

A review of the UST list, as provided by EDR, and dated 01/17/2002 has revealed that there are 16 UST sites within approximately 1.5 miles of the target property.

Equal/Higher Elevation	Address	Dist / Dir		Map ID	Page
RIO VISTA WTP PUMPING STA	27234 BOUQUET CANYON RD	1 - 2	N	L67	45
RIO VISTA WATER TREATMENT PLT	27236 BOUQUET CANYON RD	1 - 2	N	L71	46
WM HART UHSD - TRANSPORT DEPT	21429 REDVIEW DR	1 - 2	SE	P94	58
SANTA CLARITA WATER CO	21110 GOLDEN TRIANGLE R	1 - 2	E	S106	64
SAUGUS UNION SD TRANSPORTATION	***26501 GOLDEN VALLEY RD***	***1 - 2***	***ESE***	***V139***	***81***
POINTS WEST TRUCKING,INC.	20727 SANTA CLARA ST	1 - 2	ENE	AE194	112
PACIFIC BELL CNCYCAPB/KC652	26971 FURNIVALL AVE	1 - 2	E	AP273	157

Lower Elevation	Address	Dist / Dir		Map ID	Page
BOUQUET CANYON SHELL	26801 BOUQUET CANYON RD	1 - 2	NW	U123	73
CHEVRON USA SS 092437	26753 BOUQUET CANYON RD	1 - 2	NW	X145	85
DAKOTA VENTURES,LLC	26485 BOUQUET CANYON RD	1 - 2	WNW	Z162	94
TOSCO/UNOCAL #31309	23055 SOLEDAD CANYON RD	1 - 2	W	AK233	136
SAM'S MOBIL	***23060 SOLEDAD CANYON RD***	***1 - 2***	***W***	***AK244***	***143***
CROSS ROADS AUTO WASH	***23105 VALENCIA BLVD***	***1 - 2***	***W***	***AQ284***	***166***
LA CO SAN DIS-SAUGUS WRP	26200 SPRINGBROOK AVE	1 - 2	WSW	AS296	171
WORTMANN OIL CO	26954 SECO CANYON RD	1 - 2	NW	AU303	175
UNITED OIL #69	***26015 BOUQUET CANYON RD***	***1 - 2***	***WSW***	***AX313***	***180***

EXECUTIVE SUMMARY

CA FID: The Facility Inventory Database contains active and inactive underground storage tank locations. The source is the State Water Resource Control Board.

A review of the CA FID UST list, as provided by EDR, has revealed that there are 7 CA FID UST sites within approximately 1.5 miles of the target property.

Equal/Higher Elevation	Address	Dist / Dir	Map ID	Page
POINTS WEST	***20727 SANTA CLARA ST***	***1 - 2 ENE***	***AE195***	***112***
NATIONAL READY MIXED CONCRETE	27050 RUETHER AVE	1 - 2 ENE	AE201	115
MERLE NORMAN COSMETICS	26407 N GOLDEN VALLEY R	1 - 2 SE	AM277	160
Lower Elevation	**Address**	**Dist / Dir**	**Map ID**	**Page**
CAR WASH USA INC	26225 BOUQUET CANYON R	1 - 2 W	AN252	146
P&M SERVICE STATIONS #987	***26015 N BOUQUET CANYON***	***1 - 2 WSW***	***AX316***	***183***
DANA MOTORS	26011 BOUQUET CANYON R	1 - 2 WSW	AX319	184
KEYSOR-CENTURY CORP.	***26000 SPRINGBROOK AVE.***	***1 - 2 SW***	***BA342***	***200***

HIST UST: Historical UST Registered Database.

A review of the HIST UST list, as provided by EDR, and dated 10/15/1990 has revealed that there are 26 HIST UST sites within approximately 1.5 miles of the target property.

Equal/Higher Elevation	Address	Dist / Dir	Map ID	Page
AMERICAN CYANAMID, ENGINEERED	21444 GOLDEN TRIANGLE R	1/2 - 1 SE	D15	11
SANTA CLARA YARD	21014 SOLEDAD CANYON RD	1/2 - 1 E	I50	33
POINTS WEST TRUCKING, INC.	20727 SANTA CLARA ST	1 - 2 ENE	AE196	113
WAREHOUSE	21030 GOLDEN TRIANGLE R	1 - 2 E	AG198	114
NATIONAL READY MIXED CONCRETE	27050 RUETHER AVE	1 - 2 ENE	AE202	116
NATIONAL READY MIX CONCRETE CO	27050 RUETHER AVE	1 - 2 ENE	AE205	119
PACIFIC BELL (KC-652)	26971 FURNIVALL AVE	1 - 2 E	AP274	158
SAUGUS FACILITY	26407 GOLDEN VALLEY RD	1 - 2 SE	AM279	161
NEW HALL AMBULANCE	20607 SOLEDAD CANYON RD	1 - 2 E	AO294	170
FOLVEN BUILDING MATERIALS	26957 HONBY AVE	1 - 2 E	335	195
JERRY AUTOMATIC TRANSMISSIONS	***20501 SOLEDAD CYN ROAD***	***1 - 2 E***	***AZ356***	***210***
Lower Elevation	**Address**	**Dist / Dir**	**Map ID**	**Page**
BERMITE DIVISION OF WHITTAKER	22116 SOLEDAD CANYON RD	1/2 - 1 SW	E33	20
SAUGUS SWAP MEET/SAUGUS SPEEDW	22500 SOLEDAD CANYON RD	1/2 - 1 W	G43	29
LEON A. THOMPSON	26801 BOUQUET CANYON RD	1 - 2 NW	U118	70
DISTRICT OFFICE	26590 BOUQUET CANYON RD	1 - 2 WNW	Y138	81
92437	26753 BOUQUET CANYON RD	1 - 2 NW	X146	86
SERVICE STATION 5518	26279 BOUQUET CANYON RD	1 - 2 W	AJ219	127
WOLF'S BOUQUET UNION & TOW. IN	26279 BOUQUET CANYON RD	1 - 2 W	AJ220	128
UNION OIL SERVICE STATION 5518	26279 BOUQUET CANYON RD	1 - 2 W	AJ222	129
97436	23055 SOLEDAD CANYON RD	1 - 2 W	AK232	135
EXXON SERVICE STATION	23060 SOLEDAD CANYON RD	1 - 2 W	AK243	142
MICHAEL J SCANLON	23105 VALENCIA BLVD	1 - 2 W	AQ282	164
MOHAWK SERVICE STATION #04061	26015 BOUQUET CANYON RD	1 - 2 WSW	AX314	181
KIRCHNER & SON, INC.	26011 BOUQUET CANYON RD	1 - 2 WSW	AX320	185
HASA CHEMICALS, INC.	23119 DRAYTON ST	1 - 2 WSW	AY327	190
KEYSOR CENTURY CORPORATION	26000 SPRINGBROOK AVE	1 - 2 SW	BA341	199

EXECUTIVE SUMMARY

FEDERAL ASTM SUPPLEMENTAL

FINDS: The Facility Index System contains both facility information and "pointers" to other sources of information that contain more detail. These include: RCRIS; Permit Compliance System (PCS); Aerometric Information Retrieval System (AIRS); FATES (FIFRA [Federal Insecticide Fungicide Rodenticide Act] and TSCA Enforcement System, FTTS [FIFRA/TSCA Tracking System]; CERCLIS; DOCKET (Enforcement Docket used to manage and track information on civil judicial enforcement cases for all environmental statutes); Federal Underground Injection Control (FURS); Federal Reporting Data System (FRDS); Surface Impoundments (SIA); TSCA Chemicals in Commerce Information System (CICS); PADS; RCRA-J (medical waste transporters/disposers); TRIS; and TSCA. The source of this database is the U.S. EPA/NTIS.

A review of the FINDS list, as provided by EDR, and dated 03/21/2002 has revealed that there are 48 FINDS sites within approximately 1.5 miles of the target property.

Equal/Higher Elevation	Address	Dist / Dir	Map ID	Page
AMERICAN CYANAMID	*21444 GOLDEN TRIANGLE R*	*1/2 - 1 SE*	*D25*	*13*
VAL-PAK PRODUCTS	*26751 OAK AVE.*	*1 - 2 E*	*K64*	*42*
CASTAIC LAKE WATER AGNCY	*27234 BOUQUET CANYON RD*	*1 - 2 N*	*L68*	*46*
MARANATHA CHEVROLET	*26770 OAK AVE*	*1 - 2 E*	*M78*	*49*
PACIFIC EXPO	*26776 OAK AVE*	*1 - 2 E*	*M79*	*50*
VON CO TOOL	*26778 OAK AVE*	*1 - 2 E*	*M81*	*51*
NATIONAL METAL STAMPINGS INC	*26796 OAK AVENUE*	*1 - 2 E*	*M86*	*53*
HONDA OUTPOST	*26724 OAK AVE UNIT C*	*1 - 2 E*	*K91*	*56*
WM S HART UNIFIED SCHOOL DIST	*21429 REDVIEW DR*	*1 - 2 SE*	*P95*	*58*
STUDIO CITY SPORTS CARS	*26846 OAK AVE BLDG 5*	*1 - 2 E*	*O100*	*60*
G W FRANZ GRINDING	*26818 OAK AVE UNIT L*	*1 - 2 E*	*O102*	*61*
D K TRUCKING	*20811 SANTA CLARA ST*	*1 - 2 ENE*	*Q107*	*64*
ADROS CUSTOM WOOD FINISHING	*26524 GOLDEN VALLEY*	*1 - 2 ESE*	*AA158*	*91*
INLAND PACIFIC MTR	*26502 GOLDEN VALLEY RD*	*1 - 2 ESE*	*AA159*	*91*
BENS TEK	*26536 GOLDEN VALLEY RD*	*1 - 2 ESE*	*AA160*	*91*
RUSSELL DUNN AUTOMOTIVE	*26821 RUETHER UNIT G*	*1 - 2 E*	*AD184*	*106*
POINTS WEST	*20727 SANTA CLARA ST*	*1 - 2 ENE*	*AE195*	*112*
SOUTHWEST INDUSTRIES	*26911 RUETHER AVE STE S*	*1 - 2 E*	*AC197*	*114*
NATIONAL READY MIX	27050 RUETHER AVE	1 - 2 ENE	AE203	116
DISCOUNT TIRE CENTERS	*20737 SOLEDAD CANYON RD*	*1 - 2 E*	*AD210*	*120*
IMPORT AUTO CARE	*20723 SOLEDAD CANYON RD*	*1 - 2 E*	*AI215*	*124*
R C ACRYLICS	*20665 SANTA CLARA*	*1 - 2 ENE*	*AL239*	*140*
HI-SHEAR TECHNOLOGY CORP	*26413 N GOLDEN VALLEY R*	*1 - 2 SE*	*AM251*	*145*
BLUE CROSS LABORATORIES	*26411 N GOLDEN VALLEY R*	*1 - 2 SE*	*AM253*	*146*
EDS CLEANERS	*20655 SOLEDAD CANYON RD*	*1 - 2 E*	*AO259*	*150*
BROWN AUTO BODY	*26935 FURNIVALL*	*1 - 2 E*	*AO268*	*155*
EUROPEAN AUTO CENTER	*27134 FURNIVALL AVE*	*1 - 2 ENE*	*AR289*	*169*
MIKES TIREMAN	*20529 SOLEDAD CANYON RD*	*1 - 2 E*	*AZ338*	*197*
JERRY AUTOMATIC TRANSMISSIONS	*20501 SOLEDAD CYN ROAD*	*1 - 2 E*	*AZ356*	*210*
JIM DANDY	*27600 BOUGUET CYN RD*	*1 - 2 NNE*	*BD362*	*215*
WM S HART USD SAUGUS HS	*21900 W CENTURION WY*	*1 - 2 N*	*364*	*216*

Lower Elevation	Address	Dist / Dir	Map ID	Page
BERMITE DIVISION	*22116 WEST SOLEDAD CANY*	*1/2 - 1 SW*	*E34*	*21*
SAUGUS UNION SD	22211 W NEWHALL RANCH R	1 - 2 WNW	N72	47
RITE AID NO 5555	*26825 BOUQUET CYN RD*	*1 - 2 NW*	*U117*	*68*
CLARKS DRUGS 21	*26550 BOUQET CANYON RD*	*1 - 2 WNW*	*W129*	*76*
FLAMINGO CLEANERS	*26512 BOQUET CYN RD*	*1 - 2 WNW*	*Z144*	*85*
CHEVRON STN 9 2437	*26753 BOUQUET CANYON RD*	*1 - 2 NW*	*X147*	*86*

Lower Elevation	Address	Dist / Dir	Map ID	Page
SECO ONE HOUR MARTINIZING	*26830 SECO CYN RD*	*1 - 2 NW*	*AF190*	*109*
CHEVRON STATION 97436	*23055 SOLEDAD CYN RD*	*1 - 2 W*	*AK236*	*137*
LA CO., SANITATION DIST	26200 SPRINGBROOK AVE	1 - 2 WSW	AS297	171
GLORY CLEANERS	*23142 VALENCIA*	*1 - 2 W*	*AT301*	*173*
VALENCIA DODGE	*26011 BOQUET CANYON RD*	*1 - 2 WSW*	*AX318*	*184*
HASA CHEM INC	*23119 DRAYTON ST*	*1 - 2 WSW*	*AY324*	*187*
KEYSOR-CENTURY CORP.	*26000 SPRINGBROOK AVE.*	*1 - 2 SW*	*BA342*	*200*
HI TECH TRANSMISSION	*25845 SAN FERNANDO RD*	*1 - 2 WSW*	*BB346*	*204*
VALENCIA AUTOMOTIVE CENTER MD	*25835 SAN FERNANDO RD*	*1 - 2 WSW*	*BC351*	*206*
A & K BODY & FENDER	*25834 SPRINGBROOK AVE*	*1 - 2 SW*	*BE375*	*221*
MIDAS MUFFLER	*25745 SAN FERNANDO RD*	*1 - 2 SW*	*BG381*	*225*

RAATS: The RCRA Administration Action Tracking System contains records based on enforcement actions issued under RCRA and pertaining to major violators. It includes administrative and civil actions brought by the United States Environmental Protection Agency. The source of this database is the U.S. EPA.

A review of the RAATS list, as provided by EDR, and dated 04/17/1995 has revealed that there is 1 RAATS site within approximately 1.5 miles of the target property.

Lower Elevation	Address	Dist / Dir	Map ID	Page
BERMITE DIVISION	*22116 WEST SOLEDAD CANY*	*1/2 - 1 SW*	*E34*	*21*

TRIS: The Toxic Chemical Release Inventory System identifies facilities that release toxic chemicals to the air, water, and land in reportable quantities under SARA Title III, Section 313. The source of this database is the U.S. EPA.

A review of the TRIS list, as provided by EDR, and dated 12/31/2000 has revealed that there are 3 TRIS sites within approximately 1.5 miles of the target property.

Equal/Higher Elevation	Address	Dist / Dir	Map ID	Page
AMERICAN CYANAMID	*21444 GOLDEN TRIANGLE R*	*1/2 - 1 SE*	*D25*	*13*

Lower Elevation	Address	Dist / Dir	Map ID	Page
HASA INC.	23119 DRAYTON ST.	1 - 2 WSW	AY328	191
KEYSOR-CENTURY CORP.	*26000 SPRINGBROOK AVE.*	*1 - 2 SW*	*BA342*	*200*

TSCA: The Toxic Substances Control Act identifies manufacturers and importers of chemical substances included on the TSCA Chemical Substance Inventory list. It includes data on the production volume of these substances by plant site. The United States Environmental Protection Agency has no current plan to update and/or re-issue this database.

A review of the TSCA list, as provided by EDR, and dated 12/31/1998 has revealed that there are 2 TSCA sites within approximately 1.5 miles of the target property.

Equal/Higher Elevation	Address	Dist / Dir	Map ID	Page
E. I. DU PONT DE NEMOURS & CO	21444 GOLDEN TRIANGLE R	1/2 - 1 SE	D19	12

Lower Elevation	Address	Dist / Dir	Map ID	Page
KEYSOR-CENTURY CORP.	*26000 SPRINGBROOK AVE.*	*1 - 2 SW*	*BA342*	*200*

EXECUTIVE SUMMARY

SSTS: Section 7 of the Federal Insecticide, Fungicide and Rodenticide Act, as amended (92 Stat. 829) requires all registered pesticide-producing establishments to submit a report to the Environmental Protection Agency by March 1st each year. Each establishment must report the types and amounts of pesticides, active ingredients and devices being produced, and those having been produced and sold or distributed in the past year.

A review of the SSTS list, as provided by EDR, and dated 12/31/2000 has revealed that there is 1 SSTS site within approximately 1.5 miles of the target property.

Equal/Higher Elevation	Address	Dist / Dir	Map ID	Page
VAL-PAK PRODUCTS	***26751 OAK AVE.***	***1 - 2 E***	***K64***	***42***

STATE OR LOCAL ASTM SUPPLEMENTAL

AST: The Aboveground Storage Tank database contains registered ASTs. The data come from the State Water Resources Control Board's Hazardous Substance Storage Container Database.

A review of the AST list, as provided by EDR, and dated 05/21/2002 has revealed that there is 1 AST site within approximately 1.5 miles of the target property.

Equal/Higher Elevation	Address	Dist / Dir	Map ID	Page
JIFFY LUBE #680	***20703 SOLEDAD CANYON RD***	***1 - 2 E***	***AI226***	***132***

DRYCLEANERS: A list of drycleaner related facilities that have EPA ID numbers. These are facilities with certain SIC codes: power laundries, family and commercial; garment pressing and cleaners' agents; linen supply; coin-operated laundries and cleaning; drycleaning plants except rugs; carpet and upholster cleaning; industrial launderers; laundry and garment services.

A review of the CLEANERS list, as provided by EDR, and dated 03/18/2002 has revealed that there are 7 CLEANERS sites within approximately 1.5 miles of the target property.

Equal/Higher Elevation	Address	Dist / Dir	Map ID	Page
ED'S CLEANERS	20655 SOLEDAD CANYON RD	1 - 2 E	AO256	149
ED'S CLEANERS	20655 SOLEDAD CANYON RD	1 - 2 E	AO260	152
BONGIOVANNI CHIROPRACTIC	***27600 BOUQUET CANYON RD***	***1 - 2 NNE***	***BD359***	***212***
JIM DANDY CLEANERS	***27600 BOUGUET CYN RD***	***1 - 2 NNE***	***BD361***	***214***

Lower Elevation	Address	Dist / Dir	Map ID	Page
CARRIAGE TRADE CLEANERS	***26512 BOUQUET CANYON***	***1 - 2 WNW***	***Z143***	***84***
ONE HOUR MARTINIZING	***26830 SECO CYN RD***	***1 - 2 NW***	***AF191***	***110***
GLORY CLEANERS	***23142 VALENCIA***	***1 - 2 W***	***AT301***	***173***

WDS: California Water Resources Control Board - Waste Discharge System.

A review of the CA WDS list, as provided by EDR, and dated 06/17/2002 has revealed that there are 2 CA WDS sites within approximately 1.5 miles of the target property.

Lower Elevation	Address	Dist / Dir	Map ID	Page
SAUGUS WWRP, NPDES	26200 SPRINGBROOK AVE	1 - 2 WSW	AS298	171
KEYSOR-CENTURY CORPORATIO	***26000 SPRINGBROOK***	***1 - 2 SW***	***BA340***	***198***

EXECUTIVE SUMMARY

CA SLIC: SLIC Region comes from the California Regional Water Quality Control Board.

A review of the CA SLIC list, as provided by EDR, has revealed that there are 2 CA SLIC sites within approximately 1.5 miles of the target property.

Equal/Higher Elevation	Address	Dist / Dir	Map ID	Page
GLASS SEAL CORP.	21516 GOLDEN TRIANGLE R	1/2 - 1 SE	C13	10
Lower Elevation	**Address**	**Dist / Dir**	**Map ID**	**Page**
MJW INVESTMENT	26830 SECO CANYON ROAD	1 - 2 NW	AF179	103

HAZNET: The data is extracted from the copies of hazardous waste manifests received each year by the DTSC. The annual volume of manifests is typically 700,000-1,000,000 annually, representing approximately 350,000-500,000 shipments. Data from non-California manifests & continuation sheets are not included at the present time. Data are from the manifests submitted without correction, and therefore many contain some invalid values for data elements such as generator ID, TSD ID, waste category, & disposal method. The source is the Department of Toxic Substance Control is the agency

A review of the HAZNET list, as provided by EDR, has revealed that there are 112 HAZNET sites within approximately 1.5 miles of the target property.

Equal/Higher Elevation	Address	Dist / Dir	Map ID	Page
OLIVER WILLIAMS ELEVATOR COMPA	21700 W GOLDEN TRIANGLE	1/4 - 1/2 SSE	A1	6
SANTA CLARITA MEDICAL GROUP	21700 W GOLDEN TRIANGLE	1/4 - 1/2 SSE	A2	6
SANTA CLARITA VALLEY HEALTH CA	21704 W GOLDEN TRIANGLE	1/4 - 1/2 SSE	A3	6
PUBLIC STORAGE	21648 W GOLDEN TRIANGLE	1/4 - 1/2 SSE	A4	7
PACIFIC COAST ROOFING INC	21616 GOLDEN TRIANGLE R	1/4 - 1/2 SE	B6	7
MFG SANTA CLARITA LP	21516 W GOLDEN TRIANGLE	1/2 - 1 SE	C9	9
AMERICAN CYANAMID	***21444 GOLDEN TRIANGLE R***	***1/2 - 1 SE***	***D25***	***13***
LAKESIDE BOAT SERVICE	21452 GOLDEN TRIANGLE R	1/2 - 1 SE	D26	17
BOWMAN HIGH SCHOOL/WM S HART U	21508 REDVIEW DR	1/2 - 1 SE	45	30
WHITTAKER CORP/BERMITE DIV	22116 W SOLEDAD CYN RD	1/2 - 1 S	52	34
PREMIER AUTO BODY & FRAME	26723 OAK AVENUE	1 - 2 E	K58	38
MORRIS PRECISION PRODUCTS, INC	26732 OAK AVE	1 - 2 E	K61	40
BOHANS AUTOMOTOVIE	26741 OAK ST	1 - 2 E	K63	41
CASTAIC LAKE WATER AGENCY	27234 BOUQUET CANYON RD	1 - 2 N	L65	44
MARANATHA CHEVROLET	***26770 OAK AVE***	***1 - 2 E***	***M78***	***49***
CANYON COUNTRY INDUSTRIAL PARK	26776 OAK AVE	1 - 2 E	M80	51
VON CO TOOL	***26778 OAK AVE***	***1 - 2 E***	***M81***	***51***
VIP AUTO REPAIR	26794 OAK AVE	1 - 2 E	M85	53
VP MANUFACTURING INC	20732 SOLEDAD ST	1 - 2 E	O87	54
SENSORTECH SYSTEMS INC	26810-I OAK AVE	1 - 2 E	O89	55
AMERICAN UNITED INC	20730 SOLEDAD ST	1 - 2 E	O90	56
HART UNION HIGH SCHOOL DISTRIC	21429 REDVIEW DR	1 - 2 SE	P93	57
METAL WORKS	26846 OAK AVENUE #K	1 - 2 E	O99	60
RESTORATIONS PLUS	26846 OAK AVENUE UNIT "	1 - 2 E	O101	61
G W FRANZ GRINDING	***26818 OAK AVE UNIT L***	***1 - 2 E***	***O102***	***61***
SANTA CLARITA WATER CO	***21110 GOLDEN TRIANGLE***	***1 - 2 E***	***S105***	***62***
D K TRUCKING	***20811 SANTA CLARA ST***	***1 - 2 ENE***	***Q107***	***64***
D & K TRUCKING INC	20811 SANTA CLARA ST	1 - 2 ENE	Q108	65
INSPECTOR'S PAINT & BODY	26516 GOLDEN VALLEY RD	1 - 2 ESE	V125	74
1X ANESCO MANUFACTURING PARTNE	26502 GOLDEN VALLEY ROA	1 - 2 ESE	V134	79
JPS INC	26502 GOLDEN VALLEY RD	1 - 2 ESE	V135	79
KAR BODY & PAINT INC	26502 GOLDEN VALLEY	1 - 2 ESE	V136	80
SAUGUS USD/TRANSPORTATION	26501 GOLDEN VALLEY ROA	1 - 2 ESE	V140	82

EXECUTIVE SUMMARY

Equal/Higher Elevation	Address	Dist / Dir		Map ID	Page
UNIVERSAL ENGINE	26536 GOLDEN VALLEY RD,	1 - 2	ESE	V151	88
MATO PLASTICS	***26541 GOLDEN VALLEY***	***1 - 2***	***ESE***	***V152***	***89***
BENS TEK	***26536 GOLDEN VALLEY RD***	***1 - 2***	***ESE***	***AA160***	***91***
Not reported	***26477 GOLDEN VALLEY RD***	***1 - 2***	***SE***	***AB164***	***94***
SCV AUTO SPECIALIST	26921 RUETHER UNIT A	1 - 2	E	AC166	95
VELS AUTOMOTIVE/ADVANCED AUTOM	26831 RUETHER #K	1 - 2	E	AD167	97
SANTA CLARITA COLLISION CENTER	26867 RUETHER AVE	1 - 2	E	AC169	98
PETE'S AUTO REPAIR	***26911 RUETHER AVE. #D***	***1 - 2***	***E***	***AC173***	***100***
VAL-AERO INDUSTRIES INC	***26559 GOLDEN VALLEY RD***	***1 - 2***	***ESE***	***V176***	***101***
SANTA CLARITA VALLEY TOYOTA SP	26911 RUETHER AVE	1 - 2	E	AC178	102
POINT AUTO SERVICE	26921 RUETHER AVE #A	1 - 2	E	AC181	103
JERRYS TOWING SERVICE INC	26921-B RUETHER AVE	1 - 2	E	AC182	104
PREMIER PRINTING COMPANY	26951 RUETHER AVE STE G	1 - 2	E	AC183	104
ANDY GUMP INC	***26954 RUETHER AVENUE***	***1 - 2***	***E***	***AC189***	***108***
POINTS WEST	***20727 SANTA CLARA ST***	***1 - 2***	***ENE***	***AE195***	***112***
NATIONAL READY MIXED CONCRETE	***27050 RUETHER AVE***	***1 - 2***	***ENE***	***AE204***	***116***
SCV AUTO SPECIALIST	20733 SOLEDAD CANYON RD	1 - 2	E	AD211	121
NATIONAL TECHNICAL SYSTEMS	***20988 W GOLDEN TRIANGLE***	***1 - 2***	***E***	***AG218***	***126***
CANYON COUNTRY LUBRICATION	20703 SOLEDAD CANYON RO	1 - 2	E	AI224	130
JIFFY LUBE #680	***20703 SOLEDAD CANYON RD***	***1 - 2***	***E***	***AI226***	***132***
ACRYLLIC CUSTOMS COLLISION & B	20665 SANTA CLARA	1 - 2	ENE	AL238	139
BLUE CROSS LABORATORIES	***26411 N GOLDEN VALLEY R***	***1 - 2***	***SE***	***AM253***	***146***
EDS CLEANERS	***20655 SOLEDAD CANYON RD***	***1 - 2***	***E***	***AO259***	***150***
CANYON COUNTRY VETERINARY	20655 SOLEDAD CANYON RO	1 - 2	E	AO261	152
KWIK INK CREEEN PRINTING DESIG	26915 FURNIVALL	1 - 2	E	AO262	153
LOLA OLSEN PROPERTIES	26917 FURNIVALL	1 - 2	E	AO263	154
PRECISION CNC PRODUCTS	26921 1/2 FURNIVALL ST	1 - 2	E	AO266	154
BROWN AUTO BODY	***26935 FURNIVALL***	***1 - 2***	***E***	***AO268***	***155***
WILLIAM ETTER & PATRICK BETZ	26949 FURNIBAL AVE	1 - 2	E	AO270	156
STAATS CONSTRUCTION	***26951 FURNIVAL***	***1 - 2***	***E***	***AP271***	***156***
CITY OF SANTA CLARITA	***26407 GOLDEN VALLEY RD***	***1 - 2***	***SE***	***AM276***	***160***
PACIFIC BELL	26971 N FUNIVALL AVE	1 - 2	E	AP280	162
DESIGN MASONRY INC	27121 FURNIVAL	1 - 2	E	AR286	167
CALIFORNIA COLLECTIBLE COACH W	27134 FURNIVALL AVE	1 - 2	ENE	AR288	168
LIL'JOHN AUTO PARTS (USED OIL	20541 SOLEDAD CANYON RD	1 - 2	E	AZ333	194
MIKE'S TIREMAN INC	***20529 SOLEDAD CANYON RD***	***1 - 2***	***E***	***AZ336***	***196***
JERRY HIDDER	20501 SOLEDA CANYON ROA	1 - 2	E	AZ354	209
JERRY'S TRANSMISSIONS	20501 SOLEDAD CANYON RD	1 - 2	E	AZ355	209
JERRY AUTOMATIC TRANSMISSIONS	***20501 SOLEDAD CYN ROAD***	***1 - 2***	***E***	***AZ356***	***210***
BONGIOVANNI CHIROPRACTIC	***27600 BOUQUET CANYON RD***	***1 - 2***	***NNE***	***BD359***	***212***
JIM DANDY CLEANERS	***27600 BOUGUET CYN RD***	***1 - 2***	***NNE***	***BD361***	***214***
WM S HART USD SAUGUS HS	***21900 W CENTURION WY***	***1 - 2***	***N***	***364***	***216***
MAIN STREET VIDIO	27611 BOUQUET CYN RD	1 - 2	NNE	BD366	218
RIO VISTA ELEMENTARY SCHOOL	20417 CEDARCREEK ST	1 - 2	E	373	220

Lower Elevation	Address	Dist / Dir		Map ID	Page
SANTA CLARITA VALLEY DENTAL	22770 WEST SOLEDAD CYN	1/2 - 1	W	H46	31
SAUGUS UNION SCHOOL DIST	22635 ESPUELLA DR	1/2 - 1	NW	51	34
FIRST CARE WALK IN MEDICAL GR	22840 SOLDEDAD CANYON R	1/2 - 1	W	J57	37
SAUGUS SCH DIST	22211 NEWHALL RANCH RD	1 - 2	WNW	N75	47
SAUGUS	22211 W NEWHALL RANCH R	1 - 2	WNW	N76	48
RITE AID NO 5555	***26825 BOUQUET CYN RD***	***1 - 2***	***NW***	***U117***	***68***
SHELL	***26801 BOUQUET CANYON RD***	***1 - 2***	***NW***	***U122***	***72***
SAV ON 9722	26550 BOUQUET CANYON RD	1 - 2	WNW	W128	75
CLARKS DRUGS 21	***26550 BOUQET CANYON RD***	***1 - 2***	***WNW***	***W129***	***76***

EXECUTIVE SUMMARY

Lower Elevation	Address	Dist / Dir	Map ID	Page
CARRIAGE TRADE CLEANERS	***26512 BOUQUET CANYON***	***1 - 2 WNW***	***Z143***	***84***
CHEVRON USA PRODUCTS COMPANY	26753 BOQUET CANYON	1 - 2 NW	X150	87
SECO ONE HOUR MARTINIZING	***26830 SECO CYN RD***	***1 - 2 NW***	***AF190***	***109***
ONE HOUR MARTINIZING	***26830 SECO CYN RD***	***1 - 2 NW***	***AF191***	***110***
CROSSROADS DENTAL CENTER	26246 BOUQUET CANYON RD	1 - 2 WNW	AH212	121
PIP PRINTING #675	26240 BOUQUET CANYON RD	1 - 2 WNW	AH213	123
TOSCO CORPORATION STATION #313	23055 SOLEDAD CANYON RD	1 - 2 W	AK230	134
UNOCAL SERVICE STATION #7344	23055 SOLEDAD CANYON RO	1 - 2 W	AK235	136
SAMS EXXON	***23060 SOLEDAD CYN RD***	***1 - 2 W***	***AK241***	***141***
SANTA CLARITA CAR WASH INC	***23105 VALENCIA BLVD***	***1 - 2 W***	***AQ281***	***164***
GERMAN AUTO CENTER	23051 DRAYTON ST	1 - 2 WSW	AS291	169
CNTY LA SANITATION DIST/SAUGUS	26200 SPRINGBOOK AVE	1 - 2 WSW	AS295	171
GLORY CLEANERS	***23142 VALENCIA***	***1 - 2 W***	***AT301***	***173***
ANIMAL CLINIC OF SANTA CLARITA	26062 BOUQUET CANYON RD	1 - 2 WSW	AV305	177
RODNEY L CUMMINGS DC CHIROPRAC	26045 BOQUET CANYON RD.	1 - 2 WSW	AV312	179
ALERT MOBILE REPAIR SERVICE, I	26011 BOUQUET CYN RD	1 - 2 WSW	AX317	183
AUTO BODY SPECIALIST	23108 DRAYTON ST	1 - 2 WSW	AS321	185
HASA CHEMICALS INC	***23119 DRAYTON STREET***	***1 - 2 WSW***	***AY330***	***192***
KEYSOR-CENTURY CORP.	***26000 SPRINGBROOK AVE.***	***1 - 2 SW***	***BA342***	***200***
PURRFECT AUTO SERVICE #69	***25843 SAN FERNANDO RD***	***1 - 2 WSW***	***BC348***	***204***
VALENCIA AUTOMOTIVE CENTER MD	***25835 SAN FERNANDO RD***	***1 - 2 WSW***	***BC351***	***206***
LIONS TOWING AND MOTORS	25835 SAN FERNANDO ROAD	1 - 2 WSW	BC352	208
AAMCO TRANSMISSION	25825 SAN FERNANDO RD	1 - 2 WSW	BC357	211
WESTERN BAGEL TOO	23170 W VALENCIA BLVD	1 - 2 W	358	212
A & K BODY & FENDER	***25834 SPRINGBROOK AVE***	***1 - 2 SW***	***BE375***	***221***
MYFRAN INC DBA MIDAS MUFFLER	25745 SAN FERNANDO RD	1 - 2 SW	BG379	223

HMS: Los Angeles County Industrial Waste and Underground Storage Tank Sites.

A review of the LOS ANGELES CO. HMS list, as provided by EDR, has revealed that there are 162 LOS ANGELES CO. HMS sites within approximately 1.5 miles of the target property.

Equal/Higher Elevation	Address	Dist / Dir	Map ID	Page
SANTA CLARITA AUTO TRCK	21618 GOLDEN TRIANGLE R	1/4 - 1/2 SE	B5	7
SANTA CLARITA CONCESSIONS, INC	21554 GOLDEN TRIANGLE R	1/4 - 1/2 SE	C7	7
MOUNTASIA OF SANTA CLARITA LP	21516 GOLDEN TRIANGLE R	1/2 - 1 SE	C10	9
MCDONALDS RESTAURANT	21516 GOLDEN TRIANGLE R	1/2 - 1 SE	C11	10
GLASS SEAL CORPORATION	21516 GOLDEN TRIANGLE R	1/2 - 1 SE	C12	10
CYTEC INDUSTRIES	21444 W GOLDEN TRIANGLE	1/2 - 1 SE	D16	11
AMERICAN CYANAMID CO	21444 W GOLDEN TRIANGLE	1/2 - 1 SE	D22	12
FOSTERS FREEZE	21525 W SOLEDAD CANYON	1/2 - 1 ESE	F35	26
FOSTER FREEZE	21525 W SOLEDAD CANYON	1/2 - 1 ESE	F36	26
FOSTERS FREEZE	21515 SOLEDAD CANYON RD	1/2 - 1 ESE	F37	26
CAMEL WORKS	21020 W SOLEDAD CANYON	1/2 - 1 E	I47	32
LA CO DPW FLOOD SANTA CLARITA	21014 W SOLEDAD CANYON	1/2 - 1 E	I48	33
PROWLERS SPEED & CUSTOMS INC.	21021 SOLEDAD CANYON RD	1/2 - 1 E	I49	33
AUTO CENTER	26723 OAK AVE	1 - 2 E	K59	39
PREMIER AUTO BODY	26723 OAK AVE	1 - 2 E	K60	40
BOHAN'S AUTOMOTIVE	26741 OAK AVE	1 - 2 E	K62	41
RIO VISTA WATER TREATMENT	27234 BOUQUET CANYON RD	1 - 2 N	L66	45
RIO VISTA WATER TREATMENT PLT	27234 BOUQUET CANYON RD	1 - 2 N	L69	46
PACIFIC AIR LOGISTICS	26763 OAK AVE	1 - 2 E	M70	46
MARANATHA CHEVROLET SERVICE	26770 OAK AVE	1 - 2 E	M77	49
WINNERS CIRCLE AUTO PATRS	26786 OAK AVE	1 - 2 E	M82	52

EXECUTIVE SUMMARY

Equal/Higher Elevation	Address	Dist / Dir		Map ID	Page
HOBBY SHOP	26790 OAK AVE	1 - 2	E	M83	52
HONEST JOHN'S EVO'S ETC	26792 OAK AVE	1 - 2	E	M84	53
VP MFG, INC.	20732 SOLEDAD ST A	1 - 2	E	O88	55
AV BREAK SUPPLY	26818 OAK AVE E	1 - 2	E	O92	57
WS HART UNION HIGH SCH DT	21429 REDVIEW DR	1 - 2	SE	P96	59
QUALITY PAPER FIBERS, INC	20833 SANTA CLARA ST	1 - 2	ENE	Q97	59
RENT A BIN	20830 SANTA CLARA ST	1 - 2	ENE	Q98	59
SANTA CLARITA WATER CO	***21110 GOLDEN TRIANGLE***	***1 - 2***	***E***	***S105***	***62***
INSPECTORS PAINT & BODY	26516 GOLDEN VALLEY RD	1 - 2	ESE	114	67
CLASSIC UPHOLSTERY	26524 GOLDEN VALLEY RD	1 - 2	ESE	V126	75
BABY YOUR CAR	26529 GOLDEN VALLEY RD	1 - 2	ESE	V130	78
SAUGUS UNION SD TRANSPORTATION	***26501 GOLDEN VALLEY RD***	***1 - 2***	***ESE***	***V139***	***81***
SAUGUS UNION SD TRANSPORTATION	26501 GOLDEN VALLEY RD	1 - 2	ESE	V141	83
MATO PLASTICS	***26541 GOLDEN VALLEY***	***1 - 2***	***ESE***	***V152***	***89***
BENS TEK	***26536 GOLDEN VALLEY RD***	***1 - 2***	***ESE***	***AA160***	***91***
ELEC-TROL INC	26477 N GOLDEN VALLEY R	1 - 2	SE	AB163	94
FORBES METAL STAMPING CO.	26555 GOLDEN VALLEY RD	1 - 2	ESE	V165	95
SCORE INDUSTRIES	26841 RUETHER AVE E	1 - 2	E	AD168	98
PRIDE COLLISION CENTER	26867 RUETHER AVE	1 - 2	E	AC170	99
SANTA CLARITA COLLISION CENTER	26867 RUETHER AVE	1 - 2	E	AC171	100
VIDAC	26883 RUETHER AVE	1 - 2	E	AC172	100
PETE'S AUTO REPAIR	***26911 RUETHER AVE. #D***	***1 - 2***	***E***	***AC173***	***100***
INDUSTRIAL ASPHALT CO	20735 W SANTA CLARA ST	1 - 2	ENE	AE174	100
SO PACIFIC MILLING CO	20735 W SANTA CLARA ST	1 - 2	ENE	AE175	101
VAL-AERO INDUSTRIES INC	***26559 GOLDEN VALLEY RD***	***1 - 2***	***ESE***	***V176***	***101***
MOFIELD PRODUCTIONS	26911 RUETHER AVE E	1 - 2	E	AC177	101
ANDY GUMP INC	***26954 RUETHER AVENUE***	***1 - 2***	***E***	***AC189***	***108***
POINTS WEST TRUCKING,INC.	20727 SANTA CLARA ST	1 - 2	ENE	AE193	112
JOHN PAUL MICHAEL SYSTEMS	26455 GOLDEN VALLEY RD	1 - 2	SE	199	115
NATIONAL READY MIXED CONCRETE	***27050 RUETHER AVE***	***1 - 2***	***ENE***	***AE204***	***116***
LA CO DPW FLOOD DIST	21014 GOLDEN TRIANGLE R	1 - 2	E	AG208	120
DPW FMD SANTA CLARITA REFERRAL	21014 GOLDEN TRIANGLE R	1 - 2	E	AG209	120
FRONTIER AUTO SERVICE	20723 SOLEDAD CANYON RD	1 - 2	E	AI214	124
NATIONAL TECHNICAL SYSTEMS	20988 GOLDEN TRIANGLE R	1 - 2	E	AG216	125
NATIONAL TECHNICAL SYSTEMS	***20988 W GOLDEN TRIANGLE***	***1 - 2***	***E***	***AG218***	***126***
JIFFY LUBE	20703 SOLEDAD CANYON RD	1 - 2	E	AI225	131
ROBERT SAUMERS	20665 W SANTA CLARA ST	1 - 2	ENE	AL240	141
BOCCHI LABORATORIES INC	26421 GOLDEN VALLEY RD	1 - 2	SE	AM246	144
VALENCIA LABORATORY	26421 GOLDEN VALLEY RD	1 - 2	SE	AM247	144
STAR LABORATORIES INC	26421 N GOLDEN VALLEY R	1 - 2	SE	AM248	145
BLUE CROSS LABORATORIES	***26411 N GOLDEN VALLEY R***	***1 - 2***	***SE***	***AM253***	***146***
IVAN COHEN	20655 W SOLEDAD CANYON	1 - 2	E	AO257	150
SANTA CLARITA BREWING CO	20655 W SOLEDAD CANYON	1 - 2	E	AO258	150
KOCH'S	26917 FURNIVALL AVE	1 - 2	E	AO264	154
B & D GLASS	26919 FURNIVALL AVE	1 - 2	E	AO265	154
DICK SANCHEZ AUTO BODY	26935 FURNIVALL AVE	1 - 2	E	AO267	155
STORAGE LOT	26949 N FURNIVALL AVE	1 - 2	E	AO269	156
STAATS CONSTRUCTION	***26951 FURNIVAL***	***1 - 2***	***E***	***AP271***	***156***
PACIFIC BELL CNCYCAPB/KC652	26971 N FURNIVALL AVE	1 - 2	E	AP272	157
PACIFIC BELL	***26971 FURNIVALL AVE***	***1 - 2***	***E***	***AP275***	***158***
CITY OF SANTA CLARITA	***26407 GOLDEN VALLEY RD***	***1 - 2***	***SE***	***AM276***	***160***
SANTA CLARITA CAR WASH	20625 SOLEDAD CANYON RD	1 - 2	E	AO287	168
JERRYS AUTOMATIC TRANS RP	20601 W SANTA CLARA ST	1 - 2	ENE	AR290	169
MED TRANS CORP.	20607 W SOLEDAD CANYON	1 - 2	E	AO293	170
NAPA AUTO PARTS	20541 SOLEDAD CANYON RD	1 - 2	E	AZ331	193
LIL JOHN AUTO PARTS	20541 SOLEDAD CANYON RD	1 - 2	E	AZ332	194

EXECUTIVE SUMMARY

Equal/Higher Elevation	Address	Dist / Dir		Map ID	Page
CANYON AUTO SUPPLY	20541 SOLEDAD CANYON RD	1 - 2	E	AZ334	195
MIKE'S TIRE MAN	20529 SOLEDAD CANYON RD	1 - 2	E	AZ337	197
LA RUMBA	27600 N BOUQUET CANYON	1 - 2	NNE	BD360	213
JIM DANDY	***27600 BOUGUET CYN RD***	***1 - 2***	***NNE***	***BD362***	***215***
CAFE BOUQUET	27600 N BOUQUET CANYON	1 - 2	NNE	BD363	216
DRIVE-IN DAIRY	26954 N SECO CANYON RD	1 - 2	NW	BF370	219
WORTMANN OIL CO	26954 N SECO CANYON RD	1 - 2	NW	BF371	220

Lower Elevation	Address	Dist / Dir		Map ID	Page
BERMITE DIV-WHITTAKER	22116 SOLEDAD CANYON RD	1/2 - 1	SW	E31	19
BONELLI PHAR PROD	22500 W SOLEDAD CANYON	1/2 - 1	WSW	G40	28
SAUGUS SPEED WAY - SWAPMEET	22500 SOLEDAD CANYON RD	1/2 - 1	W	G42	29
SANTA CLARITA WATER CO.	22722 SOLEDAD CANYON RD	1/2 - 1	W	H44	30
AMERICAN MOTOR CYCLE	22820 SOLEDAD CANYON RD	1/2 - 1	W	J54	36
PIZZA HUT RESTAURANT #758132	22830 W SOLEDAD CANYON	1/2 - 1	W	J55	36
L A POLICE MISDEMEANANT F	27000 N BOUQUET CANYON	1/2 - 1	NNW	56	37
SAUGUS UNION SCHOOL DISTRICT	22211 NEWHALL RANCH RD	1 - 2	WNW	N74	47
POPPIS	22903 W SOLEDAD CANYON	1 - 2	W	R103	62
SPORTS BAR & GRILL	22903 W SOLEDAD CANYON	1 - 2	W	R104	62
SAFEWAY STORES INC #1024	26877 BOUQUET CANYON RD	1 - 2	NW	T109	65
MANDARIN EXPRESS	22911 W SOLEDAD CANYON	1 - 2	W	R110	66
MADARIN EXPRESS	22911 W SOLEDAD CANYON	1 - 2	W	R111	66
PEARSON AND CO	22911 W SOLEDAD CANYON	1 - 2	W	R112	66
NUMERO UNO #52	22917 W SOLEDAD CANYON	1 - 2	W	R113	66
COUSINS BURGERS	26851 N BOUQUET CANYON	1 - 2	NW	T115	67
BOUQUET CANYON SHELL	26801 N BOUQUET CANYON	1 - 2	NW	U119	71
SHELL OIL #204-7050/CAR WASH	26801 N BOUQUET CANYON	1 - 2	NW	U124	73
HUGHES MARKETS INC	26550 N BOUQUET CANYON	1 - 2	WNW	W127	75
BOUQUET AUTO PARTS	26769 BOUQET CANYON RD	1 - 2	NW	X131	78
SWENSENS BOUQUET CENTER	26586 N BOUQUET CANYON	1 - 2	WNW	W132	78
WENDYS HAMBURGERS	26538 N BOUQUET CANYON	1 - 2	WNW	W133	79
CAMP BOUQUET CANYON	26590 N BOUQUET CANYON	1 - 2	WNW	Y137	81
VONS #1669	26518 N BOUQUET CANYON	1 - 2	WNW	W142	83
CHEVRON USA SS 092437	26753 N BOUQUET CANYON	1 - 2	NW	X148	87
CHEVRON USA CO / CARWASH	26753 N BOUQUET CANYON	1 - 2	NW	X149	87
ORCHARD SUPPLY HARDWARE	26565 N BOUQUET CANYON	1 - 2	WNW	W153	89
BURGER KING RESTAURANT	26480 N BOUQUET CANYON	1 - 2	WNW	Z154	90
JACK-IN-THE-BOX	26547 N BOUQUET CANYON	1 - 2	WNW	W155	90
PRESIDENTE RESTAURANT	26625 N BOUQUET CANYON	1 - 2	NW	Y156	90
BOSTON MARKET RESTAURANT	26543 N BOUQUET CANYON	1 - 2	WNW	W157	90
CRISTA ENTERPRISES DEVELOPMENT	26485 N BOUQUET CANYON	1 - 2	WNW	Z161	93
LA CO FD FIRE STA #111	26829 N SECO CANYON RD	1 - 2	NW	AF185	106
UNOCAL	***502 BEAUMONT AVE***	***1 - 2***	***W***	***200***	***115***
DR BORIS ZAK'S DENTAL OFFICE	26324 N BOUQUET CANYON	1 - 2	WNW	AH207	120
UNOCAL CORP SS 7344	23055 W SOLEDAD CANYON	1 - 2	W	AK227	133
TOSCO/UNOCAL #31309	23055 W SOLEDAD CANYON	1 - 2	W	AK228	133
ACWA ASSOC - SEE FILE I09575	23055 W SOLEDAD CANYON	1 - 2	W	AK229	133
TOSCO/UNOCAL #31309	23055 W SOLEDAD CANYON	1 - 2	W	AK231	134
ACWA ASSOCIATES INC	23055 W SOLEDAD CANYON	1 - 2	W	AK237	139
SAMS EXXON	***23060 SOLEDAD CYN RD***	***1 - 2***	***W***	***AK241***	***141***
EXXON USA #7-3550	23060 SOLEDAD CANYON RD	1 - 2	W	AK242	142
SAM'S MOBIL	***23060 SOLEDAD CANYON RD***	***1 - 2***	***W***	***AK244***	***143***
U-HAUL CO.	26230 BOUQUET CANYON RD	1 - 2	W	AN249	145
UNOCAL CORP SS	26279 N BOUQUET CANYON	1 - 2	W	AK255	149
CROSS ROADS AUTO WASH	***23105 VALENCIA BLVD***	***1 - 2***	***W***	***AQ284***	***166***

EXECUTIVE SUMMARY

Lower Elevation	Address	Dist / Dir		Map ID	Page
MCDONALDS RESTAURANT	23111 W VALENCIA BLVD	1 - 2	W	AQ285	167
GERMAN AUTO CENTERS INC.	23051 DRAYTON AVE	1 - 2	WSW	AS292	170
LA CO SAN DIS-SAUGUS WRP	26200 SPRINGBROOK AVE	1 - 2	WSW	AS299	173
BOOK NIPPAN	1123 E DOMINGUEZ ST K	1 - 2	W	AQ300	173
VACANT	26111 N BOUQUET CANYON	1 - 2	W	AW306	178
FRED SANDS	26111 N BOUQUET CANYON	1 - 2	W	AW307	178
GERALD H. HEIDT CO.	23300 W CINEMA DR #112	1 - 2	W	AW308	178
M&M HARRIGAN	23300 W CINEMA DR #112	1 - 2	W	AW309	178
JUGGLES RESTAURANT	23300 W CINEMA DR #112	1 - 2	W	AW310	179
PAULI'S ITALIAN RESTAURANT	23300 CINEMA DR #109	1 - 2	W	AW311	179
UNITED OIL #69	***26015 BOUQUET CANYON RD***	***1 - 2***	***WSW***	***AX313***	***180***
P&M SERVICE STATIONS #987	***26015 N BOUQUET CANYON***	***1 - 2***	***WSW***	***AX316***	***183***
BACKYARD INVESTMENT GROUP	23154 W VALENCIA BLVD	1 - 2	W	AT322	187
DIRSHNER DODGE	26011 BOUQUET CANYON RD	1 - 2	WSW	323	187
HASA CHEMICALS INC	***23119 DRAYTON STREET***	***1 - 2***	***WSW***	***AY330***	***192***
KEYSOR-CENTURY CORP.	***26000 SPRINGBROOK AVE.***	***1 - 2***	***SW***	***BA342***	***200***
J I GANDARA TRUCKING REPAIR	25885 SAN FERNANDO RD	1 - 2	WSW	BB343	203
LUNA'S TIRE SERVICE	25885 SAN FERNANDO RD	1 - 2	WSW	BB344	203
PLAZA CLARITA	25845 SAN FERNANDO RD	1 - 2	WSW	BB347	204
PURRFECT AUTO SERVICE #69	***25843 SAN FERNANDO RD***	***1 - 2***	***WSW***	***BC348***	***204***
INTERSTATE BATTERIES	25835 SAN FERNANDO RD #	1 - 2	WSW	BC349	206
ACE AUTOMOTIVE	25835 SAN FERNANDO RD #	1 - 2	WSW	BC350	206
HASA PRODUCTS CO INC	25950 SPRINGBROOK AVE	1 - 2	SW	BA353	208
BEE & BEE MACHINE SHOP	25852 SPRINGBROOK AVE	1 - 2	SW	BE367	218
FOOTHILL ELECTRIC MOTORS	25852 SPRINGBROOK AVE	1 - 2	SW	BE368	218
LEONARD'S MOLDED PRODUCTS	25847 SPRINGBROOK AVE	1 - 2	SW	BE372	220
FOOTHILL ELECTRIC MOTORS	25838 SPRINGBROOK AVE	1 - 2	SW	BE374	221
A & K FRAME ALIGNMENT	25834 SPRINGBROOK AVE	1 - 2	SW	BE376	223
MYERS PUMPING CO.	25824 SPRINGBROOK AVE	1 - 2	SW	BE377	223
AUTO BODY SPECIALISTS	25823 SPRINGBROOK AVE	1 - 2	SW	BE378	223
MIDAS MUFFLER & BRAKE SHOP	25745 SAN FERNANDO RD	1 - 2	SW	BG380	225
VIKING AUTO UPHOLSTERY	25819 SPRINGBROOK AVE	1 - 2	SW	BE382	225

Site Mitigation Complaint Control Log: The Los Angeles County Site Mitigation Log comes from Community Health Services.

A review of the LA Co. Site Mitigation list, as provided by EDR, has revealed that there is 1 LA Co. Site Mitigation site within approximately 1.5 miles of the target property.

Lower Elevation	Address	Dist / Dir		Map ID	Page
SANTA CLARITA PLACE/1 HR. CLNR	26830 SECO CANYON RD	1 - 2	NW	AF180	103

EDR PROPRIETARY HISTORICAL DATABASES

See the EDR Proprietary Historical Database Section for details

Due to poor or inadequate address information, the following sites were not mapped:

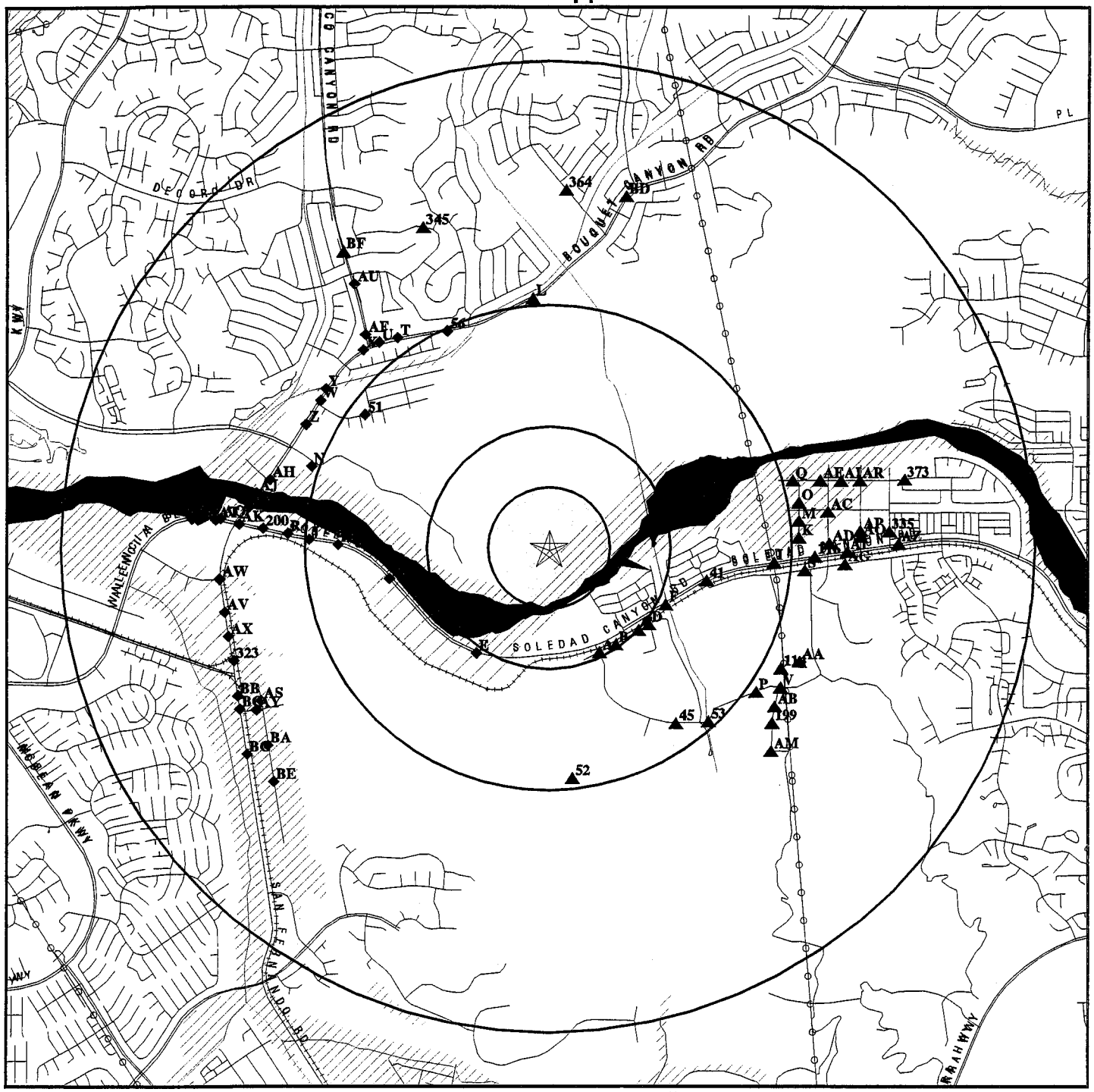
Site Name	Database(s)
MINNIE MAX CLEANERS	CLEANERS
ACE CLEANERS	CLEANERS
COUNTRY CLEANERS	HAZNET, CLEANERS
J. MICHAEL MCGRATH NEW ELEM. SCH.	Cal-Sites
BILL SMALL'S MUD SUMP	SWF/LF
BILL SMALL'S MUD SUMP	SWF/LF
USA PETROLEUM COMPANY #82	HIST UST
LOS ANGELES COUNTY FIRE DEPT	HAZNET
SAUGUS UNION SCHOOL DISTRICT	HAZNET
OAK COLOR	HAZNET
JEMCO ELECTRICAL	HAZNET
AMERICAN GRAFFITII	HAZNET
A & S EXCHANGE	HAZNET
SHARON KENNEALLY	HAZNET
LOS ANGELES COUNTY FIRE DEPT	HAZNET
CITY OF LA - ENVIRO SVCS DEPT	HAZNET
WELLS FARGO BANK	HAZNET
MERLE NORMAN COSMETICS SAUGUS	HAZNET
EXECUTIVE AUTOMOTIVE	HAZNET
THE CROISDALE GROUP	HAZNET
ROTO-JET OF AMERICA CO INC	HAZNET
AUTOMOTIVE FITNESS CENTER INC.	HAZNET
VP MANUFACTURING INC	HAZNET
CARDINAL RESTAURANT SUPPLY	HAZNET
S C RADIATOR & BODY PARTS	HAZNET
USDA FOREST SERVICE	HAZNET
LOS ANGELES COUNTY FIRE DEPT	HAZNET
SHELL	HAZNET
V P MANUFACTURING INC	RCRIS-SQG
HI TECH TRANSMISSION	RCRIS-SQG
SHELL SERVICE STATION	RCRIS-SQG
CANYON SQUARE SHOP. CTR/MOBIL	LA Co. Site Mitigation
GOLDEN VALLEY RD. SANTA CLARITA	CA SLIC
WM HART UHSD - TRANSPORT DEPT	LOS ANGELES CO. HMS, CA SLIC
SOUTHERN CALIFORNIA GAS CO.	CA WDS
DEL LAGO DEWATERING PROJ.	CA WDS
WOK EXPRESS	LOS ANGELES CO. HMS
GOOD GUYS AUTO REPAIR	LOS ANGELES CO. HMS
AQUA-FLO SUPPLY	LOS ANGELES CO. HMS
SAUGUS SUZUKI	LOS ANGELES CO. HMS
UNITED OIL CO.	LOS ANGELES CO. HMS
ALERT MOBILE REPAIR	LOS ANGELES CO. HMS
ALERT MOBILE REPAIR	LOS ANGELES CO. HMS
IN-N-OUT BURGER	LOS ANGELES CO. HMS
PANDA EXPRESS	LOS ANGELES CO. HMS
LOWE'S HOME IMPROVMNT WRHOUSE	LOS ANGELES CO. HMS
CAR WASH USA INC	LOS ANGELES CO. HMS
LUSTGARTEN OIL CO	LOS ANGELES CO. HMS
RIO VISTA WTP PUMPING STA	LOS ANGELES CO. HMS
BOUQUET CYN OILFIELD	LOS ANGELES CO. HMS
BONELLI & SONS PRCSN	LOS ANGELES CO. HMS
LON'S DIESEL REPAIR	LOS ANGELES CO. HMS
ARB ENTERPRISES	LOS ANGELES CO. HMS
PROJEX	LOS ANGELES CO. HMS
KARS BODY & PAINT	LOS ANGELES CO. HMS
STARR AUTO DETAIL	LOS ANGELES CO. HMS
GOLDEN VALLEY INDUSTRIAL	LOS ANGELES CO. HMS
AUTO DISCOUNT CENTER	LOS ANGELES CO. HMS
THE AUTOLINE	LOS ANGELES CO. HMS

R & R ENGINEERING COMPANY	LOS ANGELES CO. HMS
GALAXY DIE & ENGINEERING INC.	LOS ANGELES CO. HMS
ALL AROUND SHEET METAL	LOS ANGELES CO. HMS
HMV MOLDES & TOOLS	LOS ANGELES CO. HMS
PACIFIC AUTOMOTIVE	LOS ANGELES CO. HMS
C & N AUTOMOTIVE	LOS ANGELES CO. HMS
A SUPERIOR WOODWORKS	LOS ANGELES CO. HMS
ACCURATE TRAILER HITCH & WELD	LOS ANGELES CO. HMS
C & F SHEET METAL	LOS ANGELES CO. HMS
CALIF COLLECTABLE COACHCRAFT	LOS ANGELES CO. HMS
MERLE NORMAN COSMETICS	LOS ANGELES CO. HMS
MERLE NORMAN COSMETICS	LOS ANGELES CO. HMS
CITY OF SANTA CLARITA	LOS ANGELES CO. HMS
GOLDEN TRIANGLE INDL PARK	LOS ANGELES CO. HMS
NEWHALL OIL FIELD	LOS ANGELES CO. HMS
KERNVIEW OIL CO	LOS ANGELES CO. HMS
WILLIAM S HART REGIONAL PARK	LOS ANGELES CO. HMS
HOME DEPOT, INC	LOS ANGELES CO. HMS
GATE KING PROPERTIES INC	LOS ANGELES CO. HMS
ATLANTIC OIL CO	LOS ANGELES CO. HMS
PREMIÈR AUTOBODY FRAME	LOS ANGELES CO. HMS
BODEN'S CYLINDER HEADS	LOS ANGELES CO. HMS
CANYON AUTO ELECTRIC	LOS ANGELES CO. HMS
ARNECKES AUTOMOTIVE MACH. SHOP	LOS ANGELES CO. HMS
FINE CABINETS	LOS ANGELES CO. HMS
STRAIGHT LINE PERFORMANCE	LOS ANGELES CO. HMS
MICHAEL'S SHUTTER MFG.	LOS ANGELES CO. HMS
CHEMEX EXTERMINATORS	LOS ANGELES CO. HMS
PATROL SECURITY	LOS ANGELES CO. HMS
CYCLE ENGINEERING	LOS ANGELES CO. HMS
AMT SYSTEMS INC	LOS ANGELES CO. HMS
ACTION WOODWORKS	LOS ANGELES CO. HMS
C B C	LOS ANGELES CO. HMS
EXCLUSIVELY BRITISH & IMPORTS	LOS ANGELES CO. HMS
SKIN TIGHT	LOS ANGELES CO. HMS
TLC WOODWORKS	LOS ANGELES CO. HMS
THE BLOWERS SHOP	LOS ANGELES CO. HMS
TLC WOODWORK	LOS ANGELES CO. HMS
SANTA CLARITA AUTO AIR & RADTR	LOS ANGELES CO. HMS
ALL VALLEY CARBURETORS	LOS ANGELES CO. HMS
ADVANCED HONDA-ACURA	LOS ANGELES CO. HMS
ARENS INDUSTRIES INC.	LOS ANGELES CO. HMS
BARBS QUALITY REPAIR SERVICE	LOS ANGELES CO. HMS
CYCLE CONCEPTS INC.	LOS ANGELES CO. HMS
HERMANN MW CO.	LOS ANGELES CO. HMS
SCV TOYOTA	LOS ANGELES CO. HMS
BRITISH CUSTOMS	LOS ANGELES CO. HMS
CLASSIC MANTELS	LOS ANGELES CO. HMS
A & S EXCHANGE	LOS ANGELES CO. HMS
PACIFIC WOOD PRODUCTS	LOS ANGELES CO. HMS
SERVICE MASTER	LOS ANGELES CO. HMS
BLACKSTOCK WOODWORKS	LOS ANGELES CO. HMS
JOHN TOMMY WOODWORKS	LOS ANGELES CO. HMS
STANDARD FASTENERS MFG.	LOS ANGELES CO. HMS
TOM'S AUTOMOTIVE SERVICE	LOS ANGELES CO. HMS
VALENCIA VOLVO INDEPENDENT	LOS ANGELES CO. HMS
SOLAR DESIGN WINDOW TINTING	LOS ANGELES CO. HMS
SC CUSTOM CYCLES	LOS ANGELES CO. HMS
AJ AUTO DETAIL & ACCESSORIES	LOS ANGELES CO. HMS
CALIFORNIA TINT	LOS ANGELES CO. HMS
SANTA CLARITA VALLEY HUBCAPS	LOS ANGELES CO. HMS
WINDSHIELDS WHOLESALE AUTO GLS	LOS ANGELES CO. HMS

EXECUTIVE SUMMARY

AAMCO TRANSMISSIONS	LOS ANGELES CO. HMS
NICK'S AUTO REPAIR	LOS ANGELES CO. HMS
GASOLINE ALLEY	LOS ANGELES CO. HMS
MANJON AUTO BODY & PAINT	LOS ANGELES CO. HMS
CUSTOM SPECIALTIES	LOS ANGELES CO. HMS
HAVE YOU SEEN MY TRUCK	LOS ANGELES CO. HMS
KWIK RIG INC.	LOS ANGELES CO. HMS
J & S AUTOBODY & PAINT SUPPLY	LOS ANGELES CO. HMS
CANYON MOTORS INC.	LOS ANGELES CO. HMS
AUTOMOTIVE TECHNOLOGY	LOS ANGELES CO. HMS
ACRYLIC CUSTOM CLLSN & BODY	LOS ANGELES CO. HMS
SAUMERS WELDING	LOS ANGELES CO. HMS
SANTA CLARA RIVER BRIDGE CONST	LOS ANGELES CO. HMS
NORTH OAKS SHELL	LOS ANGELES CO. HMS
SHELL OIL CO	LOS ANGELES CO. HMS
CANYON CLEANERS	LOS ANGELES CO. HMS

OVERVIEW MAP - 851417.3s - Applied Environmental Tech.



- ★ Target Property
- ▲ Sites at elevations higher than or equal to the target property
- ◆ Sites at elevations lower than the target property
- Coal Gasification Sites
- National Priority List Sites
- Landfill Sites
- Power transmission lines
- Oil & Gas pipelines
- 100-year flood zone
- 500-year flood zone
- Areas of Concern

TARGET PROPERTY:	Riverpark-Valencia	CUSTOMER:	Applied Environmental Tech.
ADDRESS:	664 Acre Bonelli Ranch	CONTACT:	Wally Jensky
CITY/STATE/ZIP:	Santa Clarita CA 91350	INQUIRY #:	851417.3s
LAT/LONG:	34.4212 / 118.5185	DATE:	September 25, 2002 7:07 am

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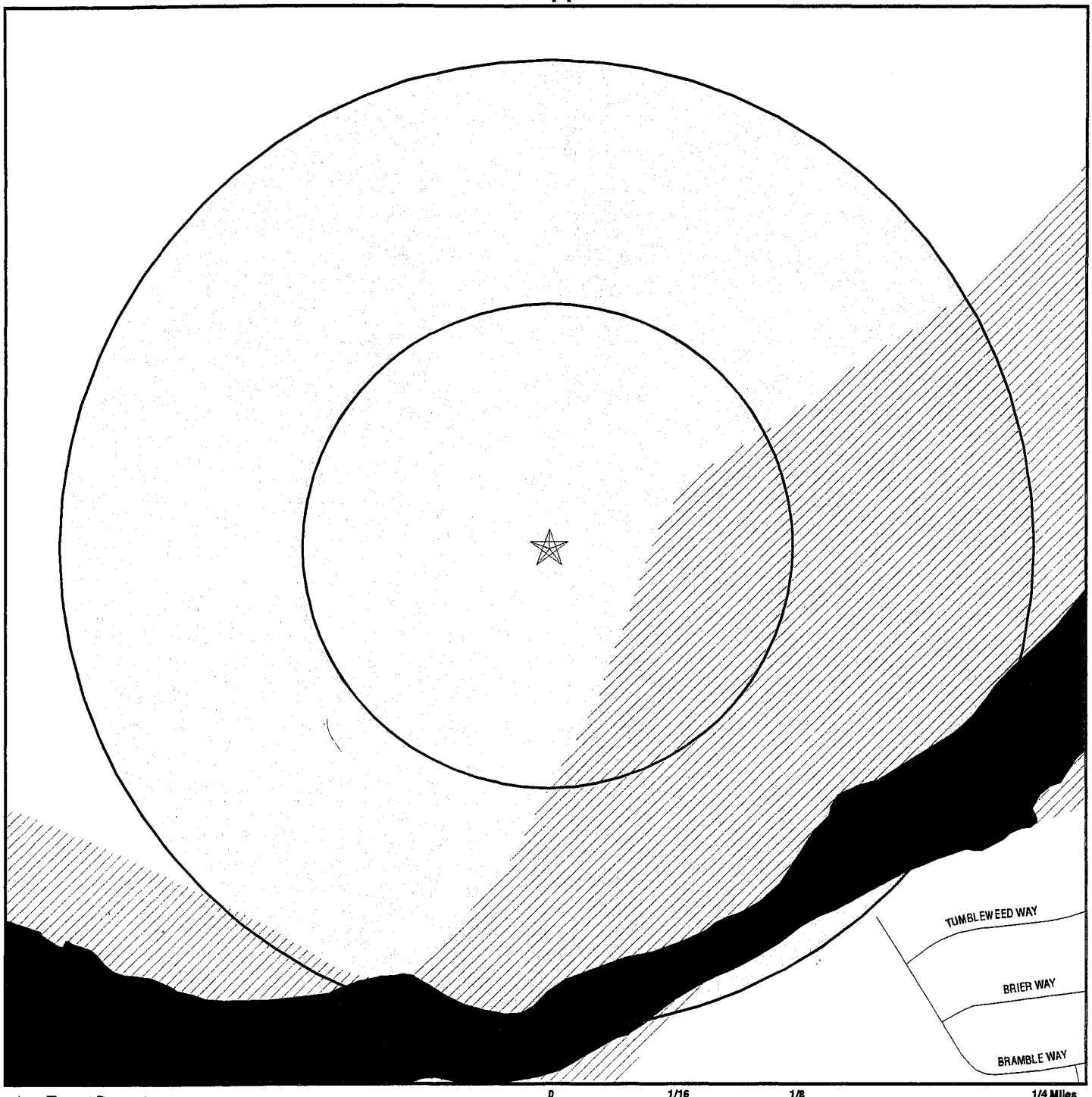
DETAIL MAP - 851417.3s - Applied Environmental Tech.



- Target Property
- Sites at elevations higher than or equal to the target property
- Sites at elevations lower than the target property
- Coal Gasification Sites
- Historical Gas Stations / Historical Dry Cleaners See the EDR Proprietary Historical Map Findings
- Sensitive Receptors
- National Priority List Sites
- Landfill Sites
- Power transmission lines
- Oil & Gas pipelines
- 100-year flood zone
- 500-year flood zone
- Areas of Concern

TARGET PROPERTY:	Riverpark-Valencia	CUSTOMER:	Applied Environmental Tech.
ADDRESS:	664 Acre Bonelli Ranch	CONTACT:	Wally Jensky
CITY/STATE/ZIP:	Santa Clarita CA 91350	INQUIRY #:	851417.3s
LAT/LONG:	34.4212 / 118.5185	DATE:	September 25, 2002 7:09 am

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MAP FINDINGS SUMMARY

Database	Target Property	Search Distance (Miles)	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
FEDERAL ASTM STANDARD								
NPL		1.500	0	0	0	0	0	0
Proposed NPL		1.500	0	0	0	0	0	0
CERCLIS		1.500	0	0	0	0	0	0
CERC-NFRAP		1.500	0	0	0	2	2	4
CORRACTS		1.500	0	0	0	2	0	2
RCRIS-TSD		1.500	0	0	0	2	0	2
RCRIS Lg. Quan. Gen.		1.500	0	0	0	1	0	1
RCRIS Sm. Quan. Gen.		1.500	0	0	0	1	45	46
ERNS		1.500	0	0	0	7	5	12
STATE ASTM STANDARD								
AWP		1.500	0	0	0	1	0	1
Cal-Sites		1.500	0	0	0	3	2	5
CHMIRS		1.500	0	0	0	2	7	9
Cortese		1.500	0	0	0	5	10	15
Notify 65		1.500	0	0	0	0	0	0
Toxic Pits		1.500	0	0	0	0	0	0
State Landfill		1.500	0	0	0	0	1	1
WMUDS/SWAT		1.500	0	0	0	0	0	0
LUST		1.500	0	0	0	2	13	15
CA Bond Exp. Plan		1.500	0	0	0	0	0	0
UST		1.500	0	0	0	0	16	16
CA FID UST		1.500	0	0	0	0	7	7
HIST UST		1.500	0	0	0	4	22	26
FEDERAL ASTM SUPPLEMENTAL								
CONSENT		1.500	0	0	0	0	0	0
ROD		1.500	0	0	0	0	0	0
Delisted NPL		1.500	0	0	0	0	0	0
FINDS		1.500	0	0	0	2	46	48
HMIRS		1.500	0	0	0	0	0	0
MLTS		1.500	0	0	0	0	0	0
MINES		1.500	0	0	0	0	0	0
NPL Liens		1.500	0	0	0	0	0	0
PADS		1.500	0	0	0	0	0	0
RAATS		1.500	0	0	0	1	0	1
TRIS		1.500	0	0	0	1	2	3
TSCA		1.500	0	0	0	1	1	2
SSTS		1.500	0	0	0	0	1	1
FTTS		1.500	0	0	0	0	0	0
STATE OR LOCAL ASTM SUPPLEMENTAL								
AST		1.500	0	0	0	0	1	1

MAP FINDINGS SUMMARY

Database	Target Property	Search Distance (Miles)	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
CLEANERS		1.500	0	0	0	0	7	7
CA WDS		1.500	0	0	0	0	2	2
DEED		TP	NR	NR	NR	NR	NR	0
CA SLIC		1.500	0	0	0	1	1	2
HAZNET		1.500	0	0	5	8	99	112
Los Angeles Co. HMS		1.500	0	0	2	18	142	162
LA Co. Site Mitigation		1.500	0	0	0	0	1	1
AOCONCERN		1.000	0	0	0	0	NR	0
EDR PROPRIETARY HISTORICAL DATABASES								
Gas Stations/Dry Cleaners		0.250	0	0	NR	NR	NR	0
Coal Gas		1.500	0	0	0	0	0	0

See the EDR Proprietary Historical Database Section for details

TP = Target Property

NR = Not Requested at this Search Distance

* Sites may be listed in more than one database

A1 **OLIVER WILLIAMS ELEVATOR COMPANY** **HAZNET** **S103979971**
SSE **21700 W GOLDEN TRIANGLE RD** **N/A**
1/4-1/2 **SAUGUS, CA 93555**
2517 ft.
Higher **Site 1 of 4 in cluster A**

HAZNET:

Gepaid:	CAC001505560
Tepaid:	CAD099452708
Gen County:	Los Angeles
Tsd County:	Los Angeles
Tons:	.2293
Category:	Oil/water separation sludge
Disposal Method:	Transfer Station
Contact:	OLIVER WILLIAMS ELEVATOR CO
Telephone:	(213) 478-2104
Mailing Address:	3039 ROSWELL ST LOS ANGELES, CA 90065
County	Los Angeles

A2 **SANTA CLARITA MEDICAL GROUP** **HAZNET** **S103986696**
SSE **21700 W GOLDEN TRIANGLE ROAD** **N/A**
1/4-1/2 **SAUGUS, CA 91350**
2517 ft.
Higher **Site 2 of 4 in cluster A**

HAZNET:

Gepaid:	CAL000127661
Tepaid:	CAL000121946
Gen County:	Los Angeles
Tsd County:	Marin
Tons:	.0200
Category:	Photochemicals/photoprocessing waste
Disposal Method:	Recycler
Contact:	JOHN B JUNG
Telephone:	(805) 259-9800
Mailing Address:	21700 GOLDEN TRIANGLE RD STE 104 SANTA CLARITA, CA 91350 - 2934
County	Los Angeles

A3 **SANTA CLARITA VALLEY HEALTH CARE MNG GRP** **HAZNET** **S103986699**
SSE **21704 W GOLDEN TRIANGLE** **N/A**
1/4-1/2 **SAUGUS, CA 91350**
2519 ft.
Higher **Site 3 of 4 in cluster A**

HAZNET:

Gepaid:	CAC000881800
Tepaid:	CAT080010101
Gen County:	Los Angeles
Tsd County:	San Diego
Tons:	.3044
Category:	Oxygenated solvents (acetone, butanol, ethyl acetate, etc.)
Disposal Method:	Transfer Station
Contact:	SANTA CLARITA VALLEY ETC
Telephone:	(000) 000-0000
Mailing Address:	21704 W GOLDEN TRIANGLE SAUGUS, CA 91350
County	Los Angeles

A4 **PUBLIC STORAGE** **HAZNET** **S103982923**
SSE **21648 W GOLDEN TRIANGLE** **N/A**
1/4-1/2 **SAUGUS, CA 91350**
2525 ft.
Higher **Site 4 of 4 in cluster A**

HAZNET:

Gepaid:	CAC001129936
Tepaid:	CAD000088252
Gen County:	Los Angeles
Tsd County:	Los Angeles
Tons:	.3127
Category:	Waste oil and mixed oil
Disposal Method:	Transfer Station
Contact:	PUBLIC STORAGE
Telephone:	(000) 000-0000
Mailing Address:	21648 W GOLDEN TRIANGLE SAUGUS, CA 91350
County	Los Angeles

B5 **SANTA CLARITA AUTO TRCK** **LOS ANGELES CO. HMS** **S103945077**
SE **21618 GOLDEN TRIANGLE RD** **N/A**
1/4-1/2 **SANTA CLARITA, CA**
2559 ft.
Higher **Site 1 of 2 in cluster B**

HMS:

Facility Id:	019967-028486		
Facility Type:	Not reported		
Permit Number:	Not reported	Permit Status:	Not reported
Facility Status:	OPEN	Area:	7A
Region:	Los Angeles County:		

B6 **PACIFIC COAST ROOFING INC** **HAZNET** **S104579764**
SE **21616 GOLDEN TRIANGLE RD** **N/A**
1/4-1/2 **SANTA CLARITA, CA 91350**
2561 ft.
Higher **Site 2 of 2 in cluster B**

HAZNET:

Gepaid:	CAL000157138
Tepaid:	CAT000613893
Gen County:	Los Angeles
Tsd County:	Los Angeles
Tons:	0.0834
Category:	Aqueous solution with less than 10% total organic residues
Disposal Method:	Transfer Station
Contact:	PJ OWENS PRESIDENT
Telephone:	(000) 000-0000
Mailing Address:	21616 GOLDEN TRIANGLE RD SANTA CLARITA, CA 91350 - 2618
County	Los Angeles

C7 **SANTA CLARITA CONCESSIONS, INC** **LOS ANGELES CO. HMS** **S104733642**
SE **21554 GOLDEN TRIANGLE RD** **N/A**
1/4-1/2 **SANTA CLARITA, CA**
2620 ft.
Higher **Site 1 of 9 in cluster C**

SANTA CLARITA CONCESSIONS, INC (Continued) **S104733642**

HMS:

Facility Id:	006483-I06703		
Facility Type:	I01		
Permit Number:	000006583	Permit Status:	Closed
Facility Status:	Permit	Area:	7A
Region:	Los Angeles County:		

C8 **GLASS SEAL CORPORATION** **LUST** **S101298092**
SE **21516 GOLDEN TRIANGLE RD** **Cortese** **N/A**
1/2-1 **SAUGUS, CA 91351**
2648 ft.
Higher **Site 2 of 9 in cluster C**

State LUST:

Cross Street:	HOPE		
Qty Leaked:	Not reported		
Case Number	913510034		
Reg Board:	4		
Chemical:	1		
Lead Agency:	Regional Board		
Local Agency :	19000		
Case Type:	Other ground water affected		
Status:	Not reported		
County:	Los Angeles		
Review Date:	Not reported	Confirm Leak:	Not reported
Workplan:	Not reported	Prelim Assess:	Not reported
Pollution Char:	Not reported	Remed Plan:	Not reported
Remed Action:	Not reported	Monitoring:	Not reported
Close Date:	2/1/95		
Release Date:	Not reported		
Cleanup Fund Id :	Not reported		
Discover Date :	Not reported		
Enforcement Dt :	Not reported		
Enf Type:	Not reported		
Enter Date :	6/14/88		
Funding:	Not reported		
Staff Initials:	Not reported		
How Discovered:	Not reported		
How Stopped:	Not reported		
Interim :	Not reported		
Leak Cause:	Not reported		
Leak Source:	Not reported		
MTBE Date :	Not reported		
Max MTBE GW :	Not reported		
MTBE Tested:	Not Required to be Tested.		
Priority:	Not reported		
Local Case # :	Not reported		
Beneficial:	Not reported		
Staff :	SLC		
GW Qualifies :	Not reported		
Max MTBE Soil :	Not reported		
Soil Qualifies :	Not reported		
Hydr Basin #:	Not reported		
Operator :	Not reported		
Oversight Prgm:	Spills, Leaks, Investigations and Cleanup UST		
Oversight Prgm :	SLIC		
Review Date :	6/14/88		
Stop Date :	Not reported		

GLASS SEAL CORPORATION (Continued) **S101298092**

Work Suspended :Not reported
Responsible PartyBLANK RP
RP Address: Not reported
Global Id: T0603702308
Org Name: Not reported
Contact Person: Not reported
MTBE Conc: 0
Mtbe Fuel: Not reported
Water System Name: VALENCIA WATER CO
Well Name: WELL U-4
Distance To Lust: 2262.92162
Waste Discharge Global ID: Not reported
Waste Disch Assigned Name: Not reported

LUST Region 4:
Report Date: 2/8/1988
Lead Agency: Regional Board
Local Agency: 19000
Case Number: 913510034
Substance: 1
Case Type: Groundwater
Status: Case Closed
Region: 4
Staff: SLC

CORTESE:
Reg Id: 913510034
Region: CORTESE
Reg By: Leaking Underground Storage Tanks

C9 **MFG SANTA CLARITA LP** **HAZNET** **S103642096**
SE **21516 W GOLDEN TRIANGLE RD** **N/A**
1/2-1 **SANTA CLARITA, CA 91350**
2648 ft.
Higher **Site 3 of 9 in cluster C**

HAZNET:
Gepaid: CAC000961264
Tepaid: CAD009007626
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: 1.6856
Category: Asbestos-containing waste
Disposal Method: Disposal, Land Fill
Contact: MFG SANTA CLARITA LP
Telephone: (000) 000-0000
Mailing Address: 18140 PARTHENIA ST
NORTHRIDGE, CA 91325
County Los Angeles

C10 **MOUNTASIA OF SANTA CLARITA LP** **LOS ANGELES CO. HMS** **S102064074**
SE **21516 GOLDEN TRIANGLE RD** **N/A**
1/2-1 **SANTA CLARITA, CA**
2648 ft.
Higher **Site 4 of 9 in cluster C**

HMS:
Facility Id: 001936-022613
Facility Type: I01

MOUNTASIA OF SANTA CLARITA LP (Continued) **S102064074**

Permit Number: 000284883 Permit Status: Permit
Facility Status: Permit Area: 7A
Region: Los Angeles County:

C11 SE 1/2-1 2648 ft. Higher **MCDONALDS RESTAURANT** **LOS ANGELES CO. HMS** **S102064073**
21516 GOLDEN TRIANGLE RD **N/A**
SANTA CLARITA, CA

Site 5 of 9 in cluster C

HMS:
Facility Id: 001936-022296
Facility Type: I01
Permit Number: 000140578 Permit Status: Closed
Facility Status: Closed Area: 7A
Region: Los Angeles County:

C12 SE 1/2-1 2648 ft. Higher **GLASS SEAL CORPORATION** **LOS ANGELES CO. HMS** **U003058320**
21516 GOLDEN TRIANGLE RD **N/A**
SANTA CLARITA, CA

Site 6 of 9 in cluster C

HMS:
Facility Id: 001936-I02011
Facility Type: I00
Permit Number: 000008008 Permit Status: Closed
Facility Status: Closed Area: 7A
Region: Los Angeles County:

C13 SE 1/2-1 2648 ft. Higher **GLASS SEAL CORP.** **CA SLIC** **1000483606**
21516 GOLDEN TRIANGLE ROAD **N/A**
SANTA CLARITA, CA 91350

Site 7 of 9 in cluster C

SLIC Region 4:
Facility Status: Unassigned
Region: 4
SLIC 0063
Staff: Manjulika Chakarbarti
Substance: Not reported
Cross Street: Not reported

C14 SE 1/2-1 2648 ft. Higher **GLASS SEAL CORPORATION** **CERC-NFRAP** **1003879618**
21516 WEST GOLDEN TRIANGLE RD. **CAD983610148**
SAUGUS, CA 91350

Site 8 of 9 in cluster C

CERCLIS-NFRAP Classification Data:
Site Incident Category: Not reported
Non NPL Code: NFRAP
Ownership Status: Private
CERCLIS-NFRAP Assessment History:
Assessment: DISCOVERY

Federal Facility: Not a Federal Facility
NPL Status: Not on the NPL
Completed: 10/25/1991

GLASS SEAL CORPORATION (Continued) **1003879618**

Assessment:	PRELIMINARY ASSESSMENT	Completed:	10/22/1992
Assessment:	SITE INSPECTION	Completed:	06/18/1993
Assessment:	EXPANDED SITE INSPECTION	Completed:	04/08/1996
Assessment:	ARCHIVE SITE	Completed:	02/07/1997

D15 **AMERICAN CYANAMID, ENGINEERED** **HIST UST** **U001567686**
SE **21444 GOLDEN TRIANGLE RD** **N/A**
1/2-1 **SAUGUS, CA 91350**
2741 ft.
Higher **Site 1 of 12 in cluster D**

UST HIST:

Facility ID:	6429		
Tank Num:	1	Container Num:	ACS-0001
Tank Capacity:	500	Year Installed:	Not reported
Tank Used for:	WASTE		
Type of Fuel:	Not Reported	Tank Construction:	Not reported
Leak Detection:			
Contact Name:	STUART C. BLAIR	Telephone:	(805) 259-1415
Total Tanks:	3	Region:	STATE
Facility Type:	2	Other Type:	MANUFACTURING

Facility ID:	6429		
Tank Num:	2	Container Num:	ACS-0002
Tank Capacity:	5000	Year Installed:	1970
Tank Used for:	PRODUCT		
Type of Fuel:	Not Reported	Tank Construction:	1/4IN inches
Leak Detection:	Stock Inventor, Pressure Test		
Contact Name:	STUART C. BLAIR	Telephone:	(805) 259-1415
Total Tanks:	3	Region:	STATE
Facility Type:	2	Other Type:	MANUFACTURING

Facility ID:	6429		
Tank Num:	3	Container Num:	ACS-0003
Tank Capacity:	8000	Year Installed:	1970
Tank Used for:	PRODUCT		
Type of Fuel:	Not Reported	Tank Construction:	1/4 INC unknown
Leak Detection:	Stock Inventor, Pressure Test		
Contact Name:	STUART C. BLAIR	Telephone:	(805) 259-1415
Total Tanks:	3	Region:	STATE
Facility Type:	2	Other Type:	MANUFACTURING

D16 **CYTEC INDUSTRIES** **LOS ANGELES CO. HMS** **S102064071**
SE **21444 W GOLDEN TRIANGLE RD** **N/A**
1/2-1 **SANTA CLARITA, CA**
2741 ft.
Higher **Site 2 of 12 in cluster D**

HMS:

Facility Id:	001972-021306		
Facility Type:	T0		
Permit Number:	000077740	Permit Status:	Removed
Facility Status:	Removed	Area:	7A
Region:	Los Angeles County:		

D17 **21444 GOLDEN TRIANGLE RD** **ERNS** **91467142**
SE **21444 GOLDEN TRIANGLE RD** **N/A**
1/2-1 **SAUGUS, CA 91350**
2741 ft.
Higher **Site 3 of 12 in cluster D**

D18 **21444 GOLDEN TRIANGLE** **ERNS** **92263926**
SE **21444 GOLDEN TRIANGLE** **N/A**
1/2-1 **SAUGUS, CA 91350**
2741 ft.
Higher **Site 4 of 12 in cluster D**

D19 **E. I. DU PONT DE NEMOURS & CO** **TSCA** **1000245205**
SE **21444 GOLDEN TRIANGLE ROAD** **N/A**
1/2-1 **SAUGUS, CA 91350**
2741 ft.
Higher **Site 5 of 12 in cluster D**

D20 **21444 GOLDEN TRIANGLE** **ERNS** **92263925**
SE **21444 GOLDEN TRIANGLE** **N/A**
1/2-1 **SAUGUS, CA 91350**
2741 ft.
Higher **Site 6 of 12 in cluster D**

D21 **21444 GOLDEN TRIANGLE RD** **ERNS** **91233147**
SE **21444 GOLDEN TRIANGLE RD** **N/A**
1/2-1 **SAUGUS, CA**
2741 ft.
Higher **Site 7 of 12 in cluster D**

D22 **AMERICAN CYANAMID CO** **LOS ANGELES CO. HMS** **S104537092**
SE **21444 W GOLDEN TRIANGLE RD** **N/A**
1/2-1 **SANTA CLARITA, CA**
2741 ft.
Higher **Site 8 of 12 in cluster D**

HMS:

Facility Id:	001972-I02049		
Facility Type:	I09		
Permit Number:	000009478	Permit Status:	Removed
Facility Status:	Removed	Area:	7A
Region:	Los Angeles County:		

Facility Id:	001972-002049		
Facility Type:	T0		
Permit Number:	00000270T	Permit Status:	Closed
Facility Status:	Permit	Area:	7A
Region:	Los Angeles County:		

D23 **21444 GOLDEN TRIANGLE RD** **ERNS** **91234870**
SE **21444 GOLDEN TRIANGLE RD** **N/A**
1/2-1 **SAUGUS, CA 91350**
2741 ft.
Higher **Site 9 of 12 in cluster D**

D24 SE 1/2-1 2741 ft. Higher — **21444 GOLDEN TRIANGLE RD**
21444 GOLDEN TRIANGLE RD
SAUGUS, CA 91350
Site 10 of 12 in cluster D

Database(s): **ERNS**
EDR ID Number: **92261459**
EPA ID Number: **N/A**

D25 SE 1/2-1 2741 ft. Higher — **AMERICAN CYANAMID**
21444 GOLDEN TRIANGLE RD
SAUGUS, CA 91350
Site 11 of 12 in cluster D

Database(s): **RCRIS-LQG, RCRIS-TSD, FINDS, TRIS, CORRACTS, CERC-NFRAP, HAZNET, Cortese**
EDR ID Number: **1000360638**
EPA ID Number: **91311MRCNN20**

CERCLIS-NFRAP Classification Data:
Site Incident Category: Not reported
Non NPL Code: DR
Ownership Status: Private
Federal Facility: Not a Federal Facility
NPL Status: Not on the NPL

CERCLIS-NFRAP Assessment History:

Assessment:	DISCOVERY	Completed:	04/01/1991
Assessment:	PRELIMINARY ASSESSMENT	Completed:	09/24/1991
Assessment:	ARCHIVE SITE	Completed:	01/23/1996

CORRACTS Data:

EPA Id:	CAT080010929
Region:	9
State:	CA
Area Name:	ENTIRE FACILITY
Original Scheduled Date:	Not reported
New Scheduled Date:	Not reported
Actual Date:	09/15/1991
Corrective Action:	CA075LO - CA Prioritization, Facility or area was assigned a low corrective action priority

RCRIS Corrective Action Summary:
Event: CA Prioritization, Facility or area was assigned a low corrective action priority.
Event Date: 09/15/1991

RCRIS:
Owner: AMERICAN CYANAMID COMPANY
(201) 831-2000
EPA ID: CAT080010929
Contact: JEAN TOBIN
(805) 259-1415
Rank Status: 3
Rank Date: 08/27/1992
Classification: Large Quantity Generator, TSDF
Used Oil Recyc: No
TSDF Activities: Not reported

AMERICAN CYANAMID (Continued) **1000360638**

Violation Status: Violations exist

Regulation Violated:	Not reported
Area of Violation:	TSD-FINANCIAL RESPONSIBILITY REQUIREMENTS
Date Violation Determined:	04/29/1994
Actual Date Achieved Compliance:	06/08/1994
Enforcement Action:	WRITTEN INFORMAL
Enforcement Action Date:	03/08/1994
Penalty Type:	Not reported
Regulation Violated:	Not reported
Area of Violation:	GENERATOR-GENERAL REQUIREMENTS
Date Violation Determined:	04/29/1994
Actual Date Achieved Compliance:	06/08/1994
Enforcement Action:	WRITTEN INFORMAL
Enforcement Action Date:	03/08/1994
Penalty Type:	Not reported
Regulation Violated:	Not reported
Area of Violation:	TSD-GENERAL STANDARDS
Date Violation Determined:	04/29/1994
Actual Date Achieved Compliance:	06/08/1994
Enforcement Action:	WRITTEN INFORMAL
Enforcement Action Date:	03/08/1994
Penalty Type:	Not reported
Regulation Violated:	Not reported
Area of Violation:	TSD-CONTINGENCY PLAN REQUREMENTS
Date Violation Determined:	04/29/1994
Actual Date Achieved Compliance:	06/08/1994
Enforcement Action:	WRITTEN INFORMAL
Enforcement Action Date:	03/08/1994
Penalty Type:	Not reported
Regulation Violated:	Not reported
Area of Violation:	TSD-LAND BAN REQUIREMENTS
Date Violation Determined:	05/23/1990
Actual Date Achieved Compliance:	06/08/1990
Enforcement Action:	WRITTEN INFORMAL
Enforcement Action Date:	06/08/1990
Penalty Type:	Not reported
Regulation Violated:	Not reported
Area of Violation:	GENERATOR-LAND BAN REQUIREMENTS
Date Violation Determined:	05/23/1990
Actual Date Achieved Compliance:	06/08/1990
Enforcement Action:	WRITTEN INFORMAL
Enforcement Action Date:	06/08/1990
Penalty Type:	Not reported
Regulation Violated:	Not reported
Area of Violation:	TSD-OTHER REQUIREMENTS
Date Violation Determined:	05/23/1990
Actual Date Achieved Compliance:	06/08/1990
Enforcement Action:	WRITTEN INFORMAL
Enforcement Action Date:	06/08/1990
Penalty Type:	Not reported

AMERICAN CYANAMID (Continued) **1000360638**

Regulation Violated:	Not reported
Area of Violation:	TSD-MANIFEST REQUIREMENTS
Date Violation Determined:	05/23/1990
Actual Date Achieved Compliance:	06/08/1990
Enforcement Action:	WRITTEN INFORMAL
Enforcement Action Date:	06/08/1990
Penalty Type:	Not reported
Regulation Violated:	Not reported
Area of Violation:	TSD-LAND BAN REQUIREMENTS
Date Violation Determined:	07/20/1988
Actual Date Achieved Compliance:	06/08/1990
Regulation Violated:	Not reported
Area of Violation:	GENERATOR-LAND BAN REQUIREMENTS
Date Violation Determined:	07/20/1988
Actual Date Achieved Compliance:	06/08/1990
Regulation Violated:	Not reported
Area of Violation:	TSD-OTHER REQUIREMENTS
Date Violation Determined:	07/20/1988
Actual Date Achieved Compliance:	12/06/1988
Enforcement Action:	WRITTEN INFORMAL
Enforcement Action Date:	08/09/1988
Penalty Type:	Not reported
Regulation Violated:	Not reported
Area of Violation:	TSD-FINANCIAL RESPONSIBILITY REQUIREMENTS
Date Violation Determined:	07/14/1988
Actual Date Achieved Compliance:	11/02/1988
Enforcement Action:	WRITTEN INFORMAL
Enforcement Action Date:	08/22/1988
Penalty Type:	Not reported

There are 12 violation record(s) reported at this site:

Evaluation	Area of Violation	Date of Compliance
Compliance Evaluation Inspection	TSD-FINANCIAL RESPONSIBILITY REQUIREMENTS	19940608
	GENERATOR-GENERAL REQUIREMENTS	19940608
	TSD-GENERAL STANDARDS	19940608
	TSD-CONTINGENCY PLAN REQUREMENTS	19940608
Compliance Evaluation Inspection	TSD-LAND BAN REQUIREMENTS	19900608
	GENERATOR-LAND BAN REQUIREMENTS	19900608
	TSD-OTHER REQUIREMENTS	19900608
	TSD-MANIFEST REQUIREMENTS	19900608
Compliance Evaluation Inspection	TSD-OTHER REQUIREMENTS	19881206
Other Evaluation	TSD-LAND BAN REQUIREMENTS	19900608
	GENERATOR-LAND BAN REQUIREMENTS	19900608
Financial Record Review	TSD-FINANCIAL RESPONSIBILITY REQUIREMENTS	19881102

AMERICAN CYANAMID (Continued) **1000360638**

FINDS:
Other Pertinent Environmental Activity Identified at Site:
Facility Registry System (FRS)
Resource Conservation and Recovery Act Information system (RCRAINFO)
Toxic Chemical Release Inventory System (TRIS)

HAZNET:

Gepaid:	CAT080010929
Tepaid:	CAD008302903
Gen County:	Los Angeles
Tsd County:	Los Angeles
Tons:	.1876
Category:	Unspecified organic liquid mixture
Disposal Method:	Not reported
Contact:	AMERICAN CYANAMID COMPANY
Telephone:	(000) 000-0000
Mailing Address:	21444 GOLDEN TRIANGLE RD
	SAUGUS, CA 91350
County	Los Angeles

Gepaid:	CAT080010929
Tepaid:	CAD008302903
Gen County:	Los Angeles
Tsd County:	Los Angeles
Tons:	1.1467
Category:	Oxygenated solvents (acetone, butanol, ethyl acetate, etc.)
Disposal Method:	Recycler
Contact:	AMERICAN CYANAMID COMPANY
Telephone:	(000) 000-0000
Mailing Address:	21444 GOLDEN TRIANGLE RD
	SAUGUS, CA 91350
County	Los Angeles

Gepaid:	CAT080010929
Tepaid:	CAL000027741
Gen County:	Los Angeles
Tsd County:	5
Tons:	8.4280
Category:	Asbestos-containing waste
Disposal Method:	Disposal, Land Fill
Contact:	AMERICAN CYANAMID COMPANY
Telephone:	(000) 000-0000
Mailing Address:	21444 GOLDEN TRIANGLE RD
	SAUGUS, CA 91350
County	Los Angeles

Gepaid:	CAT080010929
Tepaid:	CAD982484933
Gen County:	Los Angeles
Tsd County:	7
Tons:	7.0000
Category:	Other empty containers 30 gallons or more
Disposal Method:	Recycler
Contact:	AMERICAN CYANAMID COMPANY
Telephone:	(000) 000-0000
Mailing Address:	21444 GOLDEN TRIANGLE RD
	SAUGUS, CA 91350
County	Los Angeles

AMERICAN CYANAMID (Continued) **1000360638**

Gepaid: CAT080010929
Tepaid: CAT000646117
Gen County: Los Angeles
Tsd County: Kings
Tons: 2.2517
Category: Unspecified aqueous solution
Disposal Method: Not reported
Contact: AMERICAN CYANAMID COMPANY
Telephone: (000) 000-0000
Mailing Address: 21444 GOLDEN TRIANGLE RD
SAUGUS, CA 91350
County Los Angeles

The CA HAZNET database contains 11 additional records for this site.
Please contact your EDR Account Executive for more information.

CORTESE:
Reg Id: 3134
Region: CORTESE
Reg By: Leaking Underground Storage Tanks

D26 **LAKESIDE BOAT SERVICE** **HAZNET** **S105093538**
SE **21452 GOLDEN TRIANGLE RD** **N/A**
1/2-1 **SANTA CLARITA, CA 91350**
2742 ft.
Higher **Site 12 of 12 in cluster D**

HAZNET:
Gepaid: CAL000221254
Tepaid: CAD099452708
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: .2293
Category: Waste oil and mixed oil
Disposal Method: Recycler
Contact: AMIR IBRAHIM
Telephone: (661) 254-0644
Mailing Address: 21452 GOLDEN TRIANGLE RD
SANTA CLARITA, CA 91350
County Los Angeles

Gepaid: CAL000221254
Tepaid: CAD008302903
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: .2293
Category: Unspecified solvent mixture Waste
Disposal Method: Not reported
Contact: AMIR IBRAHIM
Telephone: (661) 254-0644
Mailing Address: 21452 GOLDEN TRIANGLE RD
SANTA CLARITA, CA 91350
County Los Angeles

E27 **WHITTAKER BERMITE/RAIL STATION - SITE A** **Cal-Sites** **S101480673**
SW **22116 WEST SOLEDAD CANYON ROAD** **N/A**
1/2-1 **SANTA CLARITA, CA 91350**
2778 ft.
Lower **Site 1 of 8 in cluster E**

WHITTAKER BERMITE/RAIL STATION - SITE A (Continued) **S101480673**

CAL-SITES:

Facility ID	19281203	
Status:	NFA - NO FURTHER ACTION FOR DTSC	
Status Date:	10/25/1994	
Lead:	DTSC	
Region:	3 - BURBANK	
Branch:	SA - SOUTHERN CA. - A	
File Name:	Not reported	
Status Name:	NO FURTHER ACTION FOR DTSC	
Lead Agency:	DEPT OF TOXIC SUBSTANCES CONTROL	Not reported
NPL:	Not Listed	
SIC:	28 MANU - CHEMICALS & ALLIED PRODUCTS	
Facility Type:	RESPONSIBLE PARTY	
Type Name:	RP	
Staff Member Responsible for Site:	TCOTA	
Supervisor Responsible for Site:	SAMIREBR	
Region Water Control Board:	LA - LOS ANGELES	
Access:	Not reported	
Cortese:	Not reported	
Hazardous Ranking Score:	Not reported	
Date Site Hazard Ranked:	Not reported	
Groundwater Contamination:	Not reported	
No. of Contamination Sources:	0	
Lat/Long:	0° 0′ 0.00″ / 0° 0′ 0.00″	
Lat/long Method:	Not reported	
State Assembly District Code:	36	
State Senate District:	17	

The CAL-SITES database may contain additional details for this site.
Please contact your EDR Account Executive for more information.

E28 **WHITTAKER/BERMITE FACILITY** **Cal-Sites** **S101272742**
SW **22116 WEST SOLEDAD CANYON ROAD** **AWP** **N/A**
1/2-1 **SAUGUS, CA 91350**
2778 ft.
Lower **Site 2 of 8 in cluster E**

CAL-SITES:

Facility ID	19281087	
Status:	AWP - ANNUAL WORKPLAN (AWP) - ACTIVE SITE	
Status Date:	04/14/1995	
Lead:	DTSC	
Region:	3 - BURBANK	
Branch:	SA - SOUTHERN CA. - A	
File Name:	Not reported	
Status Name:	ANNUAL WORKPLAN - ACTIVE SITE	
Lead Agency:	DEPT OF TOXIC SUBSTANCES CONTROL	Not reported
NPL:	Not Listed	
SIC:	28 MANU - CHEMICALS & ALLIED PRODUCTS	
Facility Type:	RESPONSIBLE PARTY	
Type Name:	RP	
Staff Member Responsible for Site:	NCARDER	
Supervisor Responsible for Site:	SAMIREBR	
Region Water Control Board:	LA - LOS ANGELES	
Access:	Not reported	
Cortese:	Not reported	
Hazardous Ranking Score:	Not reported	
Date Site Hazard Ranked:	Not reported	

WHITTAKER/BERMITE FACILITY (Continued) **S101272742**

Groundwater Contamination: Not reported
No. of Contamination Sources: 0
Lat/Long: 0° 0′ 0.00″ / 0° 0′ 0.00″
Lat/long Method: Not reported
State Assembly District Code: 36
State Senate District: 17

The CAL-SITES database may contain additional details for this site.
Please contact your EDR Account Executive for more information.

AWP Facility ID: 19281087
Facility Type: AWP

E29 **BERMITE, DIVISION OF WHIT** **Cortese** **S105026557**
SW **22116 SOLEDAD CNYN** **N/A**
1/2-1 **SAUGUS, CA 91350**
2778 ft.
Lower **Site 3 of 8 in cluster E**

CORTESE:
Reg Id: R-00975
Region: CORTESE
Reg By: Leaking Underground Storage Tanks

E30 **WHITTAKER BERMITE/RAIL ST** **Cortese** **S105026559**
SW **22116 SOLEDAD CNYN** **N/A**
1/2-1 **SAUGUS, CA 91350**
2778 ft.
Lower **Site 4 of 8 in cluster E**

CORTESE:
Reg Id: 19281203
Region: CORTESE
Reg By: CALSI

E31 **BERMITE DIV-WHITTAKER** **LOS ANGELES CO. HMS** **S105032927**
SW **22116 SOLEDAD CANYON RD** **N/A**
1/2-1 **SANTA CLARITA, CA**
2778 ft.
Lower **Site 5 of 8 in cluster E**

HMS:
Facility Id: 000930-I00975
Facility Type: I09
Permit Number: 000008494 Permit Status: Closed
Facility Status: Permit Area: 7A
Region: Los Angeles County:

Facility Id: 000930-000975
Facility Type: T0
Permit Number: 00001581T Permit Status: Removed
Facility Status: Removed Area: 7A
Region: Los Angeles County:

Facility Id: 000930-028916
Facility Type: Not reported
Permit Number: Not reported Permit Status: Not reported
Facility Status: OPEN Area: 7A

BERMITE DIV-WHITTAKER (Continued) **S105032927**

Region: Los Angeles County:

E32 **WHITTAKER/BERMITE FACILIT** **Cortese** **S105026558**
SW **22116 SOLEDAD CNYN** **N/A**
1/2-1 **SAUGUS, CA 91350**
2778 ft.
Lower **Site 6 of 8 in cluster E**

CORTESE:
Reg Id: 19281087
Region: CORTESE
Reg By: CALSI

E33 **BERMITE DIVISION OF WHITTAKER** **HIST UST** **U001567688**
SW **22116 SOLEDAD CANYON RD** **N/A**
1/2-1 **SAUGUS, CA 91350**
2778 ft.
Lower **Site 7 of 8 in cluster E**

UST HIST:

Facility ID:	6423		
Tank Num:	1	Container Num:	004
Tank Capacity:	1000	Year Installed:	1982
Tank Used for:	WASTE		
Type of Fuel:	Not Reported	Tank Construction:	6" inches
Leak Detection:	Visual, None		
Contact Name:	Not reported	Telephone:	(805) 259-2241
Total Tanks:	4	Region:	STATE
Facility Type:	2	Other Type:	MFG.

Facility ID:	6423		
Tank Num:	2	Container Num:	001
Tank Capacity:	2000	Year Installed:	Not reported
Tank Used for:	PRODUCT		
Type of Fuel:	REGULAR	Tank Construction:	Not reported
Leak Detection:	Stock Inventor, None		
Contact Name:	Not reported	Telephone:	(805) 259-2241
Total Tanks:	4	Region:	STATE
Facility Type:	2	Other Type:	MFG.

Facility ID:	6423		
Tank Num:	3	Container Num:	003
Tank Capacity:	1000	Year Installed:	Not reported
Tank Used for:	PRODUCT		
Type of Fuel:	DIESEL	Tank Construction:	Not reported
Leak Detection:	Stock Inventor, None		
Contact Name:	Not reported	Telephone:	(805) 259-2241
Total Tanks:	4	Region:	STATE
Facility Type:	2	Other Type:	MFG.

Facility ID:	6423		
Tank Num:	4	Container Num:	002
Tank Capacity:	2000	Year Installed:	1975
Tank Used for:	PRODUCT		
Type of Fuel:	UNLEADED	Tank Construction:	Not reported
Leak Detection:	Stock Inventor, None		
Contact Name:	Not reported	Telephone:	(805) 259-2241
Total Tanks:	4	Region:	STATE

BERMITE DIVISION OF WHITTAKER (Continued) **U001567688**

Facility Type: 2 Other Type: MFG.

E34 SW 1/2-1 2778 ft. Lower

BERMITE DIVISION
22116 WEST SOLEDAD CANYON ROAD
SAUGUS, CA 91350

Site 8 of 8 in cluster E

RCRIS-SQG **1000421644**
RCRIS-TSD **CAD064573108**
FINDS
RAATS
CORRACTS
LUST

CORRACTS Data:

EPA Id:	CAD064573108
Region:	9
State:	CA
Area Name:	ENTIRE FACILITY
Original Scheduled Date:	Not reported
New Scheduled Date:	Not reported
Actual Date:	08/06/1992
Corrective Action:	CA075ME - CA Prioritization, Facility or area was assigned a medium corrective action priority

EPA Id:	CAD064573108
Region:	9
State:	CA
Area Name:	ENTIRE FACILITY
Original Scheduled Date:	Not reported
New Scheduled Date:	Not reported
Actual Date:	06/09/1998
Corrective Action:	CA075HI - CA Prioritization, Facility or areawas assigned a high corrective action priority

EPA Id:	CAD064573108
Region:	9
State:	CA
Area Name:	ENTIRE FACILITY
Original Scheduled Date:	Not reported
New Scheduled Date:	Not reported
Actual Date:	11/21/1994
Corrective Action:	CA100 - RFI Imposition

EPA Id:	CAD064573108
Region:	9
State:	CA
Area Name:	AREA 34
Original Scheduled Date:	Not reported
New Scheduled Date:	Not reported
Actual Date:	11/21/1994
Corrective Action:	CA600SR - Stabilization Measures Implemented , Primary measure is source removal and/or treatment

EPA Id:	CAD064573108
Region:	9
State:	CA
Area Name:	AREA 34
Original Scheduled Date:	Not reported
New Scheduled Date:	Not reported
Actual Date:	06/01/1996
Corrective Action:	CA650 - Stabilization Construction Completed

BERMITE DIVISION (Continued) **1000421644**

The CORRACTS database contains 2 additional records for this site.
Please contact your EDR Account Executive for more information.

RCRIS Corrective Action Summary:

Event: CA Prioritization, Facility or area was assigned a high corrective action priority.
Event Date: 06/09/1998

Event: Current Human Exposures under Control, Current human exposures are NOT under control.
Event Date: 06/09/1998

Event: Igration of Contaminated Groundwater under Control, Unacceptable migration of contaminated groundwater is observed or expected.
Event Date: 06/09/1998

Event: Stabilization Construction Completed
Event Date: 06/01/1996

Event: RFI Imposition
Event Date: 11/21/1994

Event: Stabilization Measures Implemented, Primary measure is source removal and/or treatment (e.g., soil or waste excavation, in-situ soil treatment, off-site treatment).
Event Date: 11/21/1994

Event: Stabilization Measures Evaluation,This facility is not amenable to stabilization activity because of a lack of technical data. An evaluation has been completed, but further data is necessary to determine stabilization measures, feasibility or appropriateness. This status should be changed when data becomes available.
Event Date: 03/08/1993

Event: CA Prioritization, Facility or area was assigned a medium corrective action priority.
Event Date: 08/06/1992

RCRIS:

Owner: SANTA CLARITA L LC
(602) 238-9007
EPA ID: CAD064573108

Contact: ALAN BERG
(602) 238-9007

Rank Status: 1
Rank Date: 08/27/1992
Classification: Handler transports wastes, but commercial status is unknown, TSDF
Used Oil Recyc: No
TSDF Activities: Not reported

Violation Status: Violations exist

Regulation Violated: 264.90-94.F
Area of Violation: TSD-GOUNDWATER MONITORING REQUIREMENTS
Date Violation Determined: 03/26/2001
Actual Date Achieved Compliance: Not reported

Enforcement Action: WRITTEN INFORMAL
Enforcement Action Date: 03/28/2001
Penalty Type: Not reported

Regulation Violated: 264.140-150.H

BERMITE DIVISION (Continued) **1000421644**

Area of Violation: TSD-FINANCIAL RESPONSIBILITY REQUIREMENTS
Date Violation Determined: 11/21/1991
Actual Date Achieved Compliance: 11/21/1996

Regulation Violated: 270
Area of Violation: TSD-OTHER REQUIREMENTS (OVERSIGHT)
Date Violation Determined: 04/26/1991
Actual Date Achieved Compliance: Not reported

Enforcement Action: WRITTEN INFORMAL
Enforcement Action Date: 06/28/1991
Penalty Type: Not reported

Regulation Violated: 264.90-94.F
Area of Violation: TSD-GOUNDWATER MONITORING REQUIREMENTS
Date Violation Determined: 06/25/1990
Actual Date Achieved Compliance: Not reported

Enforcement Action: WRITTEN INFORMAL
Enforcement Action Date: 07/30/1990
Penalty Type: Not reported

Enforcement Action: FINAL 3008(A) COMPLIANCE ORDER
Enforcement Action Date: 01/16/1991
Penalty Type: Not reported

Regulation Violated: 270
Area of Violation: TSD-OTHER REQUIREMENTS (OVERSIGHT)
Date Violation Determined: 04/27/1989
Actual Date Achieved Compliance: Not reported

Enforcement Action: WRITTEN INFORMAL
Enforcement Action Date: 06/08/1989
Penalty Type: Not reported

Regulation Violated: 264.140-150.H
Area of Violation: TSD-FINANCIAL RESPONSIBILITY REQUIREMENTS
Date Violation Determined: 06/07/1988
Actual Date Achieved Compliance: 05/02/1989

Enforcement Action: WRITTEN INFORMAL
Enforcement Action Date: 11/28/1988
Penalty Type: Not reported

Regulation Violated: 264.90-94.F
Area of Violation: TSD-GOUNDWATER MONITORING REQUIREMENTS
Date Violation Determined: 06/25/1985
Actual Date Achieved Compliance: 12/31/1989

Enforcement Action: INITIAL 3008(A) COMPLIANCE ORDER
Enforcement Action Date: 06/03/1986
Penalty Type: Proposed Monetary Penalty

Enforcement Action: INITIAL 3008(A) COMPLIANCE ORDER
Enforcement Action Date: 06/04/1986
Penalty Type: Proposed Monetary Penalty

Regulation Violated: 264.140-150.H
Area of Violation: TSD-FINANCIAL RESPONSIBILITY REQUIREMENTS
Date Violation Determined: 06/25/1985
Actual Date Achieved Compliance: 07/02/1986

Enforcement Action: INITIAL 3008(A) COMPLIANCE ORDER
Enforcement Action Date: 06/03/1986

BERMITE DIVISION (Continued) **1000421644**

Penalty Type: Proposed Monetary Penalty

Enforcement Action: INITIAL 3008(A) COMPLIANCE ORDER
Enforcement Action Date: 06/04/1986
Penalty Type: Proposed Monetary Penalty

Regulation Violated: 264.110-120.G
Area of Violation: TSD-CLOSURE/POST-CLOSURE REQUIREMENTS
Date Violation Determined: 06/25/1985
Actual Date Achieved Compliance: 08/16/1986

Enforcement Action: INITIAL 3008(A) COMPLIANCE ORDER
Enforcement Action Date: 06/03/1986
Penalty Type: Proposed Monetary Penalty

Enforcement Action: INITIAL 3008(A) COMPLIANCE ORDER
Enforcement Action Date: 06/04/1986
Penalty Type: Proposed Monetary Penalty

Enforcement Action: FINAL 3008(A) COMPLIANCE ORDER
Enforcement Action Date: 08/26/1986
Penalty Type: Proposed Monetary Penalty

Regulation Violated: 264.110-120.G
Area of Violation: TSD-CLOSURE/POST-CLOSURE REQUIREMENTS
Date Violation Determined: 06/25/1985
Actual Date Achieved Compliance: 08/16/1986

Enforcement Action: INITIAL 3008(A) COMPLIANCE ORDER
Enforcement Action Date: 06/03/1986
Penalty Type: Proposed Monetary Penalty

Enforcement Action: INITIAL 3008(A) COMPLIANCE ORDER
Enforcement Action Date: 06/04/1986
Penalty Type: Proposed Monetary Penalty

Enforcement Action: FINAL 3008(A) COMPLIANCE ORDER
Enforcement Action Date: 08/26/1986
Penalty Type: Proposed Monetary Penalty

There are 10 violation record(s) reported at this site:

Evaluation	Area of Violation	Date of Compliance
Compliance GW Monitoring Evaluation	TSD-GOUNDWATER MONITORING REQUIREMENTS	
Financial Record Review	TSD-FINANCIAL RESPONSIBILITY REQUIREMENTS	19961121
Compliance Evaluation Inspection	TSD-OTHER REQUIREMENTS (OVERSIGHT)	
Compliance GW Monitoring Evaluation	TSD-GOUNDWATER MONITORING REQUIREMENTS	
Compliance Evaluation Inspection	TSD-OTHER REQUIREMENTS (OVERSIGHT)	
Financial Record Review	TSD-FINANCIAL RESPONSIBILITY REQUIREMENTS	19890502
Compliance Evaluation Inspection	TSD-GOUNDWATER MONITORING REQUIREMENTS	19891231
	TSD-CLOSURE/POST-CLOSURE REQUIREMENTS	19860816
Financial Record Review	TSD-FINANCIAL RESPONSIBILITY REQUIREMENTS	19860702
	TSD-CLOSURE/POST-CLOSURE REQUIREMENTS	19860816

NY MANIFEST
Additional detail is available in NY MANIFEST. Please contact your EDR Account Executive for more information.

BERMITE DIVISION (Continued) **1000421644**

FINDS:
Other Pertinent Environmental Activity Identified at Site:
Facility Registry System (FRS)
Resource Conservation and Recovery Act Information system (RCRAINFO)

State LUST:

Cross Street:	SIERRA HWY		
Qty Leaked:	Not reported		
Case Number	R-00975		
Reg Board:	4		
Chemical:	Diesel		
Lead Agency:	Local Agency		
Local Agency :	19000		
Case Type:	Soil only		
Status:	Not reported		
County:	Los Angeles		
Review Date:	1/2/86	Confirm Leak:	1/2/86
Workplan:	Not reported	Prelim Assess:	Not reported
Pollution Char:	Not reported	Remed Plan:	Not reported
Remed Action:	Not reported	Monitoring:	Not reported
Close Date:	Not reported		
Release Date:	Not reported		
Cleanup Fund Id :	Not reported		
Discover Date :	1/2/86		
Enforcement Dt :	Not reported		
Enf Type:	Not reported		
Enter Date :	12/31/86		
Funding:	Not reported		
Staff Initials:	Not reported		
How Discovered:	Tank Closure		
How Stopped:	Close Tank		
Interim :	Not reported		
Leak Cause:	Corrosion		
Leak Source:	Tank		
MTBE Date :	Not reported		
Max MTBE GW :	Not reported		
MTBE Tested:	Not Required to be Tested.		
Priority:	Not reported		
Local Case # :	Not reported		
Beneficial:	Not reported		
Staff :	JLC		
GW Qualifies :	Not reported		
Max MTBE Soil :	Not reported		
Soil Qualifies :	Not reported		
Hydr Basin #:	Not reported		
Operator :	Not reported		
Oversight Prgm:	Local Implementing Agency UST (includes non-LOP cases within LOP jurisdiction)		
Oversight Prgm :	LIA		
Review Date :	8/25/87		
Stop Date :	1/2/86		
Work Suspended :	Not reported		
Responsible Party	BERMITE, DIVISION OF WHITTIKER		
RP Address:	22116 SOLEDAD CANYON, SAUGUS, CA 91350		
Global Id:	T0603704547		
Org Name:	Not reported		
Contact Person:	Not reported		

BERMITE DIVISION (Continued) **1000421644**

MTBE Conc: 0
Mtbe Fuel: Not reported
Water System Name: VALENCIA WATER CO
Well Name: T-2
Distance To Lust: 1222.732762
Waste Discharge Global ID: Not reported
Waste Disch Assigned Name: Not reported

LUST Region 4:
Report Date: 1/2/1986
Lead Agency: Local Agency
Local Agency: 19000
Case Number: R-00975
Substance: Diesel
Case Type: Soil
Status: Leak being confirmed
Region: 4
Staff: Not reported

F35 ESE 1/2-1 2802 ft. Higher

FOSTERS FREEZE **LOS ANGELES CO. HMS** **S105422130**
21525 W SOLEDAD CANYON RD **N/A**
SANTA CLARITA, CA

Site 1 of 4 in cluster F

HMS:
Facility Id: 008239-022268
Facility Type: I02
Permit Number: 000220926 Permit Status: Permit
Facility Status: Permit Area: 7A
Region: Los Angeles County:

F36 ESE 1/2-1 2802 ft. Higher

FOSTER FREEZE **LOS ANGELES CO. HMS** **S105422129**
21525 W SOLEDAD CANYON RD **N/A**
SANTA CLARITA, CA

Site 2 of 4 in cluster F

HMS:
Facility Id: 008239-I08780
Facility Type: I02
Permit Number: 00009944A Permit Status: Closed
Facility Status: Closed Area: 7A
Region: Los Angeles County:

F37 ESE 1/2-1 2827 ft. Higher

FOSTERS FREEZE **LOS ANGELES CO. HMS** **S102064072**
21515 SOLEDAD CANYON RD **N/A**
SANTA CLARITA, CA

Site 3 of 4 in cluster F

HMS:
Facility Id: 009179-008780
Facility Type: Not reported
Permit Number: Not reported Permit Status: Not reported
Facility Status: OPEN Area: 7A
Region: Los Angeles County:

C38
SE
1/2-1
2848 ft.
Higher

26477 GOLDEN TRIANGLE RD.
SANTA CLARITA, CA 91355

Site 9 of 9 in cluster C

CHMIRS **S100217867**
N/A

CHMIRS:

OES Control Number:	8908461	DOT ID:	Not reported
DOT Hazard Class:	Not Reported		
Chemical Name:	RHODIUM & RUTHENIUM		
Extent of Release:	Not reported		
CAS Number:	7440-16-6	Quantity Released:	5
Environmental Contamination:	None Reported	Property Use:	Manufacturing
Incident Date:	18-OCT-89	Date Completed:	18-OCT-89

Time Completed :	800
Physical State Stored :	Liquid
Physical State Released :	Liquid
Release Unit :	Gallons
Container Description :	Not reported
Container Type :	Not reported
Container Material :	Not reported
Level Of Container :	Not reported
Container Capacity :	Not reported
Container Capacity Units (code) :	Not reported
Extent Of Release (code) :	3
Agency Id Number :	19110
Agency Incident Number :	9
OES Incident Number :	8908461
Time Notified :	619
Surrounding Area :	500
Estimated Temperature :	60
Property Management :	K
More Than Two Substances Involved? :	Not reported
Special Studies 1 :	Not reported
Special Studies 2 :	Not reported
Special Studies 3 :	Not reported
Special Studies 4 :	Not reported
Special Studies 5 :	Not reported
Special Studies 6 :	Not reported
Responding Agency Personel # Of Injuries :	0
Responding Agency Personel # Of Fatalities :	0
Resp Agncy Personel # Of Decontaminated :	0
Others Number Of Decontaminated :	0
Others Number Of Injuries :	0
Others Number Of Fatalities :	0
Vehicle Make/year :	Not reported
Vehicle License Number :	Not reported
Vehicle State :	Not reported
Vehicle Id Number :	Not reported
CA/DOT/PUC/ICC Number :	Not reported
Company Name :	Not reported
Reporting Officer Name/ID :	ROBERT J SHEETS CAPT 185
Report Date :	18-OCT-89
Comments :	Not reported
Facility Telephone Number :	213 267-2485

F39
ESE
1/2-1
2861 ft.
Higher

21361 SOLEDAD CNY RD
SANTA CLARITA, CA

Site 4 of 4 in cluster F

CHMIRS **S100216378**
N/A

(Continued) **S100216378**

CHMIRS:

OES Control Number:	8803256	DOT ID:	1789
DOT Hazard Class:	Corrosives		
Chemical Name:	ACID, MURIATIC		
Extent of Release:	Not reported		
CAS Number:	Not reported	Quantity Released:	.5
Environmental Contamination:	Ground	Property Use:	099
Incident Date:	12-OCT-88	Date Completed:	12-OCT-88
Time Completed :		1245	
Physical State Stored :		Liquid	
Physical State Released :		Liquid	
Release Unit :		Gallons	
Container Description :		2	
Container Type :		04	
Container Material :		Plastic Fiberglass , Rigid	
Level Of Container :		Ground Level	
Container Capacity :		2	
Container Capacity Units (code) :		2	
Extent Of Release (code) :		9	
Agency Id Number :		19110	
Agency Incident Number :		0	
OES Incident Number :		8803256	
Time Notified :		1208	
Surrounding Area :		400	
Estimated Temperature :		70	
Property Management :		K	
More Than Two Substances Involved? :		Not reported	
Special Studies 1 :		Not reported	
Special Studies 2 :		Not reported	
Special Studies 3 :		Not reported	
Special Studies 4 :		Not reported	
Special Studies 5 :		Not reported	
Special Studies 6 :		Not reported	
Responding Agency Personel # Of Injuries :		Not reported	
Responding Agency Personel # Of Fatalities :		Not reported	
Resp Agncy Personel # Of Decontaminated :		Not reported	
Others Number Of Decontaminated :		Not reported	
Others Number Of Injuries :		Not reported	
Others Number Of Fatalities :		Not reported	
Vehicle Make/year :		Not reported	
Vehicle License Number :		Not reported	
Vehicle State :		Not reported	
Vehicle Id Number :		Not reported	
CA/DOT/PUC/ICC Number :		Not reported	
Company Name :		Not reported	
Reporting Officer Name/ID :		CAPT JOHN W EVERETT	
Report Date :		12-OCT-88	
Comments :		Yes	
Facility Telephone Number :		213 267-2485	

G40 **BONELLI PHAR PROD** **LOS ANGELES CO. HMS** **U003060423**
WSW **22500 W SOLEDAD CANYON RD** **N/A**
1/2-1 **UNINCORPORATED, CA**
3491 ft.
Lower **Site 1 of 3 in cluster G**

HMS:
Facility Id: 004213-I04366

BONELLI PHAR PROD (Continued) **U003060423**

Facility Type: Not reported
Permit Number: Not reported
Permit Status: Not reported
Facility Status: OPEN
Area: 7
Region: Los Angeles County:

41
ESE
1/2-1
3495 ft.
Higher

21361 SOLEDAD CANYON RD. **ERNS** **8874052**
21361 SOLEDAD CANYON RD. **N/A**
SANTA CLARITA, CA

G42
West
1/2-1
3505 ft.
Lower

SAUGUS SPEED WAY - SWAPMEET **LOS ANGELES CO. HMS** **S102064137**
22500 SOLEDAD CANYON RD **N/A**
SANTA CLARITA, CA

Site 2 of 3 in cluster G

HMS:
Facility Id: 009029-004366
Facility Type: Not reported
Permit Number: Not reported
Permit Status: Not reported
Facility Status: Removed
Area: 7A
Region: Los Angeles County:

G43
West
1/2-1
3505 ft.
Lower

SAUGUS SWAP MEET/SAUGUS SPEEDW **HIST UST** **U001567721**
22500 SOLEDAD CANYON RD **N/A**
SAUGUS, CA 91350

Site 3 of 3 in cluster G

UST HIST:
Facility ID: 66476
Tank Num: 1
Container Num: #1
Tank Capacity: 3000
Year Installed: Not reported
Tank Used for: WASTE
Type of Fuel: Not Reported
Tank Construction: X inches
Leak Detection: None
Contact Name: RAYMOND J. WILKINGS, MGR.
Telephone: (805) 259-3886
Total Tanks: 3
Region: STATE
Facility Type: 2
Other Type: SPEEDWAY

Facility ID: 66476
Tank Num: 2
Container Num: #2
Tank Capacity: 3000
Year Installed: Not reported
Tank Used for: PRODUCT
Type of Fuel: UNLEADED
Tank Construction: Not reported
Leak Detection: None
Contact Name: RAYMOND J. WILKINGS, MGR.
Telephone: (805) 259-3886
Total Tanks: 3
Region: STATE
Facility Type: 2
Other Type: SPEEDWAY

Facility ID: 66476
Tank Num: 3
Container Num: #3
Tank Capacity: 4000
Year Installed: Not reported
Tank Used for: PRODUCT
Type of Fuel: DIESEL
Tank Construction: Not reported
Leak Detection: None

SAUGUS SWAP MEET/SAUGUS SPEEDW (Continued) **U001567721**

Contact Name:	RAYMOND J. WILKINGS, MGR.	Telephone:	(805) 259-3886
Total Tanks:	3	Region:	STATE
Facility Type:	2	Other Type:	SPEEDWAY

H44 **SANTA CLARITA WATER CO.** **LOS ANGELES CO. HMS** **S103945137**
West **22722 SOLEDAD CANYON RD** **N/A**
1/2-1 **SANTA CLARITA, CA**
4560 ft.
Lower **Site 1 of 2 in cluster H**

HMS:

Facility Id:	020322-028917		
Facility Type:	Not reported		
Permit Number:	Not reported	Permit Status:	Not reported
Facility Status:	OPEN	Area:	7A
Region:	Los Angeles County:		

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45 **BOWMAN HIGH SCHOOL/WM S HART UNION HSD** **HAZNET** **S102816201**
SE **21508 REDVIEW DR** **N/A**
1/2-1 **SANTA CLARITA, CA 91350**
4713 ft.
Higher

HAZNET:

Gepaid:	CAL000083996
Tepaid:	CAD981402522
Gen County:	Los Angeles
Tsd County:	Kern
Tons:	.0083
Category:	Photochemicals/photoprocessing waste
Disposal Method:	Recycler
Contact:	WM S HART UNION HS DISTRICT
Telephone:	(805) 259-0033
Mailing Address:	21515 REDVIEW DR SANTA CLARITA, CA 91350 - 2947
County	Los Angeles

Gepaid:	CAL000083996
Tepaid:	CAD981402522
Gen County:	Los Angeles
Tsd County:	Kern
Tons:	.0250
Category:	Photochemicals/photoprocessing waste
Disposal Method:	Recycler
Contact:	WM S HART UNION HS DISTRICT
Telephone:	(805) 259-0033
Mailing Address:	21515 REDVIEW DR SANTA CLARITA, CA 91350 - 2947
County	Los Angeles

Gepaid:	CAL000083996
Tepaid:	CAD008364432
Gen County:	Los Angeles
Tsd County:	Los Angeles
Tons:	.0000
Category:	Laboratory waste chemicals
Disposal Method:	Not reported
Contact:	WM S HART UNION HS DISTRICT
Telephone:	(805) 259-0033

BOWMAN HIGH SCHOOL/WM S HART UNION HSD (Continued) **S102816201**

Mailing Address: 21515 REDVIEW DR
SANTA CLARITA, CA 91350 - 2947
County Los Angeles

Gepaid: CAL000083996
Tepaid: CAD008364432
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: .0400
Category: Laboratory waste chemicals
Disposal Method: Recycler
Contact: WM S HART UNION HS DISTRICT
Telephone: (805) 259-0033
Mailing Address: 21515 REDVIEW DR
SANTA CLARITA, CA 91350 - 2947
County Los Angeles

Gepaid: CAL000083996
Tepaid: CAD008364432
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: .0050
Category: Laboratory waste chemicals
Disposal Method: Treatment, Tank
Contact: WM S HART UNION HS DISTRICT
Telephone: (805) 259-0033
Mailing Address: 21515 REDVIEW DR
SANTA CLARITA, CA 91350 - 2947
County Los Angeles

The CA HAZNET database contains 3 additional records for this site.
Please contact your EDR Account Executive for more information.

H46 **SANTA CLARITA VALLEY DENTAL** **HAZNET** **S103986698**
West **22770 WEST SOLEDAD CYN RD** **N/A**
1/2-1 **SAUGUS, CA 91350**
4816 ft.
Lower **Site 2 of 2 in cluster H**

HAZNET:
Gepaid: CAL000099024
Tepaid: CAD981402522
Gen County: Los Angeles
Tsd County: Kern
Tons: .0625
Category: Photochemicals/photoprocessing waste
Disposal Method: Not reported
Contact: R MEEKER/A MINDEL/M ORRO
Telephone: (805) 259-9674
Mailing Address: 22770 SOLEDAD CANYON RD
SANTA CLARITA, CA 91350 - 2629
County Los Angeles

SANTA CLARITA VALLEY DENTAL (Continued) **S103986698**

Gepaid: CAL000099024
Tepaid: CAD981402522
Gen County: Los Angeles
Tsd County: Kern
Tons: .0625
Category: Photochemicals/photoprocessing waste
Disposal Method: Recycler
Contact: R MEEKER/A MINDEL/M ORRO
Telephone: (805) 259-9674
Mailing Address: 22770 SOLEDAD CANYON RD
SANTA CLARITA, CA 91350 - 2629
County Los Angeles

Gepaid: CAL000099024
Tepaid: CAD981402522
Gen County: Los Angeles
Tsd County: Kern
Tons: .0625
Category: Photochemicals/photoprocessing waste
Disposal Method: Recycler
Contact: R MEEKER/A MINDEL/M ORRO
Telephone: (805) 259-9674
Mailing Address: 22770 SOLEDAD CANYON RD
SANTA CLARITA, CA 91350 - 2629
County Los Angeles

Gepaid: CAL000099024
Tepaid: CAD981402522
Gen County: Los Angeles
Tsd County: Kern
Tons: .0625
Category: Photochemicals/photoprocessing waste
Disposal Method: Recycler
Contact: R MEEKER/A MINDEL/M ORRO
Telephone: (805) 259-9674
Mailing Address: 22770 SOLEDAD CANYON RD
SANTA CLARITA, CA 91350 - 2629
County Los Angeles

Gepaid: CAL000099024
Tepaid: CAD981402522
Gen County: Los Angeles
Tsd County: Kern
Tons: .0625
Category: Photochemicals/photoprocessing waste
Disposal Method: Recycler
Contact: R MEEKER/A MINDEL/M ORRO
Telephone: (805) 259-9674
Mailing Address: 22770 SOLEDAD CANYON RD
SANTA CLARITA, CA 91350 - 2629
County Los Angeles

I47 **CAMEL WORKS** **LOS ANGELES CO. HMS** **U003061634**
East **21020 W SOLEDAD CANYON RD** **N/A**
1/2-1 **SANTA CLARITA, CA**
4840 ft.
Higher **Site 1 of 4 in cluster I**

HMS:
Facility Id: 005600-I05804

CAMEL WORKS (Continued) **U003061634**

Facility Type: I00
Permit Number: 000003368 Permit Status: Closed
Facility Status: Closed Area: 7A
Region: Los Angeles County:

I48 **LA CO DPW FLOOD SANTA CLARITA** **LOS ANGELES CO. HMS** **S102064043**
East **21014 W SOLEDAD CANYON RD** **N/A**
1/2-1 **SANTA CLARITA, CA**
4861 ft.
Higher **Site 2 of 4 in cluster I**

HMS:
Facility Id: 010790-010750
Facility Type: T0
Permit Number: 00005232T Permit Status: Removed
Facility Status: Removed Area: 7A
Region: Los Angeles County:

I49 **PROWLERS SPEED & CUSTOMS INC.** **LOS ANGELES CO. HMS** **S103945054**
East **21021 SOLEDAD CANYON RD** **N/A**
1/2-1 **SANTA CLARITA, CA**
4904 ft.
Higher **Site 3 of 4 in cluster I**

HMS:
Facility Id: 020321-028915
Facility Type: Not reported
Permit Number: Not reported Permit Status: Not reported
Facility Status: OPEN Area: 7A
Region: Los Angeles County:

I50 **SANTA CLARA YARD** **HIST UST** **U001567720**
East **21014 SOLEDAD CANYON RD** **N/A**
1/2-1 **CANYON COUNTRY, CA 91350**
4928 ft.
Higher **Site 4 of 4 in cluster I**

UST HIST:
Facility ID: 32673
Tank Num: 1 Container Num: 1
Tank Capacity: 1000 Year Installed: 1972
Tank Used for: PRODUCT
Type of Fuel: DIESEL Tank Construction: Not reported
Leak Detection: None
Contact Name: Not reported Telephone: (818) 896-0594
Total Tanks: 2 Region: STATE
Facility Type: 2 Other Type: MAINTENANCE SUB YARD

Facility ID: 32673
Tank Num: 2 Container Num: 2
Tank Capacity: 1000 Year Installed: 1972
Tank Used for: PRODUCT
Type of Fuel: REGULAR Tank Construction: Not reported
Leak Detection: None
Contact Name: Not reported Telephone: (818) 896-0594
Total Tanks: 2 Region: STATE
Facility Type: 2 Other Type: MAINTENANCE SUB YARD

51
NW
1/2-1
4929 ft.
Lower

SAUGUS UNION SCHOOL DIST
22635 ESPUELLA DR
SAUGUS, CA 91350

HAZNET **S102815982**
N/A

HAZNET:

Gepaid:	CAL000082553
Tepaid:	CAD067786749
Gen County:	Los Angeles
Tsd County:	Los Angeles
Tons:	4.2140
Category:	Asbestos-containing waste
Disposal Method:	Not reported
Contact:	PUBLIC AGENCY
Telephone:	(805) 297-8800
Mailing Address:	22211 WEST NEWHALL RANCH RD SAUGUS, CA 91350
County	Los Angeles

Gepaid:	CAL000082553
Tepaid:	CAD067786749
Gen County:	Los Angeles
Tsd County:	Los Angeles
Tons:	67.4240
Category:	Asbestos-containing waste
Disposal Method:	Disposal, Land Fill
Contact:	PUBLIC AGENCY
Telephone:	(805) 297-8800
Mailing Address:	22211 WEST NEWHALL RANCH RD SAUGUS, CA 91350
County	Los Angeles

52
South
1/2-1
5039 ft.
Higher

WHITTAKER CORP/BERMITE DIV
22116 W SOLEDAD CYN RD
SAUGUS, CA 91350

HAZNET **S103642834**
N/A

HAZNET:

Gepaid:	CAD064573108
Tepaid:	CAT080010101
Gen County:	Los Angeles
Tsd County:	San Diego
Tons:	.0250
Category:	Other inorganic solid waste
Disposal Method:	Treatment, Tank
Contact:	WHITTAKER PORTA BELLA DEV INC
Telephone:	(805) 526-5700
Mailing Address:	22116 SOLEDAD CANYON RD #W SANTA CLARITA, CA 91350 - 2627
County	Los Angeles

WHITTAKER CORP/BERMITE DIV (Continued) **S103642834**

Gepaid: CAD064573108
Tepaid: CAT000646117
Gen County: Los Angeles
Tsd County: Kings
Tons: .0000
Category: Other organic solids
Disposal Method: Not reported
Contact: WHITTAKER PORTA BELLA DEV INC
Telephone: (805) 526-5700
Mailing Address: 22116 SOLEDAD CANYON RD #W
SANTA CLARITA, CA 91350 - 2627
County Los Angeles

Gepaid: CAD064573108
Tepaid: CAT000646117
Gen County: Los Angeles
Tsd County: Kings
Tons: 8.4280
Category: Other organic solids
Disposal Method: Disposal, Land Fill
Contact: WHITTAKER PORTA BELLA DEV INC
Telephone: (805) 526-5700
Mailing Address: 22116 SOLEDAD CANYON RD #W
SANTA CLARITA, CA 91350 - 2627
County Los Angeles

Gepaid: CAD064573108
Tepaid: CAT080022148
Gen County: Los Angeles
Tsd County: San Bernardino
Tons: .0005
Category: Off-specification, aged, or surplus organics
Disposal Method: Disposal, Other
Contact: WHITTAKER PORTA BELLA DEV INC
Telephone: (805) 526-5700
Mailing Address: 22116 SOLEDAD CANYON RD #W
SANTA CLARITA, CA 91350 - 2627
County Los Angeles

Gepaid: CAD064573108
Tepaid: CAT000646117
Gen County: Los Angeles
Tsd County: Kings
Tons: 39.6116
Category: Contaminated soil from site clean-ups
Disposal Method: Disposal, Land Fill
Contact: WHITTAKER PORTA BELLA DEV INC
Telephone: (805) 526-5700
Mailing Address: 22116 SOLEDAD CANYON RD #W
SANTA CLARITA, CA 91350 - 2627
County Los Angeles

The CA HAZNET database contains 3 additional records for this site.
Please contact your EDR Account Executive for more information.

53
SE
1/2-1
5126 ft.
Higher

WILLIAM S. HART UNION SCHOOL DISTRICT
21469 REDVIEW DRIVE
SANTA CLARITA, CA 91350

Cal-Sites **S100848272**
N/A

WILLIAM S. HART UNION SCHOOL DISTRICT (Continued) **S100848272**

CAL-SITES:

Facility ID	19470010		
Status:	NFA - NO FURTHER ACTION FOR DTSC		
Status Date:	11/07/1994		
Lead:	Not reported		
Region:	3 - BURBANK		
Branch:	SA - SOUTHERN CA. - A		
File Name:	WILLIAM S. HART UNION SCHOOL DISTRICT		
Status Name:	NO FURTHER ACTION FOR DTSC		
Lead Agency:	N/A		Not reported
NPL:	Not reported		
SIC:	47 TRANSPORTATION SERVICES		
Facility Type:	N/A		
Type Name:	Not reported		
Staff Member Responsible for Site:	JABRAHAM		
Supervisor Responsible for Site:	MMONROY		
Region Water Control Board:	LA - LOS ANGELES		
Access:	Not reported		
Cortese:	Not reported		
Hazardous Ranking Score:	Not reported		
Date Site Hazard Ranked:	Not reported		
Groundwater Contamination:	Not reported		
No. of Contamination Sources:	0		
Lat/Long:	0° 0′ 0.00″ / 0° 0′ 0.00″		
Lat/long Method:	Not reported		
State Assembly District Code:	Not reported		
State Senate District:	Not reported		

The CAL-SITES database may contain additional details for this site.
Please contact your EDR Account Executive for more information.

J54 **AMERICAN MOTOR CYCLE** **LOS ANGELES CO. HMS** **S103945138**
West **22820 SOLEDAD CANYON RD** **N/A**
1/2-1 **SANTA CLARITA, CA**
5133 ft.
Lower **Site 1 of 3 in cluster J**

HMS:

Facility Id:	020323-028918		
Facility Type:	Not reported		
Permit Number:	Not reported	Permit Status:	Not reported
Facility Status:	OPEN	Area:	7A
Region:	Los Angeles County:		

J55 **PIZZA HUT RESTAURANT #758132** **LOS ANGELES CO. HMS** **S103317719**
West **22830 W SOLEDAD CANYON RD** **N/A**
1/2-1 **SANTA CLARITA, CA**
5195 ft.
Lower **Site 2 of 3 in cluster J**

HMS:

Facility Id:	008919-I16652		
Facility Type:	I01		
Permit Number:	000012437	Permit Status:	Permit
Facility Status:	Permit	Area:	7A
Region:	Los Angeles County:		

56
NNW
1/2-1
5216 ft.
Lower

L A POLICE MISDEMEANANT F — **LOS ANGELES CO. HMS** — **U003057660**
27000 N BOUQUET CANYON RD — **N/A**
SANTA CLARITA, CA

HMS:
Facility Id: 001208-I01268
Facility Type: I00
Permit Number: 000000727 — Permit Status: Closed
Facility Status: Closed — Area: 7A
Region: Los Angeles County:

J57
West
1/2-1
5238 ft.
Lower

FIRST CARE WALK IN MEDICAL GR — **HAZNET** — **S103964431**
22840 SOLDEDAD CANYON RD — **N/A**
SANTA CLARITA, CA 91350

Site 3 of 3 in cluster J

HAZNET:
Gepaid: CAL000080691
Tepaid: CAD981402522
Gen County: Los Angeles
Tsd County: Kern
Tons: .5294
Category: Photochemicals/photoprocessing waste
Disposal Method: Recycler
Contact: RALPH FARINELLA/LARRY BARNHART
Telephone: (000) 000-0000
Mailing Address: 22840 SOLEDAD CANYON RD
SANTA CLARITA, CA 91350
County Los Angeles

Gepaid: CAL000080691
Tepaid: CAD982041980
Gen County: Los Angeles
Tsd County: Fresno
Tons: .0200
Category: Metal sludge - Alkaline solution (pH <UN-> 12.5) with metals (antimony, arsenic, barium, beryllium, cadmium, chromium, cobalt, copper, lead, mercury, molybdenum, nickel, selenium, silver, thallium, vanadium, and zinc)
Disposal Method: Treatment, Incineration
Contact: RALPH FARINELLA/LARRY BARNHART
Telephone: (000) 000-0000
Mailing Address: 22840 SOLEDAD CANYON RD
SANTA CLARITA, CA 91350
County Los Angeles

Gepaid: CAL000080691
Tepaid: CAD982041980
Gen County: Los Angeles
Tsd County: Fresno
Tons: .0000
Category:
Disposal Method: Treatment, Incineration
Contact: RALPH FARINELLA/LARRY BARNHART
Telephone: (000) 000-0000
Mailing Address: 22840 SOLEDAD CANYON RD
SANTA CLARITA, CA 91350
County Los Angeles

FIRST CARE WALK IN MEDICAL GR (Continued) **S103964431**

Gepaid: CAL000080691
Tepaid: CAD981402522
Gen County: Los Angeles
Tsd County: Kern
Tons: .3710
Category: Photochemicals/photoprocessing waste
Disposal Method: Recycler
Contact: RALPH FARINELLA/LARRY BARNHART
Telephone: (000) 000-0000
Mailing Address: 22840 SOLEDAD CANYON RD
SANTA CLARITA, CA 91350
County Los Angeles

Gepaid: CAL000080691
Tepaid: CAD981402522
Gen County: Los Angeles
Tsd County: Kern
Tons: .1000
Category: Photochemicals/photoprocessing waste
Disposal Method: Recycler
Contact: RALPH FARINELLA/LARRY BARNHART
Telephone: (000) 000-0000
Mailing Address: 22840 SOLEDAD CANYON RD
SANTA CLARITA, CA 91350
County Los Angeles

K58 **PREMIER AUTO BODY & FRAME** **HAZNET** **S100942731**
East **26723 OAK AVENUE** **N/A**
> 1 **CANYON COUNTRY, CA 91351**
5431 ft.
Higher **Site 1 of 8 in cluster K**

HAZNET:
Gepaid: CAL000005147
Tepaid: CAD008252405
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: .2293
Category: Unspecified solvent mixture Waste
Disposal Method: Recycler
Contact: FRANK PINTO
Telephone: (805) 298-0198
Mailing Address: 26723 OAK AVE
CANYON COUNTRY, CA 91351
County Los Angeles

Gepaid: CAL000005147
Tepaid: CAD008252405
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: .2293
Category: Oxygenated solvents (acetone, butanol, ethyl acetate, etc.)
Disposal Method: Recycler
Contact: FRANK PINTO
Telephone: (805) 298-0198
Mailing Address: 26723 OAK AVE
CANYON COUNTRY, CA 91351
County Los Angeles

PREMIER AUTO BODY & FRAME (Continued) **S100942731**

Gepaid: CAL000005147
Tepaid: CAD008252405
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: 0.2293
Category: Unspecified solvent mixture Waste
Disposal Method: Recycler
Contact: FRANK PINTO
Telephone: (805) 298-0198
Mailing Address: 26723 OAK AVE
CANYON COUNTRY, CA 91351
County Los Angeles

Gepaid: CAL000005147
Tepaid: CAD982444481
Gen County: Los Angeles
Tsd County: San Bernardino
Tons: 0.2085
Category: Unspecified organic liquid mixture
Disposal Method: Recycler
Contact: FRANK PINTO
Telephone: (805) 298-0198
Mailing Address: 26723 OAK AVE
CANYON COUNTRY, CA 91351
County Los Angeles

Gepaid: CAL000005147
Tepaid: CAD097030993
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: .1000
Category: Other organic solids
Disposal Method: Disposal, Other
Contact: FRANK PINTO
Telephone: (805) 298-0198
Mailing Address: 26723 OAK AVE
CANYON COUNTRY, CA 91351
County Los Angeles

The CA HAZNET database contains 12 additional records for this site.
Please contact your EDR Account Executive for more information.

K59 **AUTO CENTER** **LOS ANGELES CO. HMS** **S104537772**
East **26723 OAK AVE** **N/A**
> 1 **SANTA CLARITA, CA**
5431 ft.
Higher **Site 2 of 8 in cluster K**

HMS:
Facility Id: 007868-008329
Facility Type: Not reported
Permit Number: Not reported
Facility Status: OPEN
Region: Los Angeles County:
Permit Status: Not reported
Area: 7A

K60 **PREMIER AUTO BODY** **LOS ANGELES CO. HMS** **U003063603**
East **26723 OAK AVE** **N/A**
> 1 **SANTA CLARITA, CA**
5431 ft.
Higher **Site 3 of 8 in cluster K**

HMS:

Facility Id:	007868-I08329		
Facility Type:	I01		
Permit Number:	000009001	Permit Status:	Permit
Facility Status:	Permit	Area:	7A
Region:	Los Angeles County:		

K61 **MORRIS PRECISION PRODUCTS, INC.** **HAZNET** **S102814076**
East **26732 OAK AVE** **N/A**
> 1 **CANYON COUNTRY, CA 91351**
5432 ft.
Higher **Site 4 of 8 in cluster K**

HAZNET:

Gepaid:	CAL000059926
Tepaid:	CAD980883177
Gen County:	Los Angeles
Tsd County:	Kern
Tons:	1.5429
Category:	Unspecified oil-containing waste
Disposal Method:	Recycler
Contact:	MORRIS NORMAN
Telephone:	(000) 000-0000
Mailing Address:	26732 OAK AVE
	CANYON COUNTRY, CA 91351
County	Los Angeles

Gepaid:	CAL000059926
Tepaid:	CAT080013352
Gen County:	Los Angeles
Tsd County:	Los Angeles
Tons:	.6880
Category:	Unspecified oil-containing waste
Disposal Method:	Recycler
Contact:	MORRIS NORMAN
Telephone:	(000) 000-0000
Mailing Address:	26732 OAK AVE
	CANYON COUNTRY, CA 91351
County	Los Angeles

Gepaid:	CAL000059926
Tepaid:	CAT080013352
Gen County:	Los Angeles
Tsd County:	Los Angeles
Tons:	.7506
Category:	Waste oil and mixed oil
Disposal Method:	Recycler
Contact:	MORRIS NORMAN
Telephone:	(000) 000-0000
Mailing Address:	26732 OAK AVE
	CANYON COUNTRY, CA 91351
County	Los Angeles

MORRIS PRECISION PRODUCTS, INC. (Continued) **S102814076**

Gepaid: CAL000059926
Tepaid: CAT080013352
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: .8131
Category: Unspecified oil-containing waste
Disposal Method: Recycler
Contact: MORRIS NORMAN
Telephone: (000) 000-0000
Mailing Address: 26732 OAK AVE
CANYON COUNTRY, CA 91351
County Los Angeles

Gepaid: CAL000059926
Tepaid: CAT080013352
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: .7923
Category: Unspecified oil-containing waste
Disposal Method: Recycler
Contact: MORRIS NORMAN
Telephone: (000) 000-0000
Mailing Address: 26732 OAK AVE
CANYON COUNTRY, CA 91351
County Los Angeles

The CA HAZNET database contains 2 additional records for this site.
Please contact your EDR Account Executive for more information.

K62 **BOHAN'S AUTOMOTIVE** **LOS ANGELES CO. HMS** **S103945455**
East **26741 OAK AVE** **N/A**
> 1 **SANTA CLARITA, CA**
5434 ft.
Higher **Site 5 of 8 in cluster K**

HMS:
Facility Id: 020054-028585
Facility Type: Not reported
Permit Number: Not reported
Permit Status: Not reported
Facility Status: OPEN
Area: 7A
Region: Los Angeles County:

K63 **BOHANS AUTOMOTOVIE** **HAZNET** **S104583059**
East **26741 OAK ST** **N/A**
> 1 **SANTA CLARITA, CA 91351**
5434 ft.
Higher **Site 6 of 8 in cluster K**

HAZNET:
Gepaid: CAL000208720
Tepaid: CAD099452708
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: 1.5636
Category: Unspecified aqueous solution
Disposal Method: Recycler
Contact: KENNETH MC KERNAN
Telephone: (662) 251-4288

BOHANS AUTOMOTOVIE (Continued) **S104583059**

Mailing Address: 26741 OAK ST
SANTA CLARITA, CA 91351
County Los Angeles

Gepaid: CAL000208720
Tepaid: CAD099452708
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: 0.6255
Category: Unspecified aqueous solution
Disposal Method: Recycler
Contact: KENNETH MC KERNAN
Telephone: (662) 251-4288
Mailing Address: 26741 OAK ST
SANTA CLARITA, CA 91351
County Los Angeles

K64 **VAL-PAK PRODUCTS** **FINDS 1004439683**
East **26751 OAK AVE.** **SSTS 058291CA 001**
> 1 **CANYON COUNTRY, CA 91351**
5436 ft.
Higher **Site 7 of 8 in cluster K**

FINDS:
Other Pertinent Environmental Activity Identified at Site:
Section Seven Tracking System (SSTS)

SSTS:
Product: ALGI - CONTROL
Status: Active
Registration #: 058291CA 001
Report Year: 1996
Permit: Registered
Product #: 00683600047010897
Product Type: End-use blend, formulation, or concentrate
Product Class: 20
Product Use: 5
Market: Marketed in the United States

Product: ALGI-CONTROL
Status: Active
Registration #: 058291CA 001
Report Year: 1997
Permit: Registered
Product #: 00683600047010897
Product Type: End-use blend, formulation, or concentrate
Product Class: 20
Product Use: 5
Market: Marketed in the United States

Product: ALGI-CONTROL
Status: Active
Registration #: 058291CA 001
Report Year: Not reported
Permit: Registered
Product #: 00683600047010897
Product Type: End-use blend, formulation, or concentrate
Product Class: Algicide
Product Use: All other products
Market: Marketed in the United States

VAL-PAK PRODUCTS (Continued) **1004439683**

Product:	HASACIDE
Status:	Active
Registration #:	058291CA 001
Report Year:	1991
Permit:	Registered
Product #:	01089700013
Product Type:	End-use blend, formulation, or concentrate
Product Class:	Algicide
Product Use:	All other products
Market:	Marketed in the United States

Product:	ALGI CONTROL
Status:	Active
Registration #:	058291CA 001
Report Year:	1991
Permit:	Registered
Product #:	00683600047
Product Type:	End-use blend, formulation, or concentrate
Product Class:	Algicide
Product Use:	All other products
Market:	Marketed in the United States

Product:	HASACIDE
Status:	Active
Registration #:	058291CA 001
Report Year:	1990
Permit:	Registered
Product #:	01089700013
Product Type:	End-use blend, formulation, or concentrate
Product Class:	Algicide
Product Use:	All other products
Market:	Marketed in the United States

Product:	ALGI-CONTROL
Status:	Active
Registration #:	058291CA 001
Report Year:	1990
Permit:	Registered
Product #:	00683600047
Product Type:	End-use blend, formulation, or concentrate
Product Class:	Algicide
Product Use:	All other products
Market:	Marketed in the United States

Product:	ALGI-CONTROL
Status:	Not reported
Registration #:	058291CA 001
Report Year:	1999
Permit:	Registered
Product #:	00683600047010897
Product Type:	End-use blend, formulation, or concentrate
Product Class:	Algicide
Product Use:	All other products
Market:	Marketed in the United States

VAL-PAK PRODUCTS (Continued) **1004439683**

Product:	ALGI-CONTROL
Status:	Not reported
Registration #:	058291CA 001
Report Year:	2000
Permit:	Registered
Product #:	00683600047
Product Type:	End-use blend, formulation, or concentrate
Product Class:	Algicide
Product Use:	All other products
Market:	Marketed in the United States

L65 **CASTAIC LAKE WATER AGENCY** **HAZNET** **S103955090**
North **27234 BOUQUET CANYON RD** **N/A**
> 1 **SAUGUS, CA 91350**
5437 ft.
Higher **Site 1 of 6 in cluster L**

HAZNET:

Gepaid:	CAR000006544
Tepaid:	CAD050806850
Gen County:	Los Angeles
Tsd County:	Los Angeles
Tons:	.1876
Category:	Liquids with pH <UN-> 2
Disposal Method:	Transfer Station
Contact:	CASTAIC LAKE WATER AGENCY
Telephone:	(805) 297-1600
Mailing Address:	27234 BOUQUET CYN RD
	SANTA CLARITA, CA 91350
County	Los Angeles

Gepaid:	CAR000006544
Tepaid:	CAT080033681
Gen County:	Los Angeles
Tsd County:	Los Angeles
Tons:	.9174
Category:	Liquids with pH <UN-> 2 with metals
Disposal Method:	Recycler
Contact:	CASTAIC LAKE WATER AGENCY
Telephone:	(805) 297-1600
Mailing Address:	27234 BOUQUET CYN RD
	SANTA CLARITA, CA 91350
County	Los Angeles

Gepaid:	CAR000006544
Tepaid:	CAT080033681
Gen County:	Los Angeles
Tsd County:	Los Angeles
Tons:	3.0024
Category:	Alkaline solution without metals (pH > 12.5)
Disposal Method:	Recycler
Contact:	CASTAIC LAKE WATER AGENCY
Telephone:	(805) 297-1600
Mailing Address:	27234 BOUQUET CYN RD
	SANTA CLARITA, CA 91350
County	Los Angeles

CASTAIC LAKE WATER AGENCY (Continued) **S103955090**

Gepaid: CAR000006544
Tepaid: CAT080013352
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: .4170
Category: Waste oil and mixed oil
Disposal Method: Recycler
Contact: CASTAIC LAKE WATER AGENCY
Telephone: (805) 297-1600
Mailing Address: 27234 BOUQUET CYN RD
SANTA CLARITA, CA 91350
County Los Angeles

Gepaid: CAR000006544
Tepaid: CAT080013352
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: .2293
Category: Unspecified organic liquid mixture
Disposal Method: Recycler
Contact: CASTAIC LAKE WATER AGENCY
Telephone: (805) 297-1600
Mailing Address: 27234 BOUQUET CYN RD
SANTA CLARITA, CA 91350
County Los Angeles

The CA HAZNET database contains 20 additional records for this site.
Please contact your EDR Account Executive for more information.

L66 **RIO VISTA WATER TREATMENT** **LOS ANGELES CO. HMS** **S104536199**
North **27234 BOUQUET CANYON RD** **N/A**
> 1 **SANTA CLARITA, CA**
5437 ft.
Higher **Site 2 of 6 in cluster L**

HMS:
Facility Id: 019947-028465
Facility Type: Not reported
Permit Number: Not reported
Permit Status: Not reported
Facility Status: OPEN
Area: 7A
Region: Los Angeles County:

L67 **RIO VISTA WTP PUMPING STA** **UST** **U003777367**
North **27234 BOUQUET CANYON RD** **N/A**
> 1 **SANTA CLARITA, CA 91350**
5437 ft.
Higher **Site 3 of 6 in cluster L**

State UST:
Facility ID: 20673
Total Tanks: 1
Region: STATE
Local Agency: 19000

L68 **CASTAIC LAKE WATER AGNCY** RCRIS-SQG 1001075566
North **27234 BOUQUET CANYON RD** FINDS CAR000006544
> 1 **SAUGUS, CA 91350**
5437 ft.
Higher **Site 4 of 6 in cluster L**

RCRIS:
Owner: CASTAIC LAKE WATER AGNCY
(805) 297-1600
EPA ID: CAR000006544
Contact: GEORGE CORE
(805) 297-1600
Classification: Small Quantity Generator
Used Oil Recyc: No
TSDF Activities: Not reported
Violation Status: No violations found

FINDS:
Other Pertinent Environmental Activity Identified at Site:
Facility Registry System (FRS)
Resource Conservation and Recovery Act Information system (RCRAINFO)

L69 **RIO VISTA WATER TREATMENT PLT** LOS ANGELES CO. HMS S105512334
North **27234 BOUQUET CANYON RD** N/A
> 1 **SANTA CLARITA, CA**
5437 ft.
Higher **Site 5 of 6 in cluster L**

HMS:
Facility Id: 008984-001268
Facility Type: T0
Permit Number: 0000T6392 Permit Status: Permit
Facility Status: Permit Area: 7A
Region: Los Angeles County:

M70 **PACIFIC AIR LOGISTICS** LOS ANGELES CO. HMS U003063469
East **26763 OAK AVE** N/A
> 1 **SANTA CLARITA, CA**
5441 ft.
Higher **Site 1 of 11 in cluster M**

HMS:
Facility Id: 007714-I08146
Facility Type: I02
Permit Number: 000010275 Permit Status: Permit
Facility Status: Permit Area: 7A
Region: Los Angeles County:

L71 **RIO VISTA WATER TREATMENT PLT** UST U003775875
North **27236 BOUQUET CANYON RD** N/A
> 1 **SANTA CLARITA, CA 91350**
5443 ft.
Higher **Site 6 of 6 in cluster L**

State UST:
Facility ID: 1268
Total Tanks: 1
Region: STATE

RIO VISTA WATER TREATMENT PLT (Continued) **U003775875**

Local Agency: 19000

N72 **SAUGUS UNION SD** **FINDS** **1004442941**
WNW **22211 W NEWHALL RANCH RD** **C09#09-88185**
> 1 **SAUGUS, CA 91350**
5443 ft.
Lower **Site 1 of 5 in cluster N**

FINDS:
Other Pertinent Environmental Activity Identified at Site:
National Compliance Database (NCDB)

N73 **22211 W. NEWHALL RANCH RD** **ERNS** **92284936**
WNW **22211 W. NEWHALL RANCH RD** **N/A**
> 1 **FAUGUS, CA 91350**
5443 ft.
Lower **Site 2 of 5 in cluster N**

N74 **SAUGUS UNION SCHOOL DISTRICT** **LOS ANGELES CO. HMS** **S102064119**
WNW **22211 NEWHALL RANCH RD** **N/A**
> 1 **SANTA CLARITA, CA**
5443 ft.
Lower **Site 3 of 5 in cluster N**

HMS:

Facility Id:	012851-013065		
Facility Type:	T1		
Permit Number:	000109219	Permit Status:	Removed
Facility Status:	Removed	Area:	7A
Region:	Los Angeles County:		

N75 **SAUGUS SCH DIST** **HAZNET** **S103986849**
WNW **22211 NEWHALL RANCH RD** **N/A**
> 1 **SAUGUS, CA 91350**
5443 ft.
Lower **Site 4 of 5 in cluster N**

HAZNET:

Gepaid:	CAC001036560
Tepaid:	CAD067786749
Gen County:	Los Angeles
Tsd County:	Los Angeles
Tons:	57.3104
Category:	Asbestos-containing waste
Disposal Method:	Disposal, Land Fill
Contact:	THE NEWHALL LAND
Telephone:	(000) 000-0000
Mailing Address:	23823 VALENCIA BLVD VALENCIA, CA 91355
County	Los Angeles

SAUGUS SCH DIST (Continued) **S103986849**

Gepaid: CAL000206728
Tepaid: CAD982444481
Gen County: Los Angeles
Tsd County: San Bernardino
Tons: 1.2000
Category: Other inorganic solid waste
Disposal Method: Transfer Station
Contact: BILL STAATS
Telephone: (000) 000-0000
Mailing Address: 22211 NEWHALL RANCH RD
SAUGUS, CA 91350
County Los Angeles

N76 **SAUGUS** **HAZNET** **1001614077**
WNW **22211 W NEWHALL RANCH RD** **N/A**
> 1 **SAUGUS, CA 91350**
5443 ft.
Lower **Site 5 of 5 in cluster N**

HAZNET:
Gepaid: CAD981429087
Tepaid: AZD983478322
Gen County: Los Angeles
Tsd County: 99
Tons: 8.2154
Category: Polychlorinated biphenyls and material containing PCB's
Disposal Method: Not reported
Contact: Not reported
Telephone: (000) 000-0000
Mailing Address: 24930 AVENUE STANFORD
VALENCIA, CA 91355
County Los Angeles

Gepaid: CAD981429087
Tepaid: CAT080013352
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: .1251
Category: Unspecified oil-containing waste
Disposal Method: Recycler
Contact: Not reported
Telephone: (000) 000-0000
Mailing Address: 24930 AVENUE STANFORD
VALENCIA, CA 91355
County Los Angeles

Gepaid: CAD981429087
Tepaid: CAD093459485
Gen County: Los Angeles
Tsd County: Fresno
Tons: .0208
Category: Unspecified solvent mixture Waste
Disposal Method: Transfer Station
Contact: Not reported
Telephone: (000) 000-0000
Mailing Address: 24930 AVENUE STANFORD
VALENCIA, CA 91355
County Los Angeles

SAUGUS (Continued) **1001614077**

Gepaid: CAD981429087
Tepaid: CAD099452708
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: 1.0008
Category: Waste oil and mixed oil
Disposal Method: Transfer Station
Contact: Not reported
Telephone: (000) 000-0000
Mailing Address: 24930 AVENUE STANFORD
VALENCIA, CA 91355
County Los Angeles

Gepaid: CAD981429087
Tepaid: CAD099452708
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: 1.0008
Category: Waste oil and mixed oil
Disposal Method: Recycler
Contact: Not reported
Telephone: (000) 000-0000
Mailing Address: 24930 AVENUE STANFORD
VALENCIA, CA 91355
County Los Angeles

The CA HAZNET database contains 15 additional records for this site.
Please contact your EDR Account Executive for more information.

M77
East
> 1
5445 ft.
Higher

MARANATHA CHEVROLET SERVICE **LOS ANGELES CO. HMS** **S103945460**
26770 OAK AVE **N/A**
SANTA CLARITA, CA

Site 2 of 11 in cluster M

HMS:
Facility Id: 020068-028605
Facility Type: Not reported
Permit Number: Not reported
Permit Status: Not reported
Facility Status: OPEN
Area: 7A
Region: Los Angeles County:

M78
East
> 1
5445 ft.
Higher

MARANATHA CHEVROLET **RCRIS-SQG** **1000596099**
26770 OAK AVE **FINDS** **CAD983600628**
CANYON COUNTRY, CA 91351 **HAZNET**

Site 3 of 11 in cluster M

MARANATHA CHEVROLET (Continued) **1000596099**

RCRIS:
Owner: JERRY SHUMARD
(415) 555-1212
EPA ID: CAD983600628

Contact: SHUMAD JERRY
(805) 251-5600

Classification: Small Quantity Generator
Used Oil Recyc: No
TSDF Activities: Not reported

Violation Status: No violations found

FINDS:
Other Pertinent Environmental Activity Identified at Site:
Facility Registry System (FRS)
Resource Conservation and Recovery Act Information system (RCRAINFO)

HAZNET:
Gepaid: CAD983600628
Tepaid: CAT000613893
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: .7545
Category: Aqueous solution with less than 10% total organic residues
Disposal Method: Transfer Station
Contact: JERRY SHUMARD
Telephone: (000) 000-0000
Mailing Address: 26776 OAK AVE
CANYON COUNTRY, CA 91351
County Los Angeles

Gepaid: CAD983600628
Tepaid: CAD099452708
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: .2293
Category: Unspecified aqueous solution
Disposal Method: Recycler
Contact: JERRY SHUMARD
Telephone: (000) 000-0000
Mailing Address: 26776 OAK AVE
CANYON COUNTRY, CA 91351
County Los Angeles

M79 **PACIFIC EXPO** **RCRIS-SQG 1000598101**
East **26776 OAK AVE** **FINDS CAD983621434**
> 1 **CANYON COUNTRY, CA 91351**
5449 ft.
Higher **Site 4 of 11 in cluster M**

PACIFIC EXPO (Continued) **1000598101**

RCRIS:
Owner: PACIFIC EXPORT CORP
(805) 250-1226
EPA ID: CAD983621434
Contact: GEORGE BAKER
(805) 250-1226
Classification: Small Quantity Generator
Used Oil Recyc: No
TSDF Activities: Not reported
Violation Status: No violations found

FINDS:
Other Pertinent Environmental Activity Identified at Site:
Facility Registry System (FRS)
Resource Conservation and Recovery Act Information system (RCRAINFO)

M80 **CANYON COUNTRY INDUSTRIAL PARK** **HAZNET** **S104571518**
East **26776 OAK AVE** **N/A**
> 1 **CANYON COUNTRY, CA 91351**
5449 ft.
Higher **Site 5 of 11 in cluster M**

HAZNET:
Gepaid: CAC002180625
Tepaid: CAD099452708
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: 1.5637
Category: Unspecified oil-containing waste
Disposal Method: Recycler
Contact: JOE WANG
Telephone: (000) 000-0000
Mailing Address: PO BOX 7016
THOUSAND OAKS, CA 91359
County Los Angeles

M81 **VON CO TOOL** **RCRIS-SQG** **1000685940**
East **26778 OAK AVE** **FINDS** **CAD983629056**
> 1 **CANYON COUNTRY, CA 91351** **HAZNET**
5450 ft.
Higher **Site 6 of 11 in cluster M**

RCRIS:
Owner: JON PATTERSON
(805) 251-5300
EPA ID: CAD983629056
Contact: JON PATTERSON
(805) 251-5300
Classification: Small Quantity Generator
Used Oil Recyc: No
TSDF Activities: Not reported

VON CO TOOL (Continued) **1000685940**

Violation Status: No violations found

FINDS:
Other Pertinent Environmental Activity Identified at Site:
Facility Registry System (FRS)
Resource Conservation and Recovery Act Information system (RCRAINFO)

HAZNET:

Gepaid:	CAD983629056
Tepaid:	CAD099452708
Gen County:	Los Angeles
Tsd County:	Los Angeles
Tons:	0.2293
Category:	Oil/water separation sludge
Disposal Method:	Transfer Station
Contact:	JON PATTERSON
Telephone:	(805) 251-5300
Mailing Address:	26778 OAK AVE
	CANYON COUNTRY, CA 91351 - 2409
County	Los Angeles

Gepaid:	CAD983629056
Tepaid:	CAT000613976
Gen County:	Los Angeles
Tsd County:	Orange
Tons:	.0458
Category:	Hydrocarbon solvents (benzene, hexane, Stoddard, etc.)
Disposal Method:	Transfer Station
Contact:	JON PATTERSON
Telephone:	(805) 251-5300
Mailing Address:	26778 OAK AVE
	CANYON COUNTRY, CA 91351 - 2409
County	Los Angeles

M82 **WINNERS CIRCLE AUTO PATRS** **LOS ANGELES CO. HMS** **S103945461**
East **26786 OAK AVE** **N/A**
> 1 **SANTA CLARITA, CA**
5456 ft.
Higher **Site 7 of 11 in cluster M**

HMS:

Facility Id:	020069-028610		
Facility Type:	Not reported		
Permit Number:	Not reported	Permit Status:	Not reported
Facility Status:	OPEN	Area:	7A
Region:	Los Angeles County:		

M83 **HOBBY SHOP** **LOS ANGELES CO. HMS** **S103945462**
East **26790 OAK AVE** **N/A**
> 1 **SANTA CLARITA, CA**
5459 ft.
Higher **Site 8 of 11 in cluster M**

HMS:

Facility Id:	020070-028611		
Facility Type:	Not reported		
Permit Number:	Not reported	Permit Status:	Not reported
Facility Status:	OPEN	Area:	7A
Region:	Los Angeles County:		

M84 **HONEST JOHN'S EVO'S ETC** **LOS ANGELES CO. HMS** **S102064465**
East **26792 OAK AVE** **N/A**
> 1 **SANTA CLARITA, CA**
5460 ft.
Higher **Site 9 of 11 in cluster M**

HMS:

Facility Id:	016641-022157		
Facility Type:	Not reported		
Permit Number:	Not reported	Permit Status:	Not reported
Facility Status:	OPEN	Area:	7A
Region:	Los Angeles County:		

M85 **VIP AUTO REPAIR** **HAZNET** **S104581660**
East **26794 OAK AVE** **N/A**
> 1 **SANTA CLARITA, CA 91351**
5462 ft.
Higher **Site 10 of 11 in cluster M**

HAZNET:

Gepaid:	CAL000189794
Tepaid:	CAD981696420
Gen County:	Los Angeles
Tsd County:	Los Angeles
Tons:	.2293
Category:	Aqueous solution with less than 10% total organic residues
Disposal Method:	Transfer Station
Contact:	FRED GARZA
Telephone:	(000) 000-0000
Mailing Address:	26794 OAK AVE SANTA CLARITA, CA 91351
County	Los Angeles

Gepaid:	CAL000189794
Tepaid:	CAD981696420
Gen County:	Los Angeles
Tsd County:	Los Angeles
Tons:	0.4586
Category:	Aqueous solution with less than 10% total organic residues
Disposal Method:	Transfer Station
Contact:	FRED GARZA
Telephone:	(000) 000-0000
Mailing Address:	26794 OAK AVE SANTA CLARITA, CA 91351
County	Los Angeles

M86 **NATIONAL METAL STAMPINGS INC** **RCRIS-SQG** **1000260515**
East **26796 OAK AVENUE** **FINDS** **CAD981652225**
> 1 **CANYON COUNTRY, CA 91351**
5464 ft.
Higher **Site 11 of 11 in cluster M**

NATIONAL METAL STAMPINGS INC (Continued) **1000260515**

RCRIS:
Owner: BILL & JEAN BLOOMER
(415) 555-1212
EPA ID: CAD981652225
Contact: ENVIRONMENTAL MANAGER
(805) 251-5141
Classification: Small Quantity Generator
Used Oil Recyc: No
TSDF Activities: Not reported
Violation Status: No violations found

FINDS:
Other Pertinent Environmental Activity Identified at Site:
Facility Registry System (FRS)
Resource Conservation and Recovery Act Information system (RCRAINFO)

O87 **VP MANUFACTURING INC** **HAZNET** **S103640949**
East **20732 SOLEDAD ST** **N/A**
> 1 **SANTA CLARITA, CA 91351**
5470 ft.
Higher **Site 1 of 9 in cluster O**

HAZNET:
Gepaid: CAL000179066
Tepaid: CAD000088252
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: .1000
Category: Unspecified oil-containing waste
Disposal Method: Transfer Station
Contact: VP MANUFACTURING INC
Telephone: (805) 298-2632
Mailing Address: 20732 SOLEDAD ST
CANYON COUNTRY, CA 91351 - 2420
County Los Angeles

Gepaid: CAL000179066
Tepaid: CAT080033681
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: .0050
Category: Liquids with pH <UN-> 2
Disposal Method: Recycler
Contact: VP MANUFACTURING INC
Telephone: (805) 298-2632
Mailing Address: 20732 SOLEDAD ST
CANYON COUNTRY, CA 91351 - 2420
County Los Angeles

VP MANUFACTURING INC (Continued) **S103640949**

Gepaid: CAL000179066
Tepaid: CAD008252405
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: .0750
Category: Unspecified organic liquid mixture
Disposal Method: Recycler
Contact: VP MANUFACTURING INC
Telephone: (805) 298-2632
Mailing Address: 20732 SOLEDAD ST
CANYON COUNTRY, CA 91351 - 2420
County Los Angeles

Gepaid: CAL000179066
Tepaid: CAT080033681
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: .0065
Category: Other organic solids
Disposal Method: Disposal, Land Fill
Contact: VP MANUFACTURING INC
Telephone: (805) 298-2632
Mailing Address: 20732 SOLEDAD ST
CANYON COUNTRY, CA 91351 - 2420
County Los Angeles

Gepaid: CAL000179066
Tepaid: CAD008252405
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: .0500
Category: Liquids with halogenated organic compounds > 1000 mg/l
Disposal Method: Recycler
Contact: VP MANUFACTURING INC
Telephone: (805) 298-2632
Mailing Address: 20732 SOLEDAD ST
CANYON COUNTRY, CA 91351 - 2420
County Los Angeles

O88 **VP MFG, INC.** **LOS ANGELES CO. HMS** **S103945036**
East **20732 SOLEDAD ST A** **N/A**
> 1 **SANTA CLARITA, CA**
5474 ft.
Higher **Site 2 of 9 in cluster O**

HMS:
Facility Id: 020305-028893
Facility Type: Not reported
Permit Number: Not reported
Permit Status: Not reported
Facility Status: OPEN
Area: 7A
Region: Los Angeles County:

O89 **SENSORTECH SYSTEMS INC** **HAZNET** **S103987389**
East **26810-I OAK AVE** **N/A**
> 1 **SANTA CLARITA, CA 91351**
5477 ft.
Higher **Site 3 of 9 in cluster O**

SENSORTECH SYSTEMS INC (Continued) **S103987389**

HAZNET:
Gepaid: CAC001361840
Tepaid: CAD008252405
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: .1876
Category: Oxygenated solvents (acetone, butanol, ethyl acetate, etc.)
Disposal Method: Recycler
Contact: SENSORTECH SYSTEMS INC
Telephone: (805) 252-1103
Mailing Address: 26810-I OAK AVE
SANTA CLARITA, CA 91351
County Los Angeles

O90 **AMERICAN UNITED INC** **HAZNET** **S104572896**
East **20730 SOLEDAD ST** **N/A**
> 1 **SANTA CLARITA, CA 91351**
5478 ft.
Higher **Site 4 of 9 in cluster O**

HAZNET:
Gepaid: CAC002228521
Tepaid: CAT080022148
Gen County: Los Angeles
Tsd County: San Bernardino
Tons: 0.1668
Category: Hydrocarbon solvents (benzene, hexane, Stoddard, etc.)
Disposal Method: Transfer Station
Contact: AMERICAN UNITED INC
Telephone: (805) 297-2979
Mailing Address: 20730 SOLEDAD ST
SANTA CLARITA, CA 91351
County Los Angeles

K91 **HONDA OUTPOST** **RCRIS-SQG** **1000596599**
East **26724 OAK AVE UNIT C** **FINDS** **CAD983605734**
> 1 **CANYON COUNTRY, CA 91351**
5482 ft.
Higher **Site 8 of 8 in cluster K**

RCRIS:
Owner: JEFFREY D MILLER
(805) 252-5553
EPA ID: CAD983605734
Contact: JEFF MILLER
(805) 298-8874
Classification: Small Quantity Generator
Used Oil Recyc: No
TSDF Activities: Not reported

HONDA OUTPOST (Continued) **1000596599**

Violation Status: No violations found

FINDS:
Other Pertinent Environmental Activity Identified at Site:
Facility Registry System (FRS)
Resource Conservation and Recovery Act Information system (RCRAINFO)

O92 **AV BREAK SUPPLY** **LOS ANGELES CO. HMS** **S103945465**
East **26818 OAK AVE E** **N/A**
> 1 **SANTA CLARITA, CA**
5485 ft.
Higher **Site 5 of 9 in cluster O**

HMS:

Facility Id:	020073-028614		
Facility Type:	Not reported		
Permit Number:	Not reported	Permit Status:	Not reported
Facility Status:	OPEN	Area:	7A
Region:	Los Angeles County:		

P93 **HART UNION HIGH SCHOOL DISTRICT** **HAZNET** **S100863745**
SE **21429 REDVIEW DR** **N/A**
> 1 **SANTA CLARITA, CA 91350**
5488 ft.
Higher **Site 1 of 4 in cluster P**

HAZNET:

Gepaid:	CAL000072887
Tepaid:	CAT080013352
Gen County:	Los Angeles
Tsd County:	Los Angeles
Tons:	19.1820
Category:	Unspecified oil-containing waste
Disposal Method:	Not reported
Contact:	Not reported
Telephone:	(000) 000-0000
Mailing Address:	21429 REDVIEW DR SANTA CLARITA, CA 91350
County	Los Angeles

Gepaid:	CAL000072887
Tepaid:	CAT080013352
Gen County:	Los Angeles
Tsd County:	Los Angeles
Tons:	42.1170
Category:	Unspecified oil-containing waste
Disposal Method:	Recycler
Contact:	Not reported
Telephone:	(000) 000-0000
Mailing Address:	21429 REDVIEW DR SANTA CLARITA, CA 91350
County	Los Angeles

HART UNION HIGH SCHOOL DISTRICT (Continued) **S100863745**

Gepaid: CAL000072887
Tepaid: CAD050806850
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: .2376
Category: Detergent and soap
Disposal Method: Transfer Station
Contact: Not reported
Telephone: (000) 000-0000
Mailing Address: 21429 REDVIEW DR
SANTA CLARITA, CA 91350
County Los Angeles

Gepaid: CAL000072887
Tepaid: CAD099452708
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: 32.4759
Category: Oil/water separation sludge
Disposal Method: Transfer Station
Contact: Not reported
Telephone: (000) 000-0000
Mailing Address: 21429 REDVIEW DR
SANTA CLARITA, CA 91350
County Los Angeles

Gepaid: CAL000072887
Tepaid: CAD050806850
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: .0965
Category: Laboratory waste chemicals
Disposal Method: Transfer Station
Contact: Not reported
Telephone: (000) 000-0000
Mailing Address: 21429 REDVIEW DR
SANTA CLARITA, CA 91350
County Los Angeles

The CA HAZNET database contains 22 additional records for this site.
Please contact your EDR Account Executive for more information.

P94 **WM HART UHSD - TRANSPORT DEPT** **UST** **U003776224**
SE **21429 REDVIEW DR** **N/A**
> 1 **SANTA CLARITA, CA 91350**
5488 ft.
Higher **Site 2 of 4 in cluster P**

State UST:
Facility ID: 8705
Total Tanks: 1
Region: STATE
Local Agency: 19000

P95 **WM S HART UNIFIED SCHOOL DIST** **RCRIS-SQG** **1000820110**
SE **21429 REDVIEW DR** **FINDS** **CAD983661349**
> 1 **SANTA CLARITA, CA 91350**
5488 ft.
Higher **Site 3 of 4 in cluster P**

WM S HART UNIFIED SCHOOL DIST (Continued) **1000820110**

RCRIS:
Owner: WM S HART UNIFIED HIGH SCHOOL DIST
(805) 259-0096
EPA ID: CAD983661349
Contact: GARY SMITH
(805) 259-0096
Classification: Small Quantity Generator
Used Oil Recyc: No
TSDF Activities: Not reported

Violation Status: No violations found

FINDS:
Other Pertinent Environmental Activity Identified at Site:
Facility Registry System (FRS)
Resource Conservation and Recovery Act Information system (RCRAINFO)

P96 **WS HART UNION HIGH SCH DT** **LOS ANGELES CO. HMS** **U003063880**
SE **21429 REDVIEW DR** **N/A**
> 1 **SANTA CLARITA, CA**
5488 ft.
Higher **Site 4 of 4 in cluster P**

HMS:
Facility Id: 008184-I08705
Facility Type: I01
Permit Number: 000009868 Permit Status: Permit
Facility Status: Permit Area: 7A
Region: Los Angeles County:

Q97 **QUALITY PAPER FIBERS, INC** **LOS ANGELES CO. HMS** **S103945041**
ENE **20833 SANTA CLARA ST** **N/A**
> 1 **SANTA CLARITA, CA**
5502 ft.
Higher **Site 1 of 4 in cluster Q**

HMS:
Facility Id: 020255-028837
Facility Type: Not reported
Permit Number: Not reported Permit Status: Not reported
Facility Status: OPEN Area: 7A
Region: Los Angeles County:

Q98 **RENT A BIN** **LOS ANGELES CO. HMS** **S103945040**
ENE **20830 SANTA CLARA ST** **N/A**
> 1 **SANTA CLARITA, CA**
5510 ft.
Higher **Site 2 of 4 in cluster Q**

HMS:
Facility Id: 020254-028835
Facility Type: Not reported
Permit Number: Not reported Permit Status: Not reported
Facility Status: OPEN Area: 7A
Region: Los Angeles County:

O99 **METAL WORKS** **HAZNET** **S103648105**
East **26846 OAK AVENUE #K** **N/A**
> 1 **CANYON COUNTRY, CA 91351**
5522 ft.
Higher **Site 6 of 9 in cluster O**

HAZNET:
Gepaid: CAL000055158
Tepaid: CAD008302903
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: .2085
Category: Paint sludge
Disposal Method: Recycler
Contact: BOB DALE
Telephone: (805) 251-8975
Mailing Address: 26846 OAK AVE #K
CANYON COUNTRY, CA 91351
County Los Angeles

Gepaid: CAL000055158
Tepaid: CAD008302903
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: .2168
Category: Paint sludge
Disposal Method: Recycler
Contact: BOB DALE
Telephone: (805) 251-8975
Mailing Address: 26846 OAK AVE #K
CANYON COUNTRY, CA 91351
County Los Angeles

O100 **STUDIO CITY SPORTS CARS** **RCRIS-SQG** **1000595472**
East **26846 OAK AVE BLDG 5** **FINDS** **CAD983594094**
> 1 **CANYON COUNTRY, CA 91351**
5530 ft.
Higher **Site 7 of 9 in cluster O**

RCRIS:
Owner: JOHN MATTINGLY
(415) 555-1212
EPA ID: CAD983594094
Contact: DARIN SHAUER
(805) 298-3887
Classification: Small Quantity Generator
Used Oil Recyc: No
TSDF Activities: Not reported

Violation Status: No violations found

FINDS:
Other Pertinent Environmental Activity Identified at Site:
Facility Registry System (FRS)
Resource Conservation and Recovery Act Information system (RCRAINFO)

O101
East
> 1
5530 ft.
Higher

RESTORATIONS PLUS
26846 OAK AVENUE UNIT "R"
CANYON COUNTRY, CA 91351

HAZNET **S103984166** **N/A**

Site 8 of 9 in cluster O

HAZNET:
Gepaid: CAL000045245
Tepaid: CAD980887418
Gen County: Los Angeles
Tsd County: 1
Tons: 10.8420
Category: Waste oil and mixed oil
Disposal Method: Recycler
Contact: NEWARK ANTHONY C
Telephone: (000) 000-0000
Mailing Address: 26846 OAK AVE STE R
CANYON COUNTRY, CA 91351 - 2401
County Los Angeles

O102
East
> 1
5541 ft.
Higher

G W FRANZ GRINDING
26818 OAK AVE UNIT L
CANYON COUNTRY, CA 91351

RCRIS-SQG **1000819973**
FINDS **CAD983659921**
HAZNET

Site 9 of 9 in cluster O

RCRIS:
Owner: GEORGE FRANZ
(805) 252-0836
EPA ID: CAD983659921
Contact: GEORGE FRANZ
(805) 252-0836
Classification: Small Quantity Generator
Used Oil Recyc: No
TSDF Activities: Not reported

Violation Status: No violations found

FINDS:
Other Pertinent Environmental Activity Identified at Site:
Facility Registry System (FRS)
Resource Conservation and Recovery Act Information system (RCRAINFO)

HAZNET:
Gepaid: CAD983659921
Tepaid: CAD099452708
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: 2.0433
Category: Oil/water separation sludge
Disposal Method: Recycler
Contact: GEORGE FRANZ
Telephone: (000) 000-0000
Mailing Address: 26818 OAK AVE UNIT L
CANYON COUNTRY, CA 91351
County Los Angeles

G W FRANZ GRINDING (Continued) **1000819973**

Gepaid: CAD983659921
Tepaid: CAD982444481
Gen County: Los Angeles
Tsd County: San Bernardino
Tons: 0.2293
Category: Unspecified oil-containing waste
Disposal Method: Recycler
Contact: GEORGE FRANZ
Telephone: (000) 000-0000
Mailing Address: 26818 OAK AVE UNIT L
CANYON COUNTRY, CA 91351
County Los Angeles

Gepaid: CAD983659921
Tepaid: CAT000613976
Gen County: Los Angeles
Tsd County: Orange
Tons: .2502
Category: Liquids with halogenated organic compounds > 1000 mg/l
Disposal Method: Transfer Station
Contact: GEORGE FRANZ
Telephone: (000) 000-0000
Mailing Address: 26818 OAK AVE UNIT L
CANYON COUNTRY, CA 91351
County Los Angeles

R103 **POPPIS** **LOS ANGELES CO. HMS** **U003062543**
West **22903 W SOLEDAD CANYON RD** **N/A**
> 1 **SANTA CLARITA, CA**
5584 ft.
Lower **Site 1 of 6 in cluster R**

HMS:
Facility Id: 006675-I06899
Facility Type: Not reported
Permit Number: Not reported — Permit Status: Not reported
Facility Status: OPEN — Area: 7A
Region: Los Angeles County:

R104 **SPORTS BAR & GRILL** **LOS ANGELES CO. HMS** **S102064159**
West **22903 W SOLEDAD CANYON RD** **N/A**
> 1 **SANTA CLARITA, CA**
5584 ft.
Lower **Site 2 of 6 in cluster R**

HMS:
Facility Id: 006675-020528
Facility Type: Not reported
Permit Number: Not reported — Permit Status: Not reported
Facility Status: OPEN — Area: 7A
Region: Los Angeles County:

S105 **SANTA CLARITA WATER CO** **HAZNET** **S102064053**
East **21110 GOLDEN TRIANGLE** **LOS ANGELES CO. HMS** **N/A**
> 1 **SANTA CLARITA, CA 91350**
5584 ft.
Higher **Site 1 of 2 in cluster S**

SANTA CLARITA WATER CO (Continued) **S102064053**

HAZNET:

Gepaid:	CAL000180921
Tepaid:	CAT080013352
Gen County:	Los Angeles
Tsd County:	Los Angeles
Tons:	.7297
Category:	Unspecified oil-containing waste
Disposal Method:	Recycler
Contact:	SANTA CLARITA WATER CO
Telephone:	(805) 255-8223
Mailing Address:	PO BOX 903
	SANTA CLARITA, CA 91380
County	Los Angeles

Gepaid:	CAL000180921
Tepaid:	CAD008252405
Gen County:	Los Angeles
Tsd County:	Los Angeles
Tons:	.2875
Category:	Paint sludge
Disposal Method:	Recycler
Contact:	SANTA CLARITA WATER CO
Telephone:	(805) 255-8223
Mailing Address:	PO BOX 903
	SANTA CLARITA, CA 91380
County	Los Angeles

Gepaid:	CAL000180921
Tepaid:	CAD982444481
Gen County:	Los Angeles
Tsd County:	San Bernardino
Tons:	.1500
Category:	Other organic solids
Disposal Method:	Transfer Station
Contact:	SANTA CLARITA WATER CO
Telephone:	(805) 255-8223
Mailing Address:	PO BOX 903
	SANTA CLARITA, CA 91380
County	Los Angeles

Gepaid:	CAL000180921
Tepaid:	CAD099452708
Gen County:	Los Angeles
Tsd County:	Los Angeles
Tons:	.2085
Category:	Waste oil and mixed oil
Disposal Method:	Recycler
Contact:	SANTA CLARITA WATER CO
Telephone:	(805) 255-8223
Mailing Address:	PO BOX 903
	SANTA CLARITA, CA 91380
County	Los Angeles

SANTA CLARITA WATER CO (Continued) **S102064053**

Gepaid: CAC000766536
Tepaid: CAT080013352
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: .1459
Category: Tank bottom waste
Disposal Method: Recycler
Contact: SANTA CLARITA WATER CO
Telephone: (805) 255-8223
Mailing Address: PO BOX 903
SANTA CLARITA, CA 91380
County Los Angeles

HMS:
Facility Id: 012852-013067
Facility Type: T0
Permit Number: 00005251T
Permit Status: Permit
Facility Status: Permit
Area: 7A
Region: Los Angeles County:

Facility Id: 015539-017013
Facility Type: T0
Permit Number: 0000T6381
Permit Status: Removed
Facility Status: Removed
Area: 7A
Region: Los Angeles County:

S106 **SANTA CLARITA WATER CO** **UST** **U003777086**
East **21110 GOLDEN TRIANGLE RD** **N/A**
> 1 **SANTA CLARITA, CA 91350**
5584 ft.
Higher **Site 2 of 2 in cluster S**

State UST:
Facility ID: 13067
Total Tanks: 1
Region: STATE
Local Agency: 19000

Q107 **D K TRUCKING** **RCRIS-SQG** **1000595471**
ENE **20811 SANTA CLARA ST** **FINDS** **CAD983594086**
> 1 **CANYON COUNTRY, CA 91351** **HAZNET**
5601 ft.
Higher **Site 3 of 4 in cluster Q**

RCRIS:
Owner: C JILL NIXON
(415) 555-1212
EPA ID: CAD983594086
Contact: C NIXON
(805) 252-3700
Classification: Small Quantity Generator
Used Oil Recyc: No
TSDF Activities: Not reported

D K TRUCKING (Continued) **1000595471**

Violation Status: No violations found

FINDS:
Other Pertinent Environmental Activity Identified at Site:
Facility Registry System (FRS)
Resource Conservation and Recovery Act Information system (RCRAINFO)

HAZNET:

Gepaid:	CAD983594086
Tepaid:	CAD099452708
Gen County:	Los Angeles
Tsd County:	Los Angeles
Tons:	1.6680
Category:	Waste oil and mixed oil
Disposal Method:	Recycler
Contact:	C JILL NIXON
Telephone:	(415) 555-1212
Mailing Address:	20811 SANTA CLARA CANYON COUNTRY, CA 91351
County	Los Angeles

Q108 **D & K TRUCKING INC** **HAZNET** **S104577396**
ENE **20811 SANTA CLARA ST** **N/A**
> 1 **CANYON COUNTRY, CA 91351**
5601 ft.
Higher **Site 4 of 4 in cluster Q**

HAZNET:

Gepaid:	CAL000081456
Tepaid:	CAT000613893
Gen County:	Los Angeles
Tsd County:	Los Angeles
Tons:	.0625
Category:	Organic liquids with metals Alkaline solution (pH <UN-> 12.5) with metals (antimony, arsenic, barium, beryllium, cadmium, chromium, cobalt, copper, lead, mercury, molybdenum, nickel, selenium, silver, thallium, vanadium, and zinc)
Disposal Method:	Transfer Station
Contact:	D & K TRUCKING INC
Telephone:	(000) 000-0000
Mailing Address:	20811 SANTA CLARA ST CANYON COUNTRY, CA 91351
County	Los Angeles

T109 **SAFEWAY STORES INC #1024** **LOS ANGELES CO. HMS** **U003062140**
NW **26877 BOUQUET CANYON RD** **N/A**
> 1 **SANTA CLARITA, CA**
5630 ft.
Lower **Site 1 of 2 in cluster T**

HMS:

Facility Id:	006195-I06411		
Facility Type:	I00		
Permit Number:	000010785	Permit Status:	Closed
Facility Status:	Closed	Area:	7A
Region:	Los Angeles County:		

R110 **MANDARIN EXPRESS** **LOS ANGELES CO. HMS** **S104538368**
West **22911 W SOLEDAD CANYON RD** **N/A**
> 1 **SANTA CLARITA, CA**
5634 ft.
Lower **Site 3 of 6 in cluster R**

HMS:

Facility Id:	007913-I08382		
Facility Type:	I02		
Permit Number:	000010793	Permit Status:	Closed
Facility Status:	Closed	Area:	7A
Region:	Los Angeles County:		

Facility Id:	007913-022127		
Facility Type:	I01		
Permit Number:	000133192	Permit Status:	Closed
Facility Status:	Closed	Area:	7A
Region:	Los Angeles County:		

Facility Id:	007913-025306		
Facility Type:	I01		
Permit Number:	000220727	Permit Status:	Suspended
Facility Status:	Permit	Area:	7A
Region:	Los Angeles County:		

R111 **MADARIN EXPRESS** **LOS ANGELES CO. HMS** **U002281550**
West **22911 W SOLEDAD CANYON RD** **N/A**
> 1 **SANTA CLARITA, CA**
5634 ft.
Lower **Site 4 of 6 in cluster R**

HMS:

Facility Id:	007913-008382		
Facility Type:	Not reported		
Permit Number:	Not reported	Permit Status:	Not reported
Facility Status:	OPEN	Area:	7A
Region:	Los Angeles County:		

R112 **PEARSON AND CO** **LOS ANGELES CO. HMS** **S105193895**
West **22911 W SOLEDAD CANYON RD** **N/A**
> 1 **SANTA CLARITA, CA**
5634 ft.
Lower **Site 5 of 6 in cluster R**

HMS:

Facility Id:	007913-036549		
Facility Type:	Not reported		
Permit Number:	Not reported	Permit Status:	Not reported
Facility Status:	OPEN	Area:	7A
Region:	Los Angeles County:		

R113 **NUMERO UNO #52** **LOS ANGELES CO. HMS** **U003063511**
West **22917 W SOLEDAD CANYON RD** **N/A**
> 1 **SANTA CLARITA, CA**
5667 ft.
Lower **Site 6 of 6 in cluster R**

HMS:

Facility Id:	007762-I08203
Facility Type:	I02

NUMERO UNO #52 (Continued) **U003063511**

Permit Number: 000009253 Permit Status: Closed
Facility Status: Closed Area: 7A
Region: Los Angeles County:

114
ESE
> 1
5686 ft.
Higher

INSPECTORS PAINT & BODY **LOS ANGELES CO. HMS** **U003064484**
26516 GOLDEN VALLEY RD 310 **N/A**
SANTA CLARITA, CA

HMS:
Facility Id: 008871-I16496
Facility Type: I01
Permit Number: 000012388 Permit Status: Closed
Facility Status: Closed Area: 7A
Region: Los Angeles County:

T115
NW
> 1
5714 ft.
Lower

COUSINS BURGERS **LOS ANGELES CO. HMS** **S104913316**
26851 N BOUQUET CANYON RD **N/A**
SANTA CLARITA, CA

Site 2 of 2 in cluster T

HMS:
Facility Id: 026468-036131
Facility Type: I01
Permit Number: 000327349 Permit Status: Permit
Facility Status: Permit Area: 7A
Region: Los Angeles County:

116
East
> 1
5785 ft.
Higher

CHMIRS **S100278980**

SOLEDAD CANYON/REUTHER **N/A**
SANTA CLARITA, CA

CHMIRS:

OES Control Number:	8802950	DOT ID:	Not reported
DOT Hazard Class:	Not Reported		
Chemical Name:	ACID		
Extent of Release:	Not reported		
CAS Number:	Not reported	Quantity Released:	Not reported
Environmental Contamination:	None Reported	Property Use:	County/City Road
Incident Date:	19-SEP-88	Date Completed:	19-SEP-88
Time Completed :		1258	
Physical State Stored :		Liquid	
Physical State Released :		Not reported	
Release Unit :		Not reported	
Container Description :		2	
Container Type :		04	
Container Material :		Plastic , Flexible	
Level Of Container :		0	
Container Capacity :		1	
Container Capacity Units (code) :		2	
Extent Of Release (code) :		8	
Agency Id Number :		19110	
Agency Incident Number :		0A-27	
OES Incident Number :		8802950	

(Continued) **S100278980**

Time Notified :	1058
Surrounding Area :	500
Estimated Temperature :	80
Property Management :	K
More Than Two Substances Involved? :	Not reported
Special Studies 1 :	Not reported
Special Studies 2 :	Not reported
Special Studies 3 :	Not reported
Special Studies 4 :	Not reported
Special Studies 5 :	Not reported
Special Studies 6 :	Not reported
Responding Agency Personel # Of Injuries :	Not reported
Responding Agency Personel # Of Fatalities :	Not reported
Resp Agncy Personel # Of Decontaminated :	Not reported
Others Number Of Decontaminated :	Not reported
Others Number Of Injuries :	Not reported
Others Number Of Fatalities :	Not reported
Vehicle Make/year :	Not reported
Vehicle License Number :	Not reported
Vehicle State :	Not reported
Vehicle Id Number :	Not reported
CA/DOT/PUC/ICC Number :	Not reported
Company Name :	Not reported
Reporting Officer Name/ID :	CAPT. LYNN MOHR HM-76)
Report Date :	19-SEP-88
Comments :	Yes
Facility Telephone Number :	213 267-2485

U117 **RITE AID NO 5555** **RCRIS-SQG 1000857175**
NW **26825 BOUQUET CYN RD** **FINDS CA0000068890**
> 1 **SAUGUS, CA 91350** **HAZNET**
5791 ft.
Lower **Site 1 of 8 in cluster U**

RCRIS:
Owner: RITE AID
(717) 761-2633
EPA ID: CA0000068890
Contact: GAIL RATAJCZAK
(800) 769-5845
Classification: Small Quantity Generator
Used Oil Recyc: No
TSDF Activities: Not reported

Violation Status: No violations found

FINDS:
Other Pertinent Environmental Activity Identified at Site:
Facility Registry System (FRS)
Resource Conservation and Recovery Act Information system (RCRAINFO)

RITE AID NO 5555 (Continued) **1000857175**

HAZNET:

Gepaid:	CA0000068890
Tepaid:	CAT000613976
Gen County:	Los Angeles
Tsd County:	Orange
Tons:	.0427
Category:	Photochemicals/photoprocessing waste
Disposal Method:	Transfer Station
Contact:	RITE AID CORP
Telephone:	(717) 761-2633
Mailing Address:	4020 STIRRUP CREEK DRIVE SUITE 211
	DURHAM, NC 27703 - 3165
County	Los Angeles

Gepaid:	CA0000068890
Tepaid:	CAD981402522
Gen County:	Los Angeles
Tsd County:	Kern
Tons:	.0300
Category:	Photochemicals/photoprocessing waste
Disposal Method:	Recycler
Contact:	RITE AID CORP
Telephone:	(717) 761-2633
Mailing Address:	4020 STIRRUP CREEK DRIVE SUITE 211
	DURHAM, NC 27703 - 3165
County	Los Angeles

Gepaid:	CA0000068890
Tepaid:	CAD981402522
Gen County:	Los Angeles
Tsd County:	Kern
Tons:	3.0355
Category:	Photochemicals/photoprocessing waste
Disposal Method:	Recycler
Contact:	RITE AID CORP
Telephone:	(717) 761-2633
Mailing Address:	4020 STIRRUP CREEK DRIVE SUITE 211
	DURHAM, NC 27703 - 3165
County	Los Angeles

Gepaid:	CA0000068890
Tepaid:	CAT000613976
Gen County:	Los Angeles
Tsd County:	Orange
Tons:	.1678
Category:	Photochemicals/photoprocessing waste
Disposal Method:	Transfer Station
Contact:	RITE AID CORP
Telephone:	(717) 761-2633
Mailing Address:	4020 STIRRUP CREEK DRIVE SUITE 211
	DURHAM, NC 27703 - 3165
County	Los Angeles

RITE AID NO 5555 (Continued) **1000857175**

Gepaid: CA0000068890
Tepaid: CAT000613976
Gen County: Los Angeles
Tsd County: Orange
Tons: .0035
Category:
Disposal Method: Transfer Station
Contact: RITE AID CORP
Telephone: (717) 761-2633
Mailing Address: 4020 STIRRUP CREEK DRIVE SUITE 211
DURHAM, NC 27703 - 3165
County Los Angeles

The CA HAZNET database contains 4 additional records for this site.
Please contact your EDR Account Executive for more information.

U118 **LEON A. THOMPSON** **HIST UST** **U001567706**
NW **26801 BOUQUET CANYON RD** **N/A**
> 1 **SAUGUS, CA 91350**
5838 ft.
Lower **Site 2 of 8 in cluster U**

UST HIST:

Facility ID:	55591		
Tank Num:	1	Container Num:	1
Tank Capacity:	12000	Year Installed:	1982
Tank Used for:	PRODUCT		
Type of Fuel:	DIESEL	Tank Construction:	1/4 inches
Leak Detection:	Stock Inventor, GW Monitoring Well		
Contact Name:	Not reported	Telephone:	(805) 259-9797
Total Tanks:	4	Region:	STATE
Facility Type:	1	Other Type:	Not reported

Facility ID:	55591		
Tank Num:	2	Container Num:	2
Tank Capacity:	10000	Year Installed:	1982
Tank Used for:	PRODUCT		
Type of Fuel:	UNLEADED	Tank Construction:	1/4 inches
Leak Detection:	Stock Inventor, GW Monitoring Well		
Contact Name:	Not reported	Telephone:	(805) 259-9797
Total Tanks:	4	Region:	STATE
Facility Type:	1	Other Type:	Not reported

Facility ID:	55591		
Tank Num:	3	Container Num:	3
Tank Capacity:	10000	Year Installed:	1982
Tank Used for:	PRODUCT		
Type of Fuel:	REGULAR	Tank Construction:	1/4 inches
Leak Detection:	Stock Inventor, GW Monitoring Well		
Contact Name:	Not reported	Telephone:	(805) 259-9797
Total Tanks:	4	Region:	STATE
Facility Type:	1	Other Type:	Not reported

Facility ID:	55591		
Tank Num:	4	Container Num:	4
Tank Capacity:	10000	Year Installed:	1982
Tank Used for:	PRODUCT		
Type of Fuel:	PREMIUM	Tank Construction:	1/4 inches

LEON A. THOMPSON (Continued) **U001567706**

Leak Detection: Stock Inventor, GW Monitoring Well
Contact Name: Not reported
Telephone: (805) 259-9797
Total Tanks: 4
Region: STATE
Facility Type: 1
Other Type: Not reported

U119 **BOUQUET CANYON SHELL** **LOS ANGELES CO. HMS** **S103392973**
NW **26801 N BOUQUET CANYON RD** **N/A**
> 1 **SANTA CLARITA, CA**
5838 ft.
Lower **Site 3 of 8 in cluster U**

HMS:
Facility Id: 006245-026426
Facility Type: T0
Permit Number: 000228928
Permit Status: Permit
Facility Status: Permit
Area: 7A
Region: Los Angeles County:

Facility Id: 019946-028464
Facility Type: Not reported
Permit Number: Not reported
Permit Status: Not reported
Facility Status: OPEN
Area: 7A
Region: Los Angeles County:

U120 **SHELL** **Cortese** **S105026546**
NW **26801 BOUQUET CANYON RD** **N/A**
> 1 **SAUGUS, CA 91350**
5838 ft.
Lower **Site 4 of 8 in cluster U**

CORTESE:
Reg Id: I-06462
Region: CORTESE
Reg By: Leaking Underground Storage Tanks

U121 **SHELL SERVICE STATION** **RCRIS-SQG** **1005441238**
NW **26801 BOQUET CANYON ROAD** **CAR000117010**
> 1 **SAUGUS, CA 91350**
5838 ft.
Lower **Site 5 of 8 in cluster U**

RCRIS:
Owner: EQUILON ENT LLC DBA S O P US
(713) 241-5036
EPA ID: CAR000117010
Contact: SONDRA BIENVENU
(713) 241-5036
Classification: Small Quantity Generator
Used Oil Recyc: No
TSDF Activities: Not reported

SHELL SERVICE STATION (Continued) **1005441238**

Violation Status: No violations found

U122 **SHELL** **LUST** **S102436873**
NW **26801 BOUQUET CANYON RD** **HAZNET** **N/A**
> 1 **SAUGUS, CA 91350**
5838 ft.
Lower **Site 6 of 8 in cluster U**

State LUST:

Cross Street:	SECO		
Qty Leaked:	Not reported		
Case Number	I-06462A		
Reg Board:	4		
Chemical:	Gasoline		
Lead Agency:	Regional Board		
Local Agency :	19000		
Case Type:	Soil only		
Status:	Not reported		
County:	Los Angeles		
Review Date:	Not reported	Confirm Leak:	Not reported
Workplan:	10/29/01	Prelim Assess:	10/29/01
Pollution Char:	1/20/92	Remed Plan:	1/20/92
Remed Action:	Not reported	Monitoring:	Not reported
Close Date:	7/30/96		
Release Date:	Not reported		
Cleanup Fund Id :	Not reported		
Discover Date :	10/24/01		
Enforcement Dt :	Not reported		
Enf Type:	Not reported		
Enter Date :	Not reported		
Funding:	Not reported		
Staff Initials:	Not reported		
How Discovered:	Other Means		
How Stopped:	Other Means		
Interim :	Not reported		
Leak Cause:	Unknown		
Leak Source:	Unknown		
MTBE Date :	Not reported		
Max MTBE GW :	Not reported		
MTBE Tested:	Site NOT Tested for MTBE.Includes Unknown and Not Analyzed.		
Priority:	Not reported		
Local Case # :	Not reported		
Beneficial:	Not reported		
Staff :	JLC		
GW Qualifies :	Not reported		
Max MTBE Soil :	Not reported		
Soil Qualifies :	Not reported		
Hydr Basin #:	Not reported		
Operator :	Not reported		
Oversight Prgm:	RB Lead Underground Storage Tank		
Oversight Prgm :	UST		
Review Date :	10/16/96		
Stop Date :	11/30/88		
Work Suspended :	Not reported		
Responsible Party	SHELL OIL CO.		
RP Address:	P.O. BOX 4848, ANAHEIM, CA 92803	D	
Global Id:	T0603703215		
Org Name:	Not reported		

SHELL (Continued) **S102436873**

Contact Person: Not reported
MTBE Conc: 0
Mtbe Fuel: Not reported
Water System Name: SANTA CLARITA WATER CO
Well Name: METHODIST
Distance To Lust: 850.8236944
Waste Discharge Global ID: Not reported
Waste Disch Assigned Name: Not reported

LUST Region 4:
Report Date: 5/1/1989
Lead Agency: Regional Board
Local Agency: 19000
Case Number: I-06462
Substance: Gasoline
Case Type: Soil
Status: Case Closed
Region: 4
Staff: Not reported

HAZNET:
Gepaid: CAL000162212
Tepaid: CAD982484933
Gen County: Los Angeles
Tsd County: 7
Tons: .6500
Category: Empty containers less than 30 gallons
Disposal Method: Disposal, Other
Contact: EQUILON ENTERPRISES LLC
Telephone: (713) 241-2258
Mailing Address: PO BOX 4453
HOUSTON, TX 77210 - 4453
County Los Angeles

U123 **BOUQUET CANYON SHELL** **UST** **U003778043**
NW **26801 BOUQUET CANYON RD** **N/A**
> 1 **SANTA CLARITA, CA 91350**
5838 ft.
Lower **Site 7 of 8 in cluster U**

State UST:
Facility ID: 26426
Total Tanks: 1
Region: STATE
Local Agency: 19000

U124 **SHELL OIL #204-7050/CAR WASH** **LOS ANGELES CO. HMS** **S102064466**
NW **26801 N BOUQUET CANYON RD** **N/A**
> 1 **SANTA CLARITA, CA**
5838 ft.
Lower **Site 8 of 8 in cluster U**

HMS:
Facility Id: 006245-I06462
Facility Type: I01
Permit Number: 00009816A
Permit Status: Permit
Facility Status: Permit
Area: 7A
Region: Los Angeles County:

SHELL OIL #204-7050/CAR WASH (Continued) **S102064466**

Facility Id: 006245-006462
Facility Type: T0
Permit Number: 00000583T
Permit Status: Closed
Facility Status: Closed
Area: 7A
Region: Los Angeles County:

V125
ESE
> 1
5870 ft.
Higher

INSPECTOR'S PAINT & BODY **HAZNET** **S103647889**
26516 GOLDEN VALLEY RD #209 **N/A**
CANYON COUNTRY, CA 91350

Site 1 of 13 in cluster V

HAZNET:
Gepaid: CAL000044888
Tepaid: CAD008252405
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: 0.4503
Category: Unspecified solvent mixture Waste
Disposal Method: Recycler
Contact: INDERBITZIN TONY
Telephone: (000) 000-0000
Mailing Address: 26516 GOLDEN VALLEY RD #310
SANTA-CLARITA, CA 91350
County Los Angeles

Gepaid: CAL000044888
Tepaid: CAD008252405
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: .5086
Category: Unspecified solvent mixture Waste
Disposal Method: Recycler
Contact: INDERBITZIN TONY
Telephone: (000) 000-0000
Mailing Address: 26516 GOLDEN VALLEY RD #310
SANTA-CLARITA, CA 91350
County Los Angeles

Gepaid: CAL000044888
Tepaid: CAD008252405
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: .3127
Category: Unspecified solvent mixture Waste
Disposal Method: Recycler
Contact: INDERBITZIN TONY
Telephone: (000) 000-0000
Mailing Address: 26516 GOLDEN VALLEY RD #310
SANTA-CLARITA, CA 91350
County Los Angeles

INSPECTOR'S PAINT & BODY (Continued) **S103647889**

Gepaid: CAL000044888
Tepaid: CAD008252405
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: .5003
Category: Unspecified solvent mixture Waste
Disposal Method: Recycler
Contact: INDERBITZIN TONY
Telephone: (000) 000-0000
Mailing Address: 26516 GOLDEN VALLEY RD #310
SANTA-CLARITA, CA 91350
County Los Angeles

Gepaid: CAL000044888
Tepaid: CAD008252405
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: .0667
Category: Unspecified solvent mixture Waste
Disposal Method: Recycler
Contact: INDERBITZIN TONY
Telephone: (000) 000-0000
Mailing Address: 26516 GOLDEN VALLEY RD #310
SANTA-CLARITA, CA 91350
County Los Angeles

V126 **CLASSIC UPHOLSTERY** **LOS ANGELES CO. HMS** **S103945437**
ESE **26524 GOLDEN VALLEY RD** **N/A**
> 1 **SANTA CLARITA, CA**
5882 ft.
Higher **Site 2 of 13 in cluster V**

HMS:
Facility Id: 019978-028500
Facility Type: Not reported
Permit Number: Not reported Permit Status: Not reported
Facility Status: OPEN Area: 7A
Region: Los Angeles County:

W127 **HUGHES MARKETS INC** **LOS ANGELES CO. HMS** **S104536197**
WNW **26550 N BOUQUET CANYON RD** **N/A**
> 1 **SANTA CLARITA, CA**
5893 ft.
Lower **Site 1 of 9 in cluster W**

HMS:
Facility Id: 007676-I08100
Facility Type: I01
Permit Number: 000009146 Permit Status: Closed
Facility Status: Closed Area: 7A
Region: Los Angeles County:

W128 **SAV ON 9722** **HAZNET** **S105092268**
WNW **26550 BOUQUET CANYON RD** **N/A**
> 1 **SAUGUS, CA 91350**
5893 ft.
Lower **Site 2 of 9 in cluster W**

SAV ON 9722 (Continued) **S105092268**

HAZNET:
Gepaid: CAL000208013
Tepaid: CAD008364432
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: .3252
Category: Alkaline solution without metals (pH > 12.5)
Disposal Method: Treatment, Tank
Contact: AMERICAN DRUG STORES INC
Telephone: (208) 395-5245
Mailing Address: PO BOX 20 DEPT 74100
BOISE, ID 83726
County Los Angeles

Gepaid: CAL000208013
Tepaid: COD991300484
Gen County: Los Angeles
Tsd County: 99
Tons: .0250
Category: Photochemicals/photoprocessing waste
Disposal Method: Transfer Station
Contact: AMERICAN DRUG STORES INC
Telephone: (208) 395-5245
Mailing Address: PO BOX 20 DEPT 74100
BOISE, ID 83726
County Los Angeles

W129 **CLARKS DRUGS 21** **RCRIS-SQG** **1000818980**
WNW **26550 BOUQET CANYON RD** **FINDS** **CAD983649211**
> 1 **SAUGUS, CA 91350** **HAZNET**
5893 ft.
Lower **Site 3 of 9 in cluster W**

RCRIS:
Owner: CLARKS DRUGS
(310) 306-4435
EPA ID: CAD983649211

Contact: DAVID CLYMER
(310) 494-9474

Classification: Small Quantity Generator
Used Oil Recyc: No
TSDF Activities: Not reported

Violation Status: No violations found

FINDS:
Other Pertinent Environmental Activity Identified at Site:
Facility Registry System (FRS)
Resource Conservation and Recovery Act Information system (RCRAINFO)

CLARKS DRUGS 21 (Continued) **1000818980**

HAZNET:

Gepaid:	CAD983649211
Tepaid:	CAD981402522
Gen County:	Los Angeles
Tsd County:	Kern
Tons:	2.4311
Category:	Photochemicals/photoprocessing waste
Disposal Method:	Recycler
Contact:	CLARKS DRUGS
Telephone:	(310) 306-4435
Mailing Address:	26550 BOUQUET CANYON RD SANTA CLARITA, CA 91350 - 2353
County	Los Angeles

Gepaid:	CAD983649211
Tepaid:	CAD981402522
Gen County:	Los Angeles
Tsd County:	Kern
Tons:	.0475
Category:	Metal sludge - Alkaline solution (pH <UN-> 12.5) with metals (antimony, arsenic, barium, beryllium, cadmium, chromium, cobalt, copper, lead, mercury, molybdenum, nickel, selenium, silver, thallium, vanadium, and zinc)
Disposal Method:	Recycler
Contact:	CLARKS DRUGS
Telephone:	(310) 306-4435
Mailing Address:	26550 BOUQUET CANYON RD SANTA CLARITA, CA 91350 - 2353
County	Los Angeles

Gepaid:	CAD983649211
Tepaid:	CAD981402522
Gen County:	Los Angeles
Tsd County:	Kern
Tons:	1.2093
Category:	Photochemicals/photoprocessing waste
Disposal Method:	Recycler
Contact:	CLARKS DRUGS
Telephone:	(310) 306-4435
Mailing Address:	26550 BOUQUET CANYON RD SANTA CLARITA, CA 91350 - 2353
County	Los Angeles

Gepaid:	CAD983649211
Tepaid:	CAD981402522
Gen County:	Los Angeles
Tsd County:	Kern
Tons:	.3753
Category:	Photochemicals/photoprocessing waste
Disposal Method:	Not reported
Contact:	CLARKS DRUGS
Telephone:	(310) 306-4435
Mailing Address:	26550 BOUQUET CANYON RD SANTA CLARITA, CA 91350 - 2353
County	Los Angeles

CLARKS DRUGS 21 (Continued) **1000818980**

Gepaid: CAD983649211
Tepaid: CAD981402522
Gen County: Los Angeles
Tsd County: Kern
Tons: 3.4777
Category: Photochemicals/photoprocessing waste
Disposal Method: Recycler
Contact: CLARKS DRUGS
Telephone: (310) 306-4435
Mailing Address: 26550 BOUQUET CANYON RD
SANTA CLARITA, CA 91350 - 2353
County Los Angeles

The CA HAZNET database contains 4 additional records for this site.
Please contact your EDR Account Executive for more information.

V130 **BABY YOUR CAR** **LOS ANGELES CO. HMS** **S103945438**
ESE **26529 GOLDEN VALLEY RD** **N/A**
> 1 **SANTA CLARITA, CA**
5894 ft.
Higher **Site 3 of 13 in cluster V**

HMS:
Facility Id: 019979-028501
Facility Type: Not reported
Permit Number: Not reported — Permit Status: Not reported
Facility Status: OPEN — Area: 7A
Region: Los Angeles County:

X131 **BOUQUET AUTO PARTS** **LOS ANGELES CO. HMS** **S103945459**
NW **26769 BOUQET CANYON RD** **N/A**
> 1 **SANTA CLARITA, CA**
5898 ft.
Lower **Site 1 of 7 in cluster X**

HMS:
Facility Id: 019823-028294
Facility Type: Not reported
Permit Number: Not reported — Permit Status: Not reported
Facility Status: OPEN — Area: 7A
Region: Los Angeles County:

W132 **SWENSENS BOUQUET CENTER** **LOS ANGELES CO. HMS** **U003063560**
WNW **26586 N BOUQUET CANYON RD** **N/A**
> 1 **SANTA CLARITA, CA**
5898 ft.
Lower **Site 4 of 9 in cluster W**

HMS:
Facility Id: 007820-I08278
Facility Type: I02
Permit Number: 000009359 — Permit Status: Closed
Facility Status: Closed — Area: 7A
Region: Los Angeles County:

W133
WNW
> 1
5898 ft.
Lower

WENDYS HAMBURGERS — **LOS ANGELES CO. HMS** — **U003063775**
26538 N BOUQUET CANYON RD — **N/A**
SANTA CLARITA, CA

Site 5 of 9 in cluster W

HMS:

Facility Id:	008061-I08566		
Facility Type:	I01		
Permit Number:	000009451	Permit Status:	Permit
Facility Status:	Permit	Area:	7A
Region:	Los Angeles County:		

V134
ESE
> 1
5899 ft.
Higher

1X ANESCO MANUFACTURING PARTNERSHIP — **HAZNET** — **S103647875**
26502 GOLDEN VALLEY ROAD,#107 — **N/A**
SANTA CLARITA, CA 91350

Site 4 of 13 in cluster V

HAZNET:

Gepaid:	CAC000557696
Tepaid:	CAD980883177
Gen County:	Los Angeles
Tsd County:	Kern
Tons:	.4378
Category:	Unspecified oil-containing waste
Disposal Method:	Recycler
Contact:	ANESCO MFG PARTNERSHIP
Telephone:	(000) 000-0000
Mailing Address:	26502 GOLDEN VALLEY ROAD, STE SANTA CLARITA, CA 91350
County	Los Angeles

V135
ESE
> 1
5899 ft.
Higher

JPS INC — **HAZNET** — **S103972794**
26502 GOLDEN VALLEY RD #105 — **N/A**
SAUGUS, CA 91350

Site 5 of 13 in cluster V

HAZNET:

Gepaid:	CAC001356056
Tepaid:	CAT080013352
Gen County:	Los Angeles
Tsd County:	Los Angeles
Tons:	.2293
Category:	Waste oil and mixed oil
Disposal Method:	Not reported
Contact:	PAUL SHAPIRO PRESIDENT
Telephone:	(805) 251-4241
Mailing Address:	26502 GOLDEN VALLEY RD #105 SAUGUS, CA 91350
County	Los Angeles

JPS INC (Continued) **S103972794**

Gepaid: CAC001356056
Tepaid: CAD008302903
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: .2293
Category: Waste oil and mixed oil
Disposal Method: Recycler
Contact: PAUL SHAPIRO PRESIDENT
Telephone: (805) 251-4241
Mailing Address: 26502 GOLDEN VALLEY RD #105
SAUGUS, CA 91350
County Los Angeles

V136 **KAR BODY & PAINT INC** **HAZNET** **S103973038**
ESE **26502 GOLDEN VALLEY** **N/A**
> 1 **CANYON COUNTRY, CA 91351**
5899 ft.
Higher **Site 6 of 13 in cluster V**

HAZNET:
Gepaid: CAL000178646
Tepaid: CAD008302903
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: .2919
Category: Paint sludge
Disposal Method: Recycler
Contact: KAR BODY & PAINT INC
Telephone: (805) 298-1046
Mailing Address: 26502 GOLDEN VALLEY RD
SANTA CLARITA, CA 91350 - 2943
County Los Angeles

Gepaid: CAL000178646
Tepaid: CAT000613893
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: .0180
Category: Oxygenated solvents (acetone, butanol, ethyl acetate, etc.)
Disposal Method: Transfer Station
Contact: KAR BODY & PAINT INC
Telephone: (805) 298-1046
Mailing Address: 26502 GOLDEN VALLEY RD
SANTA CLARITA, CA 91350 - 2943
County Los Angeles

Gepaid: CAL000178646
Tepaid: CAT000613893
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: .0540
Category: Oxygenated solvents (acetone, butanol, ethyl acetate, etc.)
Disposal Method: Transfer Station
Contact: KAR BODY & PAINT INC
Telephone: (805) 298-1046
Mailing Address: 26502 GOLDEN VALLEY RD
SANTA CLARITA, CA 91350 - 2943
County Los Angeles

Y137 **CAMP BOUQUET CANYON** **LOS ANGELES CO. HMS** **U003060795**
WNW **26590 N BOUQUET CANYON RD** **N/A**
> 1 **SANTA CLARITA, CA**
5905 ft.
Lower **Site 1 of 3 in cluster Y**

HMS:

Facility Id:	004644-I04822		
Facility Type:	Not reported		
Permit Number:	Not reported	Permit Status:	Not reported
Facility Status:	OPEN	Area:	7A
Region:	Los Angeles County:		

Y138 **DISTRICT OFFICE** **HIST UST** **U001567692**
WNW **26590 BOUQUET CANYON RD** **N/A**
> 1 **SAUGUS, CA 91350**
5905 ft.
Lower **Site 2 of 3 in cluster Y**

UST HIST:

Facility ID:	29386		
Tank Num:	1	Container Num:	2
Tank Capacity:	2000	Year Installed:	1974
Tank Used for:	PRODUCT		
Type of Fuel:	REGULAR	Tank Construction:	Not reported
Leak Detection:	None		
Contact Name:	DR. JAMES M. FOSTER	Telephone:	(805) 259-1886
Total Tanks:	3	Region:	STATE
Facility Type:	2	Other Type:	OFFICE

Facility ID:	29386		
Tank Num:	2	Container Num:	1
Tank Capacity:	2000	Year Installed:	1974
Tank Used for:	PRODUCT		
Type of Fuel:	DIESEL	Tank Construction:	Not reported
Leak Detection:	None		
Contact Name:	DR. JAMES M. FOSTER	Telephone:	(805) 259-1886
Total Tanks:	3	Region:	STATE
Facility Type:	2	Other Type:	OFFICE

Facility ID:	29386		
Tank Num:	3	Container Num:	3
Tank Capacity:	500	Year Installed:	Not reported
Tank Used for:	PRODUCT		
Type of Fuel:	Not Reported	Tank Construction:	Not reported
Leak Detection:	None		
Contact Name:	DR. JAMES M. FOSTER	Telephone:	(805) 259-1886
Total Tanks:	3	Region:	STATE
Facility Type:	2	Other Type:	OFFICE

V139 **SAUGUS UNION SD TRANSPORTATION** **UST** **U003777448**
ESE **26501 GOLDEN VALLEY RD** **LOS ANGELES CO. HMS** **N/A**
> 1 **SANTA CLARITA, CA 91350**
5906 ft.
Higher **Site 7 of 13 in cluster V**

HMS:

Facility Id:	016620-036312		
Facility Type:	Not reported		
Permit Number:	Not reported	Permit Status:	Not reported

SAUGUS UNION SD TRANSPORTATION (Continued) **U003777448**

Facility Status: OPEN Area: 7A
Region: Los Angeles County:

State UST:
Facility ID: 22108
Total Tanks: 1
Region: STATE
Local Agency: 19000

V140 **SAUGUS USD/TRANSPORTATION** **HAZNET** **S105090153**
ESE **26501 GOLDEN VALLEY ROAD** **N/A**
> 1 **CANYON COUNTRY, CA 91351**
5906 ft.
Higher **Site 8 of 13 in cluster V**

HAZNET:
Gepaid: CAL000125215
Tepaid: CAT080013352
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: .9174
Category: Waste oil and mixed oil
Disposal Method: Recycler
Contact: SAUGUS USD
Telephone: (805) 297-8827
Mailing Address: 24930 AVENUE STANFORD
VALENCIA, CA 91355 - 1272
County Los Angeles

Gepaid: CAL000125215
Tepaid: CAD008252405
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: .0375
Category: Off-specification, aged, or surplus organics
Disposal Method: Recycler
Contact: SAUGUS USD
Telephone: (805) 297-8827
Mailing Address: 24930 AVENUE STANFORD
VALENCIA, CA 91355 - 1272
County Los Angeles

Gepaid: CAL000125215
Tepaid: CAD008252405
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: .0625
Category: Unspecified solvent mixture Waste
Disposal Method: Recycler
Contact: SAUGUS USD
Telephone: (805) 297-8827
Mailing Address: 24930 AVENUE STANFORD
VALENCIA, CA 91355 - 1272
County Los Angeles

SAUGUS USD/TRANSPORTATION (Continued) **S105090153**

Gepaid: CAL000125215
Tepaid: CAT080013352
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: 10.0080
Category: Unspecified oil-containing waste
Disposal Method: Recycler
Contact: SAUGUS USD
Telephone: (805) 297-8827
Mailing Address: 24930 AVENUE STANFORD
VALENCIA, CA 91355 - 1272
County Los Angeles

Gepaid: CAL000125215
Tepaid: CAD097030993
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: .0875
Category: Liquids with pH <UN-> 2
Disposal Method: Recycler
Contact: SAUGUS USD
Telephone: (805) 297-8827
Mailing Address: 24930 AVENUE STANFORD
VALENCIA, CA 91355 - 1272
County Los Angeles

The CA HAZNET database contains 10 additional records for this site.
Please contact your EDR Account Executive for more information.

V141
ESE
> 1
5906 ft.
Higher

SAUGUS UNION SD TRANSPORTATION **LOS ANGELES CO. HMS** **S102685272**
26501 GOLDEN VALLEY RD **N/A**
SANTA CLARITA, CA

Site 9 of 13 in cluster V

HMS:
Facility Id: 016620-022108
Facility Type: T0
Permit Number: 000114557 Permit Status: Permit
Facility Status: Permit Area: 7A
Region: Los Angeles County:

W142
WNW
> 1
5912 ft.
Lower

VONS #1669 **LOS ANGELES CO. HMS** **S103945436**
26518 N BOUQUET CANYON RD **N/A**
SANTA CLARITA, CA

Site 6 of 9 in cluster W

HMS:
Facility Id: 019051-027320
Facility Type: I01
Permit Number: 000262706 Permit Status: Removed
Facility Status: Permit Area: 7A
Region: Los Angeles County:

Z143 **CARRIAGE TRADE CLEANERS** **HAZNET** **S103647886**
WNW **26512 BOUQUET CANYON** **CLEANERS** **N/A**
> 1 **SAUGUS, CA 91350**
5913 ft.
Lower **Site 1 of 5 in cluster Z**

CA Cleaners:
Create Date: 07/03/1987
Inactive Date: 06/30/1998
EPA Id: CAD981636384
County : Los Angeles

HAZNET:
Gepaid: CAD981636384
Tepaid: CAT000613992
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: .1950
Category: Liquids with halogenated organic compounds > 1000 mg/l
Disposal Method: Transfer Station
Contact: G1& M SHERPO, D KLINE
Telephone: (805) 296-0606
Mailing Address: 26512 BOUQUET CANYON RD
SANTA CLARITA, CA 91350
County Los Angeles

Gepaid: CAD981636384
Tepaid: CAT000613893
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: .1950
Category: Liquids with halogenated organic compounds > 1000 mg/l
Disposal Method: Transfer Station
Contact: G1& M SHERPO, D KLINE
Telephone: (805) 296-0606
Mailing Address: 26512 BOUQUET CANYON RD
SANTA CLARITA, CA 91350
County Los Angeles

Gepaid: CAD981636384
Tepaid: CAT000613893
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: .7800
Category: Liquids with halogenated organic compounds > 1000 mg/l
Disposal Method: Transfer Station
Contact: G1& M SHERPO, D KLINE
Telephone: (805) 296-0606
Mailing Address: 26512 BOUQUET CANYON RD
SANTA CLARITA, CA 91350
County Los Angeles

Gepaid: CAD981636384
Tepaid: CAT000613893
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: 0
Category:
Disposal Method: Transfer Station
Contact: G1& M SHERPO, D KLINE
Telephone: (805) 296-0606

CARRIAGE TRADE CLEANERS (Continued) **S103647886**

Mailing Address: 26512 BOUQUET CANYON RD
SANTA CLARITA, CA 91350
County Los Angeles

Gepaid: CAD981636384
Tepaid: CAT000613893
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: 0.0975
Category: Liquids with halogenated organic compounds > 1000 mg/l
Disposal Method: Not reported
Contact: G1& M SHERPO, D KLINE
Telephone: (805) 296-0606
Mailing Address: 26512 BOUQUET CANYON RD
SANTA CLARITA, CA 91350
County Los Angeles

The CA HAZNET database contains 7 additional records for this site.
Please contact your EDR Account Executive for more information.

Z144 **FLAMINGO CLEANERS** **RCRIS-SQG 1000358291**
WNW **26512 BOQUET CYN RD** **FINDS CAD981636384**
> 1 **SAUGUS, CA 91350**
5913 ft.
Lower **Site 2 of 5 in cluster Z**

RCRIS:
Owner: ERTUN SEKEROGU
(805) 296-0606
EPA ID: CAD981636384

Contact: ERTUN SEKEROGU
(661) 296-0606

Classification: Small Quantity Generator
Used Oil Recyc: No
TSDF Activities: Not reported

Violation Status: No violations found

FINDS:
Other Pertinent Environmental Activity Identified at Site:
Facility Registry System (FRS)
Resource Conservation and Recovery Act Information system (RCRAINFO)

X145 **CHEVRON USA SS 092437** **UST U003776335**
NW **26753 BOUQUET CANYON RD** **N/A**
> 1 **SANTA CLARITA, CA 91350**
5916 ft.
Lower **Site 2 of 7 in cluster X**

State UST:
Facility ID: 9574
Total Tanks: 1
Region: STATE
Local Agency: 19000

X146 **92437** **HIST UST** **U001567683**
NW **26753 BOUQUET CANYON RD** **N/A**
> 1 **SAUGUS, CA 91350**
5916 ft.
Lower **Site 3 of 7 in cluster X**

UST HIST:

Facility ID:	62259		
Tank Num:	1	Container Num:	1
Tank Capacity:	10000	Year Installed:	1970
Tank Used for:	PRODUCT		
Type of Fuel:	Not Reported	Tank Construction:	0000250 unknown
Leak Detection:	Stock Inventor		
Contact Name:	NEIDIGH,KENNETH	Telephone:	(805) 259-2325
Total Tanks:	4	Region:	STATE
Facility Type:	1	Other Type:	Not reported

Facility ID:	62259		
Tank Num:	2	Container Num:	2
Tank Capacity:	10000	Year Installed:	1970
Tank Used for:	PRODUCT		
Type of Fuel:	Not Reported	Tank Construction:	0000250 unknown
Leak Detection:	Stock Inventor		
Contact Name:	NEIDIGH,KENNETH	Telephone:	(805) 259-2325
Total Tanks:	4	Region:	STATE
Facility Type:	1	Other Type:	Not reported

Facility ID:	62259		
Tank Num:	3	Container Num:	3
Tank Capacity:	5000	Year Installed:	1970
Tank Used for:	PRODUCT		
Type of Fuel:	Not Reported	Tank Construction:	0000250 unknown
Leak Detection:	Stock Inventor		
Contact Name:	NEIDIGH,KENNETH	Telephone:	(805) 259-2325
Total Tanks:	4	Region:	STATE
Facility Type:	1	Other Type:	Not reported

Facility ID:	62259		
Tank Num:	4	Container Num:	4
Tank Capacity:	1000	Year Installed:	1970
Tank Used for:	WASTE		
Type of Fuel:	Not Reported	Tank Construction:	0000130 unknown
Leak Detection:	Stock Inventor		
Contact Name:	NEIDIGH,KENNETH	Telephone:	(805) 259-2325
Total Tanks:	4	Region:	STATE
Facility Type:	1	Other Type:	Not reported

X147 **CHEVRON STN 9 2437** **RCRIS-SQG** **1000857051**
NW **26753 BOUQUET CANYON RD** **FINDS** **CA0000031807**
> 1 **SAUGUS, CA 91350**
5916 ft.
Lower **Site 4 of 7 in cluster X**

CHEVRON STN 9 2437 (Continued) **1000857051**

RCRIS:
Owner: CHEVRON PRODUCTS COMPANY
(925) 842-5931
EPA ID: CA0000031807
Contact: KATHY NORRIS
(925) 842-5931
Classification: Small Quantity Generator
Used Oil Recyc: No
TSDF Activities: Not reported
Violation Status: No violations found

FINDS:
Other Pertinent Environmental Activity Identified at Site:
Facility Registry System (FRS)
Resource Conservation and Recovery Act Information system (RCRAINFO)

X148 **CHEVRON USA SS 092437** **LOS ANGELES CO. HMS** **S102064464**
NW **26753 N BOUQUET CANYON RD** **N/A**
> 1 **SANTA CLARITA, CA**
5916 ft.
Lower **Site 5 of 7 in cluster X**

HMS:
Facility Id: 008429-009574
Facility Type: T0
Permit Number: 00000794T Permit Status: Permit
Facility Status: Permit Area: 7A
Region: Los Angeles County:

X149 **CHEVRON USA CO / CARWASH** **LOS ANGELES CO. HMS** **S104827211**
NW **26753 N BOUQUET CANYON RD** **N/A**
> 1 **SANTA CLARITA, CA**
5916 ft.
Lower **Site 6 of 7 in cluster X**

HMS:
Facility Id: 008429-I09574
Facility Type: I01
Permit Number: 000009040 Permit Status: Permit
Facility Status: Permit Area: 7A
Region: Los Angeles County:

X150 **CHEVRON USA PRODUCTS COMPANY** **HAZNET** **S103648043**
NW **26753 BOQUET CANYON** **N/A**
> 1 **SAUGUS, CA 91350**
5916 ft.
Lower **Site 7 of 7 in cluster X**

CHEVRON USA PRODUCTS COMPANY (Continued) **S103648043**

HAZNET:
Gepaid: CAC000713304
Tepaid: CAT080010101
Gen County: Los Angeles
Tsd County: San Diego
Tons: .0208
Category: Aqueous solution with 10% or more total organic residues
Disposal Method: Transfer Station
Contact: CHEVRON USA PRODUCTS COMPANY
Telephone: (310) 694-7452
Mailing Address: PO BOX 2833
LA HABRA, CA 90632
County Los Angeles

V151 **UNIVERSAL ENGINE** HAZNET **S103647896**
ESE **26536 GOLDEN VALLEY RD, #616** **N/A**
> 1 **SANTA CLARITA, CA 91351**
5921 ft.
Higher **Site 10 of 13 in cluster V**

HAZNET:
Gepaid: CAL000110336
Tepaid: CAD099452708
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: .4586
Category: Unspecified aqueous solution
Disposal Method: Recycler
Contact: ARMOND ASLANIAN
Telephone: (000) 000-0000
Mailing Address: 26536 GOLDEN VALLEY RD, #616
SANTA CLARITA, CA 91351
County Los Angeles

Gepaid: CAL000110336
Tepaid: CAT080013352
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: .2293
Category: Unspecified aqueous solution
Disposal Method: Recycler
Contact: ARMOND ASLANIAN
Telephone: (000) 000-0000
Mailing Address: 26536 GOLDEN VALLEY RD, #616
SANTA CLARITA, CA 91351
County Los Angeles

Gepaid: CAL000110336
Tepaid: CAT080013352
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: .5837
Category: Unspecified aqueous solution
Disposal Method: Recycler
Contact: ARMOND ASLANIAN
Telephone: (000) 000-0000
Mailing Address: 26536 GOLDEN VALLEY RD, #616
SANTA CLARITA, CA 91351
County Los Angeles

UNIVERSAL ENGINE (Continued) **S103647896**

Gepaid: CAL000110336
Tepaid: CAD099452708
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: .4587
Category: Unspecified oil-containing waste
Disposal Method: Recycler
Contact: ARMOND ASLANIAN
Telephone: (000) 000-0000
Mailing Address: 26536 GOLDEN VALLEY RD, #616
SANTA CLARITA, CA 91351
County Los Angeles

Gepaid: CAL000110336
Tepaid: CAD099452708
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: .2085
Category: Unspecified aqueous solution
Disposal Method: Recycler
Contact: ARMOND ASLANIAN
Telephone: (000) 000-0000
Mailing Address: 26536 GOLDEN VALLEY RD, #616
SANTA CLARITA, CA 91351
County Los Angeles

V152 **MATO PLASTICS** HAZNET S102825380
ESE **26541 GOLDEN VALLEY** LOS ANGELES CO. HMS N/A
> 1 **SAUGUS, CA 91350**
5935 ft.
Higher **Site 11 of 13 in cluster V**

HAZNET:
Gepaid: CAL000177650
Tepaid: CAT080013352
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: .9174
Category: Unspecified oil-containing waste
Disposal Method: Recycler
Contact: MANFRED TOLL
Telephone: (000) 000-0000
Mailing Address: 26541 GOLDEN VALLEY RD UNIT A
SANTA CLARITA, CA 91350
County Los Angeles

HMS:
Facility Id: 019983-028505
Facility Type: Not reported
Permit Number: Not reported Permit Status: Not reported
Facility Status: OPEN Area: 7A
Region: Los Angeles County:

W153 **ORCHARD SUPPLY HARDWARE** LOS ANGELES CO. HMS S104536198
WNW **26565 N BOUQUET CANYON RD** N/A
> 1 **SANTA CLARITA, CA**
5945 ft.
Lower **Site 7 of 9 in cluster W**

ORCHARD SUPPLY HARDWARE (Continued) — **S104536198**

HMS:
Facility Id: 017246-023319
Facility Type: I04
Permit Number: 000158319 — Permit Status: Permit
Facility Status: Permit — Area: 7A
Region: Los Angeles County:

Z154 — **WNW** — **> 1** — **5948 ft.** — **Lower**

BURGER KING RESTAURANT — **LOS ANGELES CO. HMS** — **S104536194**
26480 N BOUQUET CANYON RD — **N/A**
SANTA CLARITA, CA

Site 3 of 5 in cluster Z

HMS:
Facility Id: 017165-023081
Facility Type: I02
Permit Number: 000148729 — Permit Status: Permit
Facility Status: Permit — Area: 7A
Region: Los Angeles County:

W155 — **WNW** — **> 1** — **5949 ft.** — **Lower**

JACK-IN-THE-BOX — **LOS ANGELES CO. HMS** — **S104536196**
26547 N BOUQUET CANYON RD — **N/A**
SANTA CLARITA, CA

Site 8 of 9 in cluster W

HMS:
Facility Id: 017100-022947
Facility Type: I01
Permit Number: 000144585 — Permit Status: Permit
Facility Status: Permit — Area: 7A
Region: Los Angeles County:

Y156 — **NW** — **> 1** — **5951 ft.** — **Lower**

PRESIDENTE RESTAURANT — **LOS ANGELES CO. HMS** — **S102229787**
26625 N BOUQUET CANYON RD — **N/A**
SANTA CLARITA, CA

Site 3 of 3 in cluster Y

HMS:
Facility Id: 017343-023505
Facility Type: I01
Permit Number: 000165205 — Permit Status: Permit
Facility Status: Permit — Area: 7A
Region: Los Angeles County:

W157 — **WNW** — **> 1** — **5952 ft.** — **Lower**

BOSTON MARKET RESTAURANT — **LOS ANGELES CO. HMS** — **S104536195**
26543 N BOUQUET CANYON RD — **N/A**
SANTA CLARITA, CA

Site 9 of 9 in cluster W

HMS:
Facility Id: 016925-022697
Facility Type: I01
Permit Number: 000140929 — Permit Status: Permit
Facility Status: Permit — Area: 7A

BOSTON MARKET RESTAURANT (Continued) — **S104536195**

Region: Los Angeles County:

AA158 **ADROS CUSTOM WOOD FINISHING** — **RCRIS-SQG** **1000472923**
ESE **26524 GOLDEN VALLEY** — **FINDS** **CAD982435539**
> 1 **CANYON COUNTRY, CA 91351**
5987 ft.
Higher **Site 1 of 3 in cluster AA**

RCRIS:
Owner: A R B ENTERPRISES
(415) 555-1212
EPA ID: CAD982435539
Contact: ENVIRONMENTAL MANAGER
(805) 252-1870
Classification: Small Quantity Generator
Used Oil Recyc: No
TSDF Activities: Not reported
Violation Status: No violations found

FINDS:
Other Pertinent Environmental Activity Identified at Site:
Facility Registry System (FRS)
Resource Conservation and Recovery Act Information system (RCRAINFO)

AA159 **INLAND PACIFIC MTR** — **RCRIS-SQG** **1000596273**
ESE **26502 GOLDEN VALLEY RD 104** — **FINDS** **CAD983602384**
> 1 **SAUGUS, CA 91350**
5987 ft.
Higher **Site 2 of 3 in cluster AA**

RCRIS:
Owner: ARB ENTERPRISES
(805) 298-1046
EPA ID: CAD983602384
Contact: CARMELO HENSON
(805) 298-8633
Classification: Small Quantity Generator
Used Oil Recyc: No
TSDF Activities: Not reported
Violation Status: No violations found

FINDS:
Other Pertinent Environmental Activity Identified at Site:
Facility Registry System (FRS)
Resource Conservation and Recovery Act Information system (RCRAINFO)

AA160 **BENS TEK** — **RCRIS-SQG** **1000376046**
ESE **26536 GOLDEN VALLEY RD 606** — **FINDS** **CAD982507139**
> 1 **SANTA CLARITA, CA 91350** — **HAZNET**
5987 ft. — **LOS ANGELES CO. HMS**
Higher **Site 3 of 3 in cluster AA**

BENS TEK (Continued) **1000376046**

RCRIS:
Owner: GOULDMANS PAUL M
(415) 555-1212
EPA ID: CAD982507139
Contact: ENVIRONMENTAL MANAGER
(805) 255-9521
Classification: Small Quantity Generator
Used Oil Recyc: No
TSDF Activities: Not reported
Violation Status: No violations found

FINDS:
Other Pertinent Environmental Activity Identified at Site:
Facility Registry System (FRS)
Resource Conservation and Recovery Act Information system (RCRAINFO)

HAZNET:
Gepaid: CAD982507139
Tepaid: CAT080013352
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: .2293
Category: Unspecified aqueous solution
Disposal Method: Recycler
Contact: PAUL GLOUDEMANS
Telephone: (000) 000-0000
Mailing Address: 26536 GOLDEN VALLEY RD STE 606
SANTA CLARITA, CA 91350 - 2661
County Los Angeles

Gepaid: CAD982507139
Tepaid: CAT080013352
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: 0.2293
Category: Aqueous solution with 10% or more total organic residues
Disposal Method: Recycler
Contact: PAUL GLOUDEMANS
Telephone: (000) 000-0000
Mailing Address: 26536 GOLDEN VALLEY RD STE 606
SANTA CLARITA, CA 91350 - 2661
County Los Angeles

Gepaid: CAD982507139
Tepaid: CAT080013352
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: .2293
Category: Aqueous solution with 10% or more total organic residues
Disposal Method: Recycler
Contact: PAUL GLOUDEMANS
Telephone: (000) 000-0000
Mailing Address: 26536 GOLDEN VALLEY RD STE 606
SANTA CLARITA, CA 91350 - 2661
County Los Angeles

BENS TEK (Continued) **1000376046**

Gepaid: CAD982507139
Tepaid: CAT080013352
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: .2293
Category: Unspecified aqueous solution
Disposal Method: Treatment, Incineration
Contact: PAUL GLOUDEMANS
Telephone: (000) 000-0000
Mailing Address: 26536 GOLDEN VALLEY RD STE 606
SANTA CLARITA, CA 91350 - 2661
County Los Angeles

Gepaid: CAD982507139
Tepaid: CAT080013352
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: .4586
Category: Aqueous solution with 10% or more total organic residues
Disposal Method: Recycler
Contact: PAUL GLOUDEMANS
Telephone: (000) 000-0000
Mailing Address: 26536 GOLDEN VALLEY RD STE 606
SANTA CLARITA, CA 91350 - 2661
County Los Angeles

The CA HAZNET database contains 3 additional records for this site.
Please contact your EDR Account Executive for more information.

HMS:
Facility Id: 019981-028503
Facility Type: Not reported
Permit Number: Not reported — Permit Status: Not reported
Facility Status: OPEN — Area: 7A
Region: Los Angeles County:

Z161 **CRISTA ENTERPRISES DEVELOPMENT** **LOS ANGELES CO. HMS** **S103945429**
WNW **26485 N BOUQUET CANYON RD** **N/A**
> 1 **SANTA CLARITA, CA**
5998 ft.
Lower **Site 4 of 5 in cluster Z**

HMS:
Facility Id: 018997-037607
Facility Type: Not reported
Permit Number: Not reported — Permit Status: Not reported
Facility Status: OPEN — Area: 7A
Region: Los Angeles County:

Facility Id: 018997-027259
Facility Type: T1
Permit Number: 000263000 — Permit Status: Permit
Facility Status: Permit — Area: 7A
Region: Los Angeles County:

Facility Id: 018997-027815
Facility Type: I01
Permit Number: 000272593 — Permit Status: Permit
Facility Status: Permit — Area: 7A

CRISTA ENTERPRISES DEVELOPMENT (Continued) **S103945429**

Region: Los Angeles County:

Z162 **DAKOTA VENTURES,LLC** **UST** **U003778157**
WNW **26485 BOUQUET CANYON RD** **N/A**
> 1 **SANTA CLARITA, CA 91350**
5998 ft.
Lower **Site 5 of 5 in cluster Z**

State UST:
Facility ID: 27259
Total Tanks: 1
Region: STATE
Local Agency: 19000

AB163 **ELEC-TROL INC** **LOS ANGELES CO. HMS** **1000165981**
SE **26477 N GOLDEN VALLEY RD** **N/A**
> 1 **SANTA CLARITA, CA**
5999 ft.
Higher **Site 1 of 2 in cluster AB**

HMS:
Facility Id: 007711-I08142
Facility Type: I01
Permit Number: 00010962B
Permit Status: Closed
Facility Status: Closed
Area: 7A
Region: Los Angeles County:

AB164 **CHMIRS** **S100281071**
SE **26477 GOLDEN VALLEY RD** **HAZNET** **N/A**
> 1 **SANTA CLARITA, CA 91350**
5999 ft.
Higher **Site 2 of 2 in cluster AB**

HAZNET:
Gepaid: CAC001090240
Tepaid: CAD099452708
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: 2.5228
Category: Waste oil and mixed oil
Disposal Method: Recycler
Contact: J.L. SAINI
Telephone: (661) 250-9090
Mailing Address: 26477 GOLDEN VALLEY RD
SANTA CLARITA, CA 91350
County Los Angeles

CHMIRS:
OES Control Number: 9991811 DOT ID: Not reported
DOT Hazard Class: Not Reported
Chemical Name: HAIR GEL ALCOHOL
Extent of Release: Not reported
CAS Number: Not reported Quantity Released: 50
Environmental Contamination: Ground Property Use: Vacant Lot
Incident Date: 13-JUL-88 Date Completed: 13-JUL-88
Time Completed : Not reported
Physical State Stored : Not reported
Physical State Released : Not reported

(Continued) **S100281071**

Release Unit :	Gallons
Container Description :	Not reported
Container Type :	Not reported
Container Material :	Not reported
Level Of Container :	Not reported
Container Capacity :	50
Container Capacity Units (code) :	2
Extent Of Release (code) :	9
Agency Id Number :	Not reported
Agency Incident Number :	Not reported
OES Incident Number :	9991811
Time Notified :	Not reported
Surrounding Area :	Not reported
Estimated Temperature :	Not reported
Property Management :	Not reported
More Than Two Substances Involved? :	Not reported
Special Studies 1 :	Not reported
Special Studies 2 :	Not reported
Special Studies 3 :	Not reported
Special Studies 4 :	Not reported
Special Studies 5 :	Not reported
Special Studies 6 :	Not reported
Responding Agency Personel # Of Injuries :	Not reported
Responding Agency Personel # Of Fatalities :	Not reported
Resp Agncy Personel # Of Decontaminated :	Not reported
Others Number Of Decontaminated :	Not reported
Others Number Of Injuries :	Not reported
Others Number Of Fatalities :	Not reported
Vehicle Make/year :	Not reported
Vehicle License Number :	Not reported
Vehicle State :	Not reported
Vehicle Id Number :	Not reported
CA/DOT/PUC/ICC Number :	Not reported
Company Name :	Not reported
Reporting Officer Name/ID :	Not reported
Report Date :	Not reported
Comments :	Not reported
Facility Telephone Number :	Not reported

V165
ESE
> 1
6014 ft.
Higher

FORBES METAL STAMPING CO.
26555 GOLDEN VALLEY RD
SANTA CLARITA, CA

LOS ANGELES CO. HMS **S103945442**
N/A

Site 12 of 13 in cluster V

HMS:

Facility Id:	019984-028506		
Facility Type:	Not reported		
Permit Number:	Not reported	Permit Status:	Not reported
Facility Status:	OPEN	Area:	7A
Region:	Los Angeles County:		

AC166
East
> 1
6048 ft.
Higher

SCV AUTO SPECIALIST
26921 RUETHER UNIT A
SANTA CLARITA, CA 91351

HAZNET **S103648154**
N/A

Site 1 of 13 in cluster AC

SCV AUTO SPECIALIST (Continued) **S103648154**

HAZNET:

Gepaid:	CAL000077272
Tepaid:	CAT080013352
Gen County:	Los Angeles
Tsd County:	Los Angeles
Tons:	.2919
Category:	Unspecified aqueous solution
Disposal Method:	Not reported
Contact:	MOORSE JERRY
Telephone:	(000) 000-0000
Mailing Address:	20733 SOLEDAD CYN RD
	CANYON COUNTRY, CA 91357 - 6508
County	Los Angeles

Gepaid:	CAL000077272
Tepaid:	CAT080013352
Gen County:	Los Angeles
Tsd County:	Los Angeles
Tons:	1.4384
Category:	Unspecified aqueous solution
Disposal Method:	Recycler
Contact:	MOORSE JERRY
Telephone:	(000) 000-0000
Mailing Address:	20733 SOLEDAD CYN RD
	CANYON COUNTRY, CA 91357 - 6508
County	Los Angeles

Gepaid:	CAL000077272
Tepaid:	CAD099452708
Gen County:	Los Angeles
Tsd County:	Los Angeles
Tons:	.3753
Category:	Unspecified aqueous solution
Disposal Method:	Recycler
Contact:	MOORSE JERRY
Telephone:	(000) 000-0000
Mailing Address:	20733 SOLEDAD CYN RD
	CANYON COUNTRY, CA 91357 - 6508
County	Los Angeles

Gepaid:	CAL000077272
Tepaid:	CAT080013352
Gen County:	Los Angeles
Tsd County:	Los Angeles
Tons:	1.4177
Category:	Aqueous solution with 10% or more total organic residues
Disposal Method:	Recycler
Contact:	MOORSE JERRY
Telephone:	(000) 000-0000
Mailing Address:	20733 SOLEDAD CYN RD
	CANYON COUNTRY, CA 91357 - 6508
County	Los Angeles

SCV AUTO SPECIALIST (Continued) **S103648154**

Gepaid: CAL000077272
Tepaid: CAD099452708
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: 1.2510
Category: Unspecified aqueous solution
Disposal Method: Recycler
Contact: MOORSE JERRY
Telephone: (000) 000-0000
Mailing Address: 20733 SOLEDAD CYN RD
CANYON COUNTRY, CA 91357 - 6508
County Los Angeles

The CA HAZNET database contains 6 additional records for this site.
Please contact your EDR Account Executive for more information.

AD167 **VELS AUTOMOTIVE/ADVANCED AUTOMOTIVE** **HAZNET** **S104579344**
East **26831 RUETHER #K** **N/A**
> 1 **SANTA CLARITA, CA 91351**
6051 ft.
Higher **Site 1 of 5 in cluster AD**

HAZNET:
Gepaid: CAL000146206
Tepaid: CAT080013352
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: .4586
Category: Aqueous solution with 10% or more total organic residues
Disposal Method: Not reported
Contact: DAN VELS
Telephone: (000) 000-0000
Mailing Address: 26831 RUETHER #K
SANTA CLARITA, CA 91351
County Los Angeles

Gepaid: CAL000146206
Tepaid: CAT080013352
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: .6879
Category: Aqueous solution with 10% or more total organic residues
Disposal Method: Recycler
Contact: DAN VELS
Telephone: (000) 000-0000
Mailing Address: 26831 RUETHER #K
SANTA CLARITA, CA 91351
County Los Angeles

Gepaid: CAL000146206
Tepaid: CAT080013352
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: .2293
Category: Aqueous solution with 10% or more total organic residues
Disposal Method: Recycler
Contact: DAN VELS
Telephone: (000) 000-0000
Mailing Address: 26831 RUETHER #K

VELS AUTOMOTIVE/ADVANCED AUTOMOTIVE (Continued) **S104579344**

SANTA CLARITA, CA 91351
County: Los Angeles

Gepaid: CAL000146206
Tepaid: CAT080013352
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: 0.9172
Category: Aqueous solution with 10% or more total organic residues
Disposal Method: Recycler
Contact: DAN VELS
Telephone: (000) 000-0000
Mailing Address: 26831 RUETHER #K
SANTA CLARITA, CA 91351
County: Los Angeles

AD168 **SCORE INDUSTRIES** **LOS ANGELES CO. HMS** **S103945479**
East **26841 RUETHER AVE E** **N/A**
> 1 **SANTA CLARITA, CA**
6052 ft.
Higher **Site 2 of 5 in cluster AD**

HMS:
Facility Id: 020147-028708
Facility Type: Not reported
Permit Number: Not reported
Permit Status: Not reported
Facility Status: OPEN
Area: 7A
Region: Los Angeles County:

AC169 **SANTA CLARITA COLLISION CENTER** **HAZNET** **S100930816**
East **26867 RUETHER AVE** **N/A**
> 1 **CANYON COUNTRY, CA 91351**
6057 ft.
Higher **Site 2 of 13 in cluster AC**

HAZNET:
Gepaid: CAD981403462
Tepaid: CAD008302903
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: .7714
Category: Paint sludge
Disposal Method: Recycler
Contact: ALANE DUFRENE-PRES
Telephone: (805) 252-2277
Mailing Address: 26867 RUETHER AVE
CANYON COUNTRY, CA 91351 - 2414
County: Los Angeles

Gepaid: CAD981403462
Tepaid: CAD008302903
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: .4587
Category: Paint sludge
Disposal Method: Recycler
Contact: ALANE DUFRENE-PRES
Telephone: (805) 252-2277
Mailing Address: 26867 RUETHER AVE

SANTA CLARITA COLLISION CENTER (Continued) **S100930816**

CANYON COUNTRY, CA 91351 - 2414
County: Los Angeles

Gepaid: CAD981403462
Tepaid: CAD089446710
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: .2293
Category: Aqueous solution with 10% or more total organic residues
Disposal Method: Transfer Station
Contact: ALANE DUFRENE-PRES
Telephone: (805) 252-2277
Mailing Address: 26867 RUETHER AVE
CANYON COUNTRY, CA 91351 - 2414
County: Los Angeles

Gepaid: CAD981403462
Tepaid: CAD008252405
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: .3044
Category: Unspecified solvent mixture Waste
Disposal Method: Recycler
Contact: ALANE DUFRENE-PRES
Telephone: (805) 252-2277
Mailing Address: 26867 RUETHER AVE
CANYON COUNTRY, CA 91351 - 2414
County: Los Angeles

Gepaid: CAD981403462
Tepaid: CAD050806850
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: .1042
Category: Paint sludge
Disposal Method: Recycler
Contact: ALANE DUFRENE-PRES
Telephone: (805) 252-2277
Mailing Address: 26867 RUETHER AVE
CANYON COUNTRY, CA 91351 - 2414
County: Los Angeles

The CA HAZNET database contains 5 additional records for this site.
Please contact your EDR Account Executive for more information.

AC170 **PRIDE COLLISION CENTER** **LOS ANGELES CO. HMS** **S104827906**
East **26867 RUETHER AVE** **N/A**
> 1 **SANTA CLARITA, CA**
6057 ft.
Higher **Site 3 of 13 in cluster AC**

HMS:
Facility Id: 003354-035533
Facility Type: Not reported
Permit Number: Not reported
Permit Status: Not reported
Facility Status: OPEN
Area: 7A
Region: Los Angeles County:

AC171 **SANTA CLARITA COLLISION CENTER** **LOS ANGELES CO. HMS** **S105053534**
East **26867 RUETHER AVE** **N/A**
> 1 **SANTA CLARITA, CA**
6057 ft.
Higher **Site 4 of 13 in cluster AC**

HMS:

Facility Id:	003354-I03470		
Facility Type:	I05		
Permit Number:	000008019	Permit Status:	Suspended
Facility Status:	Permit	Area:	7A
Region:	Los Angeles County:		

AC172 **VIDAC** **LOS ANGELES CO. HMS** **S103945487**
East **26883 RUETHER AVE** **N/A**
> 1 **SANTA CLARITA, CA**
6062 ft.
Higher **Site 5 of 13 in cluster AC**

HMS:

Facility Id:	020155-028710		
Facility Type:	Not reported		
Permit Number:	Not reported	Permit Status:	Not reported
Facility Status:	OPEN	Area:	7A
Region:	Los Angeles County:		

AC173 **PETE'S AUTO REPAIR** **HAZNET** **S103945494**
East **26911 RUETHER AVE. #D** **LOS ANGELES CO. HMS** **N/A**
> 1 **SANTA CLARITA, CA 91351**
6070 ft.
Higher **Site 6 of 13 in cluster AC**

HAZNET:

Gepaid:	CAL000142996
Tepaid:	CAD982321879
Gen County:	Los Angeles
Tsd County:	Stanislaus
Tons:	0.0125
Category:	Photochemicals/photoprocessing waste
Disposal Method:	Not reported
Contact:	PETE GARCIA
Telephone:	(000) 000-0000
Mailing Address:	27385 CROSSGLADE AVE CANYON COUNTRY, CA 91351
County	Los Angeles

HMS:

Facility Id:	020167-028726		
Facility Type:	Not reported		
Permit Number:	Not reported	Permit Status:	Not reported
Facility Status:	OPEN	Area:	7A
Region:	Los Angeles County:		

AE174 **INDUSTRIAL ASPHALT CO** **LOS ANGELES CO. HMS** **U003059733**
ENE **20735 W SANTA CLARA ST** **N/A**
> 1 **SANTA CLARITA, CA**
6072 ft.
Higher **Site 1 of 12 in cluster AE**

HMS:

INDUSTRIAL ASPHALT CO (Continued) **U003059733**

Facility Id: 003454-I04283
Facility Type: I00
Permit Number: 000001926 Permit Status: Closed
Facility Status: Closed Area: 7A
Region: Los Angeles County:

AE175 **SO PACIFIC MILLING CO** **LOS ANGELES CO. HMS** **U003059732**
ENE **20735 W SANTA CLARA ST** **N/A**
> 1 **SANTA CLARITA, CA**
6072 ft.
Higher **Site 2 of 12 in cluster AE**

HMS:
Facility Id: 003454-I03573
Facility Type: I00
Permit Number: 000001664 Permit Status: Closed
Facility Status: Closed Area: 7A
Region: Los Angeles County:

V176 **VAL-AERO INDUSTRIES INC** **HAZNET** **S103945443**
ESE **26559 GOLDEN VALLEY RD** **LOS ANGELES CO. HMS** **N/A**
> 1 **SANTA CLARITA, CA 91350**
6072 ft.
Higher **Site 13 of 13 in cluster V**

HAZNET:
Gepaid: CAL000213068
Tepaid: CAT000613976
Gen County: Los Angeles
Tsd County: Orange
Tons: .0667
Category: Liquids with halogenated organic compounds > 1000 mg/l
Disposal Method: Transfer Station
Contact: VAL-AERO INDUSTRIES INC
Telephone: (000) 000-0000
Mailing Address: 26559 GOLDEN VALLEY RD
SANTA CLARITA, CA 91350
County Los Angeles

HMS:
Facility Id: 019985-028507
Facility Type: Not reported
Permit Number: Not reported Permit Status: Not reported
Facility Status: OPEN Area: 7A
Region: Los Angeles County:

AC177 **MOFIELD PRODUCTIONS** **LOS ANGELES CO. HMS** **S103945492**
East **26911 RUETHER AVE E** **N/A**
> 1 **SANTA CLARITA, CA**
6074 ft.
Higher **Site 7 of 13 in cluster AC**

HMS:
Facility Id: 020160-028724
Facility Type: Not reported
Permit Number: Not reported Permit Status: Not reported
Facility Status: OPEN Area: 7A
Region: Los Angeles County:

AC178
East
> 1
6074 ft.
Higher

SANTA CLARITA VALLEY TOYOTA SPECALISTS
26911 RUETHER AVE
CANYON COUNTRY, CA 91351

Site 8 of 13 in cluster AC

HAZNET

S102817022
N/A

HAZNET:

Gepaid:	CAL000092195
Tepaid:	CAL000113451
Gen County:	Los Angeles
Tsd County:	Los Angeles
Tons:	1.4386
Category:	Unspecified organic liquid mixture
Disposal Method:	Transfer Station
Contact:	KEVIN FERGUSON
Telephone:	(805) 251-2091
Mailing Address:	26911 RUETHER AVE STE A CANYON COUNTRY, CA 91351 - 6520
County	Los Angeles

Gepaid:	CAL000092195
Tepaid:	CAD099452708
Gen County:	Los Angeles
Tsd County:	Los Angeles
Tons:	1.6680
Category:	Unspecified aqueous solution
Disposal Method:	Recycler
Contact:	KEVIN FERGUSON
Telephone:	(805) 251-2091
Mailing Address:	26911 RUETHER AVE STE A CANYON COUNTRY, CA 91351 - 6520
County	Los Angeles

Gepaid:	CAL000092195
Tepaid:	CAL000113451
Gen County:	Los Angeles
Tsd County:	Los Angeles
Tons:	1.6680
Category:	Unspecified organic liquid mixture
Disposal Method:	Transfer Station
Contact:	KEVIN FERGUSON
Telephone:	(805) 251-2091
Mailing Address:	26911 RUETHER AVE STE A CANYON COUNTRY, CA 91351 - 6520
County	Los Angeles

Gepaid:	CAL000092195
Tepaid:	CAD099452708
Gen County:	Los Angeles
Tsd County:	Los Angeles
Tons:	1.0425
Category:	Unspecified aqueous solution
Disposal Method:	Recycler
Contact:	KEVIN FERGUSON
Telephone:	(805) 251-2091
Mailing Address:	26911 RUETHER AVE STE A CANYON COUNTRY, CA 91351 - 6520
County	Los Angeles

SANTA CLARITA VALLEY TOYOTA SPECALISTS (Continued) — **S102817022**

Gepaid: CAL000092195
Tepaid: CAL000113451
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: .7713
Category: Unspecified organic liquid mixture
Disposal Method: Transfer Station
Contact: KEVIN FERGUSON
Telephone: (805) 251-2091
Mailing Address: 26911 RUETHER AVE STE A
CANYON COUNTRY, CA 91351 - 6520
County: Los Angeles

AF179 | **NW** | **> 1** | **6077 ft.** | **Lower**

MJW INVESTMENT — **CA SLIC** — **S104404953**
26830 SECO CANYON ROAD — **N/A**
SANTA CLARITA, CA 91354

Site 1 of 9 in cluster AF

SLIC Region 4:
Facility Status: Closure
Region: 4
SLIC: 0849
Staff: PR
Substance: VOCs
Cross Street: Not reported

AF180 | **NW** | **> 1** | **6077 ft.** | **Lower**

SANTA CLARITA PLACE/1 HR. CLNR — **LA Co. Site Mitigation** — **S103697106**
26830 SECO CANYON RD — **N/A**
SCV, CA 91350

Site 2 of 9 in cluster AF

Site Mitigation Log:
Case Number: 98S447
Abatement Date: 03/31/99
Thomas Guide Page Numbers: 4550J1

AC181 | **East** | **> 1** | **6080 ft.** | **Higher**

POINT AUTO SERVICE — **HAZNET** — **S103982144**
26921 RUETHER AVE #A — **N/A**
CANYON COUNTRY, CA 91351

Site 9 of 13 in cluster AC

HAZNET:
Gepaid: CAL000147770
Tepaid: CAD099452708
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: .2710
Category: Unspecified aqueous solution
Disposal Method: Recycler
Contact: SEHMI SAMMY
Telephone: (000) 000-0000
Mailing Address: 26921 RUETHER AVE #A
CANYON COUNTRY, CA 91351
County: Los Angeles

POINT AUTO SERVICE (Continued) **S103982144**

Gepaid:	CAL000147770
Tepaid:	CAD099452708
Gen County:	Los Angeles
Tsd County:	Los Angeles
Tons:	.2293
Category:	Unspecified aqueous solution
Disposal Method:	Recycler
Contact:	SEHMI SAMMY
Telephone:	(000) 000-0000
Mailing Address:	26921 RUETHER AVE #A
	CANYON COUNTRY, CA 91351
County	Los Angeles

Gepaid:	CAL000147770
Tepaid:	CAD099452708
Gen County:	Los Angeles
Tsd County:	Los Angeles
Tons:	0.2293
Category:	Unspecified aqueous solution
Disposal Method:	Recycler
Contact:	SEHMI SAMMY
Telephone:	(000) 000-0000
Mailing Address:	26921 RUETHER AVE #A
	CANYON COUNTRY, CA 91351
County	Los Angeles

AC182 **JERRYS TOWING SERVICE INC** **HAZNET** **S105090167**
East **26921-B RUETHER AVE** **N/A**
> 1 **SANTA CLARITA, CA 91351**
6080 ft.
Higher **Site 10 of 13 in cluster AC**

HAZNET:

Gepaid:	CAL000125880
Tepaid:	CAD028409019
Gen County:	Los Angeles
Tsd County:	Los Angeles
Tons:	.2000
Category:	Other organic solids
Disposal Method:	Transfer Station
Contact:	JERRY MORSE
Telephone:	(805) 252-8869
Mailing Address:	26921 RUETHER AVE STE B
	CANYON COUNTRY, CA 91351 - 6509
County	Los Angeles

AC183 **PREMIER PRINTING COMPANY** **HAZNET** **S104583456**
East **26951 RUETHER AVE STE G** **N/A**
> 1 **SANTA CLARITA, CA 91351**
6087 ft.
Higher **Site 11 of 13 in cluster AC**

PREMIER PRINTING COMPANY (Continued) **S104583456**

HAZNET:

Gepaid:	CAL912343463
Tepaid:	CAD108040858
Gen County:	Los Angeles
Tsd County:	Los Angeles
Tons:	.0750
Category:	Photochemicals/photoprocessing waste
Disposal Method:	Not reported
Contact:	KIRK PEELER
Telephone:	(661) 251-7913
Mailing Address:	26951 RUETHER AVE STE G
	SANTA CLARITA, CA 91351
County	Los Angeles

Gepaid:	CAL912343463
Tepaid:	CAD108040858
Gen County:	Los Angeles
Tsd County:	Los Angeles
Tons:	.1876
Category:	Photochemicals/photoprocessing waste
Disposal Method:	Recycler
Contact:	KIRK PEELER
Telephone:	(661) 251-7913
Mailing Address:	26951 RUETHER AVE STE G
	SANTA CLARITA, CA 91351
County	Los Angeles

Gepaid:	CAL912343463
Tepaid:	CAD000088252
Gen County:	Los Angeles
Tsd County:	Los Angeles
Tons:	.0825
Category:	Unspecified solvent mixture Waste
Disposal Method:	Transfer Station
Contact:	KIRK PEELER
Telephone:	(661) 251-7913
Mailing Address:	26951 RUETHER AVE STE G
	SANTA CLARITA, CA 91351
County	Los Angeles

Gepaid:	CAL912343463
Tepaid:	CAD108040858
Gen County:	Los Angeles
Tsd County:	Los Angeles
Tons:	.0792
Category:	Photochemicals/photoprocessing waste
Disposal Method:	Recycler
Contact:	KIRK PEELER
Telephone:	(661) 251-7913
Mailing Address:	26951 RUETHER AVE STE G
	SANTA CLARITA, CA 91351
County	Los Angeles

PREMIER PRINTING COMPANY (Continued) **S104583456**

Gepaid: CAL912343463
Tepaid: CAD108040858
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: .1751
Category: Photochemicals/photoprocessing waste
Disposal Method: Recycler
Contact: KIRK PEELER
Telephone: (661) 251-7913
Mailing Address: 26951 RUETHER AVE STE G
SANTA CLARITA, CA 91351
County Los Angeles

The CA HAZNET database contains 1 additional record for this site.
Please contact your EDR Account Executive for more information.

AD184 **RUSSELL DUNN AUTOMOTIVE** **RCRIS-SQG 1000596839**
East **26821 RUETHER UNIT G** **FINDS CAD983608225**
> 1 **CANYON COUNTRY, CA 91351**
6089 ft.
Higher **Site 3 of 5 in cluster AD**

RCRIS:
Owner: P AND E PROPERTIES
EPA ID: CAD983608225

Contact: RUSSELL DUNN
(805) 252-8646

Classification: Small Quantity Generator
Used Oil Recyc: No
TSDF Activities: Not reported

Violation Status: No violations found

FINDS:
Other Pertinent Environmental Activity Identified at Site:
Facility Registry System (FRS)
Resource Conservation and Recovery Act Information system (RCRAINFO)

AF185 **LA CO FD FIRE STA #111** **LOS ANGELES CO. HMS** **S102064468**
NW **26829 N SECO CANYON RD** **N/A**
> 1 **SANTA CLARITA, CA**
6101 ft.
Lower **Site 3 of 9 in cluster AF**

HMS:
Facility Id: 012424-012555
Facility Type: T0
Permit Number: 00004311T
Permit Status: Removed
Facility Status: Removed
Area: 7A
Region: Los Angeles County:

AF186 **LA CO FIRE STATION #111** **Cortese** **S105027183**
NW **26829 SECO CANYON RD** **N/A**
> 1 **SANTA CLARITA, CA 91350**
6101 ft.
Lower **Site 4 of 9 in cluster AF**

LA CO FIRE STATION #111 (Continued) **S105027183**

CORTESE:
Reg Id: R-12555
Region: CORTESE
Reg By: Leaking Underground Storage Tanks

AF187 **LA CO FIRE STATION #111** **LUST** **S103065926**
NW **26829 SECO CANYON RD** **N/A**
> 1 **VALENCIA, CA 91350**
6101 ft.
Lower **Site 5 of 9 in cluster AF**

State LUST:

Cross Street:	BOUQUET CANYON RD		
Qty Leaked:	Not reported		
Case Number	R-12555		
Reg Board:	4		
Chemical:	Gasoline		
Lead Agency:	Regional Board		
Local Agency :	19000		
Case Type:	Soil only		
Status:	Not reported		
County:	Los Angeles		
Abate Method:	Other Means		
Review Date:	1/23/97	Confirm Leak:	1/23/97
Workplan:	8/8/01	Prelim Assess:	8/8/01
Pollution Char:	Not reported	Remed Plan:	Not reported
Remed Action:	Not reported	Monitoring:	Not reported
Close Date:	Not reported		
Release Date:	Not reported		
Cleanup Fund Id :	Not reported		
Discover Date :	12/3/96		
Enforcement Dt :	Not reported		
Enf Type:	Not reported		
Enter Date :	3/31/97		
Funding:	Not reported		
Staff Initials:	Not reported		
How Discovered:	Tank Closure		
How Stopped:	Close Tank		
Interim :	Not reported		
Leak Cause:	Not reported		
Leak Source:	Piping		
MTBE Date :	4/2/01		
Max MTBE GW :	Not reported		
MTBE Tested:	MTBE Detected. Site tested for MTBE & MTBE detected		
Priority:	Not reported		
Local Case # :	Not reported		
Beneficial:	Not reported		
Staff :	JLC		
GW Qualifies :	Not reported		
Max MTBE Soil :	Not reported		
Soil Qualifies :	=		
Hydr Basin #:	Not reported		
Operator :	Not reported		
Oversight Prgm:	RB Lead Underground Storage Tank		
Oversight Prgm :	UST		
Review Date :	9/7/01		
Stop Date :	Not reported		
Work Suspended :	Not reported		

LA CO FIRE STATION #111 (Continued) **S103065926**

Responsible PartyDOUG MEYERS
RP Address: 1320 N. EASTERN AVE.
Global Id: T0603705147
Org Name: Not reported
Contact Person: Not reported
MTBE Conc: 1
Mtbe Fuel: Not reported
Water System Name: SANTA CLARITA WATER CO
Well Name: METHODIST
Distance To Lust: 764.2367395
Waste Discharge Global ID: Not reported
Waste Disch Assigned Name: Not reported

AF188
NW
> 1
6101 ft.
Lower

LA CO FIRE STATION #111 **LUST** **S104916234**
26829 SECO CANYON RD **N/A**
SANTA CLARITA, CA 91350

Site 6 of 9 in cluster AF

LUST Region 4:
Report Date: 1/23/1997
Lead Agency: Regional Board
Local Agency: 19000
Case Number: R-12555
Substance: Gasoline
Case Type: Soil
Status: Leak being confirmed
Region: 4
Staff: Not reported

AC189
East
> 1
6103 ft.
Higher

ANDY GUMP INC **HAZNET** **S103648174**
26954 RUETHER AVENUE **LOS ANGELES CO. HMS** **N/A**
CANYON COUNTRY, CA 91351

Site 12 of 13 in cluster AC

HAZNET:
Gepaid: CAL000026603
Tepaid: CAL000113451
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: .2085
Category: Unspecified organic liquid mixture
Disposal Method: Transfer Station
Contact: ANDY GUMP INC
Telephone: (000) 000-0000
Mailing Address: 26954 RUETHER AVE
CANYON COUNTRY, CA 91351
County Los Angeles

ANDY GUMP INC (Continued) **S103648174**

Gepaid: CAL000026603
Tepaid: CAL000113451
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: .2085
Category: Unspecified organic liquid mixture
Disposal Method: Transfer Station
Contact: ANDY GUMP INC
Telephone: (000) 000-0000
Mailing Address: 26954 RUETHER AVE
CANYON COUNTRY, CA 91351
County Los Angeles

Gepaid: CAL000026603
Tepaid: CAT080013352
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: .2293
Category: Aqueous solution with 10% or more total organic residues
Disposal Method: Recycler
Contact: ANDY GUMP INC
Telephone: (000) 000-0000
Mailing Address: 26954 RUETHER AVE
CANYON COUNTRY, CA 91351
County Los Angeles

HMS:
Facility Id: 008047-I08549
Facility Type: I05
Permit Number: 00010528C Permit Status: Permit
Facility Status: Permit Area: 7A
Region: Los Angeles County:

AF190 **SECO ONE HOUR MARTINIZING** **RCRIS-SQG 1000326388**
NW **26830 SECO CYN RD** **FINDS CAD981638729**
> 1 **SAUGUS, CA 91350** **HAZNET**
6113 ft.
Lower **Site 7 of 9 in cluster AF**

RCRIS:
Owner: TEAM ENTERPRISES
(415) 555-1212
EPA ID: CAD981638729

Contact: NANCY HINDENBURG
(209) 224-7705

Classification: Small Quantity Generator
Used Oil Recyc: No
TSDF Activities: Not reported

Violation Status: No violations found

SECO ONE HOUR MARTINIZING (Continued) **1000326388**

FINDS:
Other Pertinent Environmental Activity Identified at Site:
Facility Registry System (FRS)
Resource Conservation and Recovery Act Information system (RCRAINFO)

HAZNET:

Gepaid:	CAD981638729
Tepaid:	CAT000613893
Gen County:	Los Angeles
Tsd County:	Los Angeles
Tons:	.1400
Category:	Liquids with halogenated organic compounds > 1000 mg/l
Disposal Method:	Transfer Station
Contact:	Not reported
Telephone:	(000) 000-0000
Mailing Address:	750 N VALINETINE FRESNO, CA 93706
County	Los Angeles

AF191 **ONE HOUR MARTINIZING** **HAZNET** **S103648098**
NW **26830 SECO CYN RD** **CLEANERS** **N/A**
> 1 **SAUGUS, CA 93150**
6113 ft.
Lower **Site 8 of 9 in cluster AF**

CA Cleaners:

Create Date:	07/03/1987
Inactive Date:	0
EPA Id:	CAD981637499
County :	Los Angeles

HAZNET:

Gepaid:	CAD981637499
Tepaid:	CAT000613893
Gen County:	Los Angeles
Tsd County:	Los Angeles
Tons:	.2100
Category:	Liquids with halogenated organic compounds > 1000 mg/l
Disposal Method:	Transfer Station
Contact:	HEUNG KYU JANG OWNER
Telephone:	(000) 000-0000
Mailing Address:	26830 SECO CANYON RD SANTA CLARITA, CA 91350 - 2216
County	Los Angeles

Gepaid:	CAD981637499
Tepaid:	CAT000613992
Gen County:	Los Angeles
Tsd County:	Los Angeles
Tons:	.2100
Category:	Liquids with halogenated organic compounds > 1000 mg/l
Disposal Method:	Transfer Station
Contact:	HEUNG KYU JANG OWNER
Telephone:	(000) 000-0000
Mailing Address:	26830 SECO CANYON RD SANTA CLARITA, CA 91350 - 2216
County	Los Angeles

ONE HOUR MARTINIZING (Continued) **S103648098**

Gepaid: CAD981637499
Tepaid: CAT000613992
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: .0700
Category: Liquids with halogenated organic compounds > 1000 mg/l
Disposal Method: Not reported
Contact: HEUNG KYU JANG OWNER
Telephone: (000) 000-0000
Mailing Address: 26830 SECO CANYON RD
SANTA CLARITA, CA 91350 - 2216
County Los Angeles

Gepaid: CAD981637499
Tepaid: CAT000613893
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: .4500
Category: Liquids with halogenated organic compounds > 1000 mg/l
Disposal Method: Transfer Station
Contact: HEUNG KYU JANG OWNER
Telephone: (000) 000-0000
Mailing Address: 26830 SECO CANYON RD
SANTA CLARITA, CA 91350 - 2216
County Los Angeles

Gepaid: CAD981637499
Tepaid: CAT000613893
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: 0.4875
Category: Liquids with halogenated organic compounds > 1000 mg/l
Disposal Method: Transfer Station
Contact: HEUNG KYU JANG OWNER
Telephone: (000) 000-0000
Mailing Address: 26830 SECO CANYON RD
SANTA CLARITA, CA 91350 - 2216
County Los Angeles

The CA HAZNET database contains 8 additional records for this site.
Please contact your EDR Account Executive for more information.

AF192 **TEAM ENTERPRISES INC** **RCRIS-SQG** **1000118275**
NW **26830 SECO CYN RD** **CAD981637499**
> 1 **SAUGUS, CA 91350**
6113 ft.
Lower **Site 9 of 9 in cluster AF**

TEAM ENTERPRISES INC (Continued) **1000118275**

RCRIS:
Owner: TOM JONES
(209) 555-1212
EPA ID: CAD981637499
Contact: NANCY HINDENBURG
(209) 224-7705
Classification: Small Quantity Generator
Used Oil Recyc: No
TSDF Activities: Not reported
Violation Status: No violations found

AE193 **POINTS WEST TRUCKING,INC.** **LOS ANGELES CO. HMS** **S104160053**
ENE **20727 SANTA CLARA ST** **N/A**
> 1 **SANTA CLARITA, CA**
6123 ft.
Higher **Site 3 of 12 in cluster AE**

HMS:
Facility Id: 011261-011280
Facility Type: T0
Permit Number: 00002813T
Permit Status: Permit
Facility Status: Permit
Area: 7A
Region: Los Angeles County:

AE194 **POINTS WEST TRUCKING,INC.** **UST** **U003776847**
ENE **20727 SANTA CLARA ST** **N/A**
> 1 **CANYON COUNTRY, CA 91351**
6123 ft.
Higher **Site 4 of 12 in cluster AE**

State UST:
Facility ID: 11280
Total Tanks: 1
Region: STATE
Local Agency: 19000

AE195 **POINTS WEST** **RCRIS-SQG** **1000595470**
ENE **20727 SANTA CLARA ST** **FINDS** **CAD983594078**
> 1 **CANYON COUNTRY, CA 91351** **CA FID UST**
6123 ft. **HAZNET**
Higher **Site 5 of 12 in cluster AE**

POINTS WEST (Continued) **1000595470**

RCRIS:
Owner: POINTS WEST TRUCKING INC
(415) 555-1212
EPA ID: CAD983594078
Contact: JIMMIE BARTLETT
(805) 252-3306
Classification: Small Quantity Generator
Used Oil Recyc: No
TSDF Activities: Not reported

Violation Status: No violations found

FINDS:
Other Pertinent Environmental Activity Identified at Site:
Facility Registry System (FRS)
Resource Conservation and Recovery Act Information system (RCRAINFO)

HAZNET:
Gepaid: CAC001088992
Tepaid: CAT080013352
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: 2.7105
Category: Waste oil and mixed oil
Disposal Method: Recycler
Contact: ZOLTAN BERECZ/PRESIDENT
Telephone: (800) 342-3602
Mailing Address: 20727 SANTA CLARA ST
CANYON COUNTRY, CA 91351 - 2424
County Los Angeles

FID:

Facility ID:	19034716	Regulate ID:	00006603
Reg By:	Active Underground Storage Tank Location		
Cortese Code:	Not reported	SIC Code:	Not reported
Status:	Active	Facility Tel:	(818) 000-0000
Mail To:	Not reported 20727 SANTA CLARA ST SANTA CLARITA, CA		
Contact:	Not reported	Contact Tel:	Not reported
DUNs No:	Not reported	NPDES No:	Not reported
Creation:	10/22/93	Modified:	00/00/00
EPA ID:	Not reported		
Comments:	Not reported		

AE196 **POINTS WEST TRUCKING, INC.** **HIST UST** **U001567752**
ENE **20727 SANTA CLARA ST** **N/A**
> 1 **CANYON COUNTRY, CA 91351**
6123 ft.
Higher **Site 6 of 12 in cluster AE**

UST HIST:

Facility ID:	6603		
Tank Num:	1	Container Num:	1
Tank Capacity:	10000	Year Installed:	Not reported
Tank Used for:	PRODUCT		
Type of Fuel:	DIESEL	Tank Construction:	Not reported
Leak Detection:	Stock Inventor		

POINTS WEST TRUCKING, INC. (Continued) **U001567752**

Contact Name:	ZOLTAN BERECZ	Telephone:	(805) 252-3306
Total Tanks:	1	Region:	STATE
Facility Type:	2	Other Type:	TRUCKING COMPANY

AC197 **SOUTHWEST INDUSTRIES** **RCRIS-SQG 1000594650**
East **26911 RUETHER AVE STE S** **FINDS CAD983585027**
> 1 **SANTA CLARITA, CA 91351**
6131 ft.
Higher **Site 13 of 13 in cluster AC**

RCRIS:
Owner: LABELLA RICHARD AND WOODWARD
(805) 251-5451
EPA ID: CAD983585027
Contact: RICHARD LABELLA
(805) 251-5451
Classification: Small Quantity Generator
Used Oil Recyc: No
TSDF Activities: Not reported
Violation Status: No violations found

FINDS:
Other Pertinent Environmental Activity Identified at Site:
Facility Registry System (FRS)
Resource Conservation and Recovery Act Information system (RCRAINFO)

AG198 **WAREHOUSE** **HIST UST U001567734**
East **21030 GOLDEN TRIANGLE RD** **N/A**
> 1 **SAUGUS, CA 91350**
6146 ft.
Higher **Site 1 of 6 in cluster AG**

UST HIST:

Facility ID:	7943		
Tank Num:	1	Container Num:	2
Tank Capacity:	500	Year Installed:	1975
Tank Used for:	PRODUCT		
Type of Fuel:	DIESEL	Tank Construction:	Not reported
Leak Detection:	Pressure Test		
Contact Name:	ROBERT MCDOUGASL	Telephone:	(805) 259-2737
Total Tanks:	4	Region:	STATE
Facility Type:	2	Other Type:	WAREHOUSE
Facility ID:	7943		
Tank Num:	2	Container Num:	3
Tank Capacity:	4000	Year Installed:	1975
Tank Used for:	PRODUCT		
Type of Fuel:	UNLEADED	Tank Construction:	Not reported
Leak Detection:	Pressure Test		
Contact Name:	ROBERT MCDOUGASL	Telephone:	(805) 259-2737
Total Tanks:	4	Region:	STATE
Facility Type:	2	Other Type:	WAREHOUSE
Facility ID:	7943		
Tank Num:	3	Container Num:	4
Tank Capacity:	4000	Year Installed:	1975

WAREHOUSE (Continued) **U001567734**

Tank Used for:	PRODUCT		
Type of Fuel:	UNLEADED	Tank Construction:	Not reported
Leak Detection:	Pressure Test		
Contact Name:	ROBERT MCDOUGASL	Telephone:	(805) 259-2737
Total Tanks:	4	Region:	STATE
Facility Type:	2	Other Type:	WAREHOUSE
Facility ID:	7943		
Tank Num:	4	Container Num:	1
Tank Capacity:	4000	Year Installed:	1975
Tank Used for:	PRODUCT		
Type of Fuel:	UNLEADED	Tank Construction:	Not reported
Leak Detection:	Pressure Test		
Contact Name:	ROBERT MCDOUGASL	Telephone:	(805) 259-2737
Total Tanks:	4	Region:	STATE
Facility Type:	2	Other Type:	WAREHOUSE

199
SE
> 1
6170 ft.
Higher

JOHN PAUL MICHAEL SYSTEMS **LOS ANGELES CO. HMS** **U003064004**
26455 GOLDEN VALLEY RD **N/A**
SANTA CLARITA, CA

HMS:

Facility Id:	008329-I08889		
Facility Type:	I09		
Permit Number:	000010161	Permit Status:	Permit
Facility Status:	Permit	Area:	7A
Region:	Los Angeles County:		

200
West
> 1
6198 ft.
Lower

UNOCAL **LUST** **1001264000**
502 BEAUMONT AVE **LOS ANGELES CO. HMS** **N/A**
BEAUMONT, CA

LUST Region RV:

Facility ID:	891082
Region :	RIVERSIDE
Status:	Case Closed
Site Closed:	Yes
Case Type:	Soil only

HMS:

Facility Id:	020328-028928		
Facility Type:	Not reported		
Permit Number:	Not reported	Permit Status:	Not reported
Facility Status:	OPEN	Area:	7A
Region:	Los Angeles County:		

AE201
ENE
> 1
6210 ft.
Higher

NATIONAL READY MIXED CONCRETE **CA FID UST** **S101618509**
27050 RUETHER AVE **N/A**
SANTA CLARITA, CA

Site 7 of 12 in cluster AE

AE202 **NATIONAL READY MIXED CONCRETE** **HIST UST** **U001567712**
ENE **27050 RUETHER AVE** **N/A**
> 1 **CANYON COUNTRY, CA 91350**
6210 ft.
Higher **Site 8 of 12 in cluster AE**

UST HIST:

Facility ID:	16974		
Tank Num:	1	Container Num:	1
Tank Capacity:	6500	Year Installed:	Not reported
Tank Used for:	PRODUCT		
Type of Fuel:	DIESEL	Tank Construction:	Not reported
Leak Detection:	Stock Inventor		
Contact Name:	CHARLES J KENNEDY,GEN MGR	Telephone:	(805) 252-8181
Total Tanks:	3	Region:	STATE
Facility Type:	2	Other Type:	READY MIX CONCRETE

Facility ID:	16974		
Tank Num:	2	Container Num:	2
Tank Capacity:	7500	Year Installed:	Not reported
Tank Used for:	PRODUCT		
Type of Fuel:	UNLEADED	Tank Construction:	Not reported
Leak Detection:	Stock Inventor		
Contact Name:	CHARLES J KENNEDY,GEN MGR	Telephone:	(805) 252-8181
Total Tanks:	3	Region:	STATE
Facility Type:	2	Other Type:	READY MIX CONCRETE

Facility ID:	16974		
Tank Num:	3	Container Num:	3
Tank Capacity:	1000	Year Installed:	Not reported
Tank Used for:	PRODUCT		
Type of Fuel:	UNLEADED	Tank Construction:	Not reported
Leak Detection:	Stock Inventor		
Contact Name:	CHARLES J KENNEDY,GEN MGR	Telephone:	(805) 252-8181
Total Tanks:	3	Region:	STATE
Facility Type:	2	Other Type:	READY MIX CONCRETE

AE203 **NATIONAL READY MIX** **FINDS** **1005265484**
ENE **27050 RUETHER AVE** **000011031464**
> 1 **SANTA CLARITA, CA 91351**
6210 ft.
Higher **Site 9 of 12 in cluster AE**

FINDS:
Other Pertinent Environmental Activity Identified at Site:
Facility Registry System (FRS)

AE204 **NATIONAL READY MIXED CONCRETE** **LUST** **S104160049**
ENE **27050 RUETHER AVE** **HAZNET** **N/A**
> 1 **SANTA CLARITA, CA 91380** **Cortese**
6210 ft. **LOS ANGELES CO. HMS**
Higher **Site 10 of 12 in cluster AE**

State LUST:

Cross Street:	SANTA CLARA
Qty Leaked:	Not reported
Case Number	R-05519
Reg Board:	4
Chemical:	Gasoline
Lead Agency:	Regional Board

NATIONAL READY MIXED CONCRETE (Continued) **S104160049**

Local Agency : 19000
Case Type: Soil only
Status: Not reported
County: Los Angeles
Abate Method: Excavate and Dispose - remove contaminated soil and dispose in approved site
Review Date: 6/19/96 Confirm Leak: 6/19/96
Workplan: 10/2/96 Prelim Assess: 10/2/96
Pollution Char: Not reported Remed Plan: Not reported
Remed Action: Not reported Monitoring: Not reported
Close Date: 6/26/97
Release Date: Not reported
Cleanup Fund Id : Not reported
Discover Date : 6/19/96
Enforcement Dt : Not reported
Enf Type: Not reported
Enter Date : 3/28/97
Funding: Not reported
Staff Initials: Not reported
How Discovered: Tank Closure
How Stopped: Close Tank
Interim : Yes
Leak Cause: Unknown
Leak Source: Piping
MTBE Date : Not reported
Max MTBE GW : Not reported
MTBE Tested: Site NOT Tested for MTBE.Includes Unknown and Not Analyzed.
Priority: Not reported
Local Case # : Not reported
Beneficial: Not reported
Staff : JLC
GW Qualifies : Not reported
Max MTBE Soil : Not reported
Soil Qualifies : Not reported
Hydr Basin #: Not reported
Operator : Not reported
Oversight Prgm: RB Lead Underground Storage Tank
Oversight Prgm : UST
Review Date : 6/6/97
Stop Date : Not reported
Work Suspended : Not reported
Responsible Party NATIONAL READY MIXED
RP Address: 27050 RUETHER AVE., SANTA CLARITA CA 91380
Global Id: T0603704681
Org Name: Not reported
Contact Person: Not reported
MTBE Conc: 0
Mtbe Fuel: Not reported
Water System Name: Not reported
Well Name: Not reported
Distance To Lust: 677.7441396
Waste Discharge Global ID: Not reported
Waste Disch Assigned Name: Not reported

LUST Region 4:
Report Date: 9/25/1996
Lead Agency: Regional Board
Local Agency: 19000

NATIONAL READY MIXED CONCRETE (Continued) **S104160049**

Case Number: R-05519
Substance: Gasoline
Case Type: Soil
Status: Case Closed
Region: 4
Staff: Not reported

HAZNET:
Gepaid: CAC000937432
Tepaid: CAD008252405
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: .3000
Category: Off-specification, aged, or surplus organics
Disposal Method: Recycler
Contact: Not reported
Telephone: (000) 000-0000
Mailing Address: P. O. BOX 800026
SANTA CLARITA, CA 91380
County Los Angeles

Gepaid: CAR000079327
Tepaid: CAT000613893
Gen County: 0
Tsd County: Los Angeles
Tons: .4170
Category: Aqueous solution with less than 10% total organic residues
Disposal Method: Transfer Station
Contact: Not reported
Telephone: (000) 000-0000
Mailing Address: 27050 RUETHER AVE
SANTA CLARITA, CA 91351
County 0

Gepaid: CAC001187696
Tepaid: CAT080013352
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: 1.0633
Category: Aqueous solution with less than 10% total organic residues
Disposal Method: Recycler
Contact: A C WARNACK
Telephone: (000) 000-0000
Mailing Address: P O BOX 800026
SANTA CLARITA, CA 91380
County Los Angeles

Gepaid: CAC001187696
Tepaid: CAT080013352
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: 1.6680
Category: Waste oil and mixed oil
Disposal Method: Recycler
Contact: A C WARNACK
Telephone: (000) 000-0000
Mailing Address: P O BOX 800026
SANTA CLARITA, CA 91380
County Los Angeles

NATIONAL READY MIXED CONCRETE (Continued) **S104160049**

CORTESE:
Reg Id: R-05519
Region: CORTESE
Reg By: Leaking Underground Storage Tanks

HMS:
Facility Id: 005319-024283
Facility Type: Not reported
Permit Number: Not reported — Permit Status: Not reported
Facility Status: OPEN — Area: 7A
Region: Los Angeles County:

Facility Id: 005319-I05519
Facility Type: I05
Permit Number: 000008421 — Permit Status: Permit
Facility Status: Permit — Area: 7A
Region: Los Angeles County:

Facility Id: 009050-005519
Facility Type: T0
Permit Number: 00000292T — Permit Status: Closed
Facility Status: Closed — Area: 7A
Region: Los Angeles County:

AE205 **NATIONAL READY MIX CONCRETE CO** **HIST UST** **U001567711**
ENE **27050 RUETHER AVE** **N/A**
> 1 **CANYON COUNTRY, CA 91350**
6210 ft.
Higher **Site 11 of 12 in cluster AE**

UST HIST:
Facility ID: 63436
Tank Num: 1 — Container Num: 4
Tank Capacity: 2800 — Year Installed: 1982
Tank Used for: WASTE
Type of Fuel: Not Reported — Tank Construction: 8 inches
Leak Detection: None
Contact Name: CHARLES J. KENNEDY, GEN. MGR. — Telephone: (805) 252-8181
Total Tanks: 2 — Region: STATE
Facility Type: 2 — Other Type: READY MIX CONCRETE

Facility ID: 63436
Tank Num: 2 — Container Num: 5
Tank Capacity: 0 — Year Installed: 1982
Tank Used for: WASTE
Type of Fuel: Not Reported — Tank Construction: Not reported
Leak Detection: None
Contact Name: CHARLES J. KENNEDY, GEN. MGR. — Telephone: (805) 252-8181
Total Tanks: 2 — Region: STATE
Facility Type: 2 — Other Type: READY MIX CONCRETE

AE206 **NATIONAL READY MIX** **RCRIS-SQG** **1004675967**
ENE **27050 RUETHER AVE** **CAR000079327**
> 1 **SANTA CLARITA, CA 91351**
6210 ft.
Higher **Site 12 of 12 in cluster AE**

NATIONAL READY MIX (Continued) **1004675967**

RCRIS:
Owner: NATIONAL READY MIX
(661) 252-8181
EPA ID: CAR000079327
Contact: ENVIRONMENTAL MANAGER
Classification: Small Quantity Generator
Used Oil Recyc: No
TSDF Activities: Not reported
Violation Status: No violations found

AH207 **DR BORIS ZAK'S DENTAL OFFICE** **LOS ANGELES CO. HMS** **S102321790**
WNW **26324 N BOUQUET CANYON RD** **N/A**
> 1 **SANTA CLARITA, CA**
6223 ft.
Lower **Site 1 of 3 in cluster AH**

HMS:
Facility Id: 017507-023852
Facility Type: I01
Permit Number: 000189685 Permit Status: Permit
Facility Status: Permit Area: 7A
Region: Los Angeles County:

AG208 **LA CO DPW FLOOD DIST** **LOS ANGELES CO. HMS** **S105053483**
East **21014 GOLDEN TRIANGLE RD** **N/A**
> 1 **SANTA CLARITA, CA**
6252 ft.
Higher **Site 2 of 6 in cluster AG**

HMS:
Facility Id: 014208-014735
Facility Type: Not reported
Permit Number: Not reported Permit Status: Not reported
Facility Status: OPEN Area: 7A
Region: Los Angeles County:

AG209 **DPW FMD SANTA CLARITA REFERRAL** **LOS ANGELES CO. HMS** **S102064041**
East **21014 GOLDEN TRIANGLE RD** **N/A**
> 1 **SANTA CLARITA, CA**
6252 ft.
Higher **Site 3 of 6 in cluster AG**

HMS:
Facility Id: 017324-023454
Facility Type: Not reported
Permit Number: Not reported Permit Status: Not reported
Facility Status: OPEN Area: 7A
Region: Los Angeles County:

AD210 **DISCOUNT TIRE CENTERS** **RCRIS-SQG** **1000857869**
East **20737 SOLEDAD CANYON RD** **FINDS** **CAD983673195**
> 1 **CANYON COUNTRY, CA 91351**
6283 ft.
Higher **Site 4 of 5 in cluster AD**

DISCOUNT TIRE CENTERS (Continued) **1000857869**

RCRIS:
Owner: DISCOUNT TIRE CENTERS
(805) 252-0823
EPA ID: CAD983673195
Contact: SAM KECKLER
(805) 252-0823
Classification: Small Quantity Generator
Used Oil Recyc: No
TSDF Activities: Not reported

Violation Status: No violations found

FINDS:
Other Pertinent Environmental Activity Identified at Site:
Facility Registry System (FRS)
Resource Conservation and Recovery Act Information system (RCRAINFO)

AD211 **SCV AUTO SPECIALIST** **HAZNET** **S105092984**
East **20733 SOLEDAD CANYON RD** **N/A**
> 1 **CANYON COUNTRY, CA 91351**
6304 ft.
Higher **Site 5 of 5 in cluster AD**

HAZNET:
Gepaid: CAL000215030
Tepaid: CAD099452708
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: .7923
Category: Unspecified aqueous solution
Disposal Method: Recycler
Contact: MARY LICITRA
Telephone: (661) 251-7134
Mailing Address: 20733 SOLEDAD CANYON RD
CANYON COUNTRY, CA 91351
County Los Angeles

Gepaid: CAL000215030
Tepaid: CAD099452708
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: .4170
Category: Unspecified aqueous solution
Disposal Method: Not reported
Contact: MARY LICITRA
Telephone: (661) 251-7134
Mailing Address: 20733 SOLEDAD CANYON RD
CANYON COUNTRY, CA 91351
County Los Angeles

AH212 **CROSSROADS DENTAL CENTER** **HAZNET** **S102826494**
WNW **26246 BOUQUET CANYON RD** **N/A**
> 1 **SAUGUS, CA 91350**
6329 ft.
Lower **Site 2 of 3 in cluster AH**

CROSSROADS DENTAL CENTER (Continued) **S102826494**

HAZNET:

Gepaid:	CAL921855721
Tepaid:	CAD050806850
Gen County:	Los Angeles
Tsd County:	Los Angeles
Tons:	.0092
Category:	Other inorganic solid waste
Disposal Method:	Recycler
Contact:	DAVID GOLDBERG DDS
Telephone:	(661) 254-6044
Mailing Address:	26246 BOUQUET CANYON RD
	SANTA CLARITA, CA 91350 - 2645
County	Los Angeles

Gepaid:	CAL921855721
Tepaid:	CAD028409019
Gen County:	Los Angeles
Tsd County:	Los Angeles
Tons:	.0001
Category:	Other inorganic solid waste
Disposal Method:	Transfer Station
Contact:	DAVID GOLDBERG DDS
Telephone:	(661) 254-6044
Mailing Address:	26246 BOUQUET CANYON RD
	SANTA CLARITA, CA 91350 - 2645
County	Los Angeles

Gepaid:	CAL921855721
Tepaid:	CAD028409019
Gen County:	Los Angeles
Tsd County:	Los Angeles
Tons:	.0000
Category:	Other inorganic solid waste
Disposal Method:	Transfer Station
Contact:	DAVID GOLDBERG DDS
Telephone:	(661) 254-6044
Mailing Address:	26246 BOUQUET CANYON RD
	SANTA CLARITA, CA 91350 - 2645
County	Los Angeles

Gepaid:	CAL921855721
Tepaid:	CAD050806850
Gen County:	Los Angeles
Tsd County:	Los Angeles
Tons:	.8428
Category:	Other inorganic solid waste
Disposal Method:	Transfer Station
Contact:	DAVID GOLDBERG DDS
Telephone:	(661) 254-6044
Mailing Address:	26246 BOUQUET CANYON RD
	SANTA CLARITA, CA 91350 - 2645
County	Los Angeles

CROSSROADS DENTAL CENTER (Continued) **S102826494**

Gepaid: CAL921855721
Tepaid: CAD981402522
Gen County: Los Angeles
Tsd County: Kern
Tons: .0834
Category: Photochemicals/photoprocessing waste
Disposal Method: Not reported
Contact: DAVID GOLDBERG DDS
Telephone: (661) 254-6044
Mailing Address: 26246 BOUQUET CANYON RD
SANTA CLARITA, CA 91350 - 2645
County Los Angeles

The CA HAZNET database contains 1 additional record for this site.
Please contact your EDR Account Executive for more information.

AH213 **PIP PRINTING #675** HAZNET S100870896
WNW **26240 BOUQUET CANYON RD** N/A
> 1 **SANTA CLARITA, CA 91350**
6338 ft.
Lower **Site 3 of 3 in cluster AH**

HAZNET:
Gepaid: CAL000044792
Tepaid: CAT080033681
Gen County: Santa Clara
Tsd County: Los Angeles
Tons: 0.5
Category: Unspecified oil-containing waste
Disposal Method: Treatment, Incineration
Contact: DONALD G CAMERON
Telephone: (000) 000-0000
Mailing Address: 26240 BOUQUET CANYON RD
SANTA CLARITA, CA 91350
County Santa Clara

Gepaid: CAL000044792
Tepaid: CAD108040858
Gen County: Santa Clara
Tsd County: Los Angeles
Tons: .1333
Category: Photochemicals/photoprocessing waste
Disposal Method: Recycler
Contact: DONALD G CAMERON
Telephone: (000) 000-0000
Mailing Address: 26240 BOUQUET CANYON RD
SANTA CLARITA, CA 91350
County Santa Clara

Gepaid: CAL000044792
Tepaid: CAD108040858
Gen County: Santa Clara
Tsd County: Los Angeles
Tons: .2000
Category: Photochemicals/photoprocessing waste
Disposal Method: Recycler
Contact: DONALD G CAMERON
Telephone: (000) 000-0000
Mailing Address: 26240 BOUQUET CANYON RD

PIP PRINTING #675 (Continued) **S100870896**

SANTA CLARITA, CA 91350
County Santa Clara

Gepaid: CAL000044792
Tepaid: CAT080033681
Gen County: Santa Clara
Tsd County: Los Angeles
Tons: .8351
Category: Unspecified oil-containing waste
Disposal Method: Recycler
Contact: DONALD G CAMERON
Telephone: (000) 000-0000
Mailing Address: 26240 BOUQUET CANYON RD
SANTA CLARITA, CA 91350
County Santa Clara

Gepaid: CAL000044792
Tepaid: CAT080033681
Gen County: Santa Clara
Tsd County: Los Angeles
Tons: .4000
Category: Unspecified oil-containing waste
Disposal Method: Disposal, Other
Contact: DONALD G CAMERON
Telephone: (000) 000-0000
Mailing Address: 26240 BOUQUET CANYON RD
SANTA CLARITA, CA 91350
County Santa Clara

The CA HAZNET database contains 6 additional records for this site.
Please contact your EDR Account Executive for more information.

AI214 **FRONTIER AUTO SERVICE** **LOS ANGELES CO. HMS** **S103945035**
East **20723 SOLEDAD CANYON RD** **N/A**
> 1 **SANTA CLARITA, CA**
6357 ft.
Higher **Site 1 of 5 in cluster AI**

HMS:
Facility Id: 020318-028912
Facility Type: Not reported
Permit Number: Not reported Permit Status: Not reported
Facility Status: OPEN Area: 7A
Region: Los Angeles County:

AI215 **IMPORT AUTO CARE** **RCRIS-SQG** **1000596098**
East **20723 SOLEDAD CANYON RD** **FINDS** **CAD983600610**
> 1 **CANYON COUNTRY, CA 91351**
6357 ft.
Higher **Site 2 of 5 in cluster AI**

IMPORT AUTO CARE (Continued) **1000596098**

RCRIS:
Owner: BERJ PROODIAN
(805) 298-1440
EPA ID: CAD983600610
Contact: CLAUDE GROSSET
(805) 298-1440
Classification: Small Quantity Generator
Used Oil Recyc: No
TSDF Activities: Not reported

Violation Status: No violations found

FINDS:
Other Pertinent Environmental Activity Identified at Site:
Facility Registry System (FRS)
Resource Conservation and Recovery Act Information system (RCRAINFO)

AG216 **NATIONAL TECHNICAL SYSTEMS** **LOS ANGELES CO. HMS** **S105053482**
East **20988 GOLDEN TRIANGLE RD** **N/A**
> 1 **SANTA CLARITA, CA**
6428 ft.
Higher **Site 4 of 6 in cluster AG**

HMS:

Facility Id:	003909-004053		
Facility Type:	Not reported		
Permit Number:	Not reported	Permit Status:	Not reported
Facility Status:	Removed	Area:	7A
Region:	Los Angeles County:		

AG217 **CHMIRS** **S100222833**
East **20988 GOLDEN TRIANGLE** **N/A**
> 1 **CANYON COUNTRY, CA 91350**
6428 ft.
Higher **Site 5 of 6 in cluster AG**

CHMIRS:

OES Control Number:	9991739	DOT ID:	2029
DOT Hazard Class:	Miscellaneous hazardous material		
Chemical Name:	HYDRAZINE		
Extent of Release:	Not reported		
CAS Number:	Not reported	Quantity Released:	Not reported
Environmental Contamination:	Air	Property Use:	Industrial, Utility
Incident Date:	19-APR-88	Date Completed:	19-APR-88
Time Completed :	1140		
Physical State Stored :	Liquid		
Physical State Released :	Gas		
Release Unit :	Not reported		
Container Description :	1		
Container Type :	Drum		
Container Material :	Undetermined		
Level Of Container :	Ground Level		
Container Capacity :	5		
Container Capacity Units (code) :	2		
Extent Of Release (code) :	6		
Agency Id Number :	19110		
Agency Incident Number :	76-22		

(Continued) **S100222833**

OES Incident Number :	9991739
Time Notified :	933
Surrounding Area :	600
Estimated Temperature :	Not reported
Property Management :	Not reported
More Than Two Substances Involved? :	Not reported
Special Studies 1 :	Not reported
Special Studies 2 :	Not reported
Special Studies 3 :	Not reported
Special Studies 4 :	Not reported
Special Studies 5 :	Not reported
Special Studies 6 :	Not reported
Responding Agency Personel # Of Injuries :	Not reported
Responding Agency Personel # Of Fatalities :	Not reported
Resp Agncy Personel # Of Decontaminated :	Not reported
Others Number Of Decontaminated :	Not reported
Others Number Of Injuries :	Not reported
Others Number Of Fatalities :	Not reported
Vehicle Make/year :	Not reported
Vehicle License Number :	Not reported
Vehicle State :	Not reported
Vehicle Id Number :	Not reported
CA/DOT/PUC/ICC Number :	Not reported
Company Name :	Not reported
Reporting Officer Name/ID :	L MOHR
Report Date :	19-APR-88
Comments :	No
Facility Telephone Number :	213 267-2485

AG218 **NATIONAL TECHNICAL SYSTEMS** **HAZNET** **S100940614**
East **20988 W GOLDEN TRIANGLE RD STE W** **LOS ANGELES CO. HMS** **N/A**
> 1 **SANTA CLARITA, CA 91350**
6428 ft.
Higher **Site 6 of 6 in cluster AG**

HAZNET:

Gepaid:	CAL000034177
Tepaid:	CAD982444481
Gen County:	Los Angeles
Tsd County:	San Bernardino
Tons:	5.8996
Category:	Other organic solids
Disposal Method:	Transfer Station
Contact:	JACK LIN
Telephone:	(818) 591-0776
Mailing Address:	20988 W GOLDEN TRIANGLE RD STE W
	SANTA CLARITA, CA 91350 - 2678
County	Los Angeles

Gepaid:	CAL000034177
Tepaid:	CAT080013352
Gen County:	Los Angeles
Tsd County:	Los Angeles
Tons:	15.429
Category:	Waste oil and mixed oil
Disposal Method:	Recycler
Contact:	JACK LIN
Telephone:	(818) 591-0776
Mailing Address:	20988 W GOLDEN TRIANGLE RD STE W

NATIONAL TECHNICAL SYSTEMS (Continued) **S100940614**

SANTA CLARITA, CA 91350 - 2678
County Los Angeles

Gepaid: CAL000034177
Tepaid: CAD000088252
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: 5.1855
Category: Unspecified oil-containing waste
Disposal Method: Transfer Station
Contact: JACK LIN
Telephone: (818) 591-0776
Mailing Address: 20988 W GOLDEN TRIANGLE RD STE W
SANTA CLARITA, CA 91350 - 2678
County Los Angeles

Gepaid: CAL000034177
Tepaid: CAT080013352
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: 2.5020
Category: Unspecified oil-containing waste
Disposal Method: Recycler
Contact: JACK LIN
Telephone: (818) 591-0776
Mailing Address: 20988 W GOLDEN TRIANGLE RD STE W
SANTA CLARITA, CA 91350 - 2678
County Los Angeles

Gepaid: CAL000034177
Tepaid: CAD980883177
Gen County: Los Angeles
Tsd County: Kern
Tons: 1.4595
Category: Waste oil and mixed oil
Disposal Method: Recycler
Contact: JACK LIN
Telephone: (818) 591-0776
Mailing Address: 20988 W GOLDEN TRIANGLE RD STE W
SANTA CLARITA, CA 91350 - 2678
County Los Angeles

The CA HAZNET database contains 27 additional records for this site.
Please contact your EDR Account Executive for more information.

HMS:
Facility Id: 003909-I04053
Facility Type: I09
Permit Number: 000012286 Permit Status: Permit
Facility Status: Permit Area: 7A
Region: Los Angeles County:

AJ219 **SERVICE STATION 5518** **HIST UST** **U001567724**
West **26279 BOUQUET CANYON RD** **N/A**
> 1 **SAUGUS, CA 91350**
6437 ft.
Lower **Site 1 of 5 in cluster AJ**

UST HIST:
Facility ID: 8021
Tank Num: 1 Container Num: 5518-1

SERVICE STATION 5518 (Continued) **U001567724**

Tank Capacity:	9950	Year Installed:	1965
Tank Used for:	PRODUCT		
Type of Fuel:	UNLEADED	Tank Construction:	Not reported
Leak Detection:	Stock Inventor, Pressure Test		
Contact Name:	DONALD WOLF	Telephone:	(805) 259-7676
Total Tanks:	3	Region:	STATE
Facility Type:	1	Other Type:	Not reported

Facility ID:	8021		
Tank Num:	2	Container Num:	5518-2
Tank Capacity:	9950	Year Installed:	1965
Tank Used for:	PRODUCT		
Type of Fuel:	PREMIUM	Tank Construction:	Not reported
Leak Detection:	Stock Inventor, Pressure Test		
Contact Name:	DONALD WOLF	Telephone:	(805) 259-7676
Total Tanks:	3	Region:	STATE
Facility Type:	1	Other Type:	Not reported

Facility ID:	8021		
Tank Num:	3	Container Num:	5518-4
Tank Capacity:	280	Year Installed:	1965
Tank Used for:	WASTE		
Type of Fuel:	WASTE OIL	Tank Construction:	Not reported
Leak Detection:	Stock Inventor, Pressure Test		
Contact Name:	DONALD WOLF	Telephone:	(805) 259-7676
Total Tanks:	3	Region:	STATE
Facility Type:	1	Other Type:	Not reported

AJ220 **WOLF'S BOUQUET UNION & TOW. IN** **HIST UST** **U001567736**
West **26279 BOUQUET CANYON RD** **N/A**
> 1 **SAUGUS, CA 91350**
6437 ft.
Lower **Site 2 of 5 in cluster AJ**

UST HIST:

Facility ID:	51049		
Tank Num:	1	Container Num:	1
Tank Capacity:	10000	Year Installed:	1966
Tank Used for:	PRODUCT		
Type of Fuel:	PREMIUM	Tank Construction:	Not reported
Leak Detection:	Stock Inventor		
Contact Name:	DONALD E. WOLF	Telephone:	(805) 259-7676
Total Tanks:	3	Region:	STATE
Facility Type:	1	Other Type:	Not reported

Facility ID:	51049		
Tank Num:	2	Container Num:	3
Tank Capacity:	1000	Year Installed:	1966
Tank Used for:	WASTE		
Type of Fuel:	WASTE OIL	Tank Construction:	Not reported
Leak Detection:	None		
Contact Name:	DONALD E. WOLF	Telephone:	(805) 259-7676
Total Tanks:	3	Region:	STATE
Facility Type:	1	Other Type:	Not reported

Facility ID:	51049		
Tank Num:	3	Container Num:	2
Tank Capacity:	10000	Year Installed:	1966
Tank Used for:	PRODUCT		

WOLF'S BOUQUET UNION & TOW. IN (Continued) — **U001567736**

Type of Fuel:	UNLEADED	Tank Construction:	Not reported
Leak Detection:	Stock Inventor		
Contact Name:	DONALD E. WOLF	Telephone:	(805) 259-7676
Total Tanks:	3	Region:	STATE
Facility Type:	1	Other Type:	Not reported

AJ221 — **UNOCAL #5518** — Cortese — S105026545
West — **26279 BOUQUET CANYON RD** — N/A
> 1 — **SAUGUS, CA 91350**
6437 ft.
Lower

Site 3 of 5 in cluster AJ

CORTESE:

Reg Id:	913500034
Region:	CORTESE
Reg By:	Leaking Underground Storage Tanks

AJ222 — **UNION OIL SERVICE STATION 5518** — HIST UST — U001567731
West — **26279 BOUQUET CANYON RD** — N/A
> 1 — **SAUGUS, CA 91350**
6437 ft.
Lower

Site 4 of 5 in cluster AJ

UST HIST:

Facility ID:	56205		
Tank Num:	1	Container Num:	1
Tank Capacity:	0	Year Installed:	Not reported
Tank Used for:	WASTE		
Type of Fuel:	WASTE OIL	Tank Construction:	Not reported
Leak Detection:	None		
Contact Name:	DONALD WOLF	Telephone:	(805) 259-7676
Total Tanks:	1	Region:	STATE
Facility Type:	1	Other Type:	Not reported

AJ223 — **UNOCAL #5518** — LUST — S102440043
West — **26279 BOUQUET CANYON RD** — N/A
> 1 — **SAUGUS, CA 91350**
6437 ft.
Lower

Site 5 of 5 in cluster AJ

State LUST:

Cross Street:	CENTURION		
Qty Leaked:	Not reported		
Case Number	913500034		
Reg Board:	4		
Chemical:	Gasoline		
Lead Agency:	Regional Board		
Local Agency :	19000		
Case Type:	Other ground water affected		
Status:	Not reported		
County:	Los Angeles		
Abate Method:	Excavate and Dispose - remove contaminated soil and dispose in approved site		
Review Date:	Not reported	Confirm Leak:	Not reported
Workplan:	Not reported	Prelim Assess:	Not reported
Pollution Char:	Not reported	Remed Plan:	Not reported
Remed Action:	Not reported	Monitoring:	Not reported
Close Date:	6/11/86		

UNOCAL #5518 (Continued) **S102440043**

Release Date: Not reported
Cleanup Fund Id : Not reported
Discover Date : Not reported
Enforcement Dt : Not reported
Enf Type: Not reported
Enter Date : 12/31/86
Funding: Not reported
Staff Initials: Not reported
How Discovered: Not reported
How Stopped: Not reported
Interim : Yes
Leak Cause: Unknown
Leak Source: Unknown
MTBE Date : Not reported
Max MTBE GW : Not reported
MTBE Tested: Site NOT Tested for MTBE.Includes Unknown and Not Analyzed.
Priority: Not reported
Local Case # : Not reported
Beneficial: Not reported
Staff : JLC
GW Qualifies : Not reported
Max MTBE Soil : Not reported
Soil Qualifies : Not reported
Hydr Basin #: Not reported
Operator : Not reported
Oversight Prgm: RB Lead Underground Storage Tank
Oversight Prgm : UST
Review Date : 3/30/89
Stop Date : Not reported
Work Suspended : Not reported
Responsible Party UNOCAL
RP Address: 3701 WILSHIRE BLVD, SUITE 800, LOS ANGELES, CA 90010
Global Id: T0603702306
Org Name: Not reported
Contact Person: Not reported
MTBE Conc: 0
Mtbe Fuel: Not reported
Water System Name: Not reported
Well Name: Not reported
Distance To Lust: 785.919116
Waste Discharge Global ID: Not reported
Waste Disch Assigned Name: Not reported

LUST Region 4:
Report Date: 3/10/1986
Lead Agency: Regional Board
Local Agency: 19000
Case Number: 913500034
Substance: Gasoline
Case Type: Groundwater
Status: Case Closed
Region: 4
Staff: Not reported

AI224 **CANYON COUNTRY LUBRICATION** **HAZNET** **S103640931**
East **20703 SOLEDAD CANYON ROAD** **N/A**
> 1 **CANYON COUNTRY, CA 91351**
6469 ft.
Higher **Site 3 of 5 in cluster AI**

CANYON COUNTRY LUBRICATION (Continued) **S103640931**

HAZNET:

Gepaid:	CAL000031064
Tepaid:	CAD981696420
Gen County:	Los Angeles
Tsd County:	Los Angeles
Tons:	0.9382
Category:	Aqueous solution with less than 10% total organic residues
Disposal Method:	Transfer Station
Contact:	REYNOLDS BYRON
Telephone:	(000) 000-0000
Mailing Address:	20703 SOLEDAD CANYON RD
	CANYON COUNTRY, CA 91351 - 2440
County	Los Angeles

Gepaid:	CAL000031064
Tepaid:	CAD099452708
Gen County:	Los Angeles
Tsd County:	Los Angeles
Tons:	.5628
Category:	Unspecified oil-containing waste
Disposal Method:	Recycler
Contact:	REYNOLDS BYRON
Telephone:	(000) 000-0000
Mailing Address:	20703 SOLEDAD CANYON RD
	CANYON COUNTRY, CA 91351 - 2440
County	Los Angeles

Gepaid:	CAL000031064
Tepaid:	CAD099452708
Gen County:	Los Angeles
Tsd County:	Los Angeles
Tons:	2.9606
Category:	Unspecified aqueous solution
Disposal Method:	Recycler
Contact:	REYNOLDS BYRON
Telephone:	(000) 000-0000
Mailing Address:	20703 SOLEDAD CANYON RD
	CANYON COUNTRY, CA 91351 - 2440
County	Los Angeles

Gepaid:	CAL000031064
Tepaid:	CAT080011059
Gen County:	Los Angeles
Tsd County:	Los Angeles
Tons:	.2293
Category:	Unspecified oil-containing waste
Disposal Method:	Recycler
Contact:	REYNOLDS BYRON
Telephone:	(000) 000-0000
Mailing Address:	20703 SOLEDAD CANYON RD
	CANYON COUNTRY, CA 91351 - 2440
County	Los Angeles

AI225 **JIFFY LUBE** **LOS ANGELES CO. HMS** **S102064006**
East **20703 SOLEDAD CANYON RD** **N/A**
> 1 **SANTA CLARITA, CA**
6469 ft.
Higher **Site 4 of 5 in cluster AI**

JIFFY LUBE (Continued) **S102064006**

HMS:

Facility Id:	009295-009096		
Facility Type:	T0		
Permit Number:	00000071T	Permit Status:	Removed
Facility Status:	Removed	Area:	7A
Region:	Los Angeles County:		

Facility Id:	009295-028911		
Facility Type:	Not reported		
Permit Number:	Not reported	Permit Status:	Not reported
Facility Status:	OPEN	Area:	7A
Region:	Los Angeles County:		

AI226 **JIFFY LUBE #680** **HAZNET S104581761**
East **20703 SOLEDAD CANYON RD** **AST N/A**
> 1 **CANYON COUNTRY, CA 91351**
6469 ft.
Higher **Site 5 of 5 in cluster AI**

HAZNET:

Gepaid:	CAL000190089
Tepaid:	CAD981696420
Gen County:	Los Angeles
Tsd County:	Los Angeles
Tons:	10.1121
Category:	Aqueous solution with less than 10% total organic residues
Disposal Method:	Transfer Station
Contact:	MIZAR LLC
Telephone:	(000) 000-0000
Mailing Address:	20703 SOLEDAD CANYON RD CANYON COUNTRY, CA 91351
County	Los Angeles

Gepaid:	CAL000190089
Tepaid:	CAD981696420
Gen County:	Los Angeles
Tsd County:	Los Angeles
Tons:	0
Category:	
Disposal Method:	Transfer Station
Contact:	MIZAR LLC
Telephone:	(000) 000-0000
Mailing Address:	20703 SOLEDAD CANYON RD CANYON COUNTRY, CA 91351
County	Los Angeles

Gepaid:	CAL000190089
Tepaid:	CAD981696420
Gen County:	Los Angeles
Tsd County:	Los Angeles
Tons:	0.834
Category:	Aqueous solution with less than 10% total organic residues
Disposal Method:	Not reported
Contact:	MIZAR LLC
Telephone:	(000) 000-0000
Mailing Address:	20703 SOLEDAD CANYON RD CANYON COUNTRY, CA 91351
County	Los Angeles

JIFFY LUBE #680 (Continued) **S104581761**

Gepaid: CAL000190089
Tepaid: CAD981696420
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: 6.4925
Category: Aqueous solution with less than 10% total organic residues
Disposal Method: Transfer Station
Contact: MIZAR LLC
Telephone: (000) 000-0000
Mailing Address: 20703 SOLEDAD CANYON RD
CANYON COUNTRY, CA 91351
County Los Angeles

AST:
Region: 4
Owner: JIFFY LUBE

AK227 **UNOCAL CORP SS 7344** **LOS ANGELES CO. HMS** **S105422133**
West **23055 W SOLEDAD CANYON RD** **N/A**
> 1 **SANTA CLARITA, CA**
6487 ft.
Lower

Site 1 of 17 in cluster AK

HMS:
Facility Id: 009739-009575
Facility Type: T0
Permit Number: 00000795T
Permit Status: Closed
Facility Status: Permit
Area: 7A
Region: Los Angeles County:

AK228 **TOSCO/UNOCAL #31309** **LOS ANGELES CO. HMS** **S105422135**
West **23055 W SOLEDAD CANYON RD** **N/A**
> 1 **SANTA CLARITA, CA**
6487 ft.
Lower

Site 2 of 17 in cluster AK

HMS:
Facility Id: 009739-028929
Facility Type: Not reported
Permit Number: Not reported
Permit Status: Not reported
Facility Status: OPEN
Area: 7A
Region: Los Angeles County:

AK229 **ACWA ASSOC - SEE FILE I09575** **LOS ANGELES CO. HMS** **S105422132**
West **23055 W SOLEDAD CANYON RD** **N/A**
> 1 **SANTA CLARITA, CA**
6487 ft.
Lower

Site 3 of 17 in cluster AK

HMS:
Facility Id: 008430-021139
Facility Type: Not reported
Permit Number: Not reported
Permit Status: Not reported
Facility Status: OPEN
Area: 7A
Region: Los Angeles County:

AK230 **TOSCO CORPORATION STATION #31309** **HAZNET** **S103992190**
West **23055 SOLEDAD CANYON RD** **N/A**
> 1 **SAUGUS, CA 91350**
6487 ft.
Lower **Site 4 of 17 in cluster AK**

HAZNET:

Gepaid:	CAL000135711
Tepaid:	CAD028409019
Gen County:	Los Angeles
Tsd County:	Los Angeles
Tons:	.0875
Category:	Aqueous solution with less than 10% total organic residues
Disposal Method:	Treatment, Tank
Contact:	TOSCO MARKETING
Telephone:	(602) 728-4180
Mailing Address:	P O BOX 52085
	PHOENIX, AZ 85072 - 2085
County	Los Angeles

Gepaid:	CAL000135711
Tepaid:	CAD028409019
Gen County:	Los Angeles
Tsd County:	Los Angeles
Tons:	.1668
Category:	Aqueous solution with 10% or more total organic residues
Disposal Method:	Treatment, Tank
Contact:	TOSCO MARKETING
Telephone:	(602) 728-4180
Mailing Address:	P O BOX 52085
	PHOENIX, AZ 85072 - 2085
County	Los Angeles

Gepaid:	CAL000135711
Tepaid:	CAD028409019
Gen County:	Los Angeles
Tsd County:	Los Angeles
Tons:	0.271
Category:	Aqueous solution with less than 10% total organic residues
Disposal Method:	Treatment, Tank
Contact:	TOSCO MARKETING
Telephone:	(602) 728-4180
Mailing Address:	P O BOX 52085
	PHOENIX, AZ 85072 - 2085
County	Los Angeles

AK231 **TOSCO/UNOCAL #31309** **LOS ANGELES CO. HMS** **S105422134**
West **23055 W SOLEDAD CANYON RD** **N/A**
> 1 **SANTA CLARITA, CA**
6487 ft.
Lower **Site 5 of 17 in cluster AK**

HMS:

Facility Id:	009739-024755		
Facility Type:	T0		
Permit Number:	000191274	Permit Status:	Permit
Facility Status:	Permit	Area:	7A
Region:	Los Angeles County:		

AK232 **97436** **HIST UST** **U001567684**
West **23055 SOLEDAD CANYON RD** **N/A**
> 1 **SAUGUS, CA 91350**
6487 ft.
Lower **Site 6 of 17 in cluster AK**

UST HIST:

Facility ID:	62998		
Tank Num:	1	Container Num:	1
Tank Capacity:	3000	Year Installed:	1963
Tank Used for:	PRODUCT		
Type of Fuel:	Not Reported	Tank Construction:	0000170 unknown
Leak Detection:	Stock Inventor		
Contact Name:	MORSE,JERRY P	Telephone:	(805) 259-3705
Total Tanks:	5	Region:	STATE
Facility Type:	1	Other Type:	Not reported

Facility ID:	62998		
Tank Num:	2	Container Num:	2
Tank Capacity:	5000	Year Installed:	1963
Tank Used for:	PRODUCT		
Type of Fuel:	Not Reported	Tank Construction:	0000250 unknown
Leak Detection:	Stock Inventor		
Contact Name:	MORSE,JERRY P	Telephone:	(805) 259-3705
Total Tanks:	5	Region:	STATE
Facility Type:	1	Other Type:	Not reported

Facility ID:	62998		
Tank Num:	3	Container Num:	3
Tank Capacity:	6000	Year Installed:	1963
Tank Used for:	PRODUCT		
Type of Fuel:	Not Reported	Tank Construction:	0000250 unknown
Leak Detection:	Stock Inventor		
Contact Name:	MORSE,JERRY P	Telephone:	(805) 259-3705
Total Tanks:	5	Region:	STATE
Facility Type:	1	Other Type:	Not reported

Facility ID:	62998		
Tank Num:	4	Container Num:	4
Tank Capacity:	10000	Year Installed:	1969
Tank Used for:	PRODUCT		
Type of Fuel:	Not Reported	Tank Construction:	0000250 unknown
Leak Detection:	Stock Inventor		
Contact Name:	MORSE,JERRY P	Telephone:	(805) 259-3705
Total Tanks:	5	Region:	STATE
Facility Type:	1	Other Type:	Not reported

Facility ID:	62998		
Tank Num:	5	Container Num:	5
Tank Capacity:	550	Year Installed:	1963
Tank Used for:	WASTE		
Type of Fuel:	Not Reported	Tank Construction:	0000100 unknown
Leak Detection:	Stock Inventor		
Contact Name:	MORSE,JERRY P	Telephone:	(805) 259-3705
Total Tanks:	5	Region:	STATE
Facility Type:	1	Other Type:	Not reported

AK233 **TOSCO/UNOCAL #31309** **UST** **U003777688**
West **23055 SOLEDAD CANYON RD** **N/A**
> 1 **SANTA CLARITA, CA 91350**
6487 ft.
Lower **Site 7 of 17 in cluster AK**

State UST:
Facility ID: 24755
Total Tanks: 1
Region: STATE
Local Agency: 19000

AK234 **CHEVRON #9-7436 (FORMER)** **Cortese** **S105026560**
West **23055 SOLEDAD CANYON RD** **N/A**
> 1 **SAUGUS, CA 91350**
6487 ft.
Lower **Site 8 of 17 in cluster AK**

CORTESE:
Reg Id: I-09575
Region: CORTESE
Reg By: Leaking Underground Storage Tanks

AK235 **UNOCAL SERVICE STATION #7344** **HAZNET** **S103643996**
West **23055 SOLEDAD CANYON ROAD** **N/A**
> 1 **SAUGUS, CA 91350**
6487 ft.
Lower **Site 9 of 17 in cluster AK**

HAZNET:
Gepaid: CAL000046416
Tepaid: CAT080011059
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: 1.0425
Category: Waste oil and mixed oil
Disposal Method: Recycler
Contact: UNION OIL COMPANY OF CALIFORNI
Telephone: (714) 428-6560
Mailing Address: PO BOX 25376
SANTA ANA, CA 92799 - 5376
County Los Angeles

Gepaid: CAL000046416
Tepaid: CAT080011059
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: .5795
Category: Aqueous solution with 10% or more total organic residues
Disposal Method: Recycler
Contact: UNION OIL COMPANY OF CALIFORNI
Telephone: (714) 428-6560
Mailing Address: PO BOX 25376
SANTA ANA, CA 92799 - 5376
County Los Angeles

UNOCAL SERVICE STATION #7344 (Continued) **S103643996**

Gepaid: CAL000046416
Tepaid: Not reported
Gen County: Los Angeles
Tsd County: 0
Tons: .3961
Category:
Disposal Method: Not reported
Contact: UNION OIL COMPANY OF CALIFORNI
Telephone: (714) 428-6560
Mailing Address: PO BOX 25376
SANTA ANA, CA 92799 - 5376
County Los Angeles

Gepaid: CAL000046416
Tepaid: CAD028409019
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: .3961
Category:
Disposal Method: Treatment, Tank
Contact: UNION OIL COMPANY OF CALIFORNI
Telephone: (714) 428-6560
Mailing Address: PO BOX 25376
SANTA ANA, CA 92799 - 5376
County Los Angeles

Gepaid: CAL000046416
Tepaid: CAD028409019
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: .1959
Category: Aqueous solution with 10% or more total organic residues
Disposal Method: Treatment, Tank
Contact: UNION OIL COMPANY OF CALIFORNI
Telephone: (714) 428-6560
Mailing Address: PO BOX 25376
SANTA ANA, CA 92799 - 5376
County Los Angeles

AK236 **CHEVRON STATION 97436** **RCRIS-SQG** **1000905200**
West **23055 SOLEDAD CYN RD** **FINDS** **CA0000370890**
> 1 **SAUGUS, CA 91350** **LUST**
6487 ft.
Lower **Site 10 of 17 in cluster AK**

RCRIS:
Owner: CHEVRON USA PRODUCTS CO
(310) 694-7452
EPA ID: CA0000370890

Contact: SUZANNE SISSUNG
(310) 694-7452

Classification: Small Quantity Generator
Used Oil Recyc: No
TSDF Activities: Not reported

CHEVRON STATION 97436 (Continued) **1000905200**

Violation Status: No violations found

FINDS:
Other Pertinent Environmental Activity Identified at Site:
Facility Registry System (FRS)
Resource Conservation and Recovery Act Information system (RCRAINFO)

State LUST:

Cross Street:	BOUQUET CANYON		
Qty Leaked:	Not reported		
Case Number	I-09575		
Reg Board:	4		
Chemical:	Gasoline		
Lead Agency:	Regional Board		
Local Agency :	19000		
Case Type:	Other ground water affected		
Status:	Not reported		
County:	Los Angeles		
Abate Method:	Vapor Extraction		
Review Date:	Not reported	Confirm Leak:	Not reported
Workplan:	Not reported	Prelim Assess:	Not reported
Pollution Char:	Not reported	Remed Plan:	Not reported
Remed Action:	Not reported	Monitoring:	Not reported
Close Date:	11/4/96		
Release Date:	Not reported		
Cleanup Fund Id :	Not reported		
Discover Date :	8/13/87		
Enforcement Dt :	Not reported		
Enf Type:	Not reported		
Enter Date :	Not reported		
Funding:	Not reported		
Staff Initials:	Not reported		
How Discovered:	Not reported		
How Stopped:	Not reported		
Interim :	Yes		
Leak Cause:	Not reported		
Leak Source:	Not reported		
MTBE Date :	Not reported		
Max MTBE GW :	Not reported		
MTBE Tested:	Site NOT Tested for MTBE.Includes Unknown and Not Analyzed.		
Priority:	Not reported		
Local Case # :	Not reported		
Beneficial:	Not reported		
Staff :	JLC		
GW Qualifies :	Not reported		
Max MTBE Soil :	Not reported		
Soil Qualifies :	Not reported		
Hydr Basin #:	Not reported		
Operator :	Not reported		
Oversight Prgm:	RB Lead Underground Storage Tank		
Oversight Prgm :	UST		
Review Date :	2/18/98		
Stop Date :	Not reported		
Work Suspended :	Not reported		
Responsible Party	CHEVRON PRODUCTS CO		
RP Address:	P.O. BOX 2833, LA HABRA CA 90632-2833		
Global Id:	T0603703450		

CHEVRON STATION 97436 (Continued) **1000905200**

Org Name: Not reported
Contact Person: Not reported
MTBE Conc: 0
Mtbe Fuel: Not reported
Water System Name: Not reported
Well Name: Not reported
Distance To Lust: 703.4789309
Waste Discharge Global ID: Not reported
Waste Disch Assigned Name: Not reported

LUST Region 4:
Report Date: 10/9/1989
Lead Agency: Regional Board
Local Agency: 19000
Case Number: I-09575
Substance: Gasoline
Case Type: Groundwater
Status: Case Closed
Region: 4
Staff: Not reported

AK237 **ACWA ASSOCIATES INC** **LOS ANGELES CO. HMS** **S105422131**
West **23055 W SOLEDAD CANYON RD** **N/A**
> 1 **SANTA CLARITA, CA**
6487 ft.
Lower **Site 11 of 17 in cluster AK**

HMS:
Facility Id: 008430-I09575
Facility Type: I02
Permit Number: 000009516 Permit Status: Permit
Facility Status: Permit Area: 7A
Region: Los Angeles County:

AL238 **ACRYLLIC CUSTOMS COLLISION & BODY INC** **HAZNET** **S100943078**
ENE **20665 SANTA CLARA** **N/A**
> 1 **CANYON COUNTRY, CA 91351**
6501 ft.
Higher **Site 1 of 3 in cluster AL**

HAZNET:
Gepaid: CAD982005787
Tepaid: CAD008302903
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: .2293
Category: Paint sludge
Disposal Method: Recycler
Contact: CORPORATION
Telephone: (000) 000-0000
Mailing Address: 20665 SANTA CLARA ST
CANYON COUNTRY, CA 91351
County Los Angeles

ACRYLLIC CUSTOMS COLLISION & BODY INC (Continued) **S100943078**

Gepaid: CAD982005787
Tepaid: CAT000613893
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: .0720
Category: Oxygenated solvents (acetone, butanol, ethyl acetate, etc.)
Disposal Method: Transfer Station
Contact: CORPORATION
Telephone: (000) 000-0000
Mailing Address: 20665 SANTA CLARA ST
CANYON COUNTRY, CA 91351
County Los Angeles

Gepaid: CAD982005787
Tepaid: CAD008252405
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: 0.1459
Category: Unspecified solvent mixture Waste
Disposal Method: Recycler
Contact: CORPORATION
Telephone: (000) 000-0000
Mailing Address: 20665 SANTA CLARA ST
CANYON COUNTRY, CA 91351
County Los Angeles

Gepaid: CAD982005787
Tepaid: CAD008302903
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: 0.5879
Category: Paint sludge
Disposal Method: Recycler
Contact: CORPORATION
Telephone: (000) 000-0000
Mailing Address: 20665 SANTA CLARA ST
CANYON COUNTRY, CA 91351
County Los Angeles

Gepaid: CAD982005787
Tepaid: CAD008302903
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: .2293
Category: Paint sludge
Disposal Method: Recycler
Contact: CORPORATION
Telephone: (000) 000-0000
Mailing Address: 20665 SANTA CLARA ST
CANYON COUNTRY, CA 91351
County Los Angeles

The CA HAZNET database contains 3 additional records for this site.
Please contact your EDR Account Executive for more information.

AL239 **R C ACRYLICS** **RCRIS-SQG 1000101292**
ENE **20665 SANTA CLARA** **FINDS CAD982005787**
> 1 **CANYON COUNTRY, CA 91351**
6501 ft.
Higher **Site 2 of 3 in cluster AL**

R C ACRYLICS (Continued) **1000101292**

RCRIS:
Owner: RICHARD MOAT
(415) 555-1212
EPA ID: CAD982005787
Contact: ENVIRONMENTAL MANAGER
(805) 251-5401
Classification: Small Quantity Generator
Used Oil Recyc: No
TSDF Activities: Not reported

Violation Status: No violations found

FINDS:
Other Pertinent Environmental Activity Identified at Site:
Facility Registry System (FRS)
Resource Conservation and Recovery Act Information system (RCRAINFO)

AL240 **ROBERT SAUMERS** **LOS ANGELES CO. HMS** **S102063999**
ENE **20665 W SANTA CLARA ST** **N/A**
> 1 **SANTA CLARITA, CA**
6501 ft.
Higher **Site 3 of 3 in cluster AL**

HMS:
Facility Id: 013213-013521
Facility Type: Not reported
Permit Number: Not reported — Permit Status: Not reported
Facility Status: Removed — Area: 7A
Region: Los Angeles County:

AK241 **SAMS EXXON** **HAZNET** **S103986171**
West **23060 SOLEDAD CYN RD** **LOS ANGELES CO. HMS** **N/A**
> 1 **SAUGUS, CA 91350**
6525 ft.
Lower **Site 12 of 17 in cluster AK**

HAZNET:
Gepaid: CAL912136051
Tepaid: CAT080013352
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: .7297
Category: Unspecified oil-containing waste
Disposal Method: Recycler
Contact: ELHILU,ESMAT
Telephone: (805) 985-5566
Mailing Address: 23060 SOLEDAD CANYON RD
SANTA CLARITA, CA 91350 - 2634
County Los Angeles

HMS:
Facility Id: 006373-I06593
Facility Type: I01
Permit Number: 000009329 — Permit Status: Removed
Facility Status: Removed — Area: 7A
Region: Los Angeles County:

AK242 **EXXON USA #7-3550** **LOS ANGELES CO. HMS** **S102064168**
West **23060 SOLEDAD CANYON RD** **N/A**
> 1 **SANTA CLARITA, CA**
6525 ft.
Lower **Site 13 of 17 in cluster AK**

HMS:

Facility Id:	006373-006593		
Facility Type:	T0		
Permit Number:	00004534T	Permit Status:	Closed
Facility Status:	Permit	Area:	7A
Region:	Los Angeles County:		

AK243 **EXXON SERVICE STATION** **HIST UST** **U001567697**
West **23060 SOLEDAD CANYON RD** **N/A**
> 1 **SAUGUS, CA 91350**
6525 ft.
Lower **Site 14 of 17 in cluster AK**

UST HIST:

Facility ID:	29509		
Tank Num:	1	Container Num:	#1
Tank Capacity:	6000	Year Installed:	1969
Tank Used for:	PRODUCT		
Type of Fuel:	PREMIUM	Tank Construction:	Not reported
Leak Detection:	Stock Inventor		
Contact Name:	JACK RAKESTAU	Telephone:	(805) 255-6444
Total Tanks:	4	Region:	STATE
Facility Type:	1	Other Type:	Not reported

Facility ID:	29509		
Tank Num:	2	Container Num:	#2
Tank Capacity:	8000	Year Installed:	1969
Tank Used for:	PRODUCT		
Type of Fuel:	REGULAR	Tank Construction:	Not reported
Leak Detection:	Stock Inventor		
Contact Name:	JACK RAKESTAU	Telephone:	(805) 255-6444
Total Tanks:	4	Region:	STATE
Facility Type:	1	Other Type:	Not reported

Facility ID:	29509		
Tank Num:	3	Container Num:	#3
Tank Capacity:	10000	Year Installed:	1969
Tank Used for:	PRODUCT		
Type of Fuel:	UNLEADED	Tank Construction:	Not reported
Leak Detection:	Stock Inventor		
Contact Name:	JACK RAKESTAU	Telephone:	(805) 255-6444
Total Tanks:	4	Region:	STATE
Facility Type:	1	Other Type:	Not reported

Facility ID:	29509		
Tank Num:	4	Container Num:	#4
Tank Capacity:	1000	Year Installed:	1969
Tank Used for:	PRODUCT		
Type of Fuel:	WASTE OIL	Tank Construction:	Not reported
Leak Detection:	Stock Inventor		
Contact Name:	JACK RAKESTAU	Telephone:	(805) 255-6444
Total Tanks:	4	Region:	STATE
Facility Type:	1	Other Type:	Not reported

AK244 **SAM'S MOBIL** **UST** **U003777412**
West **23060 SOLEDAD CANYON RD** **LOS ANGELES CO. HMS** **N/A**
> 1 **SANTA CLARITA, CA 91350**
6525 ft.
Lower **Site 15 of 17 in cluster AK**

HMS:

Facility Id:	006373-028931		
Facility Type:	Not reported		
Permit Number:	Not reported	Permit Status:	Not reported
Facility Status:	OPEN	Area:	7A
Region:	Los Angeles County:		

Facility Id:	006373-021517		
Facility Type:	T0		
Permit Number:	000089340	Permit Status:	Permit
Facility Status:	Permit	Area:	7A
Region:	Los Angeles County:		

State UST:

Facility ID:	21517
Total Tanks:	1
Region:	STATE
Local Agency:	19000

AK245 **EXXON #7-3550 (FORMER)** **LUST** **S103891181**
West **23060 SOLEDAD CANYON RD** **N/A**
> 1 **SANTA CLARITA, CA 91350**
6525 ft.
Lower **Site 16 of 17 in cluster AK**

State LUST:

Cross Street:	BOUQUET CANYON RD		
Qty Leaked:	Not reported		
Case Number	R-06593		
Reg Board:	4		
Chemical:	Hydrocarbons		
Lead Agency:	Regional Board		
Local Agency :	19000		
Case Type:	Other ground water affected		
Status:	Not reported		
County:	Los Angeles		
Review Date:	6/5/92	Confirm Leak:	6/5/92
Workplan:	6/5/92	Prelim Assess:	6/5/92
Pollution Char:	Not reported	Remed Plan:	Not reported
Remed Action:	Not reported	Monitoring:	Not reported
Close Date:	Not reported		
Release Date:	Not reported		
Cleanup Fund Id :	Not reported		
Discover Date :	5/26/92		
Enforcement Dt :	Not reported		
Enf Type:	Not reported		
Enter Date :	5/27/92		
Funding:	Not reported		
Staff Initials:	Not reported		
How Discovered:	Other Means		
How Stopped:	Not reported		
Interim :	Not reported		
Leak Cause:	Unknown		
Leak Source:	Unknown		
MTBE Date :	1/1/65		

EXXON #7-3550 (FORMER) (Continued) **S103891181**

Max MTBE GW : 7900
MTBE Tested: MTBE Detected. Site tested for MTBE & MTBE detected
Priority: 3A
Local Case # : Not reported
Beneficial: Not reported
Staff : JT
GW Qualifies : Not reported
Max MTBE Soil : Not reported
Soil Qualifies : Not reported
Hydr Basin #: Not reported
Operator : Not reported
Oversight Prgm: RB Lead Underground Storage Tank
Oversight Prgm : UST
Review Date : 11/15/01
Stop Date : Not reported
Work Suspended :Not reported
Responsible PartyJENNIFER C. SEDLACHEK
RP Address: 2300 CLAYTON RD., STE1250
Global Id: T0603704740
Org Name: Not reported
Contact Person: Not reported
MTBE Conc: 1
Mtbe Fuel: Not reported
Water System Name: Not reported
Well Name: Not reported
Distance To Lust: 858.0592421
Waste Discharge Global ID: Not reported
Waste Disch Assigned Name: Not reported

LUST Region 4:
Report Date: 5/26/1992
Lead Agency: Regional Board
Local Agency: 19000
Case Number: R-06593
Substance: Hydrocarbons
Case Type: Groundwater
Status: Pollution Characterization
Region: 4
Staff: JT

AM246 **BOCCHI LABORATORIES INC** **LOS ANGELES CO. HMS** **S102064449**
SE **26421 GOLDEN VALLEY RD** **N/A**
> 1 **SANTA CLARITA, CA**
6546 ft.
Higher **Site 1 of 11 in cluster AM**

HMS:
Facility Id: 008033-020233
Facility Type: I01
Permit Number: 000013077 Permit Status: Permit
Facility Status: Permit Area: 7A
Region: Los Angeles County:

AM247 **VALENCIA LABORATORY** **LOS ANGELES CO. HMS** **U003063750**
SE **26421 GOLDEN VALLEY RD** **N/A**
> 1 **SANTA CLARITA, CA**
6546 ft.
Higher **Site 2 of 11 in cluster AM**

VALENCIA LABORATORY (Continued) **U003063750**

HMS:
Facility Id: 008033-I08532
Facility Type: Not reported
Permit Number: Not reported — Permit Status: Not reported
Facility Status: OPEN — Area: 7A
Region: Los Angeles County:

AM248
SE
> 1
6546 ft.
Higher

STAR LABORATORIES INC — **LOS ANGELES CO. HMS** — **S102064450**
26421 N GOLDEN VALLEY RD — **N/A**
SANTA CLARITA, CA

Site 3 of 11 in cluster AM

HMS:
Facility Id: 009155-008532
Facility Type: Not reported
Permit Number: Not reported — Permit Status: Not reported
Facility Status: OPEN — Area: 7A
Region: Los Angeles County:

AN249
West
> 1
6568 ft.
Lower

U-HAUL CO. — **LOS ANGELES CO. HMS** — **S103945419**
26230 BOUQUET CANYON RD — **N/A**
SANTA CLARITA, CA

Site 1 of 2 in cluster AN

HMS:
Facility Id: 019822-028293
Facility Type: Not reported
Permit Number: Not reported — Permit Status: Not reported
Facility Status: OPEN — Area: 7A
Region: Los Angeles County:

AM250
SE
> 1
6612 ft.
Higher

26417 GOLDEN VALLEY RD — **ERNS** — **91241955**
26417 GOLDEN VALLEY RD — **N/A**
SANTA CLARITA, CA 91350

Site 4 of 11 in cluster AM

AM251
SE
> 1
6671 ft.
Higher

HI-SHEAR TECHNOLOGY CORP — **RCRIS-SQG** — **1000381482**
26413 N GOLDEN VALLEY RD — **FINDS** — **CAD981158561**
SAUGUS, CA 91350

Site 5 of 11 in cluster AM

HI-SHEAR TECHNOLOGY CORP (Continued) **1000381482**

RCRIS:
Owner: HI-SHEAR TECHNOLOGY CORP
(415) 555-1212
EPA ID: CAD981158561
Contact: ENVIRONMENTAL MANAGER
(805) 259-1510
Classification: Handler transports wastes, but commercial status is unknown, Large Quantity Generator
Used Oil Recyc: No
TSDF Activities: Not reported

Violation Status: No violations found

FINDS:
Other Pertinent Environmental Activity Identified at Site:
Facility Registry System (FRS)
Resource Conservation and Recovery Act Information system (RCRAINFO)

AN252 **CAR WASH USA INC** **CA FID UST** **S101587230**
West **26225 BOUQUET CANYON RD** **N/A**
> 1 **SANTA CLARITA, CA 91773**
6683 ft.
Lower **Site 2 of 2 in cluster AN**

FID:

Facility ID:	19055119	Regulate ID:	Not reported
Reg By:	Active Underground Storage Tank Location		
Cortese Code:	Not reported	SIC Code:	Not reported
Status:	Active	Facility Tel:	(714) 592-9562
Mail To:	Not reported 555 W BONITA AVE SANTA CLARITA, CA 91773		
Contact:	Not reported	Contact Tel:	Not reported
DUNs No:	Not reported	NPDES No:	Not reported
Creation:	10/22/93	Modified:	00/00/00
EPA ID:	Not reported		
Comments:	Not reported		

AM253 **BLUE CROSS LABORATORIES** **RCRIS-SQG** **1000196321**
SE **26411 N GOLDEN VALLEY RD** **FINDS** **CAD982521122**
> 1 **SAUGUS, CA 91350** **HAZNET**
6700 ft. **LOS ANGELES CO. HMS**
Higher **Site 6 of 11 in cluster AM**

BLUE CROSS LABORATORIES (Continued) **1000196321**

RCRIS:
Owner: BLUE CROSS LABORATORIES
(415) 555-1212
EPA ID: CAD982521122
Contact: ENVIRONMENTAL MANAGER
(805) 255-0955
Classification: Small Quantity Generator
Used Oil Recyc: No
TSDF Activities: Not reported

Violation Status: No violations found

FINDS:
Other Pertinent Environmental Activity Identified at Site:
Facility Registry System (FRS)
National Compliance Database (NCDB)
Resource Conservation and Recovery Act Information system (RCRAINFO)
Section Seven Tracking System (SSTS)

HAZNET:
Gepaid: CAD982521122
Tepaid: CAT000613893
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: 0.4292
Category: Aqueous solution with less than 10% total organic residues
Disposal Method: Transfer Station
Contact: DARRELL MAHLER
Telephone: (805) 255-0955
Mailing Address: 26411 N GOLDEN VALLEY RD
SAUGUS, CA 91350
County Los Angeles

Gepaid: CAD982521122
Tepaid: CAD980883177
Gen County: Los Angeles
Tsd County: Kern
Tons: 1.0216
Category: Unspecified oil-containing waste
Disposal Method: Recycler
Contact: DARRELL MAHLER
Telephone: (805) 255-0955
Mailing Address: 26411 N GOLDEN VALLEY RD
SAUGUS, CA 91350
County Los Angeles

Gepaid: CAD982521122
Tepaid: CAT080033681
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: .4170
Category: Alkaline solution without metals (pH > 12.5)
Disposal Method: Recycler
Contact: DARRELL MAHLER
Telephone: (805) 255-0955
Mailing Address: 26411 N GOLDEN VALLEY RD
SAUGUS, CA 91350

BLUE CROSS LABORATORIES (Continued) **1000196321**

County Los Angeles

Gepaid: CAD982521122
Tepaid: CAD008252405
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: 1.4386
Category: Unspecified solvent mixture Waste
Disposal Method: Recycler
Contact: DARRELL MAHLER
Telephone: (805) 255-0955
Mailing Address: 26411 N GOLDEN VALLEY RD
SAUGUS, CA 91350
County Los Angeles

Gepaid: CAD982521122
Tepaid: CAT080033681
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: .2085
Category: Liquids with pH <UN-> 2
Disposal Method: Recycler
Contact: DARRELL MAHLER
Telephone: (805) 255-0955
Mailing Address: 26411 N GOLDEN VALLEY RD
SAUGUS, CA 91350
County Los Angeles

The CA HAZNET database contains 3 additional records for this site.
Please contact your EDR Account Executive for more information.

HMS:
Facility Id: 006660-I06884
Facility Type: I09
Permit Number: 00008147B
Permit Status: Permit
Facility Status: Permit
Area: 7A
Region: Los Angeles County:

AM254 **CHMIRS S100279259**
SE **N/A**
> 1 **26411 GOLDEN VALLEY RD**
6700 ft. **SANTA CLARITA, CA 91350**
Higher

Site 7 of 11 in cluster AM

CHMIRS:

OES Control Number:	8905365	DOT ID:	Not reported
DOT Hazard Class:	Not Reported		
Chemical Name:	DYE		
Extent of Release:	Not reported		
CAS Number:	Not reported	Quantity Released:	100
Environmental Contamination:	Ground	Property Use:	Industrial, Utility
Incident Date:	25-MAR-89	Date Completed:	25-MAR-89
Time Completed :		1337	
Physical State Stored :		Solid	
Physical State Released :		Liquid	
Release Unit :		Gallons	
Container Description :		Not reported	
Container Type :		Not reported	
Container Material :		Not reported	
Level Of Container :		Not reported	

(Continued) **S100279259**

Container Capacity :	Not reported
Container Capacity Units (code) :	Not reported
Extent Of Release (code) :	7
Agency Id Number :	19110
Agency Incident Number :	34
OES Incident Number :	8905365
Time Notified :	1028
Surrounding Area :	936
Estimated Temperature :	60
Property Management :	C
More Than Two Substances Involved? :	Not reported
Special Studies 1 :	Not reported
Special Studies 2 :	Not reported
Special Studies 3 :	Not reported
Special Studies 4 :	Not reported
Special Studies 5 :	Not reported
Special Studies 6 :	Not reported
Responding Agency Personel # Of Injuries :	0
Responding Agency Personel # Of Fatalities :	0
Resp Agncy Personel # Of Decontaminated :	0
Others Number Of Decontaminated :	0
Others Number Of Injuries :	0
Others Number Of Fatalities :	0
Vehicle Make/year :	Not reported
Vehicle License Number :	Not reported
Vehicle State :	Not reported
Vehicle Id Number :	Not reported
CA/DOT/PUC/ICC Number :	Not reported
Company Name :	Not reported
Reporting Officer Name/ID :	CAPT. JOHN EVERETT
Report Date :	25-MAR-89
Comments :	Not reported
Facility Telephone Number :	213 267-2485

AK255 **UNOCAL CORP SS** **LOS ANGELES CO. HMS** **U002280350**
West **26279 N BOUQUET CANYON RD** **N/A**
> 1 **SANTA CLARITA, CA**
6711 ft.
Lower **Site 17 of 17 in cluster AK**

HMS:

Facility Id:	005834-I06048		
Facility Type:	I00		
Permit Number:	000003555	Permit Status:	Closed
Facility Status:	Closed	Area:	7A
Region:	Los Angeles County:		

Facility Id:	005834-006048		
Facility Type:	T0		
Permit Number:	00001350T	Permit Status:	Removed
Facility Status:	Removed	Area:	7A
Region:	Los Angeles County:		

AO256 **ED'S CLEANERS** **CLEANERS** **S105265842**
East **20655 SOLEDAD CANYON RD #30** **N/A**
> 1 **CANYON COUNTRY, CA 91351**
6733 ft.
Higher **Site 1 of 18 in cluster AO**

ED'S CLEANERS (Continued) **S105265842**

CA Cleaners:
Create Date: 11/14/1989
Inactive Date: 06/30/1998
EPA Id: CAL000020450
County : Los Angeles

AO257 **IVAN COHEN** **LOS ANGELES CO. HMS** **S103489699**
East **20655 W SOLEDAD CANYON RD #1** **N/A**
> 1 **SANTA CLARITA, CA**
6733 ft.
Higher **Site 2 of 18 in cluster AO**

HMS:
Facility Id: 016212-026575
Facility Type: Not reported
Permit Number: Not reported
Permit Status: Not reported
Facility Status: OPEN
Area: 7A
Region: Los Angeles County:

AO258 **SANTA CLARITA BREWING CO** **LOS ANGELES CO. HMS** **S102063997**
East **20655 W SOLEDAD CANYON RD #1** **N/A**
> 1 **SANTA CLARITA, CA**
6733 ft.
Higher **Site 3 of 18 in cluster AO**

HMS:
Facility Id: 016212-021239
Facility Type: I02
Permit Number: 000075908
Permit Status: Closed
Facility Status: Closed
Area: 7A
Region: Los Angeles County:

AO259 **EDS CLEANERS** **RCRIS-SQG** **1000472892**
East **20655 SOLEDAD CANYON RD** **FINDS** **CAD982434821**
> 1 **CANYON COUNTRY, CA 91351** **HAZNET**
6733 ft.
Higher **Site 4 of 18 in cluster AO**

RCRIS:
Owner: PEDRO MARTINEZ
(805) 252-6666
EPA ID: CAD982434821
Contact: PEDRO MARTINEZ
(805) 252-6666
Classification: Small Quantity Generator
Used Oil Recyc: No
TSDF Activities: Not reported

EDS CLEANERS (Continued) **1000472892**

Violation Status: No violations found

FINDS:
Other Pertinent Environmental Activity Identified at Site:
Facility Registry System (FRS)
Resource Conservation and Recovery Act Information system (RCRAINFO)

HAZNET:

Gepaid:	CAD982434821
Tepaid:	CAD981397417
Gen County:	Ventura
Tsd County:	Los Angeles
Tons:	.7572
Category:	Halogenated solvents (chloroform, methyl chloride, perchloroethylene, etc.)
Disposal Method:	Recycler
Contact:	PHILIPOUS EDWARD
Telephone:	(415) 555-1212
Mailing Address:	20655 SOLEDAD CANYON RD
	CANYON COUNTRY, CA 91351 - 2434
County	Ventura

Gepaid:	CAD982434821
Tepaid:	CAD981397417
Gen County:	Ventura
Tsd County:	Los Angeles
Tons:	0.8675
Category:	Halogenated solvents (chloroform, methyl chloride, perchloroethylene, etc.)
Disposal Method:	Recycler
Contact:	PHILIPOUS EDWARD
Telephone:	(415) 555-1212
Mailing Address:	20655 SOLEDAD CANYON RD
	CANYON COUNTRY, CA 91351 - 2434
County	Ventura

Gepaid:	CAD982434821
Tepaid:	CAD981397417
Gen County:	Ventura
Tsd County:	Los Angeles
Tons:	.5840
Category:	Halogenated solvents (chloroform, methyl chloride, perchloroethylene, etc.)
Disposal Method:	Recycler
Contact:	PHILIPOUS EDWARD
Telephone:	(415) 555-1212
Mailing Address:	20655 SOLEDAD CANYON RD
	CANYON COUNTRY, CA 91351 - 2434
County	Ventura

Gepaid:	CAD982434821
Tepaid:	CAD981397417
Gen County:	Ventura
Tsd County:	Los Angeles
Tons:	.7572
Category:	Halogenated solvents (chloroform, methyl chloride, perchloroethylene, etc.)
Disposal Method:	Recycler
Contact:	PHILIPOUS EDWARD
Telephone:	(415) 555-1212
Mailing Address:	20655 SOLEDAD CANYON RD
	CANYON COUNTRY, CA 91351 - 2434
County	Ventura

EDS CLEANERS (Continued) **1000472892**

Gepaid: CAD982434821
Tepaid: CAD981397417
Gen County: Ventura
Tsd County: Los Angeles
Tons: 21.3641
Category: Halogenated solvents (chloroform, methyl chloride, perchloroethylene, etc.)
Disposal Method: Recycler
Contact: PHILIPOUS EDWARD
Telephone: (415) 555-1212
Mailing Address: 20655 SOLEDAD CANYON RD
CANYON COUNTRY, CA 91351 - 2434
County Ventura

The CA HAZNET database contains 2 additional records for this site.
Please contact your EDR Account Executive for more information.

AO260 **ED'S CLEANERS** **CLEANERS** **S105266075**
East **20655 SOLEDAD CANYON RD #30** **N/A**
> 1 **CANYON COUNTRY, CA 91351**
6733 ft.
Higher **Site 5 of 18 in cluster AO**

CA Cleaners:
Create Date: 12/20/1993
Inactive Date: 06/30/1999
EPA Id: CAL000055441
County : Los Angeles

AO261 **CANYON COUNTRY VETERINARY** **HAZNET** **S103640884**
East **20655 SOLEDAD CANYON ROAD #18** **N/A**
> 1 **CANYON COUNTRY, CA 91351**
6733 ft.
Higher **Site 6 of 18 in cluster AO**

HAZNET:
Gepaid: CAL922594291
Tepaid: CAD981402522
Gen County: Los Angeles
Tsd County: Kern
Tons: .1251
Category: Photochemicals/photoprocessing waste
Disposal Method: Recycler
Contact: RAFAEL VILLICANA DVM
Telephone: (818) 244-7235
Mailing Address: 431 W LOS FELIZ RD
GLENDALE, CA 91204
County Los Angeles

Gepaid: CAL922594291
Tepaid: CAD981402522
Gen County: Los Angeles
Tsd County: Kern
Tons: .1250
Category: Photochemicals/photoprocessing waste
Disposal Method: Recycler
Contact: RAFAEL VILLICANA DVM
Telephone: (818) 244-7235
Mailing Address: 431 W LOS FELIZ RD

CANYON COUNTRY VETERINARY (Continued) **S103640884**

GLENDALE, CA 91204
County Los Angeles

Gepaid: CAL922594291
Tepaid: CAD981402522
Gen County: Los Angeles
Tsd County: Kern
Tons: .0583
Category: Photochemicals/photoprocessing waste
Disposal Method: Recycler
Contact: RAFAEL VILLICANA DVM
Telephone: (818) 244-7235
Mailing Address: 431 W LOS FELIZ RD
GLENDALE, CA 91204
County Los Angeles

Gepaid: CAL922594291
Tepaid: CAD981402522
Gen County: Los Angeles
Tsd County: Kern
Tons: .0625
Category: Photochemicals/photoprocessing waste
Disposal Method: Not reported
Contact: RAFAEL VILLICANA DVM
Telephone: (818) 244-7235
Mailing Address: 431 W LOS FELIZ RD
GLENDALE, CA 91204
County Los Angeles

Gepaid: CAL922594291
Tepaid: CAD981402522
Gen County: Los Angeles
Tsd County: Kern
Tons: .0625
Category: Photochemicals/photoprocessing waste
Disposal Method: Recycler
Contact: RAFAEL VILLICANA DVM
Telephone: (818) 244-7235
Mailing Address: 431 W LOS FELIZ RD
GLENDALE, CA 91204
County Los Angeles

The CA HAZNET database contains 4 additional records for this site.
Please contact your EDR Account Executive for more information.

AO262 **KWIK INK CREEEN PRINTING DESIGNS** **HAZNET** **S105090232**
East **26915 FURNIVALL** **N/A**
> 1 **CANYON COUNTRY, CA 91351**
6753 ft.
Higher **Site 7 of 18 in cluster AO**

HAZNET:
Gepaid: CAL000130330
Tepaid: CAT000613976
Gen County: Los Angeles
Tsd County: Orange
Tons: .1209
Category: Hydrocarbon solvents (benzene, hexane, Stoddard, etc.)
Disposal Method: Transfer Station
Contact: LINDA SPUNT

KWIK INK CREEEN PRINTING DESIGNS (Continued) **S105090232**

Telephone: (000) 000-0000
Mailing Address: 26915 FURNIVALL AVE
CANYON COUNTRY, CA 91351 - 2406
County Los Angeles

AO263 **LOLA OLSEN PROPERTIES** **HAZNET** **S102801965**
East **26917 FURNIVALL** **N/A**
> 1 **CANYON COUNTRY, CA 91351**
6753 ft.
Higher **Site 8 of 18 in cluster AO**

HAZNET:
Gepaid: CAC001013200
Tepaid: CAT080013352
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: .2293
Category: Waste oil and mixed oil
Disposal Method: Recycler
Contact: LOLA OR LYLE OLSEN
Telephone: (000) 000-0000
Mailing Address: 24599 WAYMAN
NEWHALL, CA 91321
County Los Angeles

AO264 **KOCH'S** **LOS ANGELES CO. HMS** **S103945496**
East **26917 FURNIVALL AVE** **N/A**
> 1 **SANTA CLARITA, CA**
6753 ft.
Higher **Site 9 of 18 in cluster AO**

HMS:
Facility Id: 019961-028480
Facility Type: Not reported
Permit Number: Not reported
Permit Status: Not reported
Facility Status: OPEN
Area: 7A
Region: Los Angeles County:

AO265 **B & D GLASS** **LOS ANGELES CO. HMS** **S103945497**
East **26919 FURNIVALL AVE** **N/A**
> 1 **SANTA CLARITA, CA**
6753 ft.
Higher **Site 10 of 18 in cluster AO**

HMS:
Facility Id: 019962-028481
Facility Type: Not reported
Permit Number: Not reported
Permit Status: Not reported
Facility Status: OPEN
Area: 7A
Region: Los Angeles County:

AO266 **PRECISION CNC PRODUCTS** **HAZNET** **S105091015**
East **26921 1/2 FURNIVALL ST** **N/A**
> 1 **CANYON COUNTRY, CA 91351**
6754 ft.
Higher **Site 11 of 18 in cluster AO**

PRECISION CNC PRODUCTS (Continued) **S105091015**

HAZNET:
Gepaid: CAL000174103
Tepaid: CAT080013352
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: 1.0425
Category: Oil/water separation sludge
Disposal Method: Recycler
Contact: EMMIT NEAL
Telephone: (661) 252-6072
Mailing Address: 26921 1/2 FURNIVALL AVE
CANYON COUNTRY, CA 91351 - 2406
County Los Angeles

AO267 **DICK SANCHEZ AUTO BODY** **LOS ANGELES CO. HMS** **S103945499**
East **26935 FURNIVALL AVE** **N/A**
> 1 **SANTA CLARITA, CA**
6755 ft.
Higher **Site 12 of 18 in cluster AO**

HMS:
Facility Id: 019963-028482
Facility Type: Not reported
Permit Number: Not reported
Permit Status: Not reported
Facility Status: OPEN
Area: 7A
Region: Los Angeles County:

AO268 **BROWN AUTO BODY** **RCRIS-SQG** **1000437307**
East **26935 FURNIVALL** **FINDS** **CAD981649270**
> 1 **CANYON COUNTRY, CA 91351** **HAZNET**
6755 ft.
Higher **Site 13 of 18 in cluster AO**

RCRIS:
Owner: LAWERNCE
(415) 555-1212
EPA ID: CAD981649270
Contact: ENVIRONMENTAL MANAGER
(805) 251-5555
Classification: Small Quantity Generator
Used Oil Recyc: No
TSDF Activities: Not reported

Violation Status: No violations found

FINDS:
Other Pertinent Environmental Activity Identified at Site:
Facility Registry System (FRS)
Resource Conservation and Recovery Act Information system (RCRAINFO)

BROWN AUTO BODY (Continued) **1000437307**

HAZNET:
Gepaid: CAD981649270
Tepaid: CAT000613893
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: .0740
Category: Oxygenated solvents (acetone, butanol, ethyl acetate, etc.)
Disposal Method: Transfer Station
Contact: Not reported
Telephone: (000) 000-0000
Mailing Address: 26935 FURNIVALL
CANYON COUNTRY, CA 91351
County Los Angeles

AO269 **STORAGE LOT** **LOS ANGELES CO. HMS** **S102321791**
East **26949 N FURNIVALL AVE** **N/A**
> 1 **SANTA CLARITA, CA**
6758 ft.
Higher

Site 14 of 18 in cluster AO

HMS:
Facility Id: 017445-023745
Facility Type: T1
Permit Number: 000167815 Permit Status: Removed
Facility Status: Removed Area: 7A
Region: Los Angeles County:

AO270 **WILLIAM ETTER & PATRICK BETZ** **HAZNET** **S103648167**
East **26949 FURNIBAL AVE** **N/A**
> 1 **CANYON COUNTRY, CA 91351**
6758 ft.
Higher

Site 15 of 18 in cluster AO

HAZNET:
Gepaid: CAC001061056
Tepaid: CAT080013352
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: 2.2935
Category: Unspecified oil-containing waste
Disposal Method: Recycler
Contact: WILLIAM ETTER AND PATRICK BETZ
Telephone: (000) 000-0000
Mailing Address: 5120 VIA CUPERTINO
CAMARILLO, CA 93012
County Los Angeles

AP271 **STAATS CONSTRUCTION** **HAZNET** **S103648172**
East **26951 FURNIVAL** **LOS ANGELES CO. HMS** **N/A**
> 1 **CANYON COUNTRY, CA 91351**
6758 ft.
Higher

Site 1 of 6 in cluster AP

STAATS CONSTRUCTION (Continued) **S103648172**

HAZNET:
Gepaid: CAL000148813
Tepaid: CAT080013352
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: 2.2935
Category: Unspecified oil-containing waste
Disposal Method: Recycler
Contact: WILL STAATS JR & STEVEN STAATS
Telephone: (805) 263-7688
Mailing Address: 22211 NEWHALL RANCH RD
SAUGUS, CA 91350
County Los Angeles

Gepaid: CAL000148813
Tepaid: CAT080013352
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: .2293
Category: Unspecified aqueous solution
Disposal Method: Recycler
Contact: WILL STAATS JR & STEVEN STAATS
Telephone: (805) 263-7688
Mailing Address: 22211 NEWHALL RANCH RD
SAUGUS, CA 91350
County Los Angeles

HMS:
Facility Id: 017444-023744
Facility Type: T1
Permit Number: 000167808 Permit Status: Removed
Facility Status: Removed Area: 7A
Region: Los Angeles County:

AP272 **PACIFIC BELL CNCYCAPB/KC652** **LOS ANGELES CO. HMS** **S102064478**
East **26971 N FURNIVALL AVE** **N/A**
> 1 **SANTA CLARITA, CA**
6760 ft.
Higher **Site 2 of 6 in cluster AP**

HMS:
Facility Id: 006475-006695
Facility Type: T0
Permit Number: 00001681T Permit Status: Removed
Facility Status: Permit Area: 7A
Region: Los Angeles County:

AP273 **PACIFIC BELL CNCYCAPB/KC652** **UST** **U003776157**
East **26971 FURNIVALL AVE** **N/A**
> 1 **CANYON COUNTRY, CA 91351**
6760 ft.
Higher **Site 3 of 6 in cluster AP**

State UST:
Facility ID: 6695
Total Tanks: 1
Region: STATE
Local Agency: 19000

AP274
East
> 1
6760 ft.
Higher

PACIFIC BELL (KC-652)
26971 FURNIVALL AVE
CANYON COUNTRY, CA 91350

HIST UST **U001567715**
N/A

Site 4 of 6 in cluster AP

UST HIST:

Facility ID:	16788		
Tank Num:	1	Container Num:	D-70-10K
Tank Capacity:	10000	Year Installed:	1970
Tank Used for:	PRODUCT		
Type of Fuel:	DIESEL	Tank Construction:	Not reported
Leak Detection:	None		
Contact Name:	E. J. KOEHLER	Telephone:	(415) 542-6758
Total Tanks:	3	Region:	STATE
Facility Type:	2	Other Type:	PHONE CO.

Facility ID:	16788		
Tank Num:	2	Container Num:	G-70-10K
Tank Capacity:	10000	Year Installed:	1970
Tank Used for:	PRODUCT		
Type of Fuel:	UNLEADED	Tank Construction:	Not reported
Leak Detection:	None		
Contact Name:	E. J. KOEHLER	Telephone:	(415) 542-6758
Total Tanks:	3	Region:	STATE
Facility Type:	2	Other Type:	PHONE CO.

Facility ID:	16788		
Tank Num:	3	Container Num:	W-700550
Tank Capacity:	550	Year Installed:	1970
Tank Used for:	WASTE		
Type of Fuel:	WASTE OIL	Tank Construction:	Not reported
Leak Detection:	None		
Contact Name:	E. J. KOEHLER	Telephone:	(415) 542-6758
Total Tanks:	3	Region:	STATE
Facility Type:	2	Other Type:	PHONE CO.

AP275
East
> 1
6760 ft.
Higher

PACIFIC BELL
26971 FURNIVALL AVE
SANTA CLARITA, CA 91350

LUST **S100458324**
Cortese **N/A**
LOS ANGELES CO. HMS

Site 5 of 6 in cluster AP

State LUST:

Cross Street:	SOLIDAD ST		
Qty Leaked:	Not reported		
Case Number	I-06695		
Reg Board:	4		
Chemical:	Waste Oil		
Lead Agency:	Regional Board		
Local Agency :	19000		
Case Type:	Soil only		
Status:	Not reported		
County:	Los Angeles		
Review Date:	Not reported	Confirm Leak:	Not reported
Workplan:	12/31/91	Prelim Assess:	12/31/91
Pollution Char:	Not reported	Remed Plan:	Not reported
Remed Action:	Not reported	Monitoring:	Not reported
Close Date:	10/30/96		
Release Date:	Not reported		
Cleanup Fund Id :	Not reported		

PACIFIC BELL (Continued) **S100458324**

Discover Date : 7/18/91
Enforcement Dt : Not reported
Enf Type: Not reported
Enter Date : 3/14/92
Funding: Federal Funds
Staff Initials: Not reported
How Discovered: Other Means
How Stopped: Other Means
Interim : Not reported
Leak Cause: Unknown
Leak Source: Unknown
MTBE Date : Not reported
Max MTBE GW : Not reported
MTBE Tested: Not Required to be Tested.
Priority: Not reported
Local Case # : Not reported
Beneficial: Not reported
Staff : JLC
GW Qualifies : Not reported
Max MTBE Soil : Not reported
Soil Qualifies : Not reported
Hydr Basin #: Not reported
Operator : Not reported
Oversight Prgm: RB Lead Underground Storage Tank
Oversight Prgm : UST
Review Date : 1/22/97
Stop Date : 7/18/91
Work Suspended : Not reported
Responsible Party PACIFIC BELL
RP Address: 177 E COLORADO BLVD, PASADENA CA 91105
Global Id: T0603703250
Org Name: Not reported
Contact Person: Not reported
MTBE Conc: 0
Mtbe Fuel: Not reported
Water System Name: Not reported
Well Name: Not reported
Distance To Lust: 823.5307398
Waste Discharge Global ID: Not reported
Waste Disch Assigned Name: Not reported

LUST Region 4:
Report Date: 12/31/1991
Lead Agency: Regional Board
Local Agency: 19000
Case Number: I-06695
Substance: Waste Oil
Case Type: Soil
Status: Case Closed
Region: 4
Staff: Not reported

CORTESE:
Reg Id: I-06695
Region: CORTESE
Reg By: Leaking Underground Storage Tanks

HMS:
Facility Id: 006475-I06695

PACIFIC BELL (Continued) **S100458324**

Facility Type:	I01		
Permit Number:	000006449	Permit Status:	Closed
Facility Status:	Permit	Area:	7A
Region:	Los Angeles County:		

AM276 **CITY OF SANTA CLARITA** **HAZNET** **S105085565**
SE **26407 GOLDEN VALLEY RD** **LOS ANGELES CO. HMS** **N/A**
> 1 **SANTA CLARITA, CA 91350**
6760 ft.
Higher **Site 8 of 11 in cluster AM**

HAZNET:

Gepaid:	CAC002249057
Tepaid:	CAD028409019
Gen County:	Los Angeles
Tsd County:	Los Angeles
Tons:	42.1400
Category:	Other organic solids
Disposal Method:	Transfer Station
Contact:	CITY OF SANTA CLARITA
Telephone:	(661) 255-4994
Mailing Address:	PO BOX 278
	NEWHALL, CA 91322
County	Los Angeles

Gepaid:	CAC002249057
Tepaid:	CAD009007626
Gen County:	Los Angeles
Tsd County:	Los Angeles
Tons:	.8428
Category:	Asbestos-containing waste
Disposal Method:	Disposal, Land Fill
Contact:	CITY OF SANTA CLARITA
Telephone:	(661) 255-4994
Mailing Address:	PO BOX 278
	NEWHALL, CA 91322
County	Los Angeles

HMS:

Facility Id:	026826-037353		
Facility Type:	Not reported		
Permit Number:	Not reported	Permit Status:	Not reported
Facility Status:	OPEN	Area:	7A
Region:	Los Angeles County:		

AM277 **MERLE NORMAN COSMETICS** **CA FID UST** **S101586567**
SE **26407 N GOLDEN VALLEY RD** **N/A**
> 1 **SANTA CLARITA, CA 91350**
6760 ft.
Higher **Site 9 of 11 in cluster AM**

MERLE NORMAN COSMETICS (Continued) **S101586567**

FID:

Facility ID:	19054074	Regulate ID:	00017414
Reg By:	Inactive Underground Storage Tank Location		
Cortese Code:	Not reported	SIC Code:	Not reported
Status:	Inactive	Facility Tel:	(805) 251-6610
Mail To:	Not reported 15180 BLEDSOE ST SANTA CLARITA, CA 91350		
Contact:	Not reported	Contact Tel:	Not reported
DUNs No:	Not reported	NPDES No:	Not reported
Creation:	10/22/93	Modified:	00/00/00
EPA ID:	Not reported		
Comments:	Not reported		

AM278 **MERLE NORMAN COSMETICS, INC.** **Cal-Sites** **S103883825**
SE **26407 N. GOLDEN VALLEY ROAD** **N/A**
> 1 **SANTA CLARITA, CA 91350**
6760 ft.
Higher **Site 10 of 11 in cluster AM**

CAL-SITES:

Facility ID	19390049	
Status:	VCP - VOLUNTARY CLEANUP PROGRAM (VCP)	
Status Date:	05/02/1999	
Lead:	Not reported	
Region:	3 - BURBANK	
Branch:	SA - SOUTHERN CA. - A	
File Name:	Not reported	
Status Name:	VOLUNTARY CLEANUP PROGRAM	
Lead Agency:	N/A	Not reported
NPL:	Not reported	
SIC:	39 MISCELLANEOUS MANUFACTURING INDUSTRIES	
Facility Type:	VOLUNTARY CLEANUP PROGRAM	
Type Name:	VCP	
Staff Member Responsible for Site:	RKRUG	
Supervisor Responsible for Site:	HJECHE	
Region Water Control Board:	Not reported	
Access:	Not reported	
Cortese:	Not reported	
Hazardous Ranking Score:	Not reported	
Date Site Hazard Ranked:	Not reported	
Groundwater Contamination:	Not reported	
No. of Contamination Sources:	0	
Lat/Long:	0° 0′ 0.00″ / 0° 0′ 0.00″	
Lat/long Method:	Not reported	
State Assembly District Code:	36	
State Senate District:	17	

The CAL-SITES database may contain additional details for this site.
Please contact your EDR Account Executive for more information.

AM279 **SAUGUS FACILITY** **HIST UST** **U001567755**
SE **26407 GOLDEN VALLEY RD** **N/A**
> 1 **SAUGUS, CA 91351**
6760 ft.
Higher **Site 11 of 11 in cluster AM**

SAUGUS FACILITY (Continued) **U001567755**

UST HIST:

Facility ID:	17414		
Tank Num:	1	Container Num:	1
Tank Capacity:	10000	Year Installed:	1979
Tank Used for:	PRODUCT		
Type of Fuel:	PREMIUM	Tank Construction:	1/4 gauge
Leak Detection:	Visual		
Contact Name:	JAMES ARMOUR	Telephone:	(213) 367-1085
Total Tanks:	4	Region:	STATE
Facility Type:	2	Other Type:	DISTRIBUTOR

Facility ID:	17414		
Tank Num:	2	Container Num:	2
Tank Capacity:	10000	Year Installed:	1979
Tank Used for:	PRODUCT		
Type of Fuel:	PREMIUM	Tank Construction:	1/412 inches
Leak Detection:	Visual		
Contact Name:	JAMES ARMOUR	Telephone:	(213) 367-1085
Total Tanks:	4	Region:	STATE
Facility Type:	2	Other Type:	DISTRIBUTOR

Facility ID:	17414		
Tank Num:	3	Container Num:	3
Tank Capacity:	10000	Year Installed:	1979
Tank Used for:	PRODUCT		
Type of Fuel:	PREMIUM	Tank Construction:	1/4 gauge
Leak Detection:	Visual		
Contact Name:	JAMES ARMOUR	Telephone:	(213) 367-1085
Total Tanks:	4	Region:	STATE
Facility Type:	2	Other Type:	DISTRIBUTOR

Facility ID:	17414		
Tank Num:	4	Container Num:	4
Tank Capacity:	10000	Year Installed:	1979
Tank Used for:	PRODUCT		
Type of Fuel:	DIESEL	Tank Construction:	1/4 gauge
Leak Detection:	Visual		
Contact Name:	JAMES ARMOUR	Telephone:	(213) 367-1085
Total Tanks:	4	Region:	STATE
Facility Type:	2	Other Type:	DISTRIBUTOR

AP280 **PACIFIC BELL** **HAZNET** **1000250084**
East **26971 N FUNIVALL AVE** **N/A**
> 1 **CANYON COUNTRY, CA 91351**
6770 ft.
Higher **Site 6 of 6 in cluster AP**

HAZNET:

Gepaid:	CAD980891816
Tepaid:	CAT000613893
Gen County:	Los Angeles
Tsd County:	Los Angeles
Tons:	.4083
Category:	Liquids with halogenated organic compounds > 1000 mg/l
Disposal Method:	Transfer Station
Contact:	PACIFIC BELL
Telephone:	(925) 823-6161
Mailing Address:	PO BOX 5095 RM 3E000

PACIFIC BELL (Continued) **1000250084**

SAN RAMON, CA 94583 - 0995
County Los Angeles

Gepaid: CAD980891816
Tepaid: CAD981696420
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: .3961
Category: Waste oil and mixed oil
Disposal Method: Transfer Station
Contact: PACIFIC BELL
Telephone: (925) 823-6161
Mailing Address: PO BOX 5095 RM 3E000
SAN RAMON, CA 94583 - 0995
County Los Angeles

Gepaid: CAD980891816
Tepaid: CAD981696420
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: .1251
Category: Oil/water separation sludge
Disposal Method: Not reported
Contact: PACIFIC BELL
Telephone: (925) 823-6161
Mailing Address: PO BOX 5095 RM 3E000
SAN RAMON, CA 94583 - 0995
County Los Angeles

Gepaid: CAD980891816
Tepaid: CAT080013352
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: 4.2534
Category: Unspecified oil-containing waste
Disposal Method: Recycler
Contact: PACIFIC BELL
Telephone: (925) 823-6161
Mailing Address: PO BOX 5095 RM 3E000
SAN RAMON, CA 94583 - 0995
County Los Angeles

Gepaid: CAD980891816
Tepaid: CAD044429835
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: .3127
Category: Waste oil and mixed oil
Disposal Method: Recycler
Contact: PACIFIC BELL
Telephone: (925) 823-6161
Mailing Address: PO BOX 5095 RM 3E000
SAN RAMON, CA 94583 - 0995
County Los Angeles

The CA HAZNET database contains 20 additional records for this site.
Please contact your EDR Account Executive for more information.

AQ281 **SANTA CLARITA CAR WASH INC** **HAZNET** **S100852736**
West **23105 VALENCIA BLVD** **Cortese** **N/A**
> 1 **SANTA CLARITA, CA 91305**
6831 ft.
Lower **Site 1 of 6 in cluster AQ**

HAZNET:
Gepaid: CAC002204865
Tepaid: CAD982484933
Gen County: Los Angeles
Tsd County: 7
Tons: .5000
Category: Empty containers less than 30 gallons
Disposal Method: Disposal, Other
Contact: SANTA CLARITA CAR WASH INC
Telephone: (000) 000-0000
Mailing Address: 23105 VALENCIA BLVD
SANTA CLARITA, CA 91305
County Los Angeles

CORTESE:
Reg Id: I-06508
Region: CORTESE
Reg By: Leaking Underground Storage Tanks

AQ282 **MICHAEL J SCANLON** **HIST UST** **U001567869**
West **23105 VALENCIA BLVD** **N/A**
> 1 **VALENCIA, CA 91355**
6831 ft.
Lower **Site 2 of 6 in cluster AQ**

UST HIST:

Facility ID:	26689		
Tank Num:	1	Container Num:	0000000001
Tank Capacity:	10000	Year Installed:	1968
Tank Used for:	PRODUCT		
Type of Fuel:	Not Reported	Tank Construction:	Not reported
Leak Detection:	Stock Inventor		
Contact Name:	Not reported	Telephone:	(000) 000-0000
Total Tanks:	6	Region:	STATE
Facility Type:	1	Other Type:	Not reported

Facility ID:	26689		
Tank Num:	2	Container Num:	0000000002
Tank Capacity:	4000	Year Installed:	1968
Tank Used for:	PRODUCT		
Type of Fuel:	Not Reported	Tank Construction:	Not reported
Leak Detection:	Stock Inventor		
Contact Name:	Not reported	Telephone:	(000) 000-0000
Total Tanks:	6	Region:	STATE
Facility Type:	1	Other Type:	Not reported

Facility ID:	26689		
Tank Num:	3	Container Num:	0000000003
Tank Capacity:	4000	Year Installed:	1968
Tank Used for:	PRODUCT		
Type of Fuel:	Not Reported	Tank Construction:	Not reported
Leak Detection:	Stock Inventor		
Contact Name:	Not reported	Telephone:	(000) 000-0000
Total Tanks:	6	Region:	STATE
Facility Type:	1	Other Type:	Not reported

MICHAEL J SCANLON (Continued) **U001567869**

Facility ID:	26689		
Tank Num:	4	Container Num:	0000000004
Tank Capacity:	6000	Year Installed:	1968
Tank Used for:	PRODUCT		
Type of Fuel:	Not Reported	Tank Construction:	Not reported
Leak Detection:	Stock Inventor		
Contact Name:	Not reported	Telephone:	(000) 000-0000
Total Tanks:	6	Region:	STATE
Facility Type:	1	Other Type:	Not reported

Facility ID:	26689		
Tank Num:	5	Container Num:	0000000005
Tank Capacity:	6000	Year Installed:	1971
Tank Used for:	PRODUCT		
Type of Fuel:	Not Reported	Tank Construction:	Not reported
Leak Detection:	Stock Inventor		
Contact Name:	Not reported	Telephone:	(000) 000-0000
Total Tanks:	6	Region:	STATE
Facility Type:	1	Other Type:	Not reported

Facility ID:	26689		
Tank Num:	6	Container Num:	0000000006
Tank Capacity:	550	Year Installed:	1978
Tank Used for:	PRODUCT		
Type of Fuel:	WASTE OIL	Tank Construction:	0000093 inches
Leak Detection:	Stock Inventor		
Contact Name:	Not reported	Telephone:	(000) 000-0000
Total Tanks:	6	Region:	STATE
Facility Type:	1	Other Type:	Not reported

AQ283 **ARCO #1974** **LUST S102424196**
West **23105 VALENCIA BLVD** **N/A**
> 1 **VALENCIA, CA 91355**
6831 ft.
Lower **Site 3 of 6 in cluster AQ**

State LUST:

Cross Street:	BOUQUET CYN		
Qty Leaked:	Not reported		
Case Number	I-06508		
Reg Board:	4		
Chemical:	Gasoline		
Lead Agency:	Regional Board		
Local Agency :	19000		
Case Type:	Other ground water affected		
Status:	Not reported		
County:	Los Angeles		
Review Date:	Not reported	Confirm Leak:	Not reported
Workplan:	5/21/91	Prelim Assess:	5/21/91
Pollution Char:	Not reported	Remed Plan:	Not reported
Remed Action:	Not reported	Monitoring:	Not reported
Close Date:	7/24/96		
Release Date:	Not reported		
Cleanup Fund Id :	Not reported		
Discover Date :	2/18/91		
Enforcement Dt :	Not reported		
Enf Type:	Not reported		
Enter Date :	5/22/91		

ARCO #1974 (Continued) **S102424196**

Funding: Not reported
Staff Initials: Not reported
How Discovered: Other Means
How Stopped: Other Means
Interim : Not reported
Leak Cause: Unknown
Leak Source: Unknown
MTBE Date : Not reported
Max MTBE GW : Not reported
MTBE Tested: Site NOT Tested for MTBE.Includes Unknown and Not Analyzed.
Priority: Not reported
Local Case # : Not reported
Beneficial: Not reported
Staff : JLC
GW Qualifies : Not reported
Max MTBE Soil : Not reported
Soil Qualifies : Not reported
Hydr Basin #: Not reported
Operator : Not reported
Oversight Prgm: RB Lead Underground Storage Tank
Oversight Prgm : UST
Review Date : 7/24/96
Stop Date : Not reported
Work Suspended :Not reported
Responsible PartyARCO PRODUCTS CO.
RP Address: 17315 STUDEBAKER RD., CERRITOS, 90701 C
Global Id: T0603703223
Org Name: Not reported
Contact Person: Not reported
MTBE Conc: 0
Mtbe Fuel: Not reported
Water System Name: Not reported
Well Name: Not reported
Distance To Lust: 747.4457011
Waste Discharge Global ID: Not reported
Waste Disch Assigned Name: Not reported

LUST Region 4:
Report Date: 5/21/1991
Lead Agency: Regional Board
Local Agency: 19000
Case Number: I-06508
Substance: Gasoline
Case Type: Groundwater
Status: Case Closed
Region: 4
Staff: Not reported

AQ284 **CROSS ROADS AUTO WASH** **UST** **U003777333**
West **23105 VALENCIA BLVD** **LOS ANGELES CO. HMS** **N/A**
> 1 **VALENCIA, CA 91355**
6831 ft.
Lower **Site 4 of 6 in cluster AQ**

HMS:
Facility Id: 006290-016804
Facility Type: TO
Permit Number: 00006303T Permit Status: Permit
Facility Status: Permit Area: 7

CROSS ROADS AUTO WASH (Continued) **U003777333**

Region: Los Angeles County:

State UST:
Facility ID: 16804
Total Tanks: 1
Region: STATE
Local Agency: 19000

AQ285 **MCDONALDS RESTAURANT** **LOS ANGELES CO. HMS** **S104538553**
West **23111 W VALENCIA BLVD** **N/A**
> 1 **SANTA CLARITA, CA**
6865 ft.
Lower **Site 5 of 6 in cluster AQ**

HMS:
Facility Id: 007721-I08155
Facility Type: I01
Permit Number: 000009230 Permit Status: Removed
Facility Status: Removed Area: 7A
Region: Los Angeles County:

AR286 **DESIGN MASONRY INC** **HAZNET** **S103960561**
East **27121 FURNIVAL** **N/A**
> 1 **CANYON COUNTRY, CA 91351**
6875 ft.
Higher **Site 1 of 4 in cluster AR**

HAZNET:
Gepaid: CAL000068574
Tepaid: CAT000613893
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: .0625
Category: Aqueous solution with less than 10% total organic residues
Disposal Method: Treatment, Tank
Contact: CARPENTER RANDALL
Telephone: (805) 298-1013
Mailing Address: 27121 FURNIVALL AVE
CANYON COUNTRY, CA 91351 - 2460
County Los Angeles

Gepaid: CAL000068574
Tepaid: CAT000613893
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: .2001
Category: Aqueous solution with less than 10% total organic residues
Disposal Method: Transfer Station
Contact: CARPENTER RANDALL
Telephone: (805) 298-1013
Mailing Address: 27121 FURNIVALL AVE
CANYON COUNTRY, CA 91351 - 2460
County Los Angeles

DESIGN MASONRY INC (Continued) **S103960561**

Gepaid: CAL000068574
Tepaid: CAD093459485
Gen County: Los Angeles
Tsd County: Fresno
Tons: .0625
Category: Organic liquids with metals Alkaline solution (pH <UN-> 12.5) with metals (antimony, arsenic, barium, beryllium, cadmium, chromium, cobalt, copper, lead, mercury, molybdenum, nickel, selenium, silver, thallium, vanadium, and zinc)
Disposal Method: Transfer Station
Contact: CARPENTER RANDALL
Telephone: (805) 298-1013
Mailing Address: 27121 FURNIVALL AVE
CANYON COUNTRY, CA 91351 - 2460
County Los Angeles

Gepaid: CAL000068574
Tepaid: CAT000613893
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: 0.0625
Category: Aqueous solution with less than 10% total organic residues
Disposal Method: Transfer Station
Contact: CARPENTER RANDALL
Telephone: (805) 298-1013
Mailing Address: 27121 FURNIVALL AVE
CANYON COUNTRY, CA 91351 - 2460
County Los Angeles

AO287 **SANTA CLARITA CAR WASH** **LOS ANGELES CO. HMS** **U003056486**
East **20625 SOLEDAD CANYON RD** **N/A**
> 1 **SANTA CLARITA, CA**
6881 ft.
Higher **Site 16 of 18 in cluster AO**

HMS:
Facility Id: 000026-I00026
Facility Type: I01
Permit Number: 000010382 Permit Status: Permit
Facility Status: Permit Area: 7A
Region: Los Angeles County:

AR288 **CALIFORNIA COLLECTIBLE COACH WORKS** **HAZNET** **S104582536**
ENE **27134 FURNIVALL AVE** **N/A**
> 1 **CANYON COUNTRY, CA 91351**
6882 ft.
Higher **Site 2 of 4 in cluster AR**

HAZNET:
Gepaid: CAL000197332
Tepaid: CAD008302903
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: 0.1459
Category: Oxygenated solvents (acetone, butanol, ethyl acetate, etc.)
Disposal Method: Recycler
Contact: MIKE HOGAN
Telephone: (000) 000-0000

CALIFORNIA COLLECTIBLE COACH WORKS (Continued) **S104582536**

Mailing Address: 27134 FURNIVALL AVE
CANYON COUNTRY, CA 91351
County Los Angeles

AR289 **EUROPEAN AUTO CENTER** **RCRIS-SQG** **1000340138**
ENE **27134 FURNIVALL AVE** **FINDS** **CAD981652472**
> 1 **CANYON COUNTRY, CA 91351**
6882 ft.
Higher **Site 3 of 4 in cluster AR**

RCRIS:
Owner: PFLUEGLER JACOB
(415) 555-1212
EPA ID: CAD981652472
Contact: ENVIRONMENTAL MANAGER
(805) 251-3500
Classification: Small Quantity Generator
Used Oil Recyc: No
TSDF Activities: Not reported

Violation Status: No violations found

FINDS:
Other Pertinent Environmental Activity Identified at Site:
Facility Registry System (FRS)
Resource Conservation and Recovery Act Information system (RCRAINFO)

AR290 **JERRYS AUTOMATIC TRANS RP** **LOS ANGELES CO. HMS** **U003060708**
ENE **20601 W SANTA CLARA ST** **N/A**
> 1 **SANTA CLARITA, CA**
6897 ft.
Higher **Site 4 of 4 in cluster AR**

HMS:
Facility Id: 004543-I04717
Facility Type: I00
Permit Number: 000002139 Permit Status: Closed
Facility Status: Closed Area: 7A
Region: Los Angeles County:

AS291 **GERMAN AUTO CENTER** **HAZNET** **S104577098**
WSW **23051 DRAYTON ST** **N/A**
> 1 **SAUGUS, CA 91350**
6924 ft.
Lower **Site 1 of 8 in cluster AS**

HAZNET:
Gepaid: CAL000068583
Tepaid: CAD099452708
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: .2293
Category: Unspecified organic liquid mixture
Disposal Method: Recycler
Contact: HOLLATZ NELLY
Telephone: (000) 000-0000
Mailing Address: 23051 DRAYTON ST

GERMAN AUTO CENTER (Continued) **S104577098**

SANTA CLARITA, CA 91350 - 2545
County: Los Angeles

Gepaid: CAL000068583
Tepaid: CAT000613893
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: 0.1042
Category: Aqueous solution with less than 10% total organic residues
Disposal Method: Transfer Station
Contact: HOLLATZ NELLY
Telephone: (000) 000-0000
Mailing Address: 23051 DRAYTON ST
SANTA CLARITA, CA 91350 - 2545
County: Los Angeles

AS292 **GERMAN AUTO CENTERS INC.** **LOS ANGELES CO. HMS** **S103945144**
WSW **23051 DRAYTON AVE** **N/A**
> 1 **SANTA CLARITA, CA**
6924 ft.
Lower

Site 2 of 8 in cluster AS

HMS:
Facility Id: 019951-028469
Facility Type: Not reported
Permit Number: Not reported
Permit Status: Not reported
Facility Status: OPEN
Area: 7A
Region: Los Angeles County:

AO293 **MED TRANS CORP.** **LOS ANGELES CO. HMS** **S104538366**
East **20607 W SOLEDAD CANYON RD** **N/A**
> 1 **SANTA CLARITA, CA**
6980 ft.
Higher

Site 17 of 18 in cluster AO

HMS:
Facility Id: 016594-022070
Facility Type: T1
Permit Number: 000108769
Permit Status: Removed
Facility Status: Removed
Area: 7A
Region: Los Angeles County:

AO294 **NEW HALL AMBULANCE** **HIST UST** **U001567751**
East **20607 SOLEDAD CANYON RD** **N/A**
> 1 **CANYON COUNTRY, CA 91351**
6980 ft.
Higher

Site 18 of 18 in cluster AO

UST HIST:
Facility ID: 6329
Tank Num: 1
Container Num: 333
Tank Capacity: 5000
Year Installed: 1974
Tank Used for: PRODUCT
Type of Fuel: REGULAR
Tank Construction: Not reported
Leak Detection: Stock Inventor
Contact Name: Not reported
Telephone: (805) 251-3111
Total Tanks: 1
Region: STATE
Facility Type: 2
Other Type: AMBULANCE SER.

AS295
WSW
> 1
7053 ft.
Lower

CNTY LA SANITATION DIST/SAUGUS WRP — HAZNET — S103647576
26200 SPRINGBOOK AVE — N/A
SAUGUS, CA 91350, CA 91350

Site 3 of 8 in cluster AS

HAZNET:

Gepaid:	CAL000096581
Tepaid:	CAL000113451
Gen County:	Los Angeles
Tsd County:	Los Angeles
Tons:	.2293
Category:	Unspecified organic liquid mixture
Disposal Method:	Transfer Station
Contact:	LA CNTY SANITATION DIST OF LA
Telephone:	(562) 699-7411
Mailing Address:	PO BOX 4998
	WHITTIER, CA 90607 - 4998
County	Los Angeles

AS296
WSW
> 1
7053 ft.
Lower

LA CO SAN DIS-SAUGUS WRP — UST — U003776074
26200 SPRINGBROOK AVE — N/A
SANTA CLARITA, CA 91350

Site 4 of 8 in cluster AS

State UST:

Facility ID:	5146
Total Tanks:	1
Region:	STATE
Local Agency:	19000

AS297
WSW
> 1
7053 ft.
Lower

LA CO., SANITATION DIST — FINDS — 1004441980
26200 SPRINGBROOK AVE — 110002422637
SAUGUS, CA 91350

Site 5 of 8 in cluster AS

FINDS:

Other Pertinent Environmental Activity Identified at Site:
- Facility Registry System (FRS)
- National Emissions Trends (NET)
- Permit Compliance System (PCS)

AS298
WSW
> 1
7053 ft.
Lower

SAUGUS WWRP, NPDES — CA WDS — 1001612767
26200 SPRINGBROOK AVE — N/A
SAUGUS, CA 91350

Site 6 of 8 in cluster AS

WDS:

Facility ID:	Santa Clara River 190107021		
Facility Contact	Paul Lemay	Facility Telephone	(661) 259-3804
SIC Code:	4952	SIC Code 2:	Not reported
Agency Name:	LOS ANGELES COUNTY SAN DIST		
Agency Address:	1955 Workman Mill Rd.		
	Whittier 90607		
Agency Contact:	Earle C. Hartling	Agency Phone:	(562) 699-7411
Design Flow:	7 Million Gal/Day	Baseline Flow:	7 Million Gal/Day
Facility Type:	Municipal/Domestic - Facility that treats sewage or a mixture of predominantly sewage and		

SAUGUS WWRP, NPDES (Continued) **1001612767**

other waste from districts, municipalities, communities, hospitals, schools, and publicly or privately owned systems (excluding individual subsurface leaching systems disposing of less than 1,000 gallons per day).

Facility Status: Active - Any facility with a continuous or seasonal discharge that is under Waste Discharge Requirements.

Agency Type: County

Waste Type: Domestic Sewage combined with Industrial Waste - Designated/Influent or Solid Wastes that pose a significant threat to water quality because of their high concentrations (E.G., BOD, Hardness, TRF, Chloride). 'Manageable' hazardous wastes (E.G., inorganic salts and heavy metals) are included in this category.

Threat to Water: Major Threat to Water Quality. A violation could render unusable a ground water or surface water resource used as a significant drink water supply, require closure of an area used for contact recreation, result in long-term deleterious effects on shell fish spawning or growth areas of aquatic resources, or directly expose the public to toxic substances.

Complexity: Category A - Any major NPDES facility, any non-NPDES facility (particularly those with toxic wastes) that would be a major if discharge was made to surface or ground waters, or any Class I disposal site. Includes any small-volume complex facility (particularly those with toxicwastes) with numerous discharge points, leak detection systems or ground water monitoring wells.

Reclamation: Producer: Reclamation requirements that have been issued to a producer of reclaimed water that does not use the product.

POTW: POTW has a local pretreatment program that has been approved by the U.S. EPA (or the regional board if the state is delegated the Federal Pretreatment Program) as being in conformance with federal prtreatment regulations [40CFR Part 403].

NPDES Number: CA0054313 The 1st 2 characters designate the state. The remaining 7 are assigned by the Regional Board

Subregion: 4

Facility ID: Santa Clara River 190107083
Facility Contact: Paul Lemay — Facility Telephone: (661) 259-3804
SIC Code: 4952 — SIC Code 2: Not reported
Agency Name: LOS ANGELES COUNTY SAN DIST
Agency Address: 1955 Workman Mill Rd.
Whittier 90607
Agency Contact: Earle C. Hartling — Agency Phone: (562) 699-7411
Design Flow: 5 Million Gal/Day — Baseline Flow: 5 Million Gal/Day

Facility Type: Municipal/Domestic - Facility that treats sewage or a mixture of predominantly sewage and other waste from districts, municipalities, communities, hospitals, schools, and publicly or privately owned systems (excluding individual subsurface leaching systems disposing of less than 1,000 gallons per day).

Facility Status: Active - Any facility with a continuous or seasonal discharge that is under Waste Discharge Requirements.

Agency Type: County

Waste Type: Domestic Sewage combined with Industrial Waste - Designated/Influent or Solid Wastes that pose a significant threat to water quality because of their high concentrations (E.G., BOD, Hardness, TRF, Chloride). 'Manageable' hazardous wastes (E.G., inorganic salts and heavy metals) are included in this category.

Threat to Water: Major Threat to Water Quality. A violation could render unusable a ground water or surface water resource used as a significant drink water supply, require closure of an area used for contact recreation, result in long-term deleterious effects on shell fish spawning or growth areas of aquatic resources, or directly expose the public to toxic substances.

Complexity: Category A - Any major NPDES facility, any non-NPDES facility (particularly those with toxic wastes) that would be a major if discharge was made to surface or ground waters, or any Class I disposal site. Includes any small-volume complex facility (particularly those with toxicwastes) with numerous discharge points, leak detection systems or ground water

SAUGUS WWRP, NPDES (Continued) **1001612767**

monitoring wells.
Reclamation: Producer: Reclamation requirements that have been issued to a producer of reclaimed water that does not use the product.
POTW: POTW has a local pretreatment program that has been approved by the U.S. EPA (or the regional board if the state is delegated the Federal Pretreatment Program) as being in conformance with federal prtreatment regulations [40CFR Part 403].
NPDES Number: Not reported
Subregion: 4

AS299 **LA CO SAN DIS-SAUGUS WRP** **LOS ANGELES CO. HMS** **S102064436**
WSW **26200 SPRINGBROOK AVE** **N/A**
> 1 **SANTA CLARITA, CA**
7053 ft.
Lower **Site 7 of 8 in cluster AS**

HMS:

Facility Id:	015503-022692		
Facility Type:	I04		
Permit Number:	CA0054313	Permit Status:	Permit
Facility Status:	Permit	Area:	7A
Region:	Los Angeles County:		

Facility Id:	015503-005146		
Facility Type:	T0		
Permit Number:	0000T6322	Permit Status:	Permit
Facility Status:	Permit	Area:	7A
Region:	Los Angeles County:		

AQ300 **BOOK NIPPAN** **LOS ANGELES CO. HMS** **S102064171**
West **1123 E DOMINGUEZ ST K** **N/A**
> 1 **CARSON, CA**
7117 ft.
Lower **Site 6 of 6 in cluster AQ**

HMS:

Facility Id:	023960-033305		
Facility Type:	Not reported		
Permit Number:	Not reported	Permit Status:	Not reported
Facility Status:	OPEN	Area:	22
Region:	Los Angeles County:		

Facility Id:	002117-023458		
Facility Type:	I02		
Permit Number:	000158908	Permit Status:	Permit
Facility Status:	Permit	Area:	7A
Region:	Los Angeles County:		

AT301 **GLORY CLEANERS** **RCRIS-SQG** **1001111780**
West **23142 VALENCIA** **FINDS** **CAR000013185**
> 1 **VALENCIA, CA 91355** **HAZNET**
7121 ft. **CLEANERS**
Lower **Site 1 of 2 in cluster AT**

GLORY CLEANERS (Continued) **1001111780**

RCRIS:
Owner: GURGUIS CHEHATA
(805) 222-9382
EPA ID: CAR000013185

Contact: GURGUIS CHEHATA
(805) 222-9382

Classification: Small Quantity Generator
Used Oil Recyc: No
TSDF Activities: Not reported

Violation Status: No violations found

FINDS:
Other Pertinent Environmental Activity Identified at Site:
Facility Registry System (FRS)
Resource Conservation and Recovery Act Information system (RCRAINFO)

CA Cleaners:
Create Date: 08/26/1996
Inactive Date: 0
EPA Id: CAL000175106
County : Los Angeles

Create Date: 02/26/1997
Inactive Date: 06/30/1998
EPA Id: CAR000013185
County : Los Angeles

HAZNET:
Gepaid: CAL000175106
Tepaid: CAD981397417
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: .1584
Category: Halogenated solvents (chloroform, methyl chloride, perchloroethylene, etc.)
Disposal Method: Recycler
Contact: MAGDI W RIAD
Telephone: (000) 000-0000
Mailing Address: 23142 VALENCIA BLVD
VALENCIA, CA 91355 - 1716
County Los Angeles

Gepaid: CAL000175106
Tepaid: CAD981397417
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: .1584
Category: Halogenated solvents (chloroform, methyl chloride, perchloroethylene, etc.)
Disposal Method: Recycler
Contact: MAGDI W RIAD
Telephone: (000) 000-0000
Mailing Address: 23142 VALENCIA BLVD
VALENCIA, CA 91355 - 1716
County Los Angeles

GLORY CLEANERS (Continued) **1001111780**

Gepaid: CAL000175106
Tepaid: CAD981397417
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: .2835
Category: Halogenated solvents (chloroform, methyl chloride, perchloroethylene, etc.)
Disposal Method: Recycler
Contact: MAGDI W RIAD
Telephone: (000) 000-0000
Mailing Address: 23142 VALENCIA BLVD
VALENCIA, CA 91355 - 1716
County Los Angeles

AU302 **WORTMANN OIL CO** **Cortese** **S105026554**
NW **26954 SECO CANYON RD** **N/A**
> 1 **SAUGUS, CA 91321**
7123 ft.
Lower **Site 1 of 3 in cluster AU**

CORTESE:
Reg Id: R-09181
Region: CORTESE
Reg By: Leaking Underground Storage Tanks

AU303 **WORTMANN OIL CO** **UST** **U003776254**
NW **26954 SECO CANYON RD** **N/A**
> 1 **SANTA CLARITA, CA 91350**
7123 ft.
Lower **Site 2 of 3 in cluster AU**

State UST:
Facility ID: 9181
Total Tanks: 1
Region: STATE
Local Agency: 19000

AU304 **WORTMANN OIL CO** **LUST** **S102064477**
NW **26954 SECO CANYON RD** **N/A**
> 1 **SAUGUS, CA 91321**
7123 ft.
Lower **Site 3 of 3 in cluster AU**

State LUST:
Cross Street: GARZOTA
Qty Leaked: Not reported
Case Number R-09181
Reg Board: 4
Chemical: Hydrocarbons
Lead Agency: Local Agency
Local Agency : 19000
Case Type: Soil only
Status: Not reported
County: Los Angeles
Abate Method: Other Means
Review Date: 6/19/97
Workplan: Not reported
Pollution Char: Not reported
Confirm Leak: 6/19/97
Prelim Assess: Not reported
Remed Plan: Not reported

WORTMANN OIL CO (Continued) **S102064477**

Remed Action: Not reported Monitoring: Not reported
Close Date: Not reported
Release Date: Not reported
Cleanup Fund Id : Not reported
Discover Date : Not reported
Enforcement Dt : Not reported
Enf Type: Not reported
Enter Date : 7/17/97
Funding: Not reported
Staff Initials: Not reported
How Discovered: Not reported
How Stopped: Close Tank
Interim : Not reported
Leak Cause: Not reported
Leak Source: Tank
MTBE Date : Not reported
Max MTBE GW : Not reported
MTBE Tested: Not Required to be Tested.
Priority: Not reported
Local Case # : Not reported
Beneficial: Not reported
Staff : JLC
GW Qualifies : Not reported
Max MTBE Soil : Not reported
Soil Qualifies : Not reported
Hydr Basin #: Not reported
Operator : Not reported
Oversight Prgm: Local Implementing Agency UST (includes non-LOP cases within LOP jurisdiction)
Oversight Prgm : LIA
Review Date : 8/15/97
Stop Date : 3/3/97
Work Suspended : Not reported
Responsible Party WORTMANN OIL CO
RP Address: 3044 FOOTHILL BLVD., LA CRESCENTA, CA 91214
Global Id: T0603704786
Org Name: Not reported
Contact Person: Not reported
MTBE Conc: 0
Mtbe Fuel: Not reported
Water System Name: SANTA CLARITA WATER CO
Well Name: METHODIST
Distance To Lust: 1611.415922
Waste Discharge Global ID: Not reported
Waste Disch Assigned Name: Not reported

LUST Region 4:
Report Date: 6/19/1997
Lead Agency: Local Agency
Local Agency: 19000
Case Number: R-09181
Substance: Hydrocarbons
Case Type: Soil
Status: Leak being confirmed
Region: 4
Staff: Not reported

AV305 **ANIMAL CLINIC OF SANTA CLARITA** **HAZNET** **S103647461**
WSW **26062 BOUQUET CANYON RD** **N/A**
> 1 **SAUGUS, CA 91350**
7135 ft.
Lower **Site 1 of 2 in cluster AV**

HAZNET:

Gepaid:	CAL000174526
Tepaid:	CAD981402522
Gen County:	Los Angeles
Tsd County:	Kern
Tons:	.3127
Category:	Photochemicals/photoprocessing waste
Disposal Method:	Recycler
Contact:	JOHN BURKHARTSMEYER
Telephone:	(000) 000-0000
Mailing Address:	26062 BOUQUET CANYON RD
	SANTA CLARITA, CA 91350
County	Los Angeles

Gepaid:	CAL000174526
Tepaid:	CAD981402522
Gen County:	Los Angeles
Tsd County:	Kern
Tons:	.2376
Category:	Photochemicals/photoprocessing waste
Disposal Method:	Recycler
Contact:	JOHN BURKHARTSMEYER
Telephone:	(000) 000-0000
Mailing Address:	26062 BOUQUET CANYON RD
	SANTA CLARITA, CA 91350
County	Los Angeles

Gepaid:	CAL000174526
Tepaid:	CAD981402522
Gen County:	Los Angeles
Tsd County:	Kern
Tons:	.3668
Category:	Photochemicals/photoprocessing waste
Disposal Method:	Recycler
Contact:	JOHN BURKHARTSMEYER
Telephone:	(000) 000-0000
Mailing Address:	26062 BOUQUET CANYON RD
	SANTA CLARITA, CA 91350
County	Los Angeles

Gepaid:	CAL000174526
Tepaid:	CAD981402522
Gen County:	Los Angeles
Tsd County:	Kern
Tons:	0.0625
Category:	
Disposal Method:	Recycler
Contact:	JOHN BURKHARTSMEYER
Telephone:	(000) 000-0000
Mailing Address:	26062 BOUQUET CANYON RD
	SANTA CLARITA, CA 91350
County	Los Angeles

ANIMAL CLINIC OF SANTA CLARITA (Continued) — **S103647461**

Gepaid:	CAL000174526
Tepaid:	CAD981402522
Gen County:	Los Angeles
Tsd County:	Kern
Tons:	0.0625
Category:	Photochemicals/photoprocessing waste
Disposal Method:	Recycler
Contact:	JOHN BURKHARTSMEYER
Telephone:	(000) 000-0000
Mailing Address:	26062 BOUQUET CANYON RD SANTA CLARITA, CA 91350
County	Los Angeles

AW306 — **VACANT** — **LOS ANGELES CO. HMS** — **S104536193**
West — **26111 N BOUQUET CANYON RD** — **N/A**
> 1 — **SANTA CLARITA, CA**
7135 ft.
Lower

Site 1 of 6 in cluster AW

HMS:

Facility Id:	007298-I07637		
Facility Type:	Not reported		
Permit Number:	Not reported	Permit Status:	Not reported
Facility Status:	OPEN	Area:	7A
Region:	Los Angeles County:		

AW307 — **FRED SANDS** — **LOS ANGELES CO. HMS** — **S102064430**
West — **26111 N BOUQUET CANYON RD** — **N/A**
> 1 — **SANTA CLARITA, CA**
7135 ft.
Lower

Site 2 of 6 in cluster AW

HMS:

Facility Id:	015378-016623		
Facility Type:	T0		
Permit Number:	00006215T	Permit Status:	Removed
Facility Status:	Removed	Area:	7A
Region:	Los Angeles County:		

AW308 — **GERALD H. HEIDT CO.** — **LOS ANGELES CO. HMS** — **S103945153**
West — **23300 W CINEMA DR #112** — **N/A**
> 1 — **SANTA CLARITA, CA**
7137 ft.
Lower

Site 3 of 6 in cluster AW

HMS:

Facility Id:	017528-027221		
Facility Type:	Not reported		
Permit Number:	Not reported	Permit Status:	Not reported
Facility Status:	OPEN	Area:	7A
Region:	Los Angeles County:		

AW309 — **M&M HARRIGAN** — **LOS ANGELES CO. HMS** — **S104733332**
West — **23300 W CINEMA DR #112** — **N/A**
> 1 — **SANTA CLARITA, CA**
7137 ft.
Lower

Site 4 of 6 in cluster AW

M&M HARRIGAN (Continued) **S104733332**

HMS:
Facility Id: 017528-032617
Facility Type: I02
Permit Number: 000323493 Permit Status: Permit
Facility Status: Permit Area: 7A
Region: Los Angeles County:

AW310 **JUGGLES RESTAURANT** **LOS ANGELES CO. HMS** **S102321784**
West **23300 W CINEMA DR #112** **N/A**
> 1 **SANTA CLARITA, CA**
7137 ft.
Lower **Site 5 of 6 in cluster AW**

HMS:
Facility Id: 017528-023908
Facility Type: I02
Permit Number: 000189714 Permit Status: Closed
Facility Status: Closed Area: 7A
Region: Los Angeles County:

AW311 **PAULI'S ITALIAN RESTAURANT** **LOS ANGELES CO. HMS** **S102321783**
West **23300 CINEMA DR #109** **N/A**
> 1 **SANTA CLARITA, CA**
7137 ft.
Lower **Site 6 of 6 in cluster AW**

HMS:
Facility Id: 017553-023958
Facility Type: Not reported
Permit Number: Not reported Permit Status: Not reported
Facility Status: OPEN Area: 7A
Region: Los Angeles County:

AV312 **RODNEY L CUMMINGS DC CHIROPRACTIC CORP** **HAZNET** **S103647442**
WSW **26045 BOQUET CANYON RD.** **N/A**
> 1 **SAUGUS, CA 91350**
7149 ft.
Lower **Site 2 of 2 in cluster AV**

HAZNET:
Gepaid: CAL921064815
Tepaid: CAD981402522
Gen County: Los Angeles
Tsd County: Kern
Tons: .1251
Category: Photochemicals/photoprocessing waste
Disposal Method: Recycler
Contact: RODNEY L CUMMINGS
Telephone: (661) 254-6107
Mailing Address: 26045 BOUQUET CANYON RD
SANTA CLARITA, CA 91350 - 2639
County Los Angeles

RODNEY L CUMMINGS DC CHIROPRACTIC CORP (Continued) **S103647442**

Gepaid: CAL921064815
Tepaid: CAD981402522
Gen County: Los Angeles
Tsd County: Kern
Tons: .1875
Category: Photochemicals/photoprocessing waste
Disposal Method: Recycler
Contact: RODNEY L CUMMINGS
Telephone: (661) 254-6107
Mailing Address: 26045 BOUQUET CANYON RD
SANTA CLARITA, CA 91350 - 2639
County Los Angeles

Gepaid: CAL921064815
Tepaid: CAD981402522
Gen County: Los Angeles
Tsd County: Kern
Tons: .2501
Category: Photochemicals/photoprocessing waste
Disposal Method: Recycler
Contact: RODNEY L CUMMINGS
Telephone: (661) 254-6107
Mailing Address: 26045 BOUQUET CANYON RD
SANTA CLARITA, CA 91350 - 2639
County Los Angeles

Gepaid: CAL921064815
Tepaid: CAD981402522
Gen County: Los Angeles
Tsd County: Kern
Tons: .0625
Category: Photochemicals/photoprocessing waste
Disposal Method: Not reported
Contact: RODNEY L CUMMINGS
Telephone: (661) 254-6107
Mailing Address: 26045 BOUQUET CANYON RD
SANTA CLARITA, CA 91350 - 2639
County Los Angeles

Gepaid: CAL921064815
Tepaid: CAD981402522
Gen County: Los Angeles
Tsd County: Kern
Tons: .2417
Category: Photochemicals/photoprocessing waste
Disposal Method: Recycler
Contact: RODNEY L CUMMINGS
Telephone: (661) 254-6107
Mailing Address: 26045 BOUQUET CANYON RD
SANTA CLARITA, CA 91350 - 2639
County Los Angeles

The CA HAZNET database contains 3 additional records for this site.
Please contact your EDR Account Executive for more information.

AX313 **UNITED OIL #69** **UST** **U003778193**
WSW **26015 BOUQUET CANYON RD** **LOS ANGELES CO. HMS** **N/A**
> 1 **SANTA CLARITA, CA 91350**
7177 ft.
Lower **Site 1 of 8 in cluster AX**

UNITED OIL #69 (Continued) **U003778193**

HMS:
Facility Id: 009442-030670
Facility Type: T1
Permit Number: 000288207
Permit Status: Permit
Facility Status: Permit
Area: 7A
Region: Los Angeles County:

State UST:
Facility ID: 30670
Total Tanks: 1
Region: STATE
Local Agency: 19000

AX314 **MOHAWK SERVICE STATION #04061** **HIST UST** **U001567709**
WSW **26015 BOUQUET CANYON RD** **N/A**
> 1 **SAUGUS, CA 91350**
7177 ft.
Lower **Site 2 of 8 in cluster AX**

UST HIST:
Facility ID: 6555
Tank Num: 1
Container Num: 1
Tank Capacity: 10000
Year Installed: 1966
Tank Used for: PRODUCT
Type of Fuel: UNLEADED
Tank Construction: Not reported
Leak Detection: Stock Inventor
Contact Name: TERI TOLEDO
Telephone: (805) 253-9188
Total Tanks: 3
Region: STATE
Facility Type: 1
Other Type: Not reported

Facility ID: 6555
Tank Num: 2
Container Num: 2
Tank Capacity: 10000
Year Installed: 1966
Tank Used for: PRODUCT
Type of Fuel: REGULAR
Tank Construction: Not reported
Leak Detection: Stock Inventor
Contact Name: TERI TOLEDO
Telephone: (805) 253-9188
Total Tanks: 3
Region: STATE
Facility Type: 1
Other Type: Not reported

Facility ID: 6555
Tank Num: 3
Container Num: 3
Tank Capacity: 10000
Year Installed: 1966
Tank Used for: PRODUCT
Type of Fuel: PREMIUM
Tank Construction: Not reported
Leak Detection: Stock Inventor
Contact Name: TERI TOLEDO
Telephone: (805) 253-9188
Total Tanks: 3
Region: STATE
Facility Type: 1
Other Type: Not reported

AX315 **P & M #987/TEXACO (FORMER)** **LUST** **S103891133**
WSW **26015 BOUQUET CANYON RD** **N/A**
> 1 **SANTA CLARITA, CA 91350**
7177 ft.
Lower **Site 3 of 8 in cluster AX**

State LUST:
Cross Street: MAGIC MOUNTAIN PARKWAY

P & M #987/TEXACO (FORMER) (Continued) **S103891133**

Qty Leaked:	Not reported		
Case Number	I-09249		
Reg Board:	4		
Chemical:	Gasoline		
Lead Agency:	Regional Board		
Local Agency :	19000		
Case Type:	Soil only		
Status:	Not reported		
County:	Los Angeles		
Abate Method:	Vapor Extraction		
Review Date:	10/24/96	Confirm Leak:	10/24/96
Workplan:	12/3/86	Prelim Assess:	12/3/86
Pollution Char:	6/24/87	Remed Plan:	6/24/87
Remed Action:	8/28/00	Monitoring:	8/28/00
Close Date:	Not reported		
Release Date:	Not reported		
Cleanup Fund Id :	Not reported		
Discover Date :	2/20/90		
Enforcement Dt :	Not reported		
Enf Type:	Not reported		
Enter Date :	4/5/90		
Funding:	Federal Funds		
Staff Initials:	Not reported		
How Discovered:	Tank Closure		
How Stopped:	Close Tank		
Interim :	Yes		
Leak Cause:	Unknown		
Leak Source:	Unknown		
MTBE Date :	1/1/65		
Max MTBE GW :	Not reported		
MTBE Tested:	MTBE Detected. Site tested for MTBE & MTBE detected		
Priority:	3A		
Local Case # :	Not reported		
Beneficial:	Not reported		
Staff :	JT		
GW Qualifies :	Not reported		
Max MTBE Soil :	Not reported		
Soil Qualifies :	Not reported		
Hydr Basin #:	Not reported		
Operator :	Not reported		
Oversight Prgm:	RB Lead Underground Storage Tank		
Oversight Prgm :	UST		
Review Date :	9/11/00		
Stop Date :	2/20/90		
Work Suspended :	Not reported		
Responsible Party	JOE LENTINI/JEFF APPEL		
RP Address:	P.O. BOX 6249		
Global Id:	T0603703363		
Org Name:	Not reported		
Contact Person:	Not reported		
MTBE Conc:	1		
Mtbe Fuel:	Not reported		
Water System Name:	LILY OF THE VALLEY MOBILE VILLAGE		
Well Name:	STANDBY		
Distance To Lust:	789.5287905		
Waste Discharge Global ID:	Not reported		
Waste Disch Assigned Name:	Not reported		

P & M #987/TEXACO (FORMER) (Continued) **S103891133**

LUST Region 4:
Report Date: 3/20/1990
Lead Agency: Regional Board
Local Agency: 19000
Case Number: I-09249
Substance: Gasoline
Case Type: Soil
Status: Post remedial action monitoring
Region: 4
Staff: JT

AX316 **P&M SERVICE STATIONS #987** **CA FID UST** **S101583043**
WSW **26015 N BOUQUET CANYON RD** **LOS ANGELES CO. HMS** **N/A**
> 1 **SANTA CLARITA, CA**
7177 ft.
Lower **Site 4 of 8 in cluster AX**

FID:

Facility ID:	19002381	Regulate ID:	00006555
Reg By:	Active Underground Storage Tank Location		
Cortese Code:	Not reported	SIC Code:	Not reported
Status:	Active	Facility Tel:	(818) 000-0000
Mail To:	Not reported 12739 LAKEWOOD BLVD SANTA CLARITA, CA		
Contact:	Not reported	Contact Tel:	Not reported
DUNs No:	Not reported	NPDES No:	Not reported
Creation:	10/22/93	Modified:	00/00/00
EPA ID:	Not reported		
Comments:	Not reported		

HMS:

Facility Id:	009442-009249		
Facility Type:	T0		
Permit Number:	00000269T	Permit Status:	Closed
Facility Status:	Permit	Area:	7A
Region:	Los Angeles County:		
Facility Id:	009442-030297		
Facility Type:	Not reported		
Permit Number:	Not reported	Permit Status:	Not reported
Facility Status:	OPEN	Area:	7A
Region:	Los Angeles County:		

AX317 **ALERT MOBILE REPAIR SERVICE, INC** **HAZNET** **S103647410**
WSW **26011 BOUQUET CYN RD** **N/A**
> 1 **SAUGUS, CA 91350**
7181 ft.
Lower **Site 5 of 8 in cluster AX**

ALERT MOBILE REPAIR SERVICE, INC (Continued) **S103647410**

HAZNET:
- Gepaid: CAL000044834
- Tepaid: CAT080013352
- Gen County: Los Angeles
- Tsd County: Los Angeles
- Tons: 2.0850
- Category: Unspecified oil-containing waste
- Disposal Method: Recycler
- Contact: GARY DUBIN
- Telephone: (000) 000-0000
- Mailing Address: 26011 BOUQUET CANYON RD SANTA CLARITA, CA 91350
- County: Los Angeles

AX318 **VALENCIA DODGE** **RCRIS-SQG** **1000207304**
WSW **26011 BOQUET CANYON RD** **FINDS** **CAD982040339**
> 1 **SAUGUS, CA 91350**
7181 ft.
Lower **Site 6 of 8 in cluster AX**

RCRIS:
- Owner: TERRY YORK (415) 555-1212
- EPA ID: CAD982040339
- Contact: ENVIRONMENTAL MANAGER (805) 259-8770
- Classification: Small Quantity Generator
- Used Oil Recyc: No
- TSDF Activities: Not reported
- Violation Status: No violations found

FINDS:
Other Pertinent Environmental Activity Identified at Site:
- Facility Registry System (FRS)
- Resource Conservation and Recovery Act Information system (RCRAINFO)

AX319 **DANA MOTORS** **CA FID UST** **S101584779**
WSW **26011 BOUQUET CANYON RD** **N/A**
> 1 **SANTA CLARITA, CA**
7181 ft.
Lower **Site 7 of 8 in cluster AX**

DANA MOTORS (Continued) **S101584779**

FID:

Facility ID:	19015490	Regulate ID:	00004946
Reg By:	Active Underground Storage Tank Location		
Cortese Code:	Not reported	SIC Code:	Not reported
Status:	Active	Facility Tel:	(818) 000-0000
Mail To:	Not reported 5221 SYLMAR AVE SANTA CLARITA, CA		
Contact:	Not reported	Contact Tel:	Not reported
DUNs No:	Not reported	NPDES No:	Not reported
Creation:	10/22/93	Modified:	00/00/00
EPA ID:	Not reported		
Comments:	Not reported		

AX320 **KIRCHNER & SON, INC.** **HIST UST** **U001567705**
WSW **26011 BOUQUET CANYON RD** **N/A**
> 1 **SAUGUS, CA 91350**
7181 ft.
Lower **Site 8 of 8 in cluster AX**

UST HIST:

Facility ID:	4946		
Tank Num:	1	Container Num:	1
Tank Capacity:	550	Year Installed:	1967
Tank Used for:	WASTE		
Type of Fuel:	WASTE OIL	Tank Construction:	Not reported
Leak Detection:	None		
Contact Name:	Not reported	Telephone:	(805) 259-8770
Total Tanks:	2	Region:	STATE
Facility Type:	2	Other Type:	DODGE DEALER

Facility ID:	4946		
Tank Num:	2	Container Num:	2
Tank Capacity:	1000	Year Installed:	Not reported
Tank Used for:	PRODUCT		
Type of Fuel:	UNLEADED	Tank Construction:	Not reported
Leak Detection:	None		
Contact Name:	Not reported	Telephone:	(805) 259-8770
Total Tanks:	2	Region:	STATE
Facility Type:	2	Other Type:	DODGE DEALER

AS321 **AUTO BODY SPECIALIST** **HAZNET** **S103644063**
WSW **23108 DRAYTON ST** **N/A**
> 1 **SAUGUS, CA 91350**
7188 ft.
Lower **Site 8 of 8 in cluster AS**

HAZNET:

Gepaid:	CAL000125340
Tepaid:	CAD008252405
Gen County:	Los Angeles
Tsd County:	Los Angeles
Tons:	1.3466
Category:	Unspecified solvent mixture Waste
Disposal Method:	Recycler
Contact:	CONDRA DONALD
Telephone:	(661) 250-1046
Mailing Address:	23108 DRAYTON ST

AUTO BODY SPECIALIST (Continued) **S103644063**

SAUGUS, CA 91350 - 2546
County Los Angeles

Gepaid: CAL000125340
Tepaid: CAD008252405
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: .1876
Category: Aqueous solution with 10% or more total organic residues
Disposal Method: Recycler
Contact: CONDRA DONALD
Telephone: (661) 250-1046
Mailing Address: 23108 DRAYTON ST
SAUGUS, CA 91350 - 2546
County Los Angeles

Gepaid: CAL000125340
Tepaid: CAD008252405
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: .0500
Category: Other organic solids
Disposal Method: Transfer Station
Contact: CONDRA DONALD
Telephone: (661) 250-1046
Mailing Address: 23108 DRAYTON ST
SAUGUS, CA 91350 - 2546
County Los Angeles

Gepaid: CAL000125340
Tepaid: CAD008302903
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: .2710
Category: Paint sludge
Disposal Method: Not reported
Contact: CONDRA DONALD
Telephone: (661) 250-1046
Mailing Address: 23108 DRAYTON ST
SAUGUS, CA 91350 - 2546
County Los Angeles

Gepaid: CAL000125340
Tepaid: CAD008252405
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: .0625
Category: Other organic solids
Disposal Method: Recycler
Contact: CONDRA DONALD
Telephone: (661) 250-1046
Mailing Address: 23108 DRAYTON ST
SAUGUS, CA 91350 - 2546
County Los Angeles

The CA HAZNET database contains 7 additional records for this site.
Please contact your EDR Account Executive for more information.

AT322 **BACKYARD INVESTMENT GROUP** **LOS ANGELES CO. HMS** **S104828053**
West **23154 W VALENCIA BLVD** **N/A**
> 1 **SANTA CLARITA, CA**
7217 ft.
Lower **Site 2 of 2 in cluster AT**

HMS:
Facility Id: 002117-I02194
Facility Type: I02
Permit Number: 000010280 Permit Status: Removed
Facility Status: Removed Area: 7A
Region: Los Angeles County:

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323 **DIRSHNER DODGE** **LOS ANGELES CO. HMS** **S102064425**
WSW **26011 BOUQUET CANYON RD A** **N/A**
> 1 **SANTA CLARITA, CA**
7227 ft.
Lower

HMS:
Facility Id: 006321-004080
Facility Type: Not reported
Permit Number: Not reported Permit Status: Not reported
Facility Status: OPEN Area: 7A
Region: Los Angeles County:

AY324 **HASA CHEM INC** **RCRIS-SQG** **1000141826**
WSW **23119 DRAYTON ST** **FINDS** **CAD009656075**
> 1 **SAUGUS, CA 91350** **CERC-NFRAP**
7227 ft. **LUST**
Lower **Site 1 of 7 in cluster AY**

CERCLIS-NFRAP Classification Data:
Site Incident Category: Not reported Federal Facility: Not a Federal Facility
Non NPL Code: NFRAP
Ownership Status: Unknown NPL Status: Not on the NPL
CERCLIS-NFRAP Assessment History:
Assessment: DISCOVERY Completed: 03/01/1985
Assessment: PRELIMINARY ASSESSMENT Completed: 08/01/1985
Assessment: ARCHIVE SITE Completed: 09/01/1986
Assessment: SITE INSPECTION Completed: 09/01/1986

RCRIS:
Owner: DON WILSON
(805) 259-5848
EPA ID: CAD009656075
Contact: MICHAEL BERTRAM
(805) 259-5848
Classification: Small Quantity Generator
Used Oil Recyc: No
TSDF Activities: Not reported

HASA CHEM INC (Continued) **1000141826**

Violation Status: Violations exist

Regulation Violated:	Not reported
Area of Violation:	GENERATOR-GENERAL REQUIREMENTS
Date Violation Determined:	06/15/1994
Actual Date Achieved Compliance:	Not reported

There are 1 violation record(s) reported at this site:

Evaluation	Area of Violation	Date of Compliance
Compliance Evaluation Inspection	GENERATOR-GENERAL REQUIREMENTS	

FINDS:
Other Pertinent Environmental Activity Identified at Site:
Enforcement Docket System (DOCKET)
Facility Registry System (FRS)
Resource Conservation and Recovery Act Information system (RCRAINFO)
Section Seven Tracking System (SSTS)
Toxic Chemical Release Inventory System (TRIS)

State LUST:

Cross Street:	Not reported		
Qty Leaked:	Not reported		
Case Number	R-02024		
Reg Board:	4		
Chemical:	1		
Lead Agency:	Local Agency		
Local Agency :	19000		
Case Type:	Soil only		
Status:	Not reported		
County:	Los Angeles		
Review Date:	9/5/84	Confirm Leak:	9/5/84
Workplan:	Not reported	Prelim Assess:	Not reported
Pollution Char:	Not reported	Remed Plan:	Not reported
Remed Action:	Not reported	Monitoring:	Not reported
Close Date:	Not reported		
Release Date:	Not reported		
Cleanup Fund Id :	Not reported		
Discover Date :	Not reported		
Enforcement Dt :	Not reported		
Enf Type:	Not reported		
Enter Date :	8/12/87		
Funding:	Not reported		
Staff Initials:	Not reported		
How Discovered:	Not reported		
How Stopped:	Not reported		
Interim :	Not reported		
Leak Cause:	Unknown		
Leak Source:	Unknown		
MTBE Date :	Not reported		
Max MTBE GW :	Not reported		
MTBE Tested:	Not Required to be Tested.		
Priority:	Not reported		
Local Case # :	Not reported		
Beneficial:	Not reported		
Staff :	JLC		
GW Qualifies :	Not reported		
Max MTBE Soil :	Not reported		

HASA CHEM INC (Continued) **1000141826**

Soil Qualifies : Not reported
Hydr Basin #: Not reported
Operator : Not reported
Oversight Prgm: Local Implementing Agency UST (includes non-LOP cases within LOP jurisdiction)
Oversight Prgm : LIA
Review Date : 9/5/84
Stop Date : Not reported
Work Suspended : Not reported
Responsible Party HASA CHEMICAL, INC
RP Address: 23119 DRAYTON STREET, SAUGUS, CA 91350
Global Id: T0603704581
Org Name: Not reported
Contact Person: Not reported
MTBE Conc: 0
Mtbe Fuel: Not reported
Water System Name: Not reported
Well Name: Not reported
Distance To Lust: 300.0010715
Waste Discharge Global ID: Not reported
Waste Disch Assigned Name: Not reported

LUST Region 4:
Report Date: 9/5/1984
Lead Agency: Local Agency
Local Agency: 19000
Case Number: R-02024
Substance: 1
Case Type: Soil
Status: Leak being confirmed
Region: 4
Staff: Not reported

AY325 **CHMIRS S100279092**
WSW **23119 DRAYTON** **Cortese N/A**
> 1 **SAUGUS, CA 91350**
7227 ft.
Lower **Site 2 of 7 in cluster AY**

CORTESE:
Reg Id: R-02024
Region: CORTESE
Reg By: Leaking Underground Storage Tanks

CHMIRS:
OES Control Number: 8803712 DOT ID: Not reported
DOT Hazard Class: Not Reported
Chemical Name: TRICHLORO-S-TRIAZINETRIONE
Extent of Release: Not reported
CAS Number: Not reported Quantity Released: 3
Environmental Contamination: Air Property Use: Manufacturing
Incident Date: 15-NOV-88 Date Completed: 15-NOV-88
Time Completed : 1430
Physical State Stored : Solid
Physical State Released : Solid
Release Unit : Not reported
Container Description : 1
Container Type : 02
Container Material : Wood Paper, Textile and Cellulose products
Level Of Container : Ground Level

(Continued) **S100279092**

Container Capacity :	250
Container Capacity Units (code) :	2
Extent Of Release (code) :	4
Agency Id Number :	19110
Agency Incident Number :	0A-36
OES Incident Number :	8803712
Time Notified :	1307
Surrounding Area :	700
Estimated Temperature :	70
Property Management :	P
More Than Two Substances Involved? :	Not reported
Special Studies 1 :	Not reported
Special Studies 2 :	Not reported
Special Studies 3 :	Not reported
Special Studies 4 :	Not reported
Special Studies 5 :	Not reported
Special Studies 6 :	Not reported
Responding Agency Personel # Of Injuries :	Not reported
Responding Agency Personel # Of Fatalities :	Not reported
Resp Agncy Personel # Of Decontaminated :	Not reported
Others Number Of Decontaminated :	Not reported
Others Number Of Injuries :	Not reported
Others Number Of Fatalities :	Not reported
Vehicle Make/year :	Not reported
Vehicle License Number :	Not reported
Vehicle State :	Not reported
Vehicle Id Number :	Not reported
CA/DOT/PUC/ICC Number :	Not reported
Company Name :	Not reported
Reporting Officer Name/ID :	F F ALFRED W LITTLE
Report Date :	15-NOV-88
Comments :	No
Facility Telephone Number :	213 267-2485

AY326 **23119 DRAYTON ST.** **ERNS** **88180705**
WSW **23119 DRAYTON ST.** **N/A**
> 1 **SANTA CLARITA, CA 91350**
7227 ft.
Lower **Site 3 of 7 in cluster AY**

AY327 **HASA CHEMICALS, INC.** **HIST UST** **U001567701**
WSW **23119 DRAYTON ST** **N/A**
> 1 **SAUGUS, CA 91350**
7227 ft.
Lower **Site 4 of 7 in cluster AY**

UST HIST:

Facility ID:	50567		
Tank Num:	1	Container Num:	1
Tank Capacity:	1000	Year Installed:	Not reported
Tank Used for:	PRODUCT		
Type of Fuel:	REGULAR	Tank Construction:	Not reported
Leak Detection:	None		
Contact Name:	WAYNE RANDELL	Telephone:	(805) 259-5848
Total Tanks:	6	Region:	STATE
Facility Type:	2	Other Type:	POOL PRODUCTS MANUFA

Facility ID: 50567

HASA CHEMICALS, INC. (Continued) **U001567701**

Tank Num:	2	Container Num:	2
Tank Capacity:	2000	Year Installed:	Not reported
Tank Used for:	PRODUCT		
Type of Fuel:	Not Reported	Tank Construction:	Not reported
Leak Detection:	None		
Contact Name:	WAYNE RANDELL	Telephone:	(805) 259-5848
Total Tanks:	6	Region:	STATE
Facility Type:	2	Other Type:	POOL PRODUCTS MANUFA
Facility ID:	50567		
Tank Num:	3	Container Num:	3
Tank Capacity:	0	Year Installed:	Not reported
Tank Used for:	WASTE		
Type of Fuel:	Not Reported	Tank Construction:	Not reported
Leak Detection:	None		
Contact Name:	WAYNE RANDELL	Telephone:	(805) 259-5848
Total Tanks:	6	Region:	STATE
Facility Type:	2	Other Type:	POOL PRODUCTS MANUFA
Facility ID:	50567		
Tank Num:	4	Container Num:	4
Tank Capacity:	0	Year Installed:	Not reported
Tank Used for:	WASTE		
Type of Fuel:	Not Reported	Tank Construction:	Not reported
Leak Detection:	None		
Contact Name:	WAYNE RANDELL	Telephone:	(805) 259-5848
Total Tanks:	6	Region:	STATE
Facility Type:	2	Other Type:	POOL PRODUCTS MANUFA
Facility ID:	50567		
Tank Num:	5	Container Num:	5
Tank Capacity:	10000	Year Installed:	1984
Tank Used for:	PRODUCT		
Type of Fuel:	DIESEL	Tank Construction:	1/4 inches
Leak Detection:	Vapor Sniff Well		
Contact Name:	WAYNE RANDELL	Telephone:	(805) 259-5848
Total Tanks:	6	Region:	STATE
Facility Type:	2	Other Type:	POOL PRODUCTS MANUFA
Facility ID:	50567		
Tank Num:	6	Container Num:	6
Tank Capacity:	0	Year Installed:	Not reported
Tank Used for:	WASTE		
Type of Fuel:	Not Reported	Tank Construction:	Not reported
Leak Detection:	None		
Contact Name:	WAYNE RANDELL	Telephone:	(805) 259-5848
Total Tanks:	6	Region:	STATE
Facility Type:	2	Other Type:	POOL PRODUCTS MANUFA

AY328 **HASA INC.** **TRIS 1005452000**
WSW **23119 DRAYTON ST.** **91350HSNC 23**
> 1 **SAUGUS, CA 91350**
7227 ft.
Lower **Site 5 of 7 in cluster AY**

AY329
WSW
> 1
7227 ft.
Lower

23119 DRAYTON ST
SANTA CLARITA, CA 91350

Site 6 of 7 in cluster AY

CHMIRS **S100698238**
N/A

CHMIRS:

OES Control Number:	9991771	DOT ID:	Not reported
DOT Hazard Class:	Corrosives		
Chemical Name:	ACID, HYDROCHLORIC		
Extent of Release:	Not reported		
CAS Number:	Not reported	Quantity Released:	10
Environmental Contamination:	Ground	Property Use:	Industrial, Utility
Incident Date:	13-JUN-88	Date Completed:	13-JUN-88

Time Completed :	Not reported
Physical State Stored :	Liquid
Physical State Released :	Liquid
Release Unit :	Gallons
Container Description :	3
Container Type :	01
Container Material :	Undetermined
Level Of Container :	10
Container Capacity :	50
Container Capacity Units (code) :	2
Extent Of Release (code) :	6
Agency Id Number :	Not reported
Agency Incident Number :	Not reported
OES Incident Number :	9991771
Time Notified :	Not reported
Surrounding Area :	Not reported
Estimated Temperature :	Not reported
Property Management :	Not reported
More Than Two Substances Involved? :	Not reported
Special Studies 1 :	Not reported
Special Studies 2 :	Not reported
Special Studies 3 :	Not reported
Special Studies 4 :	Not reported
Special Studies 5 :	Not reported
Special Studies 6 :	Not reported
Responding Agency Personel # Of Injuries :	Not reported
Responding Agency Personel # Of Fatalities :	Not reported
Resp Agncy Personel # Of Decontaminated :	Not reported
Others Number Of Decontaminated :	Not reported
Others Number Of Injuries :	Not reported
Others Number Of Fatalities :	Not reported
Vehicle Make/year :	Not reported
Vehicle License Number :	Not reported
Vehicle State :	Not reported
Vehicle Id Number :	Not reported
CA/DOT/PUC/ICC Number :	Not reported
Company Name :	Not reported
Reporting Officer Name/ID :	Not reported
Report Date :	Not reported
Comments :	Not reported
Facility Telephone Number :	Not reported

AY330
WSW
> 1
7227 ft.
Lower

HASA CHEMICALS INC
23119 DRAYTON STREET
SAUGUS, CA 91350

Site 7 of 7 in cluster AY

HAZNET **S103644077**
LOS ANGELES CO. HMS **N/A**

HASA CHEMICALS INC (Continued) **S103644077**

HAZNET:

Gepaid:	CAD009656075
Tepaid:	CAD097030993
Gen County:	Los Angeles
Tsd County:	Los Angeles
Tons:	.2293
Category:	Aqueous solution (2 < pH < 12.5) containing reactive anions (azide, bromate, chlorate, cyanide, fluoride, hypochlorite, nitrite, perchlorate, and sulfide anions)
Disposal Method:	Disposal, Other
Contact:	HASA CHEMICALS INC
Telephone:	(000) 000-0000
Mailing Address:	23119 DRAYTON ST SANTA CLARITA, CA 91350 - 2547
County	Los Angeles

Gepaid:	CAD009656075
Tepaid:	CAT080033681
Gen County:	Los Angeles
Tsd County:	Los Angeles
Tons:	.0075
Category:	Liquids with pH <UN-> 2
Disposal Method:	Recycler
Contact:	HASA CHEMICALS INC
Telephone:	(000) 000-0000
Mailing Address:	23119 DRAYTON ST SANTA CLARITA, CA 91350 - 2547
County	Los Angeles

Gepaid:	CAD009656075
Tepaid:	CAT080013352
Gen County:	Los Angeles
Tsd County:	Los Angeles
Tons:	0.5004
Category:	Waste oil and mixed oil
Disposal Method:	Recycler
Contact:	HASA CHEMICALS INC
Telephone:	(000) 000-0000
Mailing Address:	23119 DRAYTON ST SANTA CLARITA, CA 91350 - 2547
County	Los Angeles

HMS:

Facility Id:	001947-I02024		
Facility Type:	I09		
Permit Number:	000010355	Permit Status:	Permit
Facility Status:	Permit	Area:	7A
Region:	Los Angeles County:		

Facility Id:	001947-002024		
Facility Type:	T0		
Permit Number:	00005776T	Permit Status:	Removed
Facility Status:	Removed	Area:	7A
Region:	Los Angeles County:		

AZ331 **NAPA AUTO PARTS** **LOS ANGELES CO. HMS** **S105053477**
East **20541 SOLEDAD CANYON RD** **N/A**
> 1 **SANTA CLARITA, CA**
7336 ft.
Higher **Site 1 of 10 in cluster AZ**

NAPA AUTO PARTS (Continued) **S105053477**

HMS:
Facility Id: 001651-028910
Facility Type: Not reported
Permit Number: Not reported
Permit Status: Not reported
Facility Status: OPEN
Area: 7A
Region: Los Angeles County:

AZ332 **LIL JOHN AUTO PARTS** **LOS ANGELES CO. HMS** **U003058052**
East **20541 SOLEDAD CANYON RD** **N/A**
> 1 **SANTA CLARITA, CA**
7336 ft.
Higher **Site 2 of 10 in cluster AZ**

HMS:
Facility Id: 001651-I01726
Facility Type: I09
Permit Number: 000010536
Permit Status: Removed
Facility Status: Removed
Area: 7A
Region: Los Angeles County:

AZ333 **LIL'JOHN AUTO PARTS (USED OIL COLLECTION** **HAZNET** **S103640744**
East **20541 SOLEDAD CANYON RD** **N/A**
> 1 **CANYON COUNTRY, CA 91351**
7336 ft.
Higher **Site 3 of 10 in cluster AZ**

HAZNET:
Gepaid: CAH111000460
Tepaid: CAD099452708
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: 4.1283
Category: Waste oil and mixed oil
Disposal Method: Recycler
Contact: LIL'JOHN INC.
Telephone: (000) 000-0000
Mailing Address: 25601 WEST AVENUE STANFORD
VALENCIA, CA 91355
County Los Angeles

Gepaid: CAH111000460
Tepaid: CAD099452708
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: .4587
Category: Waste oil and mixed oil
Disposal Method: Not reported
Contact: LIL'JOHN INC.
Telephone: (000) 000-0000
Mailing Address: 25601 WEST AVENUE STANFORD
VALENCIA, CA 91355
County Los Angeles

LIL'JOHN AUTO PARTS (USED OIL COLLECTION (Continued) **S103640744**

Gepaid: CAH111000460
Tepaid: CAD008252405
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: .0250
Category: Paint sludge
Disposal Method: Not reported
Contact: LIL'JOHN INC.
Telephone: (000) 000-0000
Mailing Address: 25601 WEST AVENUE STANFORD
VALENCIA, CA 91355
County Los Angeles

Gepaid: CAH111000460
Tepaid: CAD099452708
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: .4587
Category: Waste oil and mixed oil
Disposal Method: Recycler
Contact: LIL'JOHN INC.
Telephone: (000) 000-0000
Mailing Address: 25601 WEST AVENUE STANFORD
VALENCIA, CA 91355
County Los Angeles

AZ334
East
> 1
7336 ft.
Higher

CANYON AUTO SUPPLY **LOS ANGELES CO. HMS** **S102063988**
20541 SOLEDAD CANYON RD **N/A**
SANTA CLARITA, CA

Site 4 of 10 in cluster AZ

HMS:
Facility Id: 001651-001726
Facility Type: T0
Permit Number: 00000283T Permit Status: Removed
Facility Status: Removed Area: 7A
Region: Los Angeles County:

335
East
> 1
7382 ft.
Higher

FOLVEN BUILDING MATERIALS **HIST UST** **U001567747**
26957 HONBY AVE **N/A**
CANYON COUNTRY, CA 91351

UST HIST:
Facility ID: 50488
Tank Num: 1 Container Num: 1
Tank Capacity: 1000 Year Installed: 1983
Tank Used for: PRODUCT
Type of Fuel: DIESEL Tank Construction: 1/2 inches
Leak Detection: Stock Inventor
Contact Name: DENNIS FOLVEN Telephone: (805) 251-1325
Total Tanks: 1 Region: STATE
Facility Type: 2 Other Type: MAINTENANCE YARD

AZ336 **MIKE'S TIREMAN INC** **HAZNET** **S102361048**
East **20529 SOLEDAD CANYON RD** **SWF/LF** **N/A**
> 1 **CANYON COUNTRY, CA 91351**
7394 ft.
Higher **Site 5 of 10 in cluster AZ**

LF:

Facility ID:	19-TI-0138
Operator:	Mike's Tireman, Inc.
Operator Phone:	(661) 252-4455
Operator Addr:	20529 Soledad Canyon Rd Canyon Country, CA 91351
Owner:	Mike's Tireman, Inc.
Owner Address:	Not reported 20529 Soledad Canyon Rd Canyon Country, CA 91351
Owner Telephone:	(661) 252-4455
Activity:	Tire Dealer
Operator's Status:	Active
Regulation Status:	Permitted
Region:	STATE
Lat/Long:	34 / -118
Permit Date:	12/9/99
Accepted Waste:	Tires,Tires, Oversize,Tires, Passenger,Tires, Tractor,Tires, Truck
Permitted Throughput with Units:	4999
Permitted Throughput with Units:	4999
Permitted Throughput with Units:	4999
Actual Throughput with Units:	Tires
Actual Capacity with Units:	0
Permitted Capacity with Units:	0
Remaining Capacity with Units:	Not reported
Permitted Total Acreage:	4
Inspection Frequency:	30 Months
Landuse Name:	Not reported
GIS Source:	Map
Permit Status:	Permitted
Category:	Waste Tire Site
Unit Number:	01
Last Waste Tire Inspection Count :	0
Last Waste Tire Inspection Date:	8/10/00
Original Waste Tire Count:	Not reported
Original Waste Tire Count Date:	2/1/95
Closure Date:	/ /
Closure Type:	Not reported
Disposal Acreage:	Not reported
Remaining Capacity:	Not reported

HAZNET:

Gepaid:	CAD983594060
Tepaid:	CAT000613893
Gen County:	Los Angeles
Tsd County:	Los Angeles
Tons:	0.2709
Category:	Aqueous solution with less than 10% total organic residues
Disposal Method:	Transfer Station
Contact:	MICHAEL L CONE
Telephone:	(661) 252-4455
Mailing Address:	20529 SOLEDAD CANYON RD CANYON COUNTRY, CA 91351 - 2436
County	Los Angeles

MIKE'S TIREMAN INC (Continued) **S102361048**

Gepaid: CAD983594060
Tepaid: CAT000613893
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: .3418
Category: Aqueous solution with less than 10% total organic residues
Disposal Method: Transfer Station
Contact: MICHAEL L CONE
Telephone: (661) 252-4455
Mailing Address: 20529 SOLEDAD CANYON RD
CANYON COUNTRY, CA 91351 - 2436
County Los Angeles

AZ337 **MIKE'S TIRE MAN** **LOS ANGELES CO. HMS** **S103945028**
East **20529 SOLEDAD CANYON RD** **N/A**
> 1 **SANTA CLARITA, CA**
7394 ft.
Higher **Site 6 of 10 in cluster AZ**

HMS:
Facility Id: 020317-028909
Facility Type: Not reported
Permit Number: Not reported — Permit Status: Not reported
Facility Status: OPEN — Area: 7A
Region: Los Angeles County:

AZ338 **MIKES TIREMAN** **RCRIS-SQG** **1000595469**
East **20529 SOLEDAD CANYON RD** **FINDS** **CAD983594060**
> 1 **CANYON COUNTRY, CA 91351**
7394 ft.
Higher **Site 7 of 10 in cluster AZ**

RCRIS:
Owner: MICHAEL L CONE
(415) 555-1212
EPA ID: CAD983594060
Contact: MICHAEL CONE
(805) 252-4455
Classification: Small Quantity Generator
Used Oil Recyc: No
TSDF Activities: Not reported
Violation Status: No violations found

FINDS:
Other Pertinent Environmental Activity Identified at Site:
Facility Registry System (FRS)
Resource Conservation and Recovery Act Information system (RCRAINFO)

BA339 **KEYSOR-CENTURY CORPORATION** **Cal-Sites** **S101480583**
SW **26000 SPRINGBROOK ROAD** **N/A**
> 1 **SAUGUS, CA 91350**
7442 ft.
Lower **Site 1 of 5 in cluster BA**

CAL-SITES:

KEYSOR-CENTURY CORPORATION (Continued) **S101480583**

Facility ID	19280025		
Status:	REFRC - DOES NOT REQUIRE DTSC ACTION. REFERRED TO RESOURCE CONSERVATION AND RECOVERY ACT (RCRA) LEAD		
Status Date:	08/28/1995		
Lead:	Not reported		
Region:	3 - BURBANK		
Branch:	SA - SOUTHERN CA. - A		
File Name:	Not reported		
Status Name:	PROPERTY/SITE REFERRED TO RCRA		
Lead Agency:	N/A	Not reported	
NPL:	Not reported		
SIC:	28 MANU - CHEMICALS & ALLIED PRODUCTS		
Facility Type:	N/A		
Type Name:	Not reported		
Staff Member Responsible for Site:	Not reported		
Supervisor Responsible for Site:	MMONROY		
Region Water Control Board:	LA - LOS ANGELES		
Access:	Not reported		
Cortese:	Not reported		
Hazardous Ranking Score:	Not reported		
Date Site Hazard Ranked:	Not reported		
Groundwater Contamination:	Not reported		
No. of Contamination Sources:	0		
Lat/Long:	0° 0′ 0.00″ / 0° 0′ 0.00″		
Lat/long Method:	Not reported		
State Assembly District Code:	Not reported		
State Senate District:	Not reported		

The CAL-SITES database may contain additional details for this site.
Please contact your EDR Account Executive for more information.

BA340 **KEYSOR-CENTURY CORPORATIO** **Cortese** **S103617362**
SW **26000 SPRINGBROOK** **CA WDS** **N/A**
> 1 **SAUGUS, CA 91350**
7442 ft.
Lower **Site 2 of 5 in cluster BA**

CORTESE:

Reg Id:	19280025
Region:	CORTESE
Reg By:	CALSI

WDS:

Facility ID:	Santa Clara River 192000001		
Facility Contact	Paul M. Boren	Facility Telephone	(661) 259-2360
SIC Code:	2821	SIC Code 2:	Not reported
Agency Name:	KEYSOR-CENTURY CORP		
Agency Address:	0		
Agency Contact:	Not reported	Agency Phone:	0
Design Flow:	0 Million Gal/Day	Baseline Flow:	0 Million Gal/Day
Facility Type:	Industrial - Facility that treats and/or disposes of liquid or semisolid wastes from any servicing, producing, manufacturing or processing operation of whatever nature, including mining, gravel washing, geothermal operations, air conditioning, ship building and repairing, oil production, storage and disposal operations, water pumping.		
Facility Status:	Active - Any facility with a continuous or seasonal discharge that is under Waste Discharge Requirements.		
Agency Type:	Private		
Waste Type:	Stormwater Runoff - Designated/Influent or Solid Wastes that pose a significant threat to water quality because of their high concentrations (E.G., BOD, Hardness, TRF, Chloride).		

KEYSOR-CENTURY CORPORATIO (Continued) **S103617362**

'Manageable' hazardous wastes (E.G., inorganic salts and heavy metals) are included in this category.

Threat to Water: Moderate Threat to Water Quality. A violation could have a major adverse impact on receiving biota, can cause aesthetic impairment to a significant human population, or render unusable a potential domestic or municipal water supply. Awsthetic impairment would include nuisance from a waste treatment facility.

Complexity: Category C - Facilities having no waste treatment systems, such as cooling water dischargers or thosewho must comply through best management practices, facilities with passive waste treatment and disposal systems, such as septic systems with subsurface disposal, or dischargers having waste storage systems with land disposal such as dairy waste ponds.

Reclamation: No reclamation requirements associated with this facility.

POTW: The facility is not a POTW.

NPDES Number: CA0057126 The 1st 2 characters designate the state. The remaining 7 are assigned by the Regional Board

Subregion: 4

BA341 **KEYSOR CENTURY CORPORATION** **HIST UST** **U001567703**
SW **26000 SPRINGBROOK AVE** **N/A**
> 1 **SAUGUS, CA 91350**
7442 ft.
Lower **Site 3 of 5 in cluster BA**

UST HIST:

Facility ID:	479		
Tank Num:	1	Container Num:	1
Tank Capacity:	10000	Year Installed:	1974
Tank Used for:	PRODUCT		
Type of Fuel:	DIESEL	Tank Construction:	Not reported
Leak Detection:	Visual, Stock Inventor		
Contact Name:	Not reported	Telephone:	(805) 259-2360
Total Tanks:	8	Region:	STATE
Facility Type:	2	Other Type:	MANUFACTURER

Facility ID:	479		
Tank Num:	2	Container Num:	2
Tank Capacity:	10000	Year Installed:	1974
Tank Used for:	PRODUCT		
Type of Fuel:	DIESEL	Tank Construction:	Not reported
Leak Detection:	Visual, Stock Inventor		
Contact Name:	Not reported	Telephone:	(805) 259-2360
Total Tanks:	8	Region:	STATE
Facility Type:	2	Other Type:	MANUFACTURER

Facility ID:	479		
Tank Num:	3	Container Num:	3
Tank Capacity:	10000	Year Installed:	1974
Tank Used for:	PRODUCT		
Type of Fuel:	DIESEL	Tank Construction:	Not reported
Leak Detection:	Visual, Stock Inventor		
Contact Name:	Not reported	Telephone:	(805) 259-2360
Total Tanks:	8	Region:	STATE
Facility Type:	2	Other Type:	MANUFACTURER

Facility ID:	479		
Tank Num:	4	Container Num:	4
Tank Capacity:	10000	Year Installed:	1974
Tank Used for:	PRODUCT		
Type of Fuel:	DIESEL	Tank Construction:	Not reported

KEYSOR CENTURY CORPORATION (Continued) **U001567703**

Leak Detection:	Visual, Stock Inventor		
Contact Name:	Not reported	Telephone:	(805) 259-2360
Total Tanks:	8	Region:	STATE
Facility Type:	2	Other Type:	MANUFACTURER
Facility ID:	479		
Tank Num:	5	Container Num:	7
Tank Capacity:	1000	Year Installed:	1974
Tank Used for:	PRODUCT		
Type of Fuel:	DIESEL	Tank Construction:	Not reported
Leak Detection:	Visual, Stock Inventor		
Contact Name:	Not reported	Telephone:	(805) 259-2360
Total Tanks:	8	Region:	STATE
Facility Type:	2	Other Type:	MANUFACTURER
Facility ID:	479		
Tank Num:	6	Container Num:	8
Tank Capacity:	1000	Year Installed:	1972
Tank Used for:	PRODUCT		
Type of Fuel:	DIESEL	Tank Construction:	Not reported
Leak Detection:	Visual, Stock Inventor		
Contact Name:	Not reported	Telephone:	(805) 259-2360
Total Tanks:	8	Region:	STATE
Facility Type:	2	Other Type:	MANUFACTURER
Facility ID:	479		
Tank Num:	7	Container Num:	9
Tank Capacity:	6000	Year Installed:	1974
Tank Used for:	PRODUCT		
Type of Fuel:	DIESEL	Tank Construction:	Not reported
Leak Detection:	Visual, Stock Inventor		
Contact Name:	Not reported	Telephone:	(805) 259-2360
Total Tanks:	8	Region:	STATE
Facility Type:	2	Other Type:	MANUFACTURER
Facility ID:	479		
Tank Num:	8	Container Num:	10
Tank Capacity:	6000	Year Installed:	1974
Tank Used for:	PRODUCT		
Type of Fuel:	UNLEADED	Tank Construction:	Not reported
Leak Detection:	Visual, Stock Inventor		
Contact Name:	Not reported	Telephone:	(805) 259-2360
Total Tanks:	8	Region:	STATE
Facility Type:	2	Other Type:	MANUFACTURER

BA342 **KEYSOR-CENTURY CORP.** **RCRIS-SQG 1000385455**
SW **26000 SPRINGBROOK AVE.** **FINDS 91350KYSRC26**
> 1 **SAUGUS, CA 91350** **TRIS**
7442 ft. **TSCA**
Lower **Site 4 of 5 in cluster BA** **CERC-NFRAP**
CA FID UST
HAZNET
LOS ANGELES CO. HMS

KEYSOR-CENTURY CORP. (Continued) **1000385455**

CERCLIS-NFRAP Classification Data:
Site Incident Category: Not reported
Non NPL Code: NFRAP
Ownership Status: Unknown
Federal Facility: Not a Federal Facility
NPL Status: Not on the NPL

CERCLIS-NFRAP Assessment History:

Assessment:	DISCOVERY	Completed:	11/01/1979
Assessment:	PRELIMINARY ASSESSMENT	Completed:	11/01/1984
Assessment:	PRELIMINARY ASSESSMENT	Completed:	11/23/1988
Assessment:	ARCHIVE SITE	Completed:	10/15/1990
Assessment:	SITE INSPECTION	Completed:	10/15/1990

RCRIS:
Owner: NOT REQUIRED
(415) 555-1212
EPA ID: CAD009531591
Contact: ENVIRONMENTAL MANAGER
(805) 259-2360
Classification: Handler transports wastes, but commercial status is unknown, Large Quantity Generator
Used Oil Recyc: No
TSDF Activities: Not reported

Violation Status: Violations exist

Regulation Violated:	262.10-12.A
Area of Violation:	GENERATOR-ALL REQUIREMENTS (OVERSIGHT)
Date Violation Determined:	01/09/1986
Actual Date Achieved Compliance:	Not reported

There are 1 violation record(s) reported at this site:

Evaluation	Area of Violation	Date of Compliance
Non-Financial Record Review	GENERATOR-ALL REQUIREMENTS (OVERSIGHT)	

FINDS:
Other Pertinent Environmental Activity Identified at Site:
Facility Registry System (FRS)
National Emissions Trends (NET)
National Toxics Inventory (NTI)
Permit Compliance System (PCS)
Resource Conservation and Recovery Act Information system (RCRAINFO)
Toxic Chemical Release Inventory System (TRIS)

HAZNET:
Gepaid: CAD009531591
Tepaid: CAT080013352
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: .2502
Category: Unspecified oil-containing waste
Disposal Method: Recycler
Contact: KEYSOR-CENTURY CORPORATION
Telephone: (805) 259-2360
Mailing Address: PO BOX 924
SANTA CLARITA, CA 91380 - 9024
County Los Angeles

KEYSOR-CENTURY CORP. (Continued) **1000385455**

Gepaid: CAD009531591
Tepaid: UTD981552177
Gen County: Los Angeles
Tsd County: 99
Tons: .2293
Category: Off-specification, aged, or surplus organics
Disposal Method: Transfer Station
Contact: KEYSOR-CENTURY CORPORATION
Telephone: (805) 259-2360
Mailing Address: PO BOX 924
SANTA CLARITA, CA 91380 - 9024
County Los Angeles

Gepaid: CAD009531591
Tepaid: CAD008252405
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: .8548
Category: Unspecified solvent mixture Waste
Disposal Method: Recycler
Contact: KEYSOR-CENTURY CORPORATION
Telephone: (805) 259-2360
Mailing Address: PO BOX 924
SANTA CLARITA, CA 91380 - 9024
County Los Angeles

Gepaid: CAD009531591
Tepaid: CAD008302903
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: .2293
Category: Unspecified oil-containing waste
Disposal Method: Recycler
Contact: KEYSOR-CENTURY CORPORATION
Telephone: (805) 259-2360
Mailing Address: PO BOX 924
SANTA CLARITA, CA 91380 - 9024
County Los Angeles

Gepaid: CAD009531591
Tepaid: CAD008252405
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: .7088
Category: Oxygenated solvents (acetone, butanol, ethyl acetate, etc.)
Disposal Method: Recycler
Contact: KEYSOR-CENTURY CORPORATION
Telephone: (805) 259-2360
Mailing Address: PO BOX 924
SANTA CLARITA, CA 91380 - 9024
County Los Angeles

The CA HAZNET database contains 45 additional records for this site.
Please contact your EDR Account Executive for more information.

KEYSOR-CENTURY CORP. (Continued) **1000385455**

FID:

Facility ID:	19000029	Regulate ID:	00000479
Reg By:	Active Underground Storage Tank Location		
Cortese Code:	Not reported	SIC Code:	Not reported
Status:	Active	Facility Tel:	(818) 000-0000
Mail To:	Not reported 26000 SPRINGBROOK RD SANTA CLARITA, CA		
Contact:	Not reported	Contact Tel:	Not reported
DUNs No:	Not reported	NPDES No:	Not reported
Creation:	10/22/93	Modified:	00/00/00
EPA ID:	Not reported		
Comments:	Not reported		

HMS:

Facility Id:	004102-I04248		
Facility Type:	I02		
Permit Number:	000003627	Permit Status:	Permit
Facility Status:	Permit	Area:	7A
Region:	Los Angeles County:		

Facility Id:	004102-004248		
Facility Type:	T0		
Permit Number:	00000245T	Permit Status:	Removed
Facility Status:	Removed	Area:	7A
Region:	Los Angeles County:		

BB343 **J I GANDARA TRUCKING REPAIR** **LOS ANGELES CO. HMS** **S105053521**
WSW **25885 SAN FERNANDO RD** **N/A**
> 1 **SANTA CLARITA, CA**
7447 ft.
Lower **Site 1 of 4 in cluster BB**

HMS:

Facility Id:	020245-036177		
Facility Type:	Not reported		
Permit Number:	Not reported	Permit Status:	Not reported
Facility Status:	OPEN	Area:	7A
Region:	Los Angeles County:		

BB344 **LUNA'S TIRE SERVICE** **LOS ANGELES CO. HMS** **S103945400**
WSW **25885 SAN FERNANDO RD** **N/A**
> 1 **SANTA CLARITA, CA**
7447 ft.
Lower **Site 2 of 4 in cluster BB**

HMS:

Facility Id:	020245-028826		
Facility Type:	Not reported		
Permit Number:	Not reported	Permit Status:	Not reported
Facility Status:	OPEN	Area:	7A
Region:	Los Angeles County:		

345 NNW > 1 7490 ft. Higher
22520 BARBACOA DR.
22520 BARBACOA DR.
SANTA CLARITA, CA 91350
Database(s): **ERNS**
EDR ID Number: **90181601**
EPA ID Number: **N/A**

BB346 WSW > 1 7533 ft. Lower
HI TECH TRANSMISSION
25845 SAN FERNANDO RD
SAUGUS, CA 91350
Database(s): **RCRIS-SQG, FINDS**
EDR ID Number: **1000594969**
EPA ID Number: **CAD983588567**

Site 3 of 4 in cluster BB

RCRIS:
Owner: G&K MANAGEMENT CO INC
(415) 555-1212
EPA ID: CAD983588567
Contact: JONES MATTHEW
(805) 254-8060
Classification: Small Quantity Generator
Used Oil Recyc: No
TSDF Activities: Not reported
Violation Status: No violations found

FINDS:
Other Pertinent Environmental Activity Identified at Site:
Facility Registry System (FRS)
Resource Conservation and Recovery Act Information system (RCRAINFO)

BB347 WSW > 1 7533 ft. Lower
PLAZA CLARITA
25845 SAN FERNANDO RD
SANTA CLARITA, CA
Database(s): **LOS ANGELES CO. HMS**
EDR ID Number: **U002281903**
EPA ID Number: **N/A**

Site 4 of 4 in cluster BB

HMS:

Facility Id:	008466-I12315		
Facility Type:	I01		
Permit Number:	000010006	Permit Status:	Closed
Facility Status:	Permit	Area:	7A
Region:	Los Angeles County:		

Facility Id:	008466-012315		
Facility Type:	T0		
Permit Number:	00004605T	Permit Status:	Removed
Facility Status:	Removed	Area:	7A
Region:	Los Angeles County:		

BC348 WSW > 1 7535 ft. Lower
PURRFECT AUTO SERVICE #69
25843 SAN FERNANDO RD
SANTA CLARITA, CA 91350
Database(s): **HAZNET, LOS ANGELES CO. HMS**
EDR ID Number: **S103647177**
EPA ID Number: **N/A**

Site 1 of 7 in cluster BC

PURRFECT AUTO SERVICE #69 (Continued) **S103647177**

HAZNET:

Gepaid:	CAL000163437
Tepaid:	CAL000113451
Gen County:	Los Angeles
Tsd County:	Los Angeles
Tons:	1.8347
Category:	Unspecified organic liquid mixture
Disposal Method:	Transfer Station
Contact:	NAJEB JAMILI
Telephone:	(805) 222-7477
Mailing Address:	25843 SAN FERNANDO RD STE 35
	SANTA CLARITA, CA 91350 - 2560
County	Los Angeles

Gepaid:	CAL000163437
Tepaid:	CAD099452708
Gen County:	Los Angeles
Tsd County:	Los Angeles
Tons:	3.7530
Category:	Waste oil and mixed oil
Disposal Method:	Recycler
Contact:	NAJEB JAMILI
Telephone:	(805) 222-7477
Mailing Address:	25843 SAN FERNANDO RD STE 35
	SANTA CLARITA, CA 91350 - 2560
County	Los Angeles

Gepaid:	CAL000163437
Tepaid:	CAL000113451
Gen County:	Los Angeles
Tsd County:	Los Angeles
Tons:	.7923
Category:	Unspecified organic liquid mixture
Disposal Method:	Transfer Station
Contact:	NAJEB JAMILI
Telephone:	(805) 222-7477
Mailing Address:	25843 SAN FERNANDO RD STE 35
	SANTA CLARITA, CA 91350 - 2560
County	Los Angeles

Gepaid:	CAL000163437
Tepaid:	CAL000113451
Gen County:	Los Angeles
Tsd County:	Los Angeles
Tons:	.3336
Category:	Unspecified organic liquid mixture
Disposal Method:	Transfer Station
Contact:	NAJEB JAMILI
Telephone:	(805) 222-7477
Mailing Address:	25843 SAN FERNANDO RD STE 35
	SANTA CLARITA, CA 91350 - 2560
County	Los Angeles

PURRFECT AUTO SERVICE #69 (Continued) **S103647177**

Gepaid: CAL000163437
Tepaid: CAD099452708
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: 0.4587
Category: Unspecified aqueous solution
Disposal Method: Recycler
Contact: NAJEB JAMILI
Telephone: (805) 222-7477
Mailing Address: 25843 SAN FERNANDO RD STE 35
SANTA CLARITA, CA 91350 - 2560
County Los Angeles

HMS:
Facility Id: 020241-028822
Facility Type: Not reported
Permit Number: Not reported
Permit Status: Not reported
Facility Status: OPEN
Area: 7A
Region: Los Angeles County:

BC349 **INTERSTATE BATTERIES** **LOS ANGELES CO. HMS** **S104538154**
WSW **25835 SAN FERNANDO RD #24** **N/A**
> 1 **SANTA CLARITA, CA**
7553 ft.
Lower

Site 2 of 7 in cluster BC

HMS:
Facility Id: 020238-028819
Facility Type: Not reported
Permit Number: Not reported
Permit Status: Not reported
Facility Status: OPEN
Area: 7A
Region: Los Angeles County:

BC350 **ACE AUTOMOTIVE** **LOS ANGELES CO. HMS** **S104538155**
WSW **25835 SAN FERNANDO RD #29** **N/A**
> 1 **SANTA CLARITA, CA**
7553 ft.
Lower

Site 3 of 7 in cluster BC

HMS:
Facility Id: 020240-028821
Facility Type: Not reported
Permit Number: Not reported
Permit Status: Not reported
Facility Status: OPEN
Area: 7A
Region: Los Angeles County:

BC351 **VALENCIA AUTOMOTIVE CENTER MD MORTAGE** **RCRIS-SQG** **1000207308**
WSW **25835 SAN FERNANDO RD** **FINDS** **CAD982524738**
> 1 **SAUGUS, CA 91350** **HAZNET**
7553 ft.
Lower

Site 4 of 7 in cluster BC

VALENCIA AUTOMOTIVE CENTER MD MORTAGE (Continued) **1000207308**

RCRIS:
Owner: DAN MIRI TEPPER
(415) 555-1212
EPA ID: CAD982524738

Contact: ENVIRONMENTAL MANAGER
(213) 986-6110

Classification: Large Quantity Generator
Used Oil Recyc: No
TSDF Activities: Not reported

Violation Status: No violations found

FINDS:
Other Pertinent Environmental Activity Identified at Site:
Facility Registry System (FRS)
Resource Conservation and Recovery Act Information system (RCRAINFO)

HAZNET:
Gepaid: CAD982524738
Tepaid: CAT080013352
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: 1.1259
Category: Aqueous solution with less than 10% total organic residues
Disposal Method: Recycler
Contact: Not reported
Telephone: (000) 000-0000
Mailing Address: 15910 VENTURA BLVD 1813
ENCINO, CA 91436
County Los Angeles

Gepaid: CAD982524738
Tepaid: CAT080013352
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: 11.9095
Category: Unspecified oil-containing waste
Disposal Method: Recycler
Contact: Not reported
Telephone: (000) 000-0000
Mailing Address: 15910 VENTURA BLVD 1813
ENCINO, CA 91436
County Los Angeles

Gepaid: CAD982524738
Tepaid: CAD089446710
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: 5.8380
Category: Unspecified oil-containing waste
Disposal Method: Transfer Station
Contact: Not reported
Telephone: (000) 000-0000
Mailing Address: 15910 VENTURA BLVD 1813
ENCINO, CA 91436
County Los Angeles

VALENCIA AUTOMOTIVE CENTER MD MORTAGE (Continued) **1000207308**

Gepaid: CAD982524738
Tepaid: CAD980883177
Gen County: Los Angeles
Tsd County: Kern
Tons: 22.5180
Category: Unspecified oil-containing waste
Disposal Method: Recycler
Contact: Not reported
Telephone: (000) 000-0000
Mailing Address: 15910 VENTURA BLVD 1813
ENCINO, CA 91436
County Los Angeles

Gepaid: CAD982524738
Tepaid: CAT080013352
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: 1.1050
Category: Unspecified oil-containing waste
Disposal Method: Recycler
Contact: Not reported
Telephone: (000) 000-0000
Mailing Address: 15910 VENTURA BLVD 1813
ENCINO, CA 91436
County Los Angeles

The CA HAZNET database contains 1 additional record for this site.
Please contact your EDR Account Executive for more information.

BC352 **LIONS TOWING AND MOTORS** **HAZNET** **S104583143**
WSW **25835 SAN FERNANDO ROAD** **N/A**
> 1 **SANTA CLARITA, CA 91250**
7553 ft.
Lower **Site 5 of 7 in cluster BC**

HAZNET:
Gepaid: CAL000209243
Tepaid: CAT000613893
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: 0.0834
Category: Aqueous solution with less than 10% total organic residues
Disposal Method: Transfer Station
Contact: SAEED MAHABADI
Telephone: (805) 253-2700
Mailing Address: PO BOX 802585
SANTA CLARITA, CA 91380 - 2585
County Los Angeles

BA353 **HASA PRODUCTS CO INC** **LOS ANGELES CO. HMS** **U003060734**
SW **25950 SPRINGBROOK AVE** **N/A**
> 1 **SANTA CLARITA, CA**
7566 ft.
Lower **Site 5 of 5 in cluster BA**

HMS:
Facility Id: 004572-I04747
Facility Type: I00

HASA PRODUCTS CO INC (Continued) — **U003060734**

Permit Number: 000002163 — Permit Status: Closed
Facility Status: Closed — Area: 7A
Region: Los Angeles County:

AZ354 — **JERRY HIDDER** — **HAZNET** — **S103971986**
East — **20501 SOLEDA CANYON ROAD** — **N/A**
> 1 — **CANYON COUNTRY, CA 91351**
7576 ft.
Higher — **Site 8 of 10 in cluster AZ**

HAZNET:

Gepaid:	CAC001169736
Tepaid:	CAT080013352
Gen County:	Los Angeles
Tsd County:	Los Angeles
Tons:	1.3761
Category:	Unspecified oil-containing waste
Disposal Method:	Recycler
Contact:	JERRY HIDDEN
Telephone:	(818) 834-4662
Mailing Address:	PO BOX 2148
	CANYON COUNTRY, CA 91386 - 2148
County	Los Angeles

Gepaid:	CAC001169736
Tepaid:	CAD982444481
Gen County:	Los Angeles
Tsd County:	San Bernardino
Tons:	.3250
Category:	Other organic solids
Disposal Method:	Not reported
Contact:	JERRY HIDDEN
Telephone:	(818) 834-4662
Mailing Address:	PO BOX 2148
	CANYON COUNTRY, CA 91386 - 2148
County	Los Angeles

AZ355 — **JERRY'S TRANSMISSIONS** — **HAZNET** — **S103972007**
East — **20501 SOLEDAD CANYON RD** — **N/A**
> 1 — **CANYON COUNTRY, CA 91351**
7576 ft.
Higher — **Site 9 of 10 in cluster AZ**

HAZNET:

Gepaid:	CAL000157993
Tepaid:	CAT080013352
Gen County:	Los Angeles
Tsd County:	Los Angeles
Tons:	.1459
Category:	Unspecified oil-containing waste
Disposal Method:	Recycler
Contact:	GARY L GUMBEL
Telephone:	(805) 252-7200
Mailing Address:	20501 SOLEDAD CANYON RD
	CANYON COUNTRY, CA 91351 - 2436
County	Los Angeles

AZ356
East
> 1
7576 ft.
Higher

JERRY AUTOMATIC TRANSMISSIONS INCORPORATED
20501 SOLEDAD CYN ROAD
CANYON COUNTRY, CA 91351

Site 10 of 10 in cluster AZ

RCRIS-SQG
FINDS
HIST UST
HAZNET

1000372041
CAD981407331

RCRIS:
Owner: GERALD W. HIDER JR.
(415) 555-1212
EPA ID: CAD981407331
Contact: ENVIRONMENTAL MANAGER
(805) 252-7200
Classification: Large Quantity Generator
Used Oil Recyc: No
TSDF Activities: Not reported

Violation Status: No violations found

FINDS:
Other Pertinent Environmental Activity Identified at Site:
Facility Registry System (FRS)
Resource Conservation and Recovery Act Information system (RCRAINFO)

HAZNET:
Gepaid: CAD981407331
Tepaid: CAT080013352
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: .2085
Category: Unspecified oil-containing waste
Disposal Method: Recycler
Contact: JERRY'S AUTOMATIC TRANS INC
Telephone: (805) 252-7200
Mailing Address: 20501 SOLEDAD CANYON RD
CANYON COUNTRY, CA 91351 - 2436
County Los Angeles

Gepaid: CAD981407331
Tepaid: CAD980883177
Gen County: Los Angeles
Tsd County: Kern
Tons: .4378
Category: Unspecified oil-containing waste
Disposal Method: Recycler
Contact: JERRY'S AUTOMATIC TRANS INC
Telephone: (805) 252-7200
Mailing Address: 20501 SOLEDAD CANYON RD
CANYON COUNTRY, CA 91351 - 2436
County Los Angeles

Gepaid: CAD981407331
Tepaid: CAD980883177
Gen County: Los Angeles
Tsd County: Kern
Tons: .3753
Category: Unspecified oil-containing waste
Disposal Method: Not reported
Contact: JERRY'S AUTOMATIC TRANS INC
Telephone: (805) 252-7200
Mailing Address: 20501 SOLEDAD CANYON RD

JERRY AUTOMATIC TRANSMISSIONS INCORPORATED (Continued) **1000372041**

CANYON COUNTRY, CA 91351 - 2436
County Los Angeles

Gepaid: CAD981407331
Tepaid: CAT080013352
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: .6046
Category: Unspecified oil-containing waste
Disposal Method: Recycler
Contact: JERRY'S AUTOMATIC TRANS INC
Telephone: (805) 252-7200
Mailing Address: 20501 SOLEDAD CANYON RD
CANYON COUNTRY, CA 91351 - 2436
County Los Angeles

Gepaid: CAD981407331
Tepaid: CAT080013352
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: 2.3768
Category: Unspecified oil-containing waste
Disposal Method: Recycler
Contact: JERRY'S AUTOMATIC TRANS INC
Telephone: (805) 252-7200
Mailing Address: 20501 SOLEDAD CANYON RD
CANYON COUNTRY, CA 91351 - 2436
County Los Angeles

The CA HAZNET database contains 1 additional record for this site.
Please contact your EDR Account Executive for more information.

UST HIST:
Facility ID: 67087
Tank Num: 1 Container Num: #1
Tank Capacity: 450 Year Installed: 1982
Tank Used for: WASTE
Type of Fuel: Not Reported Tank Construction: X inches
Leak Detection: None
Contact Name: G.W. HIDER Telephone: (805) 252-7200
Total Tanks: 1 Region: STATE
Facility Type: 2 Other Type: TRANSMISSIONS

BC357 **AAMCO TRANSMISSION** **HAZNET** **S105088712**
WSW **25825 SAN FERNANDO RD** **N/A**
> 1 **SAUGUS, CA 91350**
7576 ft.
Lower **Site 6 of 7 in cluster BC**

HAZNET:
Gepaid: CAD982315129
Tepaid: CAT000613893
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: .3251
Category: Aqueous solution with less than 10% total organic residues
Disposal Method: Transfer Station
Contact: BEAULIEU FIN CORP.
Telephone: (661) 259-3013
Mailing Address: 25825 SAN FERNANDO RD

AAMCO TRANSMISSION (Continued) — **S105088712**

SANTA CLARITA, CA 91350
County: Los Angeles

358
West
> 1
7737 ft.
Lower

WESTERN BAGEL TOO — **HAZNET** — **S103995489**
23170 W VALENCIA BLVD — **N/A**
VALENCIA, CA 91355

HAZNET:
Gepaid: CAC001185976
Tepaid: CAL000027741
Gen County: Los Angeles
Tsd County: 5
Tons: 5.8996
Category: Asbestos-containing waste
Disposal Method: Disposal, Land Fill
Contact: WESTERN BAGEL TOO
Telephone: (000) 000-0000
Mailing Address: 23170 W VALENCIA BLVD
VALENCIA, CA 91355
County: Los Angeles

BD359
NNE
> 1
7754 ft.
Higher

BONGIOVANNI CHIROPRACTIC — **HAZNET** — **S100930965**
27600 BOUQUET CANYON RD, — **CLEANERS** — **N/A**
SAUGUS, CA 91350

Site 1 of 6 in cluster BD

CA Cleaners:
Create Date: 05/09/1990
Inactive Date: 06/01/1996
EPA Id: CAL000029375
County : Los Angeles

HAZNET:
Gepaid: CAL000087549
Tepaid: CAD981402522
Gen County: Los Angeles
Tsd County: Kern
Tons: .1250
Category: Photochemicals/photoprocessing waste
Disposal Method: Recycler
Contact: MATTHEW BONGIOVANNI
Telephone: (805) 296-2131
Mailing Address: 27600 BOUQUET CANYON RD,
SAUGUS, CA 91350
County: Los Angeles

Gepaid: CAL000087549
Tepaid: CAD981402522
Gen County: Los Angeles
Tsd County: Kern
Tons: .0625
Category: Photochemicals/photoprocessing waste
Disposal Method: Not reported
Contact: MATTHEW BONGIOVANNI
Telephone: (805) 296-2131
Mailing Address: 27600 BOUQUET CANYON RD,

BONGIOVANNI CHIROPRACTIC (Continued) **S100930965**

SAUGUS, CA 91350
County Los Angeles

Gepaid: CAL000087549
Tepaid: CAD981402522
Gen County: Los Angeles
Tsd County: Kern
Tons: .1876
Category: Photochemicals/photoprocessing waste
Disposal Method: Recycler
Contact: MATTHEW BONGIOVANNI
Telephone: (805) 296-2131
Mailing Address: 27600 BOUQUET CANYON RD,
SAUGUS, CA 91350
County Los Angeles

Gepaid: CAL000087549
Tepaid: CAD981402522
Gen County: Los Angeles
Tsd County: Kern
Tons: .1876
Category: Photochemicals/photoprocessing waste
Disposal Method: Recycler
Contact: MATTHEW BONGIOVANNI
Telephone: (805) 296-2131
Mailing Address: 27600 BOUQUET CANYON RD,
SAUGUS, CA 91350
County Los Angeles

Gepaid: CAL000087549
Tepaid: CAD981402522
Gen County: Los Angeles
Tsd County: Kern
Tons: .1875
Category: Photochemicals/photoprocessing waste
Disposal Method: Recycler
Contact: MATTHEW BONGIOVANNI
Telephone: (805) 296-2131
Mailing Address: 27600 BOUQUET CANYON RD,
SAUGUS, CA 91350
County Los Angeles

The CA HAZNET database contains 2 additional records for this site.
Please contact your EDR Account Executive for more information.

BD360 **LA RUMBA** **LOS ANGELES CO. HMS** **S105421917**
NNE **27600 N BOUQUET CANYON RD #100** **N/A**
> 1 **SANTA CLARITA, CA**
7754 ft.
Higher **Site 2 of 6 in cluster BD**

HMS:
Facility Id: 016648-037047
Facility Type: Not reported
Permit Number: Not reported
Permit Status: Not reported
Facility Status: OPEN
Area: 7A
Region: Los Angeles County:

BD361 **JIM DANDY CLEANERS** **HAZNET** **S104574793**
NNE **27600 BOUGUET CYN RD** **CLEANERS** **N/A**
> 1 **SAUGUS, CA 91350**
7754 ft.
Higher **Site 3 of 6 in cluster BD**

CA Cleaners:
Create Date: 05/16/1990
Inactive Date: 06/30/1996
EPA Id: CAL000031260
County : Los Angeles

Create Date: 03/20/1991
Inactive Date: 0
EPA Id: CAD982439366
County : Los Angeles

HAZNET:
Gepaid: CAD982439366
Tepaid: CAD981397417
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: 1.2180
Category: Halogenated solvents (chloroform, methyl chloride, perchloroethylene, etc.)
Disposal Method: Recycler
Contact: YONG CHUN KIM
Telephone: (818) 780-5314
Mailing Address: 27600 BOUQUET CANYON RD
SANTA CLARITA, CA 91350 - 3711
County Los Angeles

Gepaid: CAD982439366
Tepaid: CAD981397417
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: 0.2793
Category: Halogenated solvents (chloroform, methyl chloride, perchloroethylene, etc.)
Disposal Method: Recycler
Contact: YONG CHUN KIM
Telephone: (818) 780-5314
Mailing Address: 27600 BOUQUET CANYON RD
SANTA CLARITA, CA 91350 - 3711
County Los Angeles

Gepaid: CAD982439366
Tepaid: CAD981397417
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: .4252
Category: Halogenated solvents (chloroform, methyl chloride, perchloroethylene, etc.)
Disposal Method: Recycler
Contact: YONG CHUN KIM
Telephone: (818) 780-5314
Mailing Address: 27600 BOUQUET CANYON RD
SANTA CLARITA, CA 91350 - 3711
County Los Angeles

JIM DANDY CLEANERS (Continued) **S104574793**

Gepaid: CAD982439366
Tepaid: CAD981397417
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: 1.3264
Category: Halogenated solvents (chloroform, methyl chloride, perchloroethylene, etc.)
Disposal Method: Recycler
Contact: YONG CHUN KIM
Telephone: (818) 780-5314
Mailing Address: 27600 BOUQUET CANYON RD
SANTA CLARITA, CA 91350 - 3711
County Los Angeles

Gepaid: CAD982439366
Tepaid: CAD981397417
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: .0000
Category:
Disposal Method: Recycler
Contact: YONG CHUN KIM
Telephone: (818) 780-5314
Mailing Address: 27600 BOUQUET CANYON RD
SANTA CLARITA, CA 91350 - 3711
County Los Angeles

The CA HAZNET database contains 3 additional records for this site.
Please contact your EDR Account Executive for more information.

BD362 **JIM DANDY** **RCRIS-SQG 1000593317**
NNE **27600 BOUGUET CYN RD** **FINDS CAD982439366**
> 1 **SAUGUS, CA 91350** **LOS ANGELES CO. HMS**
7754 ft.
Higher **Site 4 of 6 in cluster BD**

RCRIS:
Owner: YONG CHUN KIM
(805) 296-0397
EPA ID: CAD982439366

Contact: KIM YONG CHUN
(805) 296-0397

Classification: Small Quantity Generator
Used Oil Recyc: No
TSDF Activities: Not reported

Violation Status: No violations found

FINDS:
Other Pertinent Environmental Activity Identified at Site:
Facility Registry System (FRS)
Resource Conservation and Recovery Act Information system (RCRAINFO)

HMS:
Facility Id: 008360-I08925
Facility Type: I01
Permit Number: 00010206A Permit Status: Closed
Facility Status: Closed Area: 7A
Region: Los Angeles County:

JIM DANDY (Continued) **1000593317**

Facility Id: 008360-021195
Facility Type: I01
Permit Number: 000086769 Permit Status: Permit
Facility Status: Permit Area: 7A
Region: Los Angeles County:

BD363 **CAFE BOUQUET** **LOS ANGELES CO. HMS** **S102064508**
NNE **27600 N BOUQUET CANYON RD #100** **N/A**
> 1 **SANTA CLARITA, CA**
7754 ft.
Higher **Site 5 of 6 in cluster BD**

HMS:
Facility Id: 016648-022168
Facility Type: I01
Permit Number: 000115305 Permit Status: Suspended
Facility Status: Permit Area: 7A
Region: Los Angeles County:

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364 **WM S HART USD SAUGUS HS** **RCRIS-SQG** **1000374912**
North **21900 W CENTURION WY** **FINDS** **CAD981624059**
> 1 **SAUGUS, CA 91350** **HAZNET**
7786 ft.
Higher

RCRIS:
Owner: WM S HART UNION HSC
(415) 555-1212
EPA ID: CAD981624059
Contact: ENVIRONMENTAL MANAGER
(805) 259-5442
Classification: Large Quantity Generator
Used Oil Recyc: No
TSDF Activities: Not reported
Violation Status: No violations found

FINDS:
Other Pertinent Environmental Activity Identified at Site:
Facility Registry System (FRS)
Resource Conservation and Recovery Act Information system (RCRAINFO)

HAZNET:
Gepaid: CAD981624059
Tepaid: CAD008364432
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: 0.0667
Category:
Disposal Method: Treatment, Tank
Contact: WM. S. HART UNION HS DISTRICT
Telephone: (805) 259-0033
Mailing Address: 21515 REDVIEW DR
SANTA CLARITA, CA 91350 - 2947
County Los Angeles

WM S HART USD SAUGUS HS (Continued) **1000374912**

Gepaid: CAD981624059
Tepaid: CAD008364432
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: 0.05
Category: Other organic solids
Disposal Method: Disposal, Land Fill
Contact: WM. S. HART UNION HS DISTRICT
Telephone: (805) 259-0033
Mailing Address: 21515 REDVIEW DR
SANTA CLARITA, CA 91350 - 2947
County Los Angeles

Gepaid: CAD981624059
Tepaid: CAD008364432
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: 0.05
Category: Laboratory waste chemicals
Disposal Method: Disposal, Land Fill
Contact: WM. S. HART UNION HS DISTRICT
Telephone: (805) 259-0033
Mailing Address: 21515 REDVIEW DR
SANTA CLARITA, CA 91350 - 2947
County Los Angeles

Gepaid: CAD981624059
Tepaid: CAD008364432
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: 0.005
Category: Laboratory waste chemicals
Disposal Method: Transfer Station
Contact: WM. S. HART UNION HS DISTRICT
Telephone: (805) 259-0033
Mailing Address: 21515 REDVIEW DR
SANTA CLARITA, CA 91350 - 2947
County Los Angeles

Gepaid: CAD981624059
Tepaid: CAD008364432
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: 0.9591
Category: Laboratory waste chemicals
Disposal Method: Recycler
Contact: WM. S. HART UNION HS DISTRICT
Telephone: (805) 259-0033
Mailing Address: 21515 REDVIEW DR
SANTA CLARITA, CA 91350 - 2947
County Los Angeles

The CA HAZNET database contains 11 additional records for this site.
Please contact your EDR Account Executive for more information.

BC365 **CORNER SAN FERNANDO RD. AND DRAYTON ST** **ERNS** **90168505**
WSW **CORNER SAN FERNANDO RD. AND DRAYTON ST** **N/A**
> 1 **SANTA CLARITA, CA**
7791 ft.
Lower **Site 7 of 7 in cluster BC**

BD366 **MAIN STREET VIDIO** **HAZNET** **S103976029**
NNE **27611 BOUQUET CYN RD** **N/A**
> 1 **SANTA CLARITA, CA 91350**
7817 ft.
Higher **Site 6 of 6 in cluster BD**

HAZNET:

Gepaid:	CAL000126273
Tepaid:	CAT000613976
Gen County:	Los Angeles
Tsd County:	Orange
Tons:	.0416
Category:	Photochemicals/photoprocessing waste
Disposal Method:	Transfer Station
Contact:	MAIN STREET VIDIO
Telephone:	(805) 297-7767
Mailing Address:	27611 BOUQUET CANYON RD SANTA CLARITA, CA 91350 - 1793
County	Los Angeles

BE367 **BEE & BEE MACHINE SHOP** **LOS ANGELES CO. HMS** **U003059896**
SW **25852 SPRINGBROOK AVE** **N/A**
> 1 **SANTA CLARITA, CA**
7822 ft.
Lower **Site 1 of 10 in cluster BE**

HMS:

Facility Id:	003639-I03763		
Facility Type:	I00		
Permit Number:	000001671	Permit Status:	Closed
Facility Status:	Closed	Area:	7A
Region:	Los Angeles County:		

BE368 **FOOTHILL ELECTRIC MOTORS** **LOS ANGELES CO. HMS** **S103945399**
SW **25852 SPRINGBROOK AVE** **N/A**
> 1 **SANTA CLARITA, CA**
7822 ft.
Lower **Site 2 of 10 in cluster BE**

HMS:

Facility Id:	020341-028945		
Facility Type:	Not reported		
Permit Number:	Not reported	Permit Status:	Not reported
Facility Status:	OPEN	Area:	7A
Region:	Los Angeles County:		

BE369 **CHMIRS** **S100279183**
SW **25848 SPRINGBROOK RD** **N/A**
> 1 **SANTA CLARITA, CA 91350**
7832 ft.
Lower **Site 3 of 10 in cluster BE**

(Continued) **S100279183**

CHMIRS:

OES Control Number:	8904376	DOT ID:	Not reported
DOT Hazard Class:	Not Reported		
Chemical Name:	POLYVINYLCHLORIDE		
Extent of Release:	Not reported		
CAS Number:	9003-22-9	Quantity Released:	500
Environmental Contamination:	Ground	Property Use:	Industrial, Utility
Incident Date:	13-JAN-89	Date Completed:	13-JAN-89
Time Completed :	845		
Physical State Stored :	Solid		
Physical State Released :	Solid		
Release Unit :	Lbs.		
Container Description :	1		
Container Type :	03		
Container Material :	Aluminum and Aluminium alloys		
Level Of Container :	10		
Container Capacity :	Not reported		
Container Capacity Units (code) :	Not reported		
Extent Of Release (code) :	7		
Agency Id Number :	19110		
Agency Incident Number :	1-10		
OES Incident Number :	8904376		
Time Notified :	742		
Surrounding Area :	700		
Estimated Temperature :	Not reported		
Property Management :	Not reported		
More Than Two Substances Involved? :	Not reported		
Special Studies 1 :	Not reported		
Special Studies 2 :	Not reported		
Special Studies 3 :	Not reported		
Special Studies 4 :	Not reported		
Special Studies 5 :	Not reported		
Special Studies 6 :	Not reported		
Responding Agency Personel # Of Injuries :	0		
Responding Agency Personel # Of Fatalities :	0		
Resp Agncy Personel # Of Decontaminated :	0		
Others Number Of Decontaminated :	0		
Others Number Of Injuries :	0		
Others Number Of Fatalities :	0		
Vehicle Make/year :	Not reported		
Vehicle License Number :	Not reported		
Vehicle State :	Not reported		
Vehicle Id Number :	Not reported		
CA/DOT/PUC/ICC Number :	Not reported		
Company Name :	Not reported		
Reporting Officer Name/ID :	LYNN A. MOHR		
Report Date :	13-JAN-89		
Comments :	Not reported		
Facility Telephone Number :	213 267-2485		

BF370 **DRIVE-IN DAIRY** **LOS ANGELES CO. HMS** **U003061939**
NW **26954 N SECO CANYON RD** **N/A**
> 1 **SANTA CLARITA, CA**
7836 ft.
Higher **Site 1 of 2 in cluster BF**

HMS:
Facility Id: 005965-I06179

DRIVE-IN DAIRY (Continued) **U003061939**

Facility Type: I00
Permit Number: 000003714 Permit Status: Closed
Facility Status: Closed Area: 7A
Region: Los Angeles County:

BF371 **WORTMANN OIL CO** **LOS ANGELES CO. HMS** **S104538244**
NW **26954 N SECO CANYON RD** **N/A**
> 1 **SANTA CLARITA, CA**
7836 ft.
Higher **Site 2 of 2 in cluster BF**

HMS:
Facility Id: 009374-009181
Facility Type: T0
Permit Number: 00000165T Permit Status: Permit
Facility Status: Permit Area: 7A
Region: Los Angeles County:

BE372 **LEONARD'S MOLDED PRODUCTS** **LOS ANGELES CO. HMS** **S103945396**
SW **25847 SPRINGBROOK AVE** **N/A**
> 1 **SANTA CLARITA, CA**
7836 ft.
Lower **Site 4 of 10 in cluster BE**

HMS:
Facility Id: 020338-028942
Facility Type: Not reported
Permit Number: Not reported Permit Status: Not reported
Facility Status: OPEN Area: 7A
Region: Los Angeles County:

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373 **RIO VISTA ELEMENTARY SCHOOL** **HAZNET** **S102815974**
East **20417 CEDARCREEK ST** **N/A**
> 1 **CANYON COUNTRY, CA 91351**
7851 ft.
Higher

HAZNET:
Gepaid: CAL000082498
Tepaid: CAD067786749
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: .8428
Category: Asbestos-containing waste
Disposal Method: Not reported
Contact: SAUGUS UNION SCHOOL DISTRICT
Telephone: (805) 297-8800
Mailing Address: SAUGUS, CA 91350
County Los Angeles

RIO VISTA ELEMENTARY SCHOOL (Continued) **S102815974**

Gepaid: CAL000082498
Tepaid: CAD067786749
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: 20.2272
Category: Asbestos-containing waste
Disposal Method: Disposal, Land Fill
Contact: SAUGUS UNION SCHOOL DISTRICT
Telephone: (805) 297-8800
Mailing Address: SAUGUS, CA 91350
County Los Angeles

BE374 **FOOTHILL ELECTRIC MOTORS** **LOS ANGELES CO. HMS** **S103945392**
SW **25838 SPRINGBROOK AVE** **N/A**
> 1 **SANTA CLARITA, CA**
7861 ft.
Lower **Site 5 of 10 in cluster BE**

HMS:
Facility Id: 020337-028941
Facility Type: Not reported
Permit Number: Not reported
Permit Status: Not reported
Facility Status: OPEN
Area: 7A
Region: Los Angeles County:

BE375 **A & K BODY & FENDER** **RCRIS-SQG** **1000121178**
SW **25834 SPRINGBROOK AVE** **FINDS** **CAD982005233**
> 1 **SAUGUS, CA 91350** **HAZNET**
7872 ft.
Lower **Site 6 of 10 in cluster BE**

RCRIS:
Owner: RICHIE KOCH
(415) 555-1212
EPA ID: CAD982005233
Contact: ENVIRONMENTAL MANAGER
(415) 555-1212
Classification: Small Quantity Generator
Used Oil Recyc: No
TSDF Activities: Not reported

Violation Status: No violations found

FINDS:
Other Pertinent Environmental Activity Identified at Site:
Facility Registry System (FRS)
Resource Conservation and Recovery Act Information system (RCRAINFO)

HAZNET:
Gepaid: CAD982005233
Tepaid: CAD009452657
Gen County: Los Angeles
Tsd County: San Mateo
Tons: .0417
Category: Unspecified solvent mixture Waste
Disposal Method: Not reported
Contact: RICHARD J & CANDICE KOCH

A & K BODY & FENDER (Continued) **1000121178**

Telephone: (000) 000-0000
Mailing Address: 25834 SPRINGBROOK AVE
SANTA CLARITA, CA 91350
County Los Angeles

Gepaid: CAD982005233
Tepaid: CAD006452657
Gen County: Los Angeles
Tsd County: 0
Tons: .1668
Category: Unspecified solvent mixture Waste
Disposal Method: Not reported
Contact: RICHARD J & CANDICE KOCH
Telephone: (000) 000-0000
Mailing Address: 25834 SPRINGBROOK AVE
SANTA CLARITA, CA 91350
County Los Angeles

Gepaid: CAD982005233
Tepaid: CAT000613893
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: 0.2208
Category: Aqueous solution with less than 10% total organic residues
Disposal Method: Transfer Station
Contact: RICHARD J & CANDICE KOCH
Telephone: (000) 000-0000
Mailing Address: 25834 SPRINGBROOK AVE
SANTA CLARITA, CA 91350
County Los Angeles

Gepaid: CAD982005233
Tepaid: CAD009452657
Gen County: Los Angeles
Tsd County: San Mateo
Tons: .4252
Category: Unspecified solvent mixture Waste
Disposal Method: Recycler
Contact: RICHARD J & CANDICE KOCH
Telephone: (000) 000-0000
Mailing Address: 25834 SPRINGBROOK AVE
SANTA CLARITA, CA 91350
County Los Angeles

Gepaid: CAD982005233
Tepaid: CAD009452657
Gen County: Los Angeles
Tsd County: San Mateo
Tons: .1251
Category: Unspecified solvent mixture Waste
Disposal Method: Not reported
Contact: RICHARD J & CANDICE KOCH
Telephone: (000) 000-0000
Mailing Address: 25834 SPRINGBROOK AVE
SANTA CLARITA, CA 91350
County Los Angeles

A & K BODY & FENDER (Continued) **1000121178**

The CA HAZNET database contains 3 additional records for this site.
Please contact your EDR Account Executive for more information.

BE376 **A & K FRAME ALIGNMENT** **LOS ANGELES CO. HMS** **S103945386**
SW **25834 SPRINGBROOK AVE** **N/A**
> 1 **SANTA CLARITA, CA**
7872 ft.
Lower **Site 7 of 10 in cluster BE**

HMS:

Facility Id:	020336-028940		
Facility Type:	Not reported		
Permit Number:	Not reported	Permit Status:	Not reported
Facility Status:	OPEN	Area:	7A
Region:	Los Angeles County:		

BE377 **MYERS PUMPING CO.** **LOS ANGELES CO. HMS** **S103945383**
SW **25824 SPRINGBROOK AVE** **N/A**
> 1 **SANTA CLARITA, CA**
7901 ft.
Lower **Site 8 of 10 in cluster BE**

HMS:

Facility Id:	020335-028939		
Facility Type:	Not reported		
Permit Number:	Not reported	Permit Status:	Not reported
Facility Status:	OPEN	Area:	7A
Region:	Los Angeles County:		

BE378 **AUTO BODY SPECIALISTS** **LOS ANGELES CO. HMS** **S103945382**
SW **25823 SPRINGBROOK AVE** **N/A**
> 1 **SANTA CLARITA, CA**
7908 ft.
Lower **Site 9 of 10 in cluster BE**

HMS:

Facility Id:	020334-028938		
Facility Type:	Not reported		
Permit Number:	Not reported	Permit Status:	Not reported
Facility Status:	OPEN	Area:	7A
Region:	Los Angeles County:		

BG379 **MYFRAN INC DBA MIDAS MUFFLER** **HAZNET** **S104574919**
SW **25745 SAN FERNANDO RD** **N/A**
> 1 **SAUGUS, CA 91351**
7913 ft.
Lower **Site 1 of 3 in cluster BG**

HAZNET:

Gepaid:	CAD983599069
Tepaid:	CAT000613893
Gen County:	Los Angeles
Tsd County:	Los Angeles
Tons:	0.3125
Category:	Aqueous solution with less than 10% total organic residues
Disposal Method:	Transfer Station
Contact:	MYFRAN INC

MYFRAN INC DBA MIDAS MUFFLER (Continued) **S104574919**

Telephone: (000) 000-0000
Mailing Address: 25745 SAN FERNANDO RD
SAUGUS, CA 91351
County Los Angeles

Gepaid: CAD983599069
Tepaid: CAT000613893
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: .0500
Category: Aqueous solution with less than 10% total organic residues
Disposal Method: Transfer Station
Contact: MYFRAN INC
Telephone: (000) 000-0000
Mailing Address: 25745 SAN FERNANDO RD
SAUGUS, CA 91351
County Los Angeles

Gepaid: CAD983599069
Tepaid: CAT000613893
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: .0417
Category: Aqueous solution with less than 10% total organic residues
Disposal Method: Treatment, Tank
Contact: MYFRAN INC
Telephone: (000) 000-0000
Mailing Address: 25745 SAN FERNANDO RD
SAUGUS, CA 91351
County Los Angeles

Gepaid: CAD983599069
Tepaid: CAD093459485
Gen County: Los Angeles
Tsd County: Fresno
Tons: .0625
Category: Organic liquids with metals Alkaline solution (pH <UN-> 12.5) with metals (antimony, arsenic, barium, beryllium, cadmium, chromium, cobalt, copper, lead, mercury, molybdenum, nickel, selenium, silver, thallium, vanadium, and zinc)
Disposal Method: Transfer Station
Contact: MYFRAN INC
Telephone: (000) 000-0000
Mailing Address: 25745 SAN FERNANDO RD
SAUGUS, CA 91351
County Los Angeles

Gepaid: CAD983599069
Tepaid: CAT080013352
Gen County: Los Angeles
Tsd County: Los Angeles
Tons: 2.6104
Category: Oil/water separation sludge
Disposal Method: Recycler
Contact: MYFRAN INC
Telephone: (000) 000-0000
Mailing Address: 25745 SAN FERNANDO RD
SAUGUS, CA 91351
County Los Angeles

MYFRAN INC DBA MIDAS MUFFLER (Continued) **S104574919**

The CA HAZNET database contains 1 additional record for this site.
Please contact your EDR Account Executive for more information.

BG380 **MIDAS MUFFLER & BRAKE SHOP** **LOS ANGELES CO. HMS** **S103945377**
SW **25745 SAN FERNANDO RD** **N/A**
> 1 **SANTA CLARITA, CA**
7913 ft.
Lower **Site 2 of 3 in cluster BG**

HMS:
Facility Id: 020233-028814
Facility Type: Not reported
Permit Number: Not reported
Permit Status: Not reported
Facility Status: OPEN
Area: 7A
Region: Los Angeles County:

BG381 **MIDAS MUFFLER** **RCRIS-SQG** **1000595948**
SW **25745 SAN FERNANDO RD** **FINDS** **CAD983599069**
> 1 **SAUGUS, CA 91351**
7913 ft.
Lower **Site 3 of 3 in cluster BG**

RCRIS:
Owner: GOLDRICH TRUST NO 1
(415) 555-1212
EPA ID: CAD983599069
Contact: SCOTT DAVIS
(805) 255-0855
Classification: Small Quantity Generator
Used Oil Recyc: No
TSDF Activities: Not reported

Violation Status: No violations found

FINDS:
Other Pertinent Environmental Activity Identified at Site:
Facility Registry System (FRS)
Resource Conservation and Recovery Act Information system (RCRAINFO)

BE382 **VIKING AUTO UPHOLSTERY** **LOS ANGELES CO. HMS** **S103945381**
SW **25819 SPRINGBROOK AVE** **N/A**
> 1 **SANTA CLARITA, CA**
7919 ft.
Lower **Site 10 of 10 in cluster BE**

HMS:
Facility Id: 020333-028937
Facility Type: Not reported
Permit Number: Not reported
Permit Status: Not reported
Facility Status: OPEN
Area: 7A
Region: Los Angeles County:

MAP FINDINGS - EDR PROPRIETARY HISTORICAL DATABASES

YEAR	NAME	ADDRESS	CITY	ST	DIR.	DIST.	ELEV.	TYPE

Coal Gas Site Search: No site was found in a search of Real Property Scan's ENVIROHAZ database.

EDR Historical Gas Station & Dry Cleaner Search: No mapped sites were found in EDR's search of the EDR Historical Gas Station & Dry Cleaner Database within 0.250 mile of the Target Property.

ORPHAN SUMMARY

City	EDR ID	Site Name	Site Address	Zip	Database(s)
ACTON	S103674992	LOS ANGELES COUNTY FIRE DEPT	8800 W SOLEDAD CYN RDC-11	91350	HAZNET
CANYON	S102797745	SAUGUS UNION SCHOOL DISTRICT	CEDARCREEK SCHOOL	91351	HAZNET
CANYON COUNTRY	S103648041	OAK COLOR	26752 OAK AVE STE E	91351	HAZNET
CANYON COUNTRY	S105092734	JEMCO ELECTRICAL	26752 OAK AVE STE H	91351	HAZNET
CANYON COUNTRY	S105092175	AMERICAN GRAFFITII	26821 RUETHER AVE UNIT I	91351	HAZNET
CANYON COUNTRY	S105093086	A & S EXCHANGE	26911 RUETHER AVE UNIT D	91351	HAZNET
CANYON COUNTRY	S105085203	SHARON KENNEALLY	27367 SAN CANYON RD	91351	HAZNET
CANYON COUNTRY	S103637390	LOS ANGELES COUNTY FIRE DEPT	18239 W SOLEDAD CYN RD - STATI	91351	HAZNET
CANYON COUNTRY	S105030846	MINNIE MAX CLEANERS	20655 SOLEDAD CANYON RD UNIT 3	91351	CLEANERS
CANYON COUNTRY	S105265668	ACE CLEANERS	18835 SOLEDAD	91351	CLEANERS
LOS ANGELES	S104575199	CITY OF LA - ENVIRO SVCS DEPT	SOLEDAD CANYON RD	91351	HAZNET
SANTA CLARITA	S102532002	WOK EXPRESS	26570 N BOUQUET CANYON RD A	91350	LOS ANGELES CO. HMS
SANTA CLARITA	S103945406	GOOD GUYS AUTO REPAIR	26015 BOUQUET CANYON RD A	91350	LOS ANGELES CO. HMS
SANTA CLARITA	S103945413	AQUA-FLO SUPPLY	26081 BOUQUET CANYON RD A	91350	LOS ANGELES CO. HMS
SANTA CLARITA	S103945414	SAUGUS SUZUKI	26081 BOUQUET CANYON RD B	91350	LOS ANGELES CO. HMS
SANTA CLARITA	S103995295	WELLS FARGO BANK	26007 26011 BOUQUET CANYON	91350	HAZNET
SANTA CLARITA	S104827210	UNITED OIL CO.	26015 N BOUQUET CANYON RD B	91350	LOS ANGELES CO. HMS
SANTA CLARITA	S105053522	ALERT MOBILE REPAIR	26011 BOUQUET CANYON RD A	91350	LOS ANGELES CO. HMS
SANTA CLARITA	S105053523	ALERT MOBILE REPAIR	26011 BOUQUET CANYON RD A	91350	LOS ANGELES CO. HMS
SANTA CLARITA	S105193537	IN-N-OUT BURGER	26401 N BOUQUET CANYON RD	91350	LOS ANGELES CO. HMS
SANTA CLARITA	S105193538	PANDA EXPRESS	26409 N BOUQUET CANYON RD	91350	LOS ANGELES CO. HMS
SANTA CLARITA	S105193539	LOWE'S HOME IMPROVMNT WRHOUSE	26415 N BOUQUET CANYON RD	91350	LOS ANGELES CO. HMS
SANTA CLARITA	S105421916	CAR WASH USA INC	26225 N BOUQUET CANYON RD	91350	LOS ANGELES CO. HMS
SANTA CLARITA	U003060611	LUSTGARTEN OIL CO	BOUQUET CYN		LOS ANGELES CO. HMS
SANTA CLARITA	S105512328	RIO VISTA WTP PUMPING STA	25401 N BOUQUET CANYON RD		LOS ANGELES CO. HMS
SANTA CLARITA	S105421919	BOUQUET CYN OILFIELD	BOUQUET CYN OF		LOS ANGELES CO. HMS
SANTA CLARITA	S104735491	J. MICHAEL MCGRATH NEW ELEM. SCH.	SW CORNER DOCKWEILER DR. / V	91355	Cal-Sites
SANTA CLARITA	S103340303	BILL SMALL'S MUD SUMP	END OF AVENUE OF THE OAKS		SWF/LF
SANTA CLARITA	S103340253	BILL SMALL'S MUD SUMP	AT END OF AVENUE OF THE OAKS		SWF/LF
SANTA CLARITA	S103945508	BONELLI & SONS PRCSN	27134 FURNIVALL AVE A	91351	LOS ANGELES CO. HMS
SANTA CLARITA	S103945509	LON'S DIESEL REPAIR	27134 FURNIVALL AVE B	91351	LOS ANGELES CO. HMS
SANTA CLARITA	S102592980	ARB ENTERPRISES	26516 GOLDEN VALLEY RD 310	91350	LOS ANGELES CO. HMS
SANTA CLARITA	S102685273	PROJEX	26516 GOLDEN VALLEY RD 112	91350	LOS ANGELES CO. HMS
SANTA CLARITA	S102685274	KARS BODY & PAINT	26516 GOLDEN VALLEY RD 116	91350	LOS ANGELES CO. HMS
SANTA CLARITA	S102685275	STARR AUTO DETAIL	26516 GOLDEN VALLEY RD 205	91350	LOS ANGELES CO. HMS
SANTA CLARITA	S103317771	GOLDEN VALLEY INDUSTRIAL	26521 GOLDEN VALLEY RD B	91350	LOS ANGELES CO. HMS
SANTA CLARITA	S103945083	AUTO DISCOUNT CENTER	21704 GOLDEN TRIANGLE RD A	91350	LOS ANGELES CO. HMS
SANTA CLARITA	S103945084	THE AUTOLINE	21704 GOLDEN TRIANGLE RD B	91350	LOS ANGELES CO. HMS
SANTA CLARITA	S103945427	R & R ENGINEERING COMPANY	26477 GOLDEN VALLEY RD A	91350	LOS ANGELES CO. HMS
SANTA CLARITA	S103945428	GALAXY DIE & ENGINEERING INC.	26477 GOLDEN VALLEY RD B	91350	LOS ANGELES CO. HMS
SANTA CLARITA	S103945431	ALL AROUND SHEET METAL	26502 GOLDEN VALLEY RD A	91350	LOS ANGELES CO. HMS
SANTA CLARITA	S103945432	HMV MOLDES & TOOLS	26502 GOLDEN VALLEY RD B	91350	LOS ANGELES CO. HMS
SANTA CLARITA	S103945433	PACIFIC AUTOMOTIVE	26502 GOLDEN VALLEY RD C	91350	LOS ANGELES CO. HMS

ORPHAN SUMMARY

City	EDR ID	Site Name	Site Address	Zip	Database(s)
SANTA CLARITA	S103945434	C & N AUTOMOTIVE	26516 GOLDEN VALLEY RD B	91350	LOS ANGELES CO. HMS
SANTA CLARITA	S103945435	A SUPERIOR WOODWORKS	26516 GOLDEN VALLEY RD A	91350	LOS ANGELES CO. HMS
SANTA CLARITA	S103945439	ACCURATE TRAILER HITCH & WELD	26536 GOLDEN VALLEY RD A	91350	LOS ANGELES CO. HMS
SANTA CLARITA	S103945441	C & F SHEET METAL	26536 GOLDEN VALLEY RD C	91350	LOS ANGELES CO. HMS
SANTA CLARITA	S103977194	MERLE NORMAN COSMETICS SAUGUS	25407 N GOLDEN VALLEY RD	91350	HAZNET
SANTA CLARITA	S104569851	EXECUTIVE AUTOMOTIVE	26536 GOLDEN VALLEY RD STE 613	91350	HAZNET
SANTA CLARITA	S105087850	THE CROISDALE GROUP	2144 GOLDEN TRIANGLE RD	91350	HAZNET
SANTA CLARITA	U003064866	CALIF COLLECTABLE COACHCRAFT	26521 GOLDEN VALLEY RD B	91350	LOS ANGELES CO. HMS
SANTA CLARITA	S105193684	MERLE NORMAN COSMETICS	C6407 GOLDEN VALLEY RD		LOS ANGELES CO. HMS
SANTA CLARITA	S105193685	MERLE NORMAN COSMETICS	C6407 GOLDEN VALLEY RD		LOS ANGELES CO. HMS
SANTA CLARITA	S104913198	CITY OF SANTA CLARITA	C6407 GOLDEN VALLEY RD		LOS ANGELES CO. HMS
SANTA CLARITA	S104791966	GOLDEN VALLEY RD. SANTA CLARITA	GOLDEN VALLEY ROAD		CA SLIC
SANTA CLARITA	U003060717	GOLDEN TRIANGLE INDL PARK	HONBY STATION		LOS ANGELES CO. HMS
SANTA CLARITA	S104857806	SOUTHERN CALIFORNIA GAS CO.	MCBEAN PARKWAY / VALENCIA BL	91355	CA WDS
SANTA CLARITA	U003057315	NEWHALL OIL FIELD	NEWHALL OLFD		LOS ANGELES CO. HMS
SANTA CLARITA	U003057317	KERNVIEW OIL CO	NEWHALL OLFD		LOS ANGELES CO. HMS
SANTA CLARITA	S103317738	WILLIAM S HART REGIONAL PARK	24151 NEWHALL AVE		LOS ANGELES CO. HMS
SANTA CLARITA	S105422050	HOME DEPOT, INC	28033 NEWHALL RANCHO RD		LOS ANGELES CO. HMS
SANTA CLARITA	U003057316	GATE KING PROPERTIES INC	NEWHALL OLFD		LOS ANGELES CO. HMS
SANTA CLARITA	S102055323	ATLANTIC OIL CO	NEWHALL OLFD		LOS ANGELES CO. HMS
SANTA CLARITA	S103945449	PREMIER AUTOBODY FRAME	26724 OAK AVE A	91351	LOS ANGELES CO. HMS
SANTA CLARITA	S103945450	BODEN'S CYLINDER HEADS	26724 OAK AVE B	91351	LOS ANGELES CO. HMS
SANTA CLARITA	S103945451	CANYON AUTO ELECTRIC	26724 OAK AVE B	91351	LOS ANGELES CO. HMS
SANTA CLARITA	S103945452	ARNECKES AUTOMOTIVE MACH. SHOP	26740 OAK AVE A	91351	LOS ANGELES CO. HMS
SANTA CLARITA	S103945453	FINE CABINETS	26740 OAK AVE B	91351	LOS ANGELES CO. HMS
SANTA CLARITA	S103945454	STRAIGHT LINE PERFORMANCE	26740 OAK AVE C	91351	LOS ANGELES CO. HMS
SANTA CLARITA	S103945456	MICHAEL'S SHUTTER MFG.	26752 OAK AVE A	91351	LOS ANGELES CO. HMS
SANTA CLARITA	S103945457	CHEMEX EXTERMINATORS	26752 OAK AVE B	91351	LOS ANGELES CO. HMS
SANTA CLARITA	S103945458	PATROL SECURITY	26752 OAK AVE C	91351	LOS ANGELES CO. HMS
SANTA CLARITA	S103945463	CYCLE ENGINEERING	26810 OAK AVE A	91351	LOS ANGELES CO. HMS
SANTA CLARITA	S103945464	AMT SYSTEMS INC	26810 OAK AVE B	91351	LOS ANGELES CO. HMS
SANTA CLARITA	S103945466	ACTION WOODWORKS	26818 OAK AVE A	91351	LOS ANGELES CO. HMS
SANTA CLARITA	S103945480	C B C	26845 OAK AVE A	91351	LOS ANGELES CO. HMS
SANTA CLARITA	S103945481	EXCLUSIVELY BRITISH & IMPORTS	26845 OAK AVE B	91351	LOS ANGELES CO. HMS
SANTA CLARITA	S103945482	SKIN TIGHT	26845 OAK AVE C	91351	LOS ANGELES CO. HMS
SANTA CLARITA	S103945483	TLC WOODWORKS	26846 OAK AVE A	91351	LOS ANGELES CO. HMS
SANTA CLARITA	S104537773	THE BLOWERS SHOP	26846 OAK AVE C	91351	LOS ANGELES CO. HMS
SANTA CLARITA	U003064942	TLC WOODWORK	26846 OAK AVE B	91351	LOS ANGELES CO. HMS
SANTA CLARITA	S103489706	WM HART UHSD - TRANSPORT DEPT	21429 REDVIEW DR	91350	LOS ANGELES CO. HMS, CA SLIC
SANTA CLARITA	S103945469	SANTA CLARITA AUTO AIR & RADTR	26821 RUETHER AVE C	91351	LOS ANGELES CO. HMS
SANTA CLARITA	S103945470	ALL VALLEY CARBURETORS	26831 RUETHER AVE J	91351	LOS ANGELES CO. HMS
SANTA CLARITA	S103945474	ADVANCED HONDA-ACURA	26831 RUETHER AVE K	91351	LOS ANGELES CO. HMS
SANTA CLARITA	S103945475	ARENS INDUSTRIES INC.	26841 RUETHER AVE A	91351	LOS ANGELES CO. HMS
SANTA CLARITA	S103945476	BARBS QUALITY REPAIR SERVICE	26841 RUETHER AVE B	91351	LOS ANGELES CO. HMS
SANTA CLARITA	S103945477	CYCLE CONCEPTS INC.	26841 RUETHER AVE C	91351	LOS ANGELES CO. HMS
SANTA CLARITA	S103945478	HERMANN MW CO.	26841 RUETHER AVE D	91351	LOS ANGELES CO. HMS
SANTA CLARITA	S103945488	SCV TOYOTA	26911 RUETHER AVE A	91351	LOS ANGELES CO. HMS

ORPHAN SUMMARY

City	EDR ID	Site Name	Site Address	Zip	Database(s)
SANTA CLARITA	S103945489	BRITISH CUSTOMS	26911 RUETHER AVE B	91351	LOS ANGELES CO. HMS
SANTA CLARITA	S103945490	CLASSIC MANTELS	26911 RUETHER AVE C	91351	LOS ANGELES CO. HMS
SANTA CLARITA	S103945491	A & S EXCHANGE	26911 RUETHER AVE D	91351	LOS ANGELES CO. HMS
SANTA CLARITA	S103945493	PACIFIC WOOD PRODUCTS	26911 RUETHER AVE F	91351	LOS ANGELES CO. HMS
SANTA CLARITA	S103945495	SERVICE MASTER	26911 RUETHER AVE H	91351	LOS ANGELES CO. HMS
SANTA CLARITA	S103945501	BLACKSTOCK WOODWORKS	26943 RUETHER AVE D	91351	LOS ANGELES CO. HMS
SANTA CLARITA	S103945502	JOHN TOMMY WOODWORKS	26943 RUETHER AVE C	91351	LOS ANGELES CO. HMS
SANTA CLARITA	S103945503	STANDARD FASTENERS MFG.	26951 RUETHER AVE A	91351	LOS ANGELES CO. HMS
SANTA CLARITA	S103945504	TOM'S AUTOMOTIVE SERVICE	26951 RUETHER AVE B	91351	LOS ANGELES CO. HMS
SANTA CLARITA	S103945505	VALENCIA VOLVO INDEPENDENT	26951 RUETHER AVE J	91351	LOS ANGELES CO. HMS
SANTA CLARITA	S104538077	SOLAR DESIGN WINDOW TINTING	26831 RUETHER AVE C	91351	LOS ANGELES CO. HMS
SANTA CLARITA	S105085906	ROTO-JET OF AMERICA CO INC	26943 RUETHER AVE UNIT S	91351	HAZNET
SANTA CLARITA	S105092361	AUTOMOTIVE FITNESS CENTER INC.	26911 RUETHER AVE STE S	91351	HAZNET
SANTA CLARITA	S103945385	SC CUSTOM CYCLES	25825 SAN FERNANDO RD B	91350	LOS ANGELES CO. HMS
SANTA CLARITA	S103945387	AJ AUTO DETAIL & ACCESSORIES	25835 SAN FERNANDO RD 32	91350	LOS ANGELES CO. HMS
SANTA CLARITA	S103945388	CALIFORNIA TINT	25835 SAN FERNANDO RD 33	91350	LOS ANGELES CO. HMS
SANTA CLARITA	S103945394	SANTA CLARITA VALLEY HUBCAPS	25845 SAN FERNANDO RD 6	91350	LOS ANGELES CO. HMS
SANTA CLARITA	S103945395	WINDSHIELDS WHOLESALE AUTO GLS	25845 SAN FERNANDO RD C	91350	LOS ANGELES CO. HMS
SANTA CLARITA	S104538153	AAMCO TRANSMISSIONS	25825 SAN FERNANDO RD A	91350	LOS ANGELES CO. HMS
SANTA CLARITA	S104913314	NICK'S AUTO REPAIR	25835 SAN FERNANDO RD D	91350	LOS ANGELES CO. HMS
SANTA CLARITA	S105053520	GASOLINE ALLEY	25845 SAN FERNANDO RD A	91350	LOS ANGELES CO. HMS
SANTA CLARITA	S104538167	MANJON AUTO BODY & PAINT	24404 SAN FERNANDO RD B		LOS ANGELES CO. HMS
SANTA CLARITA	S103945171	CUSTOM SPECIALTIES	23919 SAN FERNANDO RD A		LOS ANGELES CO. HMS
SANTA CLARITA	S103945172	HAVE YOU SEEN MY TRUCK	23919 SAN FERNANDO RD B		LOS ANGELES CO. HMS
SANTA CLARITA	S103945173	KWIK RIG INC.	23919 SAN FERNANDO RD B		LOS ANGELES CO. HMS
SANTA CLARITA	S103945181	J & S AUTOBODY & PAINT SUPPLY	23953 SAN FERNANDO RD A		LOS ANGELES CO. HMS
SANTA CLARITA	S103945199	CANYON MOTORS INC.	24254 SAN FERNANDO RD A		LOS ANGELES CO. HMS
SANTA CLARITA	S103945216	AUTOMOTIVE TECHNOLOGY	24404 SAN FERNANDO RD A		LOS ANGELES CO. HMS
SANTA CLARITA	S103945033	ACRYLIC CUSTOM CLLSN & BODY	20665 SANTA CLARA ST A	91351	LOS ANGELES CO. HMS
SANTA CLARITA	S103945034	SAUMERS WELDING	20665 SANTA CLARA ST B	91351	LOS ANGELES CO. HMS
SANTA CLARITA	S103866442	DEL LAGO DEWATERING PROJ.	SANTA CLARA RIVER	91355	CA WDS
SANTA CLARITA	S105422099	SANTA CLARA RIVER BRIDGE CONST	SANTA CLARA RIVER		LOS ANGELES CO. HMS
SANTA CLARITA	1004675784	V P MANUFACTURING INC	20732 SOLEDAD ST UNITS	91351	RCRIS-SQG
SANTA CLARITA	S103944998	NORTH OAKS SHELL	19223 SOLEDAD CANYON RD A	91351	LOS ANGELES CO. HMS
SANTA CLARITA	S105053472	SHELL OIL CO	19223 SOLEDAD CANYON RD A	91351	LOS ANGELES CO. HMS
SANTA CLARITA	S105094177	VP MANUFACTURING INC	20732 SOLEDAD ST UNITS ABCDE	91351	HAZNET
SANTA CLARITA	S105193896	CANYON CLEANERS	18635 SOLEDAD CYN	91351	LOS ANGELES CO. HMS
SANTA CLARITA	S104571178	CARDINAL RESTAURANT SUPPLY	SOLEDAD / LUTHER		HAZNET
SANTA CLARITA VALLEY	S103985800	S C RADIATOR & BODY PARTS	26821 RUETHER UNIT D	91351	HAZNET
SAUGUS	S103679198	USDA FOREST SERVICE	LOS PINETOS STORAGE RT 1	91350	HAZNET
SAUGUS	1000398169	HI TECH TRANSMISSION	258825 SAN FERNANDO	91350	RCRIS-SQG
SAUGUS	S103648095	LOS ANGELES COUNTY FIRE DEPT	26829 SECO CANYON - STATION 11	91350	HAZNET
SAUGUS	1004678097	SHELL SERVICE STATION	19223 SOLEDAD	91350	RCRIS-SQG
SAUGUS	S105126708	SHELL	19223 SOLEDAD	91350	HAZNET
SAUGUS	U001567732	USA PETROLEUM COMPANY #82	19443 W. SOLEDAD	91350	HIST UST
SCV	S104493053	CANYON SQUARE SHOP. CTR/MOBIL	18507 597 SOLEDAD CANYON RD	91351	LA Co. Site Mitigation
VALENCIA	S103958717	COUNTRY CLEANERS	27674 NEWHALL RANCH RD UNIT 25	91355	HAZNET, CLEANERS

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

To maintain currency of the following federal and state databases, EDR contacts the appropriate governmental agency on a monthly or quarterly basis, as required.

Elapsed ASTM days: Provides confirmation that this EDR report meets or exceeds the 90-day updating requirement of the ASTM standard.

FEDERAL ASTM STANDARD RECORDS

NPL: National Priority List
Source: EPA
Telephone: N/A
National Priorities List (Superfund). The NPL is a subset of CERCLIS and identifies over 1,200 sites for priority cleanup under the Superfund Program. NPL sites may encompass relatively large areas. As such, EDR provides polygon coverage for over 1,000 NPL site boundaries produced by EPA's Environmental Photographic Interpretation Center (EPIC) and regional EPA offices.

Date of Government Version: 07/18/02
Date Made Active at EDR: 09/20/02
Database Release Frequency: Semi-Annually

Date of Data Arrival at EDR: 08/01/02
Elapsed ASTM days: 50
Date of Last EDR Contact: 08/01/02

NPL Site Boundaries

Sources:

EPA's Environmental Photographic Interpretation Center (EPIC)
Telephone: 202-564-7333

EPA Region 1
Telephone 617-918-1143

EPA Region 3
Telephone 215-814-5418

EPA Region 4
Telephone 404-562-8033

EPA Region 6
Telephone: 214-655-6659

EPA Region 8
Telephone: 303-312-6774

Proposed NPL: Proposed National Priority List Sites
Source: EPA
Telephone: N/A

Date of Government Version: 05/29/02
Date Made Active at EDR: 09/20/02
Database Release Frequency: Semi-Annually

Date of Data Arrival at EDR: 08/01/02
Elapsed ASTM days: 50
Date of Last EDR Contact: 08/01/02

CERCLIS: Comprehensive Environmental Response, Compensation, and Liability Information System
Source: EPA
Telephone: 703-413-0223
CERCLIS contains data on potentially hazardous waste sites that have been reported to the USEPA by states, municipalities, private companies and private persons, pursuant to Section 103 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). CERCLIS contains sites which are either proposed to or on the National Priorities List (NPL) and sites which are in the screening and assessment phase for possible inclusion on the NPL.

Date of Government Version: 05/15/02
Date Made Active at EDR: 08/08/02
Database Release Frequency: Quarterly

Date of Data Arrival at EDR: 06/24/02
Elapsed ASTM days: 45
Date of Last EDR Contact: 06/24/02

CERCLIS-NFRAP: CERCLIS No Further Remedial Action Planned
Source: EPA
Telephone: 703-413-0223
As of February 1995, CERCLIS sites designated "No Further Remedial Action Planned" (NFRAP) have been removed from CERCLIS. NFRAP sites may be sites where, following an initial investigation, no contamination was found, contamination was removed quickly without the need for the site to be placed on the NPL, or the contamination was not serious enough to require Federal Superfund action or NPL consideration. EPA has removed approximately 25,000 NFRAP sites to lift the unintended barriers to the redevelopment of these properties and has archived them as historical records so EPA does not needlessly repeat the investigations in the future. This policy change is part of the EPA's Brownfields Redevelopment Program to help cities, states, private investors and affected citizens to promote economic redevelopment of unproductive urban sites.

Date of Government Version: 05/15/02
Date Made Active at EDR: 08/08/02
Database Release Frequency: Quarterly

Date of Data Arrival at EDR: 06/24/02
Elapsed ASTM days: 45
Date of Last EDR Contact: 06/24/02

CORRACTS: Corrective Action Report
Source: EPA
Telephone: 800-424-9346
CORRACTS identifies hazardous waste handlers with RCRA corrective action activity.

Date of Government Version: 05/02/02
Date Made Active at EDR: 07/15/02
Database Release Frequency: Semi-Annually

Date of Data Arrival at EDR: 05/06/02
Elapsed ASTM days: 70
Date of Last EDR Contact: 09/09/02

RCRIS: Resource Conservation and Recovery Information System
Source: EPA/NTIS
Telephone: 800-424-9346
Resource Conservation and Recovery Information System. RCRIS includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA).

Date of Government Version: 07/10/02
Date Made Active at EDR: 09/20/02
Database Release Frequency: Varies

Date of Data Arrival at EDR: 07/26/02
Elapsed ASTM days: 56
Date of Last EDR Contact: 06/20/02

ERNS: Emergency Response Notification System
Source: EPA/NTIS
Telephone: 202-260-2342
Emergency Response Notification System. ERNS records and stores information on reported releases of oil and hazardous substances.

Date of Government Version: 12/31/01
Date Made Active at EDR: 07/15/02
Database Release Frequency: Varies

Date of Data Arrival at EDR: 07/02/02
Elapsed ASTM days: 13
Date of Last EDR Contact: 07/24/02

FEDERAL ASTM SUPPLEMENTAL RECORDS

BRS: Biennial Reporting System
Source: EPA/NTIS
Telephone: 800-424-9346
The Biennial Reporting System is a national system administered by the EPA that collects data on the generation and management of hazardous waste. BRS captures detailed data from two groups: Large Quantity Generators (LQG) and Treatment, Storage, and Disposal Facilities.

Date of Government Version: 12/31/99
Database Release Frequency: Biennially

Date of Last EDR Contact: 09/16/02
Date of Next Scheduled EDR Contact: 12/16/02

CONSENT: Superfund (CERCLA) Consent Decrees
Source: EPA Regional Offices
Telephone: Varies
Major legal settlements that establish responsibility and standards for cleanup at NPL (Superfund) sites. Released periodically by United States District Courts after settlement by parties to litigation matters.

Date of Government Version: N/A
Database Release Frequency: Varies

Date of Last EDR Contact: N/A
Date of Next Scheduled EDR Contact: N/A

ROD: Records Of Decision
Source: EPA
Telephone: 703-416-0223
Record of Decision. ROD documents mandate a permanent remedy at an NPL (Superfund) site containing technical and health information to aid in the cleanup.

Date of Government Version: 12/21/01
Database Release Frequency: Annually

Date of Last EDR Contact: 07/09/02
Date of Next Scheduled EDR Contact: 10/07/02

DELISTED NPL: National Priority List Deletions
Source: EPA
Telephone: N/A
The National Oil and Hazardous Substances Pollution Contingency Plan (NCP) establishes the criteria that the EPA uses to delete sites from the NPL. In accordance with 40 CFR 300.425.(e), sites may be deleted from the NPL where no further response is appropriate.

Date of Government Version: 07/18/02
Database Release Frequency: Quarterly

Date of Last EDR Contact: 08/01/02
Date of Next Scheduled EDR Contact: 11/04/02

FINDS: Facility Index System/Facility Identification Initiative Program Summary Report
Source: EPA
Telephone: N/A
Facility Index System. FINDS contains both facility information and 'pointers' to other sources that contain more detail. EDR includes the following FINDS databases in this report: PCS (Permit Compliance System), AIRS (Aerometric Information Retrieval System), DOCKET (Enforcement Docket used to manage and track information on civil judicial enforcement cases for all environmental statutes), FURS (Federal Underground Injection Control), C-DOCKET (Criminal Docket System used to track criminal enforcement actions for all environmental statutes), FFIS (Federal Facilities Information System), STATE (State Environmental Laws and Statutes), and PADS (PCB Activity Data System).

Date of Government Version: 03/21/02
Database Release Frequency: Quarterly

Date of Last EDR Contact: 07/08/02
Date of Next Scheduled EDR Contact: 10/07/02

HMIRS: Hazardous Materials Information Reporting System
Source: U.S. Department of Transportation
Telephone: 202-366-4555
Hazardous Materials Incident Report System. HMIRS contains hazardous material spill incidents reported to DOT.

Date of Government Version: 05/31/02
Database Release Frequency: Annually

Date of Last EDR Contact: 07/22/02
Date of Next Scheduled EDR Contact: 10/21/02

MLTS: Material Licensing Tracking System
Source: Nuclear Regulatory Commission
Telephone: 301-415-7169
MLTS is maintained by the Nuclear Regulatory Commission and contains a list of approximately 8,100 sites which possess or use radioactive materials and which are subject to NRC licensing requirements. To maintain currency, EDR contacts the Agency on a quarterly basis.

Date of Government Version: 04/12/02
Database Release Frequency: Quarterly

Date of Last EDR Contact: 07/08/02
Date of Next Scheduled EDR Contact: 10/07/02

MINES: Mines Master Index File
Source: Department of Labor, Mine Safety and Health Administration
Telephone: 303-231-5959

Date of Government Version: 06/05/02
Database Release Frequency: Semi-Annually

Date of Last EDR Contact: 07/01/02
Date of Next Scheduled EDR Contact: 09/30/02

NPL LIENS: Federal Superfund Liens
Source: EPA
Telephone: 205-564-4267
Federal Superfund Liens. Under the authority granted the USEPA by the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) of 1980, the USEPA has the authority to file liens against real property in order to recover remedial action expenditures or when the property owner receives notification of potential liability. USEPA compiles a listing of filed notices of Superfund Liens.

Date of Government Version: 10/15/91
Database Release Frequency: No Update Planned
Date of Last EDR Contact: 08/26/02
Date of Next Scheduled EDR Contact: 11/25/02

PADS: PCB Activity Database System
Source: EPA
Telephone: 202-564-3887
PCB Activity Database. PADS Identifies generators, transporters, commercial storers and/or brokers and disposers of PCB's who are required to notify the EPA of such activities.

Date of Government Version: 03/01/02
Database Release Frequency: Annually
Date of Last EDR Contact: 08/02/02
Date of Next Scheduled EDR Contact: 11/11/02

RAATS: RCRA Administrative Action Tracking System
Source: EPA
Telephone: 202-564-4104
RCRA Administration Action Tracking System. RAATS contains records based on enforcement actions issued under RCRA pertaining to major violators and includes administrative and civil actions brought by the EPA. For administration actions after September 30, 1995, data entry in the RAATS database was discontinued. EPA will retain a copy of the database for historical records. It was necessary to terminate RAATS because a decrease in agency resources made it impossible to continue to update the information contained in the database.

Date of Government Version: 04/17/95
Database Release Frequency: No Update Planned
Date of Last EDR Contact: 09/10/02
Date of Next Scheduled EDR Contact: 12/09/02

TRIS: Toxic Chemical Release Inventory System
Source: EPA
Telephone: 202-260-1531
Toxic Release Inventory System. TRIS identifies facilities which release toxic chemicals to the air, water and land in reportable quantities under SARA Title III Section 313.

Date of Government Version: 12/31/00
Database Release Frequency: Annually
Date of Last EDR Contact: 06/24/02
Date of Next Scheduled EDR Contact: 09/23/02

TSCA: Toxic Substances Control Act
Source: EPA
Telephone: 202-260-5521
Toxic Substances Control Act. TSCA identifies manufacturers and importers of chemical substances included on the TSCA Chemical Substance Inventory list. It includes data on the production volume of these substances by plant site.

Date of Government Version: 12/31/98
Database Release Frequency: Every 4 Years
Date of Last EDR Contact: 09/09/02
Date of Next Scheduled EDR Contact: 12/09/02

FTTS INSP: FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)
Source: EPA
Telephone: 202-564-2501

Date of Government Version: 04/25/02
Database Release Frequency: Quarterly
Date of Last EDR Contact: 07/03/02
Date of Next Scheduled EDR Contact: 09/23/02

SSTS: Section 7 Tracking Systems
Source: EPA
Telephone: 202-564-5008
Section 7 of the Federal Insecticide, Fungicide and Rodenticide Act, as amended (92 Stat. 829) requires all registered pesticide-producing establishments to submit a report to the Environmental Protection Agency by March 1st each year. Each establishment must report the types and amounts of pesticides, active ingredients and devices being produced, and those having been produced and sold or distributed in the past year.

Date of Government Version: 12/31/00
Database Release Frequency: Annually
Date of Last EDR Contact: 07/19/02
Date of Next Scheduled EDR Contact: 10/21/02

FTTS: FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)
Source: EPA/Office of Prevention, Pesticides and Toxic Substances
Telephone: 202-564-2501
FTTS tracks administrative cases and pesticide enforcement actions and compliance activities related to FIFRA, TSCA and EPCRA (Emergency Planning and Community Right-to-Know Act). To maintain currency, EDR contacts the Agency on a quarterly basis.

Date of Government Version: 04/25/02
Database Release Frequency: Quarterly
Date of Last EDR Contact: 07/03/02
Date of Next Scheduled EDR Contact: 09/23/02

STATE OF CALIFORNIA ASTM STANDARD RECORDS

AWP: Annual Workplan Sites
Source: California Environmental Protection Agency
Telephone: 916-323-3400
Known Hazardous Waste Sites. California DTSC's Annual Workplan (AWP), formerly BEP, identifies known hazardous substance sites targeted for cleanup.

Date of Government Version: 07/05/02
Date Made Active at EDR: 08/12/02
Database Release Frequency: Annually
Date of Data Arrival at EDR: 07/08/02
Elapsed ASTM days: 35
Date of Last EDR Contact: 07/08/02

CAL-SITES: Calsites Database
Source: Department of Toxic Substance Control
Telephone: 916-323-3400
The Calsites database contains potential or confirmed hazardous substance release properties. In 1996, California EPA reevaluated and significantly reduced the number of sites in the Calsites database.

Date of Government Version: 10/01/00
Date Made Active at EDR: 11/22/00
Database Release Frequency: Quarterly
Date of Data Arrival at EDR: 10/30/00
Elapsed ASTM days: 23
Date of Last EDR Contact: 07/08/02

CHMIRS: California Hazardous Material Incident Report System
Source: Office of Emergency Services
Telephone: 916-845-8400
California Hazardous Material Incident Reporting System. CHMIRS contains information on reported hazardous material incidents (accidental releases or spills).

Date of Government Version: 12/31/94
Date Made Active at EDR: 04/24/95
Database Release Frequency: No Update Planned
Date of Data Arrival at EDR: 03/13/95
Elapsed ASTM days: 42
Date of Last EDR Contact: 08/26/02

CORTESE: "Cortese" Hazardous Waste & Substances Sites List
Source: CAL EPA/Office of Emergency Information
Telephone: 916-323-9100
The sites for the list are designated by the State Water Resource Control Board (LUST), the Integrated Waste Board (SWF/LS), and the Department of Toxic Substances Control (Cal-Sites).

Date of Government Version: 04/01/01
Date Made Active at EDR: 07/26/01
Database Release Frequency: Varies
Date of Data Arrival at EDR: 05/29/01
Elapsed ASTM days: 58
Date of Last EDR Contact: 07/24/02

NOTIFY 65: Proposition 65 Records
Source: State Water Resources Control Board
Telephone: 916-445-3846
Proposition 65 Notification Records. NOTIFY 65 contains facility notifications about any release which could impact drinking water and thereby expose the public to a potential health risk.

Date of Government Version: 10/21/93
Date Made Active at EDR: 11/19/93
Database Release Frequency: No Update Planned
Date of Data Arrival at EDR: 11/01/93
Elapsed ASTM days: 18
Date of Last EDR Contact: 07/19/02

TOXIC PITS: Toxic Pits Cleanup Act Sites
Source: State Water Resources Control Board
Telephone: 916-227-4364
Toxic PITS Cleanup Act Sites. TOXIC PITS identifies sites suspected of containing hazardous substances where cleanup has not yet been completed.

Date of Government Version: 07/01/95
Date Made Active at EDR: 09/26/95
Database Release Frequency: No Update Planned
Date of Data Arrival at EDR: 08/30/95
Elapsed ASTM days: 27
Date of Last EDR Contact: 07/25/02

SWF/LF (SWIS): Solid Waste Information System
Source: Integrated Waste Management Board
Telephone: 916-341-6320
Active, Closed and Inactive Landfills. SWF/LF records typically contain an inve ntory of solid waste disposal facilities or landfills. These may be active or i nactive facilities or open dumps that failed to meet RCRA Section 4004 criteria for solid waste landfills or disposal sites.

Date of Government Version: 06/14/02
Date Made Active at EDR: 07/19/02
Database Release Frequency: Quarterly
Date of Data Arrival at EDR: 06/17/02
Elapsed ASTM days: 32
Date of Last EDR Contact: 09/16/02

WMUDS/SWAT: Waste Management Unit Database
Source: State Water Resources Control Board
Telephone: 916-227-4448
Waste Management Unit Database System. WMUDS is used by the State Water Resources Control Board staff and the Regional Water Quality Control Boards for program tracking and inventory of waste management units. WMUDS is composed of the following databases: Facility Information, Scheduled Inspections Information, Waste Management Unit Information, SWAT Program Information, SWAT Report Summary Information, SWAT Report Summary Data, Chapter 15 (formerly Subchapter 15) Information, Chapter 15 Monitoring Parameters, TPCA Program Information, RCRA Program Information, Closure Information, and Interested Parties Information.

Date of Government Version: 04/01/00
Date Made Active at EDR: 05/10/00
Database Release Frequency: Quarterly
Date of Data Arrival at EDR: 04/10/00
Elapsed ASTM days: 30
Date of Last EDR Contact: 09/11/02

LUST: Leaking Underground Storage Tank Information System
Source: State Water Resources Control Board
Telephone: 916-341-5740
Leaking Underground Storage Tank Incident Reports. LUST records contain an inventory of reported leaking underground storage tank incidents. Not all states maintain these records, and the information stored varies by state.

Date of Government Version: 07/11/02
Date Made Active at EDR: 09/03/02
Database Release Frequency: Quarterly
Date of Data Arrival at EDR: 07/18/02
Elapsed ASTM days: 47
Date of Last EDR Contact: 07/09/02

CA BOND EXP. PLAN: Bond Expenditure Plan
Source: Department of Health Services
Telephone: 916-255-2118
Department of Health Services developed a site-specific expenditure plan as the basis for an appropriation of Hazardous Substance Cleanup Bond Act funds. It is not updated.

Date of Government Version: 01/01/89
Date Made Active at EDR: 08/02/94
Database Release Frequency: No Update Planned
Date of Data Arrival at EDR: 07/27/94
Elapsed ASTM days: 6
Date of Last EDR Contact: 05/31/94

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

CA UST:

UST: Active UST Facilities
Source: SWRCB
Telephone: 916-341-5700
Active UST facilities gathered from the local regulatory agencies

Date of Government Version: 01/17/02
Date Made Active at EDR: 02/12/02
Database Release Frequency: Semi-Annually

Date of Data Arrival at EDR: 01/21/02
Elapsed ASTM days: 22
Date of Last EDR Contact: 07/09/02

CA FID UST: Facility Inventory Database
Source: California Environmental Protection Agency
Telephone: 916-445-6532
The Facility Inventory Database (FID) contains a historical listing of active and inactive underground storage tank locations from the State Water Resource Control Board. Refer to local/county source for current data.

Date of Government Version: 10/31/94
Date Made Active at EDR: 09/29/95
Database Release Frequency: No Update Planned

Date of Data Arrival at EDR: 09/05/95
Elapsed ASTM days: 24
Date of Last EDR Contact: 12/28/98

HIST UST: Hazardous Substance Storage Container Database
Source: State Water Resources Control Board
Telephone: 916-341-5700
The Hazardous Substance Storage Container Database is a historical listing of UST sites. Refer to local/county source for current data.

Date of Government Version: 10/15/90
Date Made Active at EDR: 02/12/91
Database Release Frequency: No Update Planned

Date of Data Arrival at EDR: 01/25/91
Elapsed ASTM days: 18
Date of Last EDR Contact: 07/26/01

STATE OF CALIFORNIA ASTM SUPPLEMENTAL RECORDS

AST: Aboveground Petroleum Storage Tank Facilities
Source: State Water Resources Control Board
Telephone: 916-227-4382
Registered Aboveground Storage Tanks.

Date of Government Version: 05/21/02
Database Release Frequency: Quarterly

Date of Last EDR Contact: 07/29/02
Date of Next Scheduled EDR Contact: 11/04/02

CLEANERS: Cleaner Facilities
Source: Department of Toxic Substance Control
Telephone: 916-225-0873
A list of drycleaner related facilities that have EPA ID numbers. These are facilities with certain SIC codes: power laundries, family and commercial; garment pressing and cleaner's agents; linen supply; coin-operated laundries and cleaning; drycleaning plants, except rugs; carpet and upholster cleaning; industrial launderers; laundry and garment services.

Date of Government Version: 03/18/02
Database Release Frequency: Annually

Date of Last EDR Contact: 07/08/02
Date of Next Scheduled EDR Contact: 10/07/02

CA WDS: Waste Discharge System
Source: State Water Resources Control Board
Telephone: 916-657-1571
Sites which have been issued waste discharge requirements.

Date of Government Version: 06/17/02
Database Release Frequency: Quarterly

Date of Last EDR Contact: 06/24/02
Date of Next Scheduled EDR Contact: 09/23/02

DEED: List of Deed Restrictions
Source: Department of Toxic Substances Control
Telephone: 916-323-3400
The use of recorded land use restrictions is one of the methods the DTSC uses to protect the public from unsafe exposures to hazardous substances and wastes.

Date of Government Version: 07/05/02
Database Release Frequency: Semi-Annually
Date of Last EDR Contact: 07/08/02
Date of Next Scheduled EDR Contact: 10/07/02

HAZNET: Hazardous Waste Information System
Source: California Environmental Protection Agency
Telephone: 916-255-1136
Facility and Manifest Data. The data is extracted from the copies of hazardous waste manifests received each year by the DTSC. The annual volume of manifests is typically 700,000 - 1,000,000 annually, representing approximately 350,000 - 500,000 shipments. Data are from the manifests submitted without correction, and therefore many contain some invalid values for data elements such as generator ID, TSD ID, waste category, and disposal method.

Date of Government Version: 12/31/00
Database Release Frequency: Annually
Date of Last EDR Contact: 08/26/02
Date of Next Scheduled EDR Contact: 11/11/02

LOCAL RECORDS

ALAMEDA COUNTY:

Local Oversight Program Listing of UGT Cleanup Sites
Source: Alameda County Environmental Health Services
Telephone: 510-567-6700

Date of Government Version: 07/12/02
Database Release Frequency: Semi-Annually
Date of Last EDR Contact: 07/12/02
Date of Next Scheduled EDR Contact: 10/28/02

Underground Tanks
Source: Alameda County Environmental Health Services
Telephone: 510-567-6700

Date of Government Version: 06/01/02
Database Release Frequency: Semi-Annually
Date of Last EDR Contact: 07/22/02
Date of Next Scheduled EDR Contact: 10/28/02

CONTRA COSTA COUNTY:

Site List
Source: Contra Costa Health Services Department
Telephone: 925-646-2286
List includes sites from the underground tank, hazardous waste generator and business plan/2185 programs.

Date of Government Version: 06/05/02
Database Release Frequency: Semi-Annually
Date of Last EDR Contact: 09/03/02
Date of Next Scheduled EDR Contact: 12/02/02

FRESNO COUNTY:

CUPA Resources List
Source: Dept. of Community Health
Telephone: 559-445-3271
Certified Unified Program Agency. CUPA's are responsible for implementing a unified hazardous materials and hazardous waste management regulatory program. The agency provides oversight of businesses that deal with hazardous materials, operate underground storage tanks or aboveground storage tanks.

Date of Government Version: 07/31/02
Database Release Frequency: Semi-Annually

Date of Last EDR Contact: 07/30/02
Date of Next Scheduled EDR Contact: 11/11/02

KERN COUNTY:

Underground Storage Tank Sites & Tanks Listing
Source: Kern County Environment Health Services Department
Telephone: 661-862-8700
Kern County Sites and Tanks Listing.

Date of Government Version: 06/01/02
Database Release Frequency: Quarterly

Date of Last EDR Contact: 09/16/02
Date of Next Scheduled EDR Contact: 12/02/02

LOS ANGELES COUNTY:

List of Solid Waste Facilities
Source: La County Department of Public Works
Telephone: 818-458-5185

Date of Government Version: 11/09/99
Database Release Frequency: Varies

Date of Last EDR Contact: 08/28/02
Date of Next Scheduled EDR Contact: 11/18/02

City of El Segundo Underground Storage Tank
Source: City of El Segundo Fire Department
Telephone: 310-607-2239

Date of Government Version: 08/01/02
Database Release Frequency: Semi-Annually

Date of Last EDR Contact: 08/19/02
Date of Next Scheduled EDR Contact: 11/18/02

City of Long Beach Underground Storage Tank
Source: City of Long Beach Fire Department
Telephone: 562-570-2543

Date of Government Version: 05/30/02
Database Release Frequency: Annually

Date of Last EDR Contact: 08/26/02
Date of Next Scheduled EDR Contact: 11/25/02

City of Torrance Underground Storage Tank
Source: City of Torrance Fire Department
Telephone: 310-618-2973

Date of Government Version: 08/01/02
Database Release Frequency: Semi-Annually

Date of Last EDR Contact: 08/19/02
Date of Next Scheduled EDR Contact: 11/18/02

City of Los Angeles Landfills
Source: Engineering & Construction Division
Telephone: 213-473-7869

Date of Government Version: 03/01/02
Database Release Frequency: Varies

Date of Last EDR Contact: 09/16/02
Date of Next Scheduled EDR Contact: 12/16/02

HMS: Street Number List
Source: Department of Public Works
Telephone: 626-458-3517
Industrial Waste and Underground Storage Tank Sites.

Date of Government Version: 05/30/02
Database Release Frequency: Semi-Annually

Date of Last EDR Contact: 08/19/02
Date of Next Scheduled EDR Contact: 11/18/02

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Site Mitigation List
Source: Community Health Services
Telephone: 323-890-7806
Industrial sites that have had some sort of spill or complaint.

Date of Government Version: 02/28/02
Database Release Frequency: Annually

Date of Last EDR Contact: 08/19/02
Date of Next Scheduled EDR Contact: 11/18/02

San Gabriel Valley Areas of Concern
Source: EPA Region 9
Telephone: 415-744-2407
San Gabriel Valley areas where VOC contamination is at or above the MCL as designated by region 9 EPA office.

Date of Government Version: 12/31/98
Database Release Frequency: No Update Planned

Date of Last EDR Contact: 06/29/99
Date of Next Scheduled EDR Contact: N/A

MARIN COUNTY:

Underground Storage Tank Sites
Source: Public Works Department Waste Management
Telephone: 415-499-6647
Currently permitted USTs in Marin County.

Date of Government Version: 08/06/02
Database Release Frequency: Semi-Annually

Date of Last EDR Contact: 07/29/02
Date of Next Scheduled EDR Contact: 11/04/02

NAPA COUNTY:

Sites With Reported Contamination
Source: Napa County Department of Environmental Management
Telephone: 707-253-4269

Date of Government Version: 04/01/02
Database Release Frequency: Semi-Annually

Date of Last EDR Contact: 07/01/02
Date of Next Scheduled EDR Contact: 09/30/02

Closed and Operating Underground Storage Tank Sites
Source: Napa County Department of Environmental Management
Telephone: 707-253-4269

Date of Government Version: 04/01/02
Database Release Frequency: Annually

Date of Last EDR Contact: 07/01/02
Date of Next Scheduled EDR Contact: 09/30/02

ORANGE COUNTY:

List of Underground Storage Tank Cleanups
Source: Health Care Agency
Telephone: 714-834-3446
Orange County Underground Storage Tank Cleanups (LUST).

Date of Government Version: 11/27/01
Database Release Frequency: Quarterly

Date of Last EDR Contact: 09/10/02
Date of Next Scheduled EDR Contact: 12/09/02

List of Underground Storage Tank Facilities
Source: Health Care Agency
Telephone: 714-834-3446
Orange County Underground Storage Tank Facilities (UST).

Date of Government Version: 11/27/01
Database Release Frequency: Quarterly

Date of Last EDR Contact: 09/10/02
Date of Next Scheduled EDR Contact: 12/09/02

List of Industrial Site Cleanups
Source: Health Care Agency
Telephone: 714-834-3446
Petroleum and non-petroleum spills.

Date of Government Version: 10/24/00
Database Release Frequency: Annually

Date of Last EDR Contact: 09/10/02
Date of Next Scheduled EDR Contact: 12/09/02

PLACER COUNTY:

Master List of Facilities
Source: Placer County Health and Human Services
Telephone: 530-889-7312
List includes aboveground tanks, underground tanks and cleanup sites.

Date of Government Version: 07/18/02
Database Release Frequency: Semi-Annually

Date of Last EDR Contact: 06/24/02
Date of Next Scheduled EDR Contact: 09/23/02

RIVERSIDE COUNTY:

Listing of Underground Tank Cleanup Sites
Source: Department of Public Health
Telephone: 909-358-5055
Riverside County Underground Storage Tank Cleanup Sites (LUST).

Date of Government Version: 03/27/02
Database Release Frequency: Quarterly

Date of Last EDR Contact: 07/22/02
Date of Next Scheduled EDR Contact: 10/21/02

Underground Storage Tank Tank List
Source: Health Services Agency
Telephone: 909-358-5055

Date of Government Version: 03/01/02
Database Release Frequency: Quarterly

Date of Last EDR Contact: 07/22/02
Date of Next Scheduled EDR Contact: 10/21/02

SACRAMENTO COUNTY:

CS - Contaminated Sites
Source: Sacramento County Environmental Management
Telephone: 916-875-8406

Date of Government Version: 06/11/02
Database Release Frequency: Quarterly

Date of Last EDR Contact: 07/24/02
Date of Next Scheduled EDR Contact: 11/04/02

ML - Regulatory Compliance Master List
Source: Sacramento County Environmental Management
Telephone: 916-875-8406
Any business that has hazardous materials on site - hazardous material storage sites, underground storage tanks, waste generators.

Date of Government Version: 06/11/02
Database Release Frequency: Quarterly

Date of Last EDR Contact: 07/24/02
Date of Next Scheduled EDR Contact: 11/04/02

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

SAN BERNARDINO COUNTY:

Hazardous Material Permits
Source: San Bernardino County Fire Department Hazardous Materials Division
Telephone: 909-387-3041
This listing includes underground storage tanks, medical waste handlers/generators, hazardous materials handlers, hazardous waste generators, and waste oil generators/handlers.

Date of Government Version: 06/27/02
Database Release Frequency: Quarterly

Date of Last EDR Contact: 09/10/02
Date of Next Scheduled EDR Contact: 12/10/02

SAN DIEGO COUNTY:

Solid Waste Facilities
Source: Department of Health Services
Telephone: 619-338-2209
San Diego County Solid Waste Facilities.

Date of Government Version: 08/01/00
Database Release Frequency: Varies

Date of Last EDR Contact: 08/26/02
Date of Next Scheduled EDR Contact: 11/25/02

Hazardous Materials Management Division Database
Source: Hazardous Materials Management Division
Telephone: 619-338-2268
The database includes: HE58 - This report contains the business name, site address, business phone number, establishment 'H' permit number, type of permit, and the business status. HE17 - In addition to providing the same information provided in the HE58 listing, HE17 provides inspection dates, violations received by the establishment, hazardous waste generated, the quantity, method of storage, treatment/disposal of waste and the hauler, and information on underground storage tanks. Unauthorized Release List - Includes a summary of environmental contamination cases in San Diego County (underground tank cases, non-tank cases, groundwater contamination, and soil contamination are included.)

Date of Government Version: 03/31/02
Database Release Frequency: Quarterly

Date of Last EDR Contact: 07/08/02
Date of Next Scheduled EDR Contact: 10/07/02

SAN FRANCISCO COUNTY:

Local Oversite Facilities
Source: Department Of Public Health San Francisco County
Telephone: 415-252-3920

Date of Government Version: 06/12/02
Database Release Frequency: Quarterly

Date of Last EDR Contact: 09/10/02
Date of Next Scheduled EDR Contact: 12/09/02

Underground Storage Tank Information
Source: Department of Public Health
Telephone: 415-252-3920

Date of Government Version: 06/12/02
Database Release Frequency: Quarterly

Date of Last EDR Contact: 09/10/02
Date of Next Scheduled EDR Contact: 12/09/02

SAN MATEO COUNTY:

Fuel Leak List
Source: San Mateo County Environmental Health Services Division
Telephone: 650-363-1921

Date of Government Version: 04/04/02
Database Release Frequency: Semi-Annually

Date of Last EDR Contact: 07/23/02
Date of Next Scheduled EDR Contact: 10/28/02

Business Inventory
Source: San Mateo County Environmental Health Services Division
Telephone: 650-363-1921
List includes Hazardous Materials Business Plan, hazardous waste generators, and underground storage tanks.

Date of Government Version: 05/01/02
Database Release Frequency: Annually

Date of Last EDR Contact: 07/15/02
Date of Next Scheduled EDR Contact: 10/14/02

SANTA CLARA COUNTY:

Fuel Leak Site Activity Report
Source: Santa Clara Valley Water District
Telephone: 408-265-2600

Date of Government Version: 07/23/02
Database Release Frequency: Semi-Annually

Date of Last EDR Contact: 07/01/02
Date of Next Scheduled EDR Contact: 09/30/02

Hazardous Material Facilities
Source: City of San Jose Fire Department
Telephone: 408-277-4659

Date of Government Version: 01/03/02
Database Release Frequency: Annually

Date of Last EDR Contact: 09/10/02
Date of Next Scheduled EDR Contact: 12/09/02

SOLANO COUNTY:

Leaking Underground Storage Tanks
Source: Solano County Department of Environmental Management
Telephone: 707-421-6770

Date of Government Version: 06/01/02
Database Release Frequency: Quarterly

Date of Last EDR Contact: 09/17/02
Date of Next Scheduled EDR Contact: 12/16/02

Underground Storage Tanks
Source: Solano County Department of Environmental Management
Telephone: 707-421-6770

Date of Government Version: 06/01/02
Database Release Frequency: Quarterly

Date of Last EDR Contact: 09/17/02
Date of Next Scheduled EDR Contact: 12/16/02

SONOMA COUNTY:

Leaking Underground Storage Tank Sites
Source: Department of Health Services
Telephone: 707-565-6565

Date of Government Version: 11/29/01
Database Release Frequency: Quarterly

Date of Last EDR Contact: 07/22/02
Date of Next Scheduled EDR Contact: 10/28/02

SUTTER COUNTY:

Underground Storage Tanks
Source: Sutter County Department of Agriculture
Telephone: 530-822-7500

Date of Government Version: 07/01/01
Database Release Frequency: Semi-Annually

Date of Last EDR Contact: 07/08/02
Date of Next Scheduled EDR Contact: 10/07/02

VENTURA COUNTY:

Inventory of Illegal Abandoned and Inactive Sites
Source: Environmental Health Division
Telephone: 805-654-2813
Ventura County Inventory of Closed, Illegal Abandoned, and Inactive Sites.

Date of Government Version: 04/02/01
Database Release Frequency: Annually

Date of Last EDR Contact: 08/26/02
Date of Next Scheduled EDR Contact: 11/25/02

Listing of Underground Tank Cleanup Sites
Source: Environmental Health Division
Telephone: 805-654-2813
Ventura County Underground Storage Tank Cleanup Sites (LUST).

Date of Government Version: 05/08/02
Database Release Frequency: Quarterly

Date of Last EDR Contact: 09/16/02
Date of Next Scheduled EDR Contact: 12/16/02

Underground Tank Closed Sites List
Source: Environmental Health Division
Telephone: 805-654-2813
Ventura County Operating Underground Storage Tank Sites (UST)/Underground Tank Closed Sites List.

Date of Government Version: 04/22/02
Database Release Frequency: Quarterly

Date of Last EDR Contact: 07/15/02
Date of Next Scheduled EDR Contact: 10/14/02

Business Plan, Hazardous Waste Producers, and Operating Underground Tanks
Source: Ventura County Environmental Health Division
Telephone: 805-654-2813
The BWT list indicates by site address whether the Environmental Health Division has Business Plan (B), Waste Producer (W), and/or Underground Tank (T) information.

Date of Government Version: 07/23/02
Database Release Frequency: Quarterly

Date of Last EDR Contact: 09/16/02
Date of Next Scheduled EDR Contact: 12/16/02

YOLO COUNTY:

Underground Storage Tank Comprehensive Facility Report
Source: Yolo County Department of Health
Telephone: 530-666-8646

Date of Government Version: 05/01/02
Database Release Frequency: Annually

Date of Last EDR Contact: 07/22/02
Date of Next Scheduled EDR Contact: 10/21/02

California Regional Water Quality Control Board (RWQCB) LUST Records

LUST REG 1: Active Toxic Site Investigation
Source: California Regional Water Quality Control Board North Coast (1)
Telephone: 707-576-2220
Del Norte, Humboldt, Lake, Mendocino, Modoc, Siskiyou, Sonoma, Trinity counties. For more current information, please refer to the State Water Resources Control Board's LUST database.

Date of Government Version: 02/01/01
Database Release Frequency: No Update Planned

Date of Last EDR Contact: 08/26/02
Date of Next Scheduled EDR Contact: 11/25/02

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

LUST REG 2: Fuel Leak List
Source: California Regional Water Quality Control Board San Francisco Bay Region (2)
Telephone: 510-286-0457

Date of Government Version: 07/01/02
Database Release Frequency: Quarterly

Date of Last EDR Contact: 07/15/02
Date of Next Scheduled EDR Contact: 10/14/02

LUST REG 3: Leaking Underground Storage Tank Database
Source: California Regional Water Quality Control Board Central Coast Region (3)
Telephone: 805-549-3147

Date of Government Version: 08/19/02
Database Release Frequency: Quarterly

Date of Last EDR Contact: 08/19/02
Date of Next Scheduled EDR Contact: 11/18/02

LUST REG 4: Underground Storage Tank Leak List
Source: California Regional Water Quality Control Board Los Angeles Region (4)
Telephone: 213-266-6600
Los Angeles, Ventura counties. For more current information, please refer to the State Water Resources Control Board's LUST database.

Date of Government Version: 08/09/01
Database Release Frequency: No Update Planned

Date of Last EDR Contact: 07/01/02
Date of Next Scheduled EDR Contact: 09/30/02

LUST REG 5: Leaking Underground Storage Tank Database
Source: California Regional Water Quality Control Board Central Valley Region (5)
Telephone: 916-255-3125

Date of Government Version: 07/01/02
Database Release Frequency: Quarterly

Date of Last EDR Contact: 07/12/02
Date of Next Scheduled EDR Contact: 10/07/02

LUST REG 6L: Leaking Underground Storage Tank Case Listing
Source: California Regional Water Quality Control Board Lahontan Region (6)
Telephone: 916-542-5424
For more current information, please refer to the State Water Resources Control Board's LUST database.

Date of Government Version: 01/02/02
Database Release Frequency: No Update Planned

Date of Last EDR Contact: 07/08/02
Date of Next Scheduled EDR Contact: 10/07/02

LUST REG 6V: Leaking Underground Storage Tank Case Listing
Source: California Regional Water Quality Control Board Victorville Branch Office (6)
Telephone: 760-346-7491

Date of Government Version: 07/26/02
Database Release Frequency: Quarterly

Date of Last EDR Contact: 07/08/02
Date of Next Scheduled EDR Contact: 10/07/02

LUST REG 7: Leaking Underground Storage Tank Case Listing
Source: California Regional Water Quality Control Board Colorado River Basin Region (7)
Telephone: 760-346-7491

Date of Government Version: 07/02/02
Database Release Frequency: Semi-Annually

Date of Last EDR Contact: 07/01/02
Date of Next Scheduled EDR Contact: 09/30/02

LUST REG 8: Leaking Underground Storage Tanks
Source: California Regional Water Quality Control Board Santa Ana Region (8)
Telephone: 909-782-4498
California Regional Water Quality Control Board Santa Ana Region (8). For more current information, please refer to the State Water Resources Control Board's LUST database.

Date of Government Version: 07/23/01
Database Release Frequency: No Update Planned

Date of Last EDR Contact: 08/16/02
Date of Next Scheduled EDR Contact: 11/11/02

LUST REG 9: Leaking Underground Storage Tank Report
Source: California Regional Water Quality Control Board San Diego Region (9)
Telephone: 858-467-2980
Orange, Riverside, San Diego counties. For more current information, please refer to the State Water Resources Control Board's LUST database.

Date of Government Version: 03/01/01
Database Release Frequency: No Update Planned
Date of Last EDR Contact: 07/22/02
Date of Next Scheduled EDR Contact: 10/21/02

California Regional Water Quality Control Board (RWQCB) SLIC Records

SLIC REG 1: Active Toxic Site Investigations
Source: California Regional Water Quality Control Board, North Coast Region (1)
Telephone: 707-576-2220

Date of Government Version: 02/01/01
Database Release Frequency: Semi-Annually
Date of Last EDR Contact: 08/26/02
Date of Next Scheduled EDR Contact: 11/25/02

SLIC REG 2: Spills, Leaks, Investigation & Cleanup Cost Recovery Listing
Source: Regional Water Quality Control Board San Francisco Bay Region (2)
Telephone: 510-286-0457
Any contaminated site that impacts groundwater or has the potential to impact groundwater.

Date of Government Version: 07/01/02
Database Release Frequency: Quarterly
Date of Last EDR Contact: 07/15/02
Date of Next Scheduled EDR Contact: 10/14/02

SLIC REG 3: Spills, Leaks, Investigation & Cleanup Cost Recovery Listing
Source: California Regional Water Quality Control Board Central Coast Region (3)
Telephone: 805-549-3147
Any contaminated site that impacts groundwater or has the potential to impact groundwater.

Date of Government Version: 08/19/02
Database Release Frequency: Semi-Annually
Date of Last EDR Contact: 08/19/02
Date of Next Scheduled EDR Contact: 11/18/02

SLIC REG 4: Spills, Leaks, Investigation & Cleanup Cost Recovery Listing
Source: Region Water Quality Control Board Los Angeles Region (4)
Telephone: 213-576-6600
Any contaminated site that impacts groundwater or has the potential to impact groundwater.

Date of Government Version: 08/01/02
Database Release Frequency: Quarterly
Date of Last EDR Contact: 07/23/02
Date of Next Scheduled EDR Contact: 10/28/02

SLIC REG 5: Spills, Leaks, Investigation & Cleanup Cost Recovery Listing
Source: Regional Water Quality Control Board Central Valley Region (5)
Telephone: 916-855-3075
Unregulated sites that impact groundwater or have the potential to impact groundwater.

Date of Government Version: 07/01/02
Database Release Frequency: Semi-Annually
Date of Last EDR Contact: 07/08/02
Date of Next Scheduled EDR Contact: 10/07/02

SLIC REG 6V: Spills, Leaks, Investigation & Cleanup Cost Recovery Listing
Source: Regional Water Quality Control Board, Victorville Branch
Telephone: 619-241-6583

Date of Government Version: 07/19/01
Database Release Frequency: Semi-Annually
Date of Last EDR Contact: 07/08/02
Date of Next Scheduled EDR Contact: 10/07/02

SLIC REG 8: Spills, Leaks, Investigation & Cleanup Cost Recovery Listing
Source: California Region Water Quality Control Board Santa Ana Region (8)
Telephone: 909-782-3298

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Date of Government Version: 06/01/02
Database Release Frequency: Semi-Annually

Date of Last EDR Contact: 07/08/02
Date of Next Scheduled EDR Contact: 10/07/02

SLIC REG 9: Spills, Leaks, Investigation & Cleanup Cost Recovery Listing
Source: California Regional Water Quality Control Board San Diego Region (9)
Telephone: 858-467-2980

Date of Government Version: 03/01/02
Database Release Frequency: Annually

Date of Last EDR Contact: 09/03/02
Date of Next Scheduled EDR Contact: 12/02/02

EDR PROPRIETARY HISTORICAL DATABASES

EDR Historical Gas Station and Dry Cleaners: EDR has searched select national collections of business directories and has collected listings of potential dry cleaner and gas station/filling station/service station sites that were available to EDR researchers. EDR's review was limited to those categories of sources that might, in EDR's opinion, include dry cleaning and gas station/filling station/service station establishments. The categories reviewed included, but were not limited to: *gas, gas station, gasoline station, filling station, auto, automobile repair, auto service station, service station, dry cleaner, cleaners, laundry, laundromat, cleaning/laundry, wash & dry, etc.*

This information is meant to assist and complement environmental professionals in their conduct of environmental site assessments, and is not meant to be a substitute for a full historical investigation as defined in ASTM E1527. The information provided in this proprietary database may or may not be complete; i.e., the absence of a dry cleaner or gas station/filling station/service station site does not necessarily mean that such a site did not exist in the area covered by this report.

(A note on "dry cleaning" sites: it is not possible for EDR to differentiate between establishments that use PERC on-site as a cleaning solvent and sites that function simply as drop-off and pick-up locations or that are traditional wet cleaning/laundry facilities. Therefore, it is essential for environmental professionals to incorporate professional judgment in the evaluation of each site.)

Former Manufactured Gas (Coal Gas) Sites: The existence and location of Coal Gas sites is provided exclusively to EDR by Real Property Scan, Inc. ©Copyright 1993 Real Property Scan, Inc. For a technical description of the types of hazards which may be found at such sites, contact your EDR customer service representative.

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The information contained in this report has predominantly been obtained from publicly available sources produced by entities other than Real Property Scan. While reasonable steps have been taken to insure the accuracy of this report, Real Property Scan does not guarantee the accuracy of this report. Any liability on the part of Real Property Scan is strictly limited to a refund of the amount paid. No claim is made for the actual existence of toxins at any site. This report does not constitute a legal opinion.

OTHER DATABASE(S)

Depending on the geographic area covered by this report, the data provided in these specialty databases may or may not be complete. For example, the existence of wetlands information data in a specific report does not mean that all wetlands in the area covered by the report are included. Moreover, the absence of any reported wetlands information does not necessarily mean that wetlands do not exist in the area covered by the report.

Oil/Gas Pipelines/Electrical Transmission Lines: This data was obtained by EDR from the USGS in 1994. It is referred to by USGS as GeoData Digital Line Graphs from 1:100,000-Scale Maps. It was extracted from the transportation category including some oil, but primarily gas pipelines and electrical transmission lines.

Sensitive Receptors: There are individuals deemed sensitive receptors due to their fragile immune systems and special sensitivity to environmental discharges. These sensitive receptors typically include the elderly, the sick, and children. While the location of all sensitive receptors cannot be determined, EDR indicates those buildings and facilities - schools, daycares, hospitals, medical centers, and nursing homes - where individuals who are sensitive receptors are likely to be located.

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Flood Zone Data: This data, available in select counties across the country, was obtained by EDR in 1999 from the Federal Emergency Management Agency (FEMA). Data depicts 100-year and 500-year flood zones as defined by FEMA.

NWI: National Wetlands Inventory. This data, available in select counties across the country, was obtained by EDR in 2002 from the U.S. Fish and Wildlife Service.

STREET AND ADDRESS INFORMATION

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APPENDIX 4.18
Cultural Resources Reports

PHASE I ARCHAEOLOGICAL SURVEY FOR THE 750 ACRES SOLEDAD CANYON PANHANDLE STUDY AREA, LOS ANGLES COUNTY, CALIFORNIA

Prepared For:

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3 August 2001

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MANAGEMENT SUMMARY

A Phase I archaeological survey was conducted on the 750 acres Soledad Canyon Panhandle study area, northern Los Angeles County, California. This investigation involved an archival records search, a review of existing published and unpublished references on local prehistory and history, and an on-foot, intensive survey of the subject property. Archival records indicated that portions of the study area had been previously surveyed and that four cultural resources were or at one time had been present and recorded within the property: CA-LAN-351, a prehistoric habitation site; CA-LAN-1824 and -1829, both previously identified as isolated prehistoric artifacts; and CA-LAN-2105H, the Los Angeles Aqueduct, which is currently in use. On-foot survey of the study area resulted in the discovery and recording of two additional isolated prehistoric artifacts. Recommendations for the treatment of these cultural resources are provided.

1.0 INTRODUCTION

Pursuant to a request from Mr. Glenn Adamick, Newhall Land and Farming Company, Valencia, California, an intensive Phase I archaeological survey and cultural resources assessment were conducted for the 750 acres Panhandle property in Soledad Canyon, Los Angeles County, California (Figure 1). The Phase I archaeological survey was intended to provide a background studies and an archival records search to determine if any known archaeological sites were present in the study area and/or whether the area had been previously and systematically studied by archaeologists; an on-foot, intensive survey of the study area to identify previously unrecorded cultural resources; and a preliminary assessment of such resources, should any be found within the subject property. This manuscript constitutes a report on this Phase I archaeological study. Subsequent sections provide background to the study; the findings of the archival records search; a summary of the field surveying techniques employed; and the results of the fieldwork.

2.0 BACKGROUND TO THE PROJECT

2.1 Project Location and Environmental Setting

The Soledad Canyon Panhandle study area consists of 750 acres lying immediately east of Bouquet Junction, northern Los Angeles County, California (Figure 1). It includes the flood channel and river course of the Santa Clara River from its confluence with Bouquet Canyon, eastwards (upstream) along Soledad Canyon for roughly 4.4 kms, and from Soledad Canyon Road northwards, or across the flood and stream channel to include the northern canyon sides of Soledad Canyon. In the central portion of the study area this includes a series of broad river terraces.

The study area currently consists primarily of undeveloped open-space, although there are pipeline corridors across and minor structures within it. Moreover, the large majority of the 750 acres consists of the stream course and floodplain of the Santa Clara River; due to the potential for seasonal flooding, these zones have experienced little or no former use.

Vegetation in the study area, accordingly, consists of a riparian association on the river bottom and sage-scrub in the flood channel and canyon sides. The flat river terraces on the northern side of the study area in some cases have been graded and/or cultivated, and are currently covered with oat hay, wild mustard and other non-indigenous species.

2.2 Ethnographic Background

The Upper Santa Clara Valley region, including the Santa Clarita/Newhall area, appears to have been inhabited during the

ethnographic past by an ethnolinguistic group known as the Tataviam. Some controversy exists in reference to this attribution, as the Tataviam are now extinct and were effectively so prior to the initiation of systematic anthropological studies at the turn of the century. But, based on a few existing word lists, descriptions provided by early travelers, mission placenames, and the recollections of other aboriginal informants, Tataviam is generally accepted as representing a Takic language of the Uto-Aztecan family (King and Blackburn 1978). In this sense, it was related to other Takic languages in the Los Angeles County region, such as Gabrieleño/Fernandeño of the Los Angeles Basin proper, and Kitanemuk of the Antelope Valley.

The Tataviam are thought to have inhabited the upper Santa Clara River drainage from about Piru eastwards to just beyond the Vasquez Rocks/Agua Dulce area; southwards as far as Newhall; and northwards to include the middle reaches of Piru Creek, the Liebre Mountains and the southwesternmost fringe of the Antelope Valley (ibid; Kroeber 1925; Earle 1990; Johnson and Earle 1990). Their northern boundary most likely ran along the northern foothills of the Liebre Mountains (i.e., the edge of the Antelope Valley), and then crossed to the southern slopes of the Sawmill Mountains and the Sierra Pelona, extending as far east as Soledad Pass (Earle 1990:94). Ethnographically, at least, they do not appear to have controlled the Leona Valley or areas to the north, with the Elizabeth Lake area proper a zone of uncertainty. The southern boundary ran approximately along the crest of the western arm of the San Gabriel Mountains, north of San Fernando, and westward beyond Fremont and San Fernando Pass to the Santa Susana Mountains (Johnson and Earle 1990:196).

Known Tataviam villages during the historic period include: pi?irukung and ?akavaya, both near modern Piru; tsavayu(?u)ng, San Francisquito; etseng, kuvung and huyung, on Piru Creek above Piru; tochonanga, near Newhall at the head of the south fork of

the Santa Clara River; and kwarung, Elizabeth Lake. At kamulus, near modern Rancho Camulos, a mixed Chumash-Tataviam population lived (King and Blackburn 1978:535-6; Johnson and Earle 1990). No historical sites have been recorded near the juncture of Bouquet and Soledad Canyon (cf. Johnson and Earle 1990:193); that is, on or near the study area.

Culturally-speaking, the Tataviam were in most respects similar to their Fernandeño and Chumash neighbors, to the south and west, respectively (King and Blackburn 1978). In this sense, they were hunters-gatherers, with subsistence emphasizing yucca, acorns, juniper berries, sage seeds and islay. Game was also hunted, with small animals, such as rabbits/hares and rodents, probably representing more significant contributions of meat protein than larger game, such as deer.

Almost nothing is known of Tataviam social and political organization. Based on analogies with surrounding groups, however, it can be suggested that they were organized in a series of tribelets, similar to the naciones described by Earle (1990) for the Antelope Valley, and found to be characteristic of much of California aboriginal socio-political organization (cf. Kroeber 1925). The tribelet represented an autonomous land-holding unit, minimally controlled by a head-chief or big-man. They usually included one large, 'capital' village, sometimes occupied year-around, and a series of smaller, seasonally employed hamlets. Whether the Tataviam may have had exogomous clans and moieties, like the Cahuilla and Serrano to the east, is unknown. However, it is estimated that the Tataviam population was less than 1000 people at the time of Euro-American contact, and that only two or three of the largest villages existed throughout their territory (King and Blackburn 1978).

It is also likely that Tataviam religion followed the patterns of their surrounding neighbors. In this case, shamanism would have

functioned as the central element. This posits a direct and personal relationship between each individual and the supernatural world, with this relationship enacted by entering a trance or hallucinatory state (usually based on the ingestion of psychotomimetic plants, such as jimsonweed or native tobacco). Shamans, per se, who were considered individuals with an unusual degree of supernatural power, served as ritual specialists: ceremonies and rites were infrequent in occassion and limited in type. Perhaps most importantly, shamans served as healers or curers, with the etiology of disease as well as its cure held to lie in the supernatural world. Shamans are also known to have produced the rock art of this region (Whitley 1992), which depicted the hallucinations and spirits they observed during their vision quests.

Although the Tataviam were one of the earliest groups contacted by Spanish missionaries, with a number of their briefly villages described by members of the Portolá expedition of 1769, a general lack of information on this group exists because, by 1810, all Tataviam had been baptized at Mission San Fernando and were quickly absorbed by other groups through intermarriage. The last speaker of Tataviam died in 1916 (King and Blackburn 1978).

2.3 Archaeological Background

Archaeologically speaking, more information is available on the Upper Santa Clara River area, although here, too, less is known than for many of the surrounding regions of southern California. In general terms, the prehistory of this inland area appears to parallel that of the Santa Barbara Channel/southern California coastal zone (cf. McIntyre 1990), with William Wallace's (1955) cultural historical framework appropriate as a chronological system of reference.

Correspondingly, the earliest evidence for human occupation of this region corresponds to Wallace's Early Millingstone Period (or, alternatively, the Early Horizon), dated from about 7000 to 4000 years before present (B.P.). This represents a period during which subsistance and adaptation are said to have emphasized the collecting and processing of hard seeds, with inland artifact assemblages, correspondingly, dominated by manos and metates. Evidence for an Early Millingstone occupation of this specific region is, admittedly, very limited, and has been found at only two sites. Both of these are located near Vasquez Rocks, with temporal attribution based on the presence of a small number of Olivella barrel beads (McIntyre 1990). Such bead types have subsequently proven unreliable temporal indicators, throwing doubt on human inhabitation of this region before about 4000 years ago. Further, recent excavations at one of these putative early locales, the Escondido Canyon Site, failed to uncover evidence for occupation prior to about 2700 years B.P. (Love 1990).

The second temporal unit in Wallace's chronology is the Intermediate Period (or Middle Horizon), dated from 3500 to 1500 years B.P. It is marked by a shift to the mortar and pestle, with an increased emphasis on hunting and hunting tools in artifact assemblages. Population appears to have increased during this period, with more temporary camps founded. Evidence for Intermediate Period occupation of the Upper Santa Clara Valley region is substantial, in that it has been found at a number of sites and has been based on radiocarbon, obsidian hydration and typological dating (McIntyre 1990). The Agua Dulce village complex, for example, includes occupation extending back to the Intermediate Period, at which time population of the village may have been 50 or more people (King et al n.d.). Furthermore, the Intermediate Period appears to represent a time during which a substantial exploitation of mid-altitude environments first began,

with considerable use, for example, of portions of the nearby Hathaway Ranch (located northwest of the study area) beginning at this time.

Assuming that the Upper Santa Clara River region was first significantly occupied during the Intermediate Period, as existing evidence now suggests, a parallel can be drawn with the inland Ventura County region, where a similar pattern has been identified (Whitley and Beaudry 1991), as well as possibly the Antelope Valley and western Mojave Desert (Sutton 1988a, 1988b). In all of these areas a major expansion in settlement, the establishment of large site complexes, and an increase in the range of environments exploited, appear to have occurred sometime roughly around 3000 years ago. Although most efforts to explain this expansion have focussed on very local circumstances and events, it is increasingly clear that this was a major southern California-wide occurrence, and therefore that explanation of it must be sought at a larger level of analysis.

There is a continuity in the inland regions between the Intermediate Period and subsequent times, labelled the Late Prehistoric Period, lasting from 1500 years B.P. to historic contact, at about 200 years B.P. Site complexes first occupied in the Intermediate Period continued to be inhabited, although they increased in size, with more specialized and diversified sites added to the kinds of sites present. In fact, the principal distinction between Intermediate and Late Prehistoric sites in the inland regions is a change in certain diagnostic artifact types (notably, projectile points, with a shift from spear points to bow and arrow points), which in fact may not signify consequential changes in culture, adaptation or subsistence, although the trends begun in the Intermediate accelerate over time during the Late Prehistoric. For example, a large number of Late Prehistoric Period sites are known from the Upper Santa Clara River/Agua Dulce region (McIntyre 1990), with the Agua Dulce village complex estimated to

have grown to a population of 200 to 300 people around A.D. 1500 - 1600 (King et al n.d.). Sometime during this period the Tataviam can be hypothesized to have occupied this region, although it is possible that they may have appeared somewhat earlier. However, the important point is that, during the Late Prehistoric Period, the patterns of lifeways recorded for the ethnographic period were fully in operation.

During the Historic Period, the aboriginal population appears to have dropped considerably. This, without doubt, can be attributed to the effects of missionization and its attendant relocation of the aboriginal population at centralized locales, along with the depredations of introduced Old World diseases. The Upper Santa Clara River region appears to be one of those inland zones, like the Antelope Valley to the northeast, that quickly and completely lost its aboriginal population.

2.4 Historical Background

As noted previously, Euro-American mention of the Santa Clarita region first apparently occurred in the chronicles of the Portolá expedition of 1769, which passed through the San Fernando Valley to Newhall, then to the Castaic Junction area, and then down the Santa Clara River, to Ventura, on its way to Monterey (Cleland 1940). Although the region was traversed by a number of Spanish explorers in subsequent years, it initially remained isolated due to rugged topography, even though it had been suggested as a locale for a mission. Thus, with the establishment of Missions San Buenaventura, in 1782, and San Fernando, in 1797, late-18th century historical events largely occurred in areas to the west and south of the upper Santa Clara Valley proper.

However, as the missions increased in size and their herds grew,

it became necessary for many of them to establish mission ranchos, or estancias, to allow their cattle to graze some distance from the mission vineyards and fields, per se. With this geographical expansion of mission influence and activities, the upper Santa Clara Valley region became important, if not pivotal, in a number of events central to the development of southern California. Rancho San Francisco, comprising the upper reaches of the Santa Clara Valley down to Piru, served as the estancia for Mission San Fernando (Cleland 1940; Smith 1977), and was established a few years after the founding of the mission itself. (Subsequently, it was elevated to the status of asistencia, or sub-mission, apparently around 1804). The Soledad Canyon study area is located just inside the northeastern boundary of the rancho.

Rancho San Francisco remained an adjunct to Mission San Fernando until 1839, when it was granted to Antonio del Valle by Governor Alvarado, and six years thereafter passed to his son, Ygnacio. Notably, Antonio del Valle had served as majordomo and later administrator of Mission San Fernando and its lands from 1834 to 1837, and the family had made supplications to the governor in 1835 and 1837 to obtain a grant in the Santa Clara Valley. When finally granted, the rancho contained slightly more than 46,000 acres which, as Smith (1977) acknowledges, was just under the maximum of 11 square leagues then legally allowed. Headquarters for the rancho was originally at the site of the old asistencia, near Magic Mountain. In addition to having served as the original and then asistencia headquarters, it was to site of the old asistencia that the lead group of the Manly-Walker party - the "Death Valley '49ers" - first emerged out of the wilderness from their efforts to cross the Mojave Desert.

Ygnacio del Valle ultimately became a prominent politician in southern California, serving as alcalde (mayor) of Los Angeles during the Mexican period, as a member of the Territorial Deputation when California was admitted into the Union in 1850,

and ultimately in the State Legislature. Forced to fight off efforts by Pedro Carrillo to obtain the western portions of Rancho San Francisco, Ygnacio built a corral at Camulos (the approximate site of the Chumash-Tataviam village of kamulus) in 1841, and finally the Camulos Adobe in 1864, as well as one of the first commercial wineries in the state in 1867 (Smith 1977). Although previously they had resided in Los Angeles, the Camulos Adobe then became the del Valle family home, and was visited by Helen Hunt Jackson in 1882. It served as the setting for her famous early California novel Ramona. (The D.W. Griffith film "Ramona", starring Mary Pickford, was also filmed at the adobe in 1911).

The Rancho San Francisco and the upper reaches of the Santa Clara Valley figured in three other important episodes in southern California history, two of which are landmarks in the economic history of the state. The first of these is the discovery of gold. Although the history of gold discovery and exploitation in California is often linked with James Marshall's 1848 discovery of gold in John Sutter's Coloma mill-race, it is a well-known fact that gold was found in California 1842, in Placeritas Canyon, by Francisco Lopez, Manuel Cota and Domingo Bermudez (Smith 1977; Outland 1986). But it is by no means clear that even this well-documented incident represents the first true discovery of gold in the state; instead, a variety of lines of evidence suggest that gold may have been mined in the Santa Clara Valley region one or two decades earlier.

According to an account published by Outland (1986), a local tale indicates that a group of about 20 men, led by one Santiago Feliciano, left Mission San Fernando in 1820 to explore the Castaic region. After reaching the Castaic Junction area, they headed up Hasley Canyon for about 10 miles. There they discovered gold, and a mining camp, "San Feliciano" (from which San Feliciano Canyon apparently gets its name), was born. The region from San Feliciano to Soledad Canyon was subsequently prospected and

mined (mostly for placer deposits) for a number of years, with little record of these efforts presumably resulting because of the legal complications involved in recording gold claims in Mexican California: while the granting of land for agricultural purposes could be effected by the Governor of California, the recording of a gold claim under Mexican law required a trip to Mexico City, a lengthy effort none were apparently willing to gamble.

Although, as Outland notes, there is no clear verification for this tale (which ultimately derives from the prominent early Ventura settler and local historian S.P. Guiberson), there is nonetheless fairly strong evidence that the Placeritas discovery in 1842 was by no means the first in this region (Smith 1977; Outland 1986). In 1832, for example, Ewing Young discovered an old ore smelting oven in San Emigdio Canyon (Outland 1986), suggesting that gold mining in the area had occurred for one or two decades prior to the 1842 event, and a number of other sources indicate that the presence of gold in the area was known at least a few years prior to the famous 1842 Placeritas Canyon incident (Smith 1977). One of these is an early manuscript map of California, dated 1841, but of unknown original provenance (Preston 1988:2). It locates gold as present in the San Gabriel Mountains one year before its putative discovery in Placerita Canyon in 1842.

Be this as it may, the 1842 discovery did have one important repercussion: it resulted in the granting of Rancho Temescal, to Francisco Lopez and Jose Arellanes, in 1843. This included most of Piru Creek, as well as Placerita and San Feliciano Canyons, and totalled over 13,000 acres. Apparently, the legality of this grant under Mexican law has always been a point of some question for, as noted previously, the Governor of California only held the right to award agricultural but not mining grants. However, Thompson and West (1886:74) record that the area was worked by miners from Sonora, Mexico, between 1842 and 1846, at which time they returned to Mexico, and that they extracted between six and eight

thousand dollars of gold per year during that period. Nonetheless, about a dozen years later, Rancho Temescal was acquired by Ygnacio del Valle and added to his Rancho San Francisco holdings.

Not only was the upper Santa Clara Valley area the first in California in which gold was discovered, it was also the first where true oil drilling occurred (Smith 1977), which was the second historical event in the region. Petroleum exploration began about 1865, when oil seeps were discovered in Pico Canyon. This led to discoveries of oil on Rancho San Francisco and, ultimately, throughout the valley. This first historic discovery of oil precipitated Ygnacio del Valle's sale of the majority of his Rancho San Francisco holdings to Thomas Bard, partner with Senator Thomas A. Scott in the Philadelphia and California Petroleum Company, for $1.25/acre, in 1865. Del Valle retained only 1500 acres around Camulos and, seven weeks later, the first oil well came in on the south side of the Santa Clara River, on property acquired by Bard, near the del Valle adobe (Wallace 1977).

Following accepted perceptions of that period, Bard and Scott assumed that petroleum production and ranching would not be compatible. Accordingly, they sold 40,000 acres of Rancho San Francisco to Henry Mayo Newhall in 1875. Newhall was a San Francisco financier who originated in Saugus, Massachussetts, and who, after acquiring the ranch, quickly placed it into wheat and barley farming (Rolle 1991). This represented the beginnings of what would become the Newhall Land and Farming Company, one of the most successful land and farming ventures in the state.

Petroleum production continued in the region, even with Newhall's apparently successful efforts at farming. Lack of a local market and cost of shipping, however, prevented major development of this natural resource until 1876, when the Southern Pacific Railroad crossed the region (Franks and Lambert 1985). This initiated an oil boom in the area, with the development of the

Newhall oil field, and the establishment of the Pioneer Oil Refinery (ultimately, the predecessor to Chevron Oil) in 1876 (Rolle 1991).

The entry of the railroad also resulted in the laying-out of the first town of Newhall, to the south of the Soledad Canyon study area. Efforts to sell lots were stymied by dust and sand storms so severe that, in 1878, the town was moved three miles to the south, to the site of the existing nucleus of Newhall. The original town site, sometimes referred to as "Old Town" was ultimately renamed Saugus, after Mr. Newhall's place of origin (Wallace 1977; Rolle 1991). In 1880 the "new" Newhall was described as having "an exceedingly handsome hotel - with store attached, out-buildings, barns, warehouses, several dwellings, a depot, blacksmith shop, lumber-yard, school-house, and the inevitable following of small saloons" (Thompson and West 1880:104). Still, growth was apparently slow: by 1887 population remained under 100 people (Rolle 1991:96).

The third local event of historical importance was the collapse of the St. Francis Dam and the resulting flood of the Santa Clara River Valley on March 12 and 13, 1928. With the failure of the dam close to midnight on the 12th of March, water raged down San Francisquito Canyon, through the the confluence of the canyon with the Santa Clara, to Castaic Junction, which it effectively leveled, and then on to Fillmore, Santa Paula and ultimately to the Pacific, causing great loss of life and destruction along the way. At Castaic Junction, the only survivor of the flood was George McIntyre, son of the owner of McIntyre's motel and gas station. George was washed northwards by a great arc of the floodwaters, towards Castaic Canyon, where he grabbed hold of a power pole and avoided drowning; the bodies of his father and one brother were found in Santa Paula; another brother's body was never recovered. All told, at least 336 deaths were caused by the flood (undoubtedly more occurred but were never entered into coroner's statistics), 909 homes were

destroyed, and countless acres of orchards were flattened (Outland 1963).

If there were any benefits resulting from the great flood, one may have been to the Newhall Land and Farming Company, started by Henry Mayo Newhall, as noted previously, in 1875. Combined with the beginning of the Depression, the company's assets and capital had eroded over the years, and it was facing liquidation when taken over by Athol McBean in 1930. McBean was married to a grandaughter of Henry Mayo Newhall, and was an accomplished businessman in his own right. Because the flood had damaged considerable acreage within the farm, the company received three-quarters of a million dollars in restitution from the City of Los Angeles. McBean was able to use this in his reorganization of the company, and to place it on the sound financial track which it has followed to this day (Rolle 1991). It is, of course, the Newhall Land and Farming Company which has provided the impetus for the recent suburban and urban development of the upper Santa Clara Valley region.

The study area, however, is peripheral to all of the historical events and discoveries in this region, and probably did not specifically figure in the history of this part of Los Angeles County. In this sense, the study area can be considered peripheral to and isolated from the historical events of northern Los Angeles County, and probably did not participate directly in any of them.

3.0 ARCHIVAL RECORDS SEARCH

An archival records search was conducted at the California State University, Fullerton, Archaeological Information Center (AIC), by AIC staff members to determine: (i) if prehistoric or historical archaeological sites had previously been recorded within the 750 acres Soledad Canyon Panhandle study area; (ii) if all or portions of the project area had been systematically surveyed by archaeologists prior to the initiation of this field study; and/or (iii) whether the region of the field project was known to contain archaeological sites and to thereby be archaeologically sensitive. The results of this archival records search are included in this document as Appendix A.

The records search at the AIC indicated that portions of the study area had been previously surveyed by archaeologists. Specifically, five surveys had investigated portions of the study area, principally the western end of the study area, excluding the upper river terraces along the northern side of the canyon and the eastern one-third of the property. These surveys had resulted in the discovery and recording of three prehistoric archaeological sites. A summary of the nature and current conditions of each of these prehistoric sites is provided below.

CA-LAN-351: This is a large site first recorded by N. Leonard in 1968. It is located in the approximate center of the study area (Figure 2), on a series of three river terraces on the north side of Soledad Canyon. The site was revisited and site update forms were completed by L. Tartaglia in 1986, and subsequently by J. Romani and G. Romani in 1991. The estimate for site size on this latest update was 309 meters N-S by 185 meters E-W, with a projected 60 cm of depth for the archaeological deposit present at the site. According to the 1991 update, the site was believed to contain a midden deposit along its

southeastern side. An inventory of artifacts noted on the groundsurface at that time comprised a wide range of tools and debitage, including groundstone, core tools, bifaces, debitage and burnt bone. From the size of the site, its diversity of artifacts, the presence of a midden deposit, burnt bone and fire-cracked rocks, CA-LAN-351 can be inferred to represent a village or habitation site. Furthermore, the presence of mortar/bowl fragments suggests that it at least in part post-dates the Early Horizon; that is, that it is approximately 3500 years, or less, in age.

CA-LAN-1824: L. Tartaglia recorded this site in 1986 and conducted a Phase II test on it in 1990 (Tartaglia 1986, 1990). It was revisited and a site update was completed for it by Greenwood and Associates (Romani et al 1991) in 1991. According to the documents resulting from these studies and visits, when first discovered CA-LAN-1824 was described as a lithic scatter, located on the south side of the Santa Clara River, within the active flood channel area. It contained one rhyolite core, one quartzite cobble tools and one metavolcanic flake. When tested in 1990 these artifacts could not be re-located, perhaps due to seasonal innundations of the flood channel. A single mano and piece of shellfish were found on and collected from the site, however, but sub-surface testing failed to reveal the presence of any buried archaeological deposit. When re-visited in 1991 by Greenwood and Associates, no additional cultural materials could be found on the site area.

It is apparent that any cultural materials once present on this site have been removed. The area of CA-LAN-1824, therefore, can no longer be considered an archaeological site. Following the guidelines of the California Environmental Quality Act (CEQA), furthermore, the previous archaeological work at this locality has served to completely and adequately mitigate any adverse impacts to cultural resources at this site.

CA-LAN-1829: This site was also discovered and recorded by L. Tartaglia in 1986, and was re-visited and evaluated in 1991 by Greenwood and Associates (cf. Tartaglia 1986; Romani et al 1991). The site was originally described as an "extremely sparse lithic scatter", consisting of one rhyolite and one quartz flake located along a power line road in the flood channel immediately north of the Santa Clara River. During the 1991 re-visit and evaluation of the site, Romani et al (1991) noted that, since the site consisted only of two waste flakes, it originally should have been recorded as two isolates, following the State of California Office of Historic Preservation (OHP) guidelines; that is, that it did not rightly meet the primary criterion used to define an archaeological site. Moreover neither the two original flakes nor any additional archaeological remains could be found in the area of the site during the 1991 re-visit.

Inasmuch as CA-LAN-1829 apparently represents isolated artifacts rather than a site per se, and following OHP and CEQA guidelines, the recording of the two waste flakes originally constituting the extant cultural resources present at this locality has served to completely and adequately mitigate any adverse impacts that it might experience due to development or use of the area.

The archival records search also considered the possibility that historical archaeological resources might be present within the study area. Historical records in the form of the Santa Susana (1903 and 1941) and San Fernando (1900 and 1940) USGS 15' topographical quadrangles were examined to determine whether historical resources might be present on the property. No evidence of historical development in the study area, per se, was found on these maps, although roads and the Southern Pacific Railroad were present in the region by the turn of the century, and Saugus (original locale for Newhall) had been developed. However, one historical site has been recorded within the study area. This is CA-LAN-2105H, the Los Angeles Aqueduct.

Although this active water line strictly lies within the study area, it is important to note that it sits within a utility easement, and therefore lies outside of any proposed development or use.

4.0 FIELD SURVEY METHODS

A field survey of the 750 acres Soledad Canyon Panhandle study area, Los Angeles County, California, was conducted by David S. Whitley, Ph.D., Joseph M. Simon, and Tamara K. Whitley, M.A., of the W & S Consultants staff, in July, 2001. The groundsurface was examined with transects spaced at approximate 10 - 15 meter intervals; these were walked across the study area to identify artifacts or other archaeological indicators that might be present on the groundsurface. Particular attention was paid to localized micro-geomorphological contexts favorable for the preservation or burial of archaeological remains, such as aggradational environments at the toeslopes of grades and hills, and stable surfaces such as captured fans. Further, cut-banks and animal burrows were examined to determine whether buried cultural deposits might be present on the property.

5.0 SURVEY RESULTS

The Phase I archaeological survey of the Soledad Canyon Panhandle study area, Los Angeles County, California, resulted in the discovery of two isolated artifacts within the study area. It also allowed for a re-examination of site CA-LAN-351 and the areas originally containing sites CA-LAN-1824 and -1829. With the exception of the two newly discovered isolates, no additional cultural resources were found within the study area. We discuss these cultural resources in turn.

5.1 Newly Discovered Cultural Resources

Two isolated artifacts were discovered during the Phase I survey of the Soledad Canyon study area, both of which represent examples of lithic debitage. Appendix B contains isolate records for these two finds.

Isolate #1: This was a small piece of chert debitage found on a low knoll immediately north and overlooking the Santa Clara River on the eastern side of the study area (Figure 2). The specimen appears to be a piece of angular shatter. Inasmuch as chert does not occur locally within the study area, it must be inferred that this specimen was transported by human hands onto this locality. An intensive search in the immediate area of its discovery failed to uncover any additional evidence of cultural remains.

Isolate-#2: This specimen was found on a low terrace on the north side of the river, east of the Los Angeles Aquaduct easement (Figure 2). It consists of a single chert primary flake. This is a large cortical flake, with evidence of fire-spalling, which may have resulted from a brush fire, or from heat-treatment in

manufacture. No additional cultural resources could be found at the location of this waste flake, although the area was examined intensively.

5.2 Previously Recorded Cultural Resources

As noted previously, three prehistoric and one historical archaeological sites had been recorded within the study area. Each of these was visited and evaluated during the Phase I survey. We discuss the status of each of these four sites in turn.

CA-LAN-351:

Examination of this site revealed field conditions much in agreement with those described in the 1991 visit and evaluation by Greenwood and Associates (Romani et al 1991). The site is apparently a large habitation, with archaeological remains spread over three river terraces which are immediately adjacent to a bend in the course of the Santa Clara River. There is a particularly lush riparian area on this bend, filled with introduced arundu cane, suggesting that a seep may be present near this site.

We noted artifacts on CA-LAN-351 similar in diversity and number to those reported by the 1991 fieldcrew. In addition to debitage, they included groundstone (manos, metate and pestle fragments), cobble chopping tools, flaked stone tools (biface knife and biface edges), fire-cracked rock and burnt bone. Although the primary surface expression of the midden is currently on the eastern side of the middle terrace, it is very likely that downslope colluviation is mantling midden extending further to the west. Those portions of the site located on the lower and middle terraces appear to maintain high integrity and therefore are in good condition.

As noted in previous evaluations of the site, the upper terrace was graded sometime prior to the 1986 update, and was

used for a model airplane runway. A berm of the graded material currently rims the upper terrace on its eastern and southern sides. Judging from the fact that portions of the terrace immediately inside the berm have developed stands of sage and buckwheat, this grading probably occurred a few decades or more ago. A brow-ditch, presumably for erosion control, also runs along the rim of this terrace. It is apparent that this ditch cuts into an intact, non-cultural deposit of (probably early or middle Pleistocene age) alluvial cobbles. Although this rim of the upper terrace has been identified as an area of high artifact density, it is apparent that it has suffered from considerable disturbance. Further, although at one time this rim area may have been a zone of high artifact density, the exposed Pleistocene cobble lens indicates that there was no sub-surface archaeological deposit in this immediate area, and we noted only three surface artifacts along this rim area. On the other hand, we observed intact pockets of midden on the upper terrace, northwest of the berm and brow-ditch. Thus, although we found portions of the upper terrace to be more heavily disturbed than previously noted, it is also clear that there are more extant archaeological remains in this area than originally believed.

As noted previously, the presence of midden and the artifact assemblage observed on the groundsurface of the site indicate that CA-LAN-351 represents a village or habitation site. The presence of mortars/bowls and pestles suggest that it has a maximum age of about 3500 years, although it may be considerably younger. There is, however, no ethnohistorical evidence that there was a historical village in the area of the site, thus indicating that it is prehistoric and not potentially historical in age.

CA-LAN-1824:

This site was a small surface scatter that consisted solely of a mano and a single piece of shellfish when tested in 1990 (see Tartaglia 1990). Based on that Phase II test, no additional

archaeological work was recommended as necessary at this site. As noted by Romani et al (1991), however, the sparsity of artifacts at this locale indicate that it did not meet the OHP definitional criterion for an archaeological site, but instead comprised solely isolated finds, the recording of which serves to adequately and completely mitigate any adverse impacts resulting from development or use of the area.

During the current Phase I survey the area of site CA-LAN-1824 was re-visited and intensively examined. We found no evidence of additional extant artifacts at this locale, thus confirming the results of an earlier, 1991 re-examination (see Romani et al 1991).

CA-LAN-1829:

Circumstances at CA-LAN-1829 were very similar to those at CA-LAN-1824: originally recorded as a lithic scatter of two flakes, no cultural materials could be re-located in 1991 and, at that time, it was noted that the site should have been recorded originally as two isolated artifacts, rather than as a site, per se (see Romani et al 1991).

Although we visited and intensively examined the area of CA-LAN-1829, we also could not find any extant evidence of cultural materials at this locale, thus confirming the results of the 1991 re-examination.

CA-LAN-2105H:

This historical site is the Los Angeles Aqueduct, which is currently in use. Lying within a utility easement, it is outside of any proposed development.

6.0 RECOMMENDATIONS

An archival records search, background studies, and an intensive, on-foot surface reconnaissance of the Soledad Canyon Panhandle study area, northern Los Angeles County, California, were conducted as part of an intensive Phase I archaeological survey and cultural resources assessment. The following cultural resources are or at one time were present within this study area: CA-LAN-351, a prehistoric habitation site that is currently in good to fair condition; CA-LAN-1824 and -1829, both of which were recorded in 1986 but are no longer present on the property, and both of which represent isolated artifacts; Isolates #1 and #2, which were recorded during the current field study and which represent isolated finds of single chert flakes; and CA-LAN-2105H, the Los Angeles Aqueduct, which is still in use. Based on CEQA, we recommend the following with regard to each of these cultural resources:

CA-LAN-351: This is a large prehistoric site that has the potential to contain scientific information useful for the reconstruction of prehistoric lifeways in the Santa Clara Valley region, and/or artifacts or features that may be of religious importance to Native Americans. Development of the area containing CA-LAN-351, therefore, has the potential to result in adverse impacts to cultural resources. We recommend that a Phase II test excavation and determination of site significance be conducted prior to any development of the area of the site, to provide baseline data from which an acurate estimate of the nature, size and significance of CA-LAN-351 can be established, and from which final management recommendations can be made.

CA-LAN-1824: CA-LAN-1824 represents an isolated artifact rather than an archaeological site, per se, as noted by Romani et al (1991), and there are currently no extant cultural remains at this locale. Following CEQA guidelines, all potential

impacts to this cultural resource have been mitigated by the recording of this artifact. In concurrence with Tartaglia (1986) we recommend, therefore, that no additional archaeological work be required at the former locale of CA-LAN-1824.

CA-LAN-1829: As with the previous site, CA-LAN-1829 correctly represents an isolated artifact occurrence rather than an archaeological site, per se (see Romani et al 1991), with no extant remains now present at this locale. All potential adverse impacts to this cultural resource, therefore, have been completely and adequately mitigated. We recommend that no additional archaeological work be required or performed at this locale.

CA-LAN-2105H: This site, the Los Angeles Aqueduct, is currently in use, and lies in an easement across the study area. There is, therefore, no potential for adverse impacts to this historical cultural resource. We recommend no additional archaeological work for this site.

Isolate #1: This isolated piece of lithic debitage has been recorded as part of the current Phase I study. According to CEQA, this has served to completely and adequately mitigate all potential adverse impacts to this cultural resource. We recommend, therefore, that no additional archaeological work be required or performed at this locale.

Isolate #2: A recording of this isolated specimen of lithic debitage was completed during the current Phase I study. We recommend, following CEQA guidelines, that no additional archaeological work be required or performed at this locale.

7.0 CITED REFERENCES

Cleland, R.G.
1940 The Called Sespe: The History of a California Ranch. Privately printed.

Earle, D.
1990 New Evidence on the Political Geography of the Antelope Valley and the Western Mojave Desert at Spanish Contact. In B. Love and W.H. DeWitt, eds., Archaeology and Ethnohistory of the Antelope Valley and Vicinity, Antelope Valley Archaeological Society, Occasional Papers No. 2, pp. 87-104.

Franks, K.A. and P.F. Lambert
1985 Early California Oil: A Photographic Essay, 1865-1940. Texas A. and M., College Station.

Johnson, J. and D. Earle
1990 Tataviam Geography and Ethnohistory. Journal of California and Great Basin Anthropology 12:191-214.

King, C. and T.C. Blackburn
1978 Tataviam. In R.F. Heizer, ed., Handbook of North American Indians, Volume 8, California, pp. 535-537. Washington, D.C.: Smithsonian Institution.

King, C., C. Smith and T. King
n.d. Archaeologial Report Related to the Interpretation of Archaeological Resources Present at the Vasquez Rocks County Park. Report on file, UCLA AIC.

Kroeber, A.L.
1925 Handbook of the Indians of California. Bureau of

American Ethnology, Bulletin 78. Washington, D.C.

Love, B.
1990 Archaeological Testing of a Portion of LAn-618, the Escondido Canyon Site, Near Agua Dulce, Los Angeles County, California. In B. Love and W.H. DeWitt, eds., Archaeology and Ethnohistory of the Antelope Valley and Vicinity, Antelope Valley Archaeological Society, Occasional Papers No. 2, pp.21-42.

McIntyre, M.
1990 Cultural Resources of the Upper Santa Clara River Valley, Los Angeles and Ventura Counties, California. In B. Love and W.H. DeWitt, eds., Archaeology and Ethnohistory of the Antelope Valley and Vicinity, Antelope Valley Archaeological Society, Occasional Papers No. 2, pp. 1-20.

Outland, C.F.
1963 Man-Made Disaster: the story of the St. Francis Dam. Glendale: Arthur H. Clark.
1986 Mines, Murders and Grizzlies: Tales of California's Ventura Back Country. Ventura: Ventura County Historical Society.

Preston, R.N.
1988 Early California Atlas - Southern Edition. (Second edition). Binford and Mort, Portland.

Romani, J., G. Romani and R. Greenwood
1991 Archaeological Survey Report for the Route 126 Location Study from Interstate 5 to State Route 14, in the Santa Clarita Valley, California. Unpublished manuscript on file, UCLA AIC.

Rolle, A.

1991 Henry Mayo Newhall and His Times: A California Legacy. Huntington Library, San Marino.

Smith, W.E.
1977 This Land Was Ours: The del Valles and Camulos. Ventura: Ventura County Historical Society.

Sutton, M.Q.
1988a An Introduction to the Archaeology of the Western Mojave Desert, California. Archives of California Prehistory, No. 14. Salinas: Coyote Press.
1988b On the Late Prehistory of the Western Mojave Desert. Pacific Coast Archaeological Society Quarterly 24(1):22-29.

Tartaglia, L.
1986 Cultural Resource Survey Report: Soledad Canyon Project. Unpublished manuscript on file, CSUF AIC.
1990 Archaeological Site Assessment, Site A, Soledad Canyon Project, Tentative Tract Map 20838, Saugus, California. Unpublished manuscript on file, CSUF AIC.

Thompson, T.H. and A.A. West
1880 History of Los Angeles County, California, With Illustrations and Biographical Sketches of Its Prominent Men and Pioneers. Oakland.

Wallace, W.J.
1955 A Suggested Chronology fpr Southern California Coastal Archaeology. southwestern Journal of Anthropology 11:214-230.

Whitley, D.S.
1992 Shamanism and Rock Art in Far Western North America. Cambridge Archaeological Journal 2:89-113.

Whitley, D.S. and M.P. Beaudry
1991 Chiefs on the Coast: The Development of Complex Society in the Tiquisate Region in Ethnographic Perspective. In W. Fowler, ed., The Development of Complex Civilizations in Southeastern Mesoamerica, pp. 101-120. CRC Press.

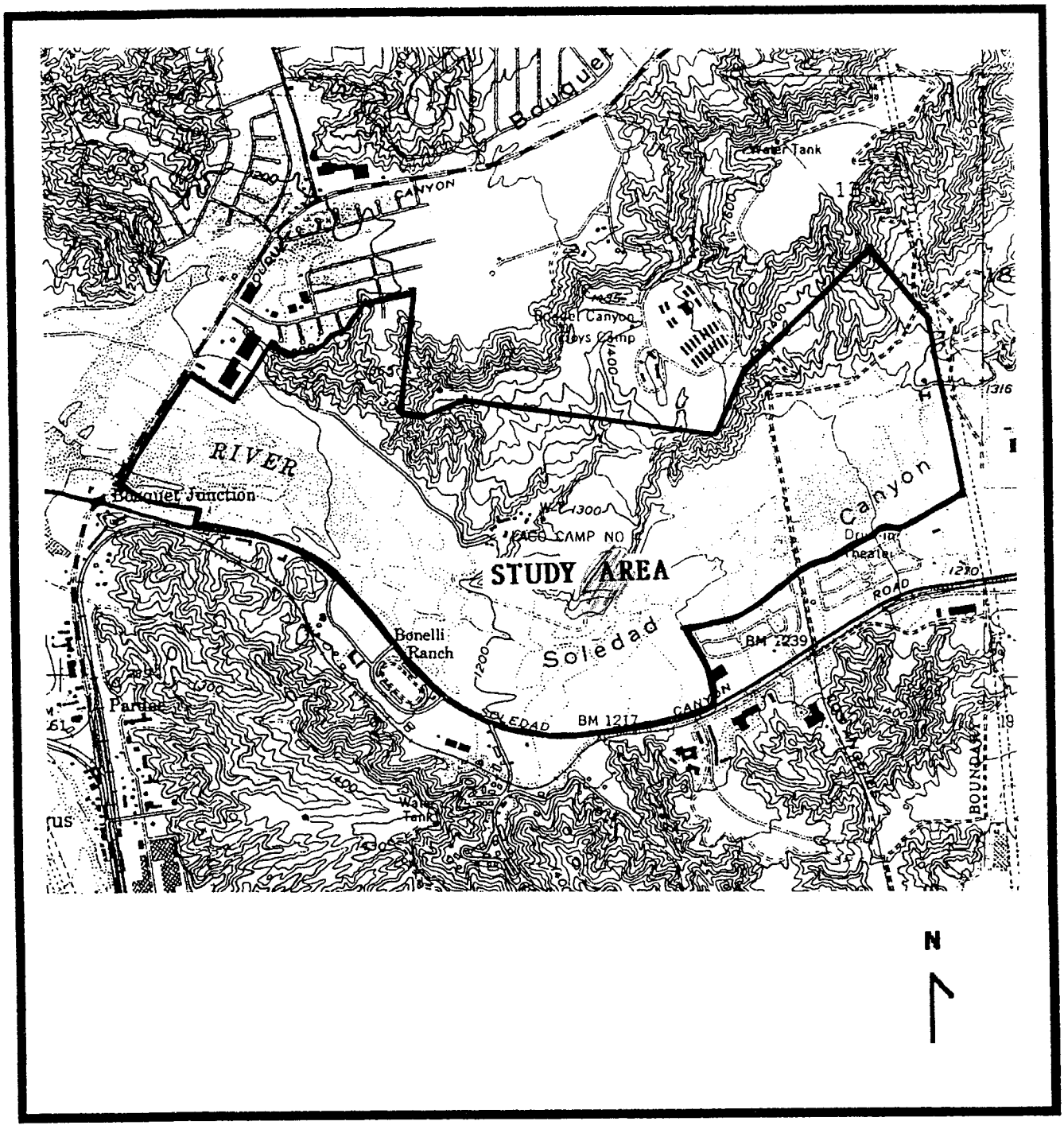

FIGURE 1: Soledad Canyon study area, northern Los Angeles County, California (base map: USGS Newhall 7.5' quadrangle; scale - 1 : 24,000).

9.0 APPENDIX A: ARCHIVAL RECORDS SEARCH

South Central Coastal Information Center
California Historical Resources Information System
California State University, Fullerton
Department of Anthropology
800 North State College Boulevard
Fullerton, CA 92834-6846
(714) 278-5395 / FAX (714) 278-5542
anthro.fullerton.edu / sccic.html

Los Angeles
Orange
Ventura

July 13, 2001

Mr. Joseph M. Simon
W and S Consultants
2242 Stinson Street
Simi Valley, CA 93605
805-581-3577

RE: Records Search for a Phase I Archaeological Resource Survey of the Pan Handle Project Site (750 ac.) in Santa Clarita, Los Angeles County, California

Dear Mr. Simon,

As per your request received on June 13, 2001, we have conducted a records search for the above referenced project. This search includes a review of all recorded historic and prehistoric archaeological sites within a ½ -mile radius of the project area as well as a review of all known cultural resource reports. In addition, we have checked our file of historic maps, the California State Historic Resources Inventory, the National Register of Historic Places, the listing of California Historical Landmarks in the region, and the California Points of Historical Interest. The following is a discussion of our findings.

PREHISTORIC RESOURCES:

Newhall 7.5' USGS Quadrangle

Three prehistoric archeological sites (19-000351, 19-001824, and 19-001829) have been identified within the project area. One prehistoric archaeological resource noted in report LA643 has been identified within a ½-mile radius of the project area, but was never formally recorded (19-120063). Six prehistoric isolates (19-100341, 19-100342, 19-100343, 19-100344, 19-100345, and 19-100346) have been identified within a ½-mile radius of the project. None of the resources have been identified on the National Register Determination of Eligibility list.

Mint Canyon 7.5' USGS Quadrangle

No prehistoric sites have been identified within a ½ -mile radius of the project area.

HISTORIC RESOURCES:

Newhall 7.5' USGS Quadrangle

Two (19-002105 and 19-002132H) historic archaeological sites have been identified within a ½-mile radius of the project area. None of the resources have been identified on the National Register Determination of Eligibility list.

Mint Canyon 7.5' USGS Quadrangle

No historic archaeological sites have been identified within a ½-mile radius of the project area.

Newhall and Mint Canyon 7.5' USGS Quadrangle

Copies of the historic maps - Santa Susana 15' 1908, 1941, and 1948) - for your project area have been enclosed for you review (see enclosed maps)

A copy of the California State Historic Resources Inventory list for the city of Santa Clarita has been enclosed for your review (see enclosure).

The National Register of Historic Places lists no properties within a ½ -mile radius of the project area.

The California Historical Landmarks (1990) of the Office of Historic Preservation, California Department of Parks and Recreation, lists no landmarks within a ½ -mile radius of the project area.

The California Points of Historical Interest (1992), of the Office of Historic Preservation California Department of Parks and Recreation, lists no properties within a ½ -mile radius of the project area.

The listings of the City of Los Angeles Historic-Cultural Monuments indicated that there are no landmarks within a ½ -mile radius of the project area.

PREVIOUS ARCHAEOLOGICAL INVESTIGATIONS:

Newhall 7.5' USGS Quadrangle

Thirty-seven studies (LA54*, LA127, LA210, LA326, LA584, LA643, LA1032, LA1152, LA1342, LA1447, LA1751, LA1752, LA1775, LA1784, LA1896*, LA1951, LA2117, LA2118*, LA2477, LA2503*, LA2562, LA2783, LA2979, LA2996, LA3154, LA3387*, LA3690*, LA3840, LA3890, LA3895, LA3913*, LA3915, LA4104, LA4158, LA4159, LA4251*, LA4506) have been conducted within a ½ -mile radius of the project area. There are four additional investigations located on the Newhall 7.5' USGS quadrangle potentially within a ½ -mile radius of the project area. These reports are not mapped due to insufficient locational information. A bibliography of these reports is available upon request.
(* = Located within the project area.)

Mint Canyon 7.5' USGS Quadrangle

Six studies (LA54, LA1032, LA2503, LA2996, LA3840, and LA3960) have been conducted within a ½ -mile radius of the project area. There are six additional investigations located on the Mint Canyon 7.5' USGS quadrangle potentially within a ½ -mile radius of the project area. These reports are not mapped due to insufficient locational information. A bibliography of these reports is available upon request.

Please forward a copy of any reports resulting from this project to our office as soon as possible. Due to the sensitive nature of site location data, we ask that you do not include record search maps in your report. If you have any questions regarding the results presented herein, please feel free to contact our office at (714) 278-5395.

Invoices are mailed approximately two weeks after records searches are completed. This enables your firm to request further information under the same invoice number. **Please reference the invoice number listed below when making inquiries.** Requests made after invoicing will result in the preparation of a separate invoice with a $15.00 handling fee.

Sincerely,

Margaret López
Coordinator

Enclosures:

(X) Primary Number Explanation
(X) Map – Newhall and Mint Canyon 7.5' USGS Quadrangles, Santa Susana 15' USGS Quadrangles (3)
(X) Bibliography - 15 pages
( ) Site list
(X) HRI - 3 pages
(X) National Register Status Codes - 4 pages
( ) Site records
( ) Survey reports
(X) Confidentiality Form
( ) Invoice # 9674

PHASE II ARCHAEOLOGICAL TEST EXCAVATIONS FOR THE RIVER PARK PROJECT AREA, NORTHERN LOS ANGELES COUNTY, CALIFORNIA

Prepared For:

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23 April, 2002

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MANAGEMENT SUMMARY

Phase II archaeological test excavations were conducted at CA-LAN-351 and site NLF/W&S-1 within the River Park project area, Saugus, northern Los Angeles County, California. For CA-LAN-351, which is slated for preservation, this involved the determination of the site boundary along its southwestern margin; geomorphological constraints limit the site in the other directions. Testing at site NLF/W&S-1 involved the hand excavation of fifteen 1x1 meter test pits along with surface collection and mapping. This site proved to contain a subsurface archaeological deposit and is believed to date to approximately 4000 - 2000 YBP. Recommendations for the further management of these sites are provided.

CHAPTER 1
INTRODUCTION

1.1 Summary and Background to the Project

At the request of The Newhall Land and Farming Company, Valencia, California, Phase II archaeological test excavations were conducted at sites CA-LAN-315 and NLF/W&S-1 (temporary designation). Both sites are located within the River Park project area in northern Los Angeles County, California (Figure 1). This archaeological study was intended to determine the size and significance of these two prehistoric archaeological sites and thereby to provide baseline data from which an assessment of potential adverse impacts to these resources could be made. These data have been employed to develop final management recommendations for the treatment of these cultural resources.

This study was conducted by W & S Consultants during March, 2002. David S. Whitley, Ph.D., and Joseph M. Simon served as principal investigators for the project; while the laboratory analyses were conducted by Tamara K. Whitley, M.A. This report was prepared by D.S. Whitley. Richard Angulo, representing the California Indian Foundation, served as Native American monitor for the project.

The remainder of this chapter provides environmental and cultural background to the prehistory of the region, including a summary of previous archaeological research conducted in this region; and descriptions of the two sites considered in this study. This is followed by the field methods used, along with summaries of the field results. We then turn to an assessment of the recovered artifact assemblage, and certain of the analytical conclusions derived therefrom. We conclude with final recommendations for the cultural resources considered during this Phase II study.

1.2 Environmental and Cultural Overview

1.21 Site Descriptions & Environmental Background

Archaeological sites CA-LAN-351 and NLF/W&S-1 are located on the north bank of the upper Santa Clara River in Saugus, northwestern Los Angeles County, California (Figure 1). This portion of the river channel is a relatively restricted stream bed known as Soledad Canyon. Originally both sites were considered part of a single cultural resource, designated CA-LAN-351. For reasons discussed below, it became apparent during our Phase II fieldwork that, more correctly, each warranted its own designation.

CA-LAN-351 was first recorded as a large site by N. Nelson Leonard in 1968. It was located on

a series of three river terraces with elevations ranging from about 1210 to 1280 feet a.m.s.l.. The site was revisited and site update forms were completed by L. Tartaglia in 1986, and then by J. Romani and G. Romani in 1991. The estimate for site size on the 1991 update was 309 meters N-S by 185 meters E-W, with a projected 60 cm of depth for the archaeological deposit present at the site. According to the 1991 update, the site was believed to contain a midden deposit along its southeastern side. An inventory of artifacts noted on the groundsurface at that time comprised a wide range of tools and debitage, including groundstone, core tools, bifaces, debitage and burnt bone. From the size of the site, its diversity of artifacts, the presence of a midden deposit, burnt bone and fire-cracked rocks, CA-LAN-351 can be inferred to represent a village or habitation site. Furthermore, the presence of mortar/bowl fragments suggests that it at least in part post-dates the Early Horizon; that is, that it is approximately 3500 years, or less, in age.

The site was revisited and examined recently by W&S Consultants (2001). Although generally concurring with the previous studies, the possibility of a separate sub-surface archaeological deposit on the upper of the three terraces was noted. Moreover, the soils context of the upper terrace appeared different from that seen in the lower two. Combined with the fact that the two areas were separated by a a distance of roughly 100 feet on a steep slope with an elevational change of over 25 feet, these circumstances suggested that the large area originally recorded as a single site perhaps should more correctly be considered two distinct archaeological sites. However, it was recognized that a decision on this point would best be made during archaeological testing, when the distribution of artifacts and deposits could be confirmed or clarified.

Phase II fieldwork at this location quickly confirmed these suppositions: two archaeological deposits are present and these are geographically distinct and appear to differ (for reasons discussed subsequently) in cultural-historical terms. We have therefore retained the designation of CA-LAN-351 for the primary area of original discovery, which is the archaeological deposit on the lower terraces (Figure 2). This covers the first and second terraces above the stream bottom, which range from 1210 to almost 1260 feet in elevation. The second site area, given the temporary designation of NLF/W&S-1, is located on the third terrace above the stream bed. Elevation for this site ranges from about 1280 to 1285 feet (Figure 3).

Although historic and recent land-use changes have altered the environment considerably from what existed during prehistoric times, at least four major plant associations probably characterized the region containing these two sites during the aboriginal period. These are chaparral, coastal sage scrub, southern oak woodlands, and riparian associations (cf. Muntz 1974).

The chaparral association covers steeper slopes with poorly developed soils and xeric conditions. It includes the following species: California sagebrush (Artemisia californica), white sage (Salvia mellifera), black sage (S. apliana), purple or white-leaved sage (S. Leucophylla), California encilia

(Encilia californica), California buckwheat (Eriogonum fasciculatum), chamise (Adneostoma fasciculatum), buckbrush (Ceanothus cuneatus), scrub oak (Quercus dumosa), toyon (Heteromeles arbutifolia), mountain mahogony (Cercocarpus betuloides), lemonade sumac (Rhus integrifolia) and sugar sumac (R. ovata). This is a particularly common association in the West Ranch study area.

The coastal sage scrub community is the climax community for portions of inland-coastal southern California. It is generally composed of coast buckwheat (Eriogonum cinereum) and wild buckwheat (E. fasciculatum), along with black sage (Salvia apliana), common hazardia (Haplopappus squarrosus), prickly phlox (Leptodactylon californicum), yucca (Yucca whipplei) and California sagebrush (Artemisia californica) as major constituents.

Although both of the above plant associations were undoubtedly of subsistence importance to the aboriginal population of the region, the third association, the southern oak woodland, may have been of primary significance in the inland zones adjacent to the coastal strip. This results because of the great importance placed on the acorn as a food staple by Native Californians (Kroeber 1925), and the rarity of this resource on the coastal side of the Santa Monica Mountains. The association is characterized by the coast live oak (Quercus lobata) and the valley oak (Q. agrifolia), but also would have included various species of native grasses. Although currently restricted in distribution, this association may once have been found across much of the wide, upper reaches of Potrero Canyon and the mesas on the south side of the Santa Clara River. Currently, stands of oak woodlands are still found at higher elevations on the less precipitous ridge/hilltops on the southern side of the property.

The fourth and final plant association consists of riparian habitats, which are localized and poorly diversified woodlands found in areas of perennial moisture. They include such species as arroyo willow (Salix lasiolepsi), mule fat (Baccharis glutinosa), willow dock (Rumex salicifolius), swamp knotweed (Polygonum coccineum), nettle (Urtica holosericea), cocklebur (Xanthium strumarium) and rabbitsfoot grass (Polypogon monspeiensis). Though this plant association is limited in distribution, it can still be considered to have had significant economic importance in aboriginal times, especially in terms of the acquisition of raw materials for items like baskets, cordage and netting.

While riparian habitat is present in the Santa Clara River, immediately adjacent to the two sites, the site areas otherwise can be characterized by introduced species (primary grass and wild mustard). Both site areas have been periodically disked, if not plowed, and used as agricultural fields. Recent disking appears to have been completed for purposes of fire safety.

1.22 Ethnographic Background

The Upper Santa Clara Valley region, including the Newhall Ranch, appears to have been inhabited during the ethnographic past by an ethnolinguistic group known as the Tataviam. Some controversy exists in reference to this attribution, as the Tataviam are now extinct and were effectively so prior to the initiation of systematic anthropological studies at the turn of the century (King and Blackburn 1976). But, based on a few existing word lists, descriptions provided by early travelers, mission placenames, and the recollections of other aboriginal informants, the Tataviam are generally accepted as the aboriginal inhabitants of this region. Their language is believed to represent a member of the Takic branch of the Uto-Aztecan linguistic family. In this sense, it was related to other Takic languages in the Los Angeles County region, such as Gabrielino/Fernandeño of the Los Angeles Basin proper, and Kitanemuk of the Antelope Valley.

The Tataviam are thought to have inhabited the upper Santa Clara River drainage from about Piru eastwards to just beyond the Vasquez Rocks/Agua Dulce area; southwards as far as Newhall and the crests of the San Gabriel and Santa Susana Mountains; and northwards to include the middle reaches of Piru Creek, the Liebre Mountains and the southwesternmost fringe of the Antelope Valley (ibid; Kroeber 1925; Earle 1990; Johnson and Earle 1990). Their northern boundary most likely ran along the northern foothills of the Liebre Mountains (i.e., the edge of the Antelope Valley), and then crossed to the southern slopes of the Sawmill Mountains and the Sierra Pelona, extending as far east as Soledad Pass (Earle 1990:94). Ethnographically, at least, the Tataviam do not appear to have controlled the Leona Valley or areas to the north, with the Elizabeth Lake area proper a zone of uncertainty.

Known Tataviam villages during the historic period include: pi?irukung and ?akavaya, both near modern Piru; tsavayu(?u)ng, San Francisquito; etseng, kuvung and huvung, on Piru Creek above Piru; tochonanga, near Newhall; kwarung, Elizabeth Lake; and tsawayung, near Castaic Junction. At kamulus, near modern Rancho Camulos, a mixed Chumash-Tataviam population lived (King and Blackburn 1976:535-6). Because the name kamulus is unquestionably Chumash and not Tataviam, however, the toponym has been viewed as problematical (Johnson and Earle 1990:197); that is, as not reflecting the original (Tataviam) name for this village. Regardless of original name, however, the Spanish missionary Señan, writing in 1804, indicated that the Chumash inhabitants of the village of sécpev had migrated to kamulos, accounting for this admixture (Señan 1962:15). Sécpev is of course now known as Sespe, near the modern town of Fillmore.

The Tataviam, culturally-speaking, were in most respects similar to their Fernandeño and Chumash neighbors, to the south and west, respectively (King and Blackburn 1976). In this sense, they were hunters-gatherers, with subsistence emphasizing yucca, acorns, juniper berries,

sage seeds and islay. Game was also hunted, with small animals, such as rabbits/hares and rodents, probably representing more significant contributions of meat protein than larger game, such as deer.

Almost nothing is known of Tataviam social and political organization. Based on analogies with surrounding groups, however, it can be suggested that they were organized in a series of tribelets, similar to the naciones described by Earle (1990) for the Antelope Valley, and found to be characteristic of much of California aboriginal socio-political organization (cf. Kroeber 1925). The tribelet represented an autonomous land-holding unit, minimally controlled by a head-chief or big-man. They usually included one large, 'capital' village, sometimes occupied year-around, and a series of smaller, seasonally inhabited hamlets. Whether the Tataviam may have had exogamous clans and moieties, like the Cahuilla and Serrano to the east, is unknown. However, it is estimated that the Tataviam population was less than 1000 people at the time of Euro-American contact, and that only two or three of the largest villages throughout their territory were inhabited at any given time (King and Blackburn 1976).

It is also likely that Tataviam religion followed the patterns of their surrounding neighbors. In this case, shamanism would have functioned as the central element. This posits a direct and personal relationship between each individual and the supernatural world, with this relationship enacted by entering a trance or hallucinatory state (usually based on the ingestion of psychoto-mimetic plants, such as jimsonweed or native tobacco). Shamans, per se, who were considered individuals with an unusual degree of supernatural power, served as ritual specialists: ceremonies and rites were infrequent in occasion and limited in type. Perhaps most importantly, shamans served as healers or curers, with the etiology of disease as well as its cure held to lie in the supernatural world. Shamans are also known to have produced the rock art of this region (Whitley 1992), which depicted the hallucinations and spirits they observed in their vision quests.

Although the Tataviam were one of the earliest groups contacted by Spanish missionaries, with a number of their villages described by members of the Portolá expedition of 1769, a general lack of information on this group exists because, by 1810, all Tataviam had been baptized at Mission San Fernando and were quickly absorbed by other groups through intermarriage. The last speaker of Tataviam died in 1916 (King and Blackburn 1976).

1.23 Archaeological Background

Archaeologically speaking, more information is available on the Upper Santa Clara River area, although here, too, less is known than for many of the surrounding regions of southern California. In general terms, the prehistory of this inland area appears to parallel that of the Santa Barbara Channel/southern California coastal zone (cf. McIntyre 1990), with William Wallace's (1955)

cultural historical framework appropriate as a chronological system of reference.

Correspondingly, the earliest evidence for human occupation of this region corresponds to Wallace's Early Millingstone Period (or, alternatively, the Early Horizon), dated from about 7000 to 3500 years before present (B.P.). This represents a period during which subsistence and adaptation are said to have emphasized the collecting and processing of hard seeds, with inland artifact assemblages, correspondingly, dominated by mullers and millingstones known as manos and metates. Evidence for an Early Millingstone occupation of the Upper Santa Clara Valley region is, admittedly, limited, and has been found at only two sites. Both of these are located near Vasquez Rocks, with temporal attribution based on the presence of a small number of Olivella barrel beads (McIntyre 1990). Such bead types have subsequently proven unreliable temporal indicators, throwing doubt on human inhabitation of this region before about 4000 years ago. Further, recent excavations at one of these putative early locales, the Escondido Canyon Site, failed to uncover evidence for occupation prior to about 2700 years B.P. (Love 1990). Although it is thus likely that this region was used during the Early Millingstone, problems with site preservation or low population numbers have limited our evidence.

The second temporal unit in Wallace's chronology is the Intermediate Period (or Middle Horizon), dated from 3500 to 800 years B.P. It is marked by a shift to the mortar and pestle, with an increased emphasis on hunting and hunting tools in artifact assemblages. Population appears to have increased during this period, with more temporary camps founded. Evidence for Intermediate Period occupation of the Upper Santa Clara Valley region is substantial, in that it has been found at a number of sites and has been based on radiocarbon, obsidian hydration and typological dating (McIntyre 1990). The Agua Dulce village complex, for example, includes occupation extending back to the Intermediate Period, at which time population of the village may have been 50 or more people (King et al n.d.). Furthermore, the Intermediate Period appears to represent a time during which a substantial exploitation of mid-altitude environments first began, with considerable use, for example, of portions of the nearby Hathaway Ranch (located to northwest of the study area) beginning at this time. It is likely that the movement of Takic peoples into the region may have occurred at this time.

Assuming that the Upper Santa Clara River region was first significantly occupied during the Intermediate Period, as existing evidence now suggests, a parallel can be drawn with the inland Ventura County region, where a similar pattern has been identified (Whitley and Beaudry 1991), as well as possibly the Antelope Valley and western Mojave Desert (Sutton 1988a, 1988b). In all of these areas a major expansion in settlement, the establishment of large site complexes, and an increase in the range of environments exploited, appear to have occurred sometime roughly around 3000 years ago. Although most efforts to explain this expansion have focussed on very local circumstances and events, it is increasingly clear that this was a major southern California-wide occurrence, and therefore that explanation of it must be sought at a larger level of analysis.

There is cultural continuity in the inland regions between the Intermediate Period and subsequent times, labeled the Late Prehistoric Period, lasting from 800 years B.P. to historic contact, at about 200 years B.P. However, despite this continuity there is increasing evidence for important changes of certain kinds. The most significant of these involved population sizes: many Intermediate Period villages were abandoned roughly between AD 1000 and 1200. It is not yet clear whether this reflected a reduction of total population numbers or instead just a redistribution of the existing population into fewer but larger villages. What is clear, however, is that while known Late Prehistoric Period villages are often found at existing springs, the early Intermediate Period sites occur at locations that currently lack water. Moreover, it is clear from paleoenvironmental reconstructions that world climate has experienced a period of drought for the last 800 years. It is highly likely that the onset of this cycle of drought contributed to the changes seen in the Intermediate to Late Prehistoric periods transition.

During the Historic Period, the aboriginal population appears to have dropped even more. This, without doubt, can be attributed to the effects of missionization and its attendant relocation of the aboriginal population to centralized locales, along with the depredations of introduced Old World diseases. The Upper Santa Clara River region appears to be one of those inland zones, like the Antelope Valley to the north, that quickly and completely lost its aboriginal population. In particular, the aboriginal population from the Upper Santa Clara Valley was moved into Mission San Fernando, in the San Fernando Valley, and the area was effectively depopulated.

CHAPTER 2
FIELD METHODS

2.1 Introduction

Phase II archaeological fieldwork at sites CA-LAN-351 and NLF/W&S-1 was intended to establish boundaries as well as the significance of each site, and to thereby provide baseline data from which a determination of the ultimate disposition of these cultural resources could be made.

Procedures followed in the collection of data useful for establishing the nature and significance of the sites included mapping, surface collecting of artifacts lying on the groundsurface, and test excavation of pits and/or auger holes to establish the presence or absence of a subsurface archaeological deposit, as well as to characterize such a deposit if found to be present. Because site conditions and our goals differed slightly for the two sites, we discuss these field methods below, on a site by site basis.

2.2 CA-LAN-351

Circumstances with respect to the management issues and therefore the nature of the fieldwork at CA-LAN-351 were somewhat different than those at NLF/W&S-1, and hence warrant a separate discussion. Prior to our fieldwork, the Newhall Land and Farming Company made the decision to preserve CA-LAN-351, in perpetuity, in open-space. The primary goal of our work at this site therefore was exclusively to define its maximum boundaries, meanwhile minimizing any impacts to the site that otherwise might result from archaeological testing (as required by CEQA). Moreover, because of the setting of the site, boundary definition primarily concerned the southwestern quarter of the site: the northern and northwestern edges of the site are clearly defined by steep slopes leading to the third terrace above the river; the eastern and southern boundaries are defined by the stream bed itself. Definition of the southwestern site boundary was particularly important because of the high likelihood that a bridge will one-day be constructed across the Santa Clara river to the west of the site.

Fieldwork at CA-LAN-351 therefore involved two procedures. The first was an intensive visual examination of the surface artifact distribution on the site. This was completed using crew members walking transects across the site spaced at 2 meter intervals, placing pin flags at the locations of surface artifacts and archaeological specimens. This provided a maximum extent for the surface component, which is invariably larger than any subsurface deposit (due to natural and cultural spreading of artifacts, for example by disking or plowing, or downslope movement). Moreover, because the surface scatter associated with a subsurface deposit is typically twice as large as the buried deposit, this also meant that site boundary definition would result in a

substantial buffer around the midden deposit.

Once the maximum size of the surface component was established, a series of three auger holes were hand-excavated along the identified southwestern site limit, with soils from these auger holes screened through 1/8th inch mesh. This confirmed that no subsurface archaeological deposit was present along this southwestern edge which might extend beyond the defined site limit.

No artifacts or archaeological specimens, thus, were collected from CA-LAN-351.

2.3 NLF/W&S-1

Fieldwork at site NLF/W&S-1 involved surface collecting, mapping and subsurface excavation. In order to determine the maximum areal extent of the site, the initial field procedure was to locate, map and collect all surface remains present on the groundsurface. In order to identify all such remains, the general area of the site was walked by crew-members spaced in approximate two meter intervals. Identified artifacts and archaeological indicators were then marked with flagging tape. Surface remains found within an area of approximately 3 meters-square in size (i.e., within a circle with a one-meter radius) were treated as discrete artifact associations and collected as clusters. Transit, stadia and surveyor's chain were subsequently used to map all remains or clusters of remains, which were numbered and collected by these provenience points.

Fifteen 1x1 m test pits were hand excavated on the site. Excavation units were designated numerically. Each unit was dug with pick, shovel and trowel in arbitrary ten centimeter spits or levels. Spoils from each of these levels was screened through one-eighth inch mesh. All artifacts and archaeological indicators were collected and bagged by unit level. In the initial excavated units, digging was continued for approximately 50 cm beyond the apparent termination of the cultural deposit and/or an auger was excavated in the bottom of the pit, in order to obtain a clear indication of the soils stratigraphy present. Subsequent to stratigraphic definition and profiling, excavation was continued through two culturally sterile levels (i.e., 20 centimeters), or until parent material was encountered.

Mapping on both sites was provided by Psomas Engineering. This not only provided for very accurate measurement of the two site areas, but also allowed for the delineation of the boundaries of CA-LAN-351 for purposes of preservation.

CHAPTER 3
FIELD RESULTS

3.1 Introduction

Using the procedures outlined above, Phase II fieldwork at sites CA-LAN-351 and NLF/W&S/-1 resulted in the collection of a small but interesting quantity of archaeological remains (although, for reasons discussed previously, the recovered remains were restricted to site NLF/W&S/-1). In the next chapter we discuss the recovered archaeological remains from this site in detail, including a summary of the laboratory procedures by which this collection was processed and analyzed, a review of the site assemblage in typological terms, and an outline of certain of the analytical concerns and conclusions the collection allows us to draw. However, prior to considering the artifact collection in specific terms, below we present a summary of the field results in a more general sense, particularly in reference to the size of the surface manifestations of the site, the presence/absence of subsurface remains, the nature of the soils present, and what these features imply about each cultural resource.

3.2 CA-LAN-351

For the reasons discussed previously, fieldwork at CA-LAN-351 did not involve any artifact collection or excavation but instead was directed towards accurate site boundary definition. This was based on three lines of evidence.

(1) Geomorphological constraints, including the river bottom and steep slopes, conclusively define the limits of the site deposit on the north, south and east, as well as along the northwest quarter; that is, natural conditions which limit the size of the two stream terraces establish all but the boundary along the southwestern edge of the site.

(2) Surface artifact distributions were used to identify the maximum extent of the surface artifact scatter. Surface artifact concentrations were highest along the eastern edge of the deposit, which is formed by a bend in the Santa Clara River. Because the site area overall slopes upwards towards the north, reflecting the fact that it extends across two stream terraces, the eastern site limit represents a cut-bank that is increasingly high towards the north. (Indeed, at the site's northeastern limit this is essentially a cliff-brow.) Surface artifact distribution was continuous across the two lower stream terraces but, on average, did not exceed more than one artifact per meter square, and thinned laterally towards the south and southwest. The maximum southwestern extent of surficial remains – waste flakes – was essentially immediately beyond (and west of) the lowest stream terrace, in the sandy stream bottom (and flood zone).

(3) Auger testing occurred along the southwestern site boundary, as defined by the

surface artifact distribution, to ensure that the subsurface deposit did not extend to this limit. This supposition was proven correct by the auger results, which lacked any evidence of subsurface archaeological remains at the limits of the surface finds.

Using these procedures the site area was defined as a maximum of 215 m NE-SW by 92 m SE-NW. The site area is generally ovoid, and is thus less than 19,780 meters square in size.

Note that, because of the planned preservation of this site, there was no justification for subsurface testing given CEQA's requirement for minimizing adverse effects during environmental evaluations; that is, because archaeological testing is itself inherently destructive. Although we thus did not estimate the size of the subsurface deposit, it is clear that it is substantially smaller than the size of the surface component provided above.

3.3 Site NLF/W&S-1

As noted above, fieldwork at site NLF/W&S-1 involved surface collecting and the excavation of 15 1x1 m pits (Figure 4). In both cases slightly complex and unusual geomorphological conditions at the site were important influences on the field results.

In summary form, the third terrace above the river consists of a large open area that appears relatively flat but, in fact, contains a minor, internally draining central depression. The site area had been disked and graded in some areas, and (unsuccessful) efforts appear to have been made to remove the boulders and cobbles from portions of the surface soil – as evidenced by a large boulder pile to the north of the site. Furthermore, the southern site edge, along the brow of the terrace, appears to have been graded and lowered, suggesting that the internally draining central depression was once more significant than it currently appears; alternatively, this edge may have been reduced by wind but, regardless of cause, the result is a slight lag deposit of coarser clasts and cobbles – a condition with archaeological implications, discussed below. (A dirt road also skirts the southern terrace edge, further contributing to disturbance in this area).

We discuss the excavation and surface collecting in turn below.

3.31 Test excavations at Site NLF/W&S-1

Soils on the site were essentially uniform. Figure 5 is a profile for the most deeply excavated pit, Unit #4. Descriptions of the soil horizons are as follows:

A Horizon: This is a loose, structureless silty loam that ranges from about 30 to 50 cm depth. It is Munsell 10 YR 4/3 (Brown), and it is disturbed by grading, disking and rodents across the entirety of the site area, with rodent disturbance constituting about 30% of the horizon

by volume. The A Horizon appears almost aeolian or loess-like. The plow pan extends to about 25 cm depth. The contact between A and the lower B Horizon is gradual. The A Horizon is artifact bearing in portions of the tested area.

B Horizon: This is clayey loam with 1 - 3 cm blocky angular peds. Its thickness ranges from 20 to 90 cm and it appears to be intact, with no evidence for disturbance of any kind. (For example, in addition to the absence of krotovinas, all recovered modern intrusive materials were obtained above the B Horizon.) The color of this paleosol varies slightly, including the following Munsell designations: 10 YR 4/3 (Brown); 7.5 YR 5/4 (Brown); and 7.5 YR 4/4 (Dark Brown). Portions of the B Horizon are artifact bearing.

C Horizon: The parent material is a Pleistocene unit of alluvial cobbles, gravel and sand which has received significant secondary clay enrichment from the B Horizon (as a Holocene imprint). It is Munsell 7.5 YR 4/4 (Dark Brown). The C Horizon is culturally sterile.

Using these soil descriptions for reference, the excavation unit results can be summarized as follows:

Unit #1: This was dug to 40 cm depth; B Horizon was encountered at 30 cm. A Horizon contained 3 pieces of debitage; 1 piece was also recovered from the top of the B Horizon.

Unit #2: Excavated to sterile alluvium at 70 cm depth. A Horizon, from 0 - 30 cm depth, contained 9 pieces of debitage and 1 worked artifact. B Horizon, 30 - 70 cm, contained 19 pieces of debitage and 6 worked artifacts.

Unit #3: Excavated to 40 cm, with B Horizon encountered at 30 cm. Two pieces of debitage recovered from A Horizon; otherwise unit was sterile.

Unit #4: This unit was hand excavated to 100 cm and an auger was then excavated in the pit bottom to 140 cm. This pit location represents the approximate bottom or low point of the central depression. A Horizon extended to 50 cm depth and contained 39 pieces of debitage and 1 worked artifact. B Horizon extended to 140 cm depth, where alluvium was encountered, but artifacts were restricted to 90 cm depth. These consisted of 21 pieces of debitage, 2 worked artifacts and 1 piece of animal bone.

Unit #5: Excavated to 40 cm depth. A Horizon extended to 30 cm and contained 3 pieces of debitage and 1 worked artifact; B Horizon was culturally sterile.

Unit #6: Dug to 30 cm depth (limit of A Horizon). One piece of debitage recovered above 20 cm.

Unit #7: Excavated to 50 cm depth; B Horizon encountered at 30 cm. Five pieces of debitage recovered from A Horizon; B Horizon was sterile.

Unit #8: This pit was taken to 80 cm depth, where Pleistocene alluvium was encountered. B Horizon present from 40 to 80 cm. A Horizon contained 19 pieces of debitage and 2 worked artifacts; B Horizon had 4 pieces of debitage.

Unit #9: Dug to the top of the B Horizon at 30 cm depth. A Horizon had 3 pieces of debitage above 20 cm.

Unit #10: Sterile alluvium encountered at only 40 cm depth and B Horizon present from 30 - 40 cm. Cultural remains limited to 1 piece of debitage in A Horizon, from 0 - 30 cm depth.

Unit #11: This was dug to alluvium, encountered at 60 cm depth. A Horizon extended to 30 cm depth and contained 7 pieces of debitage. B Horizon, from 30 - 60 cm depth, also had 7 pieces of debitage.

Unit #12: Excavated to the top of the B Horizon at 30 cm depth; only 1 piece of debitage encountered from 0 - 30 cm.

Unit #13: Dug to sterile Pleistocene alluvium at 110 cm. A Horizon, from 0 - 50 cm, contained 23 pieces of debitage. B Horizon, from 50 - 110 cm, contained 19 pieces of debitage and 2 animal bones.

Unit #14: This pit was culturally sterile and was dug to the top of the B Horizon at 30 cm depth.

Unit #15: Sterile alluvium encountered at 50 cm depth. A Horizon, from 0 - 30 cm depth, had 10 pieces of debitage. B Horizon, from 30 - 50 cm, contained 8 pieces of debitage.

These excavation results suggest the following. First, soils have accumulated in the central portion of the defined site area (Figure 4), which is essentially a slight depression. Unit #4 is the approximate low point for this depression and the depth of the ancient, culturally sterile Pleistocene alluvium at this spot is the greatest (140 cm below modern groundsurface), as is the thickness of the A (50 cm) and B (90 cm) Horizons. Depth of alluvium and thickness of the A and B Horizons reduce outward from this point, towards the edges of the depression. This is seen most dramatically towards the north where at Unit #10, for example, the alluvium is only 40 cm deep and the B Horizon is only 10 cm thick.

Second, a low density subsurface archaeological deposit is contained within portions of the A and

B Horizons of some of the units. This is best illustrated by Units #2, 4, 11, 13 and 15, although some of the additional pits have traces of subsurface archaeological remains, or remains restricted exclusively to the upper A Horizon alone.

Third, the vertical distribution of the recovered artifacts (which, like most sites, are heavily predominated by lithic debitage or waste flakes) suggests that use of the site as represented by A Horizon materials reflects a continuation of the same areal use seen in the B Horizon; that is, the same units tend to have significant numbers of artifacts in both the A and B Horizons. This prehistoric use centered around Unit #4, and thus the center of the depression.

Fourth, overall site area can be estimated at 210 m E-W by 135 m N-S. The site area is irregular in shape, partly because the eastern and southern boundaries are formed by the terrace edges, but overall site size can be estimated at about 28,350 meters square.

3.32 Surface Collecting at Site NLF/W&S-1

The distribution of surface artifacts (formal tools) was found to correspond to a disturbed band along the southern edge of the site and the terrace that contains it. A total of 26 specimens were recovered during this procedure, almost all of which are groundstone artifacts. Because of the context of recovered artifacts – on the surface in a disturbed area – the interpretation of them is ambiguous. They may represent a "true" surface scatter that is younger than the subsurface deposit; alternatively, they may represent a lag deposit derived from the underlying, deflated cultural deposit. In either case their restricted distribution may reflect a kind of specialized activity zone within the larger site area: as is discussed subsequently, groundstone artifacts recovered from the subsurface deposit also tend to concentrate in this same area, suggesting that the terrace rim – where prevailing winds would optimize seed winnowing – served as the locus for plant processing.

CHAPTER 4
ARTIFACT ASSEMBLAGE AND ANALYTICAL CONCERNS

4.0 Introduction

Although the general patterns of artifact distributions, enumerated in the previous chapter, provide important information relative to the size and nature of site NLF/W&S-1, proper determination of the significance and scientific importance of this resource can only be obtained with a more intensive analysis of the recovered artifact assemblage. Accordingly, in this chapter we consider the assemblage in some analytical detail, and what it implies about the site as well as aspects of the prehistory of the region. We begin by detailing the laboratory procedures followed in the processing and curation of the recovered remains. Subsequently we outline the taxonomic system employed to categorize and classify the artifact collection. This is followed by a typological summary of the artifacts and archaeological indicators recovered from the site, and an interpretation of its age and function.

4.1 Laboratory Procedures

Following the completion of the Phase II fieldwork at NLF/W&S-1, the recovered artifact assemblage was taken to the W & S Consultants' laboratory for washing, processing and analysis. (Note that no artifact collection was obtained at CA-LAN-351, for reasons discussed previously, and thus this site is not considered in this chapter). After each specimen was washed and labeled, metrical and typological analyses were performed. We provide measurements and weights for the various artifacts and archaeological indicators in the site catalogs (Table 1) and artifact class tables (Tables 2 and 3) included in this report. In order to facilitate typological comparisons between this site and others from this same region, we have employed a standardized taxonomic system. We describe this classificatory system in some detail below.

4.12 Taxonomic and Analytical Considerations

In considering the artifacts recovered from the Phase II investigations at site NLF/W&S-1, we employ a morphological stone tool typology first published by Whitley et al (1979) and now widely used in the region. This affords a number of advantages. First, because of its widespread use (e.g., Johnson 1979; W & S Consultants 1984, 1989a, 1989b) it permits easy comparability between existing studies. Second, because it is morphologically rather than functionally based, it provides greater objectivity in taxonomic assignments. Specifically, it avoids the dangers inherent in inferring dubious functional purposes for stone tools that may have had multiple uses, and that often exhibit little in the way of formal attributes. In the inland southern California region, in particular, it is increasingly clear that most sites are characterized by expedient or casual tool

assemblages, probably reflecting the fact that the sites resulted from dispersal phase activities that little emphasized formal patterns of behavior (W & S Consultants 1989b). Thus, a typology based on the elucidation of tool manufacturing stages, rather than one assuming final function of the implements, stands less chance of leading interpretations astray. However, this is not to imply that functional interpretations are unwarranted or undesired. Such is not the case; instead, it is simply to emphasize that functional interpretations must be made somewhat independent of - and therefore including other lines of evidence from - the typological assignments alone.

The morphological typology employed here is based on four major categories of stone artifacts (cf. Whitley et al 1979). These are: (i) groundstone implements; (ii) core/cobble tools; (iii) flaked stone tools; and (iv) tool manufacturing waste, or debitage. Groundstone implements are tools that have been pecked and/or ground into shape. They include manos (or mullers) and metates (or basal grinding slabs), along with mortars, pestles, basket hopper mortars, stone bowls and comals (or griddles). Although there is a general association between groundstone artifacts and plant grinding, pulping and processing, as in the case of manos, metates, mortars and pestles, this is not invariably so: stone bowls and comals, for example, had other uses, with certain kinds of bowls, in particular, sometimes reserved for ceremonial purposes.

Groundstone artifacts are usually (but not invariably) made of coarsely grained lithic materials. Metates, for example, are often made from sandstone or grano-diorite; bowls and comals are typically manufactured from steatite (soapstone or talc schist). In the Santa Clara River drainage, Sierra Pelona schist is a particularly common material for flat slab or shallow basin metates, and this is not steatite-grade talc schist. Manos, however, were often derived directly from river cobbles of appropriate size, so that quartzite is a common material source, as are sandstone and granodiorite.

Core/cobble tools are generally large, bulky implements made by the re-use and/or modification of a river cobbles and lithic cores. They include 'hammerstones', 'choppers' and 'scraper planes'. Hammerstones are usually unshaped or minimally shaped, roughly fist-sized, stones that exhibit characteristic battering and pounding scars, but often otherwise lack modification. Choppers are cobbles or cores that have been unifacially or bifacially flaked to create a relatively sharp edge. Scraper planes are high-backed, unifacially flaked tools that are usually 'biscuit-shaped' in plan, with edge angles near perpendicular, and with heavy use-scars along their convex face.

All of these tools were apparently employed for heavy pounding, scraping and/or battering tasks. There is a frequent association of core/cobble tools with groundstone artifacts (specifically manos and metates) in the nearby Conejo Corridor region (Whitley 1979b), suggesting that the two categories may have been functionally related; that is, that core/cobble tools may have served as part of a plant acquisition and processing toolkit. This is supported in reference to the scraper planes, in particular, which are argued to represent special yucca processing tools (Kowta 1969; Salls 1985). Further, this suggests in turn that the core/cobble tools were part of a woman's plant

gathering toolkit (W & S Consultants 1989b).

Flaked or chipped stone tools are secondary reductions from cores and cobbles. That is, they represent tools manufactured from flakes struck-off the primary sources of lithic materials. These flakes may be used without modification as 'utilized flakes'; they may be bifacially flaked; or they may be unifacially flaked. It is apparent that the majority of the flaked or chipped stone tools in the region are either utilized flakes with no modification, or have edges that have been flaked unifacially or bifacially, but exhibit little or no effort for further edge modification or shape regularization (W & S Consultants 1989b). Again, this further emphasizes the casual or expedient nature of these tools, and also implies that they may have been used for a variety of tasks with little functional specialization.

Correspondingly, the majority of the chipped stone tools from this region are what we have defined as biface or uniface 'edges', and they may have been used for any number of general cutting, scraping and abrading tasks. Of course, occasional projectile points and drills represent special types of bifaces with specific and known functions, whereas biface 'knives' (large leaf or knife-shaped tools) are presumed to have been used for cutting and piercing/stabbing tasks.

Generally, chipped stone tools were made from material with particular flaking characteristics; specifically, those subject to conchoidal fracture. Crypto-crystallates such as chert, chalcedony and jasper, therefore, are common raw materials, but fused shale, quartzite, cherty-siltstone, rhyolite, andesite, basalt and occasionally obsidian may also be present in a collection. Because small hand specimens of rhyolite, andesite and basalt are, in fact, only distinguishable with petrographic analysis, we treat them all as "fine-grained volcanics". And, as we have recently discovered (W & S Consultants 1991b), "fused sandstone", resulting from contact metamorphism between Miocene Conejo Volcanics and sedimentary beds, was also a lithic material of common use in the region. Because of its similarities to fused shale (based, of course, on similar metamorphic origins), it has often been mistaken for this latter material. This would be inconsequential, save for the assumption that the putative fused shale has its sole origins in Grimes and Happy Camp Canyons, north of Moorpark along the southern edge of the Santa Clara River Valley. Instead, it is apparent that a number of fused sandstone quarries are present in the nearby Conejo Corridor; that their respective lithic materials are widely mis-recognized as fused shale; and that, therefore, lithic exploitation was probably much more widely ranging than the often inferred simple exploitation of major quarries at Grimes Canyon might suggest (W & S Consultants 1991b).

The final category of stone artifacts is what can be considered lithic waste or debitage. It includes spent cores, waste flakes, and angular shatter. There are a number of different kinds of cores and flakes, and the presence of these varieties at a site tends to signify different types of tool reduction or manufacturing techniques. For example, the presence of large numbers of secondary and tertiary flakes usually indicates that chipped stone tool manufacture occurred at a locale,

whereas primary flakes alone might be associated with the making of the cruder chipped stone tools, or might be expected at quarries where only the preliminary stages of tool manufacturing were conducted. Similarly, relatively large proportions of tertiary flakes correlate with habitation/campsites, in that tool maintenance and finishing occurred at these locales. Furthermore, because different lithic materials tend to correlate with different categories of tools, the material present in the debitage collection can also be a clue to a site's function. Quartzite and other 'crude' lithic materials, for example, are often found where core/cobble tools are manufactured, whereas crypto-crystallates tend to occur where chipped stone tools are manufactured. And, in a general way, there is an association between these last materials, chipped stone artifacts, and habitation sites (W & S Consultants 1989c).

In addition to the lithic tool typology, other classes of artifacts may be present at southern California sites. Dietary remains, in the form of shellfish and faunal bones, are sometimes present, as are ornaments, usually in the form of shell beads. Faunal remains, in particular, entail a series of analytical problems and issues, however, and therefore warrant some discussion. The most important analytical concern is the taphonomic history of the collection. That is, because bones may occur naturally in the subsoil – especially bones of small mammals such as pocket gophers and ground squirrels that commonly reside and die in burrows – it is not always a straightforward process to determine which specimens in a faunal collection are truly archaeological and which are present as the result of normal animal activities. This problem is compounded by the fact that certain of these same burrowing animals may have been employed as parts of the prehistoric aboriginal diet. Furthermore, domestic dogs and wild coyotes may take or leave bones on sites, while large mammals can die on them after their prehistoric occupation. And, in the case of caves and rockshelters, a very wide range of animals may have lived and died in these sheltered habitats, or have been dropped there by other non-human predators.

Because of these confounding factors we have developed a series of short and general guidelines to aid in determining which specimens are most likely 'cultural', in the sense of having resulted from aboriginal behavior, and which bones are most probably unrelated to the archaeological remains and therefore only within the archaeological deposit due to serendipitous circumstances. In terms of positively determining that a given bone was brought onto a site by human agency we consider the following as useful criteria: (i) butchering and cutting marks; (ii) evidence of burning and charring; (iii) knowledge of the habits of a given species, indicating a low probability of its remains being naturally interred in a particular type of deposit; and (iv) ethnographic information concerning the diet and butchering habits of local aboriginal groups. Information counting against the inclusion of a given bone in a reconstruction of prehistoric diet includes: (a) knowledge concerning the behavior of a given species, indicating a high likelihood of natural deposition in the type of deposit in question; (b) 'freshness' of the bone; (c) absence of butchering marks and burning, or the presence of modern saw-cut marks; and (d) ethnographic data discounting the use of that species by local groups.

Thus, a cut long bone of a deer or a charred rabbit femur both would be considered most probably as 'cultural' specimens, and of course any marine mammal or fish bones could only have been deposited in an archaeological deposit by human activities. By contrast, pocket gopher and ground squirrel bones would be considered with suspicion if derived from an open-air deposit, particularly if they lacked any evidence of butchering or charring.

A second important issue concerns species identification; specifically the problems that complicate it. As is typical of the sites in the region (cf. Reynolds 1978), the large majority of archaeological faunal collections are composed of very small fragments, resulting from a heavy processing of the bones (probably by breaking and smashing) to extract the marrow. The result are faunal collections that are very difficult, if not essentially impossible, to speciate, especially since there are few articulations upon which to base a positive species identification. Consequently, we typically organize faunal specimens into a series of size categories that provide some idea of the probable species (or range of species) from which they were derived. Except in cases in which the bone is so fragmentary so as to preclude any categorization whatsoever, unspeciated bone is assigned to an appropriate size grouping; where possible, the skeletal element is also identified as well. The size categories, with the range of species potentially observable in southern California sites along with certain of their live weights (cf. Reynolds 1978), are as follows:

Small mammal:
Pocket gopher (2.5 - 8.8 ozs)
Kangaroo rat (1.6 - 2.7 ozs)
Harvest mouse (0.3 - 0.6 ozs)
Dusky-footed woodrat (8 - 13.75 ozs)
Meadow mouse (1.5 - 3.5 ozs)
Audobon cottontail (912 gms)
Brush rabbit (1.25 - 1.8 lbs)
Ground squirrel (0.2 - 0.5 lbs)
Western grey squirrel (average = 1.75 lbs)

Medium mammal:
Black-tailed hare (4.4 - 6.1 lbs)
Grey fox (7 - 13 lbs)
Coyote (20 - 50 lbs)
Domestic dog
Racoon (1.8 - 22.2 kg)
Badger (3.6 - 10 kg)
Striped skunk (6 - 14 lbs)
Bobcat (15 - 35 lbs)

Large mammal:
Mule deer (125 - 200 lbs)
Guadalupe fur seal (50 - 100 lbs)
California sea lion (males to 600 lbs, females to 400 lbs)
Grey wolf (60 - 100 lbs)
Horse Domestic sheep Domestic cow

Finally, we are careful to recover, process and catalog all modern or contemporary 'artifacts' recovered during excavations. Such items are important not for any intrinsic reasons, but instead because they provide a clear sign of soil disturbance, typically within the last 100 years.

4.3 Artifact Assemblage: NLF/W&S-1

The artifacts from NLF/W&S-1 are summarized in Table 1. A total of 238 prehistoric specimens was recovered from the site. Twenty-six of these were collected from the site surface. Of the remainder, 125 originated in the A Horizon deposit while 87 were excavated from the B Horizon. All but two of the prehistoric specimens were lithic tools or debitage. The two exceptions are pieces of animal bone. We discuss the artifact assemblage below, in terms of major artifact classes.

4.31 Groundstone artifacts

A total of 28 pieces of groundstone was recovered from NLF/W&S-1 (Table 2). Nineteen of these are manos or mano fragments (Figure 6); eight are metate or metate fragments (Figure 7); one appears to be the base of a basket-hopper mortar (Figure 6). The manos consist of three general types: unshaped unifaces, and shaped and unshaped bifaces (see Whitley et al. 1979).

By far the most common mano type is the shaped biface, which alone contributed 11 of the 19 handstone specimens (~58%). Nine of these correspond to Type 4A, which have domed grinding surfaces and pecked edges (ibid:43). The remaining two are Type 4B, which have parallel grinding surfaces.

Five of the manos (~26%) are Type 3A specimens; that is, unshaped bifaces with domed opposing surfaces. Two manos are type 1, unshaped unifaces, and one mano fragment is untypeable.

The majority (11 or ~58%) of the manos are made of locally available grano-diorite (found in the

cobble alluvial deposits along the Santa Clara River). Quartzite is the next most common material with 4 examples (21%). Two manos apiece are made of sandstone and fine-grained volcanics (10.5% each).

A possible basket-hopper mortar was recovered from the surface of the site (Figure 6, left). This consists essentially of a shaped biface mano (Type 4B) that has one grinding surface that is rimmed with an asphaltum stain; asphaltum is also present on the observe side, and seems in fact to cover it, although this is more diffuse. (Alternatively, this may be fire blackening.) The side with the clear rim of asphaltum (shown in the figure) has a series of small central peck marks, suggesting that it was pounded with a pestle. But it lacks the clear central depression that commonly characterizes hopper mortars, and in fact these kinds of pecking marks could have resulted simply from efforts to roughen the grinding surface, to make it more effective as a grinding tool. The functional identification of this implement, hence, must remain provisional.

Eight metate fragments were found at the site. The large majority (6 or 75%) of these were small and untypeable fragments of these basal grinding stones. The two typeable fragments are both Type 2 shallow basin metates (Whitley et al. 1979:33). Grano-diorite is, again, the most common lithic material (4 or 50%), but two examples (25%) are Sierra Pelona schist, with one each (12.5%) of sandstone and quartzite. Sierra Pelona schist is available in the Sierra Pelona, north of the Agua Dulce region, within the upper Santa Clara River drainage.

4.32 Core/cobble complex tools

Seven core/cobble complex tools were found at NLF/W&S-1 (Table 2). Four of these are worked artifacts, per se; the remainder are cores and, thus, strictly are a kind of debitage. Three of the four worked artifacts are hammerstones (Figure 8). All of these are Type 1 unmodified cobble hammerstones (ibid:15). All of the hammerstones are made of quartz. While quartz is the most common mineral on earth, and is locally available in cobble form in many sedimentary deposits, it is somewhat unusual as a tool stone on local archaeological sites. The relatively high proportion of quartz in the core/cobble complex assemblage, however, is matched by its importance in the debitage collection (below).

The other worked tool in the core/cobble complex assemblage is a Type 2 cobble scraper plane (ibid:19). This is made of jasper, which is a common crypto-crystallate in the nearby Mojave Desert. As noted above, scraper planes appear to have been used for pulping purposes, most likely of agave.

The cores are all Type 1 multiplatform cores (ibid:24), and thus show no evidence of systematic lithic reduction. One is chert and the other two are fine-grained volcanic. The larger of these last two specimens is, in fact, a melon-sized piece of basalt that has had just a few flakes removed

from it at different spots. As is then clear, lithic reduction was somewhat unsystematic on the site, at least with respect to the primary stage of stone flaking.

4.33 Flaked stone tools

Only two flaked stone tools were recovered from NLF/W&S-1 (Table 1). These consisted of a large and crude uniface "edge;" that is, a primary flake that has experienced a minor amount of unifacial retouch along one edge but is otherwise unshaped. Befitting its large and crude characteristics, this artifact is made of a fine-grained volcanic material.

The second flaked stone tool is a finely flaked biface mid-section (Figure 9). It is made of greenish chert; insofar as we can judge qualitatively, this appears to be tabular Temblor chert that is common to the southern San Joaquin Valley and Carrizo Plain region, rather than Monterey or Franciscan cherts which, otherwise, are more typical in this region.

Bifacially-flaked tool mid-sections (and terminal ends) may derive from knives, in the general sense of the term, projectile points, or drills, while projectile points may be either arrow points or spear/atlatl dart points. Although there are potential overlaps on the dimensions of many of these different types of bifacial tools, as a general rule spear and atlatl points are substantially more robust than arrow points or drills, and they are thicker in cross-section relative to width than knives. (In this portion of southern California knives are typically wide and flat or thin.) Although the assessment is again somewhat qualitative, based on our experience in the region this particular specimen appears to represent a spear or atlatl point, not a knife fragment, and it is clearly neither a drill of arrow fragment. As such, it is then greater than 1500 years old (the point at which the bow and arrows were introduced), although how much older than this datum is unknown.

4.34 Lithic debitage

Waste flakes, per se, are summarized in Table 3. With respect to the total of 236 lithic artifacts recovered from the site (i.e., excluding the 2 pieces of animal bone), the 199 waste flakes and shatter constituted 84% of the lithic assemblage. In fact, this is a relatively low percentage for debitage; a circumstance that is no doubt caused by the large proportion of groundstone and core/cobble complex that were surface collected on the site, and which may pertain to a separate component of the site. A more reliable assessment, accordingly, may be obtained by considering the excavated sample alone (from which all of the debitage was recovered). In this case the excavated debitage constitutes essentially 95% of the total lithics – a figure that is more typical for sites in the region.

When the debitage is classified, angular shatter proves to be the most common waste type, with 100 examples or 50% of the waste stone. This is followed by tertiary flakes, 51 or 26%, secondary flakes, 32 or 16%, and finally primary flakes, 16 or 8%. A preponderance of secondary and especially tertiary flakes is characteristic of habitation sites in the region. Typically, high relative numbers of primary flakes correlate with significant quantities of angular shatter (and cores), and this signifies primary lithic reduction which commonly occurs at quarry workshops, located at or near lithic sources, rather than camps. Site NLF/W&S-1 is somewhat unusual in this regard, having very few primary flakes but a high proportion of angular shatter.

The cause for the relatively large quantity of shatter is explained by the lithic materials themselves. Chert is the most common lithic material in the debitage, with 90 examples or 45%. This is followed by fine-grained volcanics, with 42 or 21%. But quartz is a very close third, with 41 examples or ~21% too. Quartz is useable for stone tools, but it flakes very poorly and is difficult to work. Work with quartz thus will yield high quantities of shatter. A total of 35 examples of quartz angular shatter was recovered from this site; this alone is almost 18% of the debitage total. Angular shatter, in other words, appears to be particularly common in the debitage assemblage because of the kind of lithics being used rather than just because of the lithic reduction activities being followed.

In addition to these three primary lithic sources, five other materials are also included. There are 13 jasper flakes, or ~6.5%, two quartzite flakes for ~4.5%, two fused shale flakes, 1%, and one each of siliceous sandstone and obsidian.

The obsidian is particularly notable, for two reasons. First, the closest obsidian source is the Coso Range near Death Valley in eastern California, roughly 125 miles northeast of the site. Additional desert lithics are present at the site in the form of jasper and, most likely, some of the fine-grained volcanics. While only one small obsidian flake was recovered, the important contrast is the fact that only two fused shale flakes were found. The closest source of fused shale is at the mouth of Grimes Canyon, near Fillmore, only about 25 miles west and downstream of the site; i.e., one-fifth the distance to Coso. In light of the relative proximity of this fused shale source, the quantity of desert lithics appear to stand-out. That is, trade (or at least the acquisition of resources at distance) appears to have favored the east rather than west.

This last conclusion is supported by some negative evidence from the site. While negative archaeological evidence can be difficult to interpret – e.g., because it can result from differential preservational factors rather than by human behavior – it is nonetheless worth noting that NLF/W&S-1 lacked any evidence of western trade (or direct seashore exploitation) in the form of shellfish, fish bone, marine mammal bone or shell ornaments, all of which are common at many inland southern California sites. Provisionally, then, we can suggest that the inhabitants of the site were more closely allied with groups to the east and perhaps north than to the west.

Second, obsidian can be dated by hydration analysis and sourced with XRF. The sample from the site has been submitted to the Northwest Research Obsidian Studies Laboratory in Corvallis, OR, for dating and sourcing, although the results are not yet available for this report.

4.35 Faunal remains

Two small pieces of animal bone were recovered from the site (Table 1), in both cases from the B Horizon. Both examples are small mammal in size and derive from shaft fragments. Both are also burnt and calcined, supporting their origin as cultural rather than natural in the deposit.

The presence of these two specimens suggests that bone preservation can occur within the site soil and thus that the negative evidence – the truly limited amount of faunal remains – is reflective of dietary patterns at this location. That is, this suggests that plant foods rather than hunted game were by far the emphasis in subsistence at NLF/W&S-1. This conclusion is also supported by the presence of groundstone and core/cobble complex tools, which often reflect plant processing activities.

4.4 Age and Function of NLF/W&S-1

Pending receipt of the obsidian hydration dating results, two kinds of information provide evidence concerning the age of NLF/W&S-1. The first of these is the artifact assemblage itself. Three of the recovered artifacts are temporally diagnostic, at least in very general terms. Obsidian is the first of these. Although hydration dating will test this inference, almost all obsidian from this portion of southern California dates before about AD 1200, at which point the desert to inland obsidian trade essentially terminated. The presence of obsidian on the site therefore suggests that it is Intermediate Period or older in age.

The second diagnostic artifact is the possible basket-hopper mortar base, which was found on the site surface. Artifacts of this type occur in Intermediate Period and later contexts, and thus are less than about 3500 years old. Combined with the obsidian, this brackets the site between 3500 and 800 YBP.

Two caveats, however, need to be noted about this age assignment. First, the identification of the specimen at the site as a hopper mortar is provisional inasmuch as it does not have all of the attributes typical of this artifact type. Second, and assuming that the artifact identification is correct, the chronological relationship between the surface assemblage and the subsurface deposit is still somewhat uncertain. The surface artifacts, including this specimen, were found in a restricted and disturbed area. This may reflect locational task specialization on the site; alternatively the surface component may be later dating than the subsurface deposit, potentially

quite significantly. Note however that the horizontal distribution of groundstone and core/cobble complex tools recovered during excavation tends to follow the same pattern as the surface concentration, with the majority found in Unit #2 nearest to the terrace edge. There is thus reason to infer that the surface component and subsurface components are functionally and probably temporally related.

The third temporal diagnostic is the projectile point, which is clearly a spear or atlatl dart fragment rather than the remnants of an arrow point. This indicates that the specimen is greater than about 1500 years B.P., although how much greater in age is unknown. We may thus provide a minimal age bracket for NLF/W&S-1 between 3500 and 1500 YBP, which is the Intermediate Period. Note that this is a minimum estimate for the site age; it could contain artifacts that are both younger and older than this 2000 years stretch.

Note that in addition to these positive lines of evidence within the artifact assemblage, there is also negative evidence in support of this age estimate. This concerns the absence of later dating artifacts, especially arrow points and shell beads.

The second type of information useful for dating the site is the soils context of the subsurface component. As described above, the artifacts extended into an undisturbed B Horizon or paleosol. Soils such as this are formed in wetter climates than we are experiencing today and they are most common in contexts that are 3000 or more years in age, thus dating from the middle Holocene (or earlier).

Based on these different lines of evidence, the age of site NLF/W&S-1 can be inferred minimally to pertain to the middle Holocene. Assuming that the identification of the hopper mortar is correct, it extends into the last 3500 years and thus is all or at least partly Intermediate Period in age. Whether it extends back into Early Millingstone times is unknown although the nature of the soils suggests that this is possible.

That is, we hypothesize that the site is terminal Early Millingstone/early Intermediate Period in age. Assuming this is correct, it then appears contemporaneous with site CA-LAN-2233, located at Chiquito Canyon roughly 10 miles downstream from NLF/W&S-1. The early component of CA-LAN-2233 is argued to date from 4000 - 3000 YBP (Waugh 1999), and this appears to represent the initial occupation of the region.

Functionally, site NLF/W&S-1 is best interpreted as a small campsite. This is indicated by the diversity of artifact types, which includes hunting tools (projectile point) and evidence of lithic reduction (cores, debitage and hammerstones), in addition to plant processing artifacts (groundstone, scraper plane). Plant foods, however, were clearly the subsistence emphasis. Judging from the preponderance of manos and metates (as opposed to mortars and pestles), hard seeds as opposed to acorns appear to have been the focus of the prehistoric diet at the site.

Given its size and the relatively low subsurface density of artifacts, site NLF/W&S-1 appears to have been occupied by a small group of individuals (perhaps a single extended family), sporadically for a long period. Logically, the site would have been used seasonally as a dispersal phase camp. This last conclusion is supported by the negative archaeological evidence at the site, which includes the absence of features like housepits, hearths and burials, as well as more formal types of tools, including shell beads and ornaments. NLF/W&S-1, then, is likely one seasonal component of the early prehistoric settlement system for the upper Santa Clara River drainage.

CHAPTER 5
CONCLUSIONS AND RECOMMENDATIONS

5.1 Summary and Conclusions

Phase II archaeological studies were conducted at two prehistoric archaeological sites, designated CA-LAN-351 and NLF/W&S-1, within the River Park project area, northern Los Angeles County, California. This Phase II fieldwork involved mapping, the surface collecting of groundsurface artifacts and archaeological indicators, and the hand excavation of test pits on site NLF/W&S-1, along with laboratory processing, cataloging and analyses of the recovered artifact collection. Because CA-LAN-351 was already designated for in-situ preservation, fieldwork at it was limited to boundary definition.

CA-LAN-351 was found to cover two low terraces along the north side of the Santa Clara River. Site area is 215 m NE-SW by 92 m SE-NW, and thus totals about 19,780 meters square in size.

Site NLF/W&S-1 was found to be a small, low density campsite localized on the third terrace above the river. The site area was determined to be 210 m E-W by 135 m N-S, or about 28,350 meters square, and the site includes a low density subsurface deposit that averages about 50 cm in depth. Based on the recovered artifact assemblage, the site appears to represent a terminal Early Millingstone/early Intermediate Period settlement dating from circa 4000 to 2000 YBP. It further appears to have been seasonally occupied by a small group of people, whose subsistence practices emphasized plant foods, probably hard seeds.

5.2 Final recommendations for CA-LAN-351

CA-LAN-351 contains a subsurface archaeological deposit and intact prehistoric artifacts that can contribute to the scientific reconstruction of prehistoric lifeways in the Santa Clara River Valley. Development at this locale has the potential to result in adverse impacts to cultural resources. Following the California Environmental Quality Act (CEQA), therefore, we recommend that any such adverse impacts to this site be mitigated by avoidance and preservation. Should preservation of this site be unfeasible, however, we recommend that a Phase III data recovery (salvage excavation) project be completed at CA-LAN-351, to collect and preserve the scientific information contained therein.

5.3 Final recommendations for site NLF/W&S-1 CA-LAN-3043

Archaeological site NLF/W&S-1 contains an intact subsurface deposit and artifacts which hold the potential for contributing to our understanding of the prehistory of this portion of California.

Construction or development on this site therefore has the potential to result in adverse impacts to significant cultural resources. We recommend that any such adverse impacts be mitigated by avoidance and preservation. Should this be unfeasible, we recommend that a Phase III data recovery (salvage excavation) be conducted on the site.

6.0
CITED REFERENCES

Earle, D.

1990 New Evidence on the Political Geography of the Antelope Valley and the Western Mojave Desert at Spanish Contact. In B. Love and W.H. DeWitt, eds., Archaeology and Ethnohistory of the Antelope Valley and Vicinity, Antelope Valley Archaeological Society, Occasional Papers No. 2, pp. 87-104.

Eberhart, H.

1961 The Cogged Stones of Southern California. American Antiquity 26:361-370.

Elsasser, A.B. and R.F. Heizer

1963 The Archaeology of Bowers Cave, Los Angeles County, California. University of California, Archaeological Survey, Reports, No. 59. Berkeley.

Glassow, M.A.

1965 The Conejo Rockshelter: An Inland Chumash Site in Ventura County. Archaeological Survey, Annual Report 7:19-80. UCLA.

Heizer, R.F. and E.M. Lemert

1947 Observations on Archaeological Sites in Topanga Canyon, California. University of California Publication in American Archaeology and Ethnology 44(2):237-258.

Holmer, R.

1986 Common Projectile Points of the Intermountain West. In Anthropology of the Desert West, ed. by CJ Condie and DD Fowler, pp. 89-116. University of Utah Press, Anthropological Papers, Number 110.

Horne, S.P.

1981 The Inland Chumash: Ethnography, Ethnohistory and Archeology. Ph.D. dissertation, UCSB.

Johnson, J.

1978 The Road to Kashtiq. Journal of California Anthropology 5:188-198.

Johnson, J. and D. Earle

1990 Tataviam Geography and Ethnohistory. Journal of California and Great Basin Anthropology 12:191-214.

Johnson, K.L.
1966 Site LAN-2: A Late Manifestation of the Topanga Complex in Southern California Prehistory. Anthropological Records 23. UC Berkeley.

Johnson, M.
1980 Archaeological Investigations at Ven-271. In Inland Chumash Archaeological Investigations, edited by D.S. Whitley, E. McCann and C.W. Clewlow, Jr. Institute of Archaeology, Monograph 15, UCLA.

King, C.D.
1981 The Evolution of Chumash Society: A Comparative Study of Artifacts Used in Social System Maintenance in the Santa Barbara Channel Region. PhD dissertation, UCD.

King, C.D. and T. Blackburn
1976 Tataviam. In: Handbook of North American Indians, Volume 8, California. R. Heizer, editor, pp. 535-537. Smithsonian Institution.

King, C., C. Smith and T. King
n.d. Archaeologial Report Related to the Interpretation Archaeological Resources Present at the Vasquez Rocks County Park. Report on file, UCLA AIC

Kowta, M.
1969 The Sayles Complex: A Late Milling Stone Assemblage from the Cajon Pass and the Ecological Implications of Its Scraper Planes. Publications In Anthropology, 6. University of California, Berkeley.

Kroeber, A. L.
1925 Handbook of the Indians of California. Bureau of American Ethnology, Bulletin 78.

Love, B.
1990 Archaeological Testing of a Portion of LAn-618, the Escondido Canyon Site, Near Agua Dulce, Los Angeles County, California. In B. Love and W.H. DeWitt, eds., Archaeology and Ethnohistory of the Antelope Valley and Vicinity, Antelope Valley Archaeological Society, Occasional Papers No. 2, pp.21-42.

McIntyre, M.
1990 Cultural Resources of the Upper Santa Clara River Valley, Los Angeles and Ventura Counties, California. In B. Love and W.H. DeWitt, eds., Archaeology and Ethnohistory of the Antelope Valley and Vicinity, Antelope Valley Archaeological Society, Occasional Papers No. 2,

pp. 1-20.

Moratto, M.
1984 California Archaeology. Academic Press, New York.

Muntz, P.A.
1974 A Flora of Southern California. Berkeley: University of California.

Reynolds, R.
1979 Faunal Analysis. In J. Pritchett and A. McIntyre, The Running Springs Ranch Site: Archaeological Investigations at Ven-65 and Ven-261. Institute of Archaeology Monograph 12, UCLA.

Rogers, D.B.
1929 Prehistoric Man of the Santa Barbara Coast. Santa Barbara Museum of Natural History. Santa Barbara, California.

Rosen, M.D.
1978 Archaeological Investigations at Ven-294, an Inland Chumash Village Site. In The Archaeology of Oak Park, Ventura County, California, Vol. II, ed. by C.W. Clewlow, H.F. Wells and A.G. Pastron, pp. 7-114. UCLA Institute of Archaeology, Monograph V.

Salls, R.
1985 The Scraper Plane: A Functional Interpretation. Journal of Field Archaeology 12(1):99-106.

Señán, J.
1962 The Letters of José Señán, OFM: Mission San Buenaventura 1796-1823. (Translated by P.D. Nathan, Edited by L.B. Simpson). Ventura: Ventura County Historical Society.

Sutton, M.Q.
1988a An Introduction to the Archaeology of the Western Mojave Desert, California. Archives of California Prehistory, No. 14. Salinas: Coyote Press.

1988b On the Late Prehistory of the Western Mojave Desert. Pacific Coast Archaeological Society Quarterly 24(1):22-29.

Treganza, A.E. and A. Bierman
1958 The Topanga Culture: Final Report on Excavations, 1948. Anthropological

Records 20:2. UC Berkeley.

Treganza, A.E. and C.G. Malamud
1950 The Topanga Culture: First Season's Excavations at the Tank Site, 1947. Anthropological Records 12:4.

W & S Consultants
1984 Archaeological Investigations at Sites CA-Ven-315, -323, -324, -325, -326 and -327, Thousand Oaks, Ventura County, California. Manuscript on file, City of Thousand Oaks.

1989a Archaeological Test Excavations at Fifteen Prehistoric Sites in the Lake Sherwood Development Area, Ventura County, California. Manuscript on file, County of Ventura.

1989b Phase II Archaeological Test Excavations at CA-Ven-982 and -983, Dos Vientos Ranch, Newbury Park, Ventura County, California. Manuscript on file, City of Thousand Oaks.

1989c Preliminary Archaeological Investigations at Sites CA-VEN-221, -222, -705, -706, -708, -709, and -710 on the Ahmanson Ranch, Ventura County, California. Manuscript on file, County of Ventura.

1991a Phase II Archaeological Test Excavations at CA-KER-1115, -1118 and -1947, Near Cache Peak, Kern County, California. Manuscript on file, CSUB AIC.

1991b Phase II Archaeological Test Excavations at CA-VEN-478, -1038, -1042/H, -1043, -1044, -1045 and -1046, TPM 4687, Ventura County, California. Manuscript on file, County of Ventura.

1992a Phase III Data Recovery at Archaeological Site CA-VEN-654, Thousand Oaks, Ventura County, California. Manuscript on file, UCLA AIC.

1992b Phase II Archaeological Test Excavations at CA-LAN-1884, -1886 and -1887, VTT #49856, Calabasas, Los Angeles County, California. Manuscript on file, UCLA AIC.

1993 Phase II Archaeological Test Excavations at CA-LAN-760A/H, -760B, -760C, -866, -867A and -867B, Calabasas, Western Los Angeles County, California. Manuscript on file, W & S Consultants.

1994a Phase I Archaeological Survey of the West Ranch Study Area, Western Los Angeles County, California. Manuscript on file, W & S Consultants.

1994b Phase III Data Recovery at CA-SBA-1661, Santa Barbara County, California.

Manuscript on file, W & S Consultants.

Wallace, W.
1955 A Suggested Chronology for Southern California Coastal Archaeology. Southwestern Journal of Anthropology 11 (3):214-230.

Waugh, G.
1999 A Study in the Prehistory of the Santa Clara River Valley: Archaeological Data Recovery at CA-LAN-2233, Los Angeles County, California. CALTRANS, Sacramento.

Whitley, D.S.
1979a A Historical Perspective on the Research at Oak Park. In The Archaeology of Oak Park, Ventura County, California, Volume 3. Edited by C.W. Clewlow and D.S. Whitley. Institute of Archaeology, Monograph 11. UCLA.

1979b Subsurface Features, Toolkits and a Sweathouse Pit at the Ring Brothers Complex. In Archaeological Investigations at the Ring Brothers Site Complex, Thousand Oaks, California, edited by C.W. Clewlow, Jr., D.S. Whitley and E.L. McCann, pp. 101-110. Institute of Archaeology, Monograph 13. UCLA.

1992 Shamanism and Rock Art in Far Western North America. Cambridge Archaeological Journal 2(1):89-113.

1994 By the Hunter, For the Gatherer: Art, Social Relations and Subsistence Change in the Western Great Basin. World Archaeology 25:356-373.

Whitley, D.S. and M.P. Beaudry
1991 Chiefs on the Coast: Developing Chiefdoms in the Tiquisate Region in Ethnographic Perspective. In The Development of Complex Societies in Southeastern Mesoamerica, edited by W. Fowler. CRC Press, Orlando.

Whitley, D.S., G. Gumerman IV, J. Simon and T. Rose
1988 The Late Prehistoric Period in the Coso Range and Environs. Pacific Coast Archaeological Society, Quarterly 24(1):2-20.

Whitley, D.S., E.L. McCann, J.M. Simon and M.P. Drews
1979a Artifacts from the Ring Brothers Complex. In Archaeological Investigations at the Ring Brothers Site Complex, Thousand Oaks, California, edited by C.W. Clewlow, Jr., D.S. Whitley and E.L. McCann, pp. 11-100. Institute of Archaeology, Monograph 13. UCLA.

Whitley, D.S., J. Simon and G. Gumerman IV
n.d. Out West at 3500 Years B.P. Manuscript.

Yohe, R.M.
1992 A Reevaluation of Western Great Basin Cultural Chronology and Evidence for the Timing of the Introduction of the Bow and Arrow to Eastern California Based on New Excavations at the Rose Spring Site (CA-INY-372). PhD dissertation, UCR.

7.0
TABLES

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1 - ARTIFACT CATALOG, SITE NLF/W&S-1
2 - GROUNDSTONE & CORE/COBBLE COMPLEX TOOLS
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TABLE 1: W&S / NLF-1 ARTIFACT CATALOG

Cat#	Unit/Level	Material	L x W x T	#/wt.(gms.)	Description
1	surface	grano-diorite			mano fragment- type 3A
2	surface	grano-diorite			mano- type 4A
3	surface	fgv			wasted core- type 1
4	surface	quartzite			mano- type 3A
5	surface	grano-diorite			mano- type 4A
6	surface	fgv			mano fragment- type 3A
7	surface	fgv			mano fragment- type 4A
8	surface	quartzite			metate fragment- untypeable
9	surface	chert			core- type 1
10	surface	grano-diorite			mano fragment- type 3A
11	surface	grano-diorite			metate fragment- untypeable
12	surface	grano-diorite			mano- type 3A
13	surface	grano-diorite			mano- type 4A
14	surface	grano-diorite			metate fragment- untypeable
15	surface	quartzite			mano- type 4B
16	surface	sandstone			mano/hopper morter?
17	surface	sandstone			metate fragment- untypeable
18	surface	grano-diorite			mano- type 1
19	surface	grano-diorite			mano- type 4A
20	surface	grano-diorite			mano- type 4A
21	surface	quartzite			mano- type 1
22	surface	schist			metate fragment- untypeable
23	surface	basalt			core- type 1
24	surface	schist			metate fragment- type 2
25	surface	grano-diorite			metate fragment- type 2
45	surface	quartz	6.02x4.51x3.84	112.4	hammerstone- type 1
26	1/10-20	lithic		1/3.8	debitage
27	1/20-30	lithic		2/1.9	debitage
28	1/30-40	lithic		1/26.0	debitage
29	2/0-10	lithic		6/17.1	debitage
30	2/10-20	grano-diorite			mano fragment- untypeable
31	2/10-20	lithic		2/82.0	debitage
32	2/20-30	lithic		1/26.8	debitage
33	2/30-40	lithic		6/47.0	debitage
34	2/30-40	quartzite			mano fragment- type 4A
35	2/30-40	sandstone			mano- type 4B
36	2/30-40	chert	4.56*x2.71x1.12	15.6	biface fragment
44	2/30-40	fgv	7.95x4.95x5.17	86.1	crude uniface
37	2/40-50	quartz	7.50x5.51x5.42	321.7	hammerstone- type 1
38	2/40-50	quartz	7.09x6.17x4.52	209.7	hammerstone- type 1
39	2/40-50	lithic		7/57.50	debitage
40	2/50-60	lithic		6/56.4	debitage
41	3/20-30	lithic		2/2.9	debitage
42	4/0-10	glass		1/41.8	bottle fragment
43	4/0-10	lithic		3/1.6	debitage
46	4/0-10	sandstone	5.54x5.38x3.03	141.0	scraper plane
47	4/10-20	lithic		6/10.9	debitage
48	4/20-30	lithic		8/15.9	debitage

TABLE 1: W&S / NLF-1 ARTIFACT CATALOG

49	4/30-40	lithic		13/40.6	debitage
50	4/40-50	lithic		7/10.5	debitage
51	4/50-60	lithic		7/10.4	debitage
73	4/60-70	lithic		8/102.0	debitage
52	4/60-70	jasper	5.34x4.35x2.81	71.5	scraper plane
53	4/60-70	grano-diorite			mano fragment- type 4A
54	4/70-80	lithic		4/4.8	debitage
55	4/70-80	bone		1/2.1	faunal remains- shaft frag.
56	4/80-90	lithic		2/4.3	debitage
57	5/0-10	lithic		1/.3	debitage
58	5/10-20	lithic		1/.1	debitage
59	5/10-20	sandstone			mano fragment- type 4A
60	5/20-30	lithic		1/4.2	debitage
61	6/10-20	lithic		1/4.9	debitage
62	7/0-10	lithic		1/1.0	debitage
63	7/10-20	lithic		1/1.2	debitage
64	7/20-30	lithic		3/2.4	debitage
65	8/0-10	lithic		4/20.6	debitage
66	8/10-20	lithic		3/4.2	debitage
67	8/20-30	lithic		3/8.5	debitage
68	8/20-30	gneiss			metate fragment- untypeable
69	8/30-40	lithic		9/18.0	debitage
70	8/30-40	quartzite	7.39x6.71x6.09	396.7	hammerstone- type 1
93	8/40-50	lithic		2/20.4	debitage
71	8/50-60	lithic		1/1.2	debitage
72	8/60-70	lithic		1/22.0	debitage
74	9/0-10	lithic		1/4.1	debitage
75	9/10-20	lithic		2/1.5	debitage
76	10/20-30	lithic		1/3.6	debitage
77	10/20-30	plastic		1/.2	non-i.d. fragment
78	11/0-10	lithic		4/10.2	debitage
79	11/10-20	lithic		2/1.3	debitage
80	11/20-30	lithic		1/9.4	debitage
81	11/30-40	lithic		5/8.8	debitage
82	11/40-50	lithic		2/10.4	debitage
83	12/10-20	lithic		1/2.2	debitage
84	13/0-10	metal		3/9.7	wire-cut nails
85	13/0-10	lithic		4/6.2	debitage
86	13/10-20	lithic		4/4.4	debitage
87	13/20-30	lithic		4/6.1	debitage
88	13/30-40	lithic		3/4.5	debitage
89	13/40-50	lithic		5/33.8	debitage
90	13/50-60	lithic		5/40.8	debitage
91	13/60-70	lithic		6/11.8	debitage
92	13/60-70	bone		1/.7	faunal remains- shaft frag.
94	13/70-80	lithic		5/14.5	debitage
95	13/80-90	lithic		2/5.8	debitage
96	13/80-90	bone		1/.7	faunal remains- shaft frag.
97	13/90-100	lithic		1/2.0	debitage

TABLE 1: W&S / NLF-1 ARTIFACT CATALOG

98	14/0-10	glass	4/3.2	bottle fragments
99	15/0-10	lithic	6/16.1	debitage
100	15/10-20	lithic	2/1.7	debitage
101	15/20-30	lithic	2/1.5	debitage
102	15/30-40	lithic	5/3.8	debitage
103	15/40-50	lithic		debitage

TABLE 1: W&S / NLF-1 ARTIFACT CATALOG

98	14/0-10	glass	4/3.2	bottle fragments
99	15/0-10	lithic	6/16.1	debitage
100	15/10-20	lithic	2/1.7	debitage
101	15/20-30	lithic	2/1.5	debitage
102	15/30-40	lithic	5/3.8	debitage
103	15/40-50	lithic	3/28.4	debitage

TABLE 2: W&S / NLF-1 GROUNDSTONE & CORE/COBBLE COMPLEX TOOLS

Cat#	Unit/Level	Material	L x W x T	#/wt.(gms.)	Description
1	surface	grano-diorite	11.38x6.31*x6.46	682.6	mano fragment- type 3A
2	surface	grano-diorite	12.10x10.12x5.91	1286.6	mano- type 4A
3	surface	fgv	9.78x10.08x7.65	596.8	wasted core- type 1
4	surface	quartzite	11.98x9.73x5.41	1115.7	mano- type 3A
5	surface	grano-diorite	13.25x9.11x5.50	1048.1	mano- type 4A
6	surface	fgv	9.45*x7.99x4.32*	365.7	mano fragment- type 3A
7	surface	fgv	3.49*x4.33*x5.84	113.2	mano fragment- type 4A
8	surface	quartzite	8.51*x7.53*x6.55*	585.9	metate fragment- untypeable
9	surface	chert	7.68x5.37x3.86	161.1	core- type 1
10	surface	grano-diorite	13.08x10.29*x4.45	796.9	mano fragment- type 3A
11	surface	grano-diorite	11.15*x10.03*x5.85*	658.2	metate fragment- untypeable
12	surface	grano-diorite	13.13x10.27x5.93	1082.9	mano- type 3A
13	surface	grano-diorite	10.45x8.49x4.94	639.6	mano- type 4A
14	surface	grano-diorite	18.3*x11.6*x11.3*	1907.2	metate fragment- untypeable
15	surface	quartzite	15.19x9.78x5.30	1254.4	mano- type 4B
16	surface	sandstone	12.44x9.76x5.27	989.2	mano/hopper morter?
17	surface	sandstone	14.5*x8.9*x6.6*	1218.6	metate fragment- untypeable
18	surface	grano-diorite	14.05x8.37x6.36	1085.2	mano- type 1
19	surface	grano-diorite	13.76x9.77x6.67	1407.2	mano- type 4A
20	surface	grano-diorite	12.22x7.38x5.57	771.2	mano- type 4A
21	surface	quartzite	12.26x10.97x8.29	1547.2	mano- type 1
22	surface	schist	21.2x13.3x4.8	1897.9	metate fragment- untypeable
23	surface	basalt	14.37x8.43x6.52	1276.6	core- type 1
24	surface	schist	34.2x17.2x3.9	6 lbs.	metate fragment- type 2
25	surface	grano-diorite	26.7x25.8x9.7	13 lbs.	metate fragment- type 2
45	surface	quartz	6.02x4.51x3.84	112.4	hammerstone- type 1
30	2/10-20	grano-diorite	9.81*x4.61*x5.82*	371.9	mano fragment- untypeable
34	2/30-40	quartzite	7.29*x5.34*x5.49*	265.6	mano fragment- type 4A
35	2/30-40	sandstone	12.22x9.42x4.22	728.6	mano- type 4B
53	4/60-70	grano-diorite	7.69*x8.54x4.38	556.4	mano fragment- type 4A
59	5/10-20	sandstone	9.65*x9.43x4.87	595.9	mano fragment- type 4A
68	8/20-30	gneiss	19.1x7.6x5.4	1252.2	metate fragment- untypeable

TABLE 3: W&S / NLF-1 DEBITAGE

Cat#	Unit/Level	Material	#/wt.(gms.)	Type
26	1/10-20	chert	1/3.8	S-1
27	1/20-30	chert	1/.8	AS-1
		jasper	1/1.1	AS-1
28	1/30-40	quartzite	1/26.0	P-1
29	2/0-10	chert	4/8.6	AS-4
		jasper	1/2.5	AS-1
		quartzite	1/6.0	P-1
31	2/10-20	chert	1/4.2	AS-1
		quartzite	1/77.8	P-1
32	2/20-30	jasper	1/26.8	AS-1
33	2/30-40	chert	3/12.2	P-1, T-1, AS-1
		fgv	2/8.6	S-2
		quartz	1/26.2	AS-1
39	2/40-50	chert	1/25.3	P-1
		quartz	1/2.0	AS-1
		jasper	1/18.2	P-1
		fgv	4/12.0	S-4
40	2/50-60	jasper	2/48.8	AS-2
		fgv	3/6.7	S-3
		fused shale	1/1.9	S-1
41	3/20-30	chert	2/2.9	S-1, AS-1
43	4/0-10	chert	1/.5	T-1
		jasper	1/1.0	T-1
		fgv	1/.1	T-1
47	4/10-20	chert	4/6.1	T-3, AS-2
		jasper	1/3.5	S-1
		fgv	1/1.3	S-1
48	4/20-30	chert	4/3.9	AS-4
		quartz	1/8.0	P-1
		fgv	1/2.7	S-1
		jasper	2/1.3	T-1,AS-1
49	4/30-40	chert	5/1.7	T-2,AS-3
		quartz	3/6.5	AS-3
		fgv	5/32.4	P-2, S-1,T-2
50	4/40-50	chert	1/.1	T-1
		quartz	3/7.2	AS-3
		fgv	3/3.1	T-2, AS-1
51	4/50-60	chert	2/.2	T-2
		fgv	2/.4	T-1
		sandstone	1/3.6	S-1
73	4/60-70	chert	1/4.9	AS-1
		quartz	5/152.0	P-2, AS-3
		quartzite	1/84.6	P-1
		fgv	1/.5	T-1
54	4/70-80	quartz	1/1.4	AS-1
		fgv	1/2.5	AS-1
		chert	2/.9	T-2
56	4/80-90	chert	1/.3	T-1

TABLE 3: W&S / NLF-1 DEBITAGE

		fgv	1/4.0	S-1
57	5/0-10	chert	1/.3	T-1
58	5/10-20	obsidian	1/.1	T-1
60	5/20-30	chert	1/4.2	AS-1
61	6/10-20	chert	1/4.9	AS-1
62	7/0-10	chert	1/1.0	AS-1
63	7/10-20	chert	1/1.2	AS-1
64	7/20-30	chert	1/.8	S-1
		fgv	2/1.6	S-1, T-1
65	8/0-10	chert	2/5.8	AS-2
		jasper	1/2.5	AS-1
		quartz	1/12.3	AS-1
66	8/10-20	chert	3/4.2	T-1, AS-2
67	8/20-30	quartz	1/.4	T-1
		fgv	1/4.3	S-1
		jasper	1/3.8	AS-1
69	8/30-40	chert	2/15.2	AS-2
		quartz	6/11.8	AS-6
		quartzite	1/1.0	AS-1
93	8/40-50	chert	2/20.4	AS-2
71	8/50-60	quartz	1/1.2	AS-1
72	8/60-70	quartz	1/22.0	AS-1
74	9/0-10	chert	1/4.1	AS-1
75	9/10-20	chert	1/.1	T-1
		fgv	1/1.4	S-1
76	10/20-30	fgv	1/3.6	S-1
78	11/0-10	chert	1/.1	T-1
		quartzite	1/4.8	S-1
		jasper	2/5.3	T-1, AS-1
79	11/10-20	chert	2/1.3	T-2
80	11/20-30	chert	1/9.4	AS-1
81	11/30-40	chert	2/1.4	T-1, AS-1
		quartzite	1/4.0	AS-1
		fgv	1/3.0	AS-1
		jasper	1/.4	T-1
82	11/40-50	quartzite	1/.6	T-1
		fgv	1/9.8	P-1
83	12/10-20	quartz	1/2.2	AS-1
85	13/0-10	chert	3/5.8	T-1, AS-2
		quartz	1/.4	AS-1
86	13/10-20	chert	3/1.9	T-2, AS-1
		fgv	1/2.5	S-1
87	13/20-30	chert	3/4.3	T-1, AS-2
		fgv	1/1.8	AS-1
88	13/30-40	chert	2/4.2	S-1, AS-1
		quartz	1/.3	AS-1
89	13/40-50	quartz	2/21.6	AS-2
		fgv	3/11.2	S-3
90	13/50-60	quartz	3/34.7	P-1, AS-2

TABLE 3: W&S / NLF-1 DEBITAGE

		chert	2/6.1	T-1, AS-1
91	13/60-70	chert	4/7.3	T-2, AS-2
		fgv	1/.8	T-1
		quartz	1/3.7	AS-1
94	13/70-80	chert	2/1.9	T-1, AS-1
		fgv	1/.5	T-1
		quartz	1/.3	AS-1
		quartzite	1/11.8	P-1
95	13/80-90	chert	1/2.1	AS-2
		quartz	1/3.7	AS-1
97	13/90-100	quartz	1/2.0	AS-1
99	15/0-10	chert	5/14.5	S-1, T-2, AS-2
		quartz	1/1.6	AS-1
100	15/10-20	fgv	1/1.0	T-1
		quartz	1/.7	T-1
101	15/20-30	chert	2/1.5	T-1, AS-1
102	15/30-40	quartz	2/2.4	AS-2
		fgv	2/1.2	T-2
		fused shale	1/.2	T-1
103	15/40-50	chert	2/6.9	S-2
		fgv	1/21.3	P-1

ADDENDUM TO
PHASE II ARCHAEOLOGICAL TEST EXCAVATIONS FOR THE RIVER PARK PROJECT AREA, NORTHERN LOS ANGELES COUNTY, CALIFORNIA

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ADDENDUM TO
PHASE II ARCHAEOLOGICAL TEST EXCAVATIONS FOR THE RIVER PARK PROJECT AREA, NORTHERN LOS ANGELES COUNTY, CALIFORNIA

Introduction

In 2002, Phase II archaeological test excavations were conducted at sites CA-LAN-315 and CA-LAN-3043, within the River Park project area, for the Newhall Land and Farming Company, Valencia, California (W&S Consultants 2002). Following a request by the City of Santa Clarita, W&S Consultants conducted additional test excavations on CA-LAN-3043 for NLFC in 2003. This document is a report on this additional fieldwork, completed in October of this year, and it is intended to serve as an addendum to the previous report on the site. Note that, at the time of the initial test excavation in 2002, site CA-LAN-3043 was given the temporary designation of NLF/W&S-1, and is so-referenced in the previous report.

Background and Field Methods

Archaeological site CA-LAN-3043 is located on the north bank of the upper Santa Clara River in Saugus, northwestern Los Angeles County, California. Recorded by W&S Consultants in 2001, the site is located on the third terrace above the stream bed at an elevation ranging from about 1280 to 1285 feet. The site is separated by a steep slope from site CA-LAN-351, found on the first and second terraces of the river in this same area.

Previous Phase II testing at site CA-LAN-3043, completed in 2002, involved the hand excavation of fifteen 1x1 meter test pits along with surface collection and mapping. This site proved to contain a subsurface archaeological deposit and was believed to date to approximately 4000 - 2000 YBP (W&S Consultants 2002).

Mr. Charlie Cooke, representing the local Native American community, requested that five additional test pits be excavated in the southeastern portion of the stream terrace and site, to further assess the site. These were 1x1 meter in size and, following the pit designations employed in the initial Phase II test, were labeled Units #16 - 20. Excavation techniques during this supplementary testing duplicated those employed during the previous Phase II. Layout of the five test pits is illustrated in Figure 1.

Field Results

The excavation of the five additional test pits revealed equivalent soils and archaeological conditions across the area tested. We summarize these results by unit below:

Unit #16: The westernmost of the test pits was located a short distance east of the N-S dirt road onto the site. It was excavated to 40 cm depth, at which point ancient (i.e., millions of years in age), culturally sterile alluvial gravel was encountered. The soils above the alluvial gravels were an A Horizon consisting of a compact indurated silty loam containing a large quantity of fist- to pea-sized gravels and cobbles. The top 20 - 30 cm of this horizon has been disturbed by disking. The color of this soil horizon was Munsell Grayish Brown (10YR5/2).

Cultural materials within this pit were limited to three pieces of debitage, two of which were recovered in the 0 - 10 cm level, and the third from the 10 - 20 cm level. In both cases these levels represent the disturbed disk or plow zone.

Unit #17: This pit was placed 15 meters (~50 feet) east of Unit #16. Soil conditions were identical to the first unit, with excavation terminated at ancient alluvial gravels, also encountered at 40 cm in depth.

A total of 23 specimens were recovered from this pit, 18 (78%) of which are archaeological while 5 (22%) are pieces of modern intrusive glass. Sixteen (70%) of the total were found in the top 20 cm; 21 (91%) above 30 cm depth. Archaeological remains in this portion of the site, in other words, are primarily restricted to the plow zone, which has also introduced modern glass into the sub-soil.

Unit #18: Spaced 15 m east of the previous unit, this unit was also dug to ancient alluvial gravels although, in this location, these were encountered at 45 cm depth. Soils were otherwise identical to the first two pits.

Seven archaeological specimens were recovered from this test unit, five of which were found above 20 cm. The remaining three specimens included two in the 20 - 30 cm level, and one in the 30 - 40 cm level. Again, archaeological specimens are primarily restricted to the disturbed plow zone.

Unit #19: As with the previous units, this was placed 15 m east of the previous pit. It was excavated to ancient alluvial gravels, encountered in this area at 50 cm depth. Soils otherwise were identical to those in the other test pits.

A low density of archaeological specimens was recovered from each level in this unit. This peaked at 17 specimens in the 30 to 30 cm level, but 14 specimens

were also present in the level below, which was immediately above the culturally sterile gravel layer.

Unit #20: This pit was placed 15 m north of the previous unit. Soils in Unit #20 were fully equivalent to those in Unit #19, with sterile alluvial gravels also encountered at 50 cm in depth. A low density of archaeological specimens was present in every level, along with in certain cases a large number of animal bones.

The general results of the five test pits confirm the findings of the previous Phase II test: (1) a low density subsurface archaeological deposit is present at the site; but (2) this is deepest in the central portion of the site, north of the area tested during this current assessment, where in some cases a B Horizon has developed.

Artifact Assemblage

The artifacts and archaeological specimens recovered during the 2003 test at CA-LAN-3043 are summarized in Table 1, the artifact catalog for the project. (Again, following the numeration of the test pits, assigned artifact numbers began after 103, the last number used for the previous test on the site). A total of 247 specimens was recovered; 120 of these were lithics; 122 were fragments of animal bones; and five were intrusive modern glass fragments.

The lithic specimens included 8 formal or worked artifacts and 112 pieces of lithic debitage or waste material. Five of these are groundstone artifacts and the remaining three are flaked stone tools.

Two of the formal groundstone artifacts in fact were collected from the surface of the site, and only three pieces of groundstone were recovered during the excavations. Following the typology outlined for the initial Phase II test (W&S Consultants 2002), both of the surface groundstone artifacts are sandstone manos. One is a Type 3A unshaped biface mano; the other is an untypable fragment.

The remaining examples of groundstone, all recovered from excavations, include two manos. Both of these are Type 4A shaped bifaces, and both are made of quartzite. The last groundstone specimen is made of Sierra Pelona talc schist -- steatite -- and is unidentifiable as to original form. It may have been part of a bowl or, alternatively (but less likely), a comal or griddle, but it does not appear to have been part of a metate (even though flat slab metates made of Sierra Pelona schist are common at sites in the region).

All three of the flaked stone tools are projectile point/point fragments, and all are portions of atlatl points, or throwing spears. This makes them all greater than 1500

years in age, based on the date of the introduction of the bow and arrow into this region. One chert specimen (#3043-110) is triangular and, although complete, appears to have been reworked from a once larger form. The second (#3043-128) is much smaller, is also chert but is tanged and squat. It too appears to have been reworked at some point and, for this reason, is difficult to assign to a specific type. The final example (#3043-131) is an unusual red and black obsidian. The specimen represents a small latitudinal "slice" across the juncture of the body and the base, and it appears to include the remnants of both sides of corner-notching. The specimen thus appears to be similar to an Elko corner-notched point, dating from about 3500 to 1500 YBP.

As is normally the case, debitage was common on the site and 112 specimens of it were recovered (Table 2). Chert was the most common material, contributing 86 pieces or 77% of the total. This was followed by obsidian, 11 or 10%, quartzite, 8 or 7%, metavolcanic 6 or 5% and one piece of jasper (<1%).

With respect to debitage type, tertiary flakes were by far the most common, contributing 71 examples or 63%. This was followed by angular shatter, 32 for 29%, with the remaining contributions roughly split between primary and secondary flakes. Notable here is the fact that chert tertiary flakes and angular shatter were the dominant components of the debitage assemblage. There were 57 chert tertiary flakes in the collection, representing fully 57% of the grand total, and 25 (for 22%) specimens of angular shatter. These two classes represent almost three-quarters of the entire debitage assemblage.

The final class of archaeological specimen is animal bone, or faunal remains. These have been classified by size, following the categories outlined in the Phase II report (W&S Consultants 2002).

A total of 122 animal bones was recovered from the site during this test (Table 1). Most of these appear to be cultural as opposed to natural in origin, with a number exhibiting cut marks and burning. Almost all of the bones are very fragmentary, reflecting the heavy processing (for marrow extraction) involved in animal cooking that was common in this region. Particularly notable however is the relatively large number of large mammal (deer size) bone fragments in the assemblage. A total of 36 of these are present.

The faunal remains from the site are further notable because, during the previous test, only two specimens were recovered -- despite the fact that three times as much excavation occurred during that phase of fieldwork. The paucity of faunal remains from the first test excavation supported the interpretation that subsistence on the site was largely directed towards plant foods. The results from the current test suggest instead that mammals also contributed to the diet of the site's inhabitants, and that the processing of these kinds of resources may have

been localized in the southeastern portion of the site.

That said, it is important to emphasize that, because of the way that meat and bones were processed prehistorically -- by systematic pounding and breaking to extract marrow -- counts of bone fragments can be somewhat misleading. In this respect, total weight of bone fragments rather than numbers may be more revealing. The total weight of the faunal remains from the five test units is in fact only 22.8 grams -- less than an ounce. While some mammal resources then were apparently included in the diet of the inhabitants of CA-LAN-3043, this still does not appear to have been a large (let alone dominant) component of their diet.

Plant processing, in other words, is still supported as the primary subsistence practice at the site, although the results of this test excavation also indicate that hunting was also undertaken. The site's occupants were not specialists, in other words, but instead followed a more generalized subsistence strategy.

One final comment needs to be made about the artifact assemblage from the site. CA-LAN-3043 contains a small but noticeable amount of obsidian, reflecting the coastal to desert trade that occurred during the Middle Period, with this obsidian originating in the Coso Range at the southern end of Owens Valley. The age of obsidian artifacts can be determined through obsidian hydration dating, although these analyses take a considerable length of time and, for this reason, the results of obsidian hydration tests are rarely included in reports. It is for that reason important to mention in this addendum the previously unreported chronometric results of an obsidian hydration analysis from a sample that was submitted from the previous test excavation at this site.

This analysis yielded a hydration value of 5.7 $\pm$ 0.1 microns. There are various proposed calibrations for Coso obsidian, with 280 years per micron suggested for inland areas (Meighan 19801). Using this calibration rate, the age of the site can be chronometrically estimated at approximately 1596 YBP. This places the age of the site at about A.D. 354 -- within the Middle Period. This date correlates perfectly with the age of the site inferred from the projectile points.

Summary and Conclusions

Additional Phase II testing was conducted at site CA-LAN-3043, within the River Park project area, Saugus, Los Angeles County, California. This involved the hand-excavation of five 1x1 m pits in the southeastern portion of this site.

This additional Phase II testing largely confirmed and corroborated the results of the previous excavations on the site (W&S Consultants 2002). A low density sub-

surface deposit is present at the site, with the top portions of the deposit disturbed by disking and grading. The deepest portion of this deposit appears to be in the approximate center of the site. Based on three newly recovered projectile points and an obsidian hydration date, this deposit dates to the Middle Period, as previously surmised. A small but significant quantity of animal bone was however recovered. This suggests that the site's inhabitants followed a generalized subsistence strategy: while the evidence still supports the dominance of plant processing on the site, some hunting also clearly occurred.

Final recommendations for CA-LAN-3043

Based on the fact that the additional Phase II testing confirmed and corroborated the results of the first test, the previous recommendations for the site are appropriate. These are the mitigation of adverse effects either through preservation in open space, or with a Phase III Data Recovery (salvage excavation).

Cited References

Meighan, C.W.

1981 The Little Lake Site, Pinto Points, and Obsidian Hydration Dating in the Great Basin. Journal of California and Great Basin Anthropology 3:200-214.

W & S Consultants

2002 Phase II Archaeological Test Excavations for the River Park Project Area, Northern Los Angeles County, California. Report on file, City of Santa Clarita.

TABLE 1: ARTIFACT CATALOG, LAn-3043

Cat#	Unit/Level	Material	LxWxT(cm)	#/wt.(gms.)	Description
104	16/0-10	lithic		2/2.8	debitage
105	16/10-20	lithic		1/.7	debitage
106	17/0-10	lithic		4/.8	debitage
107	17/10-20	lithic		7/41.3	debitage
108	17/10-20	glass		5/3.0	bottle glass
109	17/20-30	lithic		4/1.4	debitage
110	17/20-30	chert	3.67x2.71x.66	1/5.9	atlatl dart point
111	17/30-40	lithic		2/11.0	debitage
112	18/0-10	lithic		1/.9	debitage
113	18/0-10	bone		1/.7	faunal remains- lrg. mammal
114	18/10-20	lithic		2/7.1	debitage
115	18/10-20	steatite	8.82x4.67x3.00	1/191.9	groundstone fragment, ? type
116	18/20-30	lithic		2/1.1	debitage
117	18/30-40	lithic		1/.6	debitage
118	19/0-10	lithic		1/.3	debitage
119	19/10-20	lithic		9/10.3	debitage
120	19/10-20	bone		6/.9	fauna-lrg. mm. (2/.5),
					sm. mam. (4/.4)
121	19/20-30	lithic		8/10.1	debitage
122	19/20-30	bone		2/.1	faunal remains- small mammal
123	19/30-40	lithic		10/2.9	debitage
124	19/30-40	bone		7/1.1	fauna- lrg. mam. (4/1.7),
					sm. mam. (3/.4)
125	19/40-50	lithic		8/4.7	debitage
126	19/40-50	bone		5/1.1	fauna- lrg mam. (4/1.0),
127					sm. mam. (1/.1)
128	19/40-50	chert	2.69x1.85x.77	1/3.8	atlatl base fragment
129	20/0-10	chert		14/5.5	debitage
130	20/0-10	bone		1/.3	fauna- lrg. mammal
131	20/0-10	obsidian	.65x2.59x.64	1/1.2	atlatl base fragment
132	20/10-20	lithic		11/71.7	debitage
133	20/10-20	bone		6/3.4	fauna- lrg. mam. (4/3.0),
					sm. mam. (2/.4)
134	20/20-30	lithic		11/16.5	debitage
135	20/20-30	bone		29/5.6	fauna- lrg. mam. (8/4.2),
					sm. mam. (21/1.4)
136	20/20-30	quartzite	8.75x5.77x5.44	1/294.3	shaped biface mano frag.- 4A
137	20/30-40	lithic		8/13.1	debitage
138	20/30-40	bone		55/6.8	fauna- lrg. mam. (10/3.9),
					sm. mam. (45/2.9)
139	20/30-40	quartzite	9.99x7.54x4.14	1/453.4	shaped biface mano- type 4A
140	20/40-50	lithic		6/1.5	debitage
141	20/40-50	bone		10/2.8	fauna- lrg. mam. (2/2.3),
					sm. mam. (8/.5)
142	surface/S.A.-1	sandstone	7.67x9.87x5.84	1/628.8	unshaped biface- type 3A
143	surface/S.A.-2	sandstone	10.11x7.14x6.56	1/564..1	mano fragment- ? type

TABLE 2: CA-LAN-3043 - Debitage

Cat#	Unit/Level	Material	#/wt.(gms.)	Description		
104	16/0-10	chert	2/2.9	P-1,T-1		
105	16/10-20	jasper	1/.7	T-1		
106	17/0-10	chert	3/.7	T-2, AS-1		
		obsidian	1/.1	T-1		
107	17/10-20	chert	6/3.3	T-4, AS-2		
		metavolcanic	1/38.0	P-1		
109	17/20-30	chert	4/1.4	T-3, AS-1		
111	17/30-40	chert	2/11.0	P-1, AS-1		
112	18/0-10	chert	1/.4	AS-1		
114	18/10-20	chert	2/7.1	T-1, AS-1		
116	18/20-30	chert	2/1.1	T-2		
117	18/30-40	chert	1/.6	T-1		
118	19/0-10	obsidian	1/.3	T-1		
119	19/10-20	chert	6/4.6	T-5, AS-1		
		quartzite	1/4.2	AS-1		
		obsidian	2/1.5	AS-2		
121	19/20-30	chert	6/6.9	T-4, AS-2		
		quartzite	2/3.2	S-1,T-1		
123	19/30-40	chert	7/2.8	T-2, AS-5		
		obsidian	3/.1	T-3		
125	19/40-50	chert	8/4.7	T-6, AS-2		
129	20/0-10	chert	13/5.1	T-10, AS-3		
		obsidian	1/.4	AS-1		
132	20/10-20	chert	9/3.6	T-7, AS-2		
		quartzite	1/68.0	P-1		
		obsidian	1/.1	T-1		
134	20/20-30	chert	7/14.0	S-1, T-4, AS-2		
		obsidian	2/.1	T-2		
		metavolcanic	2/1.5	S-1, T-1		
137	20/30-40	chert	6/5.1	S-1, T-4, AS-1		
		metavolcanic	2/7.0	P-1, AS-1		
140	20/40-50	chert	1/.4	T-1		
		quartzite	4/.7	T-4		
		metavolcanic	1/.4	T-1		

APPENDIX 4.19

Agricultural Resources Storie Index

Capability Grouping

Finally, the SCS classifies soils by their suitability for most kinds of field crops. The groups are made according to the limitations of the soils when used for field crops, the risk of damage when they are used and the way they respond to treatment. In the capability system all kinds of soils are grouped at three levels: capability class, subclass and unit. These are discussed in the following paragraphs:

Capability Classes are defined as follows:

Classes	Description
I	Soils have few limitations that restrict their use
II	Soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices
III	Soils have severe limitations that reduce the choice of plants or that require special conservation practices, or both
IV	Soils have very severe limitations that reduce the choice of plants or that require very careful management, or both
V	Soils are not likely to erode, but have other limitations, impractical to remove, that limit their use largely to pasture, range, woodland or wildlife
VI	Soils have severe limitations that make them generally unsuited to cultivation and that limit their use largely to pasture, range, woodland, or wildlife habitat
VII	Soils have very severe limitations that make them unsuited to cultivation and that restrict their use largely to pasture, range, woodland, or wildlife habitat
VIII	Soils and landforms have limitations that preclude their use for commercial plants and that restrict their use to recreation, wildlife, or water supply, or to aesthetic purposes.

Capability Subclasses are soil groups within one class and are designated by adding a small letter (e.g., *e*, *w*, *s*, or *c*) to the class numeral. The letter *e* shows that the main limitation is risk of erosion unless close-growing plant cover is maintained; the letter *w* shows that water in or on the soil interferes with plant growth or cultivation; *s* shows that the soil is limited mainly because it is shallow, droughty, clayey or stony; and *c* shows that the chief limitation is climate that is too cold or too dry.

Capability Units are soil groups within the subclasses that represent soils that are enough alike to be suited to the same crops and pasture plants to require similar management and to have similar productivity and other responses to management. Capability units are defined as follows:

Unit Number	Description
0.	Sand and gravel in the substratum limit root penetration
1.	Actual or potential erosion hazard
2.	Wetness caused by poor drainage or flooding
3.	Slow or very slow permeability in the subsoil or substratum
4.	Coarse soil texture or excessive gravel
5.	Fine textured or very fine textured surface soil
6.	Salt or alkali
7.	Cobbles, stones or rocks
8.	Nearly impervious bedrock or hardpan within the effective rooting depth
9.	Low fertility or toxicity

Vegetative Soil Groups

The Soil Conservation Service (SCS) also groups soils relative to their crop production to provide an estimate of the limitation and suitability of each soil.

Soil Grouping	Description
A	Choice of plants not limited by soils
B	Choice of plants limited by droughtiness and low fertility
C	Choice of plants limited by fine texture
D	Choice of plants limited by very slowly permeable (claypan) subsoil
E	Choice of plants limited by wetness
F	Choice of plants limited by salinity or alkalinity
G	Choice of plants limited by depth
H	No information available
I	No information available
J	Choice of plants depends upon on-site investigation

Storie Index

The U.S.D.A. rates soil types according to the Storie Index which numerically expresses the relative degree of suitability of a soil for general intensive agriculture. Four general factors are considered in the index rating:

- the characteristics of the soil profile and soil depth,
- the texture of the soil surface,
- the dominant slope of the soil body, and
- other factors more readily subject to management or modification (i.e., drainage, flooding, salinity, sodicity, general nutrient level of the soil, and surface microrelief).

Each of these four general factors is evaluated on the basis of 100 percent. A rating of 100 percent expresses the most favorable or ideal condition for general crop production, while lower percentage ratings are assigned for conditions that are less favorable.

Soils are placed in grades according to their suitability for general intensive agriculture as shown by their Storie Index rating. The six grades and their range in index ratings are:

Grade	Index Rating
1	80 to 100
2	60 to 80
3	40 to 60
4	20 to 40
5	10 to 20
6	less than 10

Soils of Grade 1 are excellent or well-suited to general intensive agriculture. Grade 2 soils are good and also well-suited to agriculture, although they are not as desirable as soils of Grade 1. Grade 3 soils are only fairly well-suited, Grade 4 soils are poorly suited, Grade 5 soils are very poorly suited, and Grade 6 consists of soils and miscellaneous areas that are not suited for agriculture.

Prime Farmland Criteria

Prime farmland must meet all of the following criteria:[1]

1. Water: The soils have xeric, ustic, or aridic moisture regimes[2] in which the available water capacity is at least 4.0 inches per 40 to 60 inches of soil, and a developed irrigation water supply that is dependable and of adequate quality. A dependable water supply is one which is available for the production of the commonly grown crops in 8 out of 10 years; and

2. Soil Temperature Range: The soils have a temperature regime that is frigid, mesic, thermic, or hyperthermic.[3] These are soils that, at a depth of 20 inches, have a mean annual temperature higher than 32° F. In addition, the mean summer temperature at this depth in soils with an O horizon[4] is higher than 47° F; in soils that have no O horizon, the mean summer temperature is higher than 59° F; and

3. Acid-Alkali Balance: The soils have a pH between 4.5 and 8.4 in all horizons within a depth of 40 inches; and

4. Water Table: The soils have no water table or have a water table that is maintained at a sufficient depth during the cropping season to allow cultivated crops common to the area to be grown; and

5. Soil Sodium Content: The soils can be managed so that, in all horizons within a depth of 40 inches, during part of each year the conductivity of the saturation extract is less than 4 mmhos/cm[5] and the exchangeable sodium percentage is less than 15; and

6. Flooding: Flooding of the soil (uncontrolled runoff from natural precipitation) during the growing season occurs infrequently, taking place less often than once every two years; and

7. Erodibility: The product of K (the erodibility factor) x percent of slope is less than 2.0; and

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[1] California Department of Conservation, Division of Land Resource Protection. Advisory Guidelines for the Farmland Mapping and Monitoring Program (Sacramento: April 1984), pp. 7-8.

[2] Soil moisture regimes are used in defining soil classes at various levels in the soil taxonomy system. Xeric soil moisture regime is typically found in Mediterranean climates where winters are moist and cool, and summers are warm and dry; Ustic soil moisture regime involves the concept of limited, but effective, soil moisture; and Aridic (torric) soils moisture regime is generally found in arid climates with hot and dry summers.

[3] Soil temperature regimes are used in defining soil classes at various levels in the soil taxonomy system. Frigid - mean annual soil temperature is less than 47° F and the difference between mean winter and mean summer temperature is more than 41° F. Mesic - Mean annual soil temperature is 47° F or higher, but lower than 59° F, and the difference between mean summer and mean winter soil temperature is more than 41° F. Thermic - the mean annual soil temperature is 59° F or higher, but lower than 72° F, and the difference between mean summer and mean winter soil temperature is more than 41° F. Hyperthermic - the mean annual soil temperature is 72° F or higher, and the difference between mean summer and mean winter soil temperature is more than 41° F.

[4] An O Horizon is an organic layer of fresh and decaying plan residue at the surface of a mineral soil.

[5] Mmhos/cm is a unit of electrical conductivity, which is a measure of the salinity of soil.

8. Permeability: The soils have a permeability rate of at least 0.06 inch per hour in the upper 20 inches and the mean annual soil temperature at a depth of 20 inches is less than 59° F; the permeability rate is not a limited factor if the mean annual soil temperature is 59° F or higher; and

9. Rock Fragment Content: Less than 10 percent of the upper 6 inches in these soils consists of rock fragments coarser than 3 inches; and

10. Rooting Depth: The soils have a minimum rooting depth of 40 inches.

Prime Farmland

Prime farmland is land with the best combination of physical and chemical features able to sustain long term production of agricultural crops. This land has the soil quality, growing season, and moisture supply needed to produce sustained high yields. The land must have been used for the production of irrigated crops at some time during the two update cycles prior to the mapping date of 1992 (or since 1988).[1]

Farmland of Statewide Importance

Farmland of statewide importance is land similar to prime farmland, but with minor shortcomings, such as greater slopes or with less ability to hold and store moisture. The land must have been used for the production of irrigated crops at some time during the two update cycles prior to the mapping date (or since 1988).

Unique Farmland

Unique farmland is land of lesser quality soils used for the production of the State's leading agricultural crops.[2] This land is usually irrigated, but may include non-irrigated orchards or vineyards as found in some climatic zones in California. The land must have been cultivated at some time during the two update cycles prior to the mapping date (or since 1988).

Farmland of Local Importance

Farmland of local importance is land of importance to the local agricultural economy, as determined by each county's board of supervisors and a local advisory committee. According to the Farmland Conversion Report, farmland of local importance in Los Angeles County includes producing lands that would meet the standard criteria for prime farmland or farmland of statewide importance, but which are not irrigated.

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[1]Since the farmland mapping date for Los Angeles County is 1992, and since update cycles occur biennially, this definition implies that land on the project site must have been used for the production of irrigated crops at some time since 1988 in order to qualify as prime farmland.

[2]Leading agricultural crops include those of high economic value, such as oranges, olives, avocadoes, rice, grapes, and cut flowers. Los Angeles County's leading agricultural crop includes flowers and foliage.

Grazing Land

Grazing land is land on which the existing vegetation is suited to the grazing of livestock. The minimum mapping unit for this category is 40 acres.

APPENDIX 4.20
Floodplain Modifications

SENSITIVE AQUATIC SPECIES ASSESSMENT
UPPER SANTA CLARA RIVER

RIVERPARK PROJECT
SANTA CLARITA, CALIFORNIA

Prepared for:
Newhall Land & Farming Company
Valencia, CA

Prepared by:
ENTRIX, Inc.
Ventura, CA

Project No. 3109001

February 25, 2004

Sensitive Aquatic Species Assessment
Upper Santa Clara River

Riverpark Project
Santa Clarita, California

Prepared for:
Newhall Land & Farming Company
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February 25, 2004

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1. INTRODUCTION

This report summarizes the focused assessment of potential effects of the Riverpark Project (Project) on threatened or endangered aquatic species inhabiting the Santa Clara Valley reach of the Santa Clara River. Specifically, this report focused on potential impacts to unarmored threespine stickleback, arroyo toad, and California red-legged frog as these species are listed as threatened or endangered by the State and Federal Endangered Species Act. The primary focus of this assessment examines potential impacts to their habitat associated with alterations to local hydrology and corresponding habitat area through implementation of the project.

The Santa Clara River within the project site is dry for most of the year. Surface flows are present in this stretch of the River on an infrequent basis typically during and after a storm event or a series of storms. During El Nino years, or years where yearly rainfall is substantially more than the average, surface flows have persisted into late spring or early summer.

1.1 RIVERPARK PROJECT

Newhall Land proposes the development of a 695.4-acre site at the terminus of Newhall Ranch Road, east of Bouquet Canyon Road between the Castaic Lake Water Agency property and the Santa Clara River, north of Soledad Canyon Road (Figure 1). The proposal is titled Riverpark. A 29-acre park is also proposed along and adjacent to the Santa Clara River and approximately 330 acres of river area will remain in a natural state. The project includes the extension of Newhall Ranch Road, including the Newhall Ranch Road/Golden Valley Road bridge, and the construction of bank stabilization along the Santa Clara River. The site will require 5.2 million cubic yards (mcy) of grading (plus 3.6 mcy of removal and recompaction, overexcavation, and landslide remediation) which will be balanced on-site.

Bank stabilization will be constructed along the Santa Clara River for approximately 3,000 linear feet for the east-west extension of Newhall Ranch Road and approximately 6,000 linear feet for residential and commercial development. Accessory storm drain outlets would be provided for in the bank stabilization. An additional 1,500 linear feet of toe or erosion protection would be installed adjacent to Area B (a residential area). The proposed bank stabilization technique is primarily buried soil cement with other portions reinforced by ungrouted rock riprap, and exposed concrete gunite at the Newhall Ranch/Golden Valley Bridge abutment. The toe or erosion protection would consist of Ajax or exposed soil cement.

This assessment report focuses on potential impacts of the Riverpark Project to the three identified protected species and their habitat within the Santa Clara River. The bank stabilization, Newhall Ranch Road/Golden Valley Road bridge, and the toe or erosion protection

are the primary Project features that could potentially affect aquatic and terrestrial habitat used by the three species of focus in this document.

1.2 BACKGROUND

Unarmored Threespine Stickleback

The unarmored threespine stickleback (UTS), *Gasterosteus aculeatus williamsoni*, was designated a federally endangered species in 1970 (U. S. Fish and Wildlife Service 1985) and is restricted to three sections of the upper Santa Clara River including areas both above and below, but not within, the Riverpark Project site. Currently, Critical Habitat for unarmored threespine stickleback has not been formally designated under the Endangered Species Act.

The fish is a small, largely annual fish that requires shallow, slow, marginal (define marginal) stream flows with abundant aquatic vegetation for cover. The male guards territories, and builds a small nest of decaying vegetation where he guards the eggs until they hatch. When there is suitable habitat, as described above, large numbers of stickleback can exist in the summer and fall with the long breeding season in southern California, and breeding can be almost all year in dry years when a stream is minimally disrupted by flood flows. Up to a few hundred stickleback per 10 meters of stream can exist under optimum conditions. Strong storm flows usually severely decimate the population until the streams stabilize in spring and the numbers can build up again.

Populations occur in the following areas: 1) upstream or east of the project in Soledad Canyon above Lang Station (about 8 miles upstream); 2) downstream or west of the project site beginning generally west of the McBean Parkway Bridge and the confluence with San Francisquito Creek; 3) San Francisquito Creek, a tributary to the Santa Clara River, northwest of the project site from just below Drinkwater Reservoir upstream to the vicinity of the old St. Francis Dam location (about 7.5 miles upstream of the Santa Clara River); and 4) Bouquet Canyon Creek, a tributary of the Santa Clara River, approximately 11 miles above its confluence with the Santa Clara River (Jonathan Baskin, personal communication). The latter two locations are in tributaries to the Santa Clara River and their hydrology and habitat would clearly not be affected by the project.

Arroyo Toad

Arroyo toads (*Bufo californicus*) occupy the margins of permanent and seasonal streams in coastal foothill canyons and valleys and to a limited extent in the desert, but they require extremely specialized and limited microhabitat within that general habitat type. Most spawning occurs in shallow overflow pools adjacent to inflow channels of third and higher-order streams,

and during the remainder of the year adults occupy adjacent sand bars and sandy terraces, nearly always within 100 meters of suitable spawning pools. Suitable spawning pools lack suspended silt, aquatic predators, and dense woody bordering vegetation (Sweet 1993). Suitable bordering sandbars are usually dampened by capillarity and include some emergent vegetation. The moist substratum keeps metamorphosing juveniles from desiccating during warm weather (Sweet 1993; Jennings and Hayes 1994). Suitable terrace habitat includes at least some dense overgrowth such as California sycamore (*Platanus racemosa*), Fremont cottonwood (*Populus fremontii*), and willows (*Salix* sp.) but the understory is usually barren except for layers of dead leaves (Sweet 1993). Adult and metamorphosed juvenile arroyo toads are known to forage for various invertebrates around the drip line of large oaks (*Quercus*) and also to forage extensively on ants (Sweet 1992, 1993). Little is known of arroyo toad winter hibernaculum requirements (USFWS 1999).

California Natural Diversity Database records for arroyo toad sightings include: 1) the Santa Clara River, directly east of Interstate-5, approximately two miles west of the project site; 2) Bear Canyon at the Santa Clara River, six miles upstream of Solemint (2001) which is about nine miles east of the project site; and 3) confluence of San Francisquito Creek and the Santa Clara River, approximately one mile west of the project site (Sandburg and Impact Sciences 2001). Neither of the museum database queries (CAS 2003; UC Berkeley 2003) yielded Santa Clara River watershed specimens of the arroyo toad.

The Biological Opinion (2002) issued by the United States Fish and Wildlife Service for the Natural River Management Plan (NRMP) stated that the implementation of NRMP improvements (including bank stabilization and bridge crossings) are unlikely to damage the Santa Clara River arroyo toad population. Critical Habitat designation for the arroyo toad has been set aside by judicial orders. No information is available on the revised Critical Habitat at this time. Thus, "Critical Habitat" for the species currently is undesignated.

California Red-legged Frog

California red-legged frog (*Rana aurora draytonii*) habitat components include spawning pools and their terrestrial borders, spring/summer refuges, and subterranean hibernation sites. These may be combined at single sites or they may be separated by aquatic or terrestrial "dispersal corridors" (Hayes & Jennings 1989; Jennings & Hayes 1994). Spawning pools are the ecologically central components of California red-legged frog habitat, because they support all elements of the species' reproductive biology and also provide forage for all red-legged frog life stages. Spawning pools are typically permanent or extended seasonal (through August) ponds or stream/spring pools of 0.7-1.2 meters in depth, with dense bordering, emergent, and surface vegetation. Such pools may be as small as one square meter in surface area, with no known

upper area limit. Always present at spawning habitat is a large complex invertebrate fauna for juvenile forage, extensive submerged herbaceous and algal vegetation for tadpole forage, and small terrestrial mammals such as voles (*Microtus*) that are an important component of adult frog forage (Jennings & Hayes 1994). Most suitable ponds are also partially to fully sunlit with mud or silt substrata, environmental factors essential to promote dense floating and emergent vegetation. Large populations of exotic predators such as bullfrogs and exotic centrarchid fish are usually absent from California red-legged frog spawning pools.

Newly constructed or impounded ponds rarely support California red-legged frog populations—most spawning sites have existed in stable, relatively undisturbed form for decades (Barry unpbl; Hayes & Jennings 1989). Likewise, red-legged frog spawning habitat is usually absent from river bottomland, presumably because high springtime flows would disrupt spawning success by scouring spawning pools and discouraging long-term aquatic vegetative growth. California red-legged frogs are vulnerable to early season floods because they spawn in early to mid-winter.

Adult California red-legged frogs may move in late spring and summer to shaded pools along streams where undercut banks and exposed root masses offer secure refuges. However, an isolated summer refuge component appears not to be critical to population survival because many adult frogs may be found throughout the summer at spawning pools. Hibernaculum preferences probably include lentic substrata (pond bottoms) or any secure subterranean site near spawning or summer refuge habitat, such as rodent burrows, vegetation mats, and root channels.

California red-legged frog "dispersal habitat" refers usually to stream courses that do not offer spawning or summer habitat but could be dispersal corridors between populations (USFWS 2002). Such corridors probably pertain more to populations in xeric (arid) localities; preliminary data from Marin County, California populations indicate that in mesic regions few structures or habitats represent true dispersal barriers to California red-legged frogs (Gary Fellers USGS, personal communication). "Dispersal habitat" as discussed in this report refers to any habitat that could be occupied temporarily by California red-legged frogs; it does not necessarily imply that California red-legged frogs might use such habitat to disperse or move among spawning pool habitats.

There are no California Natural Diversity Database records for the California red-legged frog in the Santa Clara River watershed, Los Angeles and Ventura Counties. However, the Museum of Vertebrate Zoology (UC Berkeley 2003) lists 17, Soledad Canyon/Los Angeles County specimens in its collection, from as recently as 1953. The California Academy of Sciences (CAS 2003) also lists a Soledad Canyon specimen, from 1950. The nearest specific locality referenced in these records to the project site is approximately 15 miles upstream near the

confluence with Agua Dulce Creek. Jennings and Hayes (1994) indicate that this species still occurs in the Santa Clara River watershed, in sites along San Francisquito Creek 5-10 miles northwest of the project site, and in tributaries to the Santa Clara River in Ventura County. The closest documented Ventura County occurrence is in Piru Creek 4.5 miles north of Piru, about 20 airline miles west of the project site (USFWS 2002). The project site is, therefore, placed within the distribution of the California Red-Legged Frog as it has been verified upstream and downstream of the project site.

Critical Habitat designation for the California red-legged frog has been set aside by judicial orders. No information is available on the revised Critical Habitat at this time. Thus, "Critical Habitat" for the species currently is undesignated.

1.3 STUDY SCOPE

The scope of this assessment focuses on addressing the potential effects of the Riverpark Project on the target aquatic species. The assessment is based on a review of technical and regulatory documentation provided by Newhall Land (Section 2.1), other technical documentation, research, databases related to the subject matter, and a field reconnaissance survey of the Project site. Additionally, the preparers of this assessment have extensive experience in this subject. No new surveys or analyses, other than that described herein, were conducted as part of this study.

1.4 ORGANIZATION OF DOCUMENT

The remainder of this report is organized as follows:

- Section 2 describes the methods used in the development of the assessment.
- Section 3 discusses the results of the assessment.
- Section 4 provides conclusions of the assessment.
- Section 5 cites literature and technical references used in the preparation of this assessment, all of which are incorporated herein by this reference.

2. METHODS

The methods used to conduct this assessment are based on review of technical and regulatory documentation provided by Newhall Land, and a field reconnaissance survey of the Project area. The methods are described in greater detail as follows.

2.1 REVIEW OF EXISTING PROJECT REPORTS AND DOCUMENTATION

The following technical reports and supporting documentation provided by Newhall Land were reviewed in assessing the potential effects of the Riverpark project on sensitive aquatic species inhabiting the Santa Clara River:

- *Final EIS/EIR: 404 Permit and 1603 Streambed Alteration Agreement for Portions of the Santa Clara River and its Tributaries, Los Angeles County.* Valencia Company, August 1998.

- *Natural River Management Plan: Permitted Projects and Activities.* Santa Clara River and tributaries. Valencia Company, November 1998.

- *Results of Focused Surveys for Arroyo Toad and Special-Status Aquatic Reptiles and Amphibians within the Natural River Management Plan Area, Valencia, California.* Impact Sciences, September 2001.

- *Aquatic Surveys Along the Santa Clara River Part I: Castaic Junction Project Area, Los Angeles County, California.* Aquatic Consulting Services, Inc., April 2002.

- *Biological Opinion for the Natural River Management Plan, Santa Clarita, Los Angeles County, California (1-8-02-F-4R) (File No. 940050400-BAH).* U.S. Fish and Wildlife Service, November 2002.

- *Results of Focused Unarmored Threespine Stickleback and Other Special-Status Fish Species, Newhall Ranch, Valencia California.* Impact Sciences, Inc., January 2003.

- *Amended 404 Permit (No. 940050400-BAH) for Natural River Management Plan.* U.S. Army Corps of Engineers, June 2003.

- *Revised Initial Study: Riverpark Project.* City of Santa Clarita, unpublished/undated.

- *Technical Flood Report for Riverpark.* PSOMAS, February 2004.

- *Riverpark Field Study References, Surveys and Appendices from Section 4.6 Biological Resources Draft Environmental Impact Report.* Impact Sciences, Inc (unpublished), February 2004.

2.2 REVIEW OF RECORDS AND LITERATURE

Information on the special-status wildlife of the proposed Riverpark Project Area was obtained through a search of the California Natural Diversity Database (CNDDB; CDFG 2003); the U.S. Fish and Wildlife Service (USFWS), Ventura Office, Endangered Species Division's species list (USFWS 2003), and other biological studies completed in the Project vicinity. Preliminary identification of potential habitat for aquatic species within the Project site was determined by reviewing aerial photography provided by Newhall Land. A subsequent site visit identified other potential aquatic habitat.

To evaluate the effects of the bank stabilization component of the Project on potential populations of UTS, arroyo toads, California red-legged frogs and other sensitive aquatic species, ENTRIX biologists queried the California Natural Diversity Database (CDFG 2003) and the collection databases of the Museum of Vertebrate Zoology, University of California, Berkeley (UC Berkeley 2003) and the California Academy of Sciences (CAS, 2003) to determine the historical distribution of these species in the project area. Various literature sources (especially Jennings and Hayes, 1994) were also used[1]. The ENTRIX biologists then examined maps, an aerial photograph dated January 22, 2003 and provided by Newhall Land, and ground photographs taken by ENTRIX biologists during the site visit on December 2, 2003 to locate potential aquatic habitat within and near the banks of the Santa Clara River within or directly adjacent to the site. Potential aquatic habitat suitability for any of the three species was determined by comparison with previously published assessments (e.g., Holland 1991; Jennings and Hayes 1994; USFWS 1999, 2002), as well as by the ENTRIX biologists' extensive experience with the three species in various parts of California, including the Santa Clara River region.

To assess the potential effects of the proposed project streambed stabilization on unarmored threespine stickleback, arroyo toad, and California red-legged frog, ENTRIX biologists consulted the USFWS Biological Opinion for the Natural River Management Plan (NRMP), Santa Clarita, Los Angeles County, California (1-8-02-F-4R), dated 15 November 2002, the Environmental Assessment 404(b)(1) Evaluation Public Interest Review for Permit Application Number 940050400-BAH (list in the references section), Valencia Company Natural River Management

1 Unless otherwise noted, neither the CNDDB nor the museum database records are verified independently. Experts usually identify museum specimens during accession, but taxonomic changes and misidentifications are always possible. Further, unless otherwise noted, the absence of CNDDB or museum species records from any site does not indicate that the species is absent from that site.

Plan, dated 18 June 2003, the Psomas/Impact Sciences Water Resources Technical Report for Riverpark (February 2004), references, surveys, appendices from the Draft Riverpark Biological EIR Section and various natural history accounts for these species (e.g., Jennings and Hayes 1994; Holland 1991; Sweet 1993; Swift et al. 1993; Stebbins 1951).

2.3 FIELD RECONNAISSANCE SURVEY

ENTRIX biologists, Dr. Camm Swift and Kathy Frye, conducted a reconnaissance-level field survey, focused on the following sensitive aquatic vertebrate species and their associated habitat within the Santa Clara River floodplain: 1) unarmored threespine stickleback; 2) southwestern arroyo toad; and 3) California red-legged frog. The purpose of field surveys was to analyze the potential effects of the Riverpark project on these species and their habitat.

The survey was conducted on December 2, 2003 in and along the Santa Clara River, within the boundaries of the Riverpark Project site. The Project site was examined for potential aquatic habitat, such as flowing or standing water, emergent vegetation, and associated aquatic species. The Santa Clara River channel, consistent with historical data, was entirely dry in the Project reach and free of standing or flowing water. There were several areas outside of the main channel adjacent to storm drain improvements where standing water was present. These areas of the project site were photographed. Water within these areas was sampled with random passes of a seine net in order to search for species present at the time of the December 2003 surveys. Figure 1 depicts the Project site and the areas where water was present. Species observed were recorded, along with water temperature, depth and width of wetted area. Field survey data is included in Appendix A.

Potential habitat for unarmored threespine stickleback, arroyo toad, and California red-legged frog, was noted, along with other features relevant to life history, such as the presence of prey or predators. Unarmored threespine stickleback habitat includes the presence of flowing water. Arroyo toad habitat factors include the presence of clear, standing water (required for egg deposition), sandy banks, and the presence of willows, cottonwood, and sycamore trees. California red-legged frogs habitat factors include relatively deep and vegetated sunlit pools.

3. RESULTS

This section presents the results of the focused assessment of potential effects of the Project on sensitive aquatic species.

3.1 AREAS OF STANDING WATER

The following summarizes the characteristics of the three sites within or adjacent to the project site containing standing water:

Site No. 1 – located directly east of the project site on the southern bank of the Santa Clara River (Figure 1). This site appears to be the result of nuisance flows from the adjacent industrial complex. The water is conveyed to the river by an improved concrete channel with ponding occurring near the river edge, outside of the main channel. This site (Site 1 photographs, Appendix A) lacked aquatic organisms, which indicates that the ponding in this area may not be permanent or this area only recently ponded. African clawed frogs were present at this location.

Site No. 2 – located adjacent to the Los Angeles Department of Water and Power aqueduct on the southern bank of the Santa Clara River (Figure 1). This site (Site 2 photographs, Appendix A) appears to be the result of nuisance flows from the adjacent mobile home park and properties south of Soledad Canyon Road. The water is conveyed to this site by an improved concrete channel and ponding again occurs at the edge of the river outside of the main channel. An incised natural channel from the pond extends westerly 300 feet downstream. This incised channel is located approximately 10 to 40 yards north of a berm bordering the mobile home park. This site lacked any vertebrate life.

Site No. 3 – located adjacent to Soledad Canyon Road, in the vicinity of Saugus Speedway, on the southern bank of the Santa Clara River. The site (Site 3 photographs, Appendix A) appears to be the result of nuisance flows from properties south of Soledad Canyon Road. The water is conveyed via an underground storm drain, with ponding occurring at the outlet to the river. Water empties from this stormdrain into a pile of boulders and drains 15 to 20 yards downstream. This area was choked with vegetation (cattails and watercress). This site, though the best from a potential habitat perspective, contained no vertebrate life.

No other potential aquatic habitat locations were identified during the reconnaissance survey of the project site.

3.2 UNARMORED THREESPINE STICKLEBACK

No indication of the presence of unarmored threespine stickleback could be detected during the visit. The four areas of standing water were sampled with dipnets or seines as appropriate. No fish, including UTS, were observed. This is consistent with the finding of recent surveys for the species conducted on the Riverpark site. Surface water is rarely present in this stretch of river for long periods of time, and it has never been designated as a location for the species to occur except as occasional winter straying from upstream locations during storm events.

As discussed previously, the nearest populations of stickleback are upstream approximately eight miles and somewhat closer downstream (approximately one mile). Newhall Land provided California Natural Diversity Data Base forms documenting the presence of 26 UTS on January 26, 27, and 28, and February 2, 1999 behind the Greenbrier Mobile Home Park, east of Bouquet Canyon Road Bridge over the Santa Clara River. The Greenbrier Mobile Home Park is located directly across from the River Park Project area. These UTS observations followed El Nino storms of 1998 that likely brought these fish downstream from the nearest upstream population. These observations do provide an indication that fish may become temporarily established on the project site as a result of high water flows.

Although Impact Sciences has identified jurisdictional drainages (not including the Santa Clara River) on the project site, we found no indication of water in any of these drainages. One of these drainages, located in the proposed park, was investigated in more detail during the site visit. Both ENTRIX biologists examined this drainage, which is partially developed. The only water seen was contained within a small artificial ornamental pool with a trickle of water as an outflow. No evidence of flow or riparian habitat was present and this drainage appears to be ephemeral, discharging water during storm events. Due to a lack of constant surface water and appropriate habitat characteristics, UTS are unlikely to utilize this and other drainages on-site.

The above findings support the conclusions that it is unlikely that UTS would inhabit the Project site on a permanent basis. UTS, could be expected to inhabit the site Project site temporarily, during wet years such as those associated with El Nino conditions.

The Psomas Technical Flood Impact Report prepared for the Riverpark project concludes that there would be no significant increase in water surface elevation, velocity or sedimentation downstream of the project site as a result of project improvements. Based upon this, no impacts to downstream UTS populations are expected.

3.3 ARROYO TOAD

The review of CNDDB records indicates that the arroyo toad still inhabits suitable habitat within the Santa Clara River upstream and downstream of the Project. However, no arroyo toads or arroyo toad habitat were observed at the Project site.

Long-term second-order confluence sand bar/overflow pool habitat of the type favored by arroyo toads for spawning or adult use is mostly absent within the project site, based on the listed reports and documents, site visit, and photographs reviewed for this assessment. The Impact Sciences (2001) report states that habitat capable of supporting arroyo toads is absent from the Santa Clara River from 450 meters east of Bouquet Canyon Road upstream to the eastern boundary of the Newhall Land and Farming property which includes most of the Riverpark Project site.

Areas of Standing Water Site No. 3 contained associated damp substrata with willow and cattail patches, but not vegetated sandbars and overflow pools parallel to the main channel. The other Areas of Standing Water sites and identified drainages are not large enough to provide the water or sediments necessary to form overflow pools and, therefore, are not considered habitat. In conclusion, in the absence of confluence overflow pool habitat, there is no spawning habitat for arroyo toads within the Project boundaries, and currently no information or evidence to suggest that adult arroyo toads occur within those boundaries.

The greatest potential concern regarding project impacts is that alterations in stream flow and sediment transport by the project bank stabilization, bridge abutments and bridge piers could damage arroyo toad spawning habitat downstream, whether by increased siltation, decreases in available sediments from upstream of the Project, seasonal alteration of water regimes, or excessive scouring by winter and spring floods. The EIR/EIS for the NRMP, of which the project is part, stated that the widening of the river channels within the areas of bank protection (i.e., bank stabilization) would not cause system-wide channel or bed erosion, or aggradation. USFWS in its 1998 and 2002 Biological Opinion on the NRMP (p. 30) supported that conclusion. The Psomas Technical Flood Report reaffirms the findings of the NRMP – that is no significant increase in velocity, water surface elevation or sedimentation as a result of project improvements (i.e., bank stabilization, bridge abutments, bridge piers, erosion protection).

The above findings support the conclusions that it is unlikely that arroyo toad would inhabit the Project site on a permanent basis. Based upon this, no impacts to downstream arroyo toad populations are expected.

3.4 CALIFORNIA RED-LEGGED FROG

The aerial photograph and field evaluation indicates that potential spawning or summer habitat for the California red-legged frog is absent from the main channel of the Santa Clara River within the project site. The floodplain and associated stream channel are clearly subject to episodic flooding and complete desiccation soon thereafter. Such instability does not allow California red-legged frog spawning habitat to develop.

No red-legged frogs were sighted during the site visit and none have been detected within the project site during any focused surveys. Site Nos. 1-3 (Areas of Standing Water) as well as the identified jurisdictional drianages offer little or no habitat capable of supporting aquatic frogs. Conversely, during the late winter and autumn, when California red-legged frogs may be most likely to move randomly (USFWS 2002), the main Santa Clara River channel within the project site could be considered "dispersal habitat," primarily because frogs can survive in the main channel during that season.

California red-legged frogs are probably not as vulnerable to floods because they usually do not spawn in river bottomlands. Local impacts (within the project site boundaries) to California red-legged frogs would probably result only from construction activity effects on the extremely unlikely presence of dispersing red-legged frogs during the construction process.

The above findings support the conclusions that it is unlikely that Red-Legged Frog would inhabit the Project site on a permanent basis.

The Psomas Technical Flood Impact Report prepared for the Riverpark project concludes that there would be no significant alteration in water surface elevation, velocity or sedimentation downstream of the project site as a result of project improvements. Based upon this, no impacts to downstream Red-Legged Frog habitat are expected.

The above conclusions may also apply to some other sensitive aquatic species such as the southwestern pond turtle (*Clemmys marmorata pallida*). Based on observations of the field assessment, including photographs, permanent water and terrestrial egg-laying sites required by these species are absent from the project site and immediately downstream.

4. SUMMARY OF FINDINGS

4.1 GENERAL FINDINGS

The historical record for the river indicates it has always been relatively dry in the Riverpark area and restoration to previous conditions should not be aimed at developing permanent water flows in this area. However, continued development in the drainage could result in more wastewater discharge that could increase the extent of surface flow and actually improve conditions for stickleback and other native aquatic forms.

4.2 UNARMORED THREESPINE STICKLEBACK

Occurrence of unarmored threespine stickleback on the Project site is predicted to be very sporadic and due to occasional strong storms or above average rainy seasons that may flush fish downstream from known established populations upstream. Site Nos. 1-3 (Areas of Standing Water) and proposed storm drain outlets provide possible areas that could maintain fish for temporary periods depending on the permanence of surface flow in the River and from these tributaries/storm drains. The implementation of project related improvements are unlikely to affect stickleback from using the Santa Clara River on the Project site.

The Psomas Flood Impact Report prepared for the Riverpark project concludes that there would be no significant alteration in water surface elevation, velocity or sedimentation downstream of the project site as a result of project improvements. Based upon this, no impacts to downstream populations of unarmored threespine stickleback are expected.

4.3 ARROYO TOAD

Occurrence of Arroyo Toad on the Project site is unlikely as the project site does not contain the habitat characteristics necessary for the permanent habitation of the species, primarily the lack of overflow pool habitat. Site No. 3 (Areas of Standing Water) contained associated damp substrata with willow and cattail patches but not vegetated sandbars and overflow pools parallel to the main channel. The other sites (Areas of Standing Water) and on-site drainages are not large enough to form overflow pools and therefore are not considered habitat.

The Psomas Flood Impact Report prepared for the Riverpark project concludes that there would be no significant alteration in water surface elevation, velocity or sedimentation downstream of the project site as a result of project improvements. Based upon this, no impacts to downstream populations of Arroyo Toad are expected.

4.4 CALIFORNIA RED-LEGGED FROG

California red-legged frogs occur rarely if at all in the Santa Clara River channel within or near the project site. The site lacks the appropriate spawning pools which are the ecologically central component of the California red-legged frog habitat.

5. REFERENCES

Aquatic Consulting Services, Inc. 2002. Aquatic Surveys Along the Santa Clara River Part I: Castaic Junction Project Area, Los Angeles County, California. Aquatic Consulting Services, Inc., April 2002.

Bury, R. B. 1986. Feeding ecology of the turtle *Clemmys marmorata*. Journal of Herpetology 20:515-521.

California Department of Fish and Game (CDFG). 2002. California Wildlife Habitat Relationships System. California Interagency Wildlife Task Group, Sacramento, California.

California Department of Fish and Game. 2003. RareFind3. California Natural Diversity Database.

CAS. 2003. California Academy of Sciences Department of Herpetology Collections Catalogue.

City of Santa Clarita, unpublished/undated. Revised Initial Study: Riverpark Project. City of Santa Clarita, unpublished/undated.

Hayes, M. P. & Jennings, M. R. 1989: Habitat correlates of distribution of the California red-legged frog (*Rana aurora draytonii*) and the foothill yellow-legged frog (*Rana boylii*): Implications for management. In: Management of amphibians, reptiles, and small mammals in North America, Proceedings of the symposium on the [July 19-21, 1988-Flagstaff, Arizona]. Vol. Technical Report RM - 166 (Szaro, R. E., Severson, Kieth E., Patton, David R. (technical coordinators) ed). USDA. pp. 1-458.

Holland, D. 1991. A synopsis of the ecology and status of the western pond turtle (*Clemmys marmorata*) in 1991. Report prepared for US Fish and Wildlife Service, National Ecology Research Center, San Simeon, California.

Impact Sciences, Inc. 2001. Results of Focused Surveys for Arroyo Toad and Special-Status Aquatic Reptiles and Amphibians within the Natural River Management Plan Area, Valencia, California. Impact Sciences, Inc., September 2001.

Impact Sciences, Inc. 2003. Results of Focused Unarmored Threespine Stickleback and Other Special-Status Fish Species, Newhall Ranch, Valencia California. Impact Sciences, Inc., January 2003.

Impact Sciences, Inc. and PSOMAS. 2003.Water Resources Technical Report for Riverpark. Impacts Sciences, Inc./PSOMAS, October 2003.

Impact Sciences, Inc. (unpublished) 2003.Riverpark Field Study References and Appendices from Section 4.6 Biological Resources Partial Screencheck Draft Environmental Impact Report. Impact Sciences, Inc (unpublished), November 2003.

Jennings, M R. and M. Hayes. 1994. Amphibian and Reptile Species of Special Concern in California. California Department of Fish and Game, Rancho Cordova, California.

PSOMAS. 2004. Technical Flood Report for Riverpark. Prepared for Impact Sciences, Inc., February 2004

Stebbins, R. C. 1951. Amphibians of Western North America. University of California Press, Berkeley, California.

Sweet, S. 1992. Ecology and status of the arroyo toad (*Bufo microscaphus californicus*) on the Los Padres National Forest of Southern California, with management recommendations. Contract Report to USDA Forest Service, Los Padres National Forest, Goleta, California.

Sweet, S. 1993. Second report on the biology and status of the arroyo toad (*Bufo microscaphus californicus*) on the Los Padres National Forest of Southern California. Contract Report to USDA Forest Service, Los Padres National Forest, Goleta, California.

Swift, C. C., T. R. Haglund, R. Fisher, and M. Ruiz. 1993. Status and distribution of the freshwater fishes of southern California. Bull. S. Calif Acad. Sci., 92(3):101-167.

UC Berkeley. 2003. Museum of Vertebrate Zoology online Data Access.

U.S. Army Corps of Engineers. 2003. Amended 404 Permit (No. 940050400-BAH) for Natural River Management Plan. U.S. Army Corps of Engineers, June 2003.

U.S. Fish and Wildlife Service, 1999. Recovery Plan for the Arroyo Southwestern Toad. U.S. Fish and Wildlife Service, Portland, Oregon.

U.S. Fish and Wildlife Service, 2002. Recovery Plan for the California Red-Legged Frog (*Rana aurora draytonii*). U.S. Fish and Wildlife Service, Portland, Oregon.

U.S. Fish and Wildlife Service. 2002. Biological Opinion for the Natural River Management Plan, Santa Clarita, Los Angeles County, California (1-8-02-F-4R) (File No. 940050400-BAH). U.S. Fish and Wildlife Service, November 2002.

Valencia Company. 1998. Final EIS/EIR: 404 Permit and 1603 Streambed Alteration Agreement for Portions of the Santa Clara River and its Tributaries, Los Angeles County. Valencia Company, August 1998.

Valencia Company. 1998 Natural River Management Plan: Permitted Projects and Activities. Santa Clara River and tributaries. Valencia Company, November 1998.

Zeiner, D. C., W.F Laudenslayer, Jr., K.E. Mayer, and M. White. 1990b. California's Wildlife: Volume III. Mammals. California Statewide Wildlife Habitat Relationship System. State of California, the Resources Agency, Department of Fish and Game, Sacramento, California.

6. LIST OF PREPARERS

ENTRIX, Inc.

- Matt Carpenter, Project Manager: coordination and management of ENTRIX technical staff through the background document review, field reconnaissance and document preparation phases,

- Camm Swift, Ph.D., Fisheries Scientist: conducted field reconnaissance survey and background document review; prepared technical discussion of issues related to stickleback and fish.

- Sean Barry, M.S. Herpetologist: reviewed background documents, site photos and field reconnaissance documentation; prepared technical discussion of issues related to amphibians and reptiles.

- Kathy Frye, Field Wildlife Biologist: conducted field reconnaissance survey evaluating habitat conditions for amphibians and reptiles.

Resumes for ENTRIX staff are included in Appendix B.

FIGURES

APPENDICES

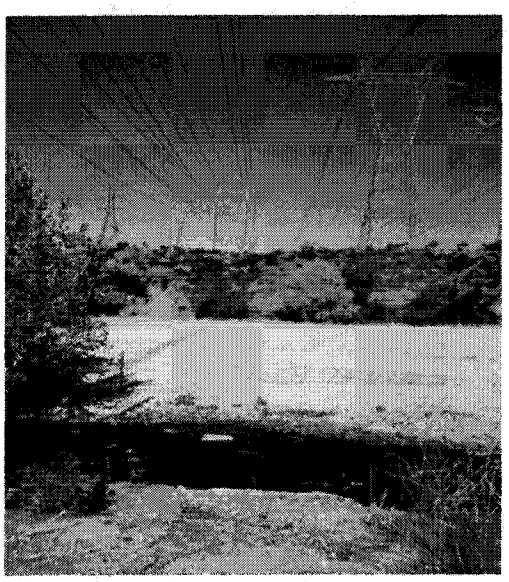
APPENDIX A

FIELD DATA & PHOTOGRAPHS

FIELD SURVEY DATA

Site ID	Feature Locale	Physical Parameters	Biological Parameters
Site 1	Storm Channel Outlet upstream of Project	Water Depth: 2 ft. Max Water Temp: 10°C	Seined 31 African clawed frogs in 5 hauls; no fish observed
Site 2	Storm Channel Outlet near DPW Aqueduct Pipeline	Water Depth: 2-3 ft. Max Water Temp: 5°C	No fish or invertebrates observed
Site 3	Stromdrain Outlet from Commuter Way	Water Depth: 1 ft. Max No Water Temp	Dense cattails and willows in shallow standing water; no sampling conducted

FIELD PHOTOGRAPHS

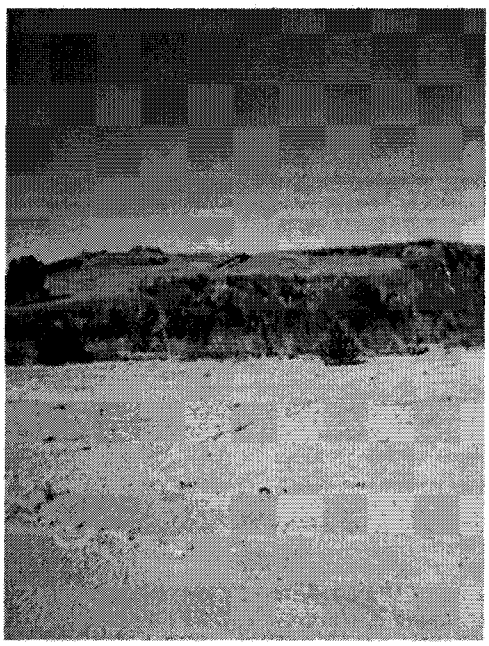


Site 1 - Sampling Site Located Upstream of Project at Outlet of Storm Channel on South Bank

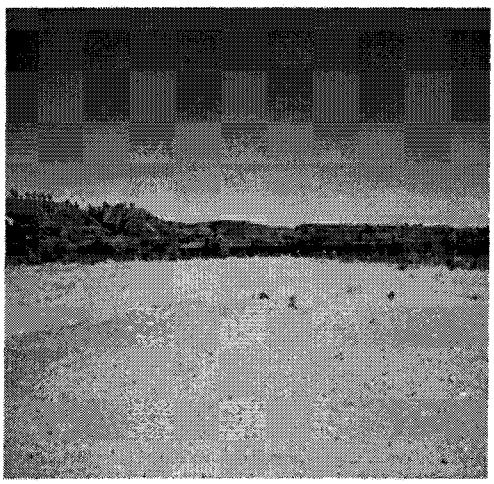
Site 2 - Sampling Site at DWP Aqueduct Pipeline Crossing on South Bank

Site 2 - Sampling Site at DWP Aqueduct Pipeline Crossing on South Bank

View Downstream (West) from
Proposed Santa Clarita
Parkway Bridge Crossing

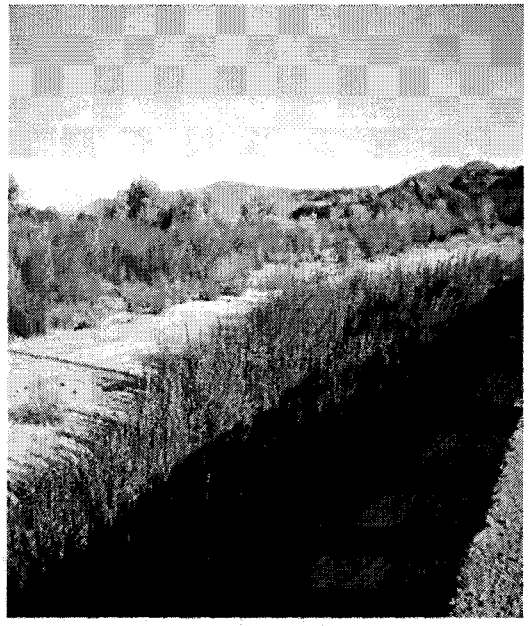


View to North Bank from
South, Downstream of DWP
Aqueduct Pipeline

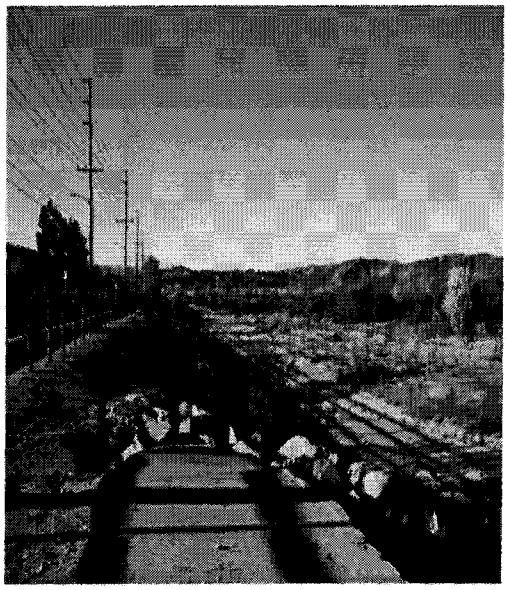


View Upstream (East) to DWP
Aqueduct Pipeline

Site 3- View Downstream (West) at Dense Cattail/Willow Stand Along Southern Bank



Site 3- View Upstream (East) Along Southern Bank (note dense cattails and willows)



View Downstream (West) from Project Site Along Southern Bank Toward Bouquet Canyon Road

APPENDIX B

RESUMES

APPENDIX 4.21

Wastewater Data

DMS Wastewater Generation Calculations						
Without Riverpark Project						
Land Use	Units	Quantity	Generation Factor (gpd)	Generation (gpd)	Generation (mgd)	AFY
Residential						
Single Family	du	62,472.00	260.00	16,242,720.00	16.24	18,194.1832
Multi-Family	du	29,037.00	195.00	5,662,215.00	5.66	6,342.4954
Non-Residential						
Commercial Retail	tsf	9,545.01	100.00	954,500.90	0.95	1,069.1783
Restaurant	tsf	-	1,000.00	0.00	0.00	0.0000
Industrial	tsf	-	25.00	0.00	0.00	0.0000
Office	tsf	-	200.00	0.00	0.00	0.0000
School (2)	tsf	-	200.00	0.00	0.00	0.0000
Park	acre	110.00		0.00	0.00	0.0000
Recreation Center (3)	tsf	-	100.00	0.00	0.00	0.0000
			Sub Totals	**22,859,435.90**	**22.86**	**25,605.86**
With Riverpark Project						
Land Use	Units	Quantity	Generation Factor (gpd)	Generation (gpd)	Generation (mgd)	AFY
Residential						
Single Family	du	439	260.00	114,140.00	0.1141	127.8532
Multi-Family	du	744	195.00	145,080.00	0.1451	162.5105
Non-Residential						
Commercial Retail	tsf	40.00	100.00	4,000.00	0.0040	4.4806
Restaurant	tsf	-	1,000.00	0.00	0.0000	0.0000
Industrial	tsf	-	25.00	0.00	0.0000	0.0000
Office	tsf	-	200.00	0.00	0.0000	0.0000
School (2)	tsf	-	200.00	0.00	0.0000	0.0000
Park	acre	29.00		0.00	0.0000	0.0000
Recreation Center (3)	tsf	-	100.00	0.00	0.0000	0.0000
			Sub Totals	**263,220.00**	**0.263220**	**294.84**
			Totals	**23,122,655.90**	**23.12**	**25,900.70**
gpd = gallons per day; mgd = million gallons per day; du = dwelling unit; tsf = thousand sq. feet; AFY = acre-feet per year						
Source of wastewater generation factors is CSDLAC, Loadings for Each Class of Land Use obtained from October 2002 correspondance.						

SCV Cumulative Buildout

Land Use Types	Unit	Cumulative Buildout w/o Project	Generation Factor	Generation Value
Single Family	du	93,281	260.00	24,253,060.00
Multi-Family	du	48,013	195.00	9,362,535.00
Mobile Home	du	2,699	156.00	421,044.00
Commercial Retail	tsf	19,859,030	100.00	1,985,903.00
Hotel	rooms	2,071	125.00	258,875.00
Sit-Down Restaurant	tsf	283,790	1,000.00	283,790.00
Fast Food Restaurant	tsf	23,600	1,000.00	23,600.00
Movie Theater(1)	seats	29,700	125.00	3,712,500.00
Health Club(2)	tsf	54,000	125.00	6,750.00
Car Dealership	tsf	411,000	100.00	41,100.00
Elem./Middle School	students	279,340	20.00	5,586,800.00
High School	students	12,958	20.00	259,160.00
College	students	29,948	20.00	598,960.00
Hospital(3)	tsf	247,460	125.00	30,932.50
Library(4)	tsf	171,790	50.00	8,589.50
Church	tsf	501,190	50.00	25,059.50
Day Care(4)	tsf	785,000	50.00	39,250.00
Industrial Park	tsf	41,743,950	200.00	8,348,790.00
Business Park	tsf	8,424,330	200.00	1,684,866.00
Manufact./Warehouse	tsf	3,932,470	200.00	786,494.00
Utilities	tsf	1,150,240	25.00	28,756.00
Commercial Office	tsf	6,380,520	200.00	1,276,104.00
Medical Office	tsf	133,730	200.00	26,746.00
Golf Course	ac	1,209	-	-
Developed Parkland	ac	493	-	-
Undeveloped Parkland	ac	1,000	-	-
Special Generator(5)	sg	413	25.00	10.33
				59,049,674.83

59.05

gpd = gallons per day; mgd = million gallons per day; du = dwelling unit;
tsf = thousand square feet; sq. ft. = square feet; stdnts = students
Source of wastewater generation factors is CDSLAC, Loadings for Each Class of Land Use

(1) Assumes each seat occupies a 9 square foot area (a total of 3,300 seats)
(2) Uses same generation factor for health club as commercial retail
(3) Number of hospital beds is based on assumed 500 square feet per bed at 247,460 sq.ft.
(4) Uses same generation factor for library as used for church.
(5) Uses same generation factor as for industrial/manufacturing.

SCV Cumulative Buildout w/ Riverpark Project

Land Use Types	Unit	Cumulative Buildout w/o Project	Generation Factor	Generation Value
Single Family	du	93,720	260.00	24,367,200.00
Multi-Family	du	48,757	195.00	9,507,615.00
Mobile Home	du	2,699	156.00	421,044.00
Commercial Retail	tsf	19,899	100.00	1,989,900.00
Hotel	rooms	2,071	125.00	258,875.00
Sit-Down Restaurant	tsf	284	1,000.00	283,790.00
Fast Food Restaurant	tsf	24	1,000.00	23,600.00
Movie Theater(1)	seats	29,700	125.00	3,712,500.00
Health Club(2)	tsf	54	125.00	6,750.00
Car Dealership	tsf	411	100.00	41,100.00
Elem./Middle School	students	279,340	20.00	5,586,800.00
High School	students	12,958	20.00	259,160.00
College	students	29,948	20.00	598,960.00
Hospital(3)	tsf	0	125.00	61.88
Library(4)	tsf	172	50.00	8,589.50
Church	tsf	501	50.00	25,059.50
Day Care(4)	tsf	785	50.00	39,250.00
Industrial Park	tsf	41,744	200.00	8,348,790.00
Business Park	tsf	8,424	200.00	1,684,866.00
Manufact./Warehouse	tsf	3,932	200.00	786,494.00
Utilities	tsf	1,150	25.00	28,756.00
Commercial Office	tsf	6,381	200.00	1,276,104.00
Medical Office	tsf	134	200.00	26,746.00
Golf Course	ac	1,238	-	-
Developed Parkland	ac	493	-	-
Undeveloped Parkland	ac	1,000	-	-
Special Generator(5)	sg	413	25.00	10,325.00
				59,292,335.88

gpd = gallons per day; mgd = million gallons per day; du = dwelling unit;
tsf = thousand square feet; sq. ft. = square feet; stdnts = students
Source of wastewater generation factors is CDSLAC, Loadings for Each Class of Land Use

(1) Assumes each seat occupies a 9 square foot area (a total of 3,300 seats)
(2) Uses same generation factor for health club as commercial retail
(3) Number of hospital beds is based on assumed 500 square feet per bed at 247,460 sq.ft.
(4) Uses same generation factor for library as used for church.
(5) Uses same generation factor as for industrial/manufacturing.

APPENDIX 6.0
Alternatives Data

Table 1

TRIP GENERATION AND TRIP RATE SUMMARY
ALTERNATIVE SCENARIOS

LAND USE	UNITS	AM PEAK HOUR IN	AM PEAK HOUR OUT	AM PEAK HOUR TOTAL	PM PEAK HOUR IN	PM PEAK HOUR OUT	PM PEAK HOUR TOTAL	ADT
TRIP GENERATION								
Proposed Project		**201**	**602**	**803**	**755**	**492**	**1,247**	**13,274**
Alternative 2: Santa Clara River Alternative								
Area A1 - Single Family	*-54 DU*	*-10*	*-30*	*-40*	*-35*	*-19*	*-54*	*-535*
Area A2 - Single Family	*-21 DU*	*-4*	*-12*	*-16*	*-14*	*-8*	*-22*	*-208*
Retail Commercial	*-13 TSF*	*-12*	*-8*	*-19*	*-38*	*-41*	*-78*	*-845*
Developed Park	*-4 AC*	*0*	*0*	*0*	*0*	*0*	*0*	*-10*
Alternative 2 Total		**175**	**552**	**728**	**668**	**424**	**1,093**	**11,676**
Alternative 3: Ridgeline Protection								
Area B - Single Family	*-76 DU*	*-14*	*-43*	*-57*	*-49*	*-27*	*-76*	*-752*
Area C - Apartment	*-55 DU*	*-4*	*-24*	*-28*	*-23*	*-12*	*-35*	*-380*
Area D - Apartment	*-27 DU*	*-2*	*-12*	*-14*	*-11*	*-6*	*-17*	*-186*
Alternative 3 Total		**181**	**523**	**704**	**672**	**447**	**1,119**	**11,956**
Alternative 4: Compliance with Noise Ordinance								
Area A1 - Single Family	*-109 DU*	*-21*	*-61*	*-82*	*-71*	*-39*	*-110*	*-1,079*
Area A2 - Single Family	*-75 DU*	*-14*	*-42*	*-56*	*-49*	*-27*	*-76*	*-743*
Area B - Single Family	*-117 DU*	*-22*	*-66*	*-88*	*-76*	*-42*	*-118*	*-1,158*
Alternative 4 Total		**144**	**433**	**577**	**559**	**384**	**943**	**10,294**
Alternative 5: Deletion of Santa Clarita Parkway								
Area A2 - Single Family	*9 DU*	*2*	*5*	*7*	*6*	*3*	*9*	*89*
Alternative 5 Total		**203**	**607**	**810**	**761**	**495**	**1,256**	**13,363**
TRIP RATES								
Single Family Detached [1]	DU	0.19	0.56	0.75	0.65	0.36	1.01	9.9
Apartment [2]	DU	0.08	0.43	0.51	0.41	0.21	0.62	6.9
Developed Park [3]	ACRE	0	0	0	0.03	0.04	0.07	2.6
Retail Commercial [4]	TSF	ADT: LN(T) = 0.643*LN(X) + 5.866						
		AM: LN(T) = 0.596*LN(X) + 2.329 (61% IB/39% OB)						
		PM: LN(T) = 0.660*LN(X) + 3.403 (48% IB/52% OB)						

Notes:
[1] SCVCTM Category 3 (Single Family 6-10 DU/Acre)
[2] SCVCTM Category 5 (Apartment)
[3] SCVCTM Category 51 (Developed Park)
[4] Institute of Transportation Engineers (ITE) Category 820 (Shopping Center)

DU = Dwelling Unit
AC = ACRE
TSF = Thousand Square Feet

Table 2

TRIP GENERATION AND TRIP RATE SUMMARY
GENERAL PLAN SCENARIOS

LAND USE	UNITS	AM PEAK HOUR IN	AM PEAK HOUR OUT	AM PEAK HOUR TOTAL	PM PEAK HOUR IN	PM PEAK HOUR OUT	PM PEAK HOUR TOTAL	ADT
TRIP GENERATION								
Permitted Development								
Community Commercial	*23.946 TSF*	*42*	*27*	*68*	*117*	*127*	*244*	*2,719*
Community Commercial (PD)	*537.544 TSF*	*266*	*170*	*435*	*915*	*991*	*1,905*	*20,101*
Commercial Office (PD)	*2381.541 TSF*	*3,691*	*452*	*4,143*	*500*	*3,072*	*3,572*	*27,531*
Residential Medium	*2670 DU*	*507*	*1,495*	*2,002*	*1,736*	*961*	*2,697*	*26,433*
Mobile Home Park	*360 DU*	*29*	*115*	*144*	*126*	*76*	*202*	*2,484*
Industrial Commercial	*304.872 TSF*	*168*	*30*	*198*	*40*	*159*	*199*	*1,829*
Total		**4,702**	**2,288**	**6,990**	**3,434**	**5,386**	**8,820**	**81,098**
With Density Bonus								
Community Commercial	*583.704 TSF*	*279*	*178*	*457*	*966*	*1,046*	*2,012*	*21,195*
Community Commercial (PD)	*13102.848 TSF*	*1,781*	*1,139*	*2,920*	*7,527*	*8,154*	*15,681*	*156,689*
Commercial Office (PD)	*0 TSF*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Residential Medium	*13865 DU*	*2,634*	*7,764*	*10,398*	*9,012*	*4,991*	*14,003*	*137,264*
Mobile Home Park	*1870 DU*	*150*	*598*	*748*	*655*	*393*	*1,048*	*12,903*
Industrial Commercial	*0 TSF*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Total		**4,844**	**9,679**	**14,523**	**18,159**	**14,584**	**32,744**	**328,051**
TRIP RATES								
Residential Medium [1]	DU	0.19	0.56	0.75	0.65	0.36	1.01	9.90
Mobile Home [2]	DU	0.08	0.32	0.40	0.35	0.21	0.56	6.90
Commercial Office [3]	TSF	1.55	0.19	1.74	0.21	1.29	1.50	11.56
Industrial Commercial [4]	TSF	0.55	0.10	0.65	0.13	0.52	0.65	6.00
Retail Commercial [5]	TSF	ADT: LN(T) = 0.643*LN(X) + 5.866						
		AM: LN(T) = 0.596*LN(X) + 2.329 (61% IB/39% OB)						
		PM: LN(T) = 0.660*LN(X) + 3.403 (48% IB/52% OB)						

Notes:
[1] SCVCTM Category 3 (Single Family 6-10 DU/Acre)
[2] SCVCTM Category 6 (Mobile Home)
[3] SCVCTM Category 40 (Commercial Office)
[4] SCVCTM Category 30 (Industrial Park)
[5] Institute of Transportation Engineers (ITE) Category 820 (Shopping Center)

DU = Dwelling Unit
TSF = Thousand Square Feet

Alternative 2
Santa Clarita Valley
Population and Employment Impact Analysis

Land Use	Unit	Quantity	Persons/ Household	Population	Employees/ Unit	Employees
Single Family Res'l	du	364	3.06	1,112	-	-
Multi-Family Res'l	du	744	3.06	2,274	-	-
Mobile Homes	du		2.55	0	-	-
Comm'l Retail	tsf	26.00	-	-	2.50	65
Hotel/Motel (1)	rooms		-	-	0.90	0
School/College	-		-	-	-	
Hospital	tsf		-	-	3.00	0
Library	tsf		-	-	1.00	0
Church	tsf		-	-	0.50	0
Business Park	tsf		-	-	3.00	0
Industrial/Mfg.	tsf		-	-	2.00	0
Utilities	tsf		-	-	0.70	0
Office	tsf		-	-	4.00	0
Golf Course/Park	acres	25.00	-	-	0.40	10
Special Generator (3)	tsf		-	-	0.70	0
			Totals	**3,386**	**-**	**75**

du = dwelling unit; tsf = thousand square feet

Build out analysis and school employment is derived from the Traffic Model.

(1) Based on 400 gross square feet per room and 0.9 employees per room (SCAG, 1990).

(3) Assumes same rate as Utilities.

Prepared by Impact Sciences, Inc.
S. Tebo
12/9/03

Alternative 2

River Park

Santa Clarita Valley
Library Impact Analysis

Land Use	Number of Units	Persons/ Household	Library (Sq. Feet)	Library Books
Single Family Res'l	364	3.01	383	2,191
Multi-Family Res'l	744	3.01	784	4,479
Mobile Homes		2.55	0	0
		Totals	**1,167**	**6,670**

L.A. County Public Library Standard: 0.35 s.f./capita
L.A. County Public Library Standard: 2.0 books/capita

Prepared by Impact Sciences, Inc.
S. Tebo
12/5/03

Santa Clarita Valley
Net Increase in
Student/Classroom/School Generation Using
Theoretical Student Generation Rates
River Park-Alternative 2

District	Housing Units by Type			Student Generation Rate			Class Size	School Size	Students	Classes	Schools
	Single Fam.	Multi-Fam.	Apartment	Single Fam.	Multi-Fam.	Apartment					
Saugus Union Elementary	364		744	0.431	0.0556	0.1326	30	770	256	8.52	0.33
Hart Junior High	364		744	0.104	0.037	0.038	32	930	66	2.07	0.07
Hart High School	364		744	0.179	0.064	0.054	32	2,764	105	3.29	0.04
								Totals	**427**	**13.88**	**0.44**

Prepared By Impact Sciences, Inc.
S.Tebo
12/5/03

Alternative 2
River Park
Parks and Recreation Impact Analysis
Using Household Size Numbers from Park Ordinance

Land Use	Number of Units	Persons/ Household	Population	Parkland Req'mt (acres)
Single Family Res'l	364	3.01	1,096	3.29
Multi-Family Res'l	744	3.01	2,239	6.72
Mobile Homes		2.55	0	0.00
		Totals	**3,335**	**10.01**
Based on Quimby requirement of 3.0 acres/1000 persons				

Prepared by Impact Sciences, Inc.
S. Tebo
12/5/03

Alternative 2
Santa Clarita Valley
Solid Waste Generation
(No Recycling) Impact Analysis

Land Use	Quantity	Units	Generation Rate		Total Waste Generated	
			(tpy) (1)	(lbs./day)	(tpy)	(lbs./day)
Residential Units:						
Single Family Detached	364	du	2.0400	11.18	743	4,069
Multi-Family or Attached	744	du	1.1700	6.41	870	4,770
Mobile Home		du	1.1700	6.41	0	0
Commercial/Industrial						
General Retail	26,000	sq. ft.	0.0024	0.01	62	342
Eating/Drnkng Establ.		sq. ft.	0.0108	0.06	0	0
Food & Drug Stores		sq. ft.	0.0072	0.04	0	0
Auto Dlr/Service Sta.		sq. ft.	0.0051	0.03	0	0
Hotel & Motel		sq. ft.	0.0053	0.03	0	0
Warehouse		sq. ft.	0.0011	0.01	0	0
Medical Offices		sq. ft.	0.0027	0.01	0	0
Hospitals		sq. ft.	0.0055	0.03	0	0
Business Park		sq. ft.	0.0014	0.01	0	0
Office		sq. ft.	0.0014	0.01	0	0
Library (4)		sq. ft.	0.0014	0.01	0	0
Education & Schools		sq. ft.	0.0013	0.01	0	0
College		sq. ft.	0.0013	0.01	0	0
Trans., Comm., Utilities		sq. ft.	0.0079	0.04	0	0
Special Generator (6)		sq. ft.	0.0079	0.04	0	0
Golf Course/Park	25	acres	0.2000	1.10	5	27
Manufacturing		sq. ft.	0.0050	0.03	0	0
Church (4)		sq. ft.	0.0014	0.01	0	0
				Totals	**1,680**	**9,208**

du = dwelling unit; sq.ft. - square feet; tpy = tons per year; lbs. = pounds

(1) The solid waste daily generation rates in tons per year are derived from the Ventura County Solid Waste Management Department's Guidelines for Preparation of Environmental Assessments for Solid Waste Impacts. These figures do not reflect any recycling activities on the part of the generator.

(4) Assumes same generation rate as for office.

(6) Conservatively assumes same generation rate as utilities.

Prepared by Impact Sciences, Inc.
S. Tebo
12/5/03

Alternative 2
Santa Clarita Valley
Wastewater Generation Impact Analysis

Land Use	Units	Quantity	Generation Factor (gpd)	Generation (gpd)	Generation (mgd)
Residential					
Single Family	du	364	260.00	94,640.00	0.0946
Multi-Family	du	744	195.00	145,080.00	0.1451
Mobile Homes	du		195.00	0.00	0.0000
Non-Residential					
Commercial Retail	tsf	3	100.00	300.00	0.0003
Hotel	sq.ft.		na		
Hotel (1)	rooms		125.00	0.00	0.0000
School	tsf		200.00	0.00	0.0000
College	stdnts		20.00	0.00	0.0000
College	sq.ft.		na		
Hospital	sq.ft.		na		
Hospital (3)	beds		125.00	0.00	0.0000
Library (4)	tsf		50.00	0.00	0.0000
Church	tsf		50.00	0.00	0.0000
Business Park (7)	tsf		300.00	0.00	0.0000
Industrial/Manufacturing (5)	tsf		25.00	0.00	0.0000
Utilities	tsf		25.00	0.00	0.0000
Commercial/Medical Office	tsf		300.00	0.00	0.0000
Golf Course/Park	acres	25	0.00	0.00	0.0000
Golf Course/Park Imps	tsf		100.00	0.00	0.0000
Visitor Serving (8)	tsf		100.00	0.00	0.0000
Special Generator (9)	tsf		25.00	0.00	0.0000
			Totals	**240,020.00**	**0.2400**

gpd = gallons per day; mgd = million gallons per day; du = dwelling unit; tsf = thousand square feet; sq. ft. = square feet; stdnts = students

Source of wastewater generation factors is CDSLAC, Loadings for Each Class of Land Use (1992-93). This list is provided in Appendix 4.10.

(1) Number of hotel rooms is based upon an assumed 400 gross square feet per room.

(3) Number of hospital beds is based upon an assumed 500 gross square feet per bed.

(4) Uses same generation factor for library as used for church.

(5) Generation factor for industrial/manufacturing is based on dry manufacturing uses.

(7) Uses same generation factor as for professional building.

(8) Uses same generation factor as for commercial retail.

(9) Uses same generation factor as for industrial/manufacturing.

Prepared by Impact Sciences, Inc.
S. Tebo
12/5/03

Alternative 2-Santa Clara River Protection
Estimated Water Demand

Land Use Category	Amount	Water Duty Factor	Water Demand (AFY)
Single Family Units	364 units	0.55 af/unit	200.2
Apartments	744 units	0.19 af/unit	141.36
Park	4 acres	3 af per acre	12.0
Other Misc. Landscaping (irrigated common landscaping, pocket parks, etc.)	76 acres	3 af per acre	228.0
Commercial (26,000 sq. ft.)	2 acres	0.0289 af/100 sq. ft.	7.51
TOTAL			**589.07**

ALTERNATIVE 2 SUMMERTIME EMISSIONS

URBEMIS 2002 For Windows 7.4.2

File Name: C:\URBEMIS2002\Urbemis River Park\River Park Alternative 2.urb
Project Name: River Park Alternative 2
Project Location: South Coast Air Basin (Los Angeles area)
On-Road Motor Vehicle Emissions Based on EMFAC2002 version 2.2

SUMMARY REPORT
(Pounds/Day - Summer)

AREA SOURCE EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10
TOTALS (lbs/day,unmitigated)	55.41	10.50	8.07	0.09	0.03
TOTALS (lbs/day, mitigated)	55.31	9.31	7.55	0.09	0.02

OPERATIONAL (VEHICLE) EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10
TOTALS (lbs/day,unmitigated)	97.01	105.44	1,138.55	0.73	110.47
TOTALS (lbs/day, mitigated)	97.01	105.44	1,138.55	0.73	110.47

SUM OF AREA AND OPERATIONAL EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10
TOTALS (lbs/day,unmitigated)	152.42	115.94	1,146.62	0.82	110.50
TOTALS (lbs/day, mitigated)	152.32	114.75	1,146.10	0.82	110.50

URBEMIS 2002 For Windows 7.4.2

File Name: C:\URBEMIS2002\Urbemis River Park\River Park Alternative 2.urb
Project Name: River Park Alternative 2
Project Location: South Coast Air Basin (Los Angeles area)
On-Road Motor Vehicle Emissions Based on EMFAC2002 version 2.2

DETAIL REPORT
(Pounds/Day - Summer)

AREA SOURCE EMISSION ESTIMATES (Summer Pounds per Day, Unmitigated)

Source	ROG	NOx	CO	SO2	PM10
Natural Gas	0.80	10.43	4.43	-	0.02
Wood Stoves - No summer emissions					
Fireplaces - No summer emissions					
Landscaping	0.40	0.06	3.64	0.09	0.01
Consumer Prdcts	54.21	-	-	-	-
TOTALS(lbs/day,unmitigated)	55.41	10.50	8.07	0.09	0.03

AREA SOURCE EMISSION ESTIMATES

Source	ROG	NOx	CO	SO2	PM10
Natural Gas	0.70	9.24	3.92	-	0.02
Wood Stoves - No summer emissions					
Fireplaces - No summer emissions					
Landscaping	0.40	0.06	3.64	0.09	0.01
Consumer Prdcts	54.21	-	-	-	-
TOTALS (lbs/day, mitigated)	55.31	9.31	7.55	0.09	0.02

Area Source Mitigation Measures

UNMITIGATED OPERATIONAL EMISSIONS

	ROG	NOx	CO	SO2	PM10
Single family housing	32.09	34.78	379.75	0.24	36.59
Apartments low rise	49.31	49.54	540.99	0.34	52.13
City park	0.13	0.09	0.91	0.00	0.09
Strip mall	15.48	21.03	216.90	0.14	21.66
TOTAL EMISSIONS (lbs/day)	97.01	105.44	1,138.55	0.73	110.47

Does not include correction for passby trips.
Does not include double counting adjustment for internal trips.

OPERATIONAL (Vehicle) EMISSION ESTIMATES

Analysis Year: 2008 Temperature (F): 90 Season: Summer

EMFAC Version: EMFAC2002 (9/2002)

Summary of Land Uses:

Unit Type	Trip Rate	Size	Total Trips
Single family housing	9.90 trips / dwelling units	364.00	3,603.60
Apartments low rise	6.90 trips / dwelling units	744.00	5,133.60
City park	2.60 trips / acres	4.00	10.40
Strip mall	94.55 trips / 1000 sq. ft.	27.00	2,552.85

Vehicle Assumptions:

Fleet Mix:

Vehicle Type	Percent Type	Non-Catalyst	Catalyst	Diesel
Light Auto	55.00	1.60	98.00	0.40
Light Truck < 3,750 lbs	15.00	2.70	95.30	2.00
Light Truck 3,751- 5,750	16.20	1.20	97.50	1.30
Med Truck 5,751- 8,500	7.20	1.40	95.80	2.80
Lite-Heavy 8,501-10,000	1.10	0.00	81.80	18.20
Lite-Heavy 10,001-14,000	0.40	0.00	50.00	50.00
Med-Heavy 14,001-33,000	1.00	0.00	20.00	80.00
Heavy-Heavy 33,001-60,000	0.90	0.00	11.10	88.90
Line Haul > 60,000 lbs	0.00	0.00	0.00	100.00
Urban Bus	0.20	0.00	50.00	50.00
Motorcycle	1.70	76.50	23.50	0.00
School Bus	0.10	0.00	0.00	100.00
Motor Home	1.20	8.30	83.30	8.40

Travel Conditions

	Residential			Commercial		
	Home-Work	Home-Shop	Home-Other	Commute	Non-Work	Customer
Urban Trip Length (miles)	11.5	4.9	6.0	10.3	5.5	5.5
Rural Trip Length (miles)	11.5	4.9	6.0	10.3	5.5	5.5
Trip Speeds (mph)	35.0	40.0	40.0	40.0	40.0	40.0
% of Trips - Residential	20.0	37.0	43.0			
% of Trips - Commercial (by land use)						
City park				5.0	2.5	92.5
Strip mall				2.0	1.0	97.0

MITIGATED OPERATIONAL EMISSIONS

	ROG	NOx	CO	SO2	PM10
Single family housing	32.09	34.78	379.75	0.24	36.59
Apartments low rise	49.31	49.54	540.99	0.34	52.13
City park	0.13	0.09	0.91	0.00	0.09
Strip mall	15.48	21.03	216.90	0.14	21.66
TOTAL EMISSIONS (lbs/day)	97.01	105.44	1,138.55	0.73	110.47

OPERATIONAL (Vehicle) EMISSION ESTIMATES

Analysis Year: 2008 Temperature (F): 90 Season: Summer

EMFAC Version: EMFAC2002 (9/2002)

Summary of Land Uses:

Unit Type	Trip Rate	Size	Total Trips
Single family housing	9.90 trips / dwelling units	364.00	3,603.60
Apartments low rise	6.90 trips / dwelling units	744.00	5,133.60
City park	2.60 trips / acres	4.00	10.40
Strip mall	94.55 trips / 1000 sq. ft.	27.00	2,552.85

Vehicle Assumptions:

Fleet Mix:

Vehicle Type	Percent Type	Non-Catalyst	Catalyst	Diesel
Light Auto	55.00	1.60	98.00	0.40
Light Truck < 3,750 lbs	15.00	2.70	95.30	2.00
Light Truck 3,751- 5,750	16.20	1.20	97.50	1.30
Med Truck 5,751- 8,500	7.20	1.40	95.80	2.80
Lite-Heavy 8,501-10,000	1.10	0.00	81.80	18.20
Lite-Heavy 10,001-14,000	0.40	0.00	50.00	50.00
Med-Heavy 14,001-33,000	1.00	0.00	20.00	80.00
Heavy-Heavy 33,001-60,000	0.90	0.00	11.10	88.90
Line Haul > 60,000 lbs	0.00	0.00	0.00	100.00
Urban Bus	0.20	0.00	50.00	50.00
Motorcycle	1.70	76.50	23.50	0.00
School Bus	0.10	0.00	0.00	100.00
Motor Home	1.20	8.30	83.30	8.40

Travel Conditions

	Residential			Commercial		
	Home-Work	Home-Shop	Home-Other	Commute	Non-Work	Customer
Urban Trip Length (miles)	11.5	4.9	6.0	10.3	5.5	5.5
Rural Trip Length (miles)	11.5	4.9	6.0	10.3	5.5	5.5
Trip Speeds (mph)	35.0	40.0	40.0	40.0	40.0	40.0
% of Trips - Residential	20.0	37.0	43.0			
% of Trips - Commercial (by land use)						
City park				5.0	2.5	92.5
Strip mall				2.0	1.0	97.0

ENVIRONMENTAL FACTORS APPLICABLE TO THE PROJECT

Pedestrian Environment

```
 0.0            Side Walks/Paths: No Sidewalks
 0.0            Street Trees Provide Shade: No Coverage
 0.0            Pedestrian Circulation Access: No Destinations
 0.0            Visually Interesting Uses: No Uses Within Walking Distance
 0.0            Street System Enhances Safety: No Streets
 0.0            Pedestrian Safety from Crime: No Degree of Safety
 0.0            Visually Interesting Walking Routes: No Visual Interest

 0.0    <- Pedestrian Environmental Credit
 0.0   /19 =  0.0    <- Pedestrian Effectiveness Factor
```

Transit Service

```
 0.0            Transit Service: Dial-A-Ride or No Transit Service

 0.0    <- Transit Effectiveness Credit
 0.0    <- Pedestrian Factor
 0.0    <-Total
 0.0    /110 =  0.0     <-Transit Effectiveness Factor
```

Bicycle Environment

```
 0.0            Interconnected Bikeways: No Bikeway Coverage
 0.0            Bike Routes Provide Paved Shoulders: No Routes
 0.0            Safe Vehicle Speed Limits: No Routes Provided
 0.0            Safe School Routes: No Schools
 0.0            Uses w/in Cycling Distance: No Uses w/in Cycling Distance
 0.0            Bike Parking Ordinance: No Ordinance or Unenforceable

 0.0    <- Bike Environmental Credit
 0.0  /20 =  0.0    <- Bike Effectiveness Factor
```

MITIGATION MEASURES SELECTED FOR THIS PROJECT
(All mitigation measures are printed, even if
the selected land uses do not constitute a mixed use.)

Transit Infrastructure Measures

% Trips Reduced	Measure
15.0	Credit for Existing or Planned Community Transit Service
15.0	<- Totals

Pedestrian Enhancing Infrastructure Measures (Residential)

% Trips Reduced	Measure
2.0	Credit for Surrounding Pedestrian Environment
1.0	Provide Sidewalks and/or Pedestrian Paths
1.0	Provide Direct Pedestrian Connections
0.5	Provide Pedestrian Safety
0.5	Provide Street Lighting
0.5	Provide Pedestrian Signalization and Signage
5.5	<- Totals

Pedestrian Enhancing Infrastructure Measures (Non-Residential)

% Trips Reduced	Measure
2.0	Credit for Surrounding Pedestrian Environment
2.0	<- Totals

Bicycle Enhancing Infratructure Measures (Residential)

% Trips Reduced	Measure
7.0	Credit for Surrounding Bicycle Environment
2.0	Provide Bike Lanes/Paths Connecting to Bikeway System
9.0	<- Totals

Bike Enhancing Infrastructure Measures (Non-Residential)

% Trips Reduced	Measure
5.0	Credit for Surrounding Area Bike Environment
5.0	<- Totals

Operational Measures (Applying to Commute Trips)

% Trips Reduced	Measure
0.0	<- Totals

Operational Measures (Applying to Employee Non-Commute Trips)

% Trips Reduced	Measure
0.0	<- Totals

Operational Measures (Applying to Customer Trips)

% Trips Reduced	Measure
0.0	<- Totals

Measures Reducing VMT (Non-Residential)

VMT Reduced	Measure
0.0	Park and Ride Lots
0.0	<- Totals

Measures Reducing VMT (Residential)

VMT Reduced	Measure
0.0	<- Totals

Total Percentage Trip Reduction
with Environmental Factors and Mitigation Measures

Travel Mode	Home-Work Trips	Home-Shop Trips	Home-Other Trips
Pedestrian	0.00	0.00	0.00
Transit	0.00	0.00	0.00
Bicycle	0.00	0.00	0.00
Totals	0.00	0.00	0.00

Travel Mode	Work Trips	Employee Trips	Customer Trips
Pedestrian	0.00	0.00	0.00
Transit	0.00	0.00	0.00
Bicycle	0.00	0.00	0.00
Other	0.00	0.00	0.00
Totals	0.00	0.00	0.00

Changes made to the default values for Land Use Trip Percentages

Changes made to the default values for Area

The wood stove option switch changed from on to off.
The area souce mitigation measure option switch changed from off to on.
The landscape year changed from 2004 to 2008.
Mitigation measure Increase Insulation Beyond Title 24: Rsdntl Space Heat.
has been changed from off to on.
Mitigation measure Increase Insulation Beyond Title 24: Cmrcl Space Heat.
has been changed from off to on.

Changes made to the default values for Operations

The operational emission year changed from 2004 to 2008.
The double counting internal work trip limit changed from to 51.577.
The double counting shopping trip limit changed from to 25.7885.
The double counting other trip limit changed from to 2485.8845.
The travel mode environment settings changed from both to: both
Mitigation measure Provide Sidewalks and/or Pedestrian Paths:1
has been changed from off to on.
Mitigation measure Provide Direct Pedestrian Connections:1
has been changed from off to on.
Mitigation measure Provide Pedestrian Safety:0.5
has been changed from off to on.
Mitigation measure Provide Street Lighting:0.5
has been changed from off to on.
Mitigation measure Provide Pedestrian Signalization and Signage:0.5
has been changed from off to on.
Mitigation measure Provide Bike Lanes/Paths Connecting to Bikeway System:2
has been changed from off to on.

ALTERNATIVE 2 WINTERTIME EMISSIONS

URBEMIS 2002 For Windows 7.4.2

File Name: C:\URBEMIS2002\Urbemis River Park\River Park Alternative 2.urb
Project Name: River Park Alternative 2
Project Location: South Coast Air Basin (Los Angeles area)
On-Road Motor Vehicle Emissions Based on EMFAC2002 version 2.2

SUMMARY REPORT
(Pounds/Day - Winter)

AREA SOURCE EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10
TOTALS (lbs/day,unmitigated)	1,296.07	24.52	1,373.39	2.17	187.53
TOTALS (lbs/day, mitigated)	1,295.97	23.33	1,372.88	2.17	187.53

OPERATIONAL (VEHICLE) EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10
TOTALS (lbs/day,unmitigated)	89.92	152.45	1,082.56	0.60	110.47
TOTALS (lbs/day, mitigated)	89.92	152.45	1,082.56	0.60	110.47

SUM OF AREA AND OPERATIONAL EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10
TOTALS (lbs/day,unmitigated)	1,385.99	176.97	2,455.96	2.76	298.00
TOTALS (lbs/day, mitigated)	1,385.88	175.78	2,455.44	2.76	298.00

URBEMIS 2002 For Windows 7.4.2

File Name: C:\URBEMIS2002\Urbemis River Park\River Park Alternative 2.urb
Project Name: River Park Alternative 2
Project Location: South Coast Air Basin (Los Angeles area)
On-Road Motor Vehicle Emissions Based on EMFAC2002 version 2.2

DETAIL REPORT
(Pounds/Day - Winter)

AREA SOURCE EMISSION ESTIMATES (Winter Pounds per Day, Unmitigated)

Source	ROG	NOx	CO	SO2	PM10
Natural Gas	0.80	10.43	4.43	-	0.02
Wood Stoves	0.00	0.00	0.00	0.00	0.00
Fireplaces	1,241.06	14.09	1,368.96	2.17	187.51
Landscaping - No winter emissions					
Consumer Prdcts	54.21	-	-	-	-
TOTALS(lbs/day,unmitigated)	1,296.07	24.52	1,373.39	2.17	187.53

AREA SOURCE EMISSION ESTIMATES

Source	ROG	NOx	CO	SO2	PM10
Natural Gas	0.70	9.24	3.92	-	0.02
Wood Stoves	0.00	0.00	0.00	0.00	0.00
Fireplaces	1,241.06	14.09	1,368.96	2.17	187.51
Landscaping - No winter emissions					
Consumer Prdcts	54.21	-	-	-	-
TOTALS (lbs/day, mitigated)	1,295.97	23.33	1,372.88	2.17	187.53

Area Source Mitigation Measures

Increase Insulation Beyond Title 24: Rsdntl Space Heat.
Percent Reduction(ROG 14% NOx 13% CO 7.4% SO2 0% PM10 13%)
Increase Insulation Beyond Title 24: Cmrcl Space Heat.
Percent Reduction(ROG 10% NOx 9% CO 7% SO2 0% PM10 9.5%)

UNMITIGATED OPERATIONAL EMISSIONS

	ROG	NOx	CO	SO2	PM10
Single family housing	29.90	50.31	359.00	0.20	36.59
Apartments low rise	42.72	71.67	511.42	0.28	52.13
City park	0.07	0.13	0.88	0.00	0.09
Strip mall	17.22	30.33	211.27	0.11	21.66
TOTAL EMISSIONS (lbs/day)	89.92	152.45	1,082.56	0.60	110.47

Does not include correction for passby trips.
Does not include double counting adjustment for internal trips.

OPERATIONAL (Vehicle) EMISSION ESTIMATES

Analysis Year: 2008 Temperature (F): 50 Season: Winter

EMFAC Version: EMFAC2002 (9/2002)

Summary of Land Uses:

Unit Type	Trip Rate	Size	Total Trips
Single family housing	9.90 trips / dwelling units	364.00	3,603.60
Apartments low rise	6.90 trips / dwelling units	744.00	5,133.60
City park	2.60 trips / acres	4.00	10.40
Strip mall	94.55 trips / 1000 sq. ft.	27.00	2,552.85

Vehicle Assumptions:

Fleet Mix:

Vehicle Type	Percent Type	Non-Catalyst	Catalyst	Diesel
Light Auto	55.00	1.60	98.00	0.40
Light Truck < 3,750 lbs	15.00	2.70	95.30	2.00
Light Truck 3,751- 5,750	16.20	1.20	97.50	1.30
Med Truck 5,751- 8,500	7.20	1.40	95.80	2.80
Lite-Heavy 8,501-10,000	1.10	0.00	81.80	18.20
Lite-Heavy 10,001-14,000	0.40	0.00	50.00	50.00
Med-Heavy 14,001-33,000	1.00	0.00	20.00	80.00
Heavy-Heavy 33,001-60,000	0.90	0.00	11.10	88.90
Line Haul > 60,000 lbs	0.00	0.00	0.00	100.00
Urban Bus	0.20	0.00	50.00	50.00
Motorcycle	1.70	76.50	23.50	0.00
School Bus	0.10	0.00	0.00	100.00
Motor Home	1.20	8.30	83.30	8.40

Travel Conditions

	Residential			Commercial		
	Home-Work	Home-Shop	Home-Other	Commute	Non-Work	Customer
Urban Trip Length (miles)	11.5	4.9	6.0	10.3	5.5	5.5
Rural Trip Length (miles)	11.5	4.9	6.0	10.3	5.5	5.5
Trip Speeds (mph)	35.0	40.0	40.0	40.0	40.0	40.0
% of Trips - Residential	20.0	37.0	43.0			
% of Trips - Commercial (by land use)						
City park				5.0	2.5	92.5
Strip mall				2.0	1.0	97.0

MITIGATED OPERATIONAL EMISSIONS

	ROG	NOx	CO	SO2	PM10
Single family housing	29.90	50.31	359.00	0.20	36.59
Apartments low rise	42.72	71.67	511.42	0.28	52.13
City park	0.07	0.13	0.88	0.00	0.09
Strip mall	17.22	30.33	211.27	0.11	21.66
TOTAL EMISSIONS (lbs/day)	89.92	152.45	1,082.56	0.60	110.47

OPERATIONAL (Vehicle) EMISSION ESTIMATES

Analysis Year: 2008 Temperature (F): 50 Season: Winter

EMFAC Version: EMFAC2002 (9/2002)

Summary of Land Uses:

Unit Type	Trip Rate	Size	Total Trips
Single family housing	9.90 trips / dwelling units	364.00	3,603.60
Apartments low rise	6.90 trips / dwelling units	744.00	5,133.60
City park	2.60 trips / acres	4.00	10.40
Strip mall	94.55 trips / 1000 sq. ft.	27.00	2,552.85

Vehicle Assumptions:

Fleet Mix:

Vehicle Type	Percent Type	Non-Catalyst	Catalyst	Diesel
Light Auto	55.00	1.60	98.00	0.40
Light Truck < 3,750 lbs	15.00	2.70	95.30	2.00
Light Truck 3,751- 5,750	16.20	1.20	97.50	1.30
Med Truck 5,751- 8,500	7.20	1.40	95.80	2.80
Lite-Heavy 8,501-10,000	1.10	0.00	81.80	18.20
Lite-Heavy 10,001-14,000	0.40	0.00	50.00	50.00
Med-Heavy 14,001-33,000	1.00	0.00	20.00	80.00
Heavy-Heavy 33,001-60,000	0.90	0.00	11.10	88.90
Line Haul > 60,000 lbs	0.00	0.00	0.00	100.00
Urban Bus	0.20	0.00	50.00	50.00
Motorcycle	1.70	76.50	23.50	0.00
School Bus	0.10	0.00	0.00	100.00
Motor Home	1.20	8.30	83.30	8.40

Travel Conditions

	Residential			Commercial		
	Home-Work	Home-Shop	Home-Other	Commute	Non-Work	Customer
Urban Trip Length (miles)	11.5	4.9	6.0	10.3	5.5	5.5
Rural Trip Length (miles)	11.5	4.9	6.0	10.3	5.5	5.5
Trip Speeds (mph)	35.0	40.0	40.0	40.0	40.0	40.0
% of Trips - Residential	20.0	37.0	43.0			
% of Trips - Commercial (by land use)						
City park				5.0	2.5	92.5
Strip mall				2.0	1.0	97.0

ENVIRONMENTAL FACTORS APPLICABLE TO THE PROJECT

Pedestrian Environment

0.0	Side Walks/Paths: No Sidewalks
0.0	Street Trees Provide Shade: No Coverage
0.0	Pedestrian Circulation Access: No Destinations
0.0	Visually Interesting Uses: No Uses Within Walking Distance
0.0	Street System Enhances Safety: No Streets
0.0	Pedestrian Safety from Crime: No Degree of Safety
0.0	Visually Interesting Walking Routes: No Visual Interest

0.0 <- Pedestrian Environmental Credit
0.0 /19 = 0.0 <- Pedestrian Effectiveness Factor

Transit Service

0.0	Transit Service: Dial-A-Ride or No Transit Service

0.0 <- Transit Effectiveness Credit
0.0 <- Pedestrian Factor
0.0 <-Total
0.0 /110 = 0.0 <-Transit Effectiveness Factor

Bicycle Environment

0.0	Interconnected Bikeways: No Bikeway Coverage
0.0	Bike Routes Provide Paved Shoulders: No Routes
0.0	Safe Vehicle Speed Limits: No Routes Provided
0.0	Safe School Routes: No Schools
0.0	Uses w/in Cycling Distance: No Uses w/in Cycling Distance
0.0	Bike Parking Ordinance: No Ordinance or Unenforceable

0.0 <- Bike Environmental Credit
0.0 /20 = 0.0 <- Bike Effectiveness Factor

Changes made to the default values for Land Use Trip Percentages

Changes made to the default values for Area

The wood stove option switch changed from on to off.
The area souce mitigation measure option switch changed from off to on.
The landscape year changed from 2004 to 2008.
Mitigation measure Increase Insulation Beyond Title 24: Rsdntl Space Heat.
has been changed from off to on.
Mitigation measure Increase Insulation Beyond Title 24: Cmrcl Space Heat.
has been changed from off to on.

Changes made to the default values for Operations

The operational emission year changed from 2004 to 2008.
The double counting internal work trip limit changed from to 51.577.
The double counting shopping trip limit changed from to 25.7885.
The double counting other trip limit changed from to 2485.8845.
The travel mode environment settings changed from both to: both
Mitigation measure Provide Sidewalks and/or Pedestrian Paths:1
has been changed from off to on.
Mitigation measure Provide Direct Pedestrian Connections:1
has been changed from off to on.
Mitigation measure Provide Pedestrian Safety:0.5
has been changed from off to on.
Mitigation measure Provide Street Lighting:0.5
has been changed from off to on.
Mitigation measure Provide Pedestrian Signalization and Signage:0.5
has been changed from off to on.
Mitigation measure Provide Bike Lanes/Paths Connecting to Bikeway System:2
has been changed from off to on.

Santa Clarita Valley
Population and Employment Impact Analysis
River Park EIR
Alternative 3

Land Use	Unit	Quantity	Persons/ Household	Population	Employees/ Unit	Employees
Single Family Res'l	du	363	3.06	1,109	-	-
Multi-Family Res'l	du	662	3.06	2,023	-	-
Mobile Homes	du		2.55	0	-	-
Comm'l Retail	tsf	39.00	-	-	2.50	98
Hotel/Motel (1)	rooms		-	-	0.90	0
School/College	-		-	-	-	
Hospital	tsf		-	-	3.00	0
Library	tsf		-	-	1.00	0
Church	tsf		-	-	0.50	0
Business Park	tsf		-	-	3.00	0
Industrial/Mfg.	tsf		-	-	2.00	0
Utilities	tsf		-	-	0.70	0
Office	tsf		-	-	4.00	0
Golf Course/Park	acres	29.00	-	-	0.40	12
Special Generator (3)	tsf		-	-	0.70	0
			Totals	**3,132**	**-**	**109**

du = dwelling unit; tsf = thousand square feet

Build out analysis and school employment is derived from the Traffic Model.

(1) Based on 400 gross square feet per room and 0.9 employees per room (SCAG, 1990).

(3) Assumes same rate as Utilities.

Prepared by Impact Sciences, Inc.
S. Tebo
12/12/03

Santa Clarita Valley
Library Impact Analysis
River Park EIR
Alternative 3

Land Use	Number of Units	Persons/ Household	Library (Sq. Feet)	Library Books
Single Family Res'l	363	3.06	388	2,219
Multi-Family Res'l	662	3.06	708	4,046
Mobile Homes		2.55	0	0
		Totals	**1,096**	**6,265**

L.A. County Public Library Standard: 0.35 s.f./capita
L.A. County Public Library Standard: 2.0 books/capita

Prepared by Impact Sciences, Inc.
S. Tebo
12/12/03

Santa Clarita Valley
Net Increase in
Student/Classroom/School Generation Using
Theoretical Student Generation Rates
Alternative 3- River Park

District	Housing Units by Type			Student Generation Rate			Class Size	School Size	Students	Classes	Schools
	Single Fam.	Multi-Fam.	Apartment	Single Fam.	Multi-Fam.	Apartment					
Saugus Union Elementary	363		662	0.431	0.0556	0.1326	30	770	244	8.14	0.32
Hart Junior High	363		662	0.104	0.037	0.038	32	930	63	1.97	0.07
Hart High School	363		662	0.179	0.064	0.054	32	2,764	101	3.15	0.04
								Totals	**408**	**13.25**	**0.42**

Prepared By Impact Sciences, Inc.
S.Tebo
12/5/03

Santa Clarita Valley
Parks and Recreation Impact Analysis
River Park EIR
Alternative 3

Land Use	Number of Units	Persons/ Household	Population	Parkland Req'mt (acres)
Single Family Res'l	363	3.06	1,109	3.33
Multi-Family Res'l	662	3.06	2,023	6.07
Mobile Homes		2.55	0	0.00
		Totals	**3,132**	**9.40**
Based on Quimby requirement of 3.0 acres/1000 persons				

Prepared by Impact Sciences, Inc.
S. Tebo
12/12/03

Santa Clarita Valley
Solid Waste Generation
(No Recycling) Impact Analysis
River Park EIR
Alternative 3

Land Use	Quantity	Units	Generation Rate		Total Waste Generated	
			(tpy) (1)	(lbs./day)	(tpy)	(lbs./day)
Residential Units:						
Single Family Detached	363	du	2.0400	11.18	741	4,058
Multi-Family or Attached	662	du	1.1700	6.41	775	4,244
Mobile Home		du	1.1700	6.41	0	0
Commercial/Industrial						
General Retail	39,000	sq. ft.	0.0024	0.01	94	513
Eating/Drnkng Establ.		sq. ft.	0.0108	0.06	0	0
Food & Drug Stores		sq. ft.	0.0072	0.04	0	0
Auto Dlr/Service Sta.		sq. ft.	0.0051	0.03	0	0
Hotel & Motel		sq. ft.	0.0053	0.03	0	0
Warehouse		sq. ft.	0.0011	0.01	0	0
Medical Offices		sq. ft.	0.0027	0.01	0	0
Hospitals		sq. ft.	0.0055	0.03	0	0
Business Park		sq. ft.	0.0014	0.01	0	0
Office		sq. ft.	0.0014	0.01	0	0
Library (4)		sq. ft.	0.0014	0.01	0	0
Education & Schools		sq. ft.	0.0013	0.01	0	0
College		sq. ft.	0.0013	0.01	0	0
Trans., Comm., Utilities		sq. ft.	0.0079	0.04	0	0
Special Generator (6)		sq. ft.	0.0079	0.04	0	0
Golf Course/Park	29	acres	0.2000	1.10	6	32
Manufacturing		sq. ft.	0.0050	0.03	0	0
Church (4)		sq. ft.	0.0014	0.01	0	0
				Totals	**1,614**	**8,846**

du = dwelling unit; sq.ft. - square feet; tpy = tons per year; lbs. = pounds

(1) The solid waste daily generation rates in tons per year are derived from the Ventura County Solid Waste Management Department's Guidelines for Preparation of Environmental Assessments for Solid Waste Impacts. These figures do not reflect any recycling activities on the part of the generator.

(4) Assumes same generation rate as for office.

(6) Conservatively assumes same generation rate as utilities.

Prepared by Impact Sciences, Inc.
S. Tebo
12/5/03

Santa Clarita Valley
Wastewater Generation Impact Analysis
River Park EIR
Alternative 3

Land Use	Units	Quantity	Generation Factor (gpd)	Generation (gpd)	Generation (mgd)
Residential					
Single Family	du	363	260.00	94,380.00	0.0944
Multi-Family	du	662	195.00	129,090.00	0.1291
Mobile Homes	du		195.00	0.00	0.0000
Non-Residential					
Commercial Retail	tsf	39	100.00	3,900.00	0.0039
Hotel	sq.ft.		na		
Hotel (1)	rooms		125.00	0.00	0.0000
School	tsf		200.00	0.00	0.0000
College	stdnts		20.00	0.00	0.0000
College	sq.ft.		na		
Hospital	sq.ft.		na		
Hospital (3)	beds		125.00	0.00	0.0000
Library (4)	tsf		50.00	0.00	0.0000
Church	tsf		50.00	0.00	0.0000
Business Park (7)	tsf		300.00	0.00	0.0000
Industrial/Manufacturing (5)	tsf		25.00	0.00	0.0000
Utilities	tsf		25.00	0.00	0.0000
Commercial/Medical Office	tsf		300.00	0.00	0.0000
Golf Course/Park	acres	29	0.00	0.00	0.0000
Golf Course/Park Imps	tsf		100.00	0.00	0.0000
Visitor Serving (8)	tsf		100.00	0.00	0.0000
Special Generator (9)	tsf		25.00	0.00	0.0000
			Totals	**227,370.00**	**0.2274**

gpd = gallons per day; mgd = million gallons per day; du = dwelling unit; tsf = thousand square feet; sq. ft. = square feet; stdnts = students

Source of wastewater generation factors is CDSLAC, Loadings for Each Class of Land Use (1992-93). This list is provided in Appendix 4.X.

(1) Number of hotel rooms is based upon an assumed 400 gross square feet per room.

(3) Number of hospital beds is based upon an assumed 500 gross square feet per bed.

(4) Uses same generation factor for library as used for church.

(5) Generation factor for industrial/manufacturing is based on dry manufacturing uses.

(7) Uses same generation factor as for professional building.

(8) Uses same generation factor as for commercial retail.

(9) Uses same generation factor as for industrial/manufacturing.

Prepared by Impact Sciences, Inc.
S. Tebo
12/5/03

Alternative 3-Secondary Ridgeline Protection
Estimated Water Demand

Land Use Category	Amount	Water Duty Factor	Water Demand (AFY)
Single Family Units	363 units	0.55 af/unit	199.65
Apartments	662 units	0.19 af/unit	125.78
Park	4 acres	3 af per acre	12.0
Other Misc. Landscaping (irrigated common landscaping, pocket parks, etc.)	80 acres	3 af per acre	240.0
Commercial (40,000 sq. ft.)	3 acres	0.0289 af/100 sq. ft.	11.56
TOTAL			**588.99**

ALTERNATIVE 3 SUMMERTIME EMISSIONS

URBEMIS 2002 For Windows 7.4.2

File Name: C:\URBEMIS2002\Urbemis River Park\River Park Alternative 3.urb
Project Name: River Park Alternative 3
Project Location: South Coast Air Basin (Los Angeles area)
On-Road Motor Vehicle Emissions Based on EMFAC2002 version 2.2

SUMMARY REPORT
(Pounds/Day - Summer)

AREA SOURCE EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10
TOTALS (lbs/day,unmitigated)	51.31	9.99	7.84	0.09	0.02
TOTALS (lbs/day, mitigated)	51.21	8.88	7.35	0.09	0.02

OPERATIONAL (VEHICLE) EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10
TOTALS (lbs/day,unmitigated)	98.95	110.02	1,182.38	0.76	115.06
TOTALS (lbs/day, mitigated)	98.95	110.02	1,182.38	0.76	115.06

SUM OF AREA AND OPERATIONAL EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10
TOTALS (lbs/day,unmitigated)	150.25	120.01	1,190.22	0.85	115.09
TOTALS (lbs/day, mitigated)	150.16	118.89	1,189.73	0.85	115.09

URBEMIS 2002 For Windows 7.4.2

File Name: C:\URBEMIS2002\Urbemis River Park\River Park Alternative 3.urb
Project Name: River Park Alternative 3
Project Location: South Coast Air Basin (Los Angeles area)
On-Road Motor Vehicle Emissions Based on EMFAC2002 version 2.2

DETAIL REPORT
(Pounds/Day - Summer)

AREA SOURCE EMISSION ESTIMATES (Summer Pounds per Day, Unmitigated)

Source	ROG	NOx	CO	SO2	PM10
Natural Gas	0.76	9.93	4.21	-	0.02
Wood Stoves - No summer emissions					
Fireplaces - No summer emissions					
Landscaping	0.40	0.06	3.63	0.09	0.01
Consumer Prdcts	50.15	-	-	-	-
TOTALS(lbs/day,unmitigated)	51.31	9.99	7.84	0.09	0.02

AREA SOURCE EMISSION ESTIMATES

Source	ROG	NOx	CO	SO2	PM10
Natural Gas	0.67	8.81	3.73	-	0.02
Wood Stoves - No summer emissions					
Fireplaces - No summer emissions					
Landscaping	0.40	0.06	3.63	0.09	0.01
Consumer Prdcts	50.15	-	-	-	-
TOTALS (lbs/day, mitigated)	51.21	8.88	7.35	0.09	0.02

Area Source Mitigation Measures

UNMITIGATED OPERATIONAL EMISSIONS

	ROG	NOx	CO	SO2	PM10
Single family housing	32.01	34.68	378.71	0.24	36.49
Apartments low rise	43.88	44.08	481.36	0.31	46.38
City park	0.13	0.09	0.96	0.00	0.10
Strip mall	22.93	31.16	321.34	0.21	32.10
TOTAL EMISSIONS (lbs/day)	98.95	110.02	1,182.38	0.76	115.06

Does not include correction for passby trips.
Does not include double counting adjustment for internal trips.

OPERATIONAL (Vehicle) EMISSION ESTIMATES

Analysis Year: 2008 Temperature (F): 90 Season: Summer

EMFAC Version: EMFAC2002 (9/2002)

Summary of Land Uses:

Unit Type	Trip Rate	Size	Total Trips
Single family housing	9.90 trips / dwelling units	363.00	3,593.70
Apartments low rise	6.90 trips / dwelling units	662.00	4,567.80
City park	2.60 trips / acres	4.25	11.05
Strip mall	94.55 trips / 1000 sq. ft.	40.00	3,782.00

Vehicle Assumptions:

Fleet Mix:

Vehicle Type	Percent Type	Non-Catalyst	Catalyst	Diesel
Light Auto	55.00	1.60	98.00	0.40
Light Truck < 3,750 lbs	15.00	2.70	95.30	2.00
Light Truck 3,751- 5,750	16.20	1.20	97.50	1.30
Med Truck 5,751- 8,500	7.20	1.40	95.80	2.80
Lite-Heavy 8,501-10,000	1.10	0.00	81.80	18.20
Lite-Heavy 10,001-14,000	0.40	0.00	50.00	50.00
Med-Heavy 14,001-33,000	1.00	0.00	20.00	80.00
Heavy-Heavy 33,001-60,000	0.90	0.00	11.10	88.90
Line Haul > 60,000 lbs	0.00	0.00	0.00	100.00
Urban Bus	0.20	0.00	50.00	50.00
Motorcycle	1.70	76.50	23.50	0.00
School Bus	0.10	0.00	0.00	100.00
Motor Home	1.20	8.30	83.30	8.40

Travel Conditions

	Residential			Commercial		
	Home-Work	Home-Shop	Home-Other	Commute	Non-Work	Customer
Urban Trip Length (miles)	11.5	4.9	6.0	10.3	5.5	5.5
Rural Trip Length (miles)	11.5	4.9	6.0	10.3	5.5	5.5
Trip Speeds (mph)	35.0	40.0	40.0	40.0	40.0	40.0
% of Trips - Residential	20.0	37.0	43.0			
% of Trips - Commercial (by land use)						
City park				5.0	2.5	92.5
Strip mall				2.0	1.0	97.0

MITIGATED OPERATIONAL EMISSIONS

	ROG	NOx	CO	SO2	PM10
Single family housing	32.01	34.68	378.71	0.24	36.49
Apartments low rise	43.88	44.08	481.36	0.31	46.38
City park	0.13	0.09	0.96	0.00	0.10
Strip mall	22.93	31.16	321.34	0.21	32.10
TOTAL EMISSIONS (lbs/day)	98.95	110.02	1,182.38	0.76	115.06

OPERATIONAL (Vehicle) EMISSION ESTIMATES

Analysis Year: 2008 Temperature (F): 90 Season: Summer

EMFAC Version: EMFAC2002 (9/2002)

Summary of Land Uses:

Unit Type	Trip Rate	Size	Total Trips
Single family housing	9.90 trips / dwelling units	363.00	3,593.70
Apartments low rise	6.90 trips / dwelling units	662.00	4,567.80
City park	2.60 trips / acres	4.25	11.05
Strip mall	94.55 trips / 1000 sq. ft.	40.00	3,782.00

Vehicle Assumptions:

Fleet Mix:

Vehicle Type	Percent Type	Non-Catalyst	Catalyst	Diesel
Light Auto	55.00	1.60	98.00	0.40
Light Truck < 3,750 lbs	15.00	2.70	95.30	2.00
Light Truck 3,751- 5,750	16.20	1.20	97.50	1.30
Med Truck 5,751- 8,500	7.20	1.40	95.80	2.80
Lite-Heavy 8,501-10,000	1.10	0.00	81.80	18.20
Lite-Heavy 10,001-14,000	0.40	0.00	50.00	50.00
Med-Heavy 14,001-33,000	1.00	0.00	20.00	80.00
Heavy-Heavy 33,001-60,000	0.90	0.00	11.10	88.90
Line Haul > 60,000 lbs	0.00	0.00	0.00	100.00
Urban Bus	0.20	0.00	50.00	50.00
Motorcycle	1.70	76.50	23.50	0.00
School Bus	0.10	0.00	0.00	100.00
Motor Home	1.20	8.30	83.30	8.40

Travel Conditions

	Residential			Commercial		
	Home-Work	Home-Shop	Home-Other	Commute	Non-Work	Customer
Urban Trip Length (miles)	11.5	4.9	6.0	10.3	5.5	5.5
Rural Trip Length (miles)	11.5	4.9	6.0	10.3	5.5	5.5
Trip Speeds (mph)	35.0	40.0	40.0	40.0	40.0	40.0
% of Trips - Residential	20.0	37.0	43.0			
% of Trips - Commercial (by land use)						
City park				5.0	2.5	92.5
Strip mall				2.0	1.0	97.0

ENVIRONMENTAL FACTORS APPLICABLE TO THE PROJECT

Pedestrian Environment

```
 0.0            Side Walks/Paths: No Sidewalks
 0.0            Street Trees Provide Shade: No Coverage
 0.0            Pedestrian Circulation Access: No Destinations
 0.0            Visually Interesting Uses: No Uses Within Walking Distance
 0.0            Street System Enhances Safety: No Streets
 0.0            Pedestrian Safety from Crime: No Degree of Safety
 0.0            Visually Interesting Walking Routes: No Visual Interest

 0.0    <- Pedestrian Environmental Credit
 0.0   /19 =  0.0    <- Pedestrian Effectiveness Factor
```

Transit Service

```
 0.0            Transit Service: Dial-A-Ride or No Transit Service

 0.0    <- Transit Effectiveness Credit
 0.0    <- Pedestrian Factor
 0.0    <-Total
 0.0    /110 =  0.0     <-Transit Effectiveness Factor
```

Bicycle Environment

```
 0.0            Interconnected Bikeways: No Bikeway Coverage
 0.0            Bike Routes Provide Paved Shoulders: No Routes
 0.0            Safe Vehicle Speed Limits: No Routes Provided
 0.0            Safe School Routes: No Schools
 0.0            Uses w/in Cycling Distance: No Uses w/in Cycling Distance
 0.0            Bike Parking Ordinance: No Ordinance or Unenforceable

 0.0    <- Bike Environmental Credit
 0.0  /20 =  0.0    <- Bike Effectiveness Factor
```

MITIGATION MEASURES SELECTED FOR THIS PROJECT
(All mitigation measures are printed, even if
the selected land uses do not constitute a mixed use.)

Transit Infrastructure Measures

% Trips Reduced	Measure
15.0	Credit for Existing or Planned Community Transit Service
15.0	<- Totals

Pedestrian Enhancing Infrastructure Measures (Residential)

% Trips Reduced	Measure
2.0	Credit for Surrounding Pedestrian Environment
1.0	Provide Sidewalks and/or Pedestrian Paths
1.0	Provide Direct Pedestrian Connections
0.5	Provide Pedestrian Safety
0.5	Provide Street Lighting
0.5	Provide Pedestrian Signalization and Signage
5.5	<- Totals

Pedestrian Enhancing Infrastructure Measures (Non-Residential)

% Trips Reduced	Measure
2.0	Credit for Surrounding Pedestrian Environment
2.0	<- Totals

Bicycle Enhancing Infratructure Measures (Residential)

% Trips Reduced	Measure
7.0	Credit for Surrounding Bicycle Environment
2.0	Provide Bike Lanes/Paths Connecting to Bikeway System
9.0	<- Totals

Bike Enhancing Infrastructure Measures (Non-Residential)

% Trips Reduced	Measure
5.0	Credit for Surrounding Area Bike Environment
5.0	<- Totals

Operational Measures (Applying to Commute Trips)

% Trips Reduced	Measure
0.0	<- Totals

Operational Measures (Applying to Employee Non-Commute Trips)

% Trips Reduced	Measure
0.0	<- Totals

Operational Measures (Applying to Customer Trips)

% Trips Reduced	Measure
0.0	<- Totals

Measures Reducing VMT (Non-Residential)

VMT Reduced	Measure
0.0	Park and Ride Lots
0.0	<- Totals

Measures Reducing VMT (Residential)

VMT Reduced	Measure
0.0	<- Totals

Total Percentage Trip Reduction
with Environmental Factors and Mitigation Measures

Travel Mode	Home-Work Trips	Home-Shop Trips	Home-Other Trips
Pedestrian	0.00	0.00	0.00
Transit	0.00	0.00	0.00
Bicycle	0.00	0.00	0.00
Totals	0.00	0.00	0.00

Travel Mode	Work Trips	Employee Trips	Customer Trips
Pedestrian	0.00	0.00	0.00
Transit	0.00	0.00	0.00
Bicycle	0.00	0.00	0.00
Other	0.00	0.00	0.00
Totals	0.00	0.00	0.00

Changes made to the default values for Land Use Trip Percentages

Changes made to the default values for Area

The wood stove option switch changed from on to off.
The area souce mitigation measure option switch changed from off to on.
The landscape year changed from 2004 to 2008.
Mitigation measure Increase Insulation Beyond Title 24: Rsdntl Space Heat.
has been changed from off to on.
Mitigation measure Increase Insulation Beyond Title 24: Cmrcl Space Heat.
has been changed from off to on.

Changes made to the default values for Operations

The operational emission year changed from 2004 to 2008.
The double counting internal work trip limit changed from to 76.1925.
The double counting shopping trip limit changed from to 38.09625.
The double counting other trip limit changed from to 3509.445.
The travel mode environment settings changed from both to: both
Mitigation measure Provide Sidewalks and/or Pedestrian Paths:1
has been changed from off to on.
Mitigation measure Provide Direct Pedestrian Connections:1
has been changed from off to on.
Mitigation measure Provide Pedestrian Safety:0.5
has been changed from off to on.
Mitigation measure Provide Street Lighting:0.5
has been changed from off to on.
Mitigation measure Provide Pedestrian Signalization and Signage:0.5
has been changed from off to on.
Mitigation measure Provide Bike Lanes/Paths Connecting to Bikeway System:2
has been changed from off to on.

ALTERNATIVE 3 WINTERTIME EMISSIONS

URBEMIS 2002 For Windows 7.4.2

File Name: C:\URBEMIS2002\Urbemis River Park\River Park Alternative 3.urb
Project Name: River Park Alternative 3
Project Location: South Coast Air Basin (Los Angeles area)
On-Road Motor Vehicle Emissions Based on EMFAC2002 version 2.2

SUMMARY REPORT
(Pounds/Day - Winter)

AREA SOURCE EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10
TOTALS (lbs/day,unmitigated)	1,199.00	22.96	1,270.62	2.01	173.49
TOTALS (lbs/day, mitigated)	1,198.91	21.85	1,270.14	2.01	173.48

OPERATIONAL (VEHICLE) EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10
TOTALS (lbs/day,unmitigated)	93.42	159.02	1,126.99	0.62	115.06
TOTALS (lbs/day, mitigated)	93.42	159.02	1,126.99	0.62	115.06

SUM OF AREA AND OPERATIONAL EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10
TOTALS (lbs/day,unmitigated)	1,292.42	181.98	2,397.61	2.62	288.55
TOTALS (lbs/day, mitigated)	1,292.33	180.87	2,397.12	2.62	288.55

URBEMIS 2002 For Windows 7.4.2

File Name: C:\URBEMIS2002\Urbemis River Park\River Park Alternative 3.urb
Project Name: River Park Alternative 3
Project Location: South Coast Air Basin (Los Angeles area)
On-Road Motor Vehicle Emissions Based on EMFAC2002 version 2.2

DETAIL REPORT
(Pounds/Day - Winter)

AREA SOURCE EMISSION ESTIMATES (Winter Pounds per Day, Unmitigated)

Source	ROG	NOx	CO	SO2	PM10
Natural Gas	0.76	9.93	4.21	-	0.02
Wood Stoves	0.00	0.00	0.00	0.00	0.00
Fireplaces	1,148.09	13.04	1,266.41	2.01	173.47
Landscaping - No winter emissions					
Consumer Prdcts	50.15	-	-	-	-
TOTALS(lbs/day,unmitigated)	1,199.00	22.96	1,270.62	2.01	173.49

AREA SOURCE EMISSION ESTIMATES

Source	ROG	NOx	CO	SO2	PM10
Natural Gas	0.67	8.81	3.73	-	0.02
Wood Stoves	0.00	0.00	0.00	0.00	0.00
Fireplaces	1,148.09	13.04	1,266.41	2.01	173.47
Landscaping - No winter emissions					
Consumer Prdcts	50.15	-	-	-	-
TOTALS (lbs/day, mitigated)	1,198.91	21.85	1,270.14	2.01	173.48

Area Source Mitigation Measures

Increase Insulation Beyond Title 24: Rsdntl Space Heat.
Percent Reduction(ROG 14% NOx 13% CO 7.4% SO2 0% PM10 13%)
Increase Insulation Beyond Title 24: Cmrcl Space Heat.
Percent Reduction(ROG 10% NOx 9% CO 7% SO2 0% PM10 9.5%)

UNMITIGATED OPERATIONAL EMISSIONS

	ROG	NOx	CO	SO2	PM10
Single family housing	29.82	50.17	358.01	0.20	36.49
Apartments low rise	38.01	63.77	455.05	0.25	46.38
City park	0.08	0.13	0.93	0.00	0.10
Strip mall	25.51	44.94	312.99	0.17	32.10
TOTAL EMISSIONS (lbs/day)	93.42	159.02	1,126.99	0.62	115.06

Does not include correction for passby trips.
Does not include double counting adjustment for internal trips.

OPERATIONAL (Vehicle) EMISSION ESTIMATES

Analysis Year: 2008 Temperature (F): 50 Season: Winter

EMFAC Version: EMFAC2002 (9/2002)

Summary of Land Uses:

Unit Type	Trip Rate	Size	Total Trips
Single family housing	9.90 trips / dwelling units	363.00	3,593.70
Apartments low rise	6.90 trips / dwelling units	662.00	4,567.80
City park	2.60 trips / acres	4.25	11.05
Strip mall	94.55 trips / 1000 sq. ft.	40.00	3,782.00

Vehicle Assumptions:

Fleet Mix:

Vehicle Type	Percent Type	Non-Catalyst	Catalyst	Diesel
Light Auto	55.00	1.60	98.00	0.40
Light Truck < 3,750 lbs	15.00	2.70	95.30	2.00
Light Truck 3,751- 5,750	16.20	1.20	97.50	1.30
Med Truck 5,751- 8,500	7.20	1.40	95.80	2.80
Lite-Heavy 8,501-10,000	1.10	0.00	81.80	18.20
Lite-Heavy 10,001-14,000	0.40	0.00	50.00	50.00
Med-Heavy 14,001-33,000	1.00	0.00	20.00	80.00
Heavy-Heavy 33,001-60,000	0.90	0.00	11.10	88.90
Line Haul > 60,000 lbs	0.00	0.00	0.00	100.00
Urban Bus	0.20	0.00	50.00	50.00
Motorcycle	1.70	76.50	23.50	0.00
School Bus	0.10	0.00	0.00	100.00
Motor Home	1.20	8.30	83.30	8.40

Travel Conditions

	Residential			Commercial		
	Home-Work	Home-Shop	Home-Other	Commute	Non-Work	Customer
Urban Trip Length (miles)	11.5	4.9	6.0	10.3	5.5	5.5
Rural Trip Length (miles)	11.5	4.9	6.0	10.3	5.5	5.5
Trip Speeds (mph)	35.0	40.0	40.0	40.0	40.0	40.0
% of Trips - Residential	20.0	37.0	43.0			
% of Trips - Commercial (by land use)						
City park				5.0	2.5	92.5
Strip mall				2.0	1.0	97.0

MITIGATED OPERATIONAL EMISSIONS

	ROG	NOx	CO	SO2	PM10
Single family housing	29.82	50.17	358.01	0.20	36.49
Apartments low rise	38.01	63.77	455.05	0.25	46.38
City park	0.08	0.13	0.93	0.00	0.10
Strip mall	25.51	44.94	312.99	0.17	32.10
TOTAL EMISSIONS (lbs/day)	93.42	159.02	1,126.99	0.62	115.06

OPERATIONAL (Vehicle) EMISSION ESTIMATES

Analysis Year: 2008 Temperature (F): 50 Season: Winter

EMFAC Version: EMFAC2002 (9/2002)

Summary of Land Uses:

Unit Type	Trip Rate	Size	Total Trips
Single family housing	9.90 trips / dwelling units	363.00	3,593.70
Apartments low rise	6.90 trips / dwelling units	662.00	4,567.80
City park	2.60 trips / acres	4.25	11.05
Strip mall	94.55 trips / 1000 sq. ft.	40.00	3,782.00

Vehicle Assumptions:

Fleet Mix:

Vehicle Type	Percent Type	Non-Catalyst	Catalyst	Diesel
Light Auto	55.00	1.60	98.00	0.40
Light Truck < 3,750 lbs	15.00	2.70	95.30	2.00
Light Truck 3,751- 5,750	16.20	1.20	97.50	1.30
Med Truck 5,751- 8,500	7.20	1.40	95.80	2.80
Lite-Heavy 8,501-10,000	1.10	0.00	81.80	18.20
Lite-Heavy 10,001-14,000	0.40	0.00	50.00	50.00
Med-Heavy 14,001-33,000	1.00	0.00	20.00	80.00
Heavy-Heavy 33,001-60,000	0.90	0.00	11.10	88.90
Line Haul > 60,000 lbs	0.00	0.00	0.00	100.00
Urban Bus	0.20	0.00	50.00	50.00
Motorcycle	1.70	76.50	23.50	0.00
School Bus	0.10	0.00	0.00	100.00
Motor Home	1.20	8.30	83.30	8.40

Travel Conditions

	Residential			Commercial		
	Home-Work	Home-Shop	Home-Other	Commute	Non-Work	Customer
Urban Trip Length (miles)	11.5	4.9	6.0	10.3	5.5	5.5
Rural Trip Length (miles)	11.5	4.9	6.0	10.3	5.5	5.5
Trip Speeds (mph)	35.0	40.0	40.0	40.0	40.0	40.0
% of Trips - Residential	20.0	37.0	43.0			
% of Trips - Commercial (by land use)						
City park				5.0	2.5	92.5
Strip mall				2.0	1.0	97.0

ENVIRONMENTAL FACTORS APPLICABLE TO THE PROJECT

Pedestrian Environment

```
 0.0            Side Walks/Paths: No Sidewalks
 0.0            Street Trees Provide Shade: No Coverage
 0.0            Pedestrian Circulation Access: No Destinations
 0.0            Visually Interesting Uses: No Uses Within Walking Distance
 0.0            Street System Enhances Safety: No Streets
 0.0            Pedestrian Safety from Crime: No Degree of Safety
 0.0            Visually Interesting Walking Routes: No Visual Interest

 0.0    <- Pedestrian Environmental Credit
 0.0   /19 =  0.0    <- Pedestrian Effectiveness Factor
```

Transit Service

```
 0.0            Transit Service: Dial-A-Ride or No Transit Service

 0.0    <- Transit Effectiveness Credit
 0.0    <- Pedestrian Factor
 0.0    <-Total
 0.0    /110 =  0.0     <-Transit Effectiveness Factor
```

Bicycle Environment

```
 0.0            Interconnected Bikeways: No Bikeway Coverage
 0.0            Bike Routes Provide Paved Shoulders: No Routes
 0.0            Safe Vehicle Speed Limits: No Routes Provided
 0.0            Safe School Routes: No Schools
 0.0            Uses w/in Cycling Distance: No Uses w/in Cycling Distance
 0.0            Bike Parking Ordinance: No Ordinance or Unenforceable

 0.0    <- Bike Environmental Credit
 0.0  /20 =  0.0    <- Bike Effectiveness Factor
```

MITIGATION MEASURES SELECTED FOR THIS PROJECT
(All mitigation measures are printed, even if
the selected land uses do not constitute a mixed use.)

Transit Infrastructure Measures

% Trips Reduced	Measure
15.0	Credit for Existing or Planned Community Transit Service
15.0 <- Totals	

Pedestrian Enhancing Infrastructure Measures (Residential)

% Trips Reduced	Measure
2.0	Credit for Surrounding Pedestrian Environment
1.0	Provide Sidewalks and/or Pedestrian Paths
1.0	Provide Direct Pedestrian Connections
0.5	Provide Pedestrian Safety
0.5	Provide Street Lighting
0.5	Provide Pedestrian Signalization and Signage
5.5 <- Totals	

Pedestrian Enhancing Infrastructure Measures (Non-Residential)

% Trips Reduced	Measure
2.0	Credit for Surrounding Pedestrian Environment
2.0 <- Totals	

Bicycle Enhancing Infratructure Measures (Residential)

% Trips Reduced	Measure
7.0	Credit for Surrounding Bicycle Environment
2.0	Provide Bike Lanes/Paths Connecting to Bikeway System
9.0 <- Totals	

Bike Enhancing Infrastructure Measures (Non-Residential)

% Trips Reduced	Measure
5.0	Credit for Surrounding Area Bike Environment
5.0 <- Totals	

Operational Measures (Applying to Commute Trips)

% Trips Reduced	Measure
0.0 <- Totals	

Operational Measures (Applying to Employee Non-Commute Trips)

% Trips Reduced	Measure
0.0 <- Totals	

Operational Measures (Applying to Customer Trips)

% Trips Reduced	Measure
0.0 <- Totals	

Measures Reducing VMT (Non-Residential)

VMT Reduced	Measure
0.0	Park and Ride Lots
0.0 <- Totals	

Measures Reducing VMT (Residential)

VMT Reduced	Measure
0.0 <- Totals	

Total Percentage Trip Reduction
with Environmental Factors and Mitigation Measures

Travel Mode	Home-Work Trips	Home-Shop Trips	Home-Other Trips
Pedestrian	0.00	0.00	0.00
Transit	0.00	0.00	0.00
Bicycle	0.00	0.00	0.00
Totals	0.00	0.00	0.00

Travel Mode	Work Trips	Employee Trips	Customer Trips
Pedestrian	0.00	0.00	0.00
Transit	0.00	0.00	0.00
Bicycle	0.00	0.00	0.00
Other	0.00	0.00	0.00
Totals	0.00	0.00	0.00

Changes made to the default values for Land Use Trip Percentages

Changes made to the default values for Area

The wood stove option switch changed from on to off.
The area souce mitigation measure option switch changed from off to on.
The landscape year changed from 2004 to 2008.
Mitigation measure Increase Insulation Beyond Title 24: Rsdntl Space Heat.
has been changed from off to on.
Mitigation measure Increase Insulation Beyond Title 24: Cmrcl Space Heat.
has been changed from off to on.

Changes made to the default values for Operations

The operational emission year changed from 2004 to 2008.
The double counting internal work trip limit changed from to 76.1925.
The double counting shopping trip limit changed from to 38.09625.
The double counting other trip limit changed from to 3509.445.
The travel mode environment settings changed from both to: both
Mitigation measure Provide Sidewalks and/or Pedestrian Paths:1
has been changed from off to on.
Mitigation measure Provide Direct Pedestrian Connections:1
has been changed from off to on.
Mitigation measure Provide Pedestrian Safety:0.5
has been changed from off to on.
Mitigation measure Provide Street Lighting:0.5
has been changed from off to on.
Mitigation measure Provide Pedestrian Signalization and Signage:0.5
has been changed from off to on.
Mitigation measure Provide Bike Lanes/Paths Connecting to Bikeway System:2
has been changed from off to on.

Alternative 4
River Park EIR

Santa Clarita Valley
Population and Employment Impact Analysis

Land Use	Unit	Quantity	Persons/ Household	Population	Employees/ Unit	Employees
Single Family Res'l	du	138	3.06	422	-	-
Multi-Family Res'l	du	744	3.06	2,274	-	-
Mobile Homes	du		2.55	0	-	-
Comm'l Retail	tsf	39.00	-	-	2.50	98
Hotel/Motel (1)	rooms		-	-	0.90	0
School/College	-		-	-	-	
Hospital	tsf		-	-	3.00	0
Library	tsf		-	-	1.00	0
Church	tsf		-	-	0.50	0
Business Park	tsf		-	-	3.00	0
Industrial/Mfg.	tsf		-	-	2.00	0
Utilities	tsf		-	-	0.70	0
Office	tsf		-	-	4.00	0
Golf Course/Park	acres	29.00	-	-	0.40	12
Special Generator (3)	tsf		-	-	0.70	0
			Totals	**2,695**	**-**	**109**

du = dwelling unit; tsf = thousand square feet
Build out analysis and school employment is derived from the Traffic Model.
(1) Based on 400 gross square feet per room and 0.9 employees per room (SCAG, 1990).
(3) Assumes same rate as Utilities.

Prepared by Impact Sciences, Inc.
S. Tebo
12/15/03

Alternative 4
River Park EIR

Santa Clarita Valley
Library Impact Analysis

Land Use	Number of Units	Persons/ Household	Library (Sq. Feet)	Library Books
Single Family Res'l	138	3.06	148	843
Multi-Family Res'l	744	3.06	796	4,547
Mobile Homes		2.55	0	0
		Totals	**943**	**5,391**

L.A. County Public Library Standard: 0.35 s.f./capita
L.A. County Public Library Standard: 2.0 books/capita

Prepared by Impact Sciences, Inc.
S. Tebo
12/11/03

Santa Clarita Valley
Net Increase in
Student/Classroom/School Generation Using
Theoretical Student Generation Rates
River Park-Alternative 4

District	Housing Units by Type			Student Generation Rate			Class Size	School Size	Students	Classes	Schools
	Single Fam.	Multi-Fam.	Apartment	Single Fam.	Multi-Fam.	Apartment					
Saugus Union Elementary	138		744	0.431	0.0556	0.1326	30	770	158	5.27	0.21
Hart Junior High	138		744	0.104	0.037	0.038	32	930	43	1.33	0.05
Hart High School	138		744	0.179	0.064	0.054	32	2,764	65	2.03	0.02
								Totals	**266**	**8.63**	**0.27**

Prepared By Impact Sciences, Inc.
R. Mamaghani
12/5/03

Alternative 4
River Park EIR

Santa Clarita Valley
Parks and Recreation Impact Analysis
Using Household Size Numbers from Park Ordinance

Land Use	Number of Units	Persons/ Household	Population	Parkland Req'mt (acres)
Single Family Res'l	138	3.06	422	1.27
Multi-Family Res'l	744	3.06	2,274	6.82
Mobile Homes		2.55	0	0.00
		Totals	**2,695**	**8.09**

Based on Quimby requirement of 3.0 acres/1000 persons

Prepared by Impact Sciences, Inc.
S. Tebo
12/11/03

Alternative 4
Santa Clarita Valley
Solid Waste Generation
(No Recycling) Impact Analysis

Land Use	Quantity	Units	Generation Rate		Total Waste Generated	
			(tpy) (1)	(lbs./day)	(tpy)	(lbs./day)
Residential Units:						
Single Family Detached	138	du	2.0400	11.18	282	1,543
Multi-Family or Attached	744	du	1.1700	6.41	870	4,770
Mobile Home		du	1.1700	6.41	0	0
Commercial/Industrial						
General Retail	39,000	sq. ft.	0.0024	0.01	94	513
Eating/Drnkng Establ.		sq. ft.	0.0108	0.06	0	0
Food & Drug Stores		sq. ft.	0.0072	0.04	0	0
Auto Dlr/Service Sta.		sq. ft.	0.0051	0.03	0	0
Hotel & Motel		sq. ft.	0.0053	0.03	0	0
Warehouse		sq. ft.	0.0011	0.01	0	0
Medical Offices		sq. ft.	0.0027	0.01	0	0
Hospitals		sq. ft.	0.0055	0.03	0	0
Business Park		sq. ft.	0.0014	0.01	0	0
Office		sq. ft.	0.0014	0.01	0	0
Library (4)		sq. ft.	0.0014	0.01	0	0
Education & Schools		sq. ft.	0.0013	0.01	0	0
College		sq. ft.	0.0013	0.01	0	0
Trans., Comm., Utilities		sq. ft.	0.0079	0.04	0	0
Special Generator (6)		sq. ft.	0.0079	0.04	0	0
Golf Course/Park	29	acres	0.2000	1.10	6	32
Manufacturing		sq. ft.	0.0050	0.03	0	0
Church (4)		sq. ft.	0.0014	0.01	0	0
				Totals	**1,251**	**6,857**

du = dwelling unit; sq.ft. - square feet; tpy = tons per year; lbs. = pounds

(1) The solid waste daily generation rates in tons per year are derived from the Ventura County Solid Waste Management Department's Guidelines for Preparation of Environmental Assessments for Solid Waste Impacts. These figures do not reflect any recycling activities on the part of the generator.

(4) Assumes same generation rate as for office.

(6) Conservatively assumes same generation rate as utilities.

Prepared by Impact Sciences, Inc.
S. Tebo
12/5/03

Alternative 4
Santa Clarita Valley
Wastewater Generation Impact Analysis

Land Use	Units	Quantity	Generation Factor (gpd)	Generation (gpd)	Generation (mgd)
Residential					
Single Family	du	138	260.00	35,880.00	0.0359
Multi-Family	du	744	195.00	145,080.00	0.1451
Mobile Homes	du		195.00	0.00	0.0000
Non-Residential					
Commercial Retail	tsf	39	100.00	3,900.00	0.0039
Hotel	sq.ft.		na		
Hotel (1)	rooms		125.00	0.00	0.0000
School	tsf		200.00	0.00	0.0000
College	stdnts		20.00	0.00	0.0000
College	sq.ft.		na		
Hospital	sq.ft.		na		
Hospital (3)	beds		125.00	0.00	0.0000
Library (4)	tsf		50.00	0.00	0.0000
Church	tsf		50.00	0.00	0.0000
Business Park (7)	tsf		300.00	0.00	0.0000
Industrial/Manufacturing (5)	tsf		25.00	0.00	0.0000
Utilities	tsf		25.00	0.00	0.0000
Commercial/Medical Office	tsf		300.00	0.00	0.0000
Golf Course/Park	acres	29	0.00	0.00	0.0000
Golf Course/Park Imps	tsf		100.00	0.00	0.0000
Visitor Serving (8)	tsf		100.00	0.00	0.0000
Special Generator (9)	tsf		25.00	0.00	0.0000
			Totals	**184,860.00**	**0.1849**

gpd = gallons per day; mgd = million gallons per day; du = dwelling unit; tsf = thousand square feet; sq. ft. = square feet; stdnts = students

Source of wastewater generation factors is CDSLAC, Loadings for Each Class of Land Use (1992-93). This list is provided in Appendix 4.X.

(1) Number of hotel rooms is based upon an assumed 400 gross square feet per room.

(3) Number of hospital beds is based upon an assumed 500 gross square feet per bed.

(4) Uses same generation factor for library as used for church.

(5) Generation factor for industrial/manufacturing is based on dry manufacturing uses.

(7) Uses same generation factor as for professional building.

(8) Uses same generation factor as for commercial retail.

(9) Uses same generation factor as for industrial/manufacturing.

Prepared by Impact Sciences, Inc.
S. Tebo
12/5/03

Alternative 4-Compliance with the City of Santa Clarita Noise Ordinance
Estimated Water Demand

Land Use Category	Amount	Water Duty Factor	Water Demand (AFY)
Single Family Units	138 units	0.55 af/unit	75.9
Apartments	744 units	0.19 af/unit	141.36
Park	4 acres	3 af per acre	12.0
Other Misc. Landscaping (irrigated common landscaping, pocket parks, etc.)	29 acres	3 af per acre	87.0
Commercial (40,000 sq. ft.)	3 acres	0.0289 af/100 sq. ft.	11.56
TOTAL			**327.82**

ALTERNATIVE 4 SUMMERTIME EMISSIONS

URBEMIS 2002 For Windows 7.4.2

File Name: C:\URBEMIS2002\Urbemis River Park\River Park Alternative 4.urb
Project Name: River Park Alternative 4
Project Location: South Coast Air Basin (Los Angeles area)
On-Road Motor Vehicle Emissions Based on EMFAC2002 version 2.2

SUMMARY REPORT
(Pounds/Day - Summer)

AREA SOURCE EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10
TOTALS (lbs/day,unmitigated)	43.96	7.76	5.13	0.04	0.02
TOTALS (lbs/day, mitigated)	43.88	6.90	4.75	0.04	0.02

OPERATIONAL (VEHICLE) EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10
TOTALS (lbs/day,unmitigated)	84.54	93.98	1,007.26	0.65	98.19
TOTALS (lbs/day, mitigated)	84.54	93.98	1,007.26	0.65	98.19

SUM OF AREA AND OPERATIONAL EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10
TOTALS (lbs/day,unmitigated)	128.50	101.74	1,012.39	0.68	98.21
TOTALS (lbs/day, mitigated)	128.43	100.88	1,012.01	0.68	98.21

URBEMIS 2002 For Windows 7.4.2

File Name: C:\URBEMIS2002\Urbemis River Park\River Park Alternative 4.urb
Project Name: River Park Alternative 4
Project Location: South Coast Air Basin (Los Angeles area)
On-Road Motor Vehicle Emissions Based on EMFAC2002 version 2.2

DETAIL REPORT
(Pounds/Day - Summer)

AREA SOURCE EMISSION ESTIMATES (Summer Pounds per Day, Unmitigated)

Source	ROG	NOx	CO	SO2	PM10
Natural Gas	0.59	7.73	3.28	-	0.01
Wood Stoves - No summer emissions					
Fireplaces - No summer emissions					
Landscaping	0.21	0.03	1.85	0.04	0.00
Consumer Prdcts	43.15	-	-	-	-
TOTALS(lbs/day,unmitigated)	43.96	7.76	5.13	0.04	0.02

AREA SOURCE EMISSION ESTIMATES

Source	ROG	NOx	CO	SO2	PM10
Natural Gas	0.52	6.87	2.90	-	0.01
Wood Stoves - No summer emissions					
Fireplaces - No summer emissions					
Landscaping	0.21	0.03	1.85	0.04	0.00
Consumer Prdcts	43.15	-	-	-	-
TOTALS (lbs/day, mitigated)	43.88	6.90	4.75	0.04	0.02

Area Source Mitigation Measures

UNMITIGATED OPERATIONAL EMISSIONS

	ROG	NOx	CO	SO2	PM10
Single family housing	12.17	13.18	143.97	0.09	13.87
Apartments low rise	49.31	49.54	540.99	0.34	52.13
City park	0.13	0.09	0.96	0.00	0.10
Strip mall	22.93	31.16	321.34	0.21	32.10
TOTAL EMISSIONS (lbs/day)	84.54	93.98	1,007.26	0.65	98.19

Does not include correction for passby trips.
Does not include double counting adjustment for internal trips.

OPERATIONAL (Vehicle) EMISSION ESTIMATES

Analysis Year: 2008 Temperature (F): 90 Season: Summer

EMFAC Version: EMFAC2002 (9/2002)

Summary of Land Uses:

Unit Type	Trip Rate	Size	Total Trips
Single family housing	9.90 trips / dwelling units	138.00	1,366.20
Apartments low rise	6.90 trips / dwelling units	744.00	5,133.60
City park	2.60 trips / acres	4.25	11.05
Strip mall	94.55 trips / 1000 sq. ft.	40.00	3,782.00

Vehicle Assumptions:

Fleet Mix:

Vehicle Type	Percent Type	Non-Catalyst	Catalyst	Diesel
Light Auto	55.00	1.60	98.00	0.40
Light Truck < 3,750 lbs	15.00	2.70	95.30	2.00
Light Truck 3,751- 5,750	16.20	1.20	97.50	1.30
Med Truck 5,751- 8,500	7.20	1.40	95.80	2.80
Lite-Heavy 8,501-10,000	1.10	0.00	81.80	18.20
Lite-Heavy 10,001-14,000	0.40	0.00	50.00	50.00
Med-Heavy 14,001-33,000	1.00	0.00	20.00	80.00
Heavy-Heavy 33,001-60,000	0.90	0.00	11.10	88.90
Line Haul > 60,000 lbs	0.00	0.00	0.00	100.00
Urban Bus	0.20	0.00	50.00	50.00
Motorcycle	1.70	76.50	23.50	0.00
School Bus	0.10	0.00	0.00	100.00
Motor Home	1.20	8.30	83.30	8.40

Travel Conditions

	Residential			Commercial		
	Home-Work	Home-Shop	Home-Other	Commute	Non-Work	Customer
Urban Trip Length (miles)	11.5	4.9	6.0	10.3	5.5	5.5
Rural Trip Length (miles)	11.5	4.9	6.0	10.3	5.5	5.5
Trip Speeds (mph)	35.0	40.0	40.0	40.0	40.0	40.0
% of Trips - Residential	20.0	37.0	43.0			
% of Trips - Commercial (by land use)						
City park				5.0	2.5	92.5
Strip mall				2.0	1.0	97.0

MITIGATED OPERATIONAL EMISSIONS

	ROG	NOx	CO	SO2	PM10
Single family housing	12.17	13.18	143.97	0.09	13.87
Apartments low rise	49.31	49.54	540.99	0.34	52.13
City park	0.13	0.09	0.96	0.00	0.10
Strip mall	22.93	31.16	321.34	0.21	32.10
TOTAL EMISSIONS (lbs/day)	84.54	93.98	1,007.26	0.65	98.19

OPERATIONAL (Vehicle) EMISSION ESTIMATES

Analysis Year: 2008 Temperature (F): 90 Season: Summer

EMFAC Version: EMFAC2002 (9/2002)

Summary of Land Uses:

Unit Type	Trip Rate	Size	Total Trips
Single family housing	9.90 trips / dwelling units	138.00	1,366.20
Apartments low rise	6.90 trips / dwelling units	744.00	5,133.60
City park	2.60 trips / acres	4.25	11.05
Strip mall	94.55 trips / 1000 sq. ft.	40.00	3,782.00

Vehicle Assumptions:

Fleet Mix:

Vehicle Type	Percent Type	Non-Catalyst	Catalyst	Diesel
Light Auto	55.00	1.60	98.00	0.40
Light Truck < 3,750 lbs	15.00	2.70	95.30	2.00
Light Truck 3,751- 5,750	16.20	1.20	97.50	1.30
Med Truck 5,751- 8,500	7.20	1.40	95.80	2.80
Lite-Heavy 8,501-10,000	1.10	0.00	81.80	18.20
Lite-Heavy 10,001-14,000	0.40	0.00	50.00	50.00
Med-Heavy 14,001-33,000	1.00	0.00	20.00	80.00
Heavy-Heavy 33,001-60,000	0.90	0.00	11.10	88.90
Line Haul > 60,000 lbs	0.00	0.00	0.00	100.00
Urban Bus	0.20	0.00	50.00	50.00
Motorcycle	1.70	76.50	23.50	0.00
School Bus	0.10	0.00	0.00	100.00
Motor Home	1.20	8.30	83.30	8.40

Travel Conditions

	Residential			Commercial		
	Home-Work	Home-Shop	Home-Other	Commute	Non-Work	Customer
Urban Trip Length (miles)	11.5	4.9	6.0	10.3	5.5	5.5
Rural Trip Length (miles)	11.5	4.9	6.0	10.3	5.5	5.5
Trip Speeds (mph)	35.0	40.0	40.0	40.0	40.0	40.0
% of Trips - Residential	20.0	37.0	43.0			
% of Trips - Commercial (by land use)						
City park				5.0	2.5	92.5
Strip mall				2.0	1.0	97.0

ENVIRONMENTAL FACTORS APPLICABLE TO THE PROJECT

Pedestrian Environment

```
 0.0            Side Walks/Paths: No Sidewalks
 0.0            Street Trees Provide Shade: No Coverage
 0.0            Pedestrian Circulation Access: No Destinations
 0.0            Visually Interesting Uses: No Uses Within Walking Distance
 0.0            Street System Enhances Safety: No Streets
 0.0            Pedestrian Safety from Crime: No Degree of Safety
 0.0            Visually Interesting Walking Routes: No Visual Interest

 0.0    <- Pedestrian Environmental Credit
 0.0   /19 =  0.0    <- Pedestrian Effectiveness Factor
```

Transit Service

```
 0.0            Transit Service: Dial-A-Ride or No Transit Service

 0.0    <- Transit Effectiveness Credit
 0.0    <- Pedestrian Factor
 0.0    <-Total
 0.0    /110 =  0.0     <-Transit Effectiveness Factor
```

Bicycle Environment

```
 0.0            Interconnected Bikeways: No Bikeway Coverage
 0.0            Bike Routes Provide Paved Shoulders: No Routes
 0.0            Safe Vehicle Speed Limits: No Routes Provided
 0.0            Safe School Routes: No Schools
 0.0            Uses w/in Cycling Distance: No Uses w/in Cycling Distance
 0.0            Bike Parking Ordinance: No Ordinance or Unenforceable

 0.0    <- Bike Environmental Credit
 0.0  /20 =  0.0    <- Bike Effectiveness Factor
```

MITIGATION MEASURES SELECTED FOR THIS PROJECT
(All mitigation measures are printed, even if
the selected land uses do not constitute a mixed use.)

Transit Infrastructure Measures

% Trips Reduced	Measure
15.0	Credit for Existing or Planned Community Transit Service
15.0	<- Totals

Pedestrian Enhancing Infrastructure Measures (Residential)

% Trips Reduced	Measure
2.0	Credit for Surrounding Pedestrian Environment
1.0	Provide Sidewalks and/or Pedestrian Paths
1.0	Provide Direct Pedestrian Connections
0.5	Provide Pedestrian Safety
0.5	Provide Street Lighting
0.5	Provide Pedestrian Signalization and Signage
5.5	<- Totals

Pedestrian Enhancing Infrastructure Measures (Non-Residential)

% Trips Reduced	Measure
2.0	Credit for Surrounding Pedestrian Environment
2.0	<- Totals

Bicycle Enhancing Infratructure Measures (Residential)

% Trips Reduced	Measure
7.0	Credit for Surrounding Bicycle Environment
2.0	Provide Bike Lanes/Paths Connecting to Bikeway System
9.0	<- Totals

Bike Enhancing Infrastructure Measures (Non-Residential)

% Trips Reduced	Measure
5.0	Credit for Surrounding Area Bike Environment
5.0	<- Totals

Operational Measures (Applying to Commute Trips)

% Trips Reduced	Measure
0.0	<- Totals

Operational Measures (Applying to Employee Non-Commute Trips)

% Trips Reduced	Measure
0.0	<- Totals

Operational Measures (Applying to Customer Trips)

% Trips Reduced	Measure
0.0	<- Totals

Measures Reducing VMT (Non-Residential)

VMT Reduced	Measure
0.0	Park and Ride Lots
0.0	<- Totals

Measures Reducing VMT (Residential)

VMT Reduced	Measure
0.0	<- Totals

Total Percentage Trip Reduction
with Environmental Factors and Mitigation Measures

Travel Mode	Home-Work Trips	Home-Shop Trips	Home-Other Trips
Pedestrian	0.00	0.00	0.00
Transit	0.00	0.00	0.00
Bicycle	0.00	0.00	0.00
Totals	0.00	0.00	0.00

Travel Mode	Work Trips	Employee Trips	Customer Trips
Pedestrian	0.00	0.00	0.00
Transit	0.00	0.00	0.00
Bicycle	0.00	0.00	0.00
Other	0.00	0.00	0.00
Totals	0.00	0.00	0.00

Changes made to the default values for Land Use Trip Percentages

Changes made to the default values for Area

The wood stove option switch changed from on to off.
The area souce mitigation measure option switch changed from off to on.
The landscape year changed from 2004 to 2008.
Mitigation measure Increase Insulation Beyond Title 24: Rsdntl Space Heat.
has been changed from off to on.
Mitigation measure Increase Insulation Beyond Title 24: Cmrcl Space Heat.
has been changed from off to on.

Changes made to the default values for Operations

The operational emission year changed from 2004 to 2008.
The double counting internal work trip limit changed from to 76.1925.
The double counting shopping trip limit changed from to 38.09625.
The double counting other trip limit changed from to 2794.914.
The travel mode environment settings changed from both to: both
Mitigation measure Provide Sidewalks and/or Pedestrian Paths:1
has been changed from off to on.
Mitigation measure Provide Direct Pedestrian Connections:1
has been changed from off to on.
Mitigation measure Provide Pedestrian Safety:0.5
has been changed from off to on.
Mitigation measure Provide Street Lighting:0.5
has been changed from off to on.
Mitigation measure Provide Pedestrian Signalization and Signage:0.5
has been changed from off to on.
Mitigation measure Provide Bike Lanes/Paths Connecting to Bikeway System:2
has been changed from off to on.

ALTERNATIVE 4 WINTERTIME EMISSIONS

URBEMIS 2002 For Windows 7.4.2

File Name: C:\URBEMIS2002\Urbemis River Park\River Park Alternative 4.urb
Project Name: River Park Alternative 4
Project Location: South Coast Air Basin (Los Angeles area)
On-Road Motor Vehicle Emissions Based on EMFAC2002 version 2.2

SUMMARY REPORT
(Pounds/Day - Winter)

AREA SOURCE EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10
TOTALS (lbs/day,unmitigated)	1,031.66	18.94	1,093.01	1.73	149.28
TOTALS (lbs/day, mitigated)	1,031.59	18.08	1,092.63	1.73	149.28

OPERATIONAL (VEHICLE) EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10
TOTALS (lbs/day,unmitigated)	79.65	135.82	961.44	0.53	98.19
TOTALS (lbs/day, mitigated)	79.65	135.82	961.44	0.53	98.19

SUM OF AREA AND OPERATIONAL EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10
TOTALS (lbs/day,unmitigated)	1,111.31	154.76	2,054.45	2.25	247.47
TOTALS (lbs/day, mitigated)	1,111.24	153.91	2,054.07	2.25	247.47

URBEMIS 2002 For Windows 7.4.2

File Name: C:\URBEMIS2002\Urbemis River Park\River Park Alternative 4.urb
Project Name: River Park Alternative 4
Project Location: South Coast Air Basin (Los Angeles area)
On-Road Motor Vehicle Emissions Based on EMFAC2002 version 2.2

DETAIL REPORT
(Pounds/Day - Winter)

AREA SOURCE EMISSION ESTIMATES (Winter Pounds per Day, Unmitigated)

Source	ROG	NOx	CO	SO2	PM10
Natural Gas	0.59	7.73	3.28	-	0.01
Wood Stoves	0.00	0.00	0.00	0.00	0.00
Fireplaces	987.92	11.22	1,089.73	1.73	149.27
Landscaping - No winter emissions					
Consumer Prdcts	43.15	-	-	-	-
TOTALS(lbs/day,unmitigated)	1,031.66	18.94	1,093.01	1.73	149.28

AREA SOURCE EMISSION ESTIMATES

Source	ROG	NOx	CO	SO2	PM10
Natural Gas	0.52	6.87	2.90	-	0.01
Wood Stoves	0.00	0.00	0.00	0.00	0.00
Fireplaces	987.92	11.22	1,089.73	1.73	149.27
Landscaping - No winter emissions					
Consumer Prdcts	43.15	-	-	-	-
TOTALS (lbs/day, mitigated)	1,031.59	18.08	1,092.63	1.73	149.28

Area Source Mitigation Measures

Increase Insulation Beyond Title 24: Rsdntl Space Heat.
Percent Reduction(ROG 14% NOx 13% CO 7.4% SO2 0% PM10 13%)
Increase Insulation Beyond Title 24: Cmrcl Space Heat.
Percent Reduction(ROG 10% NOx 9% CO 7% SO2 0% PM10 9.5%)

UNMITIGATED OPERATIONAL EMISSIONS

	ROG	NOx	CO	SO2	PM10
Single family housing	11.34	19.07	136.10	0.08	13.87
Apartments low rise	42.72	71.67	511.42	0.28	52.13
City park	0.08	0.13	0.93	0.00	0.10
Strip mall	25.51	44.94	312.99	0.17	32.10
TOTAL EMISSIONS (lbs/day)	79.65	135.82	961.44	0.53	98.19

Does not include correction for passby trips.
Does not include double counting adjustment for internal trips.

OPERATIONAL (Vehicle) EMISSION ESTIMATES

Analysis Year: 2008 Temperature (F): 50 Season: Winter

EMFAC Version: EMFAC2002 (9/2002)

Summary of Land Uses:

Unit Type	Trip Rate	Size	Total Trips
Single family housing	9.90 trips / dwelling units	138.00	1,366.20
Apartments low rise	6.90 trips / dwelling units	744.00	5,133.60
City park	2.60 trips / acres	4.25	11.05
Strip mall	94.55 trips / 1000 sq. ft.	40.00	3,782.00

Vehicle Assumptions:

Fleet Mix:

Vehicle Type	Percent Type	Non-Catalyst	Catalyst	Diesel
Light Auto	55.00	1.60	98.00	0.40
Light Truck < 3,750 lbs	15.00	2.70	95.30	2.00
Light Truck 3,751- 5,750	16.20	1.20	97.50	1.30
Med Truck 5,751- 8,500	7.20	1.40	95.80	2.80
Lite-Heavy 8,501-10,000	1.10	0.00	81.80	18.20
Lite-Heavy 10,001-14,000	0.40	0.00	50.00	50.00
Med-Heavy 14,001-33,000	1.00	0.00	20.00	80.00
Heavy-Heavy 33,001-60,000	0.90	0.00	11.10	88.90
Line Haul > 60,000 lbs	0.00	0.00	0.00	100.00
Urban Bus	0.20	0.00	50.00	50.00
Motorcycle	1.70	76.50	23.50	0.00
School Bus	0.10	0.00	0.00	100.00
Motor Home	1.20	8.30	83.30	8.40

Travel Conditions

	Residential			Commercial		
	Home-Work	Home-Shop	Home-Other	Commute	Non-Work	Customer
Urban Trip Length (miles)	11.5	4.9	6.0	10.3	5.5	5.5
Rural Trip Length (miles)	11.5	4.9	6.0	10.3	5.5	5.5
Trip Speeds (mph)	35.0	40.0	40.0	40.0	40.0	40.0
% of Trips - Residential	20.0	37.0	43.0			
% of Trips - Commercial (by land use)						
City park				5.0	2.5	92.5
Strip mall				2.0	1.0	97.0

MITIGATED OPERATIONAL EMISSIONS

	ROG	NOx	CO	SO2	PM10
Single family housing	11.34	19.07	136.10	0.08	13.87
Apartments low rise	42.72	71.67	511.42	0.28	52.13
City park	0.08	0.13	0.93	0.00	0.10
Strip mall	25.51	44.94	312.99	0.17	32.10
TOTAL EMISSIONS (lbs/day)	79.65	135.82	961.44	0.53	98.19

OPERATIONAL (Vehicle) EMISSION ESTIMATES

Analysis Year: 2008 Temperature (F): 50 Season: Winter

EMFAC Version: EMFAC2002 (9/2002)

Summary of Land Uses:

Unit Type	Trip Rate	Size	Total Trips
Single family housing	9.90 trips / dwelling units	138.00	1,366.20
Apartments low rise	6.90 trips / dwelling units	744.00	5,133.60
City park	2.60 trips / acres	4.25	11.05
Strip mall	94.55 trips / 1000 sq. ft.	40.00	3,782.00

Vehicle Assumptions:

Fleet Mix:

Vehicle Type	Percent Type	Non-Catalyst	Catalyst	Diesel
Light Auto	55.00	1.60	98.00	0.40
Light Truck < 3,750 lbs	15.00	2.70	95.30	2.00
Light Truck 3,751- 5,750	16.20	1.20	97.50	1.30
Med Truck 5,751- 8,500	7.20	1.40	95.80	2.80
Lite-Heavy 8,501-10,000	1.10	0.00	81.80	18.20
Lite-Heavy 10,001-14,000	0.40	0.00	50.00	50.00
Med-Heavy 14,001-33,000	1.00	0.00	20.00	80.00
Heavy-Heavy 33,001-60,000	0.90	0.00	11.10	88.90
Line Haul > 60,000 lbs	0.00	0.00	0.00	100.00
Urban Bus	0.20	0.00	50.00	50.00
Motorcycle	1.70	76.50	23.50	0.00
School Bus	0.10	0.00	0.00	100.00
Motor Home	1.20	8.30	83.30	8.40

Travel Conditions

	Residential			Commercial		
	Home-Work	Home-Shop	Home-Other	Commute	Non-Work	Customer
Urban Trip Length (miles)	11.5	4.9	6.0	10.3	5.5	5.5
Rural Trip Length (miles)	11.5	4.9	6.0	10.3	5.5	5.5
Trip Speeds (mph)	35.0	40.0	40.0	40.0	40.0	40.0
% of Trips - Residential	20.0	37.0	43.0			
% of Trips - Commercial (by land use)						
City park				5.0	2.5	92.5
Strip mall				2.0	1.0	97.0

ENVIRONMENTAL FACTORS APPLICABLE TO THE PROJECT

Pedestrian Environment

```
 0.0            Side Walks/Paths: No Sidewalks
 0.0            Street Trees Provide Shade: No Coverage
 0.0            Pedestrian Circulation Access: No Destinations
 0.0            Visually Interesting Uses: No Uses Within Walking Distance
 0.0            Street System Enhances Safety: No Streets
 0.0            Pedestrian Safety from Crime: No Degree of Safety
 0.0            Visually Interesting Walking Routes: No Visual Interest

 0.0    <- Pedestrian Environmental Credit
 0.0   /19 =  0.0    <- Pedestrian Effectiveness Factor
```

Transit Service

```
 0.0            Transit Service: Dial-A-Ride or No Transit Service

 0.0    <- Transit Effectiveness Credit
 0.0    <- Pedestrian Factor
 0.0    <-Total
 0.0    /110 =  0.0     <-Transit Effectiveness Factor
```

Bicycle Environment

```
 0.0            Interconnected Bikeways: No Bikeway Coverage
 0.0            Bike Routes Provide Paved Shoulders: No Routes
 0.0            Safe Vehicle Speed Limits: No Routes Provided
 0.0            Safe School Routes: No Schools
 0.0            Uses w/in Cycling Distance: No Uses w/in Cycling Distance
 0.0            Bike Parking Ordinance: No Ordinance or Unenforceable

 0.0    <- Bike Environmental Credit
 0.0  /20 =  0.0    <- Bike Effectiveness Factor
```

MITIGATION MEASURES SELECTED FOR THIS PROJECT
(All mitigation measures are printed, even if
the selected land uses do not constitute a mixed use.)

Transit Infrastructure Measures

% Trips Reduced	Measure
15.0	Credit for Existing or Planned Community Transit Service
15.0 <- Totals	

Pedestrian Enhancing Infrastructure Measures (Residential)

% Trips Reduced	Measure
2.0	Credit for Surrounding Pedestrian Environment
1.0	Provide Sidewalks and/or Pedestrian Paths
1.0	Provide Direct Pedestrian Connections
0.5	Provide Pedestrian Safety
0.5	Provide Street Lighting
0.5	Provide Pedestrian Signalization and Signage
5.5 <- Totals	

Pedestrian Enhancing Infrastructure Measures (Non-Residential)

% Trips Reduced	Measure
2.0	Credit for Surrounding Pedestrian Environment
2.0 <- Totals	

Bicycle Enhancing Infratructure Measures (Residential)

% Trips Reduced	Measure
7.0	Credit for Surrounding Bicycle Environment
2.0	Provide Bike Lanes/Paths Connecting to Bikeway System
9.0 <- Totals	

Bike Enhancing Infrastructure Measures (Non-Residential)

% Trips Reduced	Measure
5.0	Credit for Surrounding Area Bike Environment
5.0 <- Totals	

Operational Measures (Applying to Commute Trips)

% Trips Reduced	Measure
0.0 <- Totals	

Operational Measures (Applying to Employee Non-Commute Trips)

% Trips Reduced	Measure
0.0 <- Totals	

Operational Measures (Applying to Customer Trips)

% Trips Reduced	Measure
0.0 <- Totals	

Measures Reducing VMT (Non-Residential)

VMT Reduced	Measure
0.0	Park and Ride Lots
0.0 <- Totals	

Measures Reducing VMT (Residential)

VMT Reduced	Measure
0.0 <- Totals	

Total Percentage Trip Reduction
with Environmental Factors and Mitigation Measures

Travel Mode	Home-Work Trips	Home-Shop Trips	Home-Other Trips
Pedestrian	0.00	0.00	0.00
Transit	0.00	0.00	0.00
Bicycle	0.00	0.00	0.00
Totals	0.00	0.00	0.00

Travel Mode	Work Trips	Employee Trips	Customer Trips
Pedestrian	0.00	0.00	0.00
Transit	0.00	0.00	0.00
Bicycle	0.00	0.00	0.00
Other	0.00	0.00	0.00
Totals	0.00	0.00	0.00

Changes made to the default values for Land Use Trip Percentages

Changes made to the default values for Area

The wood stove option switch changed from on to off.
The area souce mitigation measure option switch changed from off to on.
The landscape year changed from 2004 to 2008.
Mitigation measure Increase Insulation Beyond Title 24: Rsdntl Space Heat.
has been changed from off to on.
Mitigation measure Increase Insulation Beyond Title 24: Cmrcl Space Heat.
has been changed from off to on.

Changes made to the default values for Operations

The operational emission year changed from 2004 to 2008.
The double counting internal work trip limit changed from to 76.1925.
The double counting shopping trip limit changed from to 38.09625.
The double counting other trip limit changed from to 2794.914.
The travel mode environment settings changed from both to: both
Mitigation measure Provide Sidewalks and/or Pedestrian Paths:1
has been changed from off to on.
Mitigation measure Provide Direct Pedestrian Connections:1
has been changed from off to on.
Mitigation measure Provide Pedestrian Safety:0.5
has been changed from off to on.
Mitigation measure Provide Street Lighting:0.5
has been changed from off to on.
Mitigation measure Provide Pedestrian Signalization and Signage:0.5
has been changed from off to on.
Mitigation measure Provide Bike Lanes/Paths Connecting to Bikeway System:2
has been changed from off to on.

Alternative 5
Santa Clarita Valley
Population and Employment Impact Analysis
River Park EIR

Land Use	Unit	Quantity	Persons/ Household	Population	Employees/ Unit	Employees
Single Family Res'l	du	448	3.06	1,369	-	-
Multi-Family Res'l	du	744	3.06	2,274	-	-
Mobile Homes	du		2.55	0	-	-
Comm'l Retail	tsf	39.00	-	-	2.50	98
Hotel/Motel (1)	rooms		-	-	0.90	0
School/College	-		-	-	-	
Hospital	tsf		-	-	3.00	0
Library	tsf		-	-	1.00	0
Church	tsf		-	-	0.50	0
Business Park	tsf		-	-	3.00	0
Industrial/Mfg.	tsf		-	-	2.00	0
Utilities	tsf		-	-	0.70	0
Office	tsf		-	-	4.00	0
Golf Course/Park	acres	29.00	-	-	0.40	12
Special Generator (3)	tsf		-	-	0.70	0
			Totals	**3,643**	**-**	**109**

du = dwelling unit; tsf = thousand square feet

Build out analysis and school employment is derived from the Traffic Model.

(1) Based on 400 gross square feet per room and 0.9 employees per room (SCAG, 1990).

(3) Assumes same rate as Utilities.

Prepared by Impact Sciences, Inc.
S. Tebo
12/15/03

Alternative 5

River Park EIR

Santa Clarita Valley
Library Impact Analysis

Land Use	Number of Units	Persons/ Household	Library (Sq. Feet)	Library Books
Single Family Res'l	448	3.06	479	2,738
Multi-Family Res'l	744	3.06	796	4,547
Mobile Homes		2.55	0	0
		Totals	**1,275**	**7,286**

L.A. County Public Library Standard: 0.35 s.f./capita
L.A. County Public Library Standard: 2.0 books/capita

Prepared by Impact Sciences, Inc.
S. Tebo
12/15/03

Santa Clarita Valley
Net Increase in
Student/Classroom/School Generation Using
Theoretical Student Generation Rates
River Park EIR

District	Housing Units by Type			Student Generation Rate			Class Size	School Size	Students	Classes	Schools
	Single Fam.	Multi-Fam.	Apartment	Single Fam.	Multi-Fam.	Apartment					
Saugus Union Elementary	439		744	0.431	0.0556	0.1326	30	770	288	9.60	0.37
Hart Junior High	439		744	0.104	0.037	0.038	32	930	74	2.31	0.08
Hart High School	439		744	0.179	0.064	0.054	32	2,764	119	3.71	0.04
								Totals	**481**	**15.62**	**0.50**

Prepared By Impact Sciences, Inc.
S. Tebo
12/15/03

Alternative 5
Santa Clarita Valley
Parks and Recreation Impact Analysis
River Park EIR

Land Use	Number of Units	Persons/ Household	Population	Parkland Req'mt (acres)
Single Family Res'l	448	3.06	1,369	4.11
Multi-Family Res'l	744	3.06	2,274	6.82
Mobile Homes		2.55	0	0.00
		Totals	**3,643**	**10.93**
Based on Quimby requirement of 3.0 acres/1000 persons				

Prepared by Impact Sciences, Inc.
S. Tebo
12/15/03

Alternative 5
Santa Clarita Valley
Solid Waste Generation
(No Recycling) Impact Analysis
River Park EIR

Land Use	Quantity	Units	Generation Rate		Total Waste Generated	
			(tpy) (1)	(lbs./day)	(tpy)	(lbs./day)
Residential Units:						
Single Family Detached	448	du	2.0400	11.18	914	5,008
Multi-Family or Attached	744	du	1.1700	6.41	870	4,770
Mobile Home		du	1.1700	6.41	0	0
Commercial/Industrial						
General Retail	39,000	sq. ft.	0.0024	0.01	94	513
Eating/Drnkng Establ.		sq. ft.	0.0108	0.06	0	0
Food & Drug Stores		sq. ft.	0.0072	0.04	0	0
Auto Dlr/Service Sta.		sq. ft.	0.0051	0.03	0	0
Hotel & Motel		sq. ft.	0.0053	0.03	0	0
Warehouse		sq. ft.	0.0011	0.01	0	0
Medical Offices		sq. ft.	0.0027	0.01	0	0
Hospitals		sq. ft.	0.0055	0.03	0	0
Business Park		sq. ft.	0.0014	0.01	0	0
Office		sq. ft.	0.0014	0.01	0	0
Library (4)		sq. ft.	0.0014	0.01	0	0
Education & Schools		sq. ft.	0.0013	0.01	0	0
College		sq. ft.	0.0013	0.01	0	0
Trans., Comm., Utilities		sq. ft.	0.0079	0.04	0	0
Special Generator (6)		sq. ft.	0.0079	0.04	0	0
Golf Course/Park	29	acres	0.2000	1.10	6	32
Manufacturing		sq. ft.	0.0050	0.03	0	0
Church (4)		sq. ft.	0.0014	0.01	0	0
				Totals	**1,884**	**10,322**

du = dwelling unit; sq.ft. - square feet; tpy = tons per year; lbs. = pounds

(1) The solid waste daily generation rates in tons per year are derived from the Ventura County Solid Waste Management Department's Guidelines for Preparation of Environmental Assessments for Solid Waste Impacts. These figures do not reflect any recycling activities on the part of the generator.

(4) Assumes same generation rate as for office.

(6) Conservatively assumes same generation rate as utilities.

Prepared by Impact Sciences, Inc.
S. Tebo
12/5/03

Alternative 5
Santa Clarita Valley
Wastewater Generation Impact Analysis
River Park EIR

Land Use	Units	Quantity	Generation Factor (gpd)	Generation (gpd)	Generation (mgd)
Residential					
Single Family	du	448	260.00	116,480.00	0.1165
Multi-Family	du	744	195.00	145,080.00	0.1451
Mobile Homes	du		195.00	0.00	0.0000
Non-Residential					
Commercial Retail	tsf	39	100.00	3,900.00	0.0039
Hotel	sq.ft.		na		
Hotel (1)	rooms		125.00	0.00	0.0000
School	tsf		200.00	0.00	0.0000
College	stdnts		20.00	0.00	0.0000
College	sq.ft.		na		
Hospital	sq.ft.		na		
Hospital (3)	beds		125.00	0.00	0.0000
Library (4)	tsf		50.00	0.00	0.0000
Church	tsf		50.00	0.00	0.0000
Business Park (7)	tsf		300.00	0.00	0.0000
Industrial/Manufacturing (5)	tsf		25.00	0.00	0.0000
Utilities	tsf		25.00	0.00	0.0000
Commercial/Medical Office	tsf		300.00	0.00	0.0000
Golf Course/Park	acres	29	0.00	0.00	0.0000
Golf Course/Park Imps	tsf		100.00	0.00	0.0000
Visitor Serving (8)	tsf		100.00	0.00	0.0000
Special Generator (9)	tsf		25.00	0.00	0.0000
			Totals	**265,460.00**	**0.2655**

gpd = gallons per day; mgd = million gallons per day; du = dwelling unit; tsf = thousand square feet; sq. ft. = square feet; stdnts = students

Source of wastewater generation factors is CDSLAC, Loadings for Each Class of Land Use (1992-93). This list is provided in Appendix 4.10.

(1) Number of hotel rooms is based upon an assumed 400 gross square feet per room.

(3) Number of hospital beds is based upon an assumed 500 gross square feet per bed.

(4) Uses same generation factor for library as used for church.

(5) Generation factor for industrial/manufacturing is based on dry manufacturing uses.

(7) Uses same generation factor as for professional building.

(8) Uses same generation factor as for commercial retail.

(9) Uses same generation factor as for industrial/manufacturing.

Prepared by Impact Sciences, Inc.
S. Tebo
12/5/03

Alternative 5- Deletion of Santa Clarita Parkway
Estimated Water Demand

Land Use Category	Amount	Water Duty Factor	Water Demand (AFY)
Single Family Units	448 units	0.55 af/unit	246.40
Apartments	744 units	0.19 af/unit	141.36
Park	4 acres	3 af per acre	12.0
Other Misc. Landscaping (irrigated common landscaping, pocket parks, etc.)	100 acres	3 af per acre	300.0
Commercial (40,000 sq. ft.)	3 acres	0.0289 af/100 sq. ft.	11.56
TOTAL			**711.32**

ALTERNATIVE 5 SUMMERTIME EMISSIONS

URBEMIS 2002 For Windows 7.4.2

File Name: C:\URBEMIS2002\Urbemis River Park\River Park Alternative 5.urb
Project Name: River Park Alternative 5
Project Location: South Coast Air Basin (Los Angeles area)
On-Road Motor Vehicle Emissions Based on EMFAC2002 version 2.2

SUMMARY REPORT
(Pounds/Day - Summer)

AREA SOURCE EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10
TOTALS (lbs/day,unmitigated)	65.66	19.60	15.17	0.18	0.05
TOTALS (lbs/day, mitigated)	65.48	17.36	14.20	0.18	0.05

OPERATIONAL (VEHICLE) EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10
TOTALS (lbs/day,unmitigated)	133.48	134.46	1,519.64	1.33	113.10
TOTALS (lbs/day, mitigated)	133.48	134.46	1,519.64	1.33	113.10

SUM OF AREA AND OPERATIONAL EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10
TOTALS (lbs/day,unmitigated)	199.14	154.06	1,534.81	1.51	113.16
TOTALS (lbs/day, mitigated)	198.95	151.82	1,533.84	1.51	113.15

URBEMIS 2002 For Windows 7.4.2

File Name: C:\URBEMIS2002\Urbemis River Park\River Park Alternative 5.urb
Project Name: River Park Alternative 5
Project Location: South Coast Air Basin (Los Angeles area)
On-Road Motor Vehicle Emissions Based on EMFAC2002 version 2.2

DETAIL REPORT
(Pounds/Day - Summer)

AREA SOURCE EMISSION ESTIMATES (Summer Pounds per Day, Unmitigated)

Source	ROG	NOx	CO	SO2	PM10
Natural Gas	1.51	19.51	8.29	-	0.04
Wood Stoves - No summer emissions					
Fireplaces - No summer emissions					
Landscaping	0.82	0.09	6.88	0.18	0.01
Consumer Prdcts	63.34	-	-	-	-
TOTALS(lbs/day,unmitigated)	65.66	19.60	15.17	0.18	0.05

UNMITIGATED OPERATIONAL EMISSIONS

	ROG	NOx	CO	SO2	PM10
Single family housing	54.76	55.98	636.72	0.55	47.16
Apartments low rise	65.03	62.03	705.49	0.61	52.26
City park	0.18	0.12	1.32	0.00	0.10
Strip mall	13.51	16.34	176.11	0.16	13.58
TOTAL EMISSIONS (lbs/day)	133.48	134.46	1,519.64	1.33	113.10

Does not include correction for passby trips.
Includes a double counting reduction for internal trips.

OPERATIONAL (Vehicle) EMISSION ESTIMATES

Analysis Year: 2004 Temperature (F): 90 Season: Summer

EMFAC Version: EMFAC2002 (9/2002)

Summary of Land Uses:

Unit Type	Trip Rate	Size	Total Trips
Single family housing	9.90 trips / dwelling units	468.00	4,633.20
Apartments low rise	6.90 trips / dwelling units	744.00	5,133.60
City park	2.60 trips / acres	4.50	11.70
Strip mall	40.00 trips / 1000 sq. ft.	40.00	1,600.00

Vehicle Assumptions:

Fleet Mix:

Vehicle Type	Percent Type	Non-Catalyst	Catalyst	Diesel
Light Auto	92.00	2.70	96.80	0.50
Light Truck < 3,750 lbs	0.00	4.60	92.70	2.70
Light Truck 3,751- 5,750	0.00	2.60	96.20	1.20
Med Truck 5,751- 8,500	2.00	2.90	94.20	2.90
Lite-Heavy 8,501-10,000	0.00	0.00	80.00	20.00
Lite-Heavy 10,001-14,000	1.00	0.00	66.70	33.30
Med-Heavy 14,001-33,000	0.00	10.00	20.00	70.00
Heavy-Heavy 33,001-60,000	2.00	0.00	12.50	87.50
Line Haul > 60,000 lbs	0.00	0.00	0.00	100.00
Urban Bus	0.10	0.00	0.00	100.00
Motorcycle	1.60	87.50	12.50	0.00
School Bus	0.00	0.00	0.00	100.00
Motor Home	1.30	15.40	76.90	7.70

Travel Conditions

	Residential			Commercial		
	Home-Work	Home-Shop	Home-Other	Commute	Non-Work	Customer
Urban Trip Length (miles)	11.5	4.9	6.0	10.3	5.5	5.5
Rural Trip Length (miles)	11.5	4.9	6.0	10.3	5.5	5.5
Trip Speeds (mph)	35.0	40.0	40.0	40.0	40.0	40.0
% of Trips - Residential	20.0	37.0	43.0			
% of Trips - Commercial (by land use)						
City park				5.0	2.5	92.5
Strip mall				2.0	1.0	97.0

Changes made to the default values for Land Use Trip Percentages

Changes made to the default values for Area

The wood stove option switch changed from on to off.
The area souce mitigation measure option switch changed from off to on.
The natural gas residential percentage changed from 60 to 100.
The consumer product persons per residential unit changed from 2.861 to 3.056.
Mitigation measure Increase Insulation Beyond Title 24: Rsdntl Space Heat.
has been changed from off to on.
Mitigation measure Increase Insulation Beyond Title 24: Cmrcl Space Heat.
has been changed from off to on.

Changes made to the default values for Operations

The light auto percentage changed from 56.1 to 92.
The light truck < 3750 lbs percentage changed from 15.1 to 0.
The light truck 3751-5750 percentage changed from 15.6 to 0.
The med truck 5751-8500 percentage changed from 6.9 to 2.
The lite-heavy truck 8501-10000 percentage changed from 1.0 to 0.
The lite-heavy truck 10001-14000 percentage changed from 0.3 to 1.
The med-heavy truck 14001-33000 percentage changed from 1.0 to 0.
The heavy-heavy truck 33001-60000 percentage changed from 0.8 to 2.
The school bus percentage changed from 0.2 to 0.
The home based work selection item changed from 8 to 7.
The home based shopping selection item changed from 9 to 8.
The home based shopping urban trip length changed from 4.87 to 4.9.
The home based shopping rural trip length changed from 4.87 to 4.9.
The home based other selection item changed from 9 to 8.
The commercial based commute selection item changed from 9 to 8.
The commercial based non-work selection item changed from 9 to 8.
The commercial based customer selection item changed from 9 to 8.
The double counting internal work trip limit changed from to 32.585.
The double counting shopping trip limit changed from to 16.2925.
The double counting other trip limit changed from to 1562.8225.
The travel mode environment settings changed from both to: both
Mitigation measure Provide Sidewalks and/or Pedestrian Paths:1
has been changed from off to on.
Mitigation measure Provide Direct Pedestrian Connections:1
has been changed from off to on.
Mitigation measure Provide Pedestrian Safety:0.5
has been changed from off to on.
Mitigation measure Provide Street Lighting:0.5
has been changed from off to on.
Mitigation measure Provide Pedestrian Signalization and Signage:0.5
has been changed from off to on.
Mitigation measure Provide Bike Lanes/Paths Connecting to Bikeway System:2
has been changed from off to on.

ALTERNATIVE 5 WINTERTIME EMISSIONS

URBEMIS 2002 For Windows 7.4.2

File Name: C:\URBEMIS2002\Urbemis River Park\River Park Alternative 5.urb
Project Name: River Park Alternative 5
Project Location: South Coast Air Basin (Los Angeles area)
On-Road Motor Vehicle Emissions Based on EMFAC2002 version 2.2

SUMMARY REPORT
(Pounds/Day - Winter)

AREA SOURCE EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10
TOTALS (lbs/day,unmitigated)	1,422.39	34.93	1,505.75	2.37	205.15
TOTALS (lbs/day, mitigated)	1,422.20	32.69	1,504.78	2.37	205.15

OPERATIONAL (VEHICLE) EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10
TOTALS (lbs/day,unmitigated)	123.15	193.54	1,419.71	1.18	113.10
TOTALS (lbs/day, mitigated)	123.15	193.54	1,419.71	1.18	113.10

SUM OF AREA AND OPERATIONAL EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10
TOTALS (lbs/day,unmitigated)	1,545.54	228.46	2,925.45	3.55	318.25
TOTALS (lbs/day, mitigated)	1,545.36	226.22	2,924.49	3.55	318.25

URBEMIS 2002 For Windows 7.4.2

File Name: C:\URBEMIS2002\Urbemis River Park\River Park Alternative 5.urb
Project Name: River Park Alternative 5
Project Location: South Coast Air Basin (Los Angeles area)
On-Road Motor Vehicle Emissions Based on EMFAC2002 version 2.2

DETAIL REPORT
(Pounds/Day - Winter)

AREA SOURCE EMISSION ESTIMATES (Winter Pounds per Day, Unmitigated)

Source	ROG	NOx	CO	SO2	PM10
Natural Gas	1.51	19.51	8.29	-	0.04
Wood Stoves	0.00	0.00	0.00	0.00	0.00
Fireplaces	1,357.55	15.41	1,497.45	2.37	205.11
Landscaping - No winter emissions					
Consumer Prdcts	63.34	-	-	-	-
TOTALS(lbs/day,unmitigated)	1,422.39	34.93	1,505.75	2.37	205.15

UNMITIGATED OPERATIONAL EMISSIONS

	ROG	NOx	CO	SO2	PM10
Single family housing	51.44	80.59	592.88	0.49	47.16
Apartments low rise	57.12	89.30	656.91	0.54	52.26
City park	0.11	0.18	1.26	0.00	0.10
Strip mall	14.48	23.47	168.66	0.14	13.58
TOTAL EMISSIONS (lbs/day)	123.15	193.54	1,419.71	1.18	113.10

Does not include correction for passby trips.
Includes a double counting reduction for internal trips.

OPERATIONAL (Vehicle) EMISSION ESTIMATES

Analysis Year: 2004 Temperature (F): 50 Season: Winter

EMFAC Version: EMFAC2002 (9/2002)

Summary of Land Uses:

Unit Type	Trip Rate	Size	Total Trips
Single family housing	9.90 trips / dwelling units	468.00	4,633.20
Apartments low rise	6.90 trips / dwelling units	744.00	5,133.60
City park	2.60 trips / acres	4.50	11.70
Strip mall	40.00 trips / 1000 sq. ft.	40.00	1,600.00

Vehicle Assumptions:

Fleet Mix:

Vehicle Type	Percent Type	Non-Catalyst	Catalyst	Diesel
Light Auto	92.00	2.70	96.80	0.50
Light Truck < 3,750 lbs	0.00	4.60	92.70	2.70
Light Truck 3,751- 5,750	0.00	2.60	96.20	1.20
Med Truck 5,751- 8,500	2.00	2.90	94.20	2.90
Lite-Heavy 8,501-10,000	0.00	0.00	80.00	20.00
Lite-Heavy 10,001-14,000	1.00	0.00	66.70	33.30
Med-Heavy 14,001-33,000	0.00	10.00	20.00	70.00
Heavy-Heavy 33,001-60,000	2.00	0.00	12.50	87.50
Line Haul > 60,000 lbs	0.00	0.00	0.00	100.00
Urban Bus	0.10	0.00	0.00	100.00
Motorcycle	1.60	87.50	12.50	0.00
School Bus	0.00	0.00	0.00	100.00
Motor Home	1.30	15.40	76.90	7.70

Travel Conditions

	Residential			Commercial		
	Home-Work	Home-Shop	Home-Other	Commute	Non-Work	Customer
Urban Trip Length (miles)	11.5	4.9	6.0	10.3	5.5	5.5
Rural Trip Length (miles)	11.5	4.9	6.0	10.3	5.5	5.5
Trip Speeds (mph)	35.0	40.0	40.0	40.0	40.0	40.0
% of Trips - Residential	20.0	37.0	43.0			
% of Trips - Commercial (by land use)						
City park				5.0	2.5	92.5
Strip mall				2.0	1.0	97.0

Changes made to the default values for Land Use Trip Percentages

Changes made to the default values for Area

The wood stove option switch changed from on to off.
The area souce mitigation measure option switch changed from off to on.
The natural gas residential percentage changed from 60 to 100.
The consumer product persons per residential unit changed from 2.861 to 3.056.
Mitigation measure Increase Insulation Beyond Title 24: Rsdntl Space Heat.
has been changed from off to on.
Mitigation measure Increase Insulation Beyond Title 24: Cmrcl Space Heat.
has been changed from off to on.

Changes made to the default values for Operations

The light auto percentage changed from 56.1 to 92.
The light truck < 3750 lbs percentage changed from 15.1 to 0.
The light truck 3751-5750 percentage changed from 15.6 to 0.
The med truck 5751-8500 percentage changed from 6.9 to 2.
The lite-heavy truck 8501-10000 percentage changed from 1.0 to 0.
The lite-heavy truck 10001-14000 percentage changed from 0.3 to 1.
The med-heavy truck 14001-33000 percentage changed from 1.0 to 0.
The heavy-heavy truck 33001-60000 percentage changed from 0.8 to 2.
The school bus percentage changed from 0.2 to 0.
The home based work selection item changed from 8 to 7.
The home based shopping selection item changed from 9 to 8.
The home based shopping urban trip length changed from 4.87 to 4.9.
The home based shopping rural trip length changed from 4.87 to 4.9.
The home based other selection item changed from 9 to 8.
The commercial based commute selection item changed from 9 to 8.
The commercial based non-work selection item changed from 9 to 8.
The commercial based customer selection item changed from 9 to 8.
The double counting internal work trip limit changed from to 32.585.
The double counting shopping trip limit changed from to 16.2925.
The double counting other trip limit changed from to 1562.8225.
The travel mode environment settings changed from both to: both
Mitigation measure Provide Sidewalks and/or Pedestrian Paths:1
has been changed from off to on.
Mitigation measure Provide Direct Pedestrian Connections:1
has been changed from off to on.
Mitigation measure Provide Pedestrian Safety:0.5
has been changed from off to on.
Mitigation measure Provide Street Lighting:0.5
has been changed from off to on.
Mitigation measure Provide Pedestrian Signalization and Signage:0.5
has been changed from off to on.
Mitigation measure Provide Bike Lanes/Paths Connecting to Bikeway System:2
has been changed from off to on.

NOTE:
FLOOD MAINTENANCE DIVISION APPROVAL OF ALL DRAINAGE DEVICES IS REQUIRED PRIOR TO DRAINAGE CONCEPT APPROVAL. (PER TIM CHEN'S REQUEST ON 10/8/03)

MATCHLINE SEE SHEET 3

OFF-SITE SUB-AREAS MATCHLINE SEE SHEET 1

OFF-SITE SUB-AREAS MATCHLINE SEE SHEET 1

MATCHLINE SEE BELOW LEFT

MATCHLINE SEE ABOVE RIGHT

301A
34.0 AC.

1420' ELEV. (2) Tc=6min.

L=1345'

300A
12.0 AC.

1456 ELEV. Tc=11min.

1540' ELEV.

502B
5.3 AC.

1620 ELEV.

1613 ELEV. (1)(2) Tc=12 min.

1623 ELEV. (1)

1627 ELEV. (1)

AG

500A
33.2 AC.

1613 ELEV. (1)(2) Tc=9 min.

1639 ELEV. L=200'

1643 ELEV. (1)

L=1095'

L=2000'

503B
18.5 AC.

501A
18.0 AC.

DESILTING INLET 'G'
DPV=722cy
ΣA=23.8Ac
ΣQc=61cfs
ΣQb=68cfs
(PART OF MTD)

DESILTING INLET 'H'
DPV=702cy
ΣA=51.2Ac
ΣQc=121cfs
ΣQb=127cfs
(PART OF MTD)

OFF-SITE DRAINAGE SEE SHEET 1

306A
6.7 AC.

1430 ELEV. (1)

BRIDGE OVER AQUEDUCT (NOT A PART OF MTD)

506A
16.5 AC.

700A
2.1 AC.

1380 ELEV. (2) Tc=6 min.

1380 ELEV. (2)(1) Tc=8 min.

40' RUNAROUND

15' ACCESS ROAD

1562 ELEV.

L=1820'

PROPERTY BOUNDARY

1345 ELEV. (2) Tc=5 min.

1320 ELEV.

L=1895'

505A
25.0 AC.

Tc=13 min. 1308 ELEV. (3)

Q=7 cfs (clear)
Q=8 cfs (burned)
ΣA=2.1 Ac

RETAINING WALLS

BIKE/PED BRIDGE

(NOT A PART OF MTD)

SANTA CLARA RIVER

(NOT A PART OF MTD)

EQUESTRIAN TRAIL

BIKE/ PED TRAIL

CDS UNIT OR EQUIVALENT
Qpm = 6.6 cfs
(PART OF MTD)

Q=281 cfs (clear)
Q=295 cfs (burned)
ΣA=116.5 Ac

CAPITAL FLOOD WATER SURFACE CONTOURS CUMULATIVE (n=0.085) PER: FLOOD PLAIN IMPACT REPORT PREPARED BY PSOMAS FOR RIVERPARK NOV 13, 2003

ENERGY DISSIPATOR (PART OF MTD)

BANK LINING (PART OF MTD)

EXIST. DIRT ROAD

507A

506A

L=910'

L=1945'

L=1400'

L=700'

L=1100'

L=1200'

L=1300'

L=1500'

L=1600'

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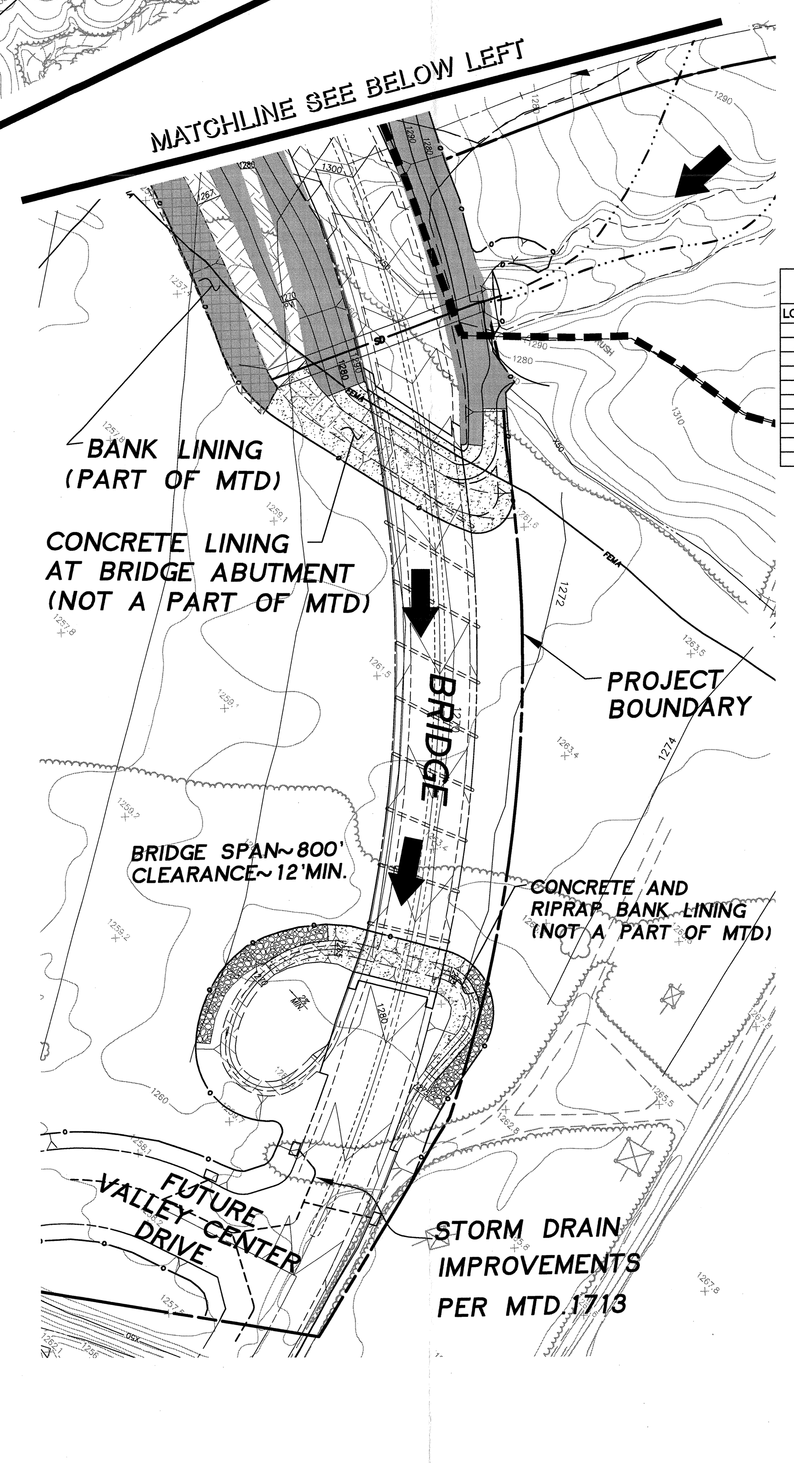

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100 50 0 100 200
INCHES
1 1/2 0 1 2

LEGEND

- 100A / 14.5 Ac. — AREA No. / ACREAGE
- 1A — MODIFIED RATIONAL METHOD NODE
- (1) — RATIONAL METHOD Tc NODE
- FLOW PATH
- LIMITS OF GRADING
- WATERSHED BOUNDARY
- SUB-AREA BOUNDARY
- PROJECT BOUNDARY
- STORM DRAIN LINE – (Part of MTD)
- STORM DRAIN LINE – (Not A Part of MTD)
- DEBRIS CONE
- FEMA — FEMA LINE
- X00 — EXISTING Qcap LIMIT
- Q=100cfs-(Clear) — CLEAR SUB-AREA FLOW
- Q=105cfs-(Burned) — BURNED SUB-AREA FLOW
- FLOW ARROW
- 55 Cy/Ac. — DEBRIS PRODUCTION RATE
- 1.36 — BULKING RATE
- –SOIL 97
- –DPA ZONE B & 9
- –RAINFALL ZONE K
- BURIED BANK LINING

SUMMARY TABLE

SUB-AREA	SUB-AREA AREA			TOTAL AREA			Q50 BURNED + BULKED	DEBRIS (CY)	DEBRIS CONTROL TYPE	Qpm (cfs)	Vm (cfs)
LOCATION	Ac.	Tc(min)	Q50 CLEAR (cfs)	Q50 BURNED (cfs)	AREA Ac.	Q50 CLEAR (cfs)	Q50 BURNED (cfs)					
500A	33.2	9	85	85	33.2	85	85	85				
501A	18.0	8	48	54	51.2	121	127	173	702	DESILTING INLET 'H'		
502B	5.3	12	12	12	5.3	12	12	12				
503B	18.5	6	58	66	23.8	81	68	93	722	DESILTING INLET 'G'		
505A	25.0	5	109	109	100.0	240	254	254				
506A	16.5	13	46	46	116.5	281	295	295				
507A										ENERGY DISSIPATOR	6.6	92.674
700A	2.1	5	7	8	2.1	7	8	11	116	BRIDGE		

LEGAL DESCRIPTION:

THAT PORTION OF RANCHO SAN FRANCISCO, IN THE COUNTY OF LOS ANGELES, STATE OF CALIFORNIA, AS SHOWN ON MAP RECORDED IN BOOK 1 PAGES 521 PAGES 522 OF PATENTS, IN THE OFFICE OF THE COUNTY RECORDER OF SAID COUNTY.

REGISTERED PROFESSIONAL ENGINEER — MATTHEW G. HEIDEMAN — No. 55639 — Exp. 12-31-04 — CIVIL — STATE OF CALIFORNIA

MATTHEW G. HEIDEMAN R.C.E. NO. 55639 DATE

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DESIGNED : MGH
DRAFTED : J.H.
CHECKED : MGH

OWNER/DEVELOPER :
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23823 WEST VALENCIA BOULEVARD
VALENCIA, CALIFORNIA 91355
TELEPHONE: (661) 255-4000
REPRESENTATIVES : GLENN ADAMICK & CORY HARPOLE

RIVER PARK
DRAINAGE CONCEPT FOR TR 53425
PROPOSED CONDITION

LOCATED IN THE CITY OF SANTA CLARITA, COUNTY OF LOS ANGELES STATE OF CALIFORNIA

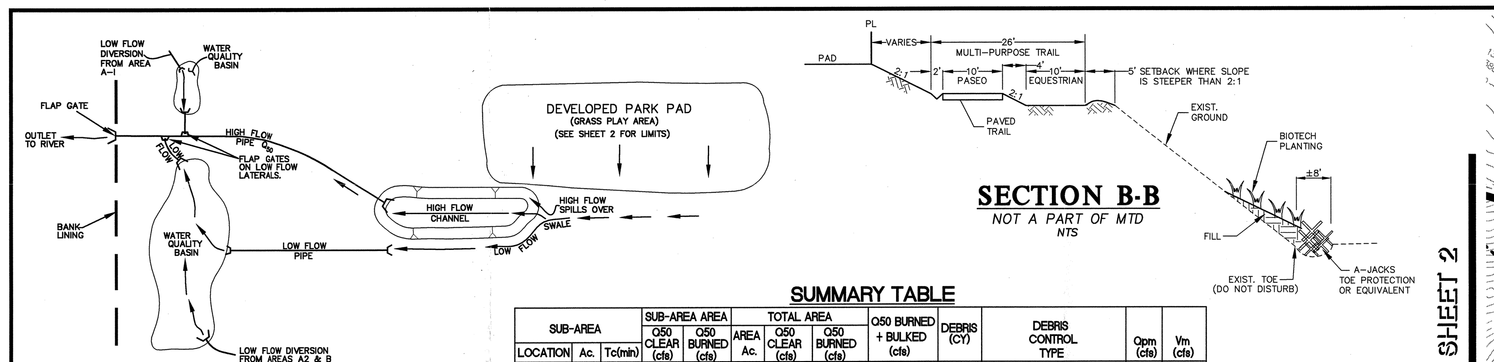
DEIR
Map #35

REV: 12/10/03
DATE: 11/20/03

PROJECT NO.
1VAL0215.06

SHEET 4 OF 5

RP032-04



PARK WATER QUALITY SCHEMATIC

NOT A PART OF MTD
NTS

NOTE:
FLOOD MAINTENANCE DIVISION APPROVAL OF ALL DRAINAGE DEVICES IS REQUIRED PRIOR TO DRAINAGE CONCEPT APPROVAL. (PER TIM CHEN'S REQUEST ON 10/8/03)

SECTION B-B

NOT A PART OF MTD
NTS

SUMMARY TABLE

SUB-AREA LOCATION	Ac.	Tc(min)	SUB-AREA AREA Q50 CLEAR (cfs)	SUB-AREA AREA Q50 BURNED (cfs)	TOTAL AREA Ac.	TOTAL AREA Q50 CLEAR (cfs)	TOTAL AREA Q50 BURNED (cfs)	Q50 BURNED + BULKED (cfs)	DEBRIS (CY)	DEBRIS CONTROL TYPE			
300A	12.0	11	27	30	12.0	27	30	41	468				
301A	34.0	6	137	137	46.0	148	150	150	468				
302B	6.5	10	15	17	6.5	15	17	23	722				
303B	23.0	11	51	58	29.5	59	68	93	1819				
304B	11.2	10	26	30	40.7	85	97	132	2055	DESILTING INLET "E"			
306A	6.7	7	25	25	93.4	249	265	265		ENERGY DISSIPATOR	1.0	14,892	
308A	28.0	18	48	55	121.4	270	293	340	613	DESILTING INLET TY'MG' BASIN	WQ BASIN 'B'		
										SMALL ENERGY DISSIPATOR	5.0	170,104	
350A	9.3	16	20	20	9.3	20	20	20					
351A	39.3	17	81	81	48.6	96	96	96					
352A	31.0	10	83	83	79.6	170	170	170		ENERGY DISSIPATOR	6.7	94,416	
800A	4.0	5	14	16	4.0	14	16	22	103	DEBRIS CARRYING CULVERT			

MATCHLINE SEE SHEET 2

MATCHLINE SEE SHEET 2

MATCHLINE SEE SHEET 4

MATCHLINE SEE SHEET 4

PROPERTY BOUNDARY

NEWHALL RANCH ROAD

SANTA CLARITA PARKWAY

SANTA CLARA RIVER (NOT A PART OF MTD)

200A 12.3 AC.

302B 6.5 AC.

304B 11.2 AC.

303B 23.0 AC.

301A 34.0 AC.

300A 12.0 AC.

308A 28.0 Ac.

306A 6.7 AC.

400A 17.7 Ac.

506A 16.5 AC.

700A 21 AC.

352A 31.0 Ac.

351A 39.3 Ac.

350A 9.5 Ac.

800A 4.0 Ac.

DESILTING INLET 'E' (NOT A PART OF MTD)
DPV=2055cy
ΣA=84.7Ac
ΣQc=85cfs
ΣQb=97cfs

CDS UNITS OR EQUIVALENT Qpm=0.62cfs (PART OF MTD)

40'x40' PAD
15' ACCESS ROAD

ENERGY DISSIPATOR (NOT A PART OF MTD)
Q=249 cfs (clear)

CDS UNITS OR EQUIVALENT Qpm=0.46cfs (PART OF MTD)

STORM DRAIN (NOT A PART OF MTD)

NATURALIZED SWALE (NOT A PART OF MTD)

Q=270 cfs (clear)
Q=293 cfs (burned)
Q=340 cfs (burned and bulked)
ΣA=121.4 Ac

FIRST FLUSH DIVERSION PIPE (NOT A PART OF MTD)
Qpm=1.5 cfs

SEE WATER QUALITY SCHEMATIC HEREON

STORM DRAIN PIPE (NOT A PART OF MTD)

DESILTING INLET 'F' (NOT A PART OF MTD)
DPV=613cy
ΣA=121.4Ac
ΣQc=270cfs
ΣQb=293cfs
ΣQbb=340cfs

WATER QUALITY BASIN 'B'
Qpm=6.7 cfs(FROM 352A)
Qpm=1.5 cfs(FROM 400A)
Qpm=0.1 cfs(FROM PARK)
ΣQpm=8.3cfs
(NOT A PART OF MTD)

FIRST FLUSH DIVERSION PIPE Qpm=6.7 cfs (NOT A PART OF MTD)

ENERGY DISSIPATOR Q=170 cfs (clear) ΣA=79.6 Ac (PART OF MTD)

BANK LINING (PART OF MTD)

Q=14 cfs (clear)
Q=16 cfs (burned)
Q=22 cfs (burned and bulked)
ΣA=4.0 Ac

DEBRIS CARRYING CULVERT (NOT A PART OF MTD)
ΣV=103cy

SLOPE TOE PROTECTION (NOT A PART OF MTD)

CAPITAL FLOOD WATER SURFACE CONTOURS CUMULATIVE (n=0.085) PER: FLOOD PLAIN IMPACT REPORT PREPARED BY PSOMAS FOR RIVERPARK NOV 13, 2003

BRIDGE OVER AQUEDUCT

RETAINING WALLS

BIKE/PED BRIDGE

BIKE/PED TRAIL

EQUESTRIAN TRAIL

(NOT A PART OF MTD)

(NOT A PART OF MTD)

DEBRIS CONE (TYP.)

LEGEND

- 100A / 14.5 Ac. — AREA No. / ACREAGE
- 1A — MODIFIED RATIONAL METHOD NODE
- 1 — RATIONAL METHOD Tc NODE
- LIMITS OF GRADING
- FLOW PATH
- WATERSHED BOUNDARY
- SUB-AREA BOUNDARY
- PROJECT BOUNDARY
- STORM DRAIN LINE – (Part of MTD)
- STORM DRAIN LINE – (Not A Part of MTD)
- DEBRIS CONE
- FEMA LINE
- X50 — EXISTING Qcap LIMIT
- BURIED BANK LINING
- Q=100cfs-(Clear) — CLEAR SUB-AREA FLOW
- Q=150cfs-(Burned) — BURNED SUB-AREA FLOW
- FLOW ARROW
- 55 Cy/Ac. — DEBRIS PRODUCTION RATE
- 1.36 — BULKING RATE
- -SOIL 97
- -DPA ZONE 8 & 9
- -RAINFALL ZONE K

FEET 100 50 0 100 200
INCHES 1/2 0 1/2 1

LEGAL DESCRIPTION:
THAT PORTION OF RANCHO SAN FRANCISCO, IN THE COUNTY OF LOS ANGELES, STATE OF CALIFORNIA, AS SHOWN ON MAP RECORDED IN BOOK 1 PAGES 521 PAGES 522 OF PATENTS, IN THE OFFICE OF THE COUNTY RECORDER OF SAID COUNTY.

REGISTERED PROFESSIONAL ENGINEER — No. 55639 Exp. 12-31-04 — CIVIL — STATE OF CALIFORNIA

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(805) 230-0060 (805) 230-0061 (FAX)

MATTHEW G. HEIDEMAN R.C.E. NO. 55639 DATE

DESIGNED : MGH
DRAFTED : JH
CHECKED : MGH

OWNER/DEVELOPER :
NEWHALL LAND
23823 WEST VALENCIA BOULEVARD
VALENCIA, CALIFORNIA 91355
TELEPHONE: (661) 255-4000
REPRESENTATIVES : GLENN ADAMICK & CORY HARPOLE

RIVER PARK
DRAINAGE CONCEPT FOR TR 53425
PROPOSED CONDITION

LOCATED IN THE CITY OF SANTA CLARITA, COUNTY OF LOS ANGELES STATE OF CALIFORNIA

DEIR
Map #34

REV. 12/10/03
DATE: 11/20/03

PROJECT NO. 1VAL0215.06

SHEET 3 OF 5

RP032-03

Dec 10, 2003 - 13:51:01
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NOTE:
FLOOD MAINTENANCE DIVISION APPROVAL OF ALL DRAINAGE DEVICES IS REQUIRED PRIOR TO DRAINAGE CONCEPT APPROVAL. (PER TIM CHEN'S REQUEST ON 10/8/03)

DESILTING INLET 'A1' DPV = 82.5cy ΣA = 1.5Ac (PART OF MTD)

ΣQc = 22cfs ΣQb = 25cfs

DESILTING INLET 'A2' DPV = 82.5cy ΣA = 1.5Ac (PART OF MTD)

DESILTING INLET 'B' (PART OF MTD) DPV = 198cy ΣA = 3.6Ac ΣQc = 13cfs ΣQb = 14cfs

DESILTING INLET 'C' DPV = 815cy ΣA = 16.4Ac. ΣQc = 64cfs ΣQb = 72cfs (PART OF MTD)

TRACT BOUNDARY

BOUQUET CANYON ROAD

NEWHALL RANCH ROAD

SOLEDAD CANYON RD.

SOLEDAD CANYON ROAD

SWALE (NOT A PART OF MTD)

NATURALIZED SWALE (NOT A PART OF MTD)

Existing 60"SD Not Part of MTD

MATCHLINE SEE SHEET 3

899A 14.9 AC.
900A 3.5 AC.
901A 2.2 AC.
902A 1.6 AC.
903A 8.0 AC.
904A 2.1 AC.
905A 12.6 AC.
906A 5.5 AC.
907A
100A 1.6 AC.
101A 2.0 AC.
102A 3.0 AC
103A 8.0 AC.
104A 2.1 AC.
105A 12.6 AC.
106A 5.5 AC.
200A 12.3 AC.
201A 4.0 AC.
202A 2.3 AC.
203A 3.5 AC.
204A 2.7 AC.
205B 20.6 Ac.
206B 34.2 Ac.
207AB
208A
304B 11.2 AC.
308A 28.0 Ac.
400A 17.7 Ac.

Q=108 cfs (clear) Q=111 cfs (burned) ΣA=34.8 Ac

CDS UNIT OR EQUIVALENT Qpm=3.4cfs (PART OF MTD)

WATER QUALITY BASIN 'A' Qpm=5.1 cfs (NOT A PART OF MTD)

CDS UNIT OR EQUIVALENT Qpm=3.3cfs (PART OF MTD)

Q=85 cfs (clear) ΣA=22.2 Ac

BASIN OUTLET (NOT A PART OF MTD)

PIPE OR SWALE DIVERTS FIRST FLUSH TO BASIN "A" (NOT A PART OF MTD)

BANK LINING (PART OF MTD)

ENERGY DISSIPATOR (PART OF MTD)

Q=180 cfs (clear) Q=187 cfs (burned) ΣA=79.6 Ac

SANTA CLARA RIVER (NOT A PART OF MTD)

CAPITAL FLOOD WATER SURFACE CONTOURS CUMULATIVE (n=0.085) PER: FLOOD PLAIN IMPACT REPORT PREPARED BY PSOMAS FOR RIVERPARK NOV 13, 2003

BANK LINING (PART OF MTD)

Q=34 cfs (clear) A=17.7ac.

FIRST FLUSH DIVERSION PIPE (NOT A PART OF MTD) Qpm=1.5 cfs

DEVELOPED PARK AREA 4.7 AC.

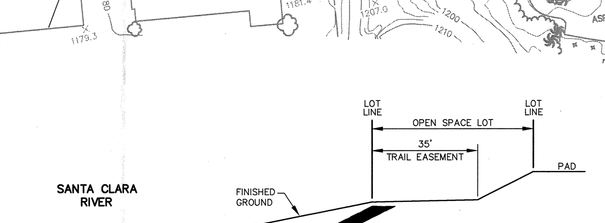
NOTE

PROJECT TOTALS: (DOES NOT INCLUDE RIVER)

Proposed: ΣA = 834ac. ΣQc = 1,687cfs ΣQbb = 2,112cfs

Existing: ΣA = 834ac. ΣQc = 1,396cfs ΣQbb = 2,225cfs

SECTION A-A



NTS

FEET
100 50 0 100 200
1/2 0 INCHES 1 2

LEGEND

- 100A / 14.5 Ac. — AREA No. / ACREAGE
- 1A — MODIFIED RATIONAL METHOD NODE
- 1 — RATIONAL METHOD Tc NODE
- FLOW PATH
- LIMITS OF GRADING
- WATERSHED BOUNDARY
- SUB-AREA BOUNDARY
- PROJECT BOUNDARY
- STORM DRAIN LINE – (Part of MTD)
- STORM DRAIN LINE – (Not A Part of MTD)
- DEBRIS CONE
- FEMA — FEMA LINE
- X00 — EXISTING Qcap LIMIT
- BURIED BANK LINING
- Q=100cfs-(Clear) — CLEAR SUB-AREA FLOW
- Q=105cfs-(Burned) — BURNED SUB-AREA FLOW
- FLOW ARROW
- 55 Cy/Ac. — DEBRIS PRODUCTION RATE
- 1.36 — BULKING RATE
- –SOIL 97
- –DPA ZONE 8 & 9
- –RAINFALL ZONE K

SUMMARY TABLE

SUB-AREA LOC.	Ac.	Tc(min)	SUB-AREA AREA Q50 CLEAR (cfs)	SUB-AREA AREA Q50 BURNED (cfs)	TOTAL AREA AREA Ac.	TOTAL AREA Q50 CLEAR (cfs)	TOTAL AREA Q50 BURNED (cfs)	Q50 BURNED + BULKED (cfs)	DEBRIS (CY)	DEBRIS CONTROL TYPE	Qpm (cfs)	Vm (acft)
100A	1.6		6	6	1.6	6	6	88				
101A	2.0		5	7	3.6	13	14	19	198	DESILTING INLET B		
102A	3.0		5	11	6.6	22	25	34	165	DESILTING INLETS A1, A2		
103A	8.0		18	18	14.6	39	42	42				
104A	2.1		5	7	16.7	43	46	46				
105A	12.6		56	56	29.3	85	88	88				
106A	5.5		25	25	34.8	108	111	111			3.4	48,025
200A	12.3		9	31	35	12.3	31	35	48	400			
201A	4.0		5	14	16	16.3	43	49	67	600			
202A	2.3		5	8	9	18.6	49	56	76	685			
203A	3.5		5	12	12	22.1	57	65	76	685			
204A	2.7		5	10	11	24.8	64	72	91	815	DESILTING INLET C		
205B	20.6		17	42	42	20.6	42	42	42				
206B	34.2		12	84	84	54.8	123	123	123				WQ BASIN "A"
208A						79.6	180	187			5.1	71,765
400A	17.7		18	34	34	17.7	34	34	34		1.5	20,364
899A	14.9		5	66	66	14.9	66	66	66			
900A	3.5		12	10	10	18.4	74	74	74			
901A	2.2		12	6	6	20.6	80	80	80			
902A	1.6		9	5	5	22.2	85	85	85		3.3	45,901

LEGAL DESCRIPTION:
THAT PORTION OF RANCHO SAN FRANCISCO, IN THE COUNTY OF LOS ANGELES, STATE OF CALIFORNIA, AS SHOWN ON MAP RECORDED IN BOOK 1 PAGES 521 PAGES 522 OF PATENTS, IN THE OFFICE OF THE COUNTY RECORDER OF SAID COUNTY.

REGISTERED PROFESSIONAL ENGINEER — MATTHEW G. HEIDEMAN No. 55639 Exp. 12-31-04 CIVIL STATE OF CALIFORNIA

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MATTHEW G. HEIDEMAN R.C.E. NO. 55639 DATE

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CHECKED : MGH

OWNER/DEVELOPER :
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REPRESENTATIVES : GLENN ADAMICK & CORY HARPOLE

RIVER PARK
DRAINAGE CONCEPT FOR TR 53425
PROPOSED CONDITION

LOCATED IN THE CITY OF SANTA CLARITA, COUNTY OF LOS ANGELES STATE OF CALIFORNIA

DEIR
Map #33

REV: 12/10/03
DATE: 11/20/03

PROJECT NO. 1VAL0215.06

SHEET 2 OF 5

RP032-02

Nov 10, 2003 - 11:54:47 Signed by: Administrator
S:\Projects\1VAL0215.06\Engineering\Drainage\DEIR\Maps\1VAL0215-06-DEIR-Map33-Proposed.dwg

SUMMARY TABLE

SUB-AREA			SUB-AREA AREA		TOTAL AREA			Q50 BURNED + BULKED (cfs)	DEBRIS (CY)	DEBRIS CONTROL TYPE	SEE REPORT FOR CALC.	
LOCATION	Ac.	Tc(min)	Q50 CLEAR (cfs)	Q50 BURNED (cfs)	AREA Ac.	Q50 CLEAR (cfs)	Q50 BURNED (cfs)				Qm (cfs)	Vm (cfs)
601A	46.8	10	110	125	46.8	110	125	170	220			
602A	37.3	9	93	106	84.1	182	209	284	330			
603A	48	15	91	104	132.1	269	309	420	165			
604A	37.9	10	89	101	170	342	395	537	220			
605A	45.1	10	106	120	215.1	353	422	574	330			
606A	26.3	11	58	67	241.4	348	423	575	165			
607B	24.1	9	60	68	24.1	60	68	93	165			
608B	36.3	12	77	88	60.4	128	147	200	395			
609B	40.3	11	90	102	100.7	179	211	287	595			
611A	14.5	9	36	41	356.6	511	619	842	9985	ELEVATED INLET		

TOTAL ACREAGE OF DRAINAGE CONCEPT FOR PROPOSED CONDITION=834Ac

DEIR
Map #32

REV: ______
DATE: 11/20/03

LEGAL DESCRIPTION:

THAT PORTION OF RANCHO SAN FRANCISCO, IN THE COUNTY OF LOS ANGELES, STATE OF CALIFORNIA, AS SHOWN ON MAP RECORDED IN BOOK 1 PAGES 521 PAGES 522 OF PATENTS, IN THE OFFICE OF THE COUNTY RECORDER OF SAID COUNTY.

REGISTERED PROFESSIONAL ENGINEER MATTHEW G. HEIDEMAN No. 55639 Exp. 12-31-04 CIVIL STATE OF CALIFORNIA

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(661) 219-6000 (661) 775-2718 (FAX)

MATTHEW G. HEIDEMAN R.C.E. NO. 55639 DATE

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DRAFTED : J.H.
CHECKED : MGH

OWNER/DEVELOPER :
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23823 WEST VALENCIA BOULEVARD
VALENCIA, CALIFORNIA 91355
TELEPHONE: (661) 255-4000
REPRESENTATIVES : GLENN ADAMICK & CORY HARPOLE

RIVER PARK
DRAINAGE CONCEPT FOR TR 53425
PROPOSED CONDITION

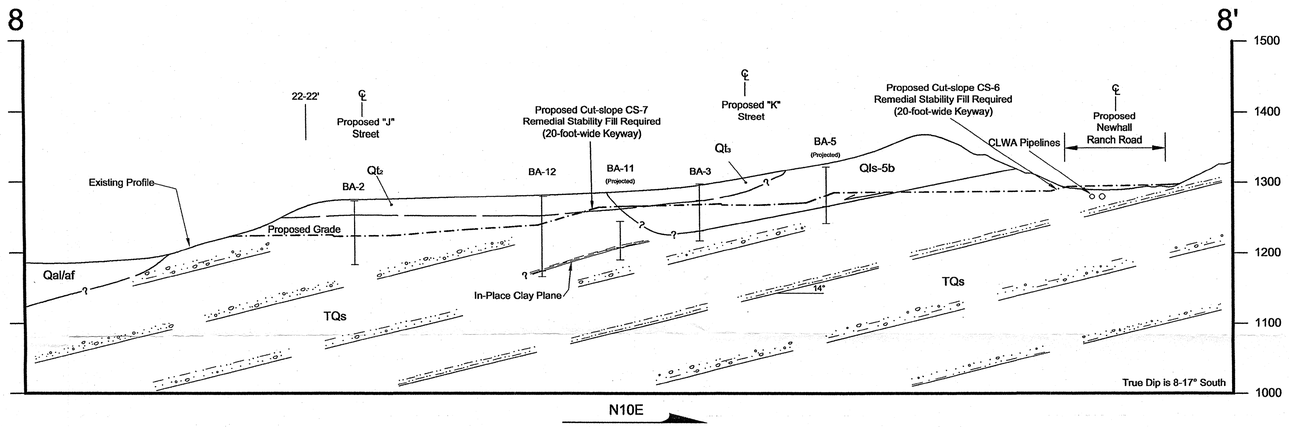
LOCATED IN THE CITY OF SANTA CLARITA, COUNTY OF LOS ANGELES STATE OF CALIFORNIA

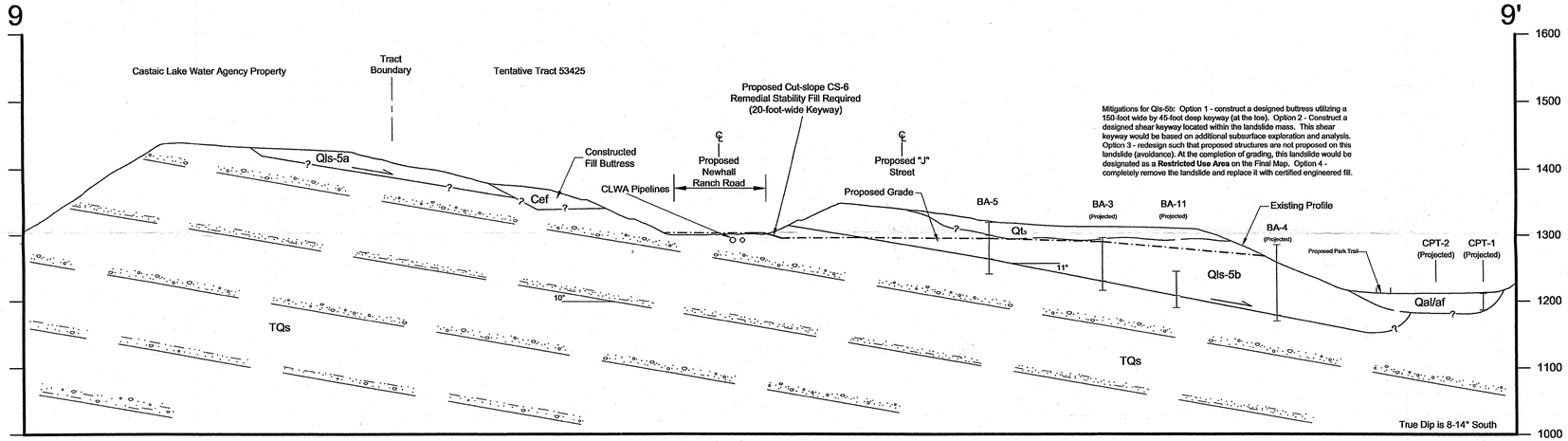
PROJECT NO. 1VAL0215.06

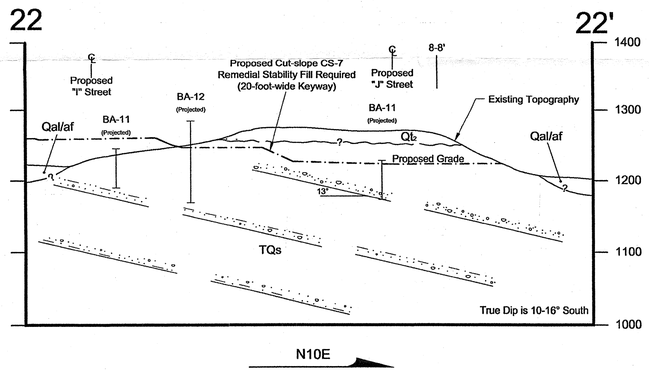
SHEET 1 OF 5

RP032-01

Nov. 06, 2003 - 12:27:01 DWG Name: M:\Northriv-mp\53425-mp\ENGR\MASTDES\Hydr\RP032-01.dwg Updated By: JHernandez







DEIR
Map #31

ALLAN E. SEWARD
ENGINEERING GEOLOGY, INC.
Geological and Geotechnical Consultants

Revised Cross Sections
8-8', 9-9', 22-22'

Date: 06/30/03	*Job No.:* 03-1571-4
Scale: 1" = 100'	*CAD File:* Plate II
PLATE II	*Geology by:* Staff *Drawn by:* GSD/MBW
	Revised:

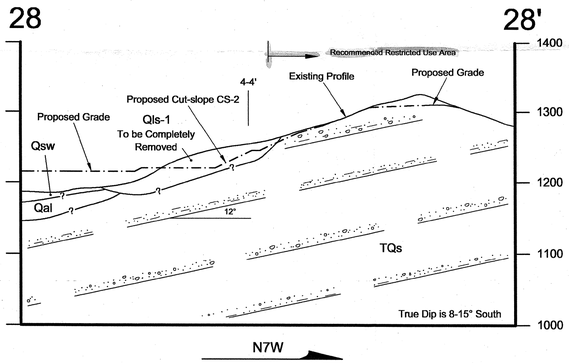
Approximate Limits of Stability Fill Backout
Approximate Limits of Buttress Fill Backout
Limits of Removal/Grading
Limits of Removal/Grading
CASTAIC LAKE WATER AGENCY
TRACT NO. 28882
SEPARATE OWNERSHIP
NOT A PART
Qls-13
Qls-14
Qls-12
Qls-11
Qls-10
Qls-9
Qls-7
Qls-4
Qls-5b
Qls-8
Qal/af/Qsw
Qsw/Qal
Qsw/Qt
Qal/af
TQs/Qal/af
Qsw/Qal/af
Qt/Qls-5b
Qsw/Qls-6/sf
LEGEND
af Artificial Fill
Qsw Quaternary Slopewash
Qal Quaternary Alluvium
sf Surficial Failure
Qls-14 Quaternary Landslide
Qt3 Quaternary Terrace Deposits
TQs Saugus Formation
R=106' Local Anticipated Removal Depth
*R=23' Local Anticipated Removal Depth from pre-stockpile/artificial fill topography
Approximate Limits of Removals
Approximate Limits of Buttress/Stability Fill Backcut
CPT-37 Approximate Location of Cone Penetration Test
HS-9 Approximate Location of Exploratory Hollow-Stem-Auger Boring
RW-10 Approximate Location of Rotary Wash Boring
N
200' 100' 0' 200' 400'
SCALE IN FEET
Contour Intervals 2 and 10 feet
SCALE 1:2400
DEIR
Map #30
ALLAN E. SEWARD
ENGINEERING GEOLOGY, INC.
Geological and Geotechnical Consultants
REMOVALS MAP
Date: 06/30/03
Job No.: 03-1571-4
Scale: 1" = 200'
CAD File: Plate I
PLATE I
Geology by: Staff
Drawn by: GSD/MBW
Revised:

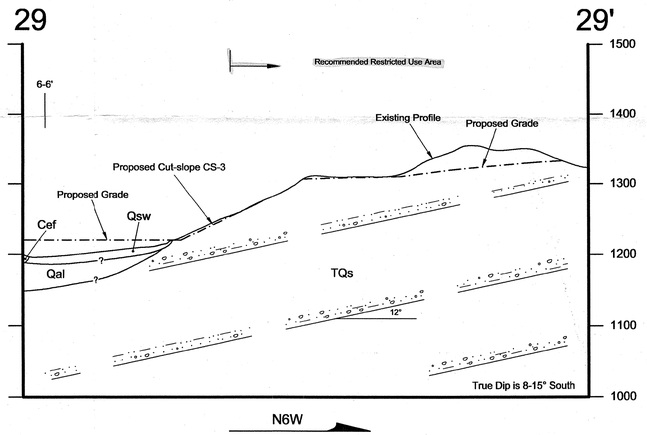
ALLAN E. SEWARD
ENGINEERING GEOLOGY, INC.
Geological and Geotechnical Consultants

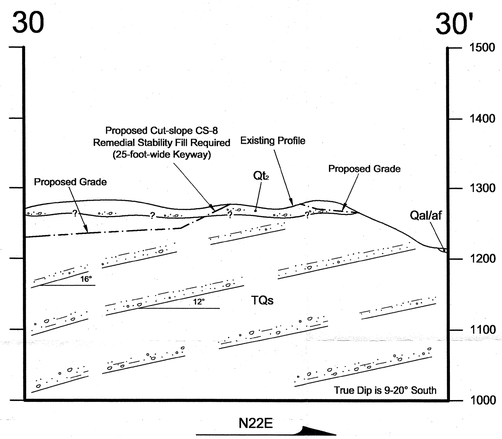
CROSS SECTIONS 28-31

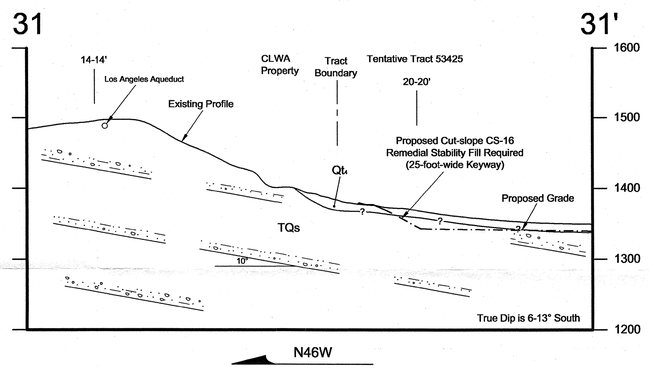
Date: 04/04/03	Job No.: 03-1571-4
Scale: 1" = 100' (Horizontal = Vertical)	CAD File: SECTIONS 28-31
PLATE VII	Geology by: Staff / Drawn by: GSD
	Revised:

DEIR Map #29







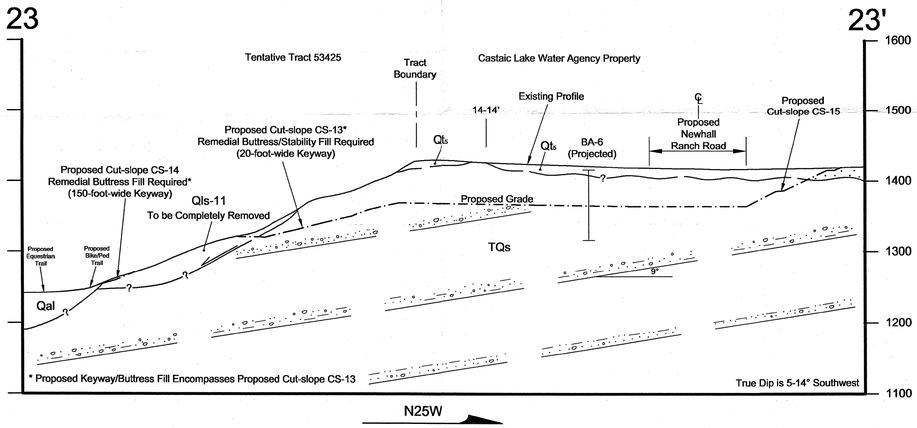


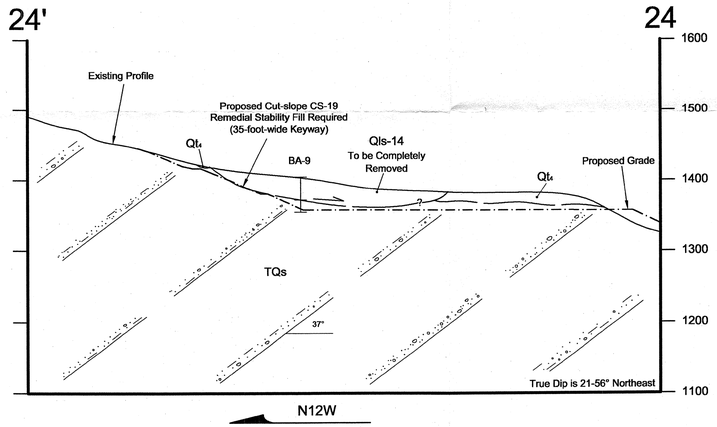
ALLAN E. SEWARD
ENGINEERING GEOLOGY, INC.
Geological and Geotechnical Consultants

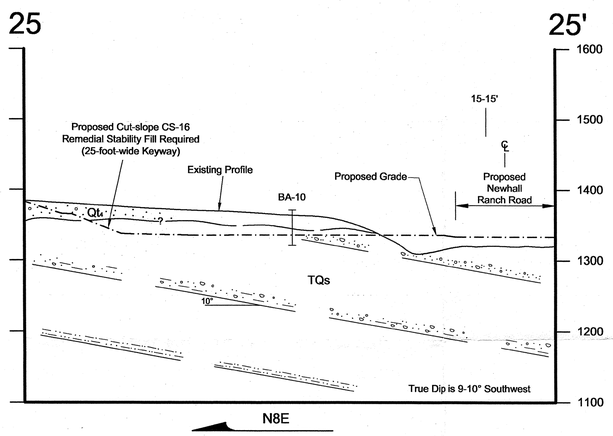
CROSS SECTIONS 23-27

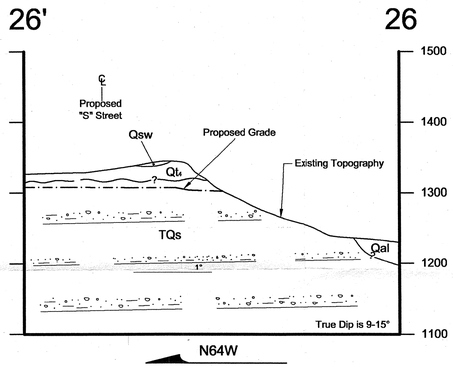
Date: 04/04/03	*Job No.:* 03-1571-4
Scale: 1" = 100' (Horizontal = Vertical)	*CAD File:* SECTIONS 23-27
PLATE VI	*Geology by:* Staff; *Drawn by:* GSD; *Revised:*

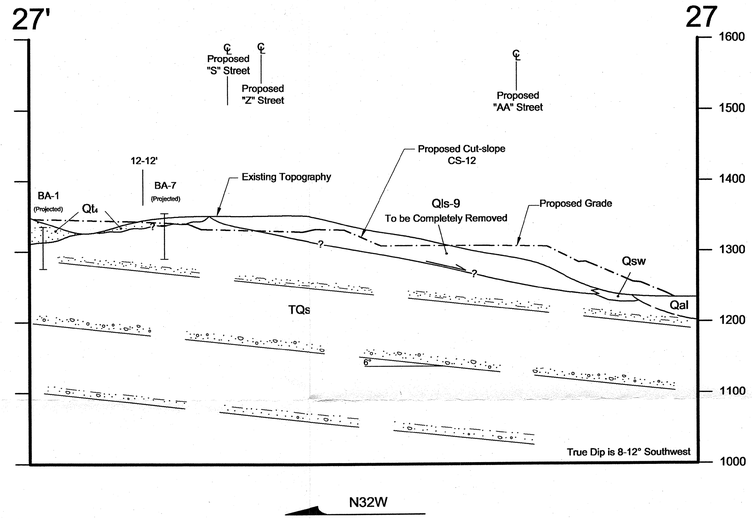
DEIR Map #28

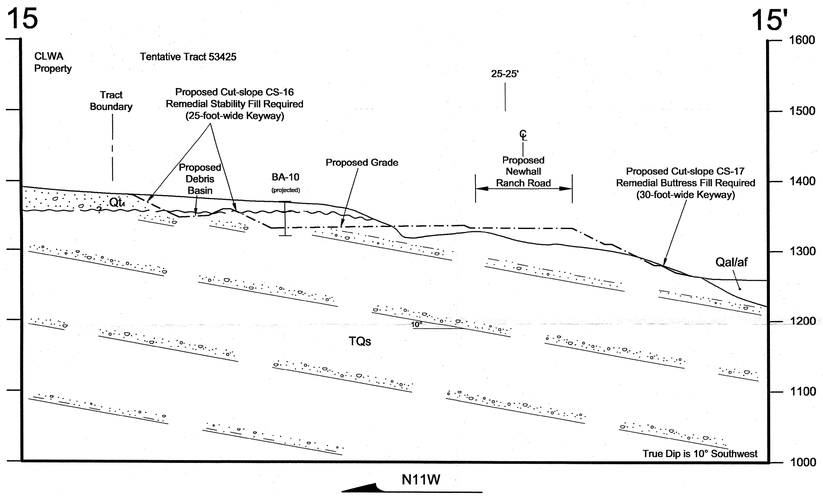


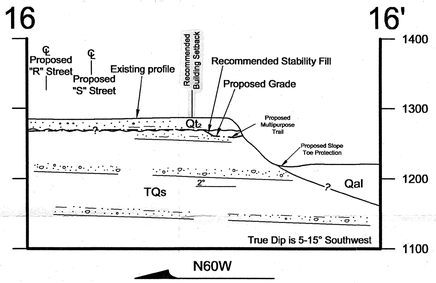


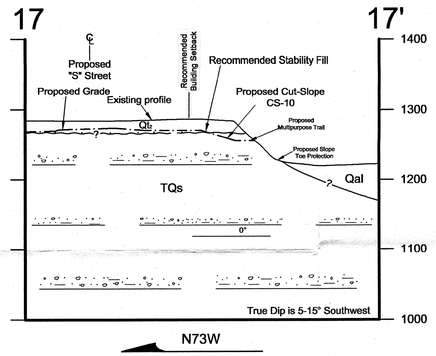


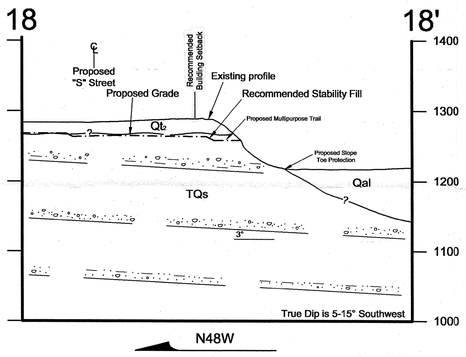


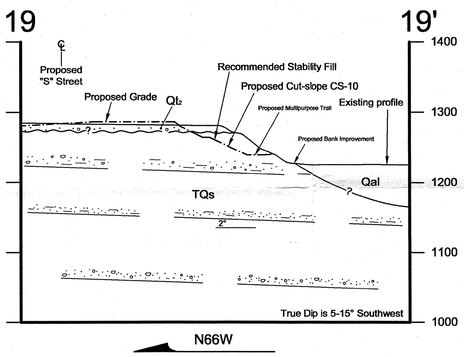


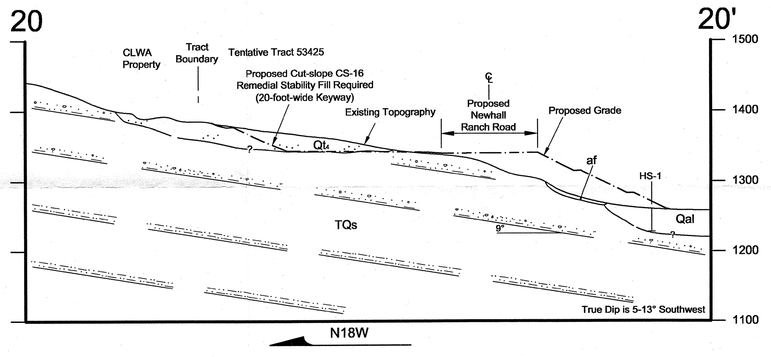


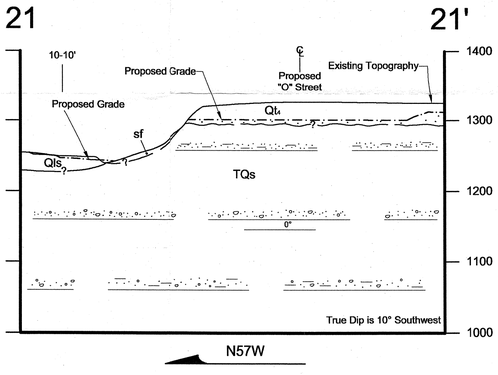


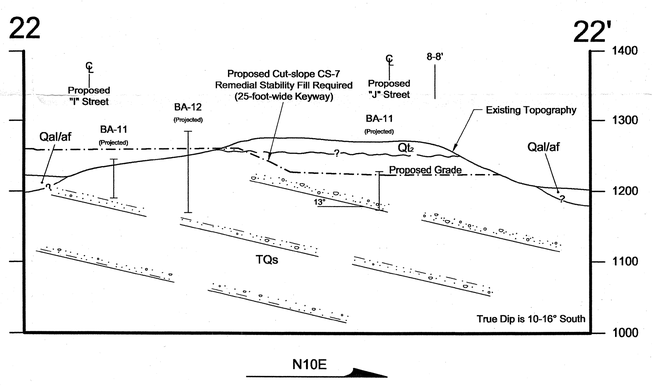












ALLAN E. SEWARD
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Geological and Geotechnical Consultants

CROSS SECTIONS 15-22

Date: 04/04/03	*Job No.:* 03-1571-4
Scale: 1" = 100' (Horizontal = Vertical)	*CAD File:* SECTIONS 15-22
PLATE V	*Geology by:* Staff
	Drawn by: GSD
	Revised:

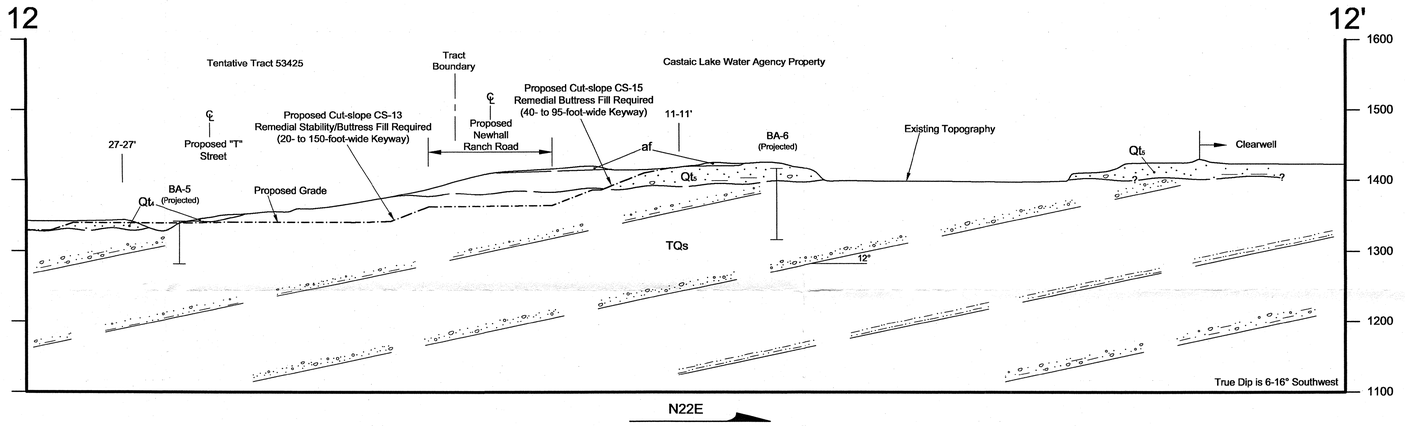
DEIR Map #27

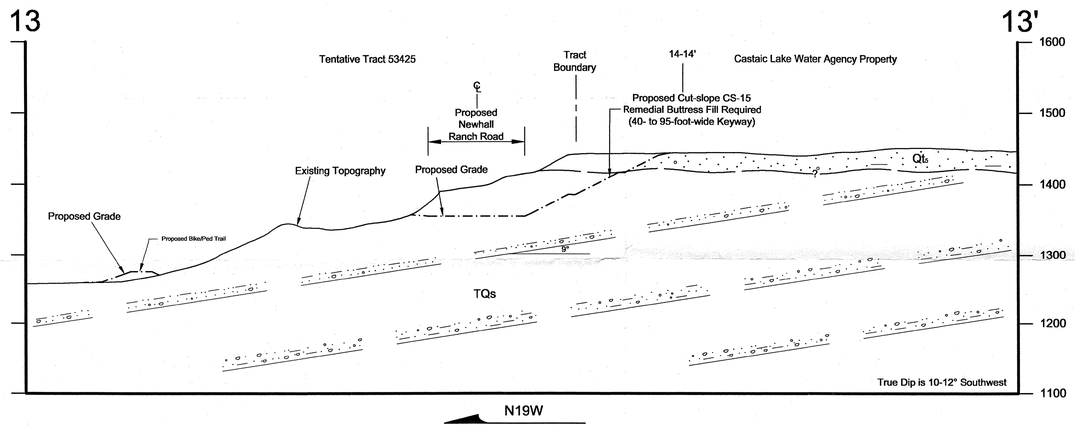
ALLAN E. SEWARD
ENGINEERING GEOLOGY, INC.
Geological and Geotechnical Consultants

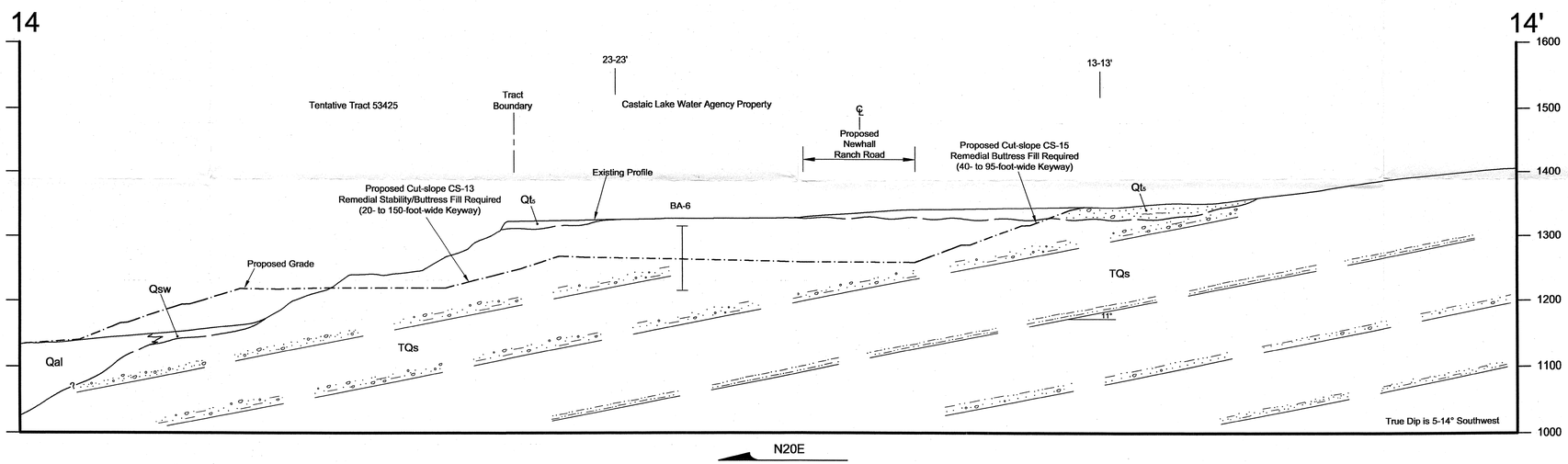
CROSS SECTIONS 12-14

Date: 04/04/03	*Job No.:* 03-1571-4
Scale: 1" = 100' (Horizontal = Vertical)	*CAD File:* SECTIONS 12-14
PLATE IV	*Geology by:* Staff; *Drawn by:* GSD; *Revised:*

DEIR Map #26







ALLAN E. SEWARD
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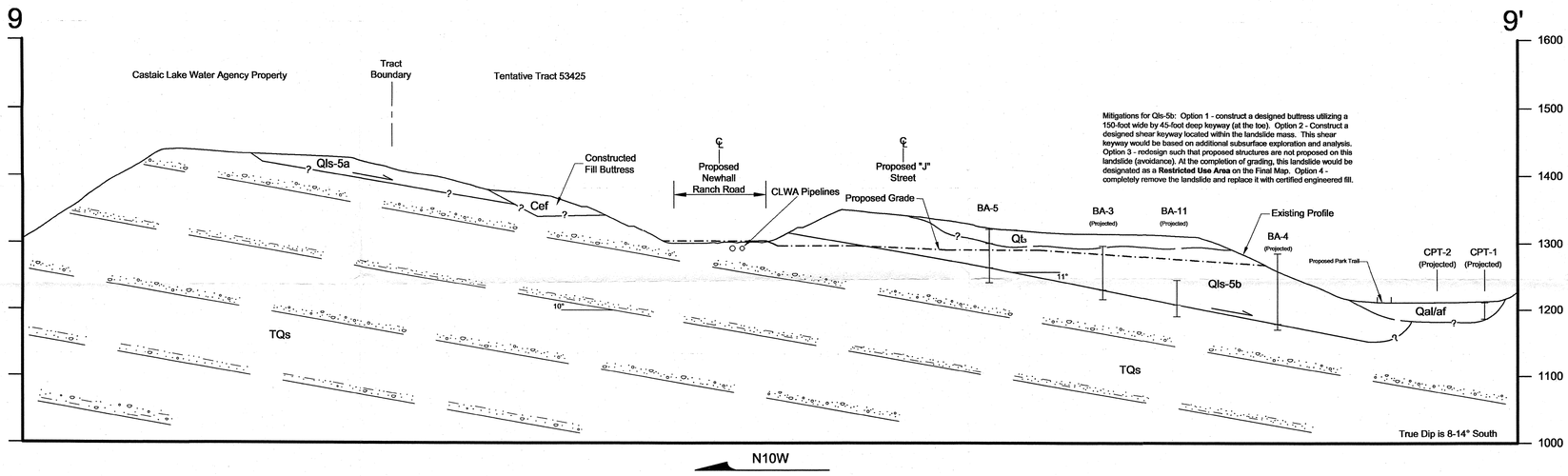
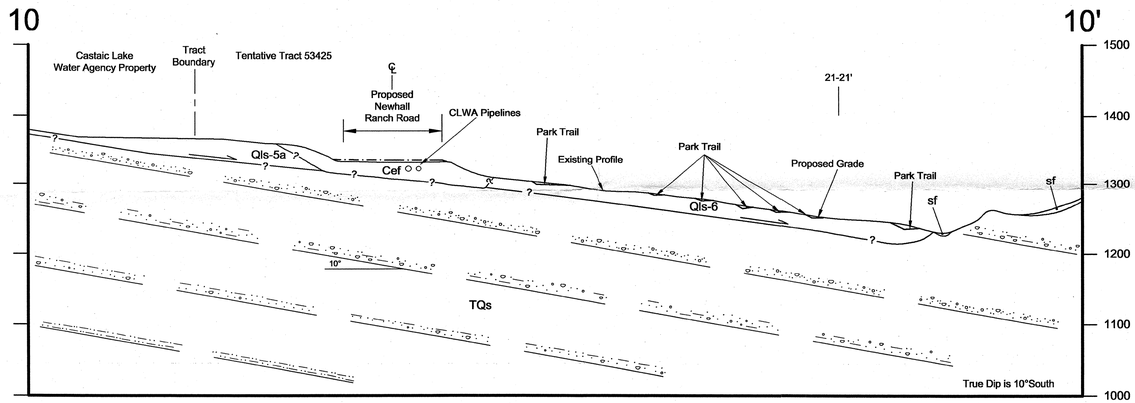
Geological and Geotechnical Consultants

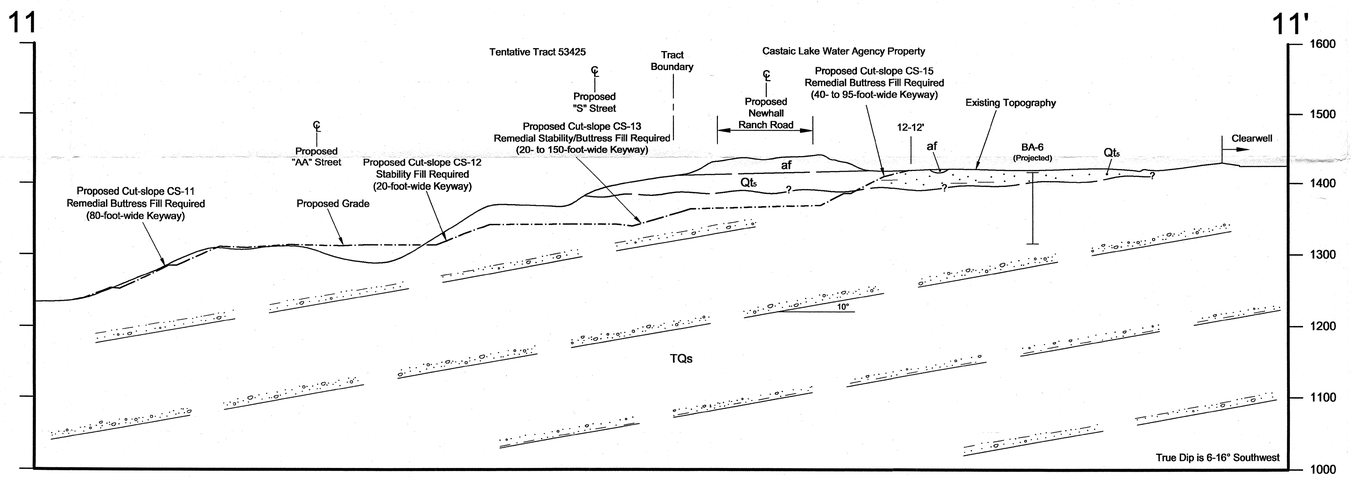
CROSS SECTIONS 9-11

Date: 04/04/03	*Job No.:* 03-1571-4
Scale: 1" = 100' (Horizontal = Vertical)	*CAD File:* SECTIONS 9-11
PLATE III	*Geology by:* Staff; *Drawn by:* GSD; *Revised:*

DEIR Map #25







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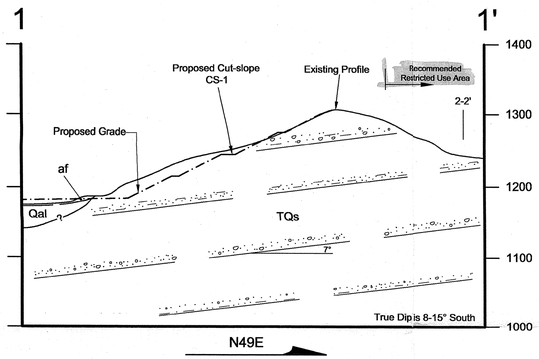
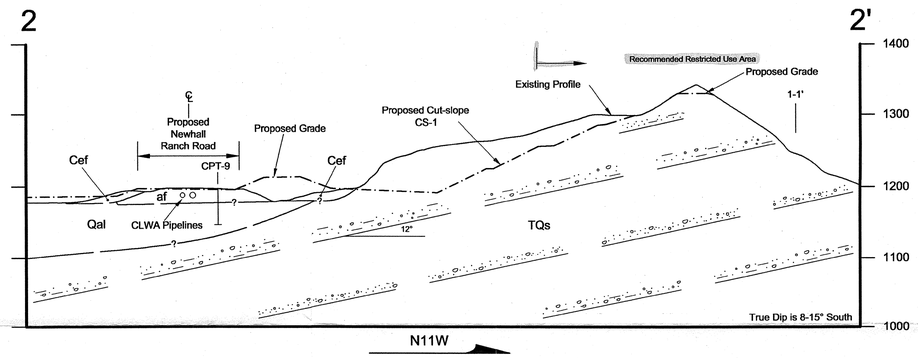
Geological and Geotechnical Consultants

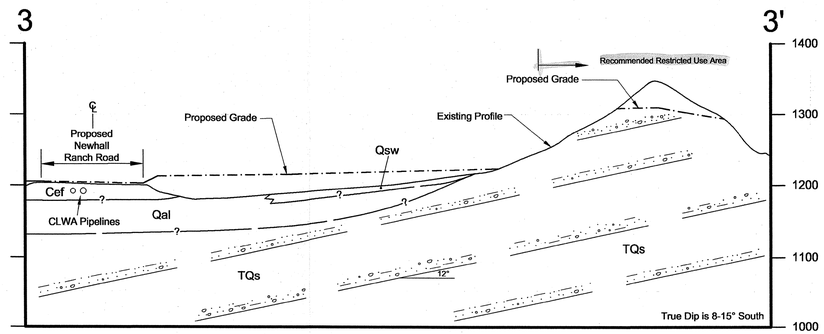
CROSS SECTIONS 1-8

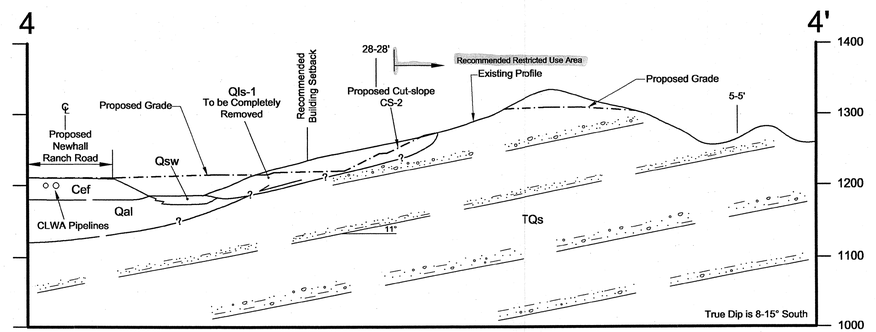
Date: 04/04/03	*Job No.:* 03-1571-4
Scale: 1" = 100' (Horizontal = Vertical)	*CAD File:* SECTIONS 1-8
PLATE II	*Geology by:* Staff
	Drawn by: GSD
	Revised:

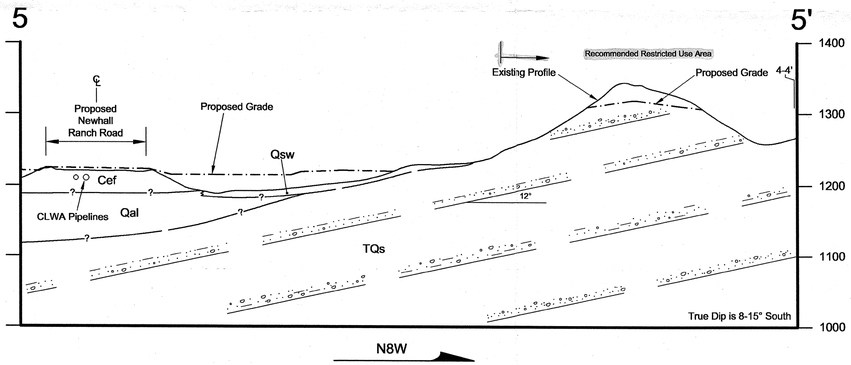
DEIR Map #24

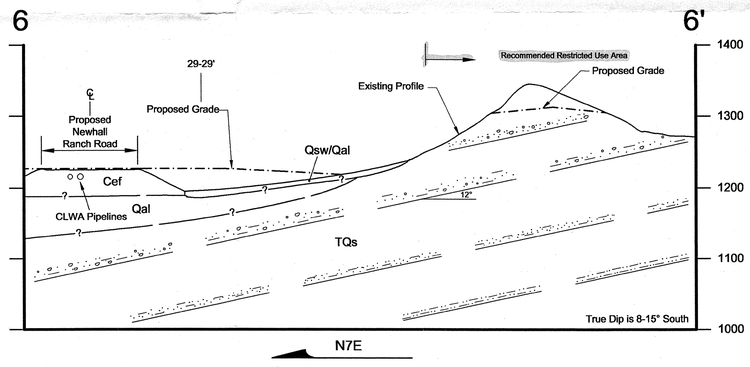


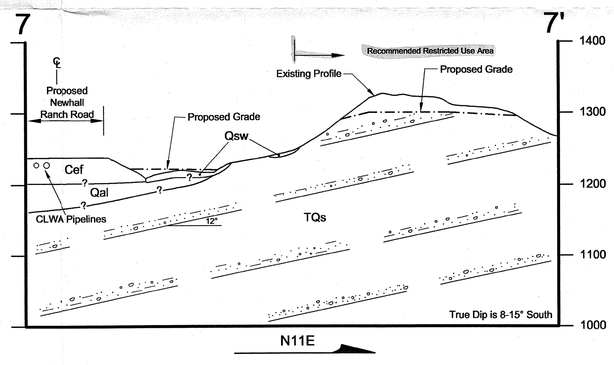


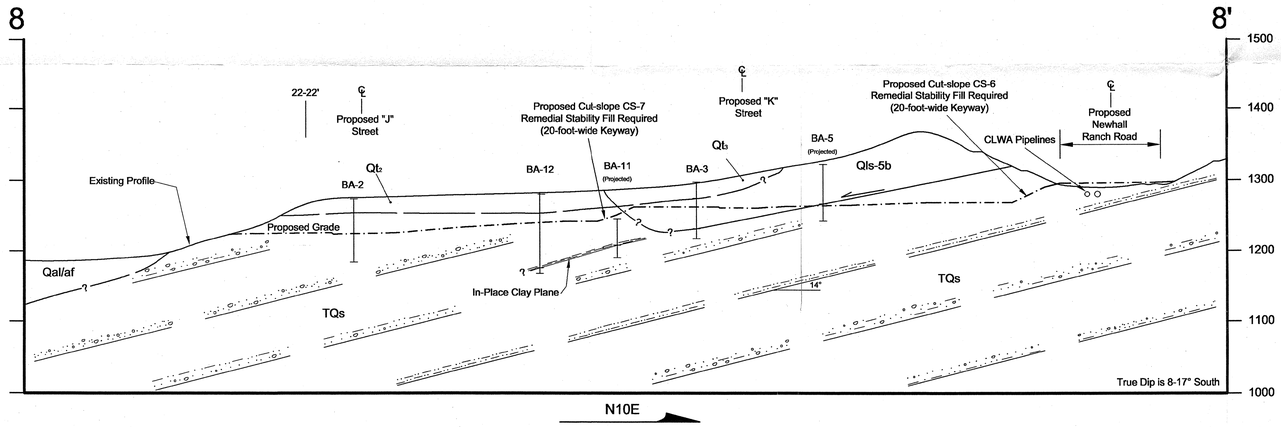




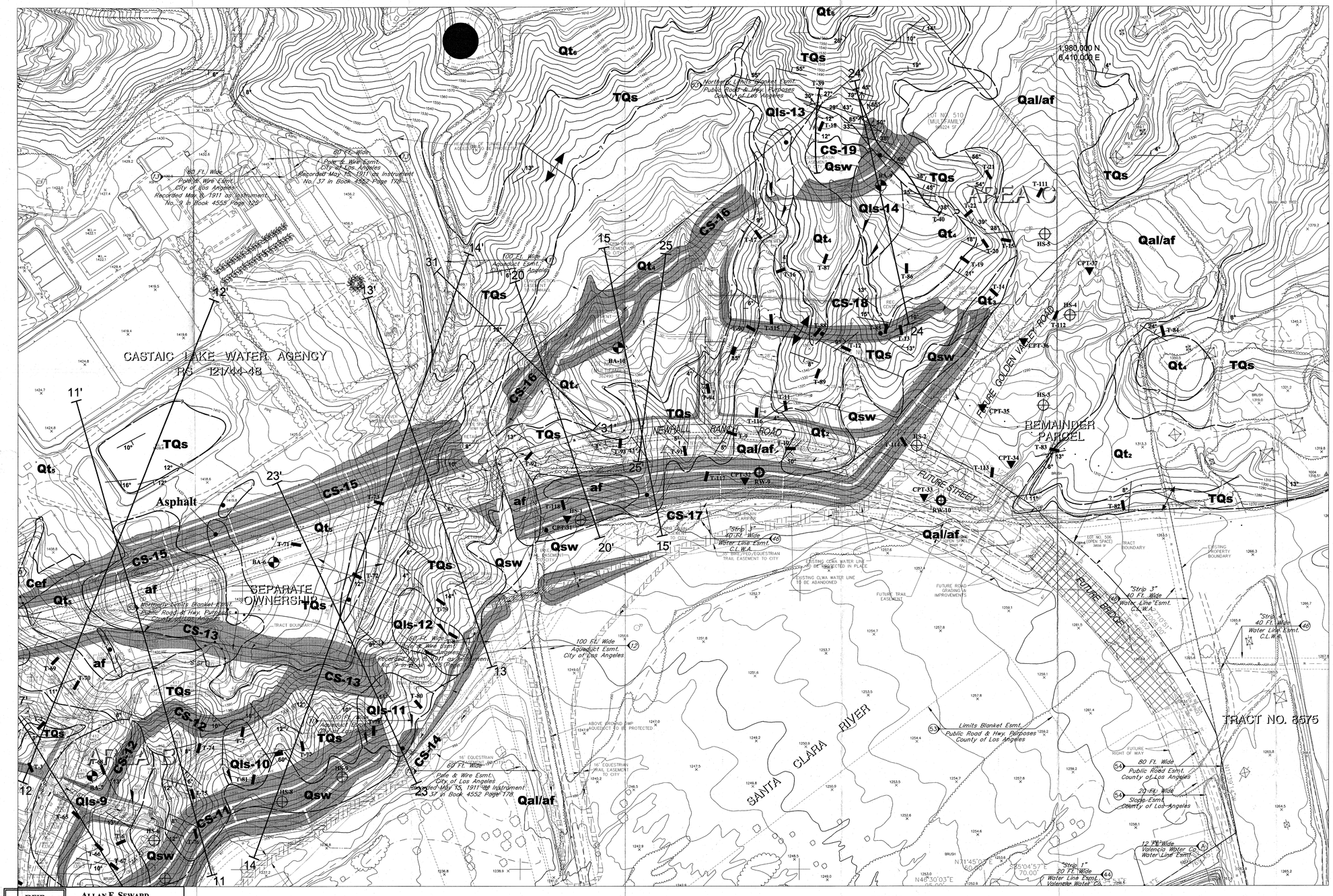


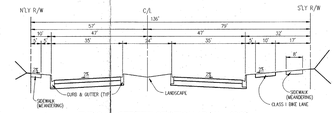




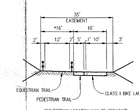


LEGEND
af
Artificial Fill
Qsw
Quaternary Slopewash
Qal
Quaternary Alluvium
sf
Surficial Failure
Qls-14
Quaternary Landslide
Qt3
Quaternary Terrace Deposits
TQs
Saugus Formation
R=106'
Local Anticipated Removal Depth
*R=23'
Local Anticipated Removal Depth from pre-stockpile/artificial fill topography
Approximate Limits of Removals
Approximate Limits of Buttress/Stability Fill Backcut
CPT-37
Approximate Location of Cone Penetration Test
HS-9
Approximate Location of Exploratory Hollow-Stem-Auger Boring
RW-10
Approximate Location of Rotary Wash Boring
Approximate Limits of Stability Fill Backout
Approximate Limits of Buttress Fill Backout
Limits of Removal/Grading
TRACT NO. 28882
CASTAIC LAKE WATER AGENCY
SEPARATE OWNERSHIP
SANTA CLARA RIVER
TTM 20838
Point of Beginning Parcel 1
Qal/af/Qsw
Qsw/Qal
Qsw/Qal/af
Qal/af
TQs/Qal/af
Qt/Qls-5b
Qsw/Qt
Qsw/Qls-6/sf
Qls-1
Qls-4
Qls-7
Qls-8
Qls-9
Qls-10
Qls-11
Qls-12
Qls-13
Qls-14
N
200' 100' 0' 200' 400'
SCALE IN FEET
Contour Intervals 2 and 10 feet
SCALE 1:2400
DEIR
Map #23
ALLAN E. SEWARD
ENGINEERING GEOLOGY, INC.
Geological and Geotechnical Consultants
REMOVALS MAP
Date: 04/04/03
Job No.: 03-1571-4
Scale: 1" = 200'
CAD File: REMOVALS MAP
PLATE I
Geology by: Staff
Drawn by: GSD/MBW
Revised:





TYPICAL STREET SECTION (R/W = 136')
NEWHALL RANCH ROAD
BOUQUET CANYON ROAD TO FUTURE BRIDGE
AT SANTA CLARA RIVER

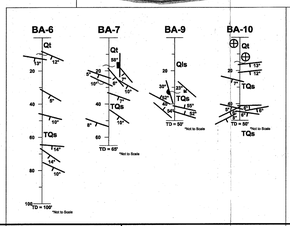


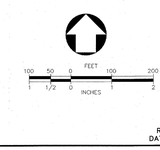
*EQUESTRIAN LOCATION MAY BE SEPARATE

TYPICAL TRAIL SECTION
NOT TO SCALE

LEGEND

af	Artificial Fill
Cef	Certified Engineered Fill
Qsw	Quaternary Slopewash
Qal	Quaternary Alluvium
sf	Surficial Failure
Qls-14	Quaternary Landslide
Qt_6	Quaternary Terrace Deposits
TQs	Saugus Formation
?---?	Geologic Contact; Dotted where concealed; Queried where inferred
⟷	Trace of Anticline; Dotted where concealed
56°	Strike and Dip of Bedding
27°	Aproximate Strike and Dip of Bedding
⊕	Horizontal Bedding
56°	Strike and Dip of Contact
15°	Strike and Dip of Slide Plane; Arrow indicates trend of striations
85°	Strike and Dip of Fracture
12°	Strike and Dip of Polished Surface
25°	Strike and Dip of Parting Surface
10°	Strike and Dip of Bedding/Possible Slide Plane
9°	Strike and Dip of Shear
85°	Strike and Dip of Fault
31 — 31'	Geologic Cross Section
RW-10	Approximate Location of Rotary Wash Boring
HS-9	Approximate Location of Exploratory Hollow-Stem-Auger Boring
CPT-37	Approximate Location of Cone Penetration Test
BA-13	Approximate Location of Exploratory Bucket-Auger Boring
T-118	Approximate Location of Exploratory Backhoe Trench
BA-7 (CLWA)	Approximate Location of Exploratory Bucket-Auger Boring From CLWA report dated 3/3/00
8 W	Approximate Location of Corrosion Test Sample
	Existing Water Well
	Oil Well
dfh	Debris Flow Hazard Color-coded PINK
CS-19	Proposed Cut-Slope
	Recommended Building Setback Color-coded YELLOW
	Recommended Restricted Use Area Color-coded GREEN





DEIR
Map #22

ALLAN E. SEWARD
ENGINEERING GEOLOGY, INC.
Geological and Geotechnical Consultants

GEOLOGIC/GEOTECHNICAL MAP

Date: 04/04/03	Job No.: 03-1571-4
Scale: 1" = 100'	CAD File: SHEET 4
Sheet 4 of 4	Geology by: Staff / Drawn by: OSD/MBW / Revised:

KEY MAP
NOT TO SCALE

LEGAL DESCRIPTION:
THAT PORTION OF RANCHO SAN FRANCISCO, IN THE COUNTY OF LOS ANGELES, STATE OF CALIFORNIA, AS SHOWN ON MAP RECORDED IN BOOK 1 PAGES 521 PAGES 522 OF PATENTS, IN THE OFFICE OF THE COUNTY RECORDER OF SAID COUNTY.

REGISTERED CIVIL ENGINEER — No. 40695 — Exp. 9-30-03 — CIVIL — STATE OF CALIFORNIA

PSOMAS
3340 Ocean Park Blvd., Suite 300
Santa Monica, CA 90405
(661) 259-8000 (661) 775-2778 (FAX)

JASON H. FUKUMITSU R.C.E. NO. 40695 DATE

DESIGNED : MGH
DRAFTED : D.S.H./J.H/T.D.
CHECKED : JHF/JG

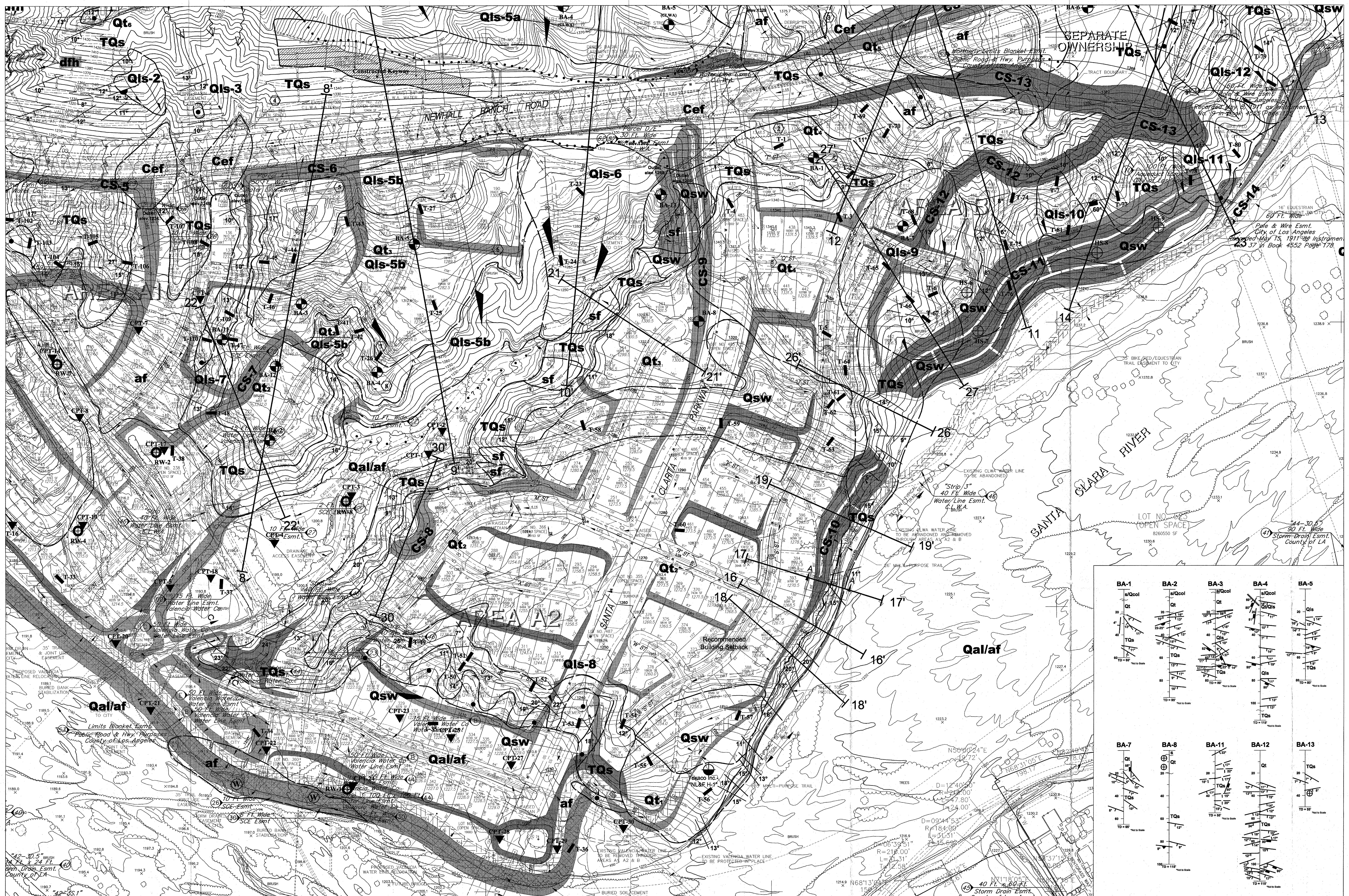
OWNER/DEVELOPER :
NEWHALL LAND
23823 WEST VALENCIA BOULEVARD
VALENCIA, CALIFORNIA 91355
TELEPHONE: (661) 255-4000
REPRESENTATIVES : GLENN ADAMICK & CORY HARPOLE

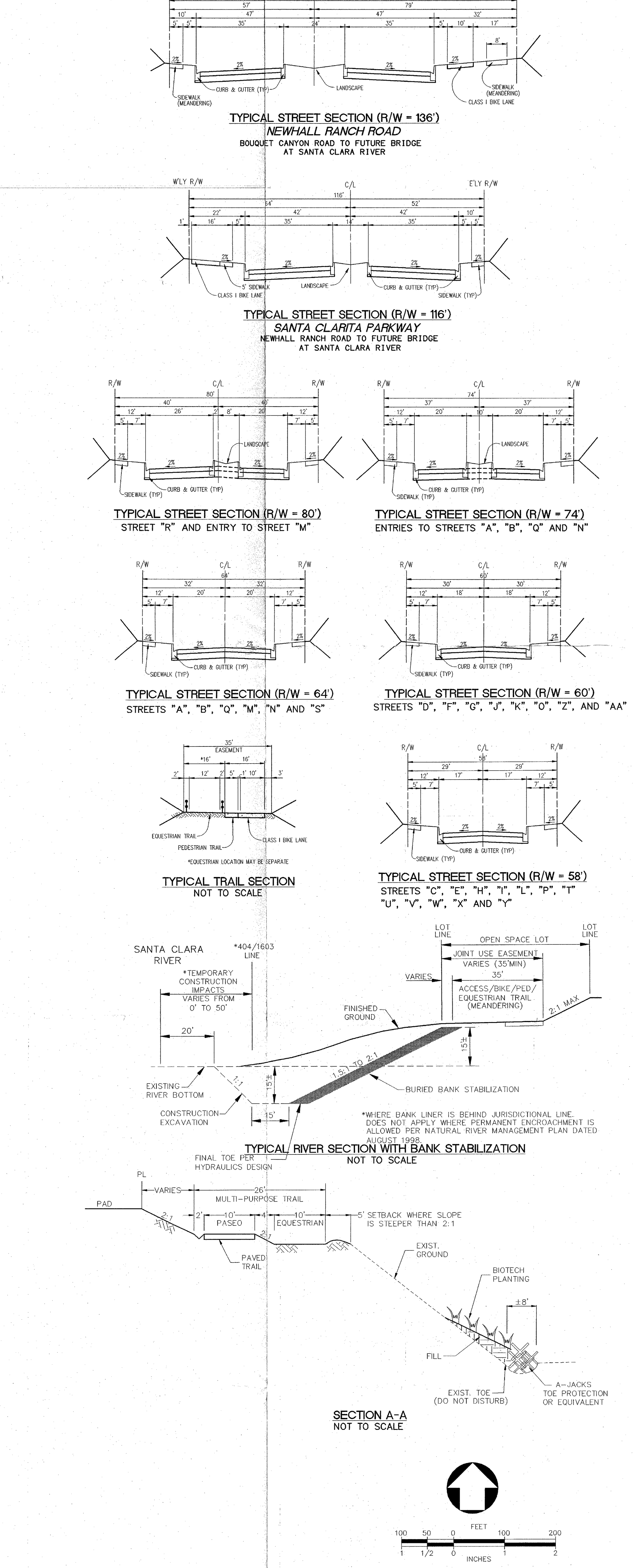
RIVER PARK
VESTING TENTATIVE TRACT MAP
LOCATED IN THE CITY OF SANTA CLARITA, COUNTY OF LOS ANGELES STATE OF CALIFORNIA

REV:
DATE: 2/25/03

PROJECT NO.
1VAL0215.06

SHEET 4
OF 4





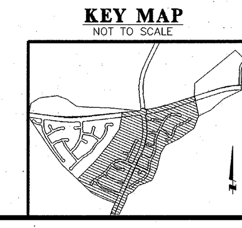
DEIR Map #21	ALLAN E. SEWARD ENGINEERING GEOLOGY, INC. Geological and Geotechnical Consultants

GEOLOGIC/GEOTECHNICAL MAP

Date: 04/04/03	Job No.: 03-1571-4
Scale: 1" = 100'	CAD File: SHEET 3
Sheet 3 of 4	Geology by: Staff / Drawn by: GSD/MBW — Revised:

SEE SHEET 4 of 4 FOR LEGEND

KEY MAP
NOT TO SCALE



LEGAL DESCRIPTION:

THAT PORTION OF RANCHO SAN FRANCISCO, IN THE COUNTY OF LOS ANGELES, STATE OF CALIFORNIA, AS SHOWN ON MAP RECORDED IN BOOK 1 PAGES 521 PAGES 522 OF PATENTS, IN THE OFFICE OF THE COUNTY RECORDER OF SAID COUNTY.

REGISTERED PROFESSIONAL ENGINEER JASON H. FUKUMITSU No. 40695 Exp. 3-31-03 CIVIL STATE OF CALIFORNIA

PSOMAS
28470 Avenue Stanford, Suite 300
Santa Clarita, CA 91355
(661) 219-6000 (661) 775-2718 (FAX)

JASON H. FUKUMITSU R.C.E. NO. 40695 DATE

DESIGNED : MGH
DRAFTED : D.S.H./J.H/T.D.
CHECKED : JHF/JG

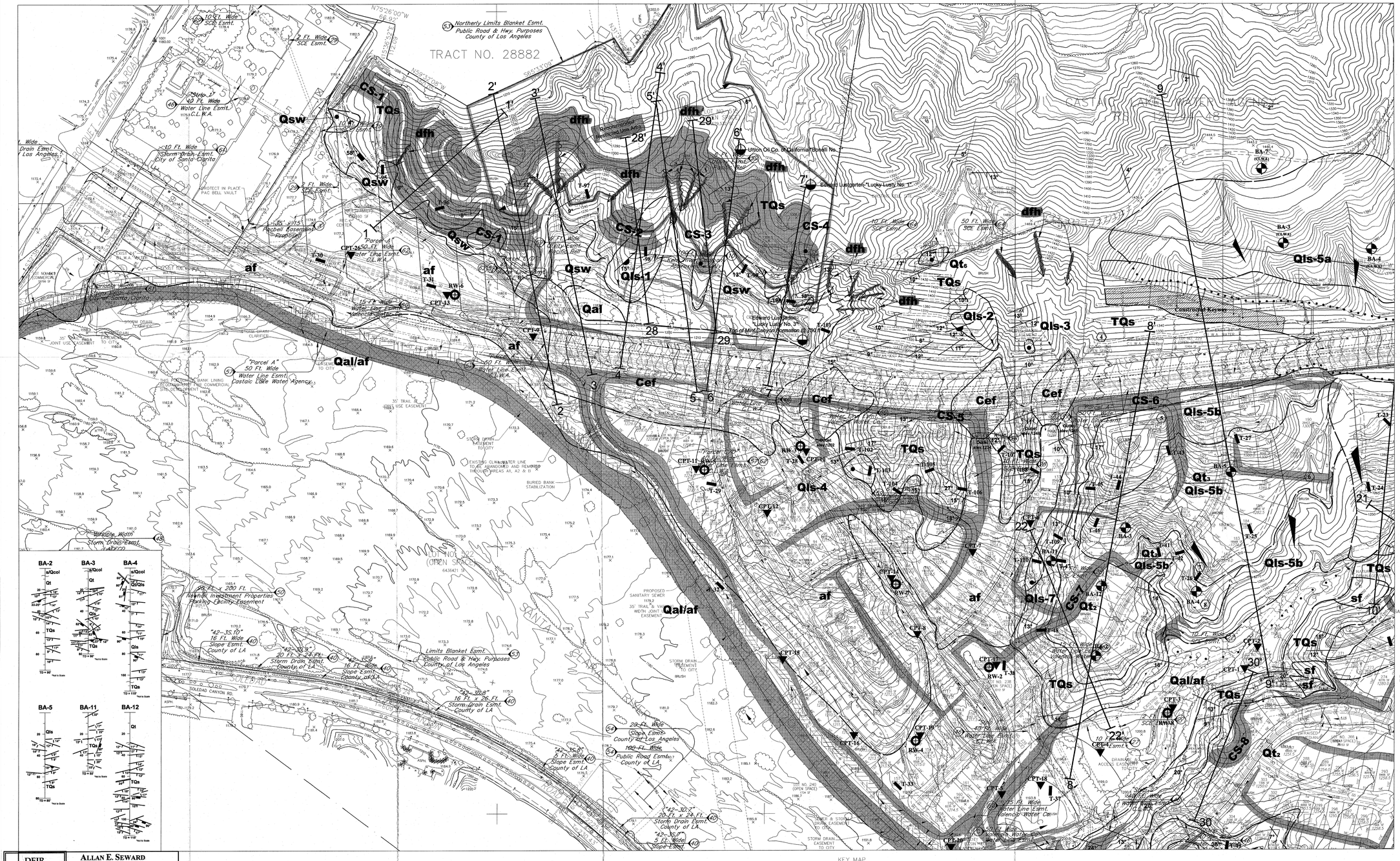
OWNER/DEVELOPER :
NEWHALL LAND
23823 WEST VALENCIA BOULEVARD
VALENCIA, CALIFORNIA 91355
TELEPHONE: (661) 255-4000
REPRESENTATIVES : GLENN ADAMICK & CORY HARPOLE

REV:
DATE: 2/25/03

RIVER PARK VESTING TENTATIVE TRACT MAP

LOCATED IN THE CITY OF SANTA CLARITA, COUNTY OF LOS ANGELES STATE OF CALIFORNIA

PROJECT NO. 1VAL0215.06
SHEET 3 OF 4


TRACT NO. 28882
SOLEDAD CANYON ROAD
Qsw
CS-1
TQs
dfh
CS-2
CS-3
CS-4
Qls-1
Qal
Qal/af
af
Cef
Qls-2
Qls-3
Qls-4
Qls-5a
Qls-5b
Qt₀
Qt₁
Qt₂
CS-5
CS-6
CS-7
CS-8
Qls-7
sf
Recommended Restricted Use Area
Northerly Limits Blanket Esmt. Public Road & Hwy. Purposes County of Los Angeles
Union Oil Co. of California Boreal No. 1
Edward Lasorsten "Lucky Lusty No. 1"
Edward Lusk Sorbo "Lucky Lusty No. 3"
Top of Mint Canyon Formation @ 2700 ft.
Constructed Keyway
"Parcel A" 50 Ft. Wide Water Line Esmt. Castaic Lake Water Agency
"Parcel B" 50 Ft. Wide Water Line Esmt. Castaic Lake Water Agency
"Parcel C" 50 Ft. Wide Water Line Esmt. Castaic Lake Water Agency
"Parcel D" 50 Ft. Wide Water Line Esmt. Castaic Lake Water Agency
"Parcel E" 50 Ft. Wide Water Line Esmt. Castaic Lake Water Agency
"Parcel F" 50 Ft. Wide Water Line Esmt. Castaic Lake Water Agency
"Parcel G" 50 Ft. Wide Water Line Esmt. Castaic Lake Water Agency
"Parcel H" 50 Ft. Wide Water Line Esmt. Castaic Lake Water Agency
"Parcel I" 50 Ft. Wide Water Line Esmt. Castaic Lake Water Agency
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"Parcel K" 50 Ft. Wide Water Line Esmt. Castaic Lake Water Agency
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"Parcel M" 50 Ft. Wide Water Line Esmt. Castaic Lake Water Agency
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"Parcel DDDDDDDDDDDDD" 50 Ft. Wide Water Line Esmt. Castaic Lake Water Agency
"Parcel EEEEEEEEEEEEE" 50 Ft. Wide Water Line Esmt. Castaic Lake Water Agency
"Parcel FFFFFFFFFFFFF" 50 Ft. Wide Water Line Esmt. Castaic Lake Water Agency
"Parcel GGGGGGGGGGGGG" 50 Ft. Wide Water Line Esmt. Castaic Lake Water Agency
"Parcel HHHHHHHHHHHHH" 50 Ft. Wide Water Line Esmt. Castaic Lake Water Agency
"Parcel IIIIIIIIIIIII" 50 Ft. Wide Water Line Esmt. Castaic Lake Water Agency
"Parcel JJJJJJJJJJJJJ" 50 Ft. Wide Water Line Esmt. Castaic Lake Water Agency
"Parcel KKKKKKKKKKKKK" 50 Ft. Wide Water Line Esmt. Castaic Lake Water Agency
"Parcel LLLLLLLLLLLLL" 50 Ft. Wide Water Line Esmt. Castaic Lake Water Agency
"Parcel MMMMMMMMMMMMM" 50 Ft. Wide Water Line Esmt. Castaic Lake Water Agency
"Parcel NNNNNNNNNNNNN" 50 Ft. Wide Water Line Esmt. Castaic Lake Water Agency
"Parcel OOOOOOOOOOOOO" 50 Ft. Wide Water Line Esmt. Castaic Lake Water Agency
"Parcel PPPPPPPPPPPPP" 50 Ft. Wide Water Line Esmt. Castaic Lake Water Agency
"Parcel QQQQQQQQQQQQQ" 50 Ft. Wide Water Line Esmt. Castaic Lake Water Agency
"Parcel RRRRRRRRRRRRR" 50 Ft. Wide Water Line Esmt. Castaic Lake Water Agency
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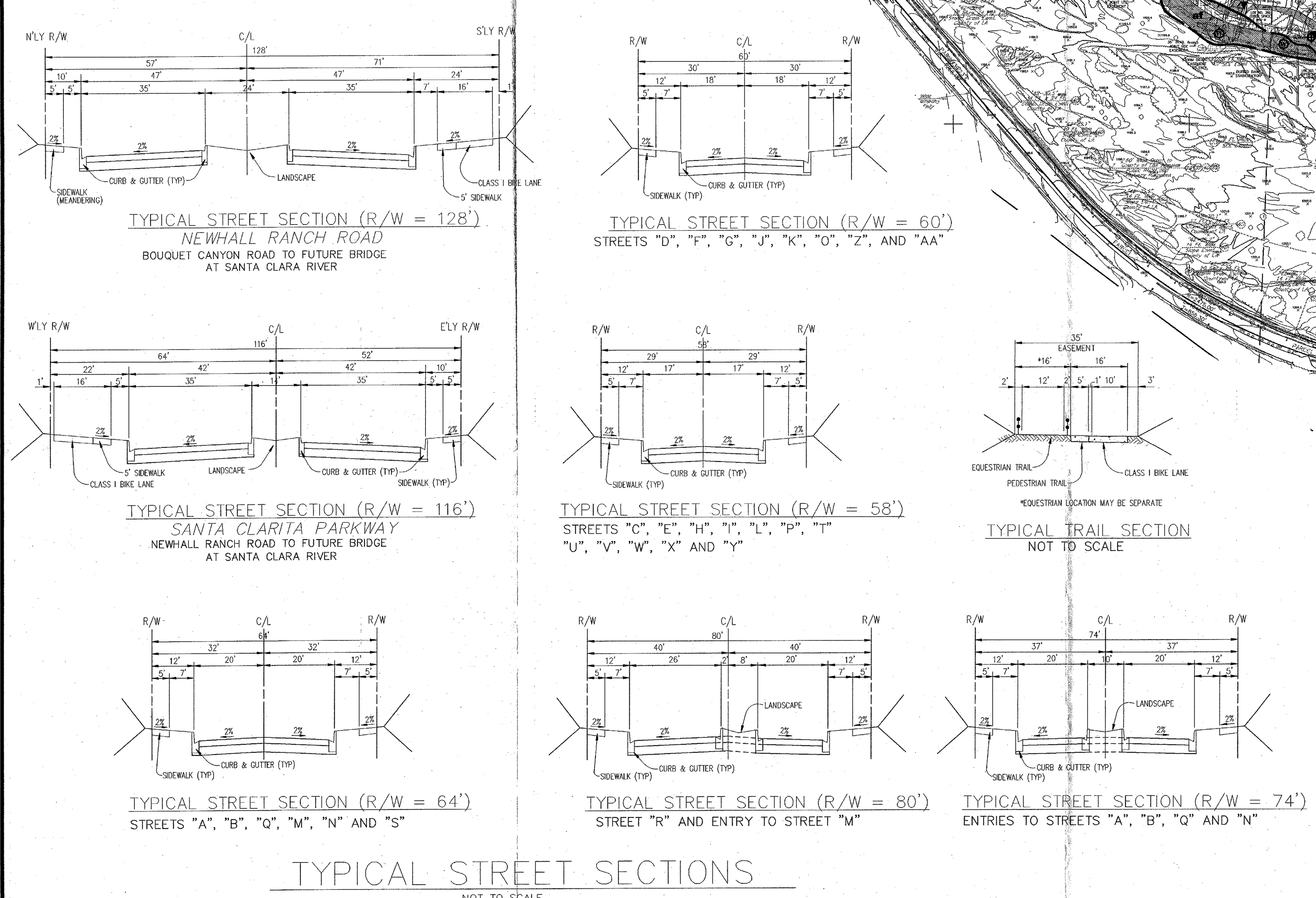
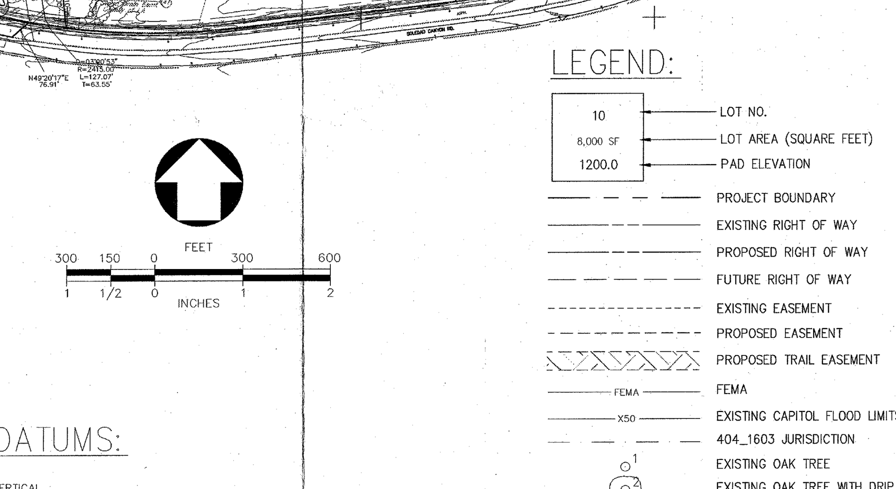
"Parcel TTTTTTTTTTTTT" 50 Ft. Wide Water Line Esmt. Castaic Lake Water Agency
"Parcel UUUUUUUUUUUUU" 50 Ft. Wide Water Line Esmt. Castaic Lake Water Agency
"Parcel VVVVVVVVVVVVV" 50 Ft. Wide Water Line Esmt. Castaic Lake Water Agency
"Parcel WWWWWWWWWWWWW" 50 Ft. Wide Water Line Esmt. Castaic Lake Water Agency
"Parcel XXXXXXXXXXXXX" 50 Ft. Wide Water Line Esmt. Castaic Lake Water Agency
"Parcel YYYYYYYYYYYYY" 50 Ft. Wide Water Line Esmt. Castaic Lake Water Agency
"Parcel ZZZZZZZZZZZZZ" 50 Ft. Wide Water Line Esmt. Castaic Lake Water Agency
"Parcel AAAAAAAAAAAAAA" 50 Ft. Wide Water Line Esmt. Castaic Lake Water Agency
"Parcel BBBBBBBBBBBBBB" 50 Ft. Wide Water Line Esmt. Castaic Lake Water Agency
"Parcel CCCCCCCCCCCCCC" 50 Ft. Wide Water Line Esmt. Castaic Lake Water Agency
"Parcel DDDDDDDDDDDDDD" 50 Ft. Wide Water Line Esmt. Castaic Lake Water Agency
"Parcel EEEEEEEEEEEEEE" 50 Ft. Wide Water Line Esmt. Castaic Lake Water Agency
"Parcel FFFFFFFFFFFFFF" 50 Ft. Wide Water Line Esmt. Castaic Lake Water Agency
"Parcel GGGGGGGGGGGGGG" 50 Ft. Wide Water Line Esmt. Castaic Lake Water Agency
"Parcel HHHHH





DATUMS:

VERTICAL

BENCHMARK: LOS ANGELES COUNTY NO. ...

NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88)

GENERAL NOTES:

1. REQUEST PERMISSION FOR UNIT PHASING.
2. REQUEST PERMISSION TO FILE PARCEL MAP (MIN. 20 ACRE PARCELS).
3. REQUEST PERMISSION TO ADJUST LOT LINES.
4. REQUEST PERMISSION TO COMBINE LOTS.
5. REQUEST PERMISSION TO RECORD ADDITIONAL OPEN SPACE LOTS.
6. ALL LOTS DEVELOPABLE DEDICATE THE RIGHT TO RESTRICT DRIVEWAY ACCESS TO MAJOR HIGHWAYS.
7. TOPOGRAPHY COMPILED FROM NORTH RIVER AERIAL TOPOGRAPHY (4/99).
8. BLANKET EASEMENT FOR ACCESS, UTILITIES AND PIPELINES TO WATER WELL SITES TO BE GRANTED TO VALENCIA WATER CO. PRIOR TO RECORDATION.
9. ANY STREET THAT WILL BE GATED SHALL BE DEDICATED AS A PRIVATE STREET. EXCEPT FOR PRIVATE DRIVEWAYS.
10. ANY GATED STREET WILL MEET CITY STANDARDS IN ACCORDANCE WITH THE CONDITIONS OF APPROVAL.
11. EXISTING EASEMENTS PER FIRST AMERICAN PRELIMINARY SUBDIVISION REPORT NO. 217627-58 DATED 8/29/02 WILL BE ADJUSTED WHERE NECESSARY TO ACCOMMODATE DEVELOPMENT.
12. LOCATION OF TRAILS TO BE FINALIZED PRIOR TO FINAL MAP APPROVAL.
13. ALL LOT LINE DIMENSIONS SHOWN ARE APPROXIMATE.
14. PROPOSED GRADING IS APPROXIMATE ONLY AND SUBJECT TO ADJUSTMENTS PENDING DETERMINATION OF FINAL DEVELOPMENT LAYOUT AND PLANS. LOTS MAY BE LOWERED OR RAISED 10' DEPENDING ON DIRT AVAILABILITY, AND SUBJECT TO THE HILLSIDE ORDINANCE.
15. MODIFIED STREET SECTIONS ARE REQUESTED – STREET SECTIONS PER THE CONDITIONAL USE PERMIT AND AS SHOWN.
16. REQUEST PERMISSION TO MASS GRADE.
17. FINAL PLANS MUST PROVIDE PUBLIC ACCESS TO SANTA CLARA RIVER.
18. ALL LOCATIONS OF TRAILS AND TRAIL CROSS SECTIONS SHALL BE OF A DIMENSION, LOCATION AND MATERIAL TO THE SATISFACTION OF THE DIRECTOR OF PARKS, RECREATION AND COMMUNITY SERVICES.
19. PAVING WIDTHS MAY VARY, PER FIRE DEPARTMENT REQUIREMENTS.
20. PARKING RESTRICTIONS MAY APPLY IN LOCATIONS OF MINIMAL PAVING WIDTHS, PER FIRE DEPARTMENT REQUIREMENTS.

SPECIAL NOTES:

1. APPROXIMATE LOCATION OF WATER QUALITY BASIN AND SIZE DEPENDS ON AMOUNT OF WATER QUALITY FILTRATION PROVIDED IN UPSTREAM PROJECTS AND SUBJECT TO FINAL DESIGN.
2. A LARGE LOT PARCEL MAP FOR CONVEYANCE PURPOSES (SUCH AS THE RIVER) MAY BE RECORDED WITHOUT ANY IMPROVEMENT REQUIREMENTS. RESIDENTIAL PARCELS EXCEPT FOR WATER COMPANY LOTS ARE TO BE 20 ACRES MINIMUM SIZE. LOT MINIMUM ACREAGE WILL BE THE AGGREGATE AREA OF LOTS SHOWN ON TENTATIVE MAP. RIVER AND BUFFER LOTS WILL INCLUDE TRAILS WHERE APPROPRIATE.

PLOTTED EASEMENTS:

(10) A ONE HUNDRED FOOT WIDE EASEMENT TO KERN RIVER COMPANY FOR POLES AND POLE STRUCTURES TOGETHER WITH GUYS AND ANCHORS, ETC. NECESSARY IN THE CONVEYANCE OF ELECTRICAL ENERGY RECORDED FEBRUARY 20, 1909 AS INSTRUMENT NO. 120 IN BOOK 3644 PAGE 41 OF DEEDS. LOCATION APPROXIMATE ONLY.

(11) A ONE HUNDRED FOOT WIDE EASEMENT TO CITY OF LOS ANGELES FOR CONVEYING WATER FROM THE OWENS RIVER VALLEY, KNOWN AS THE LOS ANGELES AQUADUCT, RECORDED MAY 8, 1911 AS INSTRUMENT NO. 9 IN BOOK 4555 PAGE 125 OF DEEDS.

(12) A ONE HUNDRED FOOT WIDE EASEMENT TO CITY OF LOS ANGELES FOR CONVEYING WATER FROM THE OWENS RIVER VALLEY, KNOWN AS THE LOS ANGELES AQUADUCT, RECORDED MAY 15, 1911 AS INSTRUMENT NO. 37 IN BOOK 4552 PAGE 178 OF DEEDS.

(13) A SIXTY FOOT WIDE EASEMENT TO CITY OF LOS ANGELS FOR POLE AND WIRE LINES FOR THE TRANSMISSION OF ELECTRICAL ENERGY AND TELEPHONE AND TELEGRAPH MESSAGES, RECORDED MAY 8, 1911 AS INSTRUMENT NO. 9 IN BOOK 4555 PAGE 125 OF DEEDS AND RECORDED MAY 15, 1911 AS INSTRUMENT NO. 37 IN BOOK 4552 PAGE 178 OF DEEDS.

(14) A FIFTEEN FOOT WIDE EASEMENT TO SOUTHERN CALIFORNIA EDISON FOR THE RIGHT TO CONSTRUCT, USE, MAINTAIN AND REPLACE POLES OR TOWERS UPON WHICH TO SUSPEND FROM CROSS-ARMS, BRACKETS, OR OTHER APPROPRIATE DEVICES TO BE ATTACHED TO SAID POLES, OR TOWERS, WIRES FOR CONVEYING ELECTRICAL ENERGY RECORDED NOVEMBER 15, 1911 AS INSTRUMENT NO. 224 IN BOOK 4790 PAGE 73 OF DEEDS.

(19) A 100' FOOT WIDE EASEMENT TO COUNTY OF LOS ANGELES FOR PUBLIC ROAD AND HIGHWAY PURPOSES AS RECORDED OCTOBER 20, 1931 AS INSTRUMENT NO. 938 IN BOOK 11155 PAGE 307, OFFICIAL RECORDS.

(23) A TWO FOOT WIDE EASEMENT TO SOUTHERN CALIFORNIA EDISON COMPANY FOR AN ELECTRIC LINE CONSISTING OF POLES AND POLE STRUCTURES TOGETHER WITH GUYS AND ANCHORS, ETC. NECESSARY IN THE CONVEYANCE OF ELECTRICAL ENERGY RECORDED OCTOBER 15, 1943 AS INSTRUMENT NO. 1551 IN BOOK 20331 PAGE 245, OFFICIAL RECORDS.

(26) A TEN FOOT WIDE EASEMENT TO SOUTHERN CALIFORNIA EDISON COMPANY FOR AN ELECTRIC LINE CONSISTING OF POLES AND POLE STRUCTURES TOGETHER WITH GUYS AND ANCHORS, ETC. NECESSARY IN THE CONVEYANCE OF ELECTRICAL ENERGY RECORDED NOVEMBER 3, 1952 AS INSTRUMENT NO. 2461 IN BOOK 40222 PAGE 376, OFFICIAL RECORDS.

(27) A TEN FOOT WIDE AND A TWO FOOT WIDE EASEMENT TO SOUTHERN CALIFORNIA EDISON COMPANY FOR AN ELECTRIC LINE CONSISTING OF POLES AND POLE STRUCTURES TOGETHER WITH GUYS AND ANCHORS, ETC. NECESSARY IN THE CONVEYANCE OF ELECTRICAL ENERGY RECORDED DECEMBER 19, 1952 AS INSTRUMENT NO. 2079 IN BOOK 40559 PAGE 446, OFFICIAL RECORDS.

(28) A TEN FOOT WIDE AND A TWO FOOT WIDE EASEMENT TO SOUTHERN CALIFORNIA EDISON COMPANY FOR AN ELECTRIC LINE CONSISTING OF POLES AND POLE STRUCTURES TOGETHER WITH GUYS AND ANCHORS, ETC. NECESSARY IN THE CONVEYANCE OF ELECTRICAL ENERGY RECORDED APRIL 29, 1953 AS INSTRUMENT NO. 3135 IN BOOK 41597 PAGE 412, OFFICIAL RECORDS.

(29) A TEN FOOT WIDE AND A TWO FOOT WIDE EASEMENT TO SOUTHERN CALIFORNIA EDISON COMPANY FOR AN ELECTRIC LINE CONSISTING OF POLES AND POLE STRUCTURES TOGETHER WITH GUYS AND ANCHORS, ETC. NECESSARY IN THE CONVEYANCE OF ELECTRICAL ENERGY RECORDED JULY 15, 1953 AS INSTRUMENT NO. 2843 IN BOOK 42220 PAGE 298, OFFICIAL RECORDS.

(30) A SIX FOOT WIDE AND A TWO FOOT WIDE EASEMENT TO SOUTHERN CALIFORNIA EDISON COMPANY FOR AN ELECTRIC LINE CONSISTING OF POLES AND POLE STRUCTURES TOGETHER WITH GUYS AND ANCHORS, ETC. NECESSARY IN THE CONVEYANCE OF ELECTRICAL ENERGY RECORDED SEPTEMBER 4, 1953 AS INSTRUMENT NO. 3127 IN BOOK 42632 PAGE 211, OFFICIAL RECORDS.

(32) A 20' WIDE EASEMENT TO COUNTY SANITATION DISTRICT NO. 26 OF LOS ANGELES FOR SEWER PURPOSES AND THE RIGHT TO LAY, CONSTRUCT, MAINTAIN AND OPERATE A SEWER PIPE LINE RECORDED SEPTEMBER 17, 1962 AS INSTRUMENT NO. 4870 IN BOOK D-1758 PAGE 969, OFFICIAL RECORDS.

(33) TWO (2) TEN FOOT WIDE EASEMENTS TO SOUTHERN CALIFORNIA EDISON COMPANY FOR AN ELECTRIC LINE CONSISTING OF POLES AND POLE STRUCTURES TOGETHER WITH GUYS AND ANCHORS, ETC. NECESSARY IN THE CONVEYANCE OF ELECTRICAL ENERGY RECORDED MAY 12, 1966 AS INSTRUMENT NO. 3407 IN BOOK D-3303 PAGE 10, OFFICIAL RECORDS.

(34) VARIABLE WIDTH EASEMENTS TO SOUTHERN CALIFORNIA EDISON COMPANY FOR AN ELECTRIC LINE CONSISTING OF POLES AND POLE STRUCTURES TOGETHER WITH GUYS AND ANCHORS, ETC. NECESSARY IN THE CONVEYANCE OF ELECTRICAL ENERGY RECORDED MAY 31, 1966 AS INSTRUMENT NO. 2560 IN BOOK M-2236 PAGE 474, OFFICIAL RECORDS.

(36) A SIXTY THREE FOOT WIDE EASEMENT TO COUNTY OF LOS ANGELES FOR PUBLIC ROAD AND HIGHWAY PURPOSES RECORDED JUNE 13, 1966 AS INSTRUMENT NO. 1814 IN BOOK D-3333 PAGE 544, OFFICIAL RECORDS.

(38) VARIABLE WIDTH EASEMENTS TO COUNTY OF LOS ANGELES FOR PUBLIC ROAD AND HIGHWAY, SLOPES, DRAINS AND APPURTENANT STRUCTURES RECORDED JUNE 11, 1971 AS INSTRUMENT NO. 2621 IN BOOK D-5086 PAGE 478, OFFICIAL

(39) VARIABLE WIDTH EASEMENTS TO COUNTY OF LOS ANGELES FOR PUBLIC ROAD AND HIGHWAY AS RECORDED AUGUST 2, 1972 AS INSTRUMENT NO. 3927 IN BOOK D-5554 PAGE 328, OFFICIAL RECORDS.

(40) VARIABLE WIDTH EASEMENTS TO COUNTY OF LOS ANGELES FOR PUBLIC ROAD AND HIGHWAY, SLOPES, DRAINS AND APPURTENANT STRUCTURES RECORDED OCTOBER 18, 1972 AS INSTRUMENT NO. 3265 IN BOOK D-5639 PAGE 106, OFFICIAL RECORDS.

(41) VARIABLE WIDTH EASEMENTS TO COUNTY OF LOS ANGELES FOR PUBLIC ROAD AND HIGHWAY, DRAINS AND APPURTENANT STRUCTURES RECORDED OCTOBER 18, 1972 AS INSTRUMENT NO. 3266 IN BOOK D-5639 PAGE 115, OFFICIAL RECORDS.

(42) A FIFTEEN FOOT WIDE AND NINETY FOOT WIDE EASEMENT TO LOS ANGELES COUNTY FOR STORM DRAIN AND PATROL ROAD PURPOSES RECORDED MARCH 8, 1974 AS INSTRUMENT NO. 3868 IN BOOK D-6194 PAGE 694, OFFICIAL RECORDS.

(43) A TEN FOOT WIDE AND THREE FOOT WIDE EASEMENT TO SOUTHERN CALIFORNIA EDISON COMPANY FOR AN ELECTRIC LINE CONSISTING OF POLES AND POLE STRUCTURES TOGETHER WITH GUYS AND ANCHORS, ETC. NECESSARY IN THE CONVEYANCE OF ELECTRICAL ENERGY RECORDED MARCH 10, 1976 AS INSTRUMENT NO. 2379 IN BOOK D-6997 PAGE 781, OFFICIAL RECORDS.

(44) REMAINDER OF A TWENTY FOOT WIDE, FIFTEEN FOOT WIDE AND ONE HUNDRED FOOT WIDE EASEMENT TO VALENCIA WATER COMPANY FOR WATER PIPELINES RECORDED NOVEMBER 26, 1976 AS INSTRUMENT NO. 2950 IN BOOK D-7333 PAGE 151, OFFICIAL RECORDS, SAID EASEMENTS WERE QUITCLAIMED TO THE NEWHALL LAND AND FARMING COMPANY RECORDED JULY 2, 1997 AS INSTRUMENT NO. 97-984038, OFFICIAL RECORDS.

(45) VARIABLE WIDTH EASEMENTS TO LACFCD FOR STORM DRAIN PURPOSES AND APPURTENANT STRUCTURES AS SHOWN ON PARCEL MAP NO. 8675 RECORDED IN BOOK 96, PAGES 92 THROUGH 96, INCLUSIVE OF PARCEL MAPS, SAID EASEMENT WAS QUITCLAIMED TO THE LA COUNTY FLOOD CONTROL DISTRICT AND RECORDED JANUARY 24, 1980 AS INSTRUMENT NO. 80-91107 OFFICIAL RECORDS.

(46) A FORTY FOOT WIDE EASEMENT TO CASTAIC LAKE WATER AGENCY FOR WATER TRANSMISSION CONDUIT PURPOSES INCLUDING THE RIGHT TO USE EXISTING PRIVATE ROADS FOR INGRESS TO AND EGRESS FROM SAID EASEMENT RECORDED OCTOBER 17, 1978 AS INSTRUMENT NO. 78-1153522, OFFICIAL RECORDS.

(48) A VARIABLE WIDTH EASEMENT TO COUNTY OF LOS ANGELES FOR STORM DRAIN PURPOSES, APPURTENANT STRUCTURES AND INGRESS AND EGRESS PURPOSES RECORDED OCTOBER 15, 1979 AS INSTRUMENT NO. 79-1153551, OFFICIAL RECORDS. SAID EASEMENT WAS QUITCLAIMED TO THE LOS ANGELES COUNTY FLOOD CONTROL DISTRICT BY QUITCLAIM DEED DATED JUNE 30, 1981 AND RECORDED JULY 6, 1981 AS INSTRUMENT NO. 81-673920, OFFICIAL RECORDS.

(49) A 36 FOOT WIDE EASEMENT TO COUNTY OF LOS ANGELES FOR STORM DRAIN PURPOSES, APPURTENANT STRUCTURES AND INGRESS AND EGRESS PURPOSES AS SHOWN ON PARCEL MAP NO. 15721 RECORDED IN BOOK 175, PAGES 80 THROUGH 82, INCLUSIVE OF PARCEL MAPS.

(50) A NINETY FOOT WIDE EASEMENT TO NEWHALL INVESTMENT PROPERTIES FOR PARKING OF VEHICLES, PARKING FACILITIES AND LANDSCAPING PURPOSES RECORDED MARCH 25, 1985 AS INSTRUMENT NO. 85-319020, OFFICIAL RECORDS.

(53) A VARIABLE WIDTH EASEMENT TO COUNTY OF LOS ANGELES FOR PUBLIC ROAD AND HIGHWAY PURPOSES TO BE KNOWN AS NEWHALL RANCH ROAD (ROUTE 126), RIO VISTA ROAD AND GOLDEN VALLEY ROAD RECORDED MARCH 6, 1986 AS INSTRUMENT NO. 86-287610, OFFICIAL RECORDS.

(54) A VARIABLE WIDTH EASEMENT TO COUNTY OF LOS ANGELES FOR PUBLIC ROAD AND HIGHWAY PURPOSES TO BE KNOWN AS RIO VISTA ROAD AND GOLDEN VALLEY ROAD TOGETHER WITH SLOPE, CUTS AND/OR FILLS AND APPURTENANT STRUCTURES RECORDED MARCH 6, 1986 AS INSTRUMENT NO. 86-287611, OFFICIAL RECORDS.

(57) VARIABLE WIDTH EASEMENTS TO CASTAIC LAKE WATER AGENCY FOR RAW AND TREATED WATER PIPELINES RECORDED JANUARY 5, 1993 AS INSTRUMENT NO. 93-141359, OFFICIAL RECORDS.

(59) A SIX FOOT WIDE EASEMENT TO PACIFIC BELL TO CONSTRUCT AND MAINTAIN AERIAL FACILITIES CONSISTING OF POLES, ANCHORS, GUYS, CABLES AND OTHER NECESSARY FIXTURES AND APPURTENANCES INCLUDING INGRESS THERETO AND EGRESS THEREFROM RECORDED MARCH 9, 1993 AS INSTRUMENT NO. 93-445282, OFFICIAL RECORDS.

(60) A FIFTEEN FOOT WIDE EASEMENT TO VALENCIA WATER COMPANY FOR WATER PIPELINES AND APPURTENANCES RECORDED JULY 27, 1995 AS INSTRUMENT NO. 95-1220108, OFFICIAL RECORDS.

(61) A VARIABLE WIDTH EASEMENT TO CITY OF SANTA CLARITA FOR COVERED STORM DRAIN PURPOSES, APPURTENANT STRUCTURES AND INGRESS AND EGRESS PURPOSES RECORDED NOVEMBER 9, 1995 AS INSTRUMENT NO. 95-1804649, OFFICIAL RECORDS.

(62) A FIFTY FOOT WIDE, FORTY FOOT WIDE AND THIRTY FOOT WIDE EASEMENT (PARCELS A-D) TO CASTAIC LAKE WATER AGENCY FOR WATER PIPELINES AND THE RIGHT OF INGRESS AND EGRESS FOR SUCH PURPOSES RECORDED OCTOBER 2, 1996 AS INSTRUMENT NO. 96-1619209, OFFICIAL RECORDS.

(64) A TEN FOOT WIDE EASEMENT TO SOUTHERN CALIFORNIA EDISON COMPANY FOR OVERHEAD AND UNDERGROUND ELECTRICAL SUPPLY SYSTEMS CONSISTING OF CABLES, VAULTS AND MANHOLES, ETC. NECESSARY IN THE CONVEYANCE OF ELECTRICAL ENERGY RECORDED FEBRUARY 3, 1997 AS INSTRUMENT NO. 97-181386, OFFICIAL RECORDS.

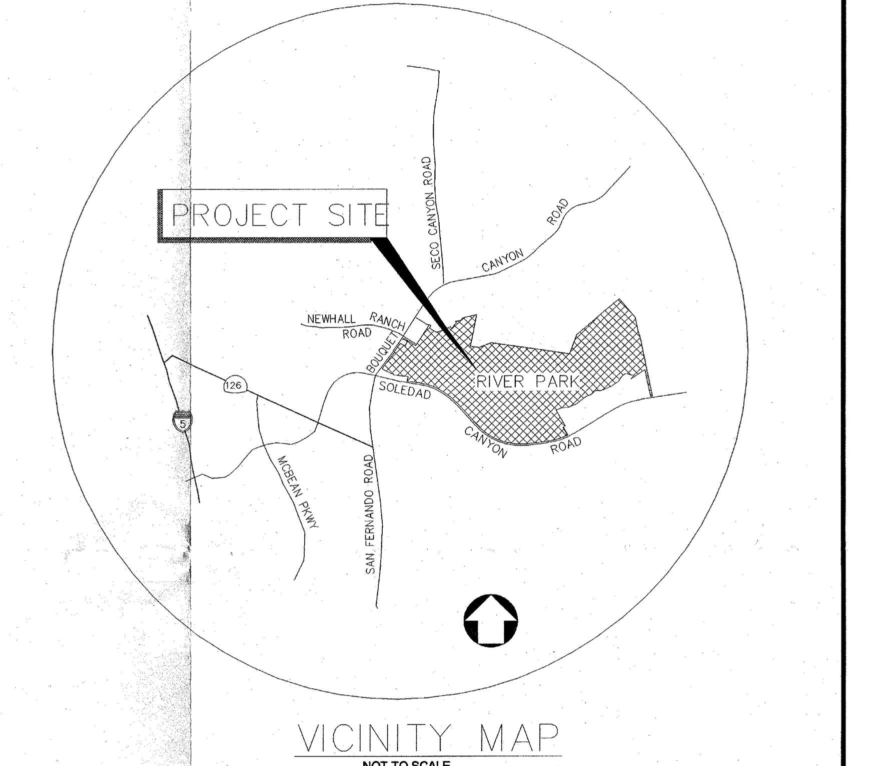
(A) A TWELVE FOOT AND TWENTY FOOT WIDE EASEMENT TO VALENCIA WATER COMPANY FOR WATER PIPELINE PURPOSES, PER INSTRUMENT NO 84-599509, MODIFIED BY INSTRUMENT NO 98-2128583 AND A PORTION QUITCLAIMED BY INSTRUMENT NO 98-2271119

(B) A FIFTEEN FOOT AND FIFTY FOOT WIDE EASEMENT TO VALENCIA WATER COMPANY FOR WATER PIPELINE AND WATER WELL PURPOSES, PER INSTRUMENT NO 92-1433075, PORTION QUITCLAIMED BY INSTRUMENT NO 01-0410999 AND A PORTION QUITCLAIMED BY INSTRUMENT NO 01-0411000

(C) A TWENTY FOOT WIDE EASEMENT TO VALENCIA WATER COMPANY FOR WATER PIPELINE PURPOSES, PER INSTRUMENT NO 00-1185545

(D) A TWENTY FOOT AND FIFTY FOOT WIDE EASEMENT TO VALENCIA WATER COMPANY FOR WATER PIPELINE AND WATER WELL PURPOSES, PER INSTRUMENT NO 00-1185546

(E) A FIFTY FOOT WIDE EASEMENT TO VALENCIA WATER COMPANY FOR WATER PIPELINE PURPOSES, PER INSTRUMENT NO 01-1001061



COMMENTS:

BOUNDARY LINES . . . . . . WERE DEVELOPED BASED ON RECORD INFORMATION PROVIDED IN THE HEREIN REFERENCED TITLE REPORT. A FIELD SURVEY WAS NOT PERFORMED.

NUMBERED EASEMENTS . . . PLOTTABLE EASEMENTS ARE SHOWN FROM AN OWNER SUPPLIED TITLE REPORT. NON-PLOTTABLE ONES ARE NOTED ON THE MAP AS HAVING "EFFECT OF". BECAUSE OUR SERVICE IS LIMITED TO REPORTING ON EASEMENT LOCATIONS, WE STRONGLY RECOMMEND LEGAL COUNSEL BE RETAINED TO REPORT ON TITLE PAPERS IN THEIR ENTIRETY.

LETTERED EASEMENTS . . . ADDITIONAL PLOTTED EASEMENTS WERE TAKEN FROM THE PRELIMINARY SUBDIVISION REPORT, ORDER NUMBER 2217627-58 FOR TRACT NO 53425 DATED AUGUST 29, 2002 BY FIRST AMERICAN TITLE COMPANY.

TITLE REPORT . . . . . . CHICAGO TITLE COMPANY PRELIMINARY TITLE REPORT NO. 8128021 DATED NOVEMBER 12, 1998. (PANHANDLE)

(–) INDICATES TITLE REPORT EXCEPTION NO.

BASIS OF BEARINGS . . . THE BEARING NORTH 76°52'13" WEST ALONG THE PROPOSED CENTERLINE OF SOLEDAD CANYON ROAD AS SHOWN ON CSB MAP NO. 2874-3 ON FILE IN THE OFFICE OF THE COUNTY SURVEYOR, WAS TAKEN AS THE BASIS OF BEARINGS FOR THIS SURVEY.

AREA . . . . BASED UPON RECORD BEARINGS AND DISTANCES AS SHOWN HEREON, THE GROSS AREA IS: 32,389,038 SQ.FT. = 743.55 ACRES

AERIAL SURVEY . . . . . THIS SURVEY WAS PREPARED BY PHOTOGRAMMETRIC PROCESSES, UTILIZING AERIAL PHOTOGRAMMETRY DATED NOVEMBER 20, 1998. THE OUTLINE OF BUILDINGS AND OTHER ROOFED IMPROVEMENTS MAY INCLUDE EAVES, CANOPIES AND BALCONIES, SINCE BUILDINGS BELOW THESE ITEMS ARE NOT VISIBLE TO THE CAMERA.

TOPOGRAPHY . . . . BY PHOTGRAMMETRIC PROCESSES FROM AERIAL PHOTOGRAPHY DATED NOVEMBER 20, 1998, AND COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS FOR 40 SCALE MAPPING AND SMALLER.

ORTHOPHOTO . . . . PRODUCED FROM AERIAL PHOTOGRAPHY DATED NOVEMBER 20, 1998. PHOTOGRAPH RECTIFIED AT GROUND LEVEL ONLY SUITABLE FOR 40 SCALE AND SMALLER MAPPING PURPOSES.

CONTOUR INTERVAL . . . . TWO FOOT.

EFFECT OF . . . . (15) THE RIGHT TO EXTEND ANY PIPES, CULVERTS, BULKHEAD, PASSES OR WING-WALLS THAT MAY BE NECESSARY IN THE PROPER CONSTRUCTION AND DRAINAGE OF SOLEDAD CANYON ACROSS SAID LAND, AND TO EXTEND THE SLOPES OF CUT OR FILL OF SAID ROAD BEYOND THE LIMITS OF SAID ROADWAY WHENEVER IT MAY BE NECESSARY TO DO SO, AS CONVEYED TO THE COUNTY OF LOS ANGELES BY DEED RECORDED JULY 10, 1916 AS INSTRUMENT NO. 64 IN BOOK 6322 PAGE 19 OF DEEDS.

EFFECT OF . . . . (16) A TEN FOOT WIDE EASEMENT TO SOUTHERN CALIFORNIA EDISON COMPANY FOR AN ELECTRICAL LINE CONSISTING OF PLOES AND POLE STRUCTURES TOGETHER WITH GUYS AND ANCHORS, ETC. NECESSARY IN THE CONVEYANCE OF ELECTRICAL ENERGY RECORDED MAY 15, 1918 AS INSTRUMENT NO. 156 IN BOOK 6682 PAGE 77 OF DEEDS. SAID EASEMENT NORTH OF PIQ.

EFFECT OF . . . . (18) THE PERMISSIVE LICENSE TO EMPTY OR SPILL WATER FROM THE LOS ANGELES AQUEDUCT INTO THE STREAMS OR WATER CHANNELS RUNNING THROUGH CERTAIN PORTIONS OF THE PREMISES HEREINAFTER DESCRIBED UPON CERTAIN CONDITIONS AND CONTAINED IN THE AGREEMENT BETWEEN THE NEWHALL LAND AND FARMING COMPANY AND THE CITY OF LOS ANGELES, RECORDED DECEMBER 14, 1920 AS INSTRUMENT NO. 825 IN BOOK 308 PAGE 82 OF MISCELLANEOUS RECORDS, OF SAID COUNTY.

EFFECT OF . . . . (20) THE RIGHT TO EXTEND DRAINAGE STRUCTURES AND EXCAVATION AND EMBANKMENT SLOPES BEYOND THE LIMITS OF THE 100 FOOT EASEMENT FOR SOLEDAD CANYON ROAD WHERE REQUIRED FOR CONSTRUCTION AND MAINTENANCE OF SAID HIGHWAY RECORDED OCTOBER 20, 1931 AS INSTRUMENT NO. 938 IN BOOK 11155 PAGE 307, OFFICIAL RECORDS.

EFFECT OF . . . . (21) A WAIVER OF ANY CLAIMS FOR DAMAGES BY REASON OF THE LOCATION, CONSTRUCTION, LANDSCAPING OR MAINTENANCE OF A HIGHWAY OR FREEWAY CONTIGUOUS THERETO, AS CONTAINED IN AN INSTRUMENT RECORDED OCTOBER 20, 1931 AS INSTRUMENT NO. 938 IN BOOK 11155 PAGE 307, OFFICIAL RECORDS.

EFFECT OF . . . . (22) AN AGREEMENT DATED DECEMBER 30, 1939, EXECUTED BY THE NEWHALL LAND AND FARMING COMPANY AND AUGUST A. RUBEL AND MARY RUBEL RELATING TO THE RESPECTIVE RIGHTS OF THE SANTA CLARA RIVER AND THE UNDERGROUND WATERS UNDERLYING THE LANDS OF THE NEWHALL RANCH AND THE CAMULOS RANCH AND TO THE APPORTIONMENT AND DIVISION OF SUCH WATERS, AND TO THE METHODS OF DIVERTING AND TRANSPORTING SUCH WATERS, AND WHEREIN NEWHALL LAND AND FARMING GRANTS TO AUGUST AND MARY RUBEL, EASEMENTS OVER THE LAND FOR PIPE LINES, THE CONSTRUCTION AND MAINTENANCE OF DIVERSION WORKS, AND INCIDENTAL PURPOSES RECORDED JUNE 14, 1940 AS INSTRUMENT NO. 988 IN BOOK 17568 PAGE 237, OFFICIAL RECORDS. SAID EASEMENT IS INDETERMINATE IN NATURE.

EFFECT OF . . . . (24) A TWO FOOT WIDE EASEMENT FOR UTILITIES AND APPURTENANCES GRANTED TO SOUTHERN CALIFORNIA EDISON COMPANY, LTD. RECORDED AUGUST 26, 1949 AS INSTRUMENT NO. 2120 IN BOOK 30870 PAGE 237, OFFICIAL RECORDS. SAID EASEMENT IS INDETERMINATE IN NATURE.

EFFECT OF . . . . (25) A TWO FOOT WIDE EASEMENT FOR UTILITIES AND APPURTENANCES GRANTED TO SOUTHERN CALIFORNIA EDISON COMPANY, LTD. RECORDED APRIL 2, 1952 AS INSTRUMENT NO. 2552 IN BOOK 38621 PAGE 251, OFFICIAL RECORDS. SAID EASEMENT LIES WITHIN THE RIGHT OF WAY OF SOLEDAD CANYON ROAD,120 FEET WIDE.

EFFECT OF . . . . (31) SLANT DRILLING RIGHTS AND ALL OTHER RIGHTS GRANTED IN CONNECTION WITH A LEASE RECORDED MARCH 6, 1958 AS INSTRUMENT NO. 3785 IN BOOK 56515 PAGE 445 AND LATER QUITCLAIMED BY DEEDS RECORDED AUGUST 30, 1960 AS INSTRUMENT NO. 4187 IN BOOK R719 PAGE 554 AND JUNE 6, 1961 AS INSTRUMENT NO. 4250 IN BOOK D-1244 PAGE 316, ALL OF OFFICIAL RECORDS.

EFFECT OF . . . . (34) A TWENTY FIVE FOOT WIDE EASEMENT FOR UTILITIES AND APPURTENANCES GRANTED TO SOUTHERN CALIFORNIA EDISON COMPANY, LTD. RECORDED MAY 31, 1966 AS INSTRUMENT NO. 2560 IN BOOK M-2236 PAGE 474, OFFICIAL RECORDS. SAID EASEMENT LIES WITHIN THE RIGHT OF WAY OF SOLEDAD CANYON ROAD.

EFFECT OF . . . . (37) A VARIABLE WIDTH EASEMENT FOR WATER PIPE LINES GRANTED TO BOUQUET CANYON WATER COMPANY RECORDED DECEMBER 8, 1967 AS INSTRUMENT NO. 654 IN BOOK D-3852 PAGE 864, OFFICIAL RECORDS. SAID EASEMENT LIES WITHIN THE RIGHT OF WAY OF SOLEDAD CANYON ROAD, 120 FEET WIDE.

EFFECT OF . . . . (42) THE CITY OF LOS ANGELES, DEPARTMENT OF POWER AND WATER RIGHTS TO CONVEY TO THE COUNTY OF LOS ANGELES A JOINT USE EASEMENT FOR ACESS ROAD AS RECORDED MARCH 8, 1974 AS INSTRUMENT NO. 3688 IN BOOK D-6194 PAGE 694, OFFICIAL RECORDS.

EFFECT OF . . . . (46) A FORTY FOOT WIDE EASEMENT TO CASTAIC LAKE WATER AGENCY FOR WATER TRANSMISSION CONDUIT PURPOSES INCLUDING THE RIGHT TO USE EXISTING PRIVATE ROADS FOR INGRESS TO AND EGRESS FROM SAID EASEMENT RECORDED OCTOBER 17, 1978 AS INSTRUMENT NO. 78-1153522, OFFICIAL RECORDS.

EFFECT OF . . . . (52) A CONDITIONAL CERTIFICATE OF COMPLIANCE EXECUTED BY THE NEWHALL LAND AND FARMING COMPANY RECORDED OCTOBER 31, 1985 AS INSTRUMENT NO. 85-1293150, OFFICIAL RECORDS. SAID DOCUMENT IS CONDITIONED UPON THE FOLLOWING:

1. OFFER FOR ROAD RIGHT OF WAY ANY PORTION OF THE SUBJECT PROPERTY WITHIN 60 FEET OF THE CENTERLINES FOR BOUQUET AND SOLEDAD CANYON ROADS AND SLOPE EASEMENTS ADJACENT THERETO.
2. DEDICATE TO THE COUNTY THE RIGHT TO RESTRICT ACCESS FROM THE SUBJECT PROPERTY TO BOUQUET AND SOLEDAD CANYONS ROADS.
3. DEDICATE TO THE COUNTY THE RIGHT TO RESTRICT ERECTION OF BUILDINGS AND/OR OTHER STRUCTURES, BECAUSE THE PROPERTY AND/OR ITS ACCESS IS WITHIN A FLOOD-PRONE AND/OR OTHER HIGH-HAZARD AREA.
4. OFFER RIGHT OF WAY FOR A DRAINAGE CHANNEL OR CONDUIT TO THE SATISFACTION OF COUNTY FLOOD CONTROL ENGINEERS.

EFFECT OF . . . . (65) A CERTIFICATE OF COMPLIANCE FOR LOT LINE ADJUSTMENT EXECUTED BY THE NEWHALL LAND AND FARMING COMPANY RECORDED JUNE 19, 1998 AS INSTRUMENT NO. 98-1039023, OFFICIAL RECORDS.

PROJECT SUMMARY:

GROSS AREA	664.3 ac.
TOTAL LOTS	496
TOTAL DU	1,099
EXISTING ZONING	RM, CO(PD), CC(PD), MHP, IC
PROPOSED ZONING	RM
GENERAL PLAN LAND USE	IC(SEA), CO(SEA), CC(SEA), CC

LOT SUMMARY – AREA A1:

LOTS 1-90	90 S.F.D. – 4,950 FEE LOTS (45' X 110') 90 DU
LOTS 91-136, 138-213	122 S.F.D. – 5,500 FEE LOTS (50' X 110') 122 DU
LOTS 137	1 RECREATION LOT
LOTS 214-232, 234-238, 495	25 OPEN SPACE LOTS
LOTS 233	1 WATER QUALITY BASIN LOT
LOTS 496	1 FUTURE PUBLIC STREET LOT (SANTA CLARITA PKWY)
AREA A1 TOTAL:	240 LOTS 212 DU 74.7 ac

LOT SUMMARY – AREA A2:

LOTS 239-330, 332-343	104 S.F.D. – 6,050 FEE LOTS (55' X 110') 104 DU
LOTS 331, 344-353, 357-360	15 OPEN SPACE LOTS
LOTS 354	1 TRAIL HEAD PARKING LOT
LOT 355-356	2 PARK LOTS
AREA A2 TOTAL:	122 LOTS 104 DU 68.4 ac

LOT SUMMARY – AREA B:

LOTS 361-469	109 S.F.D. – 6,600 FEE LOTS (60' X 110') 109 DU
LOTS 470	1 RECREATION LOT
LOTS 471-482, 483	12 OPEN SPACE LOTS
AREA B TOTAL:	122 LOTS 109 DU 79.5 ac

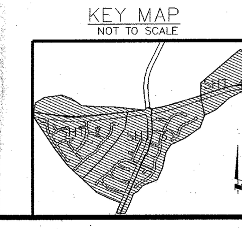
LOT SUMMARY – AREA C:

LOTS 487-489	3 LOTS FOR APARTMENTS – 420 DU
LOTS 490-492	3 OPEN SPACE RIVER LOTS
LOTS 493, 494	2 OPEN SPACE RIVER / FUTURE BRIDGE LOTS
AREA C TOTAL:	8 LOTS 420 DU 360.3 ac

LOT SUMMARY – AREA D:

LOT 484	1 LOT FOR APARTMENTS – 170 DU
LOT 485	1 LOT FOR TOWNHOMES – 84 DU
LOT 486	1 OPEN SPACE LOT
AREA D TOTAL:	3 LOTS 254 DU 54.4 ac
PUBLIC STREET RIGHT OF WAY:	27.0 ac

KEY MAP
NOT TO SCALE



LEGAL DESCRIPTION:

THAT PORTION OF RANCHO SAN FRANCISCO, IN THE COUNTY OF LOS ANGELES, STATE OF CALIFORNIA, AS SHOWN ON MAP RECORDED IN BOOK 1 PAGES 521 PAGES 522 OF PATENTS, IN THE OFFICE OF THE COUNTY RECORDER OF SAID COUNTY.

REGISTERED PROFESSIONAL ENGINEER JASON H. FUKUMITSU No. 40695 Exp. 3-31-03 CIVIL STATE OF CALIFORNIA

PSOMAS
28470 Avenue Stanford, Suite 300
Santa Clarita, CA 91355
(661) 219-6000 (661) 775-2718 (FAX)
JASON H. FUKUMITSU R.C.E. NO. 40695 DATE

DESIGNED : MGH
DRAFTED : D.S.H./J.H/T.D.
CHECKED : JHF/JG

OWNER/DEVELOPER :
NEWHALL LAND
23823 WEST VALENCIA BOULEVARD
VALENCIA, CALIFORNIA 91355
TELEPHONE: (661) 255-4000
REPRESENTATIVES : GLENN ADAMICK & CORY HARPOLE

ALLAN E. SEWARD
ENGINEERING GEOLOGY, INC.
Geological and Geotechnical Consultants

GEOLOGIC/GEOTECHNICAL MAP

Date: 04/04/03	Job No.: 03-1571-4
Scale: 1" = 300'	CAD File: SHEET 1
Sheet 1 of 4 — Geology by: Staff; Drawn by: GSD/MBW	Revised:

DEIR
Map #19

REV:
DATE: 2/25/03

RIVER PARK
VESTING TENTATIVE TRACT MAP

LOCATED IN THE CITY OF SANTA CLARITA, COUNTY OF LOS ANGELES STATE OF CALIFORNIA

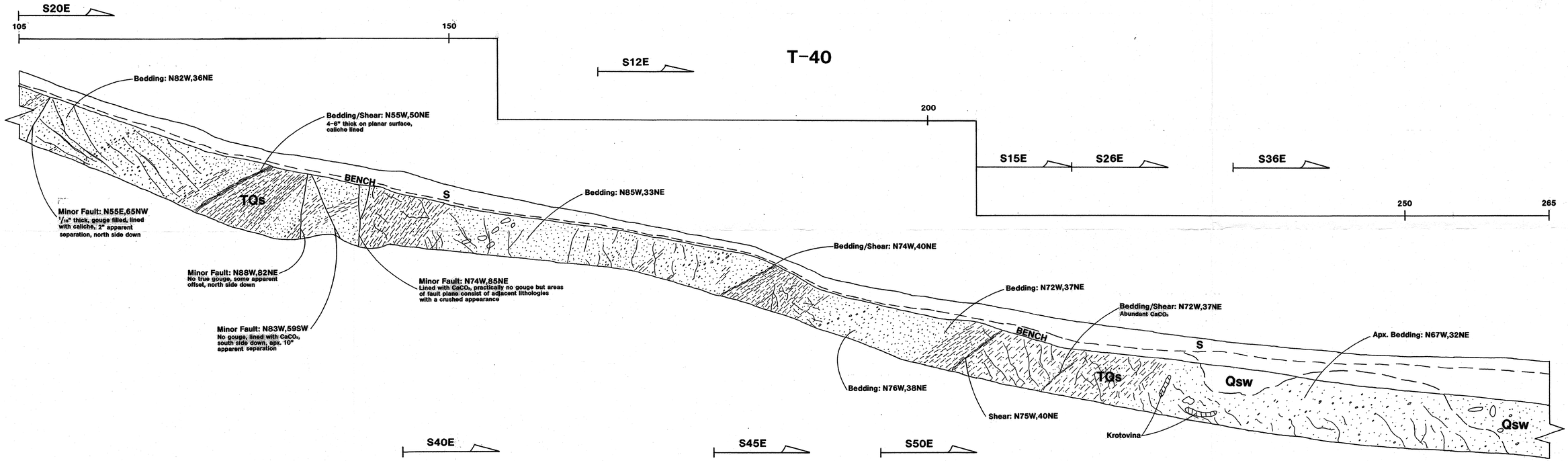
PROJECT NO. 1VAL0215.06

SHEET 1 OF 4

DWG Name: M:\Northriv-mp\53425-mp\ENGR\MASTDES\VTTM\PL\RP013-01.dwg Updated By: MHeideman Sept. 11, 2002 – 16:19:31

RP013-01.dwg

T-40



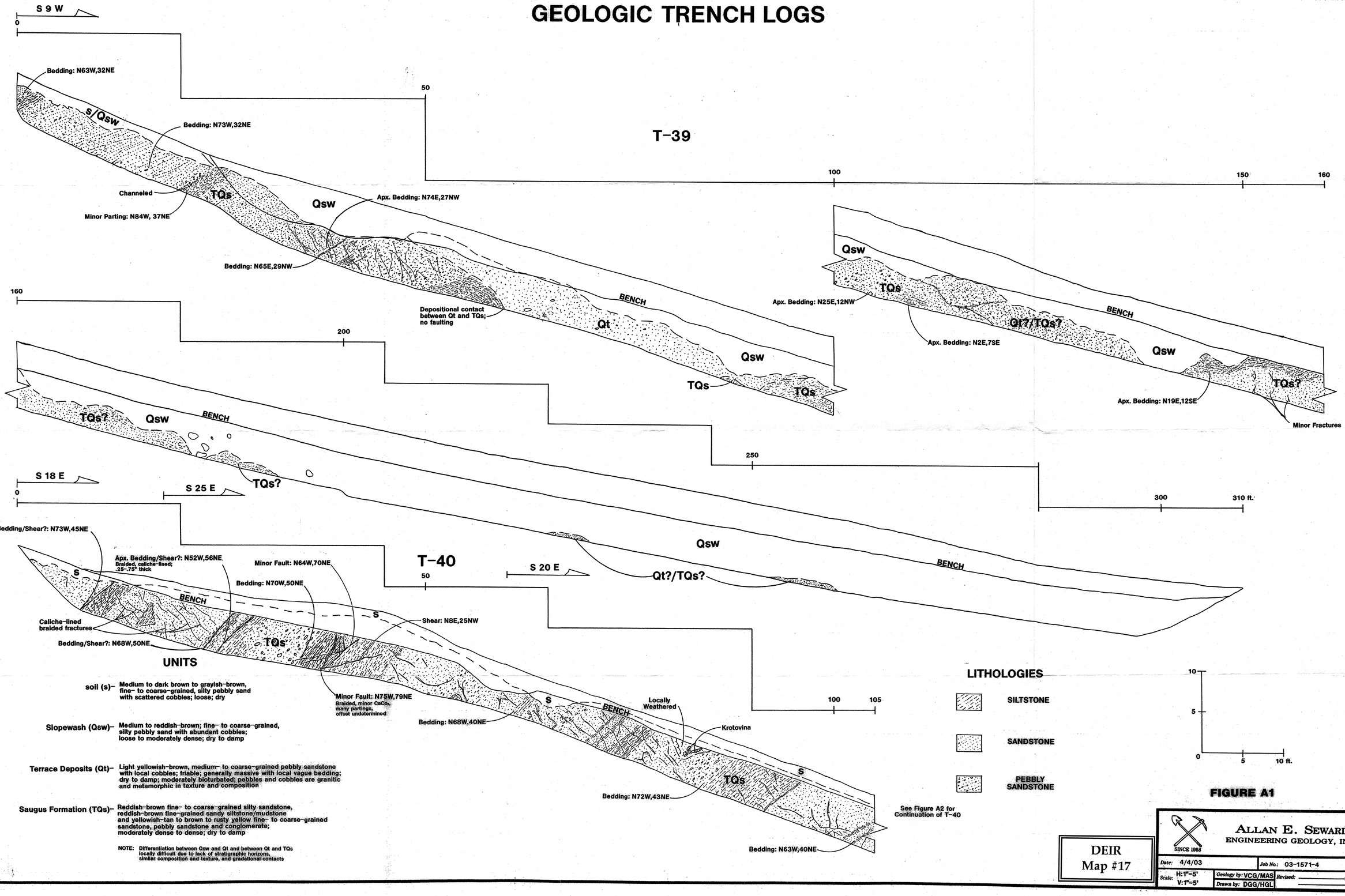
DEIR
Map #18

FIGURE A2

ALLAN E. SEWARD
ENGINEERING GEOLOGY, INC.
SINCE 1958

Date: 4/4/03		Job No.: 03-1571-4	
Scale: H:1"=5' V:1"=5'	Geology by: VCG/MAS	Revised:	
	Drawn by: HGL/DGG		

GEOLOGIC TRENCH LOGS



UNITS

soil (s)– Medium to dark brown to grayish-brown, fine- to coarse-grained, silty pebbly sand with scattered cobbles; loose; dry

Slopewash (Qsw)– Medium to reddish-brown; fine- to coarse-grained, silty pebbly sand with abundant cobbles; loose to moderately dense; dry to damp

Terrace Deposits (Qt)– Light yellowish-brown, medium- to coarse-grained pebbly sandstone with local cobbles; friable; generally massive with local vague bedding; dry to damp; moderately bioturbated; pebbles and cobbles are granitic and metamorphic in texture and composition

Saugus Formation (TQs)– Reddish-brown fine- to coarse-grained silty sandstone, reddish-brown fine-grained sandy siltstone/mudstone and yellowish-tan to brown to rusty yellow fine- to coarse-grained sandstone, pebbly sandstone and conglomerate; moderately dense to dense; dry to damp

NOTE: Differentiation between Qsw and Qt and between Qt and TQs locally difficult due to lack of stratigraphic horizons, similar composition and texture, and gradational contacts

LITHOLOGIES

SILTSTONE

SANDSTONE

PEBBLY SANDSTONE

FIGURE A1

DEIR Map #17

ALLAN E. SEWARD
ENGINEERING GEOLOGY, INC.
SINCE 1958

Date: 4/4/03 | Job No.: 03-1571-4

Scale: H:1"=5' V:1"=5' | Geology by: VCG/MAS | Drawn by: DGG/HGL | Revised:

RIVER PARK
DRAINAGE CONCEPT FOR TR 53425
EXISTING HYDROLOGY

LOCATED IN THE CITY OF SANTA CLARITA, COUNTY OF LOS ANGELES STATE OF CALIFORNIA

DEIR Map #36

PROJECT NO. TVAL0215.06
DATE: 11/20/03 REV.
SHEET 5 OF 5
PR0JZ-05

OWNER/DEVELOPER:
NEWHALL LAND
23823 WEST VALENCIA BOULEVARD
VALENCIA, CALIFORNIA 91355
TELEPHONE: (661) 255-4000
REPRESENTATIVES: GLENN ADAMICK & CORY HARPOLE

ENGINEER/PREPARER:
PSOMAS
3815 Mt. Diablo Blvd. Suite 300
Lafayette, CA 94549
(661) 259-6000 (661) 775-2769 (FAX)

DESIGNED:	MCH
DRAFTED:	J.H.
CHECKED:	MCH

MATTHEW G. HIDDEMAN R.C.E. NO. 56629 DATE
EXP. 12-31-04

LEGAL DESCRIPTION:
THAT PORTION OF RANCHO SAN FRANCISCO, IN THE COUNTY OF LOS ANGELES, STATE OF CALIFORNIA, AS SHOWN ON MAP RECORDED IN BOOK 1 PAGES 521 PAGES 522 OF PATENTS, IN THE OFFICE OF THE COUNTY RECORDER OF SAID COUNTY.

LEGEND

- FLOW PATH
- RATIONAL METHOD TC NODE
- MAIN LINE
- WATERSHED BOUNDARY
- SUB-AREA BOUNDARY
- PROJECT BOUNDARY
- EXISTING Q100 LIMIT
- CLEAR SUB-AREA FLOW
- BURNED SUB-AREA FLOW
- FLOW ARROW
- DEBRIS PRODUCTION RATE — 55 cy/ac.
- BULKING RATE — 1.36

SUMMARY TABLE

SUB-AREA	SUB-AREA AREA (ac)	TOTAL AREA (ac)	SUB-AREA Q50 BURNED (cfs)	SUB-AREA Q50 BURNED + BULKED (cfs)	SUB-AREA Q100 BURNED (cfs)	SUB-AREA Q100 BURNED + BULKED (cfs)	Tc DERIVATION
100A	2.3	6	9	23	9	13	127
101A	18.4	8	52	58	70	79	95
102A	18.4	5	65	72	49.2	103	120	98	163	2706
103A	1.7	12	7	15	25.0	46	52	21.7	46	62	71	1172
104A	2.3	6	9	23	11.6	25	27	9.2	32	36
105A	14.9	5	66	66	14.9	66	66	66
106A	17.5	10	41	47	17.5	41	47	64	64	962
200A	6.3	5	22	26	6.3	22	25	34	34	347
201A	9.6	10	23	26	350.7	509	617	39	840	10107
202A	14.9	9	60	68	24.1	60	68	92	91	7414
203A	26.1	11	56	67	241.4	348	423	91	275	6729
204A	45.1	10	106	120	215.1	353	422	213	274	6023
205A	12.0	10	89	101	170	342	395	136	457	4480
206A	16.8	16	91	104	170.1	269	309	141	420	3699
207A	17.3	9	93	106	84.1	182	209	144	284	2325
208A	24.8	8	66	80	101.3	193	225	109	306	3572
209A	28.0	12	81	92	71.2	137	159	125	216	3916
210A	13.2	9	84	96	33.2	83	94	128	128	1826
211A	20.5	12	44	50	20.5	44	50	68	68	1128
212A	14.8	11	33	38	14.8	33	38	52	52	814
213A	2.3	6	9	23	9	13	127
214A	14.9	5	66	66	14.9	66	66
215A	17.5	10	41	47	17.5	41	47	64	64	962
216A	6.3	5	22	26	6.3	22	25	34	34	347
217A	9.6	10	23	26	350.7	509	617	39	840	10107
218A	14.9	9	60	68	24.1	60	68	92	91	7414
219A	26.1	11	56	67	241.4	348	423	91	275	6729
220A	45.1	10	106	120	215.1	353	422	213	274	6023
221A	12.0	10	89	101	170	342	395	136	457	4480
222A	16.8	16	91	104	170.1	269	309	141	420	3699
223A	17.3	9	93	106	84.1	182	209	144	284	2325
224A	24.8	8	66	80	101.3	193	225	109	306	3572
225A	28.0	12	81	92	71.2	137	159	125	216	3916
226A	13.2	9	84	96	33.2	83	94	128	128	1826
227A	20.5	12	44	50	20.5	44	50	68	68	1128
228A	14.8	11	33	38	14.8	33	38	52	52	814
229A	2.3	6	9	23	9	13	127
230A	14.9	5	66	66	14.9	66	66
231A	17.5	10	41	47	17.5	41	47	64	64	962
232A	6.3	5	22	26	6.3	22	25	34	34	347
233A	9.6	10	23	26	350.7	509	617	39	840	10107
234A	14.9	9	60	68	24.1	60	68	92	91	7414
235A	26.1	11	56	67	241.4	348	423	91	275	6729
236A	45.1	10	106	120	215.1	353	422	213	274	6023
237A	12.0	10	89	101	170	342	395	136	457	4480
238A	16.8	16	91	104	170.1	269	309	141	420	3699
239A	17.3	9	93	106	84.1	182	209	144	284	2325
240A	24.8	8	66	80	101.3	193	225	109	306	3572
241A	28.0	12	81	92	71.2	137	159	125	216	3916
242A	13.2	9	84	96	33.2	83	94	128	128	1826
243A	20.5	12	44	50	20.5	44	50	68	68	1128
244A	14.8	11	33	38	14.8	33	38	52	52	814
245A	2.3	6	9	23	9	13	127
246A	14.9	5	66	66	14.9	66	66
247A	17.5	10	41	47	17.5	41	47	64	64	962
248A	6.3	5	22	26	6.3	22	25	34	34	347
249A	9.6	10	23	26	350.7	509	617	39	840	10107
250A	14.9	9	60	68	24.1	60	68	92	91	7414
251A	26.1	11	56	67	241.4	348	423	91	275	6729
252A	45.1	10	106	120	215.1	353	422	213	274	6023
253A	12.0	10	89	101	170	342	395	136	457	4480
254A	16.8	16	91	104	170.1	269	309	141	420	3699
255A	17.3	9	93	106	84.1	182	209	144	284	2325
256A	24.8	8	66	80	101.3	193	225	109	306	3572
257A	28.0	12	81	92	71.2	137	159	125	216	3916
258A	13.2	9	84	96	33.2	83	94	128	128	1826
259A	20.5	12	44	50	20.5	44	50	68	68	1128
260A	14.8	11	33	38	14.8	33	38	52	52	814
261A	2.3	6	9	23	9	13	127
262A	14.9	5	66	66	14.9	66	66
263A	17.5	10	41	47	17.5	41	47	64	64	962
264A	6.3	5	22	26	6.3	22	25	34	34	347
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266A	14.9	9	60	68	24.1	60	68	92	91	7414
267A	26.1	11	56	67	241.4	348	423	91	275	6729
268A	45.1	10	106	120	215.1	353	422	213	274	6023
269A	12.0	10	89	101	170	342	395	136	457	4480
270A	16.8	16	91	104	170.1	269	309	141	420	3699
271A	17.3	9	93	106	84.1	182	209	144	284	2325
272A	24.8	8	66	80	101.3	193	225	109	306	3572
273A	28.0	12	81	92	71.2	137	159	125	216	3916
274A	13.2	9	84	96	33.2	83	94	128	128	1826
275A	20.5	12	44	50	20.5	44	50	68	68	1128
276A	14.8	11	33	38	14.8	33	38	52	52	814
277A	2.3	6	9	23	9	13	127
278A	14.9	5	66	66	14.9	66	66
279A	17.5	10	41	47	17.5	41	47	64	64	962
280A	6.3	5	22	26	6.3	22	25	34	34	347
281A	9.6	10	23	26	350.7	509	617	39	840	10107
282A	14.9	9	60	68	24.1	60	68	92	91	7414
283A	26.1	11	56	67	241.4	348	423	91	275	6729
284A	45.1	10	106	120	215.1	353	422	213	274	6023
285A	12.0	10	89	101	170	342	395	136	457	4480
286A	16.8	16	91	104	170.1	269	309	141	420	3699
287A	17.3	9	93	106	84.1	182	209	144	284	2325
288A	24.8	8	66	80	101.3	193	225	109	306	3572
289A	28.0	12	81	92	71.2	137	159	125	216	3916
290A	13.2	9	84	96	33.2	83	94	128	128	1826
291A	20.5	12	44	50	20.5	44	50	68	68	1128
292A	14.8	11	33	38	14.8	33	38	52	52	814
293A	2.3	6	9	23	9	13	127
294A	14.9	5	66	66	14.9	66	66
295A	17.5	10	41	47	17.5	41	47	64	64	962
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298A	14.9	9	60	68	24.1	60	68	92	91	7414
299A	26.1	11	56	67	241.4	348	423	91	275	6729
300A	45.1	10	106	120	215.1	353	422	213	274	6023
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302A	16.8	16	91	104	170.1	269	309	141	420	3699
303A	17.3	9	93	106	84.1	182	209	144	284	2325
304A	24.8	8	66	80	101.3	193	225	109	306	3572
305A	28.0	12	81	92	71.2	137	159	125	216	3916
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308A	14.8	11	33	38	14.8	33	38	52	52	814
309A	2.3	6	9	23	9	13	127
310A	14.9	5	66	66	14.9	66	66
311A	17.5	10	41	47	17.5	41	47	64	64	962
312A	6.3	5	22	26	6.3	22	25	34	34	347
313A	9.6	10	23	26	350.7	509	617	39	840	10107
314A	14.9	9	60	68	24.1	60	68	92	91	7414
315A	26.1	11	56	67	241.4	348	423	91	275	6729
316A	45.1	10	106	120	215.1	353	422	213	274	6023
317A	12.0	10	89	101	170	342	395	136	457	4480
318A	16.8	16	91	104	170.1	269	309	141	420	3699
319A	17.3	9	93	106	84.1	182	209	144	284	2325
320A	24.8	8	66	80	101.3	193	225	109	306	3572
321A	28.0	12	81	92	71.2	137	159	125	216	3916
322A	13.2	9	84	96	33.2	83	94	128	128	1826
323A	20.5	12	44	50	20.5	44	50	68	68	1128
324A	14.8	11	33	38	14.8	33	38	52	52	814
325A	2.3	6	9	23	9	13	127
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327A	17.5	10	41	47	17.5	41	47	64	64	962
328A	6.3	5	22	26	6.3	22	25	34	34	347
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330A	14.9	9	60	68	24.1	60	68	92	91	7414
331A	26.1	11	56	67	241.4	348	423	91	275	6729
332A	45.1	10	106	120	215.1	353	422	213	274	6023
333A	12.0	10	89	101	170	342	395	136	457	4480
334A	16.8	16	91	104	170.1	269	309	141	420	3699
335A	17.3	9	93	106	84.1	182	209	144	284	2325
336A	24.8	8	66	80	101.3	193	225	109	306	3572
337A	28.0	12	81	92	71.2	137	159	125	216	3916
338A	13.2	9	84	96	33.2	83	94	128	128	1826
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341A	2.3	6	9	23	9	13	127
342A	14.9	5	66	66	14.9	66	66
343A	17.5	10	41	47	17.5	41	47	64	64	962
344A	6.3	5	22	26	6.3	22	25	34	34	347
345A	9.6	10	23	26	350.7	509	617	39	840	10107
346A	14.9	9	60	68	24.1	60	68	92	91	7414
347A	26.1	11	56	67	241.4	348	423	91	275	6729
348A	45.1	10	106	120	215.1	353	422	213	274	6023
349A	12.0	10	89	101	170	342	395	136	457	4480
350A	16.8	16	91	104	170.1	269	309	141	420	3699
351A	17.3	9	93	106	84.1	182	209	144	284	2325
352A	24.8	8	66	80	101.3	193	225	109	306	3572
353A	28.0	12	81	92	71.2	137	159	125	216	3916
354A	13.2	9	84	96	33.2	83	94	128	128	1826
355A	20.5	12	44	50	20.5	44	50	68	68	1128
356A	14.8	11	33	38	14.8	33	38	52	52	814
357A	2.3	6	9	23	9	13	127
358A	14.9	5	66	66	14.9	66	66
359A	17.5	10	41	47	17.5	41	47	64	64	962
360A	6.3	5	22	26	6.3	22	25	34	34	347
361A	9.6	10	23	26	350.7	509	617	39	840	10107
362A	14.9	9	60	68	24.1	60	68	92	91	7414
363A	26.1	11	56	67	241.4	348	423	91	275	6729
364A	45.1	10	106	120	215.1	353	422	213	274	6023
365A	12.0	10	89	101	170	342	395	136	457	4480
366A	16.8	16	91	104	170.1	269	309	141	420	3699
367A	17.3	9	93	106	84.1	182	209	144	284	2325
368A	24.8	8	66	80	101.3	193	225	109	306	3572
369A	28.0	12	81	92	71.2	137	159	125	216	3916
370A	13.2	9	84	96	33.2	83	94	128	128	1826
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497A	28.0	12	81	92	71.2	137	159	125	216	3916
498A	13.2	9	84	96	33.2	83	94	128	128	1826
499A	20.5	12	44	50	20.5	44	50	68	68	1128
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Letter No. 47

Ken Pulskamp
Planning Commission
Council

RECEIVED
PLANNING DIVISION
JAN 20 2005
PLANNING & ECONOMIC DEVELOPMENT
CITY OF SANTA CLARITA

RECEIVED
JAN 18 2005
CITY COUNCIL
CITY OF SANTA CLARITA

24201 Colwyn Ave.
Newhall, CA 91321
January 13, 2005

City Council
Santa Clarita City Hall
23920 Valencia Blvd.
Santa Clarita, CA 91355

Re: Proposed Riverpark Development

Dear Council Members:

Please do not approve the above project. (1) The river must be given its flood plain. Certainly, the situation at the moment should make that clear. (2) We must do what we can to save our water supply, (3) do what we can to stop the burden of excessive traffic and keep our air (the most polluted in L8s Angeles County) from becoming any dirtier and unsafe to breathe. (4)

The citizens of this city are depending on you to represent all of us as well as future generations when you make this decision.

Yours truly,

Adrian and Jane Adams

Adrian and Jane Adams

Letter No. 48

cc: Planning
Ken Pulskamp

Friends of the Santa Clara River

660 Randy Drive, Newbury Park, California 91320-3036 • (805) 498-4323

January 19, 2005

Santa Clarita City Council
City of Santa Clarita
23920 Valencia Boulevard
Santa Clarita, CA 91355-2196

JAN 24 2005
CITY COUNCIL
CITY OF SANTA CLARITA

Re: Riverpark Project

Dear City Council Members,

Friends of the Santa Clara River offers the following comments on the Riverpark Project.

Once again, those of us who have attempted over the years to care for the Santa Clara River are confronted with a large development project which cannot avoid having significant and degrading impacts on the River ecosystem. 1

The unprecedented growth in the Santa Clara watershed over the last few decades has caused an array of cumulative impacts to flora and fauna, not to mention air quality, water quality, aesthetics, traffic and nearly every other category addressed by the California Environmental Quality Act. Continued encroachment by development into the River floodplain and terrace lands has resulted in habitat loss and fragmentation which have been cited by many experts as the major causes for the decline of species and loss of biological diversity (Noss, 1987; Beier and Loe, 1992; Beier et al, 2002; Forman et al, 2003). Further, the continued filling and channelization of the River has altered and is altering the hydrology of the watershed, increasing storm runoff and decreasing water quality (the River is now impaired for ammonia, chloride, coliform, nitrate/nitrite and organic enrichment). These cumulative impacts were not adequately addressed in the subject EIR nor in other EIRs for projects in the Santa Clara watershed. Continuing failure to address and to act on these impacts will, we believe, turn a large section of the River, in and around Santa Clarita, into a biological "dead zone". 2 3 4 5 6 7 8

The Santa Clara River is the largest and one of the last undammed and relatively natural riverine systems remaining in southern California. Considering the southern California region as a whole, the U. S. Fish and Wildlife Service (Faber et al, 1989) has estimated that 95 to 97 percent of riparian communities have been eliminated due to human influences. Damage occurs primarily because (1) the river is channelized by 9 10

Board of Directors

Ron Bottorff
Chair
Barbara Wampole
Vice-Chair
Ginnie Bottorff
Secretary

Affiliated Organizations

California Native Plant Society
L.A./Santa Monica Mountains Chapter

Santa Clarita Organization for Planning the Environment (SCOPE)

Sierra Club
Angeles Chapter
Los Padres Chapter

Surfrider Foundation

Audubon Society
Ventura Chapter

Ventura County Environmental Coalition

Wishtoyo Foundation

10

hardening its banks; (2) riparian and terrace habitats have been lost and fragmented; (3) urban edge effects, including illegal ORV use, degrade riparian biological values; (4) adequate buffer zones protecting the riparian corridor have not been provided; and (5) the function of the river terrace area as wildlife habitat or wildlife corridor is eliminated.

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We cite two scientific studies in support of our statement that urban development degrades adjacent biological resources. The first (Kelly et al, 1993) is a paper by two University of California Riverside scientists entitled "Buffer Zones for Ecological Reserves in California: Replacing Guesswork with Science". This paper shows that even nature reserves over a mile in width suffer urban edge effects at their centers - and of course the Santa Clara River riparian corridor is much narrower than these reserves and even more susceptible to such effects. The second (Rottenborn, 1999) is a paper by a Stanford University scientist entitled "Predicting the impacts of urbanization on riparian bird communities". This paper shows impacts to bird communities out to a distance of 500 meters, or over 1500 feet, from the urban edge.

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More studies are definitely needed on the impacts of development on riparian ecosystems. For the Santa Clarita area, development is occurring on 20 miles of the River and tributaries. This is an experiment on a large scale, with the fate of the River ecosystem in the balance. Creating larger buffer zones to conserve more of the riparian community is a must. To quote from the closing sentence in the Stanford paper: "The single most important step that can be taken to conserve riparian communities in the face of urbanization is to minimize development in and along floodplains by maintaining broad buffers of undeveloped land between developed areas and riparian habitats."

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The Riverpark project will have impacts bringing into play the City's General Plan policies on Significant Ecological Areas. Policy 5.3 under Goal 5 states "New development must be sensitive to the Significant Ecological Areas through utilization of creative planning techniques to avoid and minimize disturbance of these and other sensitive areas." **Only by creating an adequate buffer zone around Riverpark can this policy be effectively implemented.** We suggest that among the most creative planning techniques which could and should be used here is the development and adoption of a Floodplain/Terrace Avoidance Alternative for Riverpark. The EIR Alternative 2 is a step in that direction but considers only the Q50 floodplain instead of the floodplain and terrace areas which are steadily becoming rarer in the River corridor and which provide high quality habitat for such species as the spadefoot toad and arroyo toad.

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Besides larger buffer areas, establishing the east terminus of the River trail

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at Santa Clarita Parkway would greatly help in protecting riparian resources. Continuing the trail beyond the Parkway will negatively impact the eastern portion of the project area which has significant biological value. These impacts are related to increased disturbance by humans, off-highway vehicles and domestic animals. 21 22

Thank you for considering these comments.

Sincerely,

Ron Bottorff

Ron Bottorff, Chair

References:

Beier, P. and S. Loe, *A checklist for evaluating impacts to wildlife movement corridors,* Wildlife Society Bulletin 20:434-440, 1992.

Faber et al, *The Ecology of Riparian Habitats of the Southern California Coastal Region*: *A Community Profile*, U.S, Department of Interior Biological Report 85(7-27), September 1989.

Forman. R.T.T. *Land Mosaics: The Ecology of Landscapes and Regions*, Cambridge University Press, 1995.

Kelly, Patrick J. and John T. Rotenberry, *Buffer Zones for Ecological Reserves in California: Replacing Guesswork with Science*, in *Interface Between Ecology and Land Development in California*, Southern California Academy of Sciences, 1993.

Noss, R. F., *Protecting natural areas in fragmented landscapes,* Natural Areas Journal 7:2-13, 1987.

Rottenborn, S.C. *Predicting the impacts of urbanization on riparian bird communities*, Biological Conservation 88 (1999).

Letter No. 49

City of Santa Clarita - Request to Register Written Comments

Please complete the following information to register your written comments to the City Council, in lieu of speaking orally. Your comments will be considered part of the official proceedings. **(Please print)**

Meeting date: JANUARY 25, 2005 Agenda item number: 11

Agenda Title or Subject to be addressed: RIVERPARK PROJECT

Please check one: ☐ Support Recommendation ☑ Oppose Recommendation ☐ Neutral

Written Comment (Use other side if necessary):

I oppose development of flood plain as described for esthetics & environmental protect, but mostly (Cover) 1

Name: Mary Indermill

Street Address: 26340 IVIZEA PL City: VALENCIA

Council requires that persons registering written comments who represent other individuals, groups or organizations disclose that relationship.

I declare that the foregoing is true and correct.

Representing: _____ Signature: _____

because the flood plain is vulnerable to floods.

The City of Santa Clarita and its councilmembers could be liable for property loss and loss of life.

1

2

Letter No. 50

City of Santa Clarita - Request to Register Written Comments

Please complete the following information to register your written comments to the City Council, in lieu of speaking orally. Your comments will be considered part of the official proceedings. **(Please print)**

Meeting date: JAN 25, 2005 Agenda item number: #11

Agenda Title or Subject to be addressed: RIVERPARK PROJECT

Please check one: ☐ Support Recommendation ☑ Oppose Recommendation ☐ Neutral

Written Comment (Use other side if necessary): MINE IS A CONCERN OF OUR QUALITY OF LIFE-ADDI ANOTHER HOUSING DEVELOPMENT (WHEN OVERCROWDING AND TRAFFIC AND POLLUTION IS BECOMING A PROBLEM) IS VERY SHORT-SIGHTED. THE LONG TERM DETRIMENTAL EFFECTS →

1

Name: MARC FLORES

Street Address: 22315 ESPUELLA DR. City: SAUGUS / SCV 91350

Council requires that persons registering written comments who represent other individuals, groups or organizations disclose that relationship.

I declare that the foregoing is true and correct.

Representing: MYSELF Signature:

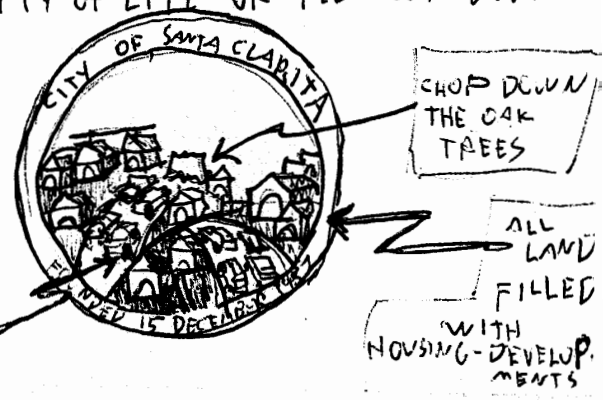
OF RIVERPARK ON OUR QUALITY OF LIFE OUTWEIGH THE QUICK, SHORT-TERM INFLUX OF REVENUE FR. THE DEVELOPERS. SCV HAS ENOUGH PROBLEMS WITH ITS CURRENT POPULATION DENSITY. INCREASING THAT POP. DENSITY BEFORE THE CITY HAS ACHIEVED SOME EQUILIBRIUM WILL JUST COMPLICATE AND INCREASE ITS PROBLEMS

1

2

- IF THE RESIDENTS WERE ALLOWED TO VOTE ON RIVERPARK, ALL THE NOTES AND SPEAKERS THAT SPEAK AGAINST RIVERPARK SHOULD TELL YOU THAT THE DEVELOPMENT IS UNWANTED AND THE PEOPLE WOULD VOTE AGAINST RIVERPARK.
- DO WE WANT TO PRESERVE OUR QUALITY OF LIFE OR FILL OUT EVERY OPEN SPACE WITH DEVELOPMENT?
- IF THIS HAPPENS, IT CHANGES WHAT SCV IS AND WHY IT IS "A GREAT PLACE TO LIFE", SO FAR...
- SHOULD WE REDESIGN THE CITY LOGO TO FIT WHAT IT'S BECOMING?

3



Letter No. 51

City of Santa Clarita - Request to Register Written Comments

Please complete the following information to register your written comments to the City Council, in lieu of speaking orally. Your comments will be considered part of the official proceedings. **(Please print)**

Meeting date: 1/25/05 Agenda item number: #11

Agenda Title or Subject to be addressed: RIVERPARK

Please check one: ☐ Support Recommendation ☑ Oppose Recommendation ☐ Neutral

Written Comment (Use other side if necessary): RIVERPARK HAS THE potential TO be another La CONCHITA. This Newspaper article says it all. This is sprawl in UNSAFE locations (See newspaper article)

1

Name: John Gonzalez

Street Address: 26604 Gavilan Dr City: Saugus 91350

Council requires that persons registering written comments who represent other individuals, groups or organizations disclose that relationship.

I declare that the foregoing is true and correct.

Representing: SCOPE – SAVE SCV Signature: John Gonzalez

BAFFLING BABY DEATHS U

Not-so-sweet RETURNS
MONEY & CAREERS

Published in the
Santa Clarita Valley
at 24800 Avenue Rockefeller, Valencia

Daily News
santaclarita.dailynews.com

SANTA CLARI

EDITION

2005, Los Angeles Daily News

MONDAY, JANUARY 24, 2005

Experts: Go with t

Development near rivers a risky v

By Susan Abram
Staff Writer

SANTA CLARITA — The storm water earlier this month that gathered and gushed through the Santa Clara River created new channels, destroyed riparian habitat and clogged up systems with debris that caused street flooding.

The scene offered a glimpse of how controlling a natural river through development and man-made concrete channels could lead to more destruction, biologists and geologists say.

"The answer to living near rivers is to not live near the rivers," said Frank Hovore, a local independent biologist. "It's when we put bridges across and narrow the span of a river, when we build a house on the edge or in the flood plain ... We choose to live in the path of potential tragedy and then blame nature or an agency. Think about how much the tragedy of these rains could have been prevented."

More than 20 housing developments have been built, proposed or planned along the Santa Clara River, according to a map created by the nonprofit Northern California-based group South Coast Wildlands. The group's mission is to help communities restore waterways to help save riparian areas and wildlife corridors, said the group's executive director, Kristeen Penrod, who constructed the map.

Nature watcher
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River, water does
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During the rains
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Musicians jamming for tsunami relief

By Carol Rock

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SUPER BO TEAMS SET

SPORTS MONDAY

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WEATHER

Partly cloudy
Highs: 67-72
Lows: 44-49
Air quality: Moderate

For details, see back of Money & Careers

DESIGNATED AREAS HIGHER 50¢

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or heavily damaged, including one double-wide in Sand Canyon that fell into the raging Santa Clara River. Three neighboring homes also were threatened.

"I haven't seen the river in a couple of weeks, but certainly new channels have been cut and some of the riparian habitat has been washed out," said Dwayne Maxwell, senior biologist for the state's Department of Fish and Game. "We've gotten reports from several wildlife protection folks that say some of the

Please see **RIVER** / Page 4

Cities jointly pitch charms

By Eugene Tong

million from its hotel-occupancy tax and city officials hope for more this year. Marketing alliances of neighboring cities — Oxnard is roughly an hour west [illegible] useful in encouraging more and longer visits to both communities, Flippen said.

"By coming together, there's so much more to do," she said. [illegible] might spend a night."

The campaign's $70,000 budget is shared by the Santa Clarita Valley Tourism Bureau, the Oxnard Convention and [illegible] where 2 million of the house holds have annual incomes o more than $100,000 each.

Eugene Tong, (661) 257-5253
eugene.tong@dailynews.com

River poses threat

RIVER / From Page 1

aquatic species, such as the turtles that normally resided in tributaries, have been found on the beach."

Maxwell said he is uncertain about the extent of how development in the Santa Clarita Valley has affected the river.

Hovore said runoff and debris from the highways, rooftops and hillside homes caused the waters to produce a scouring affect along the sides of the river, destroying native plants.

But others see the future clearly, saying that officials are allowing people to build on five- and 10-year flood plains, said Amalie J. Orme, professor of geography at California State University, Northridge.

"I saw a lot of those housing areas (in Santa Clarita) underwater in 1978 and eventually it will come back to haunt you," she said. "We have to be more diligent in terms of where we permit development. I'm referring to Santa Clarita and to hillside development."

The Los Angeles Regional Water Quality Control Board has been concerned about planning and developing near riverbanks for more than a year.

On Thursday, the board will vote on a resolution to encourage planning agencies and developers to consider the potential impact on water quality early in the development planning process.

"The regional board strongly discourages direct hydromodification of water courses except in limited circumstances where avoidances or other natural alternatives are not feasible ..." according to the resolution.

"This resolution is an attempt by staff and our board to raise the bar in the development and planning community to say we are really serious," said Jonathan Bishop, executive officer for the water quality control board.

"We are going to be looking to start a process to strengthen our regulations. We've been working on this for a year. The impetus is a concern that as we continue our development in more pristine areas as a result of housing pressure, we are building on the last few natural streams. We don't want to get to the point where we have more Los Angeles Rivers."

Meanwhile, biologists and others say a lesson should be learned as a result of the storms and the subsequent flooding of roads.

"In historical times, this river could go where it wanted to go, but now we want to make it go through a straight line," biologist Hovore said. "Water is not something we should try to channelize and get rid of. It's such a lesson here. Don't develop along the banks of the rivers."

Staff Writer Kerry Cavanaugh contributed to this story.

Susan Abram, (661) 257-5255
susan.abram@dailynews.com

SENIOR CALENDAR

The following events will take place this week at the Santa Clarita Valley Senior Center, 22900 Market St., Newhall. For information, call (661) 259-9444.

MONDAY

Aerobics class, 8:30-9:30 a.m. in the dining room.

Bridge will be played, 9 a.m. in Room A1.

Chair exercise class, 9:45-10:15 a.m. in the dining room.

Senior citizen lunches will be served, 11:30 a.m. in the dining room. Cost: $2.

Computer training for the visually impaired will be offered, 11:30 a.m.-2 p.m. in Room A3.

Canasta will be played, 1-4 p.m. in Room A2.

Country-western line dancing will be taught, 2-3 p.m. Cost: $3.

Oil painting class, 6:30-9:30 p.m. in Room A3.

TUESDAY

T'ai chi ch'uan class, 8:30-9:30 a.m. and 3-4 p.m. in the dining room.

Bridge will be played, 9 a.m. Room A1.

Country-western line dancin will be taught, 9:30-10:30 a.n Cost: $3.

Creative-writing class, opent all ages, 1-2:30 p.m. Cost: $4 pe class.

Santa Clarita Senior Hams wi meet, 1-2 p.m. in Room A2.

Tap dancing will be taught, 2-3 p.m. in the dining room.

Watercolor class, 6:30-9:3(p.m. in Room A3.

Duplicate bridge will be played, 6:45-10 p.m. Call Kathy at (661) 253-1105 or Rand at (661) 295-4644.

Sierra Hillbillies Square Dance Club will offer an intermediate class, 7-9 p.m. in Rooms A1 and 2. Call (661) 252-2210 or (661) 255-0463.

WEDNESDAY

Aerobics class, 8:30-9:30 a.m. in the dining room.

Three-D origami class, 9-11 a.m. in Room A3.

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Letter No. 52

City of Santa Clarita - Request to Register Written Comments

Please complete the following information to register your written comments to the City Council, in lieu of speaking orally. Your comments will be considered part of the official proceedings. **(Please print)**

Meeting date: Jan 25, 2005 Agenda item number: 11

Agenda Title or Subject to be addressed: Riverpark

Please check one: ☐ Support Recommendation ☑ Oppose Recommendation ☐ Neutral

Written Comment (Use other side if necessary):

Who assumes liability for flood insurance
in a flood plain. The Builder or City - also schools. 1

Name: Joseph Robidoux

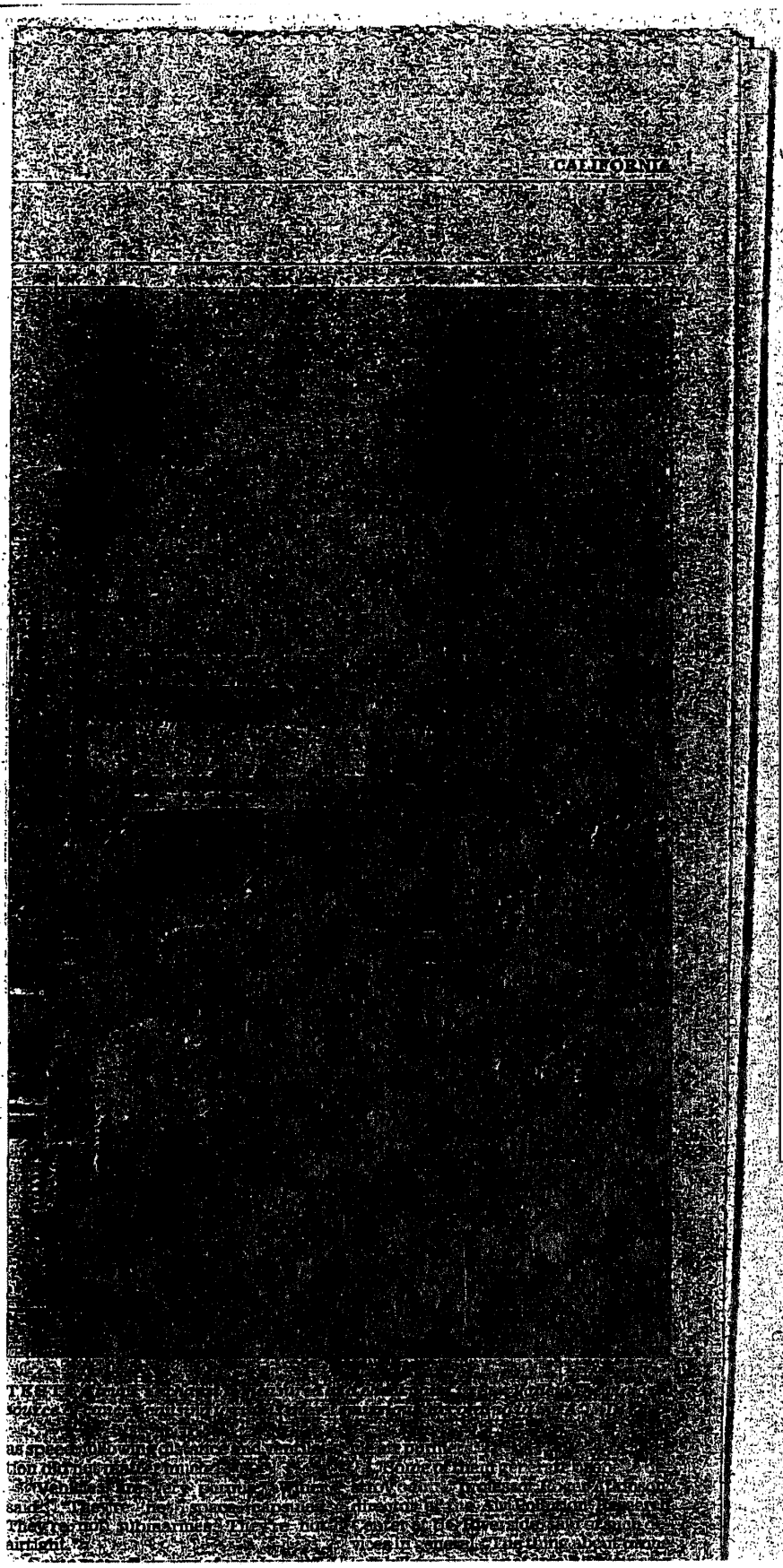
Street Address: 22552 Paraguay Dr City: Saugus

Council requires that persons registering written comments who represent other individuals, groups or organizations disclose that relationship.

I declare that the foregoing is true and correct.

Representing: Self Signature: Joseph K Robidoux

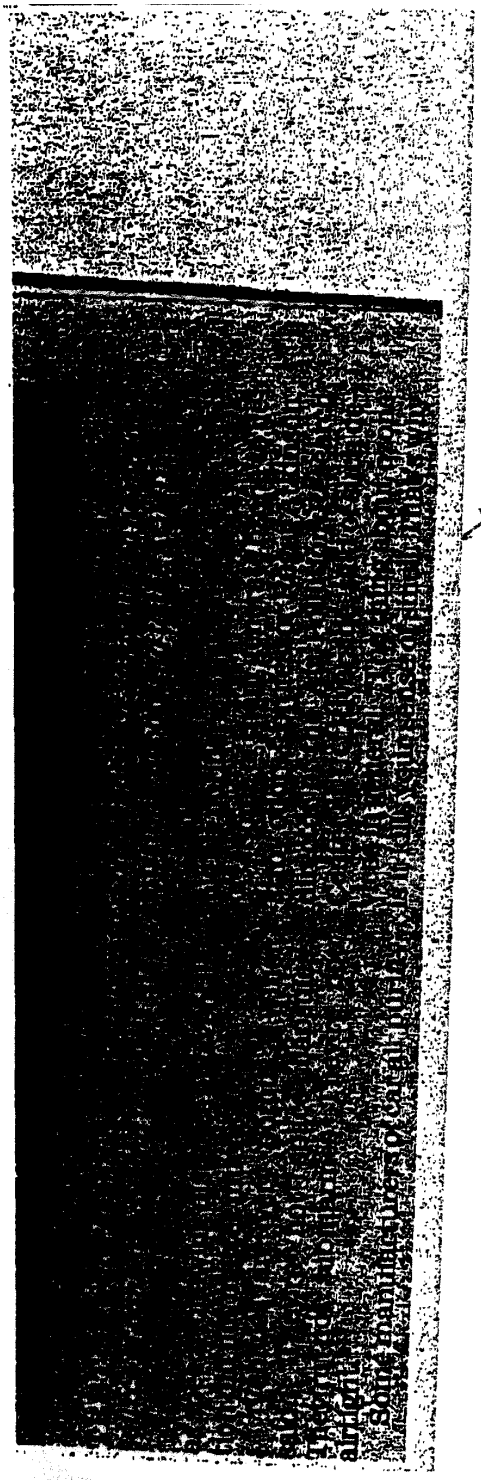
Letter No. 53



RECEIVED AND MADE A PART OF THE RECORD AT 11/25/ MEETING
ITEM NO. 11
FROM: JOHN STEFFEN

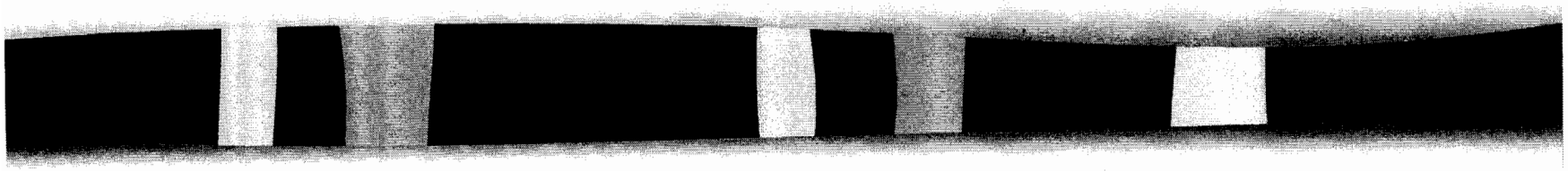
NOTE: THE COMMENTER SUBMITTED COMMENTS ON RED PAPER WHICH DOES NOT COPY WELL AND THE COPY IS CONSEQUENTLY ILLEGIBLE. HOWEVER, TAKING FROM THE ORIGINAL SUBMITTAL THE VERBIAGE ON THE SUBMITTAL READS AS FOLLOWS:

Truck exhaust is measured at a checkpoint in Sun Valley. The major source of cancer causing toxins is diesel emissions according to the AQMD.



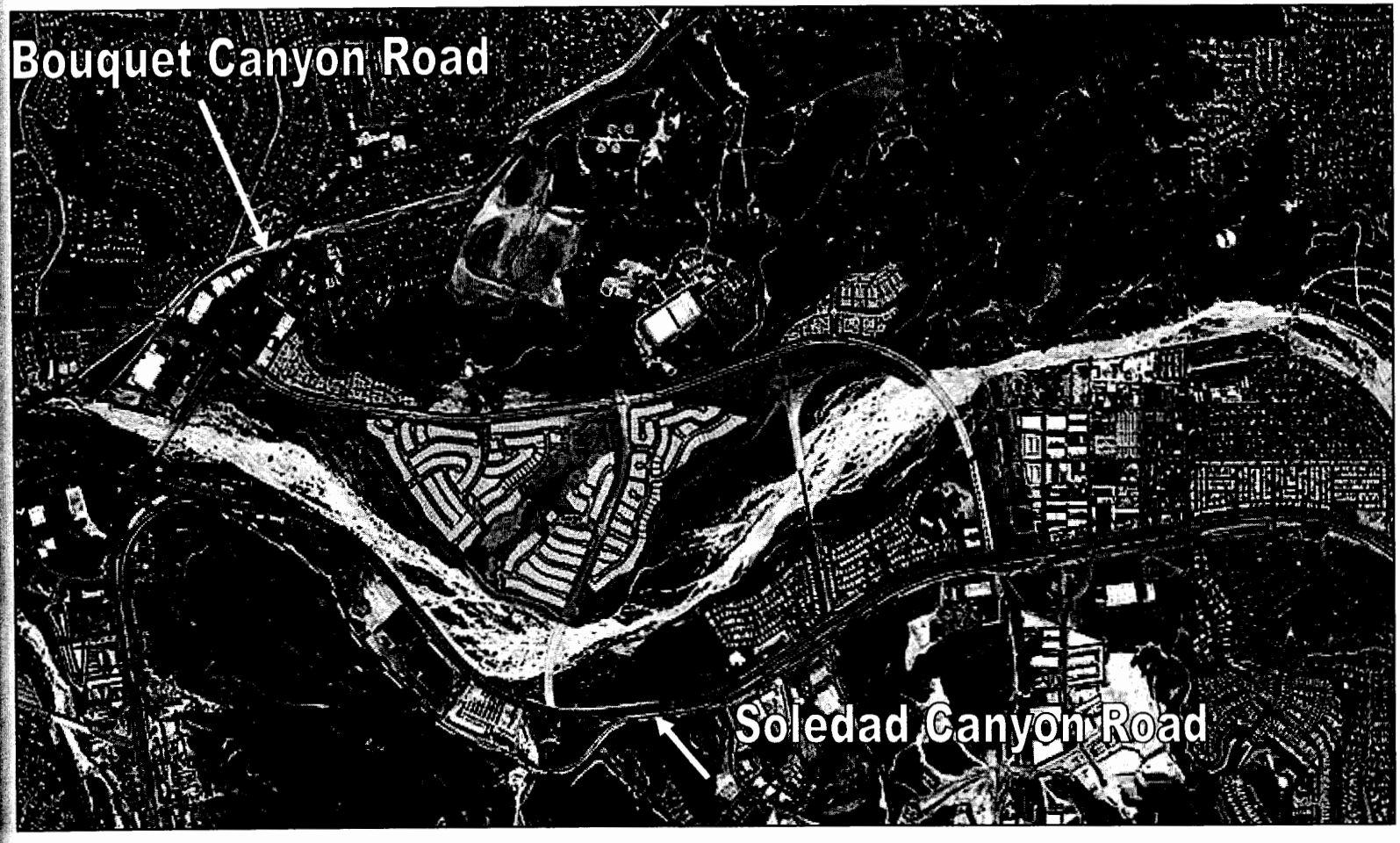
TO Susan
febo
2pages

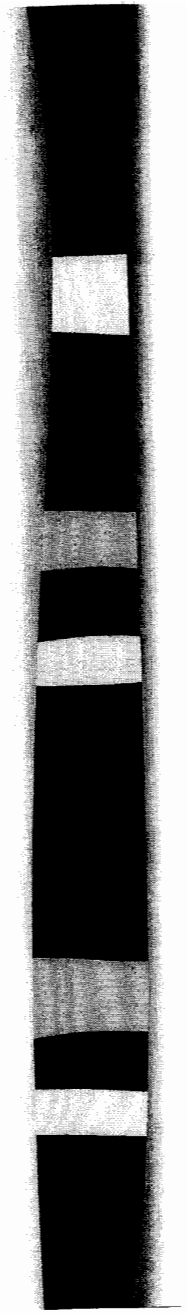
Riverpark
EIR Project



City Council
January 25, 2005

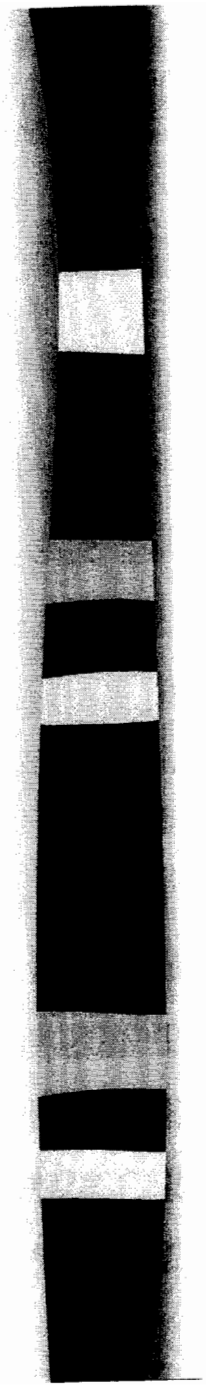
VICINITY MAP





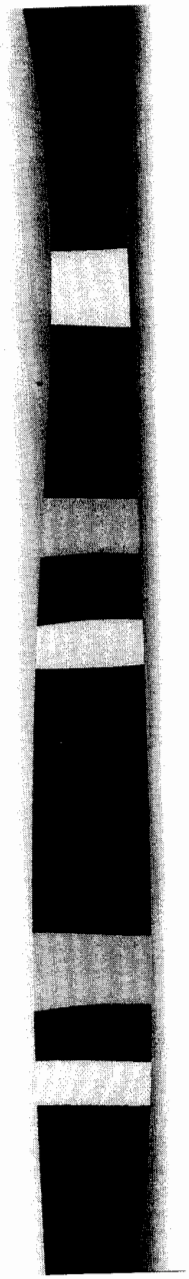
RIVERPARK EIR PROJECT

- **Purpose of tonight's meeting**
  - **Introduction of project**
  - **Open the public hearing**
  - **Provide direction to staff on project related issues**



PROJECT BACKGROUND

- **Riverpark Project**
  - **Application**
    - **Submitted on May 10, 2002**
    - **Requested approval of entitlements on a 695.4 acre site**
      - **General Plan Amendment, Zone Change, Vesting Tentative Tract Map, Conditional Use Permit, Hillside Review Permit, Oak Tree Permit, Adjustment, and an EIR**
    - **Staff processed the project that included several development review committee meetings and 11 Planning Commission meetings that went from February 2004 to December 2004**

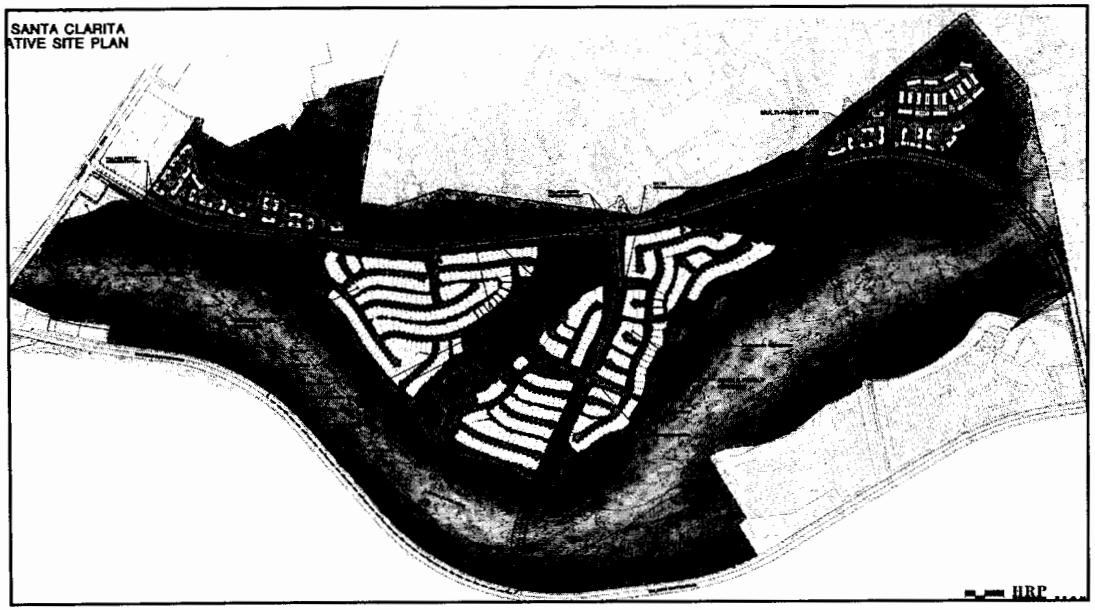


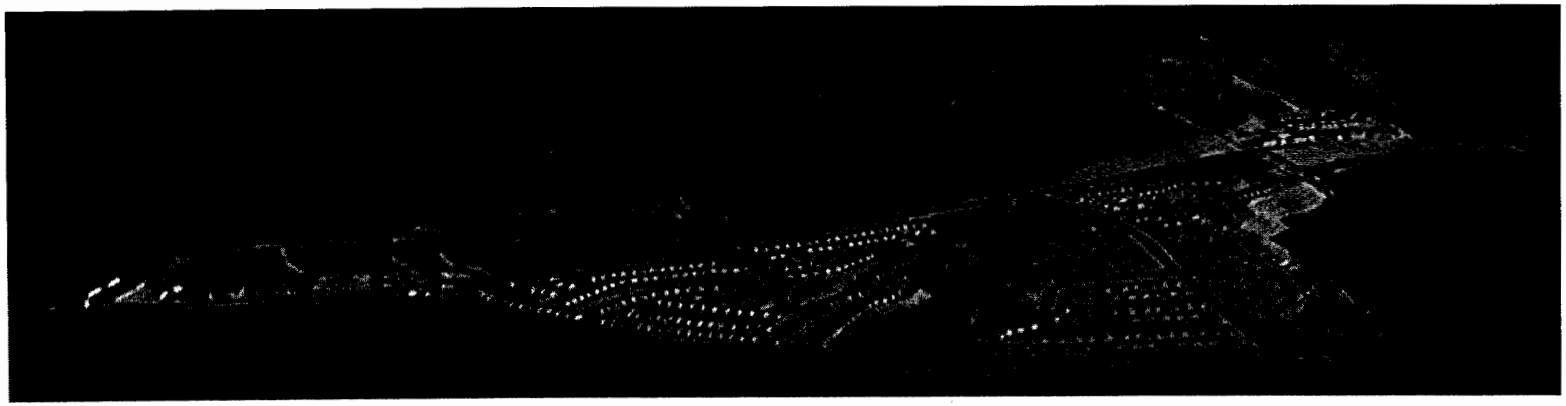
CURRENT PROJECT DESCRIPTION

- **Current Project Summary**
  - **Substantial revisions have been made as a result of comments made from the following:**
    - **Public Agencies**
    - **Members of the public**
    - **Planning Commissioners**

Current Project Summary Cont.

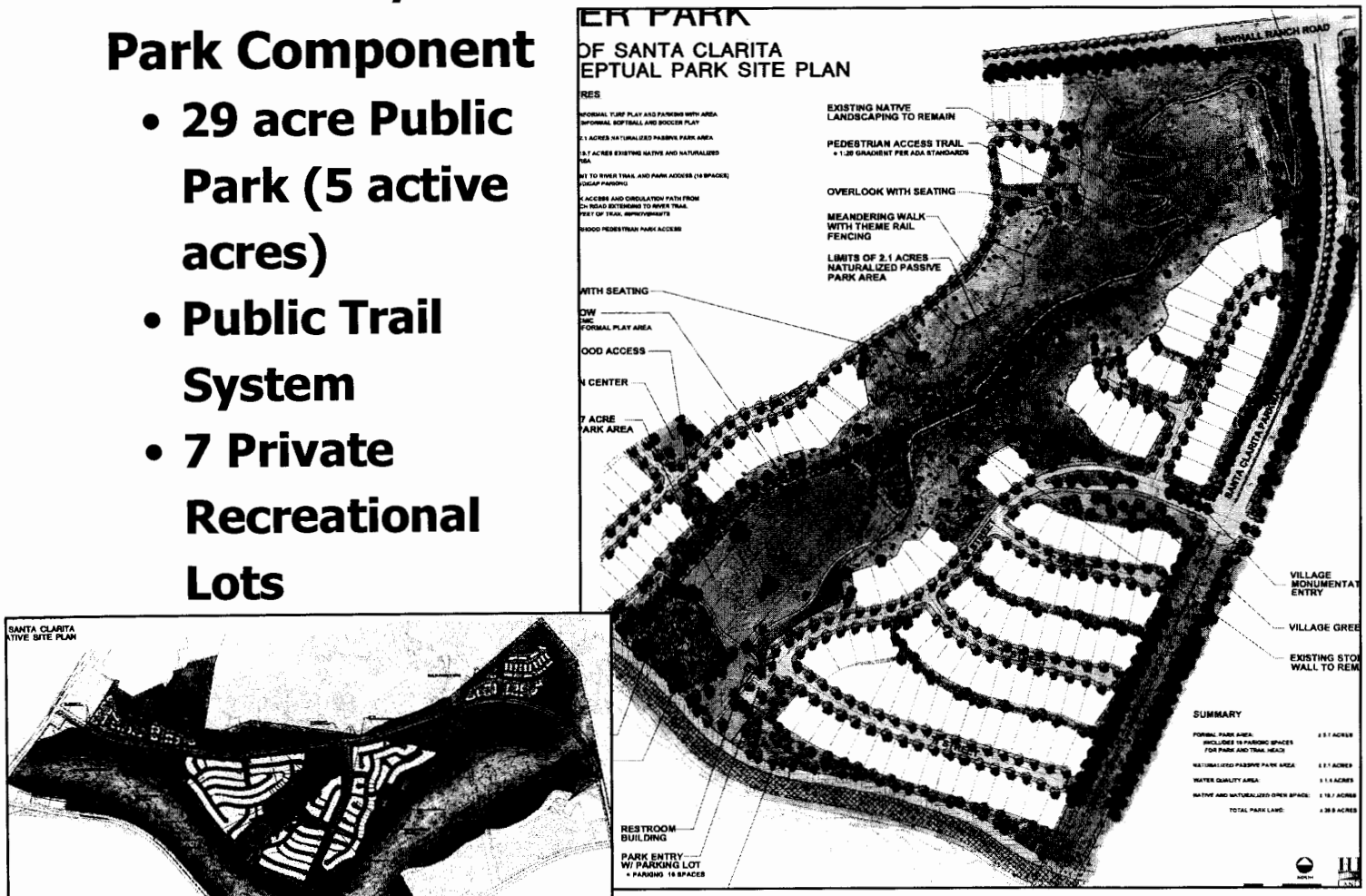
- Residential/Commercial Component
  - 1,123 dwelling units/16,000 sq. ft.

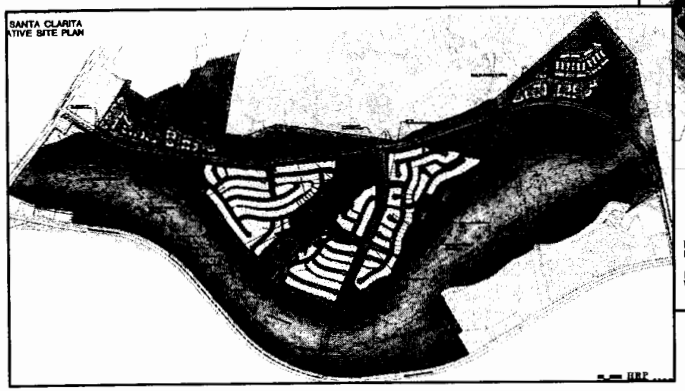




Current Project Summary

- Recreation/ Park Component
  - 29 acre Public Park (5 active acres)
  - Public Trail System
  - 7 Private Recreational Lots

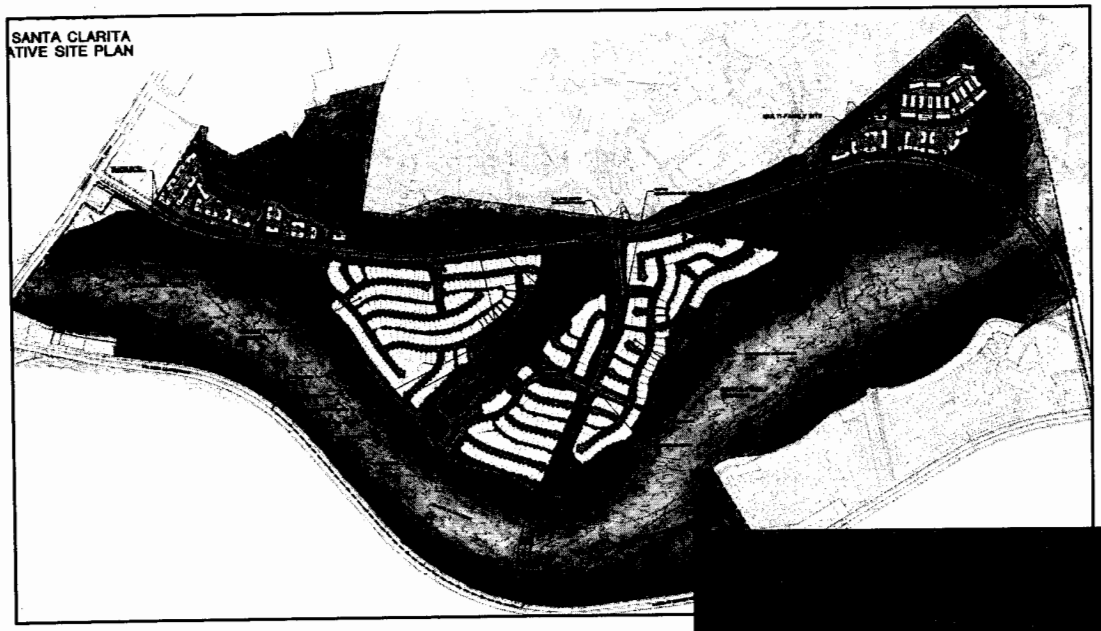


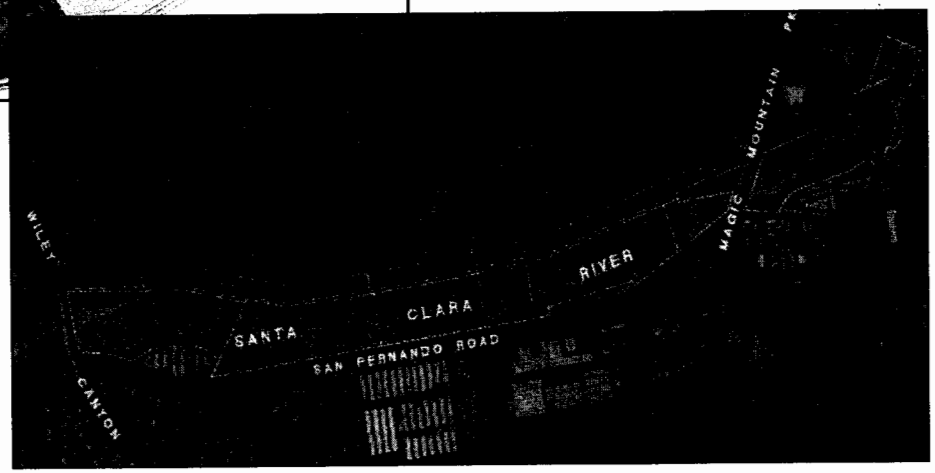


■ Current Project Summary Cont.

– Dedicated Open Space Component

• 350 acres (on-site)/130 acres (off-site)

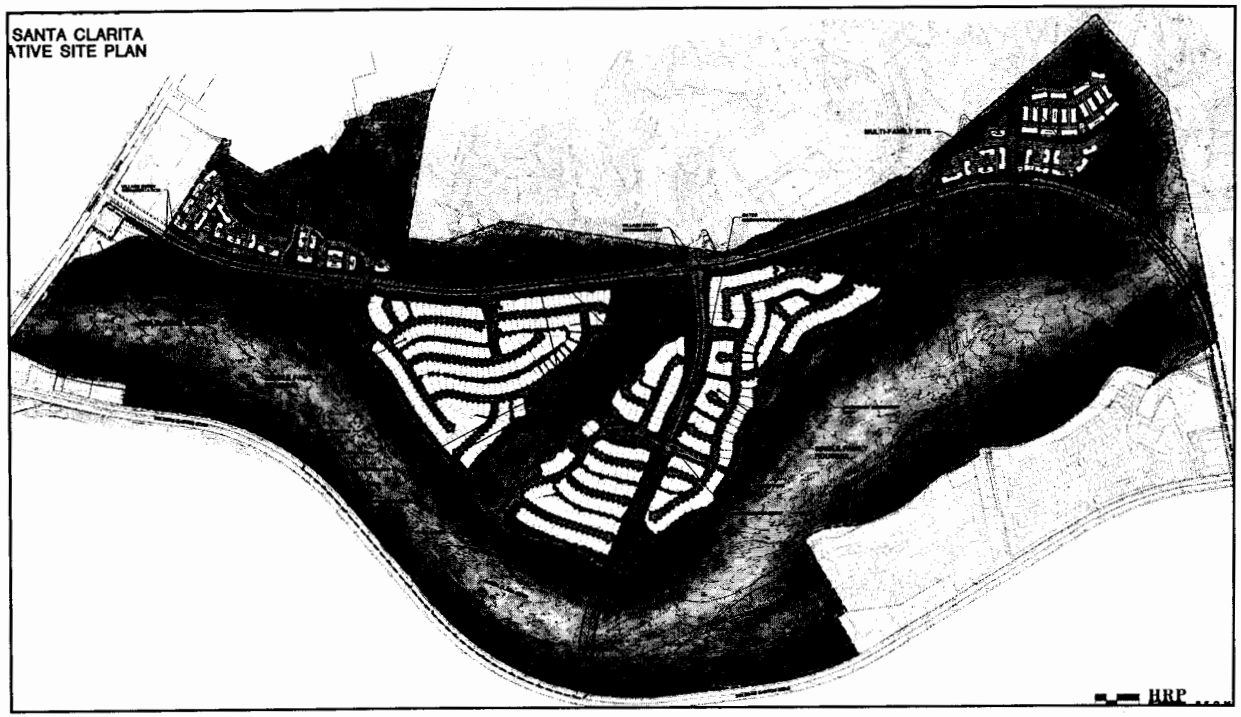




■ Current Project Summary Cont.

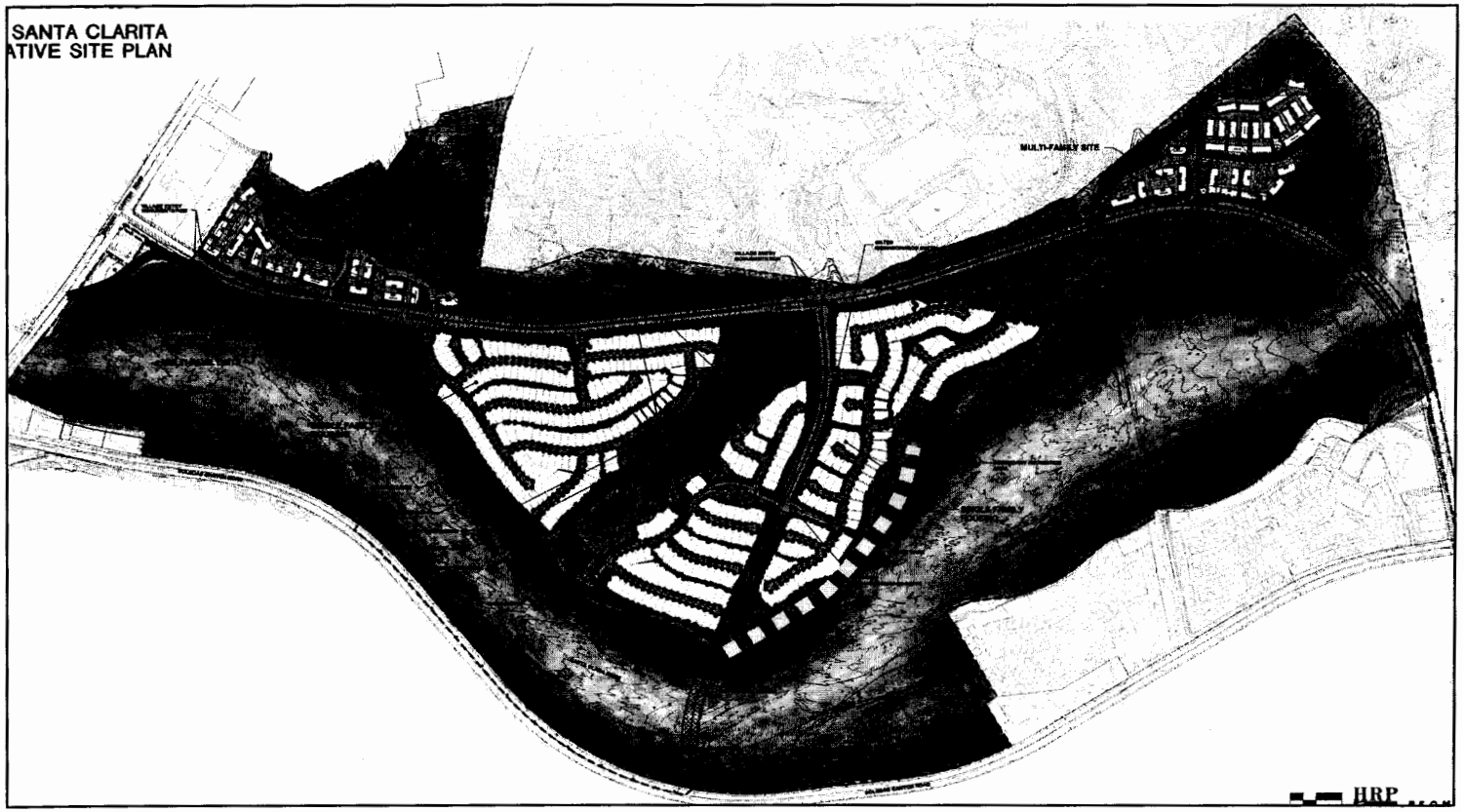
– Infrastructure

- **Newhall Ranch Road (including Newhall Ranch Road/Golden Valley Road Bridge)**



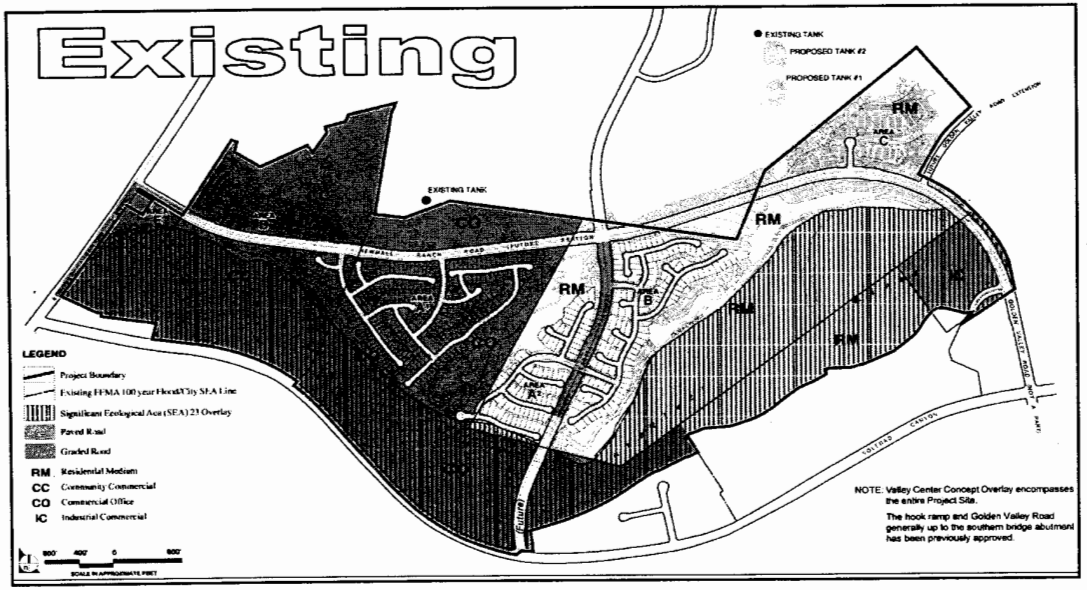
■ Current Project Summary Cont.

- **Bank Stabilization**
  - **Buried Bank Stabilization**
  - **Toe Protection**



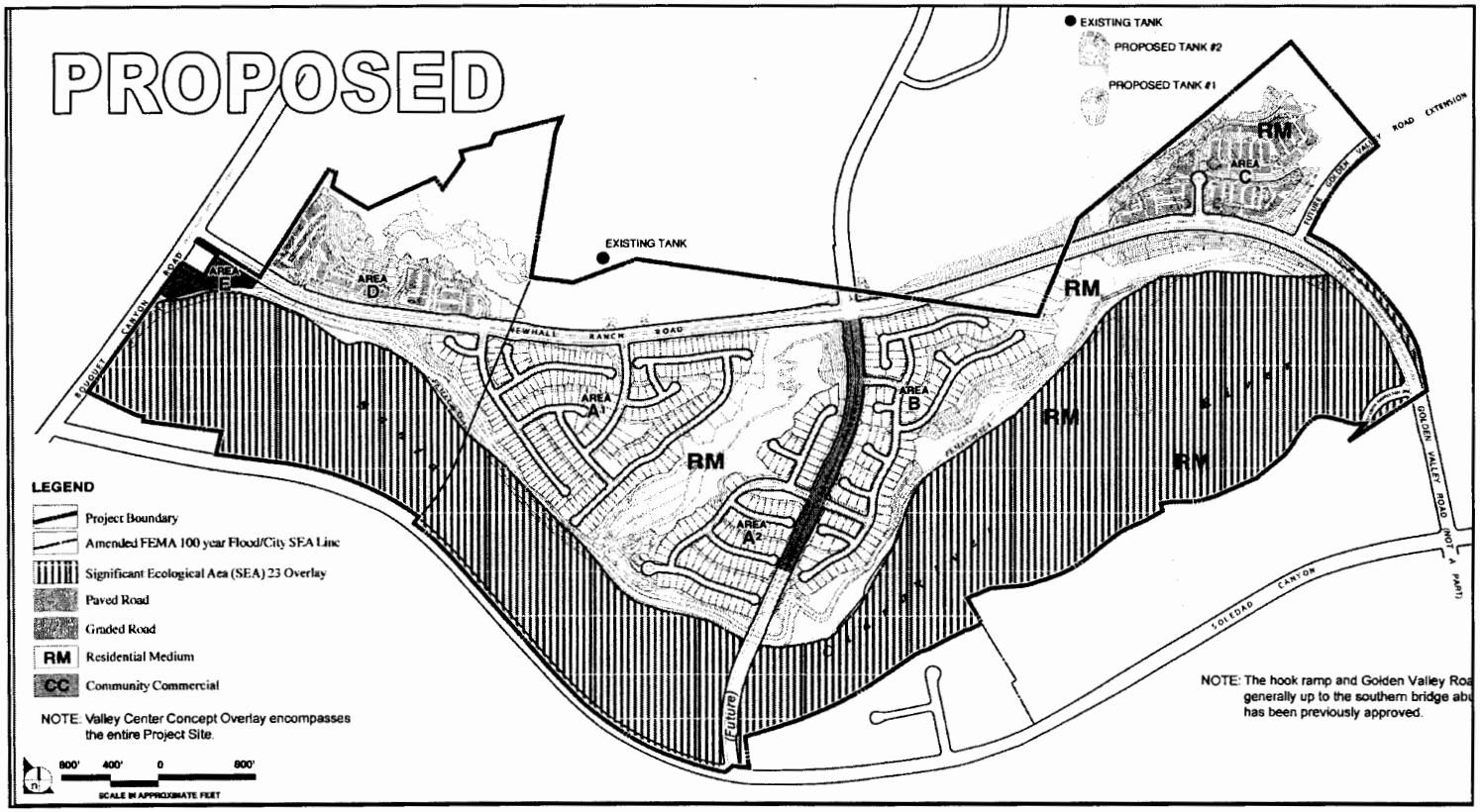
ENTITLEMENT DESCRIPTION

- **General Plan Amendment**
  - **From RM, IC, CC, CO (SEA, VCC), and CC (VCC)**
  - **Current GP allows up to 13,000,000 commercial square feet and up to 15,000 dwelling units**

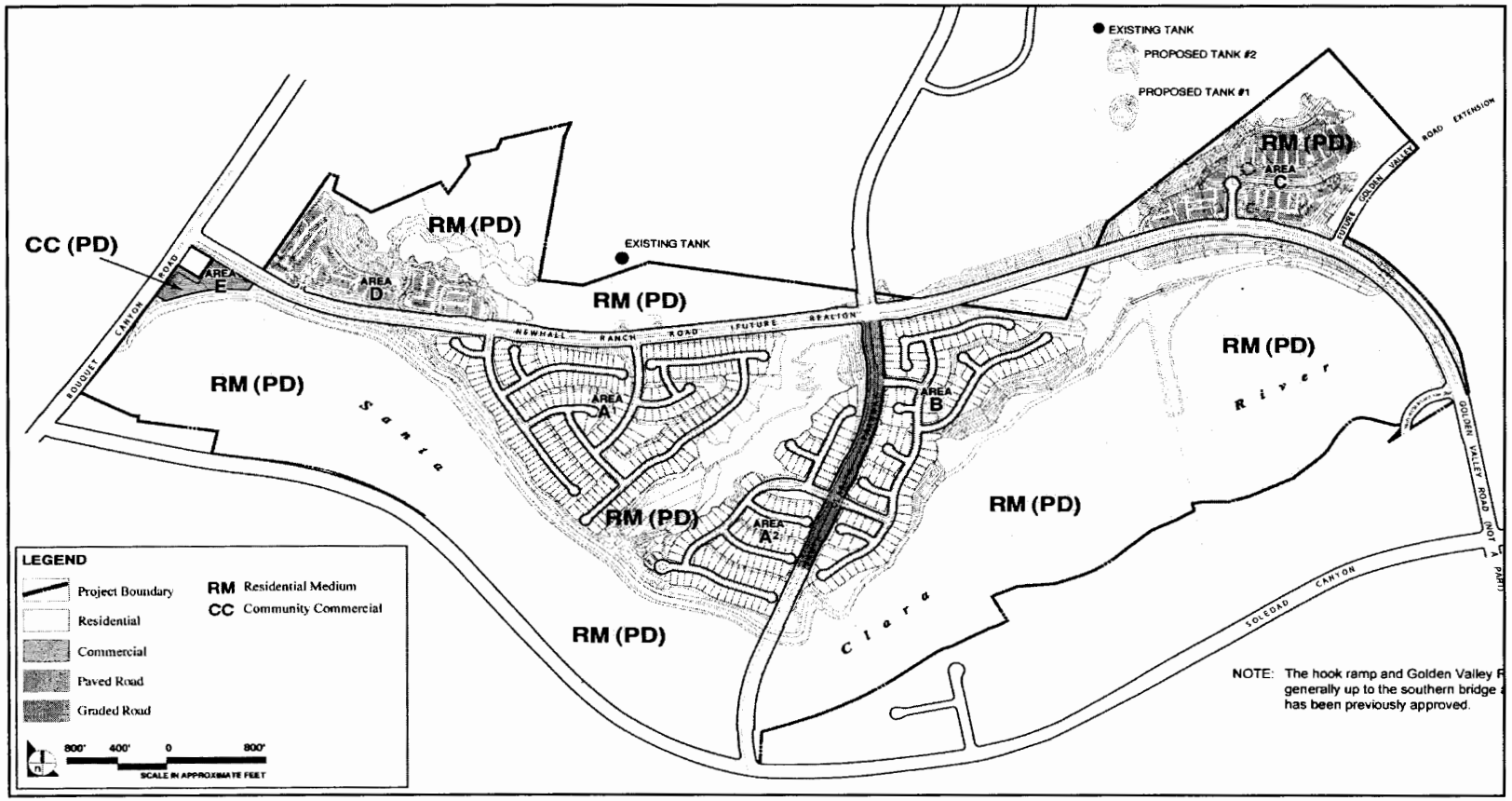


■ General Plan Amendment

– To RM (SEA), RM (VCC) and CC (VCC)

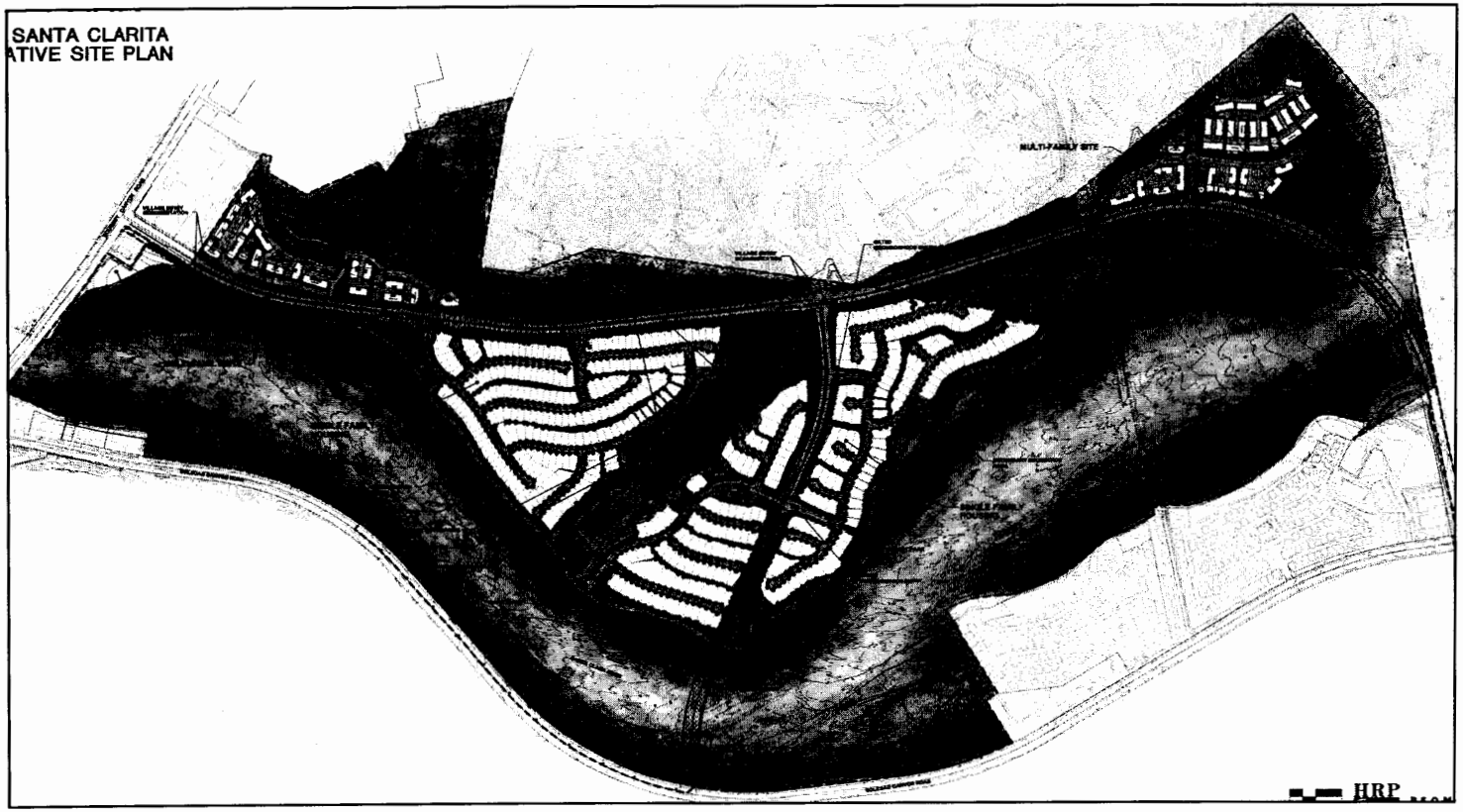


■ Zone Change
– To RM (PD) and CC (PD)

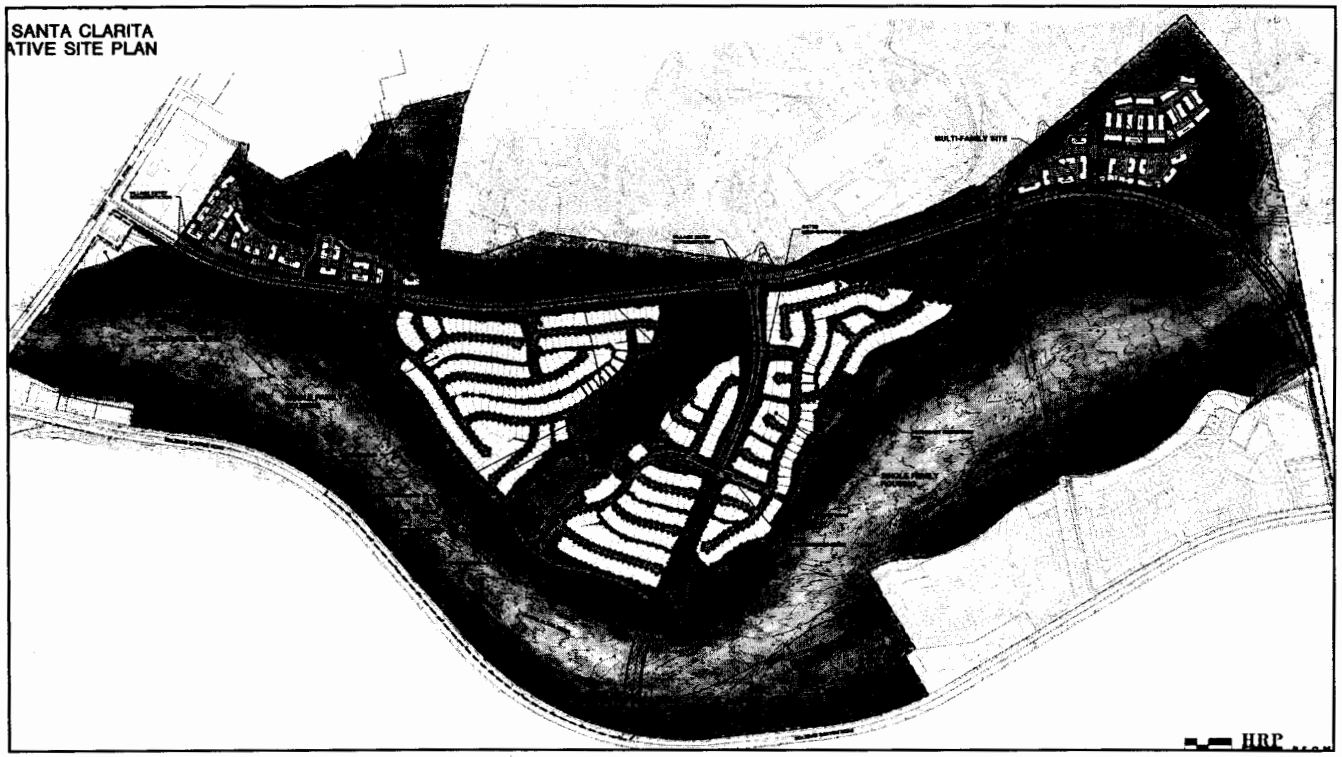


■ Vesting Tentative Tract Map

– Subdivision of the 695.4 acre site

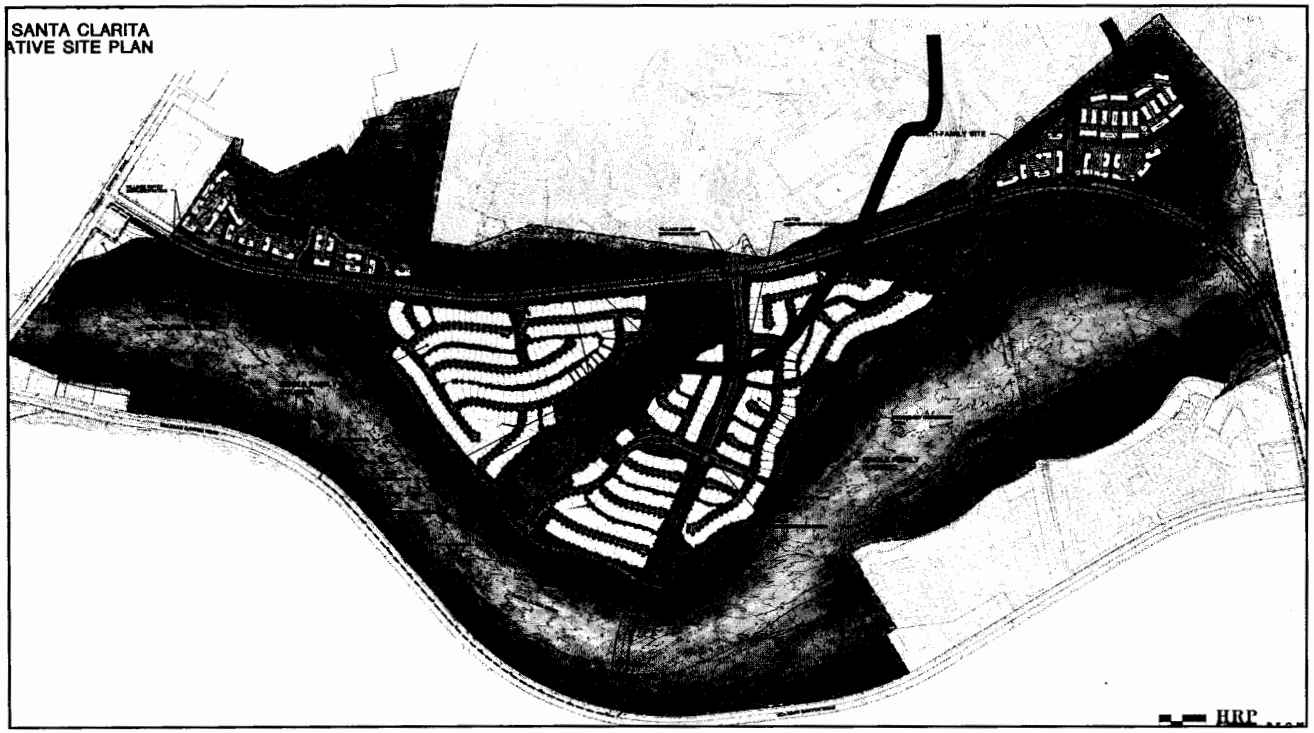


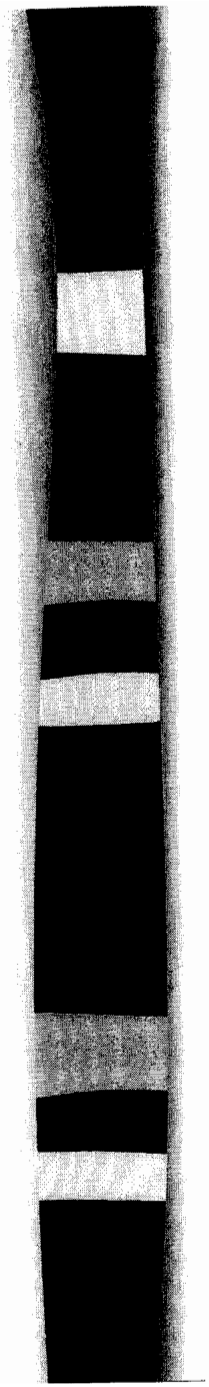
- **Conditional Use Permit**
  - **Planned Development Overlay**
  - **Multi-family buildings exceeding 35' in height**
  - **Hillside Innovative Application**
  - **Vehicular gating for Planning Areas A1, B, &C**



■ Hillside Review Permit

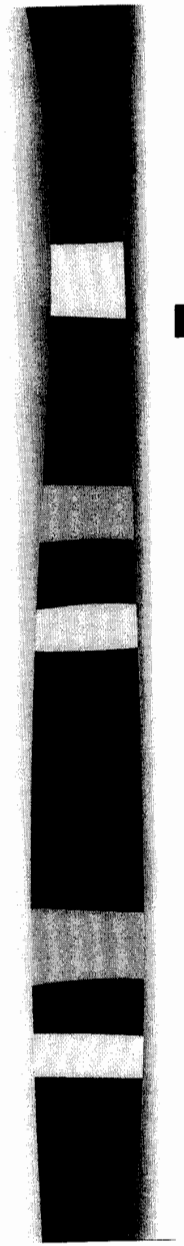
- – Development on slopes greater than 10%
  - • Site includes two secondary ridgelines
- – Innovative Design Request





- **Oak Tree Permit**
  - 16 Removals (87 total oaks on-site)
    - 13 are to be relocated (2 heritage)
    - 3 to be encroached upon
  - Mitigation
    - Dedication of 18.9 acres
    - 56 (24") oak trees (3 to 1 replacement)

- **Adjustment**
  - 20% reduction
    - 16' front yard setbacks with 20' long driveways
    - 7' sound walls along Newhall Ranch Road and Santa Clarita Parkway

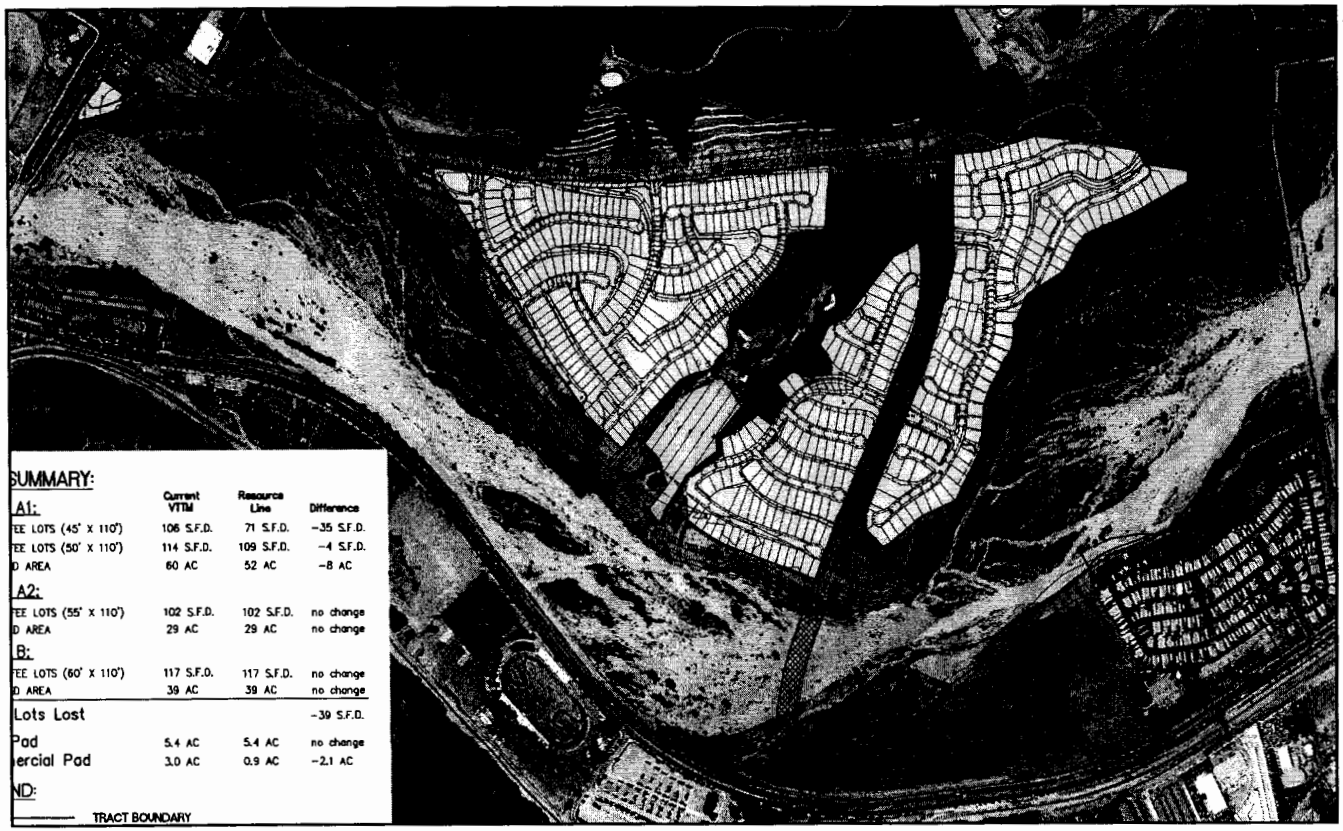


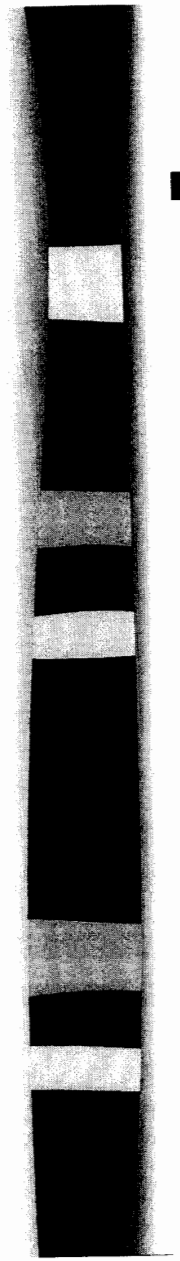
Environmental Impact Report

- **21 Environmental Topics Analyzed**
  - **Included Traffic, Flood, Noise, Education, Water, etc.**
  - **14 environmental topics were mitigated to less than significant**
  - **7 environmental topics were considered unavoidable significant impacts after mitigation**

PC's Recommendation

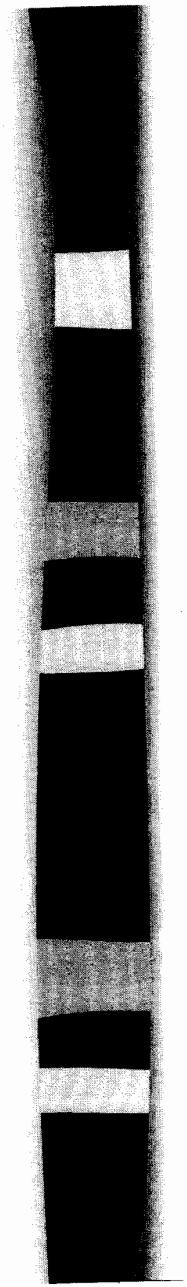
- **Revisions**
  - **Relocation of bank stabilization to preserve mature riparian resources**





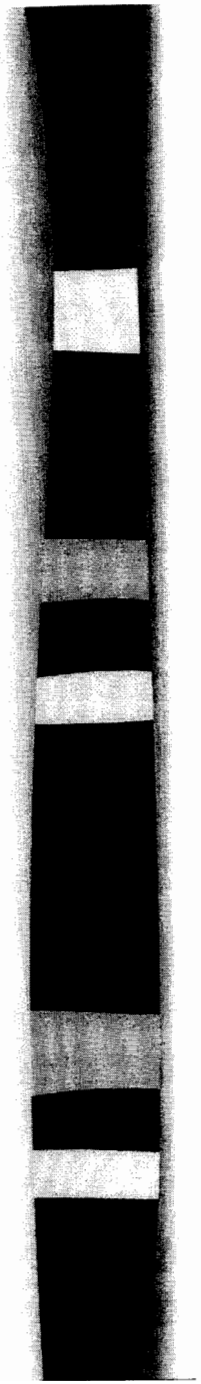
PC's Recommendation

- **Revisions**
  - **Allow vehicular gating**
  - **Reroute equestrian trail away from the River and over the Aqueduct**
  - **Construct Santa Clarita Parkway with 2 lanes until remaining lanes are warranted**
  - **Convert Area C apartments to a for-sale product**
  - **Revised Park Site Plan**
  - **Dedication of open space adjacent to Central Park**
  - **Subject to CLWA approval, construct a temporary trail from northern project boundary to an established dirt trail accessing Central Park**
  - **Redesign of Area D – eliminating grading on the nose of the ridgeline facing the Emblem neighborhood**



PC's Recommendation

- **Revisions cont.**
  - Dedication of 130 off-site acres
  - Enhanced landscaping along Newhall Ranch Road and Santa Clarita Parkway
  - Require applicant to pay for 25% of the cost of a pedestrian bridge over Newhall Ranch Road
  - Installation of two water guzzlers along the River
  - Enhance Pipeline corridor under the Newhall Ranch Road bridge for its potential use for on-site wildlife mobility
  - Final colored elevations and site plans to be approved by PC
  - Require NRR/GVR bridge and abutments to be subject to the CVC Aesthetics' Guideline Book
  - Provision for a decorative wall, landscaping, and use restrictions near the Emblem tract



PC's Recommendation

- **PC found that the project met the innovative findings**
  - **Employs a site design that tailors the development to the site and minimizes impacts to topography, Santa Clara River, and the central canyon on-site**
  - **Substantial benefits include:**
    - **Preservation/dedication of 450 acres of open space on-site**
    - **Dedication of 130 off-site acres**
    - **Extension of two miles of the Class I trail**
    - **Extension of two miles of trails along the Santa Clara River including bridging over the Pipeline**
    - **Dedication and improvement of the site's central canyon as a public park**
    - **Contribution through right-of-way dedication and B & T fees for the Cross Valley Connector**

Letter No. 46

page 1

Karen Pearson M.S., M.F.C.C.

Marriage, Family & Child Counselor
Lic. No. MFC 14674
26617 Gavilan, Santa Clarita, CA. 91350 Phone No. (805) 296-4438

4/20/04

To: Planning Commission
City of Santa Clarita
23920 Valencia Blvd.
Santa Clarita, CA 91355

Re. Item # 3 Master Case No 02-175
(and Riverpark Plan in general.

There are many problems with this plan. Certainly transplanting 3 heritage oaks as described in ~~[illegible]~~ the proposal at the back of the room should not be done.

I note that this is a request to have 3 story buildings in area C. When I look at exhibit 22c (area D) I notice that also is showing 3 story buildings and there fore conclude that at some point Needham Land and Farming will create those buildings to be 3 stories.

I am very concerned about area D because it lies directly south of my back yard. I also strongly question the line of sight drawing which is exhibit 29 (b) in the booklet entitled Riverpark Innovative Application Compliance Report" dated April 16, 2004. That line of sight does not begin in my backyard which is directly north of Area D. I believe my view shed will be directly affected by this project.

1

2

3

page 2

Karen Pearson M.S., M.F.C.C.

Marriage, Family & Child Counselor
Lic. No. MFC 14674
26617 Gavilan, Santa Clarita, CA. 91350 Phone No. (805) 296-4438

4/20/04 Comments on Item #3 cont.

I invite you all to come and visit my back yard so you can physically get a sense of the impact that this proposal will have on my quality of life. 4

First, it is absolutely unacceptable to shave back or cut down the height of the hill at the end of Gavilan Dr. This hill is part of the ambience of the entire neighborhood. In addition to its aesthetic contribution, it also provides a buffer for the noise and pollution that Newhall Ranch Road will generate. 5

Though the city had nothing to do with the planning of Bouquet Center, I believe its negative impact on the neighborhood should be kept in mind when considering this proposal by the same developer. Why allow them to once again, tromp on the quality of life of existing residents. 6

Once this hill was almost all the way to Bouquet Canyon Road. When I looked south I saw a view which was totally mature. Then the hill was cut back to make room for Bouquet Center. When I look in a southwesterly direction now I see the cement back of the northerly building of Bouquet Center. I do not know how tall that building is, but I resent the intrusion into my view shed. They didn't even have the courtesy to plant Cedar Trees around the perimeter of the center 7

page 3

Karen Pearson M.S., M.F.C.C.

Marriage, Family & Child Counselor
Lic. No. MFC 14674
26617 Gavilan, Santa Clarita, CA. 91350 Phone No. (805) 296-4438

4/20/04
Comment on Item #3 cont.
Farther, I resent that the light on the back of the building is a form of light pollution in the starry nights I love so much.
Worse, The planners of that center chose to place their dumpsters directly adjacent to the fence that divides the center from the neighborhood homes. In addition to the smell the once a week garbage pick up - often between 6:30 a 7:00 am is extra ordinarily noisy.
So they cut back the lovely hill I loved so much and gave me all of the above. Now they are proposing to cut more of the hill down and cut it further back! This would allow more noise pollution from the apartments and from Needhall Rand Road. The latter adding to the already poisoned air I breathe. I believe you must hold the line on that hill for to further cut it back or shave it off gives new meaning to the phrase, "adding insult to injury."
Also, getting back to the request to extend the height of the planned apartment buildings not only threatens to destroy my view shed but add greater noise pollution, air pollution and light pollution than I am already subjected to. Please hold the line!
Thank you for your attention to my rights
Karen Pearson

7

8

Letter No. 45

California Native Plant Society

May 10, 2004

City of Santa Clarita
Department of Planning and Building Services
23920 Valencia Blvd. Suite 302
Santa Clarita, CA 91355

RE: Comments on the Riverpark Draft Environmental Impact Report SCH No. 2002091081

To Whom It May Concern:

The California Native Plant Society (CNPS) is a non-profit organization of more than 10,000 laypersons and professional botanists organized into 32 chapters throughout California, with three local chapters in Los Angeles County. The mission of the California Native Plant Society is to increase understanding and appreciation of California's native plants and to conserve them and their natural habitats, through education, science, advocacy, horticulture and land stewardship. The CNPS has been very involved in Santa Clara River Valley plant issues for years. The Santa Clara River Valley is a unique botanical resource because of the convergence of desert, coastal and montane biota in this region. Based on our experience, we offer the following comments on Riverpark Draft Environmental Impact Report SCH No. 2002091081

The CNPS can not support the project as proposed because of its significant, unmitigable impacts on the unique vegetation resources, the failure of the document as presented to minimize and mitigate to the maximum extent practicable the impacts to biological resources, and the failure of the document to fully evaluate the impacts to the plants and plant communities as described below. Our comments are divided into two categories: General Comments made up primarily of issues that the document fails to address and Document Specific Comments.

General Comments

The document fails to address the fragmentation issues to the plant communities and habitat. While piece by piece the plant communities will be substantially reduced, the CNPS requests that the overall evaluation of fragmentation be addressed in the document and evaluated for impacts. This analysis will allow for appropriate mitigation to be developed to minimize and mitigate this important issue. 1

The document fails to address the impacts of fire regulations and clearance activities on the areas of native habitat that will be adjacent to developed areas. The CNPS requests that this issue be addressed in the subsequent EIR, and that the fire clearance be included in the project "footprint". Then true impacts to the native communities and habitats will need to be re-evaluated and appropriate mitigation provided. This is especially important based on the presentation at previous City Council meetings for this project, where the proponent is touting the value of clustered housing. While cluster housing does focus the project on the landscape, the "open space" between housing clusters will increase fragmentation (which leads to environmental degradation), and may often be the fuel reduction zone, which will further degrade biological resources. 2

"Hazing machines" need to be strictly forbidden on or near the project site. 3

Dedicated to the preservation of California native flora

Document Specific Comments

Page 4.6-6 states that the project site is approximately 695 acres, while the total acreage tallied from the 14 identified plant communities is 727.4 acres (pgs 4.6-9 – 4.6-17. It is necessary to have consistent acreages throughout the document to fully evaluate the actual amount of impact. Please explain the difference in acreages. 4

Page 4.6-6 also states that the plant community nomenclature follows (where applicable) CDFG's and the Manual of California Vegetation (Sawyer & Keeler-Wolf 1995). However, the plant communities identified do not use the series and association levels commonly found in the either of these treatments. The CNPS requests that the designations be revised to reflect common plant community treatments. 5

Page 4.6-38 3) Sensitive Plant Communities Present On-site. This section fails to comprehensively include all of the sensitive plant communities on the "List of California Terrestrial Natural Communities" from September 2003. Additional plant communities that occur on site and also on the list: 6

- 32.005.02 Riversidian Alluvial Fan Sage Scrub
- 78.000.00 Hollyleaf Cherry Woodland and Scrub Unique Stands [*Prunus ilicifolia*]. In checking with Keeler-Wolf (personal communication, 2004), old growth stands of *Prunus illicifolia* are rare.

Because the treatment of the existing communities do not reflect current community classifications, there is nothing to reference "riverwash" community. Occurring in the floodplain of the Santa Clara River, this "riverwash" community has the potential to represent a suite of rare plant communities including Riversidian Alluvial Fan Sage Scrub (mentioned above); 32.040.04 California Buckwheat Alluvial Fan or 32.070.00 Scalebroom Scrub 7

Furthermore, the mixed oak/grass area is of great botanical significance because of the number of oak species (4) that are all found within the 2.3 acres. 8

Pg 4.6-52 C. Construction Impacts

a) The CNPS requests that the locations of "temporary construction sites and the routes of all access roads shall be shown" in this document, as part of the CEQA process of full disclosure of all impacts. The types and amounts of vegetation that will be impacted even temporarily is required to be fully disclosed in the public document for public evaluation – not just by the jurisdictional agencies. 9

b)

c) While mulching of native vegetation provides some initial nutrient cycling, the common practice for facilitating regeneration of native plant communities and habitat is appropriate salvage, storage and re-distribution of topsoil. Topsoil salvage not only captures the existing seedbank present on site, but also captures all of the soil microorganisms that are essential in maintaining ecosystem functions. 10

d) In light of the fact that 98% of southern California's wetlands are extirpated (Bowler 1989), the CNPS finds the 1:1 mitigation for permanent removal of wetlands unacceptable. The impacts to the resource are the same whether or not the mitigation is done before project implementation or after. There fore, the CNPS requests that all impacts to wetlands regardless of their "habitat value" be mitigated at 3:1. 11

e) Where is the opportunity under CEQA for public review of the wetlands mitigation? The CNPS views the "Habitat restoration sites in the riverbed shall only be located in areas where the predominant habitats present are dry open floodplain, weedy herbaceous, or their functional equivalent" as a recipe for failed wetland mitigation. Why are the "highest priority habitat restoration sites should be new riverbed areas created during the excavation of uplands for bank protection" the only sites under consideration? 12

l) While the CNPS support Arundo removal, until the Santa Clara River watershed is systematically treated from the head of the watershed downstream, and when re-introduction is not longer an issue, the notion of removing Arundo to mitigate for mature wetland extirpation is not equitable mitigation. This type of "mitigation" will encourage the net loss of wetlands because the "mitigation" is does not preclude any potential, future re-infestation. In other words, the same Arundo "mitigation" area may be repeatedly used as mitigation for permanent extirpation of wetlands from a variety of projects, as it is re-infested from upstream propagules. As the mitigation proposal itself specifies "Removal areas shall be kept free of exotic plant species for five years after initial treatment" only. 13

Page 4.6-63 Planted Coastal Sage Scrub. No evaluation is provided for the basis of the planted Coastal Sage Scrub. The CNPS requests that a full discussion on why the Coastal sage Scrub was planted be evaluated in the document. It is likely that the CSS was planted as mitigation for the previously cut or graded for the installation of water lines and slope drains. Despite the paucity of understory and lack of success of the previous mitigation, the CNPS requests that appropriate mitigation for impacts to previous mitigation be addressed. Absent appropriate mitigation, a net loss of this diminishing community will result from this project. At a minimum a 3:1 successful mitigation (reestablishment of a functioning community) is required to offset impacts to the previous mitigation site. The determination of non-significant impact on Page 4.6-63 fails to disclose the mitigation history of the site and therefore is arbitrary and capricious. 14

Page 4.6-63 Riversidean Sage Scrub. The analysis is faulty because Riversidean Sage Scrub actually IS a sensitive plant community (CDFG 2003). Law requires appropriate mitigation for this sensitive plant community and the sensitive species that occur in it. 15

Page 4.6-65 Holly-leaf Cherry. The analysis is faulty because mature Holly-leaf Cherry stands ARE actually a sensitive plant community (CDFG 2003). Law requires appropriate mitigation for this sensitive plant community and the sensitive species that occur in it. 16

Page 4.6-66 Southern Willow Scrub. With approximately 80% of the sensitive plant community being impacted by the project, and the issue of wetlands loss in southern California, the CNPS fails to see how the proposed mitigation will off set the impact. Please explain. 17

Page 4.6-66 Southern Riparian Scrub. The CNPS fails to see how the preservation in perpetuity of part of the Riparian Scrub and "riverwash" mitigates the impact to the 30 acres. Impacts for the project require mitigation, not just a dedication of unbuildable lands (due to flood hazard) as open space. The dedication of open space requires an endowment in perpetuity to maintain the open space as a functioning ecosystem. Edge effects from the project will impact the "open space" introducing urbanizing woes of 18

exotic species introduction, ORV impacts, etc. The CNPS requests that appropriate mitigation for the impacts be addressed. 18

Page 4.6-68 Oaks. It is unclear exactly how many oaks will be impacted and how many will be retained in open space (not landscaped). Of the oaks impacted, what is the mitigation? How many of which species? The mitigation of oaks must not occur in landscaped areas, because oaks die a slow death in areas where artificial water regimes are in place. 19

Page 4.6-68 Developed Areas with Mixed Trees. The first sentence of the second paragraph contradicts itself. The Southern California Walnut is a sensitive species that is known from the site. Therefore, adequate mitigation is required. 20

Page 4.6-70. (a) Special-Status Plant Species. While 3 species are identified as CNPS List 4 species (California Walnut, Palmer's grappling hook and Peirson's morning glory), impacts to these species warrants full disclosure and mitigation under CEQA. Repeated dismissal of mitigation for these species continues their march towards greater range restriction and vulnerability for extinction. Minimization and mitigation will prevent the need for future listings under State or Federal Endangered Species Acts. Therefore, the CNPS requests that these species be addressed and accommodated to minimize impacts to them, and mitigation for any impacts. 21

Page 4.6-71. (a) Special-Status Plant Species. The CNPS supports the salvage and retention of the dead Heritage oaks due to the fact that dead "snags" provide niches for a variety of animals. The natural decomposing processes and organisms need to also be retained. 22

Page 4.6-87 (c). While mulching of native vegetation provides some initial nutrient cycling, the common practice for facilitating regeneration of native plant communities and habitat is appropriate salvage, storage and re-distribution of topsoil. Topsoil salvage not only captures the existing seedbank present on site, but also captures all of the soil microorganisms that are essential in maintaining ecosystem functions. Therefore, the CNPS requests that topsoil salvage in areas of native vegetation, storage and re-distribution be implemented to potentially improve the success of the mitigation. 23

Page 4.6-88 (d). In light of the fact that 98% of southern California's wetlands are extirpated (Bowler 1989), the CNPS finds the 1:1 mitigation for permanent removal of wetlands unacceptable. The impacts to the resource are the same whether or not the mitigation is done before project implementation or after. There fore, the CNPS requests that all impacts to wetlands regardless of their "habitat value" be mitigated at 3:1. 24

Page 4.6-90 (l). While the CNPS support Arundo removal, until the Santa Clara River watershed is systematically treated from the head of the watershed downstream, and when re-introduction is not longer an issue, the notion of removing Arundo to mitigate for mature wetland extirpation is not equitable mitigation. This type of "mitigation" will encourage the net loss of wetlands because the "mitigation" is does not preclude any potential, future re-infestation. In other words, the same Arundo "mitigation" area may be repeatedly used as mitigation for permanent extirpation of wetlands from a variety of projects, as it is re-infested from upstream propagules. As the mitigation proposal itself specifies "Removal areas shall be kept free of exotic plant species for five years after initial treatment" only. 25

(RMMP)?

Page 4.6-99 4.6.5. Where is the opportunity for public comment on the RMMP? The RMMP needs to be included in this EIR as part of the CEQA process. 26

? (RMMP)

Page 4.6-99 4.6.5. The CNPS does not consider additional surveys as mitigation to decrease impacts to sensitive plant species. Additional data on species numbers and location is incumbent upon the project proponent in their evaluation of impacts. Data however is not mitigation. Furthermore, the notion of mitigation of 1:1 impact; re-establishment does nothing to decrease the march of the species toward extinction. Translocation of rare species has a dismal failure record – 98% (CDFG – personal communication 2003). Additional mitigation is required for adequacy of the document. 27

Page 4.6-124 Unavoidable Significant Impacts. While the document clearly states that the impacts to biota are significant and unmitigable, the document does not clearly present how the project avoided these impacts "to the greatest extent practicable" as required by CEQA. The CNPS requests that the project be re-evaluated further for additional ways to reduce impacts to the biological resources. Issues not considered are pulling construction back from the floodplain of the Santa Clara River, off-site mitigation of upland impacts, landscaping with locally native species etc. 28

Thank you for the opportunity to submit these comments. Addressing and incorporating the suggestions presented here will enhance the CEQA document. If you have any questions, please feel free to contact me at (323) 654-5943.

Sincerely,

Ileene Anderson
Southern California Regional Botanist
California Native Plant Society

cc: David Chipping, Conservation Director,. CNPS
CDFG
ACOE

Letter No. 44

Friends of the Santa Clara River
660 Randy Drive Newbury Park, California 91320 (805) 498-4323

March 2, 2004

City of Santa Clarita Planning Commission
City of Santa Clarita
23920 Valencia Blvd.
Santa Clarita, CA 91355
RE: Case No.: 02-175, VestingTentative Tract Map 533425, GPA 02-002, Oak Tree Permit etc.

Board of Directors

Ron Bottorff
Chair
Barbara Wampole
Vice Chair
Ginnie Bottorff
Secretary

Affiliated Organizations

California Native Plant Society

Santa Clarita Organization for Planning the Environment (SCOPE)

Sierra Club, Angeles Chapter

Sierra Club, Los Padres Chapter

Surfrider Foundation

Ventura Audubon Society

Wishtoyo Foundation

Ventura Coast Keepers

Ventura Environmental Coalition

Dear Commissioners,

Friends of the Santa Clara River has a history of offering the best information we can regarding sensitivity to environmental concerns and planning.

We anticipate receipt of the DEIR sometime this week. Though we have not received a DEIR yet, we have been informed that those who have toured the site and live in the immediate community are aware of plans to dramatically alter the natural character of the landscape in the last remaining natural river and upland areas. Though we have many concerns, the most disturbing information we are aware of is a plan to build in the floodplain. We are concerned about intrusion of roadways/bridges in the river and floodplain. We are concerned that maintenance of linkages for wildlife movement be studied and provided. The removal of any oak trees is strongly discouraged. Native American sites need to be preserved and celebrated as part of our community's collective heritage. We are concerned that native vegetation be preserved in unaltered areas and planted in developed areas. 1 2 3 4 5

In spite of providing information to encourage the City to provide natural buffers and back away from the river and leave it's tributaries natural, we have seen both concepts ignored repeatedly. We urge provision for substantial buffer areas. 6

We also understand that an alternative discussed in the DEIR includes avoidance of building in the floodplain. We strongly urge staff and the commission to choose this alternative in any final recommendation you present to the City Council. 7

The Valencia Natural River Management Plan (NRMP) is not simply a disappointment but a disgrace. Mitigations are visibly failing right in the center of the City, endangered species are routinely ignored in decision making, according to an article in the press even the City admits safeguards for retention of water on building sites fail routinely, treated water does not meet standards to protect river water quality, off road vehicles are ravaging the riverbed and it's banks in areas now owned by the City, monitoring and enforcement to avoid discharge of illegal fill is a farce. Meanwhile, the City continues to imagine that they can successfully fight Cemex with this sort of disregard of impacts that would be unacceptable farther up stream. 8

The challenge to minimize risks to the health and well-being of a community as part of the planning process is staggering but nonetheless the one addressed here. 9
We feel that the challenge is clear and should not be compromised nor should minimizing risks to the health and well-being of a community be confused with trying to balance the these risks against economic benefits. Erring on the side of caution should fall clearly in favor of a community's health and well being even when the economic consequences may be unfavorable, politically or otherwise. 10

We understand the City's role in providing housing for a growing community. Therefore we urge the Commission to study the risks to the health and well-being of this community and remember that the health of the natural landscape is the foundation for providing Clean Air, Clean Water and Species Diversity for Sustainability.

Respectfully

Barbara Wampole

Barbara Wampole
Vice Chair, Friends of the Santa Clara River

Item 4

Letter No. 43

28528 Sugar Pine Way, Saugus CA 91390-4121

Regina Colombo

Fax

To:	Santa Clarita Planning Commission	**From:**	Regina Colombo
Fax:	661-259-8125	**Pages:**	1
Phone:		**Date:**	8/31/2004
Re:	Riverpark Project	**CC:**	

☐ **Urgent** ☐ **For Review** ☐ **Please Comment** ☐ **Please Reply** ☐ **Please Recycle**

• **Comments:**

Greetings:

I would attend the hearing at City Hall to voice my opposition to the Riverpark Project but, like most Santa Clarita residents, I commute and, traffic being what it is in our still fair city, I'm certain I wouldn't make it on time. So, I'm sending this fax instead.

Since I'm on the subject of traffic, it seems the rush hour congestion in Santa Clarita has reached critical mass. Adding more homes and businesses means adding more commuters to our already overcrowded roads. Of course, more cars results in more air pollution. And, given our already terrible air quality, I really can't see how any responsible arm of our City's government could in good conscience approve a project that would certainly aggravate this serious problem. 1

I'm also strongly opposed to further degradation of wildlife habitat, especially along our river, and destruction of more hillsides which are a big part of the natural beauty of our city. 2

I don't think that anything Santa Clarita might gain from this project in terms of additional tax revenue, etc., is worth the cost in terms of our quality of life. Please don't approve this project. 3

Sincerely,

Regina Colombo

Agenda Item: 2

Centre Pointe Business Park

9701.2272

August 31, 2004

Mr. Michael Berger, Chairperson
City of Santa Clarita - Planning Commission
23920 Valencia Blvd.
Santa Clarita, CA 91355

Dear Michael:

This evening you will be asked to approve Newhall's "River Park" project.

I have reviewed the plans and available documents. The planning is very good; the resulting project will enhance our community. This is a good project, proposed by a good community oriented builder/developer. 1

I recommend that you approve this project, not only because of its many positive community benefits but because it is the RIGHT & PROPER thing to do.

Yours truly,

Larry Rasmussen

Larry Rasmussen

Cc: Diane Trautman, Vice Chairperson
Tim Burkhart, Commissioner
Dennis Ostrom, Commissioner
Rick Winsman, Commissioner
Mayor Bob Kellar
Mayor Pro Tem Cameron Smyth
Councilman Frank Ferry
Councilwoman Laurene Weste
Councilwoman Marsha McLean

21070 Centre Pointe Parkway, Santa Clarita, California 91350
661.259.5606 Fax: 661.259.4065

Letter No. 41

From: <Jawims@aol.com>
To: <tsullivan@santa-clarita.com>
Date: 8/31/04 3:12:03 PM
Subject: River Park Development

As a concerned resident of Santa Clarita, I want to express my opinion regarding both the River Park and Synergy Developments. While I am in favor of increased road development to ease congestion, and especially to allow for easier access to emergency vehicles, I am opposed to both of these developments. Not the whole development, but the size of both. We do not have the capacity at the existing Saugus elementary schools, (ie. Rio Vista, Skyblue or Plum Canyon), to accommodate developments of this size. Nor can our environment handle the never-ending building projects. We say we want to be family friendly, and environmentally friendly, however our actions do not "walk the talk." I've watched the development of Plum Canyon and have seen first hand the loss of wildlife, the deer crossing signs along Plum Canyon Road seem to be an unnecessary distraction. Let's be who we say we are, and really limit growth. I pray that you as a Planning Commission will heed the voices of your constituents and not the developers that don't have any vested interest in our valley except for their bottom line. Please vote to limit the size of these developments SIGNIFICANTLY!

1

2

3

Thank you.

Jean Wims
Skyblue Mesa/Canyon High parent

Agenda Item: 2

Letter No. 40

From: Alice Constantine <missalimagoo@yahoo.com>
To: <tsullivan@santa-clarita.com>
Date: 8/31/04 1:44:40 PM
Subject: Planning Commission Mtg tonight

HI, My name is Alice Constantine and I own the home @ 27812 Haycreek Ave (off Ermine). I just moved in Dec 03 and really enjoy the quiet and peaceful feeling I get from the neighborhood. Now, it seems that the feeling will only end ever so soon. I am a believer that progree is a good thing. But, like all things in life we must have balance. We dont have the roads to handle the capacity now. How do they expect to handle 2200 more homes with each home having 2-3 cars. That means there will be about 5500 more vehicles to deal with on the same overcrowded roads. In addition, there will be all the construction of those homes interfering with the quiet and solitude we all love so much. The dust, dirt, noise, traffic is just too much!!! Our quiet little streets will become a freeway !!!!! I am not sure what the pricing of these homes will be but am curious as it might also affect the real estate value of the homes in my area. I am now considering moving to avoid this mess if it
becomes a reality
Alice Constantine
(661) 252-7169

1
2
3
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5

Do you Yahoo!?
New and Improved Yahoo! Mail - Send 10MB messages!

Agenda Item: 2

Letter No. 39

,Mrs. Judy Reinsma
29750 San Francisquito Canyon Road
Saugus, CA 91390

August 31, 2004

Fax to: Santa Clarita City Planning Commission

Subject: Riverpark

It has all been said, again and again, but I will try once more.

RIVERPARK SHOULD NOT BE APPROVED !!!!!! 1

The negatives far outweigh the positives for the citizens of Santa Clarita.

It will increase traffic. 2 It will increase air pollution. 3 It will increase demand for domestic and landscape water. 4 It will decrease the recharge area of the Santa Clara River watershed. 5 It will further impact our schools. 6 It will destroy an aesthetically pleasing river landscape. It will further degrade the integrity of what this city could preserve as a jewel in its midst, the Santa Clara River. 7

The only positive I can see is that it will provide construction jobs while being built and it will increase the profits of Lennar, Inc. stockholders. The money it will bring in to complete the cross-valley connector road is not sufficient to warrant accepting the permanent destruction of what may well be our greatest asset, our river. The traffic it will add will mainly impact local streets; the connector will not alleviate this impact. 8 9

Los Angeles is currently spending millions to return its river to a natural state. People need undeveloped, natural, beautiful areas in their midst. We have one. Let's keep it 10

For an example of how beautiful a river-park can be, you should go to Chico, CA. They have a real river park and it is absolutely wonderful; the crown jewel of their city. We can have one too, if this city can summon the courage to accept what the original Master Planner gave us and protect it today, as well as for the generations of citizens to come. I urge you to be bold, be brave, be visionary and say no to Riverpark. 11 12

Sincerely,

Judy Reinsma

Judy Reinsma

Agenda Item: 2

Letter No. 38

Lisa Goldwag Kassner
19701 Terri Drive
Santa Clarita, CA 91351-4815

City Planning Commission
City of Santa Clarita
23920 Valencia Blvd.
Santa Clarita, CA
FAX: 661/259-8125

RECEIVED
PLANNING DIVISION
SEP 0 3 2004
PLANNING AND BUILDING SERVICES
CITY OF SANTA CLARITA

Re: NO ON RIVER PARK DEVELOPMENT

Dear Planning Commission:

I am writing to urge you to reject the development of the River Park project. 1

I attended the meeting you held at the end of June, 2004. A man who wanted to put a car wash on Soledad Canyon Rd. across from the Edwards movie theater, was heavily critiqued for a variety of details about the effects of his development on the environment, the "look" of the area, and on his neighbors, and the traffic impacts. 2

Of much greater import related to all of these factors is the River Park project, but we haven't heard you critique it nearly the same way. 3 What about the environmental impacts -- on our air, our river, even our floodplain? 4 And the view of THAT area? How about the neighbors, all of us, who love this area and are seeing it being destroyed by rampant development, to our great dismay? 5 How about the traffic impacts, which would be many, many times greater than from a little car wash? 6

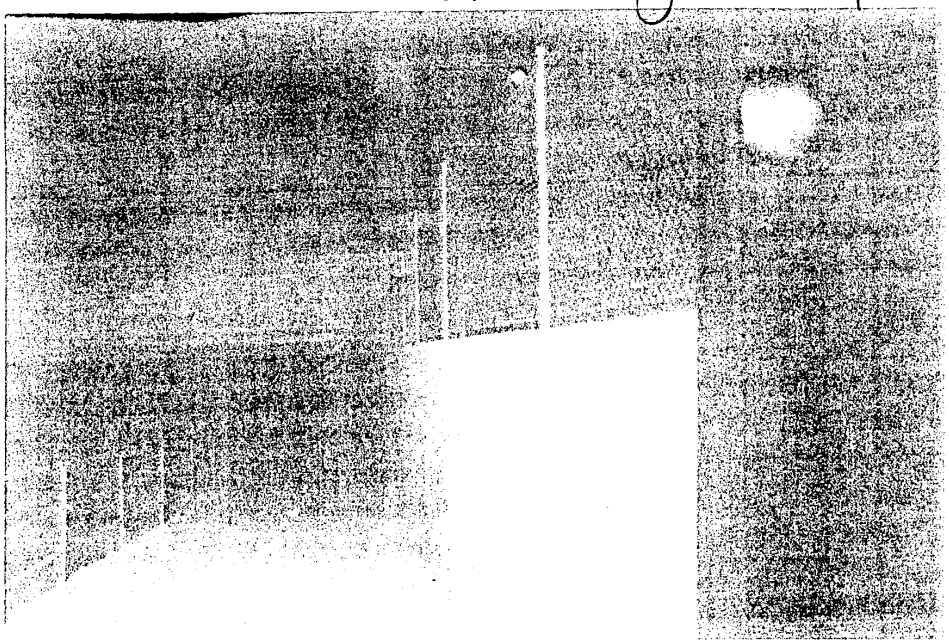
Please: if you care enough about these to protect us from a car wash, it is your responsibility to do the same with an 1100-home development. That would be the responsible thing as our Planning Commission. And when you see that the development doesn't live up to your requirements for that car wash, please just say no. 7

With thanks for your consideration,

Lisa Goldwag Kassner

Lisa Goldwag Kassner

submitted by: Stacy Kuhnel

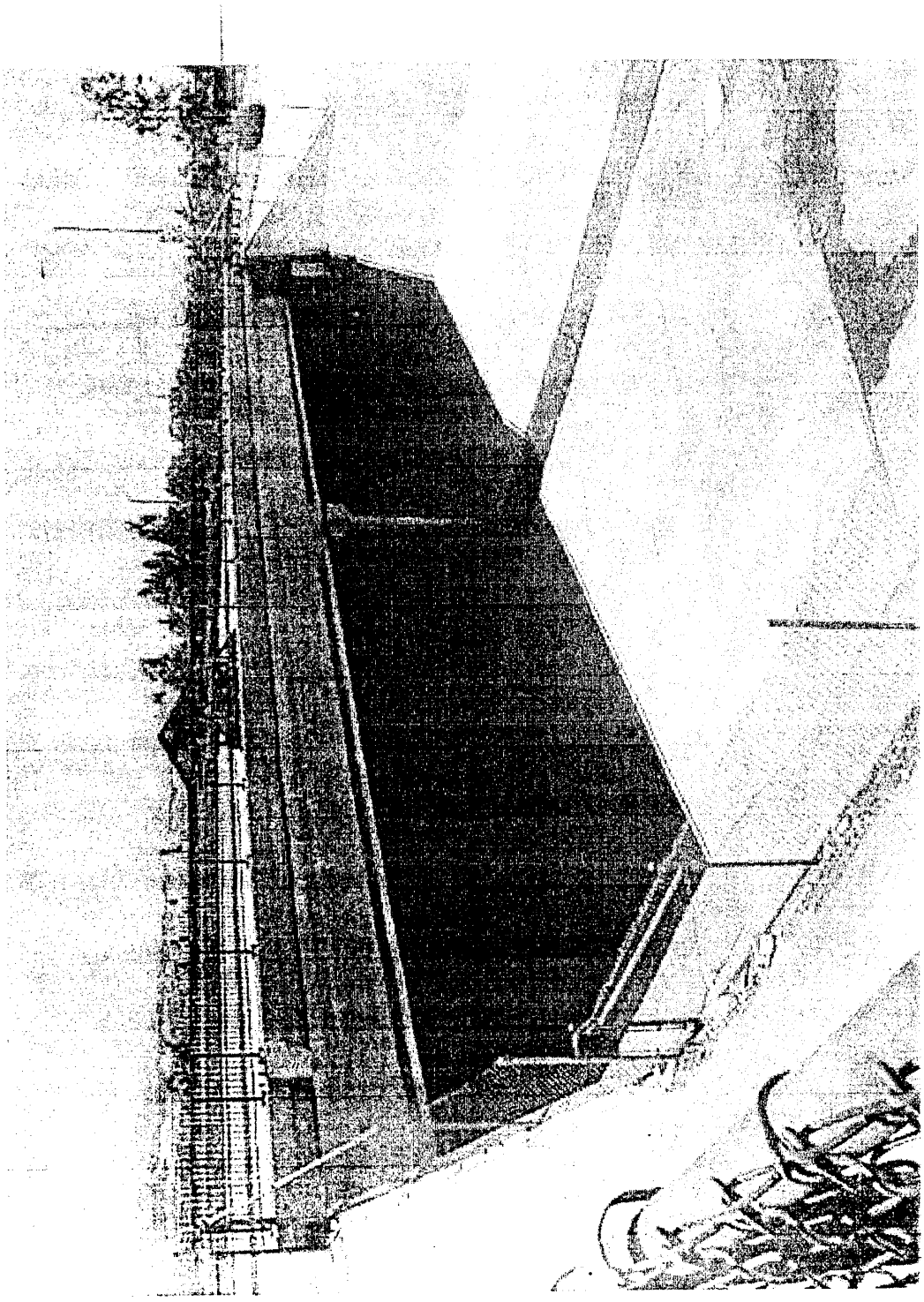


2 pages

Under Newhall Ranch Road
at
Back Bay in Bridgeport
and

City for safety reasons
needs
to
do
same
under Newhall Ranch Road
by
Lowell's. (See other
Grading Photos
#'s)

1



Letter No. 36

Submitted by: Enc Duranez
8/31/04
Agenda Item: 2

August 31, 2004

TO: City of Santa Clarita Planning Commission
23920 Valencia Blvd
Santa Clarita, CA 91355

FROM: Wishtoyo Foundation

RE: Comments on Cultural Resources Section of the Draft Environmental Impact Report (DEIR) for the proposed Riverpark Development Project

Dear Santa Clarita Planning Commission:

The Wishtoyo Foundation is submitting these comments with the hope that we might encourage the Riverpark Development Project Developers and Partners to recognize traditional Native American cultural and religious values as important, living parts of our Nation's heritage, and to develop the capability to sufficiently address any potential disruption of the traditional expression or maintenance of these values that might result from the development scheme.

It is the duty and responsibility of the developers to coordinate and consult regularly with Native American groups to identify and consider their concerns in their planning and decision-making and document fully all coordination and consultation efforts. In order for this public comment process to function as it should, developers must be sensitive to and respectful of the needs and values of all community members, particularly those members of the community whose ties to the land in question extend back through time immemorial. Additionally, the Wishtoyo Foundation sincerely hopes that this development project will avoid unnecessary interference with areas that are historically, culturally, or religiously significant to the Tataviam people, as it is on their ancestral lands that Riverpark project will be built. 1

Finally, the Wishtoyo Foundation encourages the project developers to protect sensitive and confidential information about Native American values, practices, and specific locations with which they are associated from disclosure to the public, to the greatest degree possible under the law and regulation. 2

INTRODUCTION

These comments are preliminary, in direct correlation to the preliminary nature of the Environmental Impact Report completed in March of 2004. These comments seek to address the inadequacy of the DEIR with regards to cultural resources located within the boundaries of the proposed development project and that are likely to be severely impacted by the Riverpark Development Project. The cultural resources portion of the DEIR is deficient in many respects. 3

First, the Riverpark DEIR fails to grasp the distinction between resources as cultural and resources as archeological. The failure of the DEIR to take into account this distinction has rendered both the assessment of the existence of significant resources located within the development area and the mitigation measures proposed to deal with potential impacts inadequate.

Second, the DEIR is inadequate because of its failure to consult with any members of the Tataviam community during the course of the DEIR's preparation. Under CEQA case law, consultation with the Native American Heritage Commission and tribal community members for whom the area slated for development is culturally significant is mandated when it is likely that cultural resources will be impacted by the project. Additionally, there are several federal laws that are govern consultation requirements for projects that are likely to impact Native American cultural resources. 4

Third, the cultural resource section of the DEIR is deficient for its failure to fully consider and plan for the event that more resources and/or ancestors may be unearthed during the development process. Major events in the region's history, such as the flood caused by the breaking of the St. Francis dam have altered the surface area such that it is likely that resources may remain concealed absent some disturbance such as grading. Therefore, the DEIR should prepare for the likelihood of the discovery of remains and culturally significant objects now rather than later and thus avoid a potential repeat of the recent situation at Playa Vista. (See recent local news articles regarding the desecration of more than 180 Tongva ancestral remains on a development site located off of Lincoln Blvd in Playa Vista.) 5

Finally, the mitigation measures proposed in the DEIR are inadequate for their failure to address ways in which impacts to cultural resources might be mitigated from a tribal perspective. Thus the DEIR does not meet the CEQA requirements regarding the exploration of potential mitigation measures. 6

CULTURAL RESOURCE PROTECTION LAWS OF POTENTIAL APPLICABILITY TO THE RIVERPARK DEVELOPMENT PROJECT

Cultural resources are protected under several state and federal laws. These laws were enacted to ensure consideration of historic values and to protect significant resources from destruction or theft. The major federal laws include: 7

The National Historic Preservation Act (NHPA), Archaeological Resources

Protection Act (ARPA), the Native American Graves Protection and Repatriation Act (NAGPRA), and the American Indian Religious Freedom Act of 1978 (AIRFA). State-level cultural resource protection is regulated through the provisions of Appendix K of the California Environmental Quality Act (CEQA). Paleontological resource protection is regulated through the 1906 Antiquities Act. Also of importance is the National Environmental Policy Act of 1969 (NEPA) which establishes a national policy for protection and enhancement of the human environment. Part of the function of the Federal Government, as stated in the Act, is to preserve Important cultural aspects of our national heritage and maintain whenever possible an environment which supports diversity and variety of individual choice. (P.L. 91-190; 83 Stat. 852; 42 U.S.C. 4321).

Based on the Developer's consultations with tribes, the California Native American Heritage Commission (NAHC), and other interested parties, and pursuant to 43 CFR 10.5(e) (1), the developers shall consider the following as Native American cultural items:

1. Human Remains
2. Associated funerary objects, which shall be understood to mean objects placed intentionally with human remains and still physically associated in placed with such remains. The location of objects within the grave fill or in immediate proximity to human remains shall be understood to evidence intentional placement with human remains.
3. Unassociated funerary objects, which shall be understood to mean objects intentionally placed with human remains but whose association has been disturbed through vandalism, erosion, plowing, rodent action, and other ground disturbing phenomena.
4. Sacred objects which shall be understood to include those classes of objects identified by Chumash/Tataviam religious leaders as needed in the practice of traditional Chumash/Tataviam religions by their present day adherents.
5. Sacred/historical places, which shall be understood to mean village sites, religious/ceremonial sites, food sites, burial sites, etc.

7

The California Environmental Quality Act (Public Resources Code Sections 21000, et seq.) requires that before approving most discretionary projects the Lead Agency must identify and examine the significant adverse environmental effects which may result from that project. Where a project may adversely affect a unique archaeological resource, Section 21083.2 of the Act requires that the Lead Agency treat that effect as a significant environmental effect and prepare an environmental impact report (EIR). Section 21083.2 (c) stipulates that there is a duty to mitigate and that consideration shall be given to preserving California Native American culturally significant sites in place or left in an undisturbed state. When an archaeological resource is listed in or eligible to be listed in the California Register of Historical Resources, Section 21084.1 requires that any substantial adverse effect to that resource be considered a significant environmental effect. Historical resources included in a local register of historical resources, as defined in subsection (k) of Section 5020.1, are presumed to be historically or culturally significant for purposes of this section, unless the preponderance of the evidence demonstrates that the resource is not historically or culturally significant. The fact that a

resource is not listed in, or determined to be eligible for listing in, the California Register of Historical Resources, not included in a local register of historical resources, or not deemed significant pursuant to criteria set forth in subdivision (g) of Section 5024.1 shall not preclude a lead agency from determining whether the resource may be an historical resource for purposes of this section. 7

The CEQA guidelines also provide some additional aid with determining sufficiency of the report. Section 15003(i) states that CEQA does not require technical perfection in an EIR, but rather adequacy, completeness, and a good-faith effort at full disclosure. A court does not pass upon the correctness of an EIR's environmental conclusions, but only determines if the EIR is sufficient as an informational document. (Kings County Farm Bureau v. City of Hanford (1990) 221 Cal.App.3d 692) It is the belief of the compiler of this comment letter that the Draft EIR is not sufficient as an informational document, since the amount of work done on the Cultural Resources section is woefully inadequate and lacking in even the basic understanding of the term cultural resources. 8

THE DEIR'S FAILURE TO TAKE INTO ACCOUNT THE DISTINCTION BETWEEN CULTURAL AND ARCHEOLOGICAL RESOURCES RENDERS THE DOCUMENT INADEQUATE

The Riverpark DEIR makes an unfortunately all too common mistake with regard to its assessment of cultural resources located within the project boundaries. While the determinations made regarding whether sites are significant, whether they are likely to be impacted by the development project, and what the most appropriate mitigation measures may be, are probably sufficient to meet CEQA and federal requirements regarding archeological resources that are significant for their likely ability to provide information important to the scientific community or society as a whole, these determinations in no way reflect an adequate assessment of the importance of sites and objects located within the project bounds as cultural resources. Both federal and state laws recognize this distinction as they provide specific requirements and guidelines for cultural resources that are important to Indigenous people for their association with Indigenous history, culture, and practice. 9

In order for the DEIR to be sufficient in this regard, the developers must, at a bare minimum, consult with members of the Tataviam community regarding the importance of resources located within the development area. 10

THE DEIR IS INADEQUATE FOR ITS FAILURE TO COMPLY WITH STATE AND FEDERAL GUIDELINES REGARDING CONSULTATION WITH TRIBES AND INDIAN COMMUNITY MEMBERS

The Draft EIR plainly indicates that the developers of the Riverpark Development Scheme failed to adequately consult with Native Americans on this project. One person as an observer does not equal adequate consultation (see DEIR discussion regarding the presence of a single Native American monitor during grading.) Any and all developers in California must consult with the Native American Heritage Commission, which is mandated by CEQA. Developers who aspire to utilize federal moneys, grants, or assistance with land reclamation, i.e. usage of the Army Corps of Engineers, must also 11

consult with Native American tribes and interests, such as the federally recognized Santa Inez band of Chumash Indians, the local Tataviam (Fernandeno) band of mission Indians-whose land and archeological sites are the very ones in question, and with other interested Native community actors, which would include groups like the Wishtoyo Foundation. 11

Requirements Under CEQA

According to CEQA Guidelines, economic and social effects of a project can be used to determine the significance of changes caused by the project. If construction of a road and resulting noise increase disturbs religious practices, this is considered a significant effect on the environment. The Riverpark specific and general plans do not address this significant impact and instead conclude, without any supporting evidence, that these sites will not be impacted by the development. However, Riverpark is not equipped to make a judgment on this issue, at least certainly not without proper Native input, which has yet to be solicited by the developer. 12

The cultural resources portion of the Draft EIR is not consistent with CEQA requirements, as the duty to notify the Native American Heritage Commission was not fulfilled. This notification requirement was made explicit in the EPIC v. Johnson case, which held that the presence of cultural resources on a proposed development site created a mandatory consultation requirement. 13

In Epic v. Johnson, at issue was whether the California Department of Forestry had a legal duty to consult with NAHC before approving a proposed timber-harvesting plan. The court held that presence of an archeological site on the land proposed for timber harvesting mandated consultation with the NAHC. See Epic v. Johnson at 627. The court explained that CEQA mandates that agencies evaluating a project for environmental impacts consult with agencies having jurisdiction over affected natural resources. ID. 14

The court cited CEQA guidelines Appendix B, which lists NAHC as a public agency with specific expertise regarding places or religious significance to Native Americans, including archeological sites, to support the rule that the NAHC has jurisdiction by law over such natural resources. See ID at 625. The Court continued,

> The [Native American Heritage C]omission has jurisdiction to identify sites of special religious and spiritual significance to Native Americans and their heritage, to make recommendations regarding sacred places located on private lands, and to consider the environmental impact on property identified or reasonably identified as a place of special religious significance to Native Americans. see ID

The court's holding indicates the strength of CEQA's commitment to protect cultural resources. Consultation with the NAHC is not merely encouraged under CEQA, it is mandated. Furthermore, because the archeological sites found in the Riverpark development zone have been deemed as a Tataviam site of some importance, dating back 15

3500 years, the case for consultation with NAHC and local Native Americans regarding the Riverpark Development Project is even stronger. 15

Under Federal law, tribes and Native Americans in general are supposed to be consulted with when sites identified as American Indian have been found on a proposed project development site. Cultural resource inventory and evaluation, use allocations, National Register nominations, use permits, public interpretation, and protection projects may require consultation with Native American groups as appropriate to the nature of the cultural resources or the areas affected. Identification of tribal traditional life-way values can only be done through consultation with native people if accuracy and sufficiency is truly a goal of the developers. 16

National Historic Preservation Act Consultation Requirements

The 1992 amendments to the National Historic Preservation Act (NHPA) provide that properties of traditional religious and cultural importance to Indian tribes may be eligible for listing on the National Register of Historic Places. If a site (aka cultural property) is eligible for listing or is listed, it is subject to the 106 consultation process, which provides some measure of protection for sites that might be impacted by developments that involve and/or receive funding from federal agencies. Specifically, Section 106 requires federal agencies to take into account the effects their projects may have on "historic properties" (cultural resources), and they must allow a reasonable time period for the Advisory Council on Historic Preservation (the Council) to comment. The Section 106 regulations (36 CFR 800, Protection of Historic and Cultural Properties) outline a five-step review process that is conducted on a project-by-project basis. The five steps are the following:

Identify and evaluate historic properties.
Assess project effects. 17
Consult on mitigation measures.
Obtain Council comment.
Proceed with project.

Section 106 obligations apply to any "proposed Federal or federally assisted undertaking," and must be completed "prior to the approval of the expenditure of any Federal funds . . . or prior to the issuance of any license..." An "undertaking," which triggers the procedural steps of the NHPA, not defined in the NHPA initially, is defined under the 1992 NHPA Amendments as:

> [a] project, activity, or program funded in whole or in part under the direct or indirect jurisdiction of a Federal agency, including:
> (A) those carried out by or on behalf of the agency;
> (B) those carried out with Federal financial assistance;
> (C) those requiring a Federal permit, license, or approval; and
> (D) those subject to State or local regulation administered pursuant to a delegation or approval by a Federal agency. (16 U.S.C. S 470f)

The regulations implementing Section 106 prior to the 1992 Amendments defined "undertaking" as: any project, activity, or program that can result in changes in the character or use of historic properties, if any such historic properties are located in the area of potential effects. The project, activity, or program must be under the direct or

indirect jurisdiction of a Federal agency or licensed or assisted by a Federal agency. Undertakings include new and continuing projects, activities, or programs and any of their elements not previously considered under Section 106. \{36 C.F.R. \'a7 800.2(o)

Furthermore, "Undertakings" include without limitation: (a)non-Federal activities carried out pursuant to a federal permit, lease or license; (b) the approval of a grant or loan of federal funds; (c) promulgation of regulations; (d) federal approval of state regulatory program under federal regulatory statutes such as the Surface Coal Mining and Reclamation Act; (e) development of management plans; (f) approval of an application for permit to drill on an oil and gas lease; (g) approval of a mine plan on federal lands; and (h) issuance of permits by state agencies pursuant to a delegation of authority from a federal agency. 17

Again, the Riverpark Development project will need certain permits or licenses to manage the Santa Clara river valley area, will no doubt require federal funds to operate, and issuance of permits by state agencies following the consent from the federal agency. In either a general or specific scope, the Riverpark Development plan falls under the undertakings model outlined in Section 106, meaning that there must be some protections for the historical sites located in the developmental zone. Even if federal involvement is "indirect," the NHPA may apply. In Indiana Coal Council, Inc. v Lujan, for example, the district court held that SMCRA permits issued by state regulatory agencies under a delegation from OSM triggered NHPA compliance requirements. Because OSM's involvement is not "de minimis", given OSM's oversight and funding of state regulatory programs, the "state permitting process is a federal undertaking. . . ." 18 19

Presumably, the same analysis would apply to other federal regulatory schemes which authorize delegation of regulatory primacy to tribes or states. In any event, with limited exceptions, the NHPA section 106 compliance processes applies to activities in which the federal government plays a permitting or oversight role.

Indiana Coal Council v. Lujan, 774 F. Supp. at 1401, Techworld Dev, Corp. v. D.C. Preservation League, 648 F. Supp. 106, 117 (D.D.C. 1986).

The sites on the Riverpark Development Scheme, especially CA LAN-351, first recorded in 1968, should at least be placed as eligible for listing to the National Register of Historic Places. Considering that CA LAN-351 is at least 3,500 years old, which is based on two different studies, Section 106 of NHPA would be applicable, especially if the developers are using or hope to use federal funds or seek aid from federal agencies, such as the Army Corp of Engineers. Of course, the developers have probably not looked into the classification of traditional cultural properties, which are defined as propert[ies] eligible for inclusion in the National Register because of [their] association with cultural practices or beliefs of a living community that (a) are rooted in that community's history, and (b) are important in maintaining the continuing cultural identity of the community. Traditional cultural properties (or TCPs) include, but are not limited to sacred sites, and may be wholly natural places with no evidence of human use. Thus, sacred sites and other places of traditional religious and cultural importance to tribes are eligible for 20 21

listing on the National Register. These sites would also be considered traditional cultural properties under the NPS Guidelines. 21

NAGPRA Requirements

Under the Native American Graves Protection and Repatriation Act, or NAGPRA, Section 3(c), developers and agencies cannot exhume, remove, or otherwise degrade Native American bones or cultural items on federal or Indian land without a permit issued pursuant to the Archeological Resources Protection Act (ARPA), which has to have been coordinated with the tribe(s) or groups(s) culturally affiliated with the remains, and which has to include provision or their disposition consistent with NAGPRA. 22

Under Section 3(d) of NAGPRA, if a Native American cultural item is encountered on land during construction for example, the party responsible for the project has to: cease the activity in the area of the discovery, make a reasonable effort to protect the items discovered; notify in writing, the head of the agency having primary management authority, and following notification and upon certification by the head of the agency that notification has been received, the activity may resume after 30 days of such certification (25 U.S.C. 3002[d])

The Riverpark Development Scheme is indeed on private lands, being funded by private interests, but not entirely, as state and federal funds and resources will no doubt be employed for the needs of the proposed community, such as transportation, services, sanitation, etc. Thus, NAGPRA and its provisions are clearly in their proper scope with this project. 23

In addition, the developer of the Riverpark Development scheme has failed to create any plan of action for managing Native American cultural items that may be encountered during the project, though they have mentioned that almost all the sites of relevance that have been found are deemed insignificant, which is significant in itself. 24

NAGPRA regulations (43 CFR 10) require developers and federal agencies to notify tribes likely to be culturally affiliated with the items likely to be discovered, as well as any identifiable lineal descendants of those who produced or valued such items, of the likelihood that such items will be excavated. The Draft EIR does not deal with these issues at all, nor is it apparent that the developers have taken reasonable steps to determine whether a planned activity may result in the excavation of human remains, funerary objects, sacred objects, or objects of cultural patrimony. 25

The developer, and any prospective state and federal agencies planning on conducting studies, construction, and business in the Riverpark development zone must identify tribes and others that may be cultural affiliated with any Native American cultural items that might be found on the lands subject to effect by the project. Notice must be in writing and with a clear description of the planned activity, its general location, the basis upon which it was determined that Native American cultural items may be excavated. and the basis for determining likely custody. The Notice must also propose a time and place for meetings or consultations (43 CFR 10.3[c] [1]). 26

The Riverpark developers and consultants state that they have a goal to preserve sites that have the potential to contain scientific information useful for the reconstruction of prehistoric lifeways in the Santa Clara Valley region, and/or artifacts or features that may be of religious importance to Native Americans.(RIVERPARK Draft EIR, pg. 1197). This rhetoric sounds disingenuous, as the developer has excluded well-respected scientists with expertise in California Indian archeology and local Chumash and Tataviam tribal members. The main scientific and archeological consulting firm utilized by the developer, W & S Consultants, does not represent an honest effort by the developer to insure that integrity in the archeological and cultural sites is maintained. W & S consultants are known for their work in the Ahmanson Ranch Project, which is acknowledged as a failure to understand the local geography, history, and cultural relevancy by the consulting firm. W & S consultants, in a similar fashion employed at the Riverpark Development Scheme, deemed six different sites on the Ahmanson Ranch as insignificant, though these sites proved to be quite significant for the local Chumash people. (See transcripts of public hearings on the Ahmanson Ranch proposed development project). It would seem as though history is repeating itself over again with the Riverpark development scheme.

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CEQA does not require technical perfection in an EIR, but rather adequacy, completeness, and a good faith effort at full disclosure. See Kings County Farm Bureau v. City of Hanford (5th App. Dist. 1990) 221 Cal. App. 3d 692, 712. No effort, let alone a good-faith effort, has been made to discover the true extent of the archeological, cultural, historical, and religious resources located within the bounds of the proposed development area. Local Tataviam (Fernandeno) leaders and community members have been denied entrance onto the lands. They have not been consulted or even notified of the developments scope and destructive capabilities over their people's ancient sites and cultural items. Without a good faith effort to discover the baseline conditions with respect to cultural resources, the 2004 Draft EIR fails to comply with CEQA's mandate of a good faith effort at full disclosure.

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The Draft EIR has described in its report that only one site can be designated as significant, labeling two-three other sites as insignificant and proposing that grading impacts on the remaining site would be less than significant. This is a preposterous and culturally insulting conclusion rendered by personal that do not hold the correct expertise, nor can they be considered to be qualified Native American consultation. While the 2004 Draft EIR relied on basic-level studies of the archeological sites on the development site, there was no ethnographic research of any kind conducted. Without ethnographic and ethnohistorical field work, how can the developers make any consideration of the importance of the lands they are about to develop over, or whether particular places in their development area are known to be burial places or sacred sites. This is the kind of work that still needs to be done, and was not conducted by W & S Consultants.

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That is not to say that W & S Consultants should be the ones to conduct such a study. They have already demonstrated a general apathy and unwillingness to do even the basic and necessary work when dealing with Native peoples. Here is an excerpt from the Draft EIR that is meant to represent their ethnographic study:

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Whether the Tataviam may have had exogamous clans and moieties, like the Cahuilla and Serrano to the east, is unknown. However, it is estimated that the Tataviam population was less than 1,000 at the time of Euro-American contact, and that only two or three of the largest villages existed throughout their territory. Although the Tataviam were one of the earliest groups contacted by Spanish missionaries, with a number of their villages briefly described by members of the Portol\'e1 expedition of 1769, a general lack of information on this group exists. By 1810, all Tataviam had been baptized at Mission San Fernando and were quickly absorbed by other groups through intermarriage. The last speaker of Tataviam died in 1916.
Pg. 1190, section 4.18 of the Cultural resources section of the Draft EIR.

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Of course, if one is to read this excerpt at face value, with little actual knowledge of native people or their current status, then one would be led to the conclusion that the Tataviam are extinct, or were in general a small, tiny, and insignificant band of Indians that were done away with long ago. Of course this is clearly not the case, as there remains many Tataviam/Fernandeno people living in both the Antelope and San Fernando Valleys, which was due to having been forcibly removed by private land owners, like the Newhall Family. There is an estimated 2300 Tataviam tribal members, and the tribe is currently seeking federal recognition. This would seem to demonstrate that the tribe is alive and kicking. In any case, this excerpt is a perfect example of relying only on weak archeological and ethnographic work done by W & S consultants. It would be best for the Developers to get new consultants for their cultural resource work.

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Even the scope of cultural resources was limited to only include items and sites found, though the landscape itself is deemed as important to Native American representatives. The plants and herbs utilized by local native people's for medicine and ceremonies, the Oak trees located on the site that could only be planted by people hundreds of years before European colonization, and the river itself as a lifeway through which animal and plant species dwell in that are within native stories and belief structures. The developers claim that the ancient Tataviam sites will be protected due to the open space areas that the developer has allowed for. In effect, the sites will be left in situ, meaning that they will not be altered or developed. However, even if some of the ancient sites are located in open space, this ignores the significant ways that Tataviam religious practices and ceremony will be impacted as a result of the development occurring near the sites. Not to mention that even though the site is to remain left intact and without disturbance, grading has already taken place that has altered the landscape of the site.

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AIRFA Requirements

The American Indian Religious Freedom Act (AIRFA) directs agencies and developers utilizing agency funding and resources to consult with tribes about anything that might affect their religious practices. The Developer at Riverpark must consult with native people about the proposed impacts that the development will have on the practice of traditional religious custom. The impacts of development on such aspects of religious

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practice as plant gathering for religious purposes, access to land at sacred sites, and integrity of the sites themselves all must be considered. 36

Executive Order 13007, issued on May 24, 1996, clearly indicates that it is priority of the US government that consultation with native Americans over the proposed development of sacred sites must happen. Developers and the state/federal agencies they wish to employ in their development scheme must accommodate access to and ceremonial use of Indian sacred sites by Indian religious practitioners, where such accommodation is not clearly inconsistent with law, avoid adverse effect to the physical integrity of such sites, make the confidentiality of information on such sites a priority, implement procedures to carry out the provisions of the order, including provisions of providing notice to American Indians of actions that might affect sacred sites or access to or ceremonial use of such sites. 37

DEIR IS DEFICIENT FOR ITS FAILURE TO PLAN FOR THE LIKELIHOOD THAT MORE RESOURCES AND/OR ANCESTORS MAY BE UNEARTHED DURING THE DEVELOPMENT PROCESS

Furthermore, W & S consultants fail to address the possibility of more sites being found on the site due to man-made conditions. These conditions have altered the terrain of the land in unknown measure, which has to be taken into account when doing any study on the land and its possible development. While there may be those who suggest that such incidents are presently irrelevant to the present situation, history often has more to teach us then we often know. 38

The third local event of historical importance in Southern California was the collapse of the St. Francis Dam and the resulting flood of the Santa Clara River Valley on March 12 and 13, 1928. With the failure of the dam near midnight on the March 12th, water raged down San Francisquito Canyon, through the project site, to Castaic Junction, which it effectively leveled, and then on to Fillmore, Santa Paula and ultimately to the Pacific. The flood caused at least 336 deaths, and destroyed 990 homes and many acres of orchards. It is likely that prehistoric archaeological deposits would have been washed away or covered with alluvium.(RIVERPARK DRAFT EIR, pg.1192)

One such incident involved the destruction of a dam constructed by William Mullholland, who was attempting to bring water into Los Angeles. In certain ways, the current project is similar to what Mullholland proposed, since he believed there was a water shortage in LA, and the current developers believe there is a housing shortage. His development did not take into full account the ecological, engineering, or geological circumstances of the area. Perhaps history is repeating itself. 39

On March 12, 1928, one of California's worst catastrophes occurred. The St. Francis Dam broke. Huge torrents of water washed down the San Francisquito Canyon, killing many on the way. The official body count was estimated at 450 dead, which is only slightly less then the famous 1906 earthquake in San Francisco. The actual number was substantially higher, since San Francisquito Canyon was the home to hundreds of transients and illegal immigrants that were never accounted for. After the dam broke, the water took 5 1/2

hours for the water, all 12.5 billion gallons, to reach the ocean. At times, there was a wall of water as high as 140 feet. 900 buildings were destroyed. The problem was ignorance. The geology of the locality was ignored. The dam was built directly over the San Francisquito Fault. This fault, as with many other faults had "gouge." Fault gouge is broken rocks and debris along the fault. Water can easily seep through the gouge, as it did under the dam. After two years of water slowly eroding away the gouge, a gap large enough for water to flow through formed. Once this gap formed, water could instantly rush through, as it did at midnight on March 12, 1928. Association of Engineering Geologists, Southern California Section. Failure of the St. Francis Dam Association of Engineering Geologists, March 1978 Willman, Martha L., "Secret of the St. Francis Dam," Los Angeles Times March 12, 1978

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The breaking of the Dam caused a huge wall of water and silt to pour over the Santa Clarita valley, and through the present Riverpark Development Project Area. While the archeological consultants mention the event with a paragraph, it does not seem to be very in-depth, nor given much gravity as a possible factor to consider. It is entirely possible that more sites, objects, and remains are presently buried under the silt from the St. Francis Dam incident. According to the Draft EIR, the archeological consultants did the bare minimum research to investigate any possible sites or cultural resources, namely through their scanning method. They dug a few holes in select places. This does not seem to qualify as an adequate or sufficient study of the local lands, especially since they are about to be developed. We believe that it is likely that there is more to be found once construction, grading, and excavation starts, and that the developers have not adequately done the proper studies nor have they compiled a detailed plan of action to deal with these eventualities.

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PROPOSED MITIGATION MEASURES ARE INSUFFICIENT TO ADDRESS POTENTIAL IMPACTS TO CULTURAL RESOURCES LOCATED ON THE PROPERTY

Furthermore, the amount of mitigation measures employed by the developers and their consultants is neither sufficient, nor performed in good faith. They have merely made a listing of a handful of sites located on the property, and then go on to state that all but one are insignificant in terms of relevance and importance. This is coming from the same experts who worked on the Ahmanson Ranch Project, which has since been bought by the state and is considered a historically significant land area. Finally, they have failed to consult with the very people who hold the information necessary to make even a preliminary report both feasible and legitimate. This issue is outlined in the following section.

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Appropriate Mitigation plans and Alternatives.

Federal, state or local laws usually require a project's environmental impact to be assessed. The parties proposing the project must attempt to find ways to avoid or mitigate environmental damage before they can proceed. These requirements apply to projects on public land, and they often apply to projects on private property. Archaeological and cultural resources are considered a part of the environment. The Native American Heritage Commission maintains an inventory of sites in California that are important to

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Native Americans, and reviews environmental impact documents to protect these sites from damage or destruction. Native American cultural resources can be divided into four categories:

Native American skeletal remains and grave-related artifacts.
Different types of burials may occur in one geographic area inhabited by the same tribal group, especially if it was inhabited over an extended period of time. There is no way to generalize about the burial practices of California Native Americans; the possibility of discovering remains and methods for preventing or minimizing disturbance of burials must be evaluated individually for each project.

Traditional cultural sites.
Such as villages, campsites, gathering and harvesting areas, quarries, tool manufacturing areas, rock painting and carving areas, and burial grounds.

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Religious or spiritual sites.
Traditional locations for events or rites with spiritual significance. A dance-ground, a place for gathering traditional medicine items, or a place for an Indian doctor or shaman to gather strength might be a spiritual site. It could be a prominent peak, a rock formation, a quiet glen, or a cave.

Artifacts
Cultural remains left by past peoples. Artifacts often found in California may be made of fish or animal bone, shells of sea animals, stone or wood.

Providing administrative access to sensitive areas; making special land use designations; developing Cooperative Management Agreements with Native American communities and groups; stipulating for continuing Native American uses in leases, permits, and other land use authorizations; diverting or denying clearly incompatible land uses; and similar affirmative management solutions. Consultation should identify not only Native Americans' interests and concerns, but also their suggestions for potentially effective approaches to address them. Consultation is incomplete, and largely pointless, unless it is directed toward the identification of mutually acceptable solutions. With true and meaningful consultation, strategies could be developed for appropriate management response when lands and resources valued by Native Americans are threatened.

Perhaps the best way that Riverpark Developers can best mitigate the situation is to finally consult and investigate the Native perspective on the plans for the development. What is considered insignificant to one group is not necessarily the same for another, and it is important that the native voice be heard. A major step that still needs to be taken into account is a plan of action when and if Native remains are found in the proposed development area.

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All work must come to a halt if and when such remains, funerary objects, and/or cultural items are found or disturbed. Included in this plan must be adequate consultation with the native nations affiliated with the remains/objects, as well as with concerned parties like the NAHC and the Wishtoyo Foundation. This must be done in order to find some

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resolution as to what to do with the remains, and to insure that no mass desecration takes place. Another highly recommended suggestion is that new studies be conducted in the development zone. The reasons for this has already been mentioned: First, the San Francisquito damn disaster makes it probable and possible that there is still a great deal to be found, especially once construction begins, Second, the work done by W & S consultants is weak and insufficient. We highly recommend that new and qualified experts be brought in to do a new study and survey of the area. These experts must also have a great deal of knowledge on native history, lifeways, traditions, and present conditions. They must respect the native inhabitants of the land that is about to be developed, a development project which ultimately, is probably not for the benefit of the Tataviam people.

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"The Legislature further finds and declares that it is the policy of the state to: ... (g) Require governmental agencies ... to consider alternatives to proposed actions affecting the environment." (Pub.Resources Code, subd. (g).) "All ... boards ... shall ... certify the completion of an environmental impact report.... Such a report shall include a detailed statement setting forth ...: ... (d) Alternatives to the proposed project." (Pub.Resources Code, subd. (d).) Guidelines to CEQA state that the EIR shall describe "a range of reasonable alternatives to the project, or to the location of the project...." (Cal.Admin.Code, tit. 14, subd. (d).)

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While the Draft EIR does include some possible alternatives that are clearly superior in different ways, they are nevertheless rejected, not because they economically, environmentally, or socially inferior, but because the project objectives are not met. The numbers of housing units are diminished, which apparently cannot be even considered. Of course, this goes along with the self-propagating myth that there is a housing need in the area, and that constructing hundreds of fewer housing units doesn't meet the demand. In an ominous sign of things to come, the Draft EIR even mentions that all available open parcels of land may soon need to be developed to meet some unspecified population growth at some unspecified time in the future. This doesn't sound like an alternative that protects and promotes environmental and cultural protection and management. In any case, in every alternative proposed by the developers and their consultants, there is no mention of protection of the cultural resources in the area.

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However, a sign of hope does appear on page 1211 of the draft EIR, in which the consultants suggest to the developers that certain steps must be taken in the even that additional materials, objects, or possible burials are found:

all grading activities and surface modifications must be confined to only those areas of absolute necessity to reduce any form of impact on unrecorded (buried) cultural resources that may exist within the confines of the project area. In the event that resources are found during construction, activity shall stop and a qualified archaeologist shall be contacted to evaluate the resources. If the find is determined to be a historical or unique archaeological resource, contingency funding and a time allotment sufficient to allow for implementation of avoidance measures or appropriate mitigation should be available.

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Construction on other parts of the project will be subject to Public Resources Code (i). (RIVERPARK Draft EIR, pg. 1211).

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This point at least begins to take into account the possibilities that additional finds are possible. And there is even the advent of a framework on how to deal with additional finds should they be encountered. Of course, there is still a lot to be taken into account when dealing with this proposed mitigation effort. Who shall be qualified to be a proper archeologist on this project, who makes such a determination? Obviously, native people need to be brought in to see the site for themselves, and this is not mentioned in this mitigation example. But it is a useful step that perhaps can be built further upon.

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Specific knowledge of historical and contemporary Native American cultural values can be obtained only from the Native American community that possesses the values and information. The Riverpark Developers must demonstrate a good faith effort to elicit specific kinds of information from Native Americans. Published notices and letters will generally not prove sufficient to ensure that legal obligations to consult with Native Americans have been met.

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Native Americans may also be reluctant to share sensitive information regarding resource locations and values with agency officials. This is partly due to historical and contemporary depredations of Native Americans values, resources, and sacred sites. This is also partly because laws created to protect sacred sites have not been rigorously enforced, and the location of some sites have been made public under the Freedom of Information Act.

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Broad information, regarding the general nature of traditional values and the general location of culturally significant traditional places, should be asked for in the early planning stages. Improved relationships improve consultation. Once an effective working relationship has been built, information maybe easier to acquire, and trust can be established.

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CONCLUSION

It is important to note at this juncture that the Wishtoyo foundation does not automatically reject development that is based on reason and with clear objectives that take into account all voices and perspectives. The native perspective and voice has not been heard in this process so far, and the Draft EIR clearly demonstrates that there is little to no respect for the Native stance on culture places and resources. No matter what future outcome may arise from this present comments period, or whether the Draft EIR is endorsed, the Native voice must be heard, respected, and acted upon by the developers, agencies, and government officials alike. 55 56

However, the significance of the area as a whole has not been adequately surveyed or appreciated by the developers or their archeological/cultural resources consultants. The Tataviam believe this area to be a major life-way area, where daily rites occurred on a regular and cyclical basis. Ceremonies for different intersections in one's life; birth, initiation, marriage, and death, occurred right on the river. Wherever trees can be found in the area, especially the blue oak trees, settlements of some sort are bound to have been located. In many locales, burials were consecrated and interned. In fact, burials have been found in recent enlargements and improvements of the nearby 126 and 5 freeways. There are markers, unknown to those untrained and uninitiated, which point to the sacred and historically significant areas of the Tataviam people, which continue to hold true today, though now it is private property. The whole area of this development is really an area of historical, cultural, and religious importance to the Tatviam people, and this must be recognized. Another proposal that may be helpful in the present discourse is the possible creation of a Native California Center, which would be helpful as a gathering place for local native people. It could be a center for learning for those without the proper information on Native Californians, for community gatherings, for remembering the stories of our elders, and for preserving the ways of our ancestors. 57 58

Since western expansion began, California tribes have fought to protect their cultural and religious sites from destruction, vandalism, and desecration. Hundreds of cultural and religious sites have been lost over the years, and tribes do not want to spend their futures retrieving stolen and desecrated items. Today, California tribes are not only fighting for the re-burial of their ancestors, the return of cultural items, and redress for violations of existing laws that result in the destruction of sacred sites; many tribes are becoming more pro-active in their efforts to save remaining sites. This comment letter, and the others like it, serves as a reminder of this effort. Hopefully, what has been written here will be seen as important by someone working with the developers, by someone planning this project, and by someone with conviction and integrity. Fairness must be added to an equation that has of yet remained un-equitable and unjust. Thank You for your consideration.

Sincerely

Eric Sanchez
Summer Associate, Wishtoyo Foundation

Letter No. 35

8/31/04

Agenda Item:

Good Evening Planning Commissioners:

Connie Worden- Roberts.
Tonight, I am wearing two hats. First, I chair the Transportation Committees for both the Chamber of Commerce and the Valley Industrial Association. In this capacity I am pleased to report to you that for a number of years the Transportation Committees have addressed and reviewed the importance of a fully integrated transportation system to serve the Santa Clarita Valley. 1

One of the vital corridors we have studied is the Cross Valley Connector. We recognize that it is a critical link connecting SR 14 to Interstate 5 and SR 126. The construction of this corridor will relieve some of the pressure on Soledad Cyn. Road, and greatly facilitate getting across SCV. You may be interested in knowing that long before most of us resided in SCV, the Los Angeles County Public Works Dept., back in 1965, drew up a map with an extremely similar road in recognition of its ultimate importance to this Valley.

Who uses this road? Currently many who work in the Western portion of SCV including the industrial and town centers. Many companies identify fully 20 to 30% of their workers reside in either Canyon Country and or Antelope Valley. Currently they use Soledad Canyon Road or SR 14 in getting to and from their jobs. 2

Additionally, I serve on both the Chamber of Commerce and the Valley Industrial Assn. As a Board Member, I joined with the others in taking the unanimous vote by both boards to concur with the City Council's position over the past two years: that the completion of this roadway is the "number one priority for our city". Requests for transportation improvements remain at the very top of the list of citizen demands.

However, the proposal before you this evening addresses more than just a vital roadway! It incorporates a proven bank stabilization plan that will preserve the river mostly in its natural state. Unlike the City's General which allowed 3,000 housing units, this plan requests a total of 1128 -there are 424 SFU, 380 town homes and 324 apartments. Only one acre of commercial development is proposed. A significant park of 29 acres is planned and a multi-use trail corridor is planned. 440 acres of open space and replanting of oak trees will occur. 3

As a City we can be truly grateful for the help our local Congressman has given to our Valley in securing some Federal funding to assist in the construction of this vital roadway. What you may not know is that among other issues this roadway is also a defense corridor linking as it does Vandenberg Base and Edwards Air Force Base. In these troubled terrorist times, this is something we must acknowledge. When I spoke to the Congressional Committee in the Spring of 2004, on which Congressman McKeon sits, he concurred as did the Committee Chairman Ishtuk in understanding its regional significance and the need to construct it.

4

For all of the positive features presented to you this evening, I urge the approval of the Riverpark development.

5

Letter No. 34

Agenda Item: 2

From the desk of . . .

Karen Pearson
26617 Gavilan Dr., Santa Clarita, CA 91350. Ph. & Fax 661 296 4438

August 31, 2004

Planning Commission
City of Santa Clarita
23920 West Valencia Blvd.
Santa Clarita, CA 91355

Regarding the Riverpark Project

Dear Chairman and Planning Commission Members,

This is to request that protection be given to my backyard at 26617 Gavilan Dr. and to the back yards of my neighbors on Gavilan Drive who are living at 26607 and 26611 Gavilan Drive in the planning of this project. There is a plot of land behind our three houses that is a concern to us. We do not want any chance for the abysmal, inconsiderate, rude planning to occur that occurred with the construction of the Bouquet Center. I am referring to the fact that the hill was removed and land was plowed up to the lot lines and adjacent bedroom windows of the homes along Espuella--after which dumpsters were placed there. I now wake up to the loud rattle of dumpsters at approximately 6:15 AM every week as a result. The dumpsters are at the end of my back yard and not even under my window. Neither do we want any chance of the land being plowed out to make a parking lot. In short, we do not want the land changed in any way.

There has been some consideration of this land being deeded to us, but that creates a problem in that I have been told if there is ownership then we could not keep our neighbors from building sheds or dumping stuff up there. I do not want my privacy encroached upon and I do not want my view encroached upon and I believe neither do my neighbors. I have been told that it is unlikely that the city would like to own that piece of property. Consequently, I believe at this point the best bet is to give it an open space designation which totally disallows any buildings or unnecessary structures or any dumping or any digging away of the land for purposes of creating parking spaces. (I was present when a representative of Newhall Land and Farming suggested that the definition of open space include parking lots.) Fortunately, the city does not define open space that way, but just in case they change their mind due to the great influence of Newhall Land and Farming, I would request that it be declared open space and then add the insurance statement that it shall never become parking for either the Bouquet Center or the apartments or condominiums of the Riverpark Project. 1

I am not an expert in these matters. There may be some other solution that is even better than the above suggestion, but I am unaware of it. If you have a better solution please offer it. We will already be inhaling more pollution because of the road going through and enduring more dust from the digging of this project and enduring more noise when the apartments go up. We have lost so much from the Bouquet Center already that we believe we are due a lot of consideration at this point. Before the dumpsters came I used to have my phone lines lined with singing sparrows. The crows came with the dumpsters. The sparrows are gone. Enough is enough.

It is my understanding that the hill behind Gavilan Drive will not be cut down in height and from our view will stay the same. We also understand that there will be a wall built from the 2

wall behind the Bouquet Center to the hill to block noise and pollution and the kids from the condos from entering our back yards. That this wall shall start approximately where the north end of that northern most building in Bouquet Center ends. All of these were negotiated with Newhall Land and Farming. They have been cooperative and I believe this last problem with the small lot we share can also find a good solution.

2

Thank you for your consideration of these requests.

Sincerely,

Karen Pearson

Letter No. 33

Received 6/15
9:32 p.m

THE HIGH DENSITY CONCERNS ARE MANY:

188 APARTMENTS NOT BUILT YET, BUT ALREADY OKED FOR MCBEAN AND NEWHALL RANCH ROAD THAT ARE NOT REFLECTED IN THE 91% RENTED FIGURE OF SURVEY.
490 APARTMENTS OKED BY L. A. COUNTY NEAR COPPERHILL, NOT BUILT YET, AND NOT REFLECTED IN THE 91% RENTED FIGURE.
867 THE 9% OF APARTMENTS NOT RENTED OF THE 9,640 APARTMENTS IN THE AREA, SINCE THERE IS A 91% RENTED RATE.
439 RIVER PROJECT SINGLE HOMES NOT BUILT YET.
744 RIVER PROJECT MULTI-FAMILY CONDOMINIUMS AND APARTMENTS NOT BUILT YET.

FOR A TOTAL OF 2,728 DWELLINGS NOT BUILT IF RIVER PROJECT GOES AT HIGH DENSITY, COUNTING OTHER PROJECTS OKED AND NOT BUILT, AND THE 9% VACANT APARTMENTS BUILT, BUT NOT RENTED.

1

Stacy Kelleher
submitted

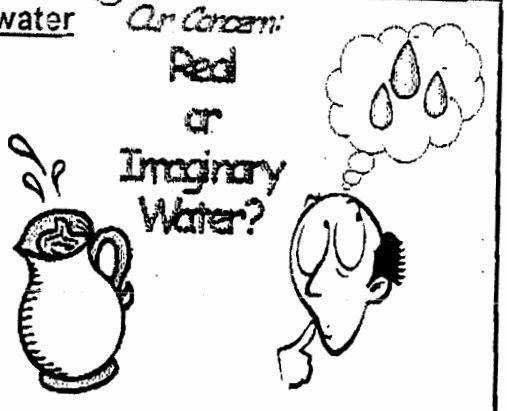
HC Mtg 7/15/04

Rec'd on Item 1 By Lynne Plambeck

You may have heard about our new Resolution on water availability. Here's the scoop!

What Our Resolution Does:

- Stops counting water from the five wells shutdown due to perchlorate pollution as "available"
- Clarifies the reliability of water supply we get from Northern California
- Makes clear that additional water supply from proposed projects like desalination of sea water will not be counted until that water is on hand



New building developments are approved by planners based in part on water supply. We have clarified our water numbers so that planners understand our water situation better. We don't want existing residents and businesses to suffer in the future because all the details weren't spelled out.

This action mirrors state law enacted by Senate Bills 610 and 221, which mandate that planning decisions for large projects must be based on finalized, rather than pending, water sources.

1

Final – Approved 1/29/04

RESOLUTION NO. 2004-3

RESOLUTION OF THE BOARD OF DIRECTORS OF

NEWHALL COUNTY WATER DISTRICT

REGARDING WATER SUPPLY AND DEMAND

PREAMBLE

This resolution provides notice to the public that the District intends to protect the rights of its current customers to safe, dependable and adequate domestic water supplies on an ongoing basis and in all water supply assessments and verifications, to utilize the best available knowledge concerning supplies, the current information on which is summarized in the following resolution. After much deliberation, the Board is proposing to adopt the following resolution to send the strongest message possible to the public:

1) That, at least as far as the District is concerned, there is not sufficient current supply of water to meet all current and future demands, especially in times of drought or other emergency;

2) That, as stated in *SCOPE v. County of Los Angeles and Newhall Land and Farming Company* (2003) 106 Cal. App. 4th 715,131 Cal. Rptr 2d 186, the State Water Project (SWP) "entitlements are based on a state water system that has not been completed. There is a vast difference between entitlements and the amount of water that SWP can actually deliver;"

3) That the Urban Water Management Plan 2000 being relied upon in granting entitlements to develop and build is inaccurate in its assessment of current supply; and

4) That in its actions regarding water service, the District will be guided by its decisions as to the available supply based upon the facts set forth in the accompanying resolution.

By adopting this resolution the District is not purporting to amend or change the current regional Urban Water Management Plan 2000 ("UWMP 2000"). By this resolution, however, the District does intend to put members of public and planning agencies with jurisdiction over the Santa Clarita Valley on notice that the continued granting of rights to develop property without proof of adequate water supplies and infrastructure is irresponsible. This resolution also is intended to make the District customers aware of the fact that any loss or damage resulting from city and county planning agencies ignoring the true facts regarding water supply and intentionally allowing additional growth, not supported by adequate supply, will be the responsibility of those planning agencies.

WHEREAS, State Water Project (SWP) water presently constitutes the majority of water served to NCWD customers, and in some areas is the exclusive water available; and

WHEREAS, the remaining water supplies of the District are primarily derived from the extraction of groundwater by wells overlying the Alluvial Aquifer and Saugus Formation; and

WHEREAS, the UWMP 2000 Table 1-4 "Total Existing and Planned Supplies" of water (Exhibit A to this Resolution) is among the factors used by planners to determine whether adequate water supplies exist to meet specific project demands; and

Alluvial Aquifer

WHEREAS, according to the December 10, 2003 CH2M Hill presentation titled "Groundwater Modeling Analysis, Upper Santa Clara River Basin" stated that 700-1000 acre-feet per year of water in the Alluvial Aquifer are currently not available due to Perchlorate pollution; and

WHEREAS, one Santa Clarita Water Company (SCWC) well in the Alluvial Aquifer has been taken out of service due to Perchlorate contamination; and

WHEREAS, the area impacted by the Perchlorate pollution in the Alluvial Aquifer has not been characterized as of the date of this resolution; and

WHEREAS, a Remedial Action Plan for local groundwater affected by Perchlorate pollution is not projected to be complete until August 2005 and certification of final cleanup is not expected until August 2010, according to the November 2003 schedule from the Department of Toxic Substances Control: and

WHEREAS, the December 1986 "Hydrogeologic Investigation: Perennial Yield and Artificial Recharge Potential of the Alluvial Sediments in the Santa Clarita River Valley of Los Angeles County, California" by Richard C. Slade ("Slade") studied 30 wells over a 28-year base period and found a practical perennial yield of 31,600 to 32,600 acre-feet per year from the Alluvial Aquifer before the Perchlorate contamination was found; and

WHEREAS, the 1990 Kennedy/Jenks/Chilton report "Conjunctive Use of the Saugus Aquifer: Castaic Lake Water Agency" stated "from the alluvial aquifer the safe yield is anticipated to be 32,500 acre-feet/year;" and

WHEREAS, many additional public agency reports during the period of 1993-1999 incorporated and referenced the 31,600-32,600 acre-feet per year safe perennial yield figure; and

WHEREAS, the July 2002 Slade report entitled "2001 Update Report: Hydrogeologic Conditions in the Alluvial and Saugus Formation Aquifer Systems" reiterated that perennial yield "represents a long-term average value for annual yield" and introduced the concept of "operational yield" which was defined as "a fluctuating value of pumpage that may be above or below the perennial yield in any given year, and that varies as a function of the availability of other water supplies. The basic intent of the operational yield value is that it should not exceed the perennial yield of the groundwater basin over multi-year wet and dry cycles;" and

WHEREAS, the 2002 Slade report did not quantify in detail a safe yield or a perennial yield, which is defined in the 1986 report as "the quantity of groundwater" that "can be pumped annually without any change in groundwater levels or net change in groundwater in storage over the Base Period" (28 years), and

WHEREAS, the 2002 Slade report did state that the Alluvial Aquifer "on a long-term average basis can be operated at an average pumping volume on the order of 10 percent higher than was reported as a 'practical or perennial yield' in 1986," but the report based that conclusion on "the combination of historical observations and current planning;" and

WHEREAS, the 2002 Slade report referred to "current planning" that included the UWMP 2000 and the future commitment via a MOU between the "Santa Clarita Valley Water Purveyors and the downstream United Water Conservation District to develop a numerical groundwater flow model in order to analyze in greater detail how this aquifer system can be operated;" and

WHEREAS, the numerical flow model is not complete as of the date of this resolution; and

WHEREAS, the 2002 Slade report cited increased recharge from Water Reclamation Plants as a reason for higher potential yields, but the Water Reclamation Plants are not located in areas that would recharge the eastern part of the Alluvial Aquifer system; and

WHEREAS, the 2002 Slade report did not address other factors such as loss of recharge areas due to development and increased flood control channeling; and

WHEREAS, the December 1986 Slade report (referenced above) stated "... urbanization has had a rather startling impact on the availability of areas for recharge.... All recharge to the aquifer system does not occur in the low-flow channels of the river and its tributaries, but infiltrates over much of the alluviated areas which are not within the flood channels of the Santa Clara River system. Paving of these areas has, and will continue to reduce the net effective area for natural recharge to the underlying groundwater system;" and

WHEREAS, the Alluvial Aquifer has been pumped above the safe perennial yield since 1994; and

WHEREAS, the alluvial groundwater level in the eastern basin has been dropping, which may be caused by weather patterns, increased development, increased pumping, or a combination of the foregoing and possibly other factors; and

Saugus Formation

WHEREAS, the December 2003 CH2M Hill presentation (referenced above) stated that 4,000 acre-feet/year of water in the Saugus Formation are currently not available due to Perchlorate pollution; and

WHEREAS, NCWD Well #11, two SCWC wells, and one Valencia Water Company well in the Saugus Formation have been taken out of service due to Perchlorate pollution; and

WHEREAS, the Winter 2003 "Water Currents" newsletter published by Castaic Lake Water Agency states that the four closed Saugus Formation wells have a combined maximum production of 14,500 acre-feet per year; and

WHEREAS, the area impacted by the Perchlorate pollution in the Saugus Formation has not been characterized as of the date of this resolution; and

WHEREAS, a Remedial Action plan for cleanup of Perchlorate in local groundwater is not projected to be complete until August 2005 and certification of final cleanup is not expected until August 2010, according to the November 2003 schedule from the Department of Toxic Substances Control; and

Recycled Water

WHEREAS, Table 1-4 (Exhibit A attached) references recycled water supply amounts up to 17,000 acre-feet per year, but existing facilities only supply 1700 acre-feet per year and new facilities are not planned or budgeted in the NCWD area; and

WHEREAS, the UWMP 2000 states that the Saugus Water Reclamation Plant (WRP) cannot be expanded and both the Valencia WRP and the proposed Newhall Ranch WRP exist on the western edge of the CLWA service area, limiting the areas to which recycled water could be practically provided; and

WHEREAS, to serve the eastern portion of the Valley with reclaimed water, a new WRP would be required; and

WHEREAS, the technical and economic feasibility determination for the potential recycled water use in the CLWA service area has not yet been finalized; and

SWP Water

WHEREAS, the current maximum CLWA "Table A" entitlement to State Water Project (SWP) water is 95,200 acre-feet per year; and

WHEREAS, according to the 2002 State Water Delivery Reliability Report, 90% of the time deliveries can be at or above 30% of the full Table A amount, and 80% of the time deliveries can be at or above 50% of the Table A amount; and

WHEREAS, the reliability criteria established in Chapter 4.0 of UWMP 2000 states that "this criterion requires water supply to be sufficient to meet projected demands 90 percent of the time;" and

WHEREAS, that, as stated in *SCOPE v. County of Los Angeles and Newhall Land and Farming Company* (2003) 106 Cal. App. 4th 715,131 Cal. Rptr 2d 186, the State Water Project (SWP) "entitlements are based on a state water system that has not been completed" and "there is a vast difference between entitlements and the amount of water that SWP can actually deliver;" and

WHEREAS, SWP water deliveries could be interrupted in an emergency; and

Un-Finalized Water Sources

WHEREAS, Table 1-4 (Exhibit A attached) includes supply numbers for new wells in the Saugus Formation, water banking/conjunctive-use, water transfers, and desalination, yet no finalized, approved plans or budgets for these items exist in the CLWA or NCWD area; and

WHEREAS, many of these supplemental supply projects would require extensive infrastructure improvements; and

WHEREAS, California Water Code Division 6 Part 2.6 Chapter 1 (the Urban Water Management Planning Act) Section 10631(c) states that the preparer of an UWMP shall "for any water source that may not be available at a consistent level of use, given specific legal, environmental, water quality, or climactic factors, describe plans to supplement or replace that source with alternative sources or water demand management measures, to the extent practicable" and the UWMP 2000 does not contain detailed information to that end for the projected, but not implemented, new Saugus wells, water banking/conjunctive-use, water transfers, desalination, and recycled water sources; and

WHEREAS, without specific perennial yield figures for the Saugus aquifer, new wells in the Saugus aquifer can not be assumed to provide additional water, but rather only additional pumping points for the same total bank of water from which the current Saugus wells draw.

NOW, THEREFORE, BE IT RESOLVED that, based on the foregoing recitals, the NCWD Board of Directors resolves and makes the following determinations, reserving to itself the right to make changes as new facts, data or studies justify in the opinion of NCWD Board of Directors; for planning purposes, NCWD no longer has confidence in the water supply and availability numbers in Table 1-4 (and identical tables) in the UWMP 2000;

FURTHER RESOLVED, that in response to any inquiry from cities, county, developers or the public generally NCWD will provide the water supply and availability statistics as presented in Exhibit B attached to this resolution.

FURTHER RESOLVED, that the supply from the alluvial aquifer will be based on the perennial yield of 31,600-32,600 acre feet/year as established in the 1986 Slade report. Because the perennial yield is a long-term average based on wet and dry years, no differentiation will be made between wet and dry year. Pending characterization, containment and/or remediation, the current supply will be reduced by the amount of Perchlorate contaminated water (700-1000 acre feet/year at current estimate.) The contaminated water will be counted as "unfinalized supply," with restoration of water supply counted incrementally as remediation to drinking water standards occurs and individual well production is restored with DHS and DTSC approval.

FURTHER RESOLVED, that any increase in pumping not offset by imported supplies or other factors will be supported only for short terms, unless future comprehensive groundwater studies clarify that longer term pumping that pushes averages above the perennial yield will not harm the aquifer.

FURTHER RESOLVED that the numbers over the perennial yield values for the Alluvial Aquifer will not be used for any planning purposes other than emergency planning or when necessary to meet short term demands of existing customers.

FURTHER RESOLVED, pending characterization, containment and/or remediation; that the current supply (7,500-15,000) from the Saugus Formation will be reduced by the amount of Perchlorate-contaminated water, which is currently estimated at between 4,000-14,500 acre-ft. The contaminated water will be counted as "unfinalized supply," with restoration of water supply counted incrementally as remediation to drinking water standards occurs and individual well production is restored with DHS and DTSC approval.

FURTHER RESOLVED, that new columns for "unfinalized additional supply" were added to the planning table in Exhibit B to differentiate between water that is available and water that is only in the conceptual planning stages. Unfinalized additional supply means that conceptual plans have been made, but no budget, approved capital project, or contractual construction or purchase deadline exists. These supplies may be constrained, limited, or voided by economic or legal issues. Water from the UWMP 2000 categories of "Saugus formation new wells," "recycled water," "water

banking/conjunctive use," "water transfers" and "desalination" have been moved to the unfinalized supply columns until they are finalized.

FURTHER RESOLVED, that potential water from new Saugus Formation wells will not be considered new "finalized supply" until it can be shown that the formation has a perennial yield above the total supply specified in Exhibit B for the existing Saugus wells (7,500-15,000 acre-ft/year.)

FURTHER RESOLVED, that until adequate assurances exist, water in the "unfinalized additional supply" column of Exhibit B will not be considered as available.

PASSED AND ADOPTED this 29th day of January, 2004, by the Board of Directors of the Newhall County Water District.

Lynne Plambeck, President of the
Board of Directors of the
NEWHALL COUNTY WATER DISTRICT
ATTEST:

Kenneth J. Petersen, General Manager
NEWHALL COUNTY WATER DISTRICT

Attach: Exhibit A
Exhibit B

STATE OF CALIFORNIA)
) ss.
COUNTY OF LOS ANGELES)

I, KARIN J. RUSSELL, Secretary of the Newhall County Water District, DO HEREBY CERTIFY that the foregoing is a full, true and correct copy of Resolution No. 2004-3 of the Board of Directors of Newhall County Water District adopted at a Special Meeting held on January 29, 2004 and that the same has not been amended or repealed.

Karin J. Russell, Secretary,
NEWHALL COUNTY WATER DISTRICT

DATED: January 31, 2004

Exhibit A

Table 1-4
Total Existing and Planned Supplies
(acre-feet per year)

Source	Average/Normal Year	Dry-year
Local Supplies		
Groundwater		
Alluvial Aquifer	30,000-40,000	30,000-35,000
Saugus Formation	7,500-15,000	11,000-15,000
Saugus Formation (new wells)*	–	10,000-20,000
Stormwater*	–	–
Recycled Water*	1,700-17,000	1,700-17,000
Imported Supplies		
SWP Supplies	56,800-95,200	37,900-75,800
Water Banking/conjunctive-use*	–	105,000
Water Transfers*	5,200-8,700	3,500-6,900
Desalination*	2,000-5,000	2,000-5,000
Total Supplies	**103,200-180,900**	**201,100-279,700**

*Planned programs for future implementation.

Source: UWMP 2000

Exhibit A to NCWD Resolution 2004-3
Inital: _____
Dated: January 31, 2004

Exhibit B

Total Existing and Planned Supplies
(acre-feet per year unless noted)

Source	Current and Finalized Future Supply: Average/Normal Year Range[5]	Current and Finalized Future Supply: Average/Normal Year Average	Current and Finalized Future Supply: Dry Year[2] Range[4]	Current and Finalized Future Supply: Dry Year[2] Average	Existing Back-up Dry Year Supply[1]
Local Supply					
Groundwater					
Alluvial Aquifer	30,750-31,750 [3]	31,250	30,750-31,750 [3]	31,250	
Saugus Formation	0-5,750 [6]	2,875	0-5,750 [6]	2,875	
Saugus Formation (new wells)					
Stormwater					
Recycled Water (NOT potable)	1,700	1,700	1,700	1,700	
Imported Supply					
SWP	28,560-47,600 [7]	38,080	28,560-47,600 [7]	38,080	
Water Banking/conjunctive use					21000 af
Water Transfers					
Desalination					
Total Supply		73,905		73,905	21000 acre-feet (total, not per year)
Total Potable Supply		72,205		72,205	21000 acre-feet (total, not per year)

Source	Unfinalized Additional Supply[1]: Average/Normal Year Range[5]	Unfinalized Additional Supply[1]: Average/Normal Year Average	Unfinalized Additional Supply[1]: Dry Year[2] Range[4]	Unfinalized Additional Supply[1]: Dry Year[2] Average
Local Supply				
Groundwater				
Alluvial Aquifer	700-1000 [4]	850	700-1000 [4]	850
Saugus Formation	4,000-14,500 [4]	9,250	4,000-14,500 [4]	9,250
Saugus Formation (new wells)	10,000-20,000 [6]	15,000	10,000-20,000 [6]	15,000
Stormwater				
Recycled Water (NOT potable)	15,300	15,300	15,300	15,300
Imported Supply				
SWP	0-57,120	28,560	0-57,120	28,560
Water Banking/conjunctive use			0-84,000	42,000
Water Transfers	3,200-8,700	4,950	3,500-6,900	5,200
Desalination	2,000-5,000	3,500	2,000-5,000	3,500
Total Additional Supply incl. Non-Potable only if all Future Projects Approved and Built [8]		78,410		119,660
Total Additional Potable Supply only if all Future Projects Approved and Built [8]		64,110		104,360

Note: All numbers are from UWMP 2000 unless otherwise noted below.

[1] Unfinalized additional supply means that conceptual plans have been made, but no budget, approved capital project, or contractual construction or purchase deadline exists. These supplies may be constrained or limited by economic or legal issues.

[2] Dry Year means a short term period during drought. Supplies listed in these columns should be viewed as contingency planning only and are not considered sustainable on a long-term basis.

[3] Perennial yield (31,600-32,600 af/yr per Slade, 1986) less average of range of loss (850 af/yr) due to perchlorate contamination.

[4] Estimated amount currently lost to perchlorate contamination per 12/2003 CH2MHill presentation and Winter 2003 CLWA "Water Currents."

[5] UWMP 2000-stated supply (7,500-15,000 af/yr based on operational yield) less average of range of loss (9,250 af/yr) from perchlorate contamination.

[6] New Saugus wells will not yield additional water supply beyond the perennial yield of the formation, which has not been quantified.

[7] Per 2002 DWR Reliability Report, 90% of the time deliveries can be made at or above 30% of the full Table A amount, and 80% of the time deliveries can be at or above 50% of the Table A amount. The range in the current supply column reflects 80-90% reliability and in some cases water deliveries will be lower than what is shown. Our current full Table A amount is 95,200 af/yr. 95,200 af/yr minus the average of the "current supply" range (38,060) is shown as unfinalized additional supply. SWP deliveries vary unequally.

[8] An additional one-time stored excess of 21,000 acre-ft currently exists in a water bank for dry year supply. This amount is not to be counted when planning for future projects. This amount may not reoccur in the future, and is required by court settlements to be provided to current users only. The UWMP 2000 estimated a total of 105,000 acre-feet potential exists for water banking. The remainder (105,000 minus 21,000) is listed in the unfinalized supply column on this table.

[9] Where ranges exist, the midpoint of the range was used for calculating totals.

Letter No. 31

4/29/04 PC Hearing

Dear Planning Commission members;

I said I would submit a letter signed by the residents of Gavilan Dr. (The street right by the planned Riverpark development) stating the actual sentiment of the residents and here it is (Enclosed).

In short everyone is vehemently against carving down the ridgeline as every foot that is removed the higher the decibels (Volume of noise) from 12 lanes of busy traffic (6 of Soledad and 6 of the proposed Newhall Ranch road) . High noise levels mean lower property values and noise is uncomfortable and stressful. I work out of my house and my office faces this potential noise source. This natural barrier also helps stop traffic pollution. 1

On top of that the residents of Gavilan Dr. as well as Emblem homes love that hill, love the wildlife and will be very upset to see it carved up by bulldozers (5 million Cubic ft.!), not to mention the dust, diesel and noise pollution in the air that this will cause.

The 300 or so grade school children from this project (Which I think is a conservative estimate) will again crowd Emblem School and create a hazard as Espuella, a small residential street cannot safely handle that amount of traffic. The school will only be about 200 yards from all this proposed grading and bulldozing exposing the children to the above mentioned pollution . 2 3 4

Why must we, the residents of this community, sacrifice, so the developers can make themselves wealthy ? 5

I have made copies of newspaper articles that are very alarming. I have lived in the area since 1960 and I am seeing this area being destroyed by over-development and the resident's existences being compromised by profit minded entities that care ONLY about profit.

PLEASE... do the right thing.

John Gonzalez 26604 Gavilan Dr Saugus CA 91350

John Gonzalez

WE, residents of Gavilan Dr (Saugus). declare the following .

We do not want the hill or ridgeline taken down any degree or amount as this is a natural barrier against traffic noise and noise from the shopping area . We will especially need it intact if the CROSS VALLEY connector goes through to help shield us from **12** lanes of traffic including in all probability increased truck noise going through gears from the intersection of Bouquet and Soledad and Newhall Ranch road. . Noise pollution will **lessen** our property values .

We DO NOT want the ridgeline changed as it is part of the aesthetics of our area.

We DO NOT want to tolerate the noise of bull-dozers and graders moving **5 million** cubic feet of dirt.

We do not want to breath the dust of such a project and risk respiratory diseases such as valley fever We do not want our children to breath this material as the area already has bad air quality and we do not want the children of Emblem school (only a few hundred feet from the proposed site) to breath this dusty air.

We do not want more school traffic that this project will cause (The 300 or so children from the new houses). The access to EMBLEM school is very limited causing a hazard for the children and causing congestion on this small residential street . People dropping off and picking up children park illegally on Gavilan Dr. causing safety problems as it is.

In general we would prefer these 1100 homes be built elsewhere and this land left alone .

John M Gonzalez 26604 Gavilan Dr
John M. Gonzalez
April Garland, 26604 Gavilan Pl., Saugus, CA 91350
April Garland
Karen Pearson 26617 Gavilan Dr, Saugus, CA
Karen Pearson
Michael Mulligan 26621 Gavilan Dr Saugus Ca
Michael Mulligan
Maria Delapaz 26608 Gavilan Dr. Saugus CA
James Delapaz 26608 Gavilan dr. Saugus CA

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DONA BALSZ Nora Balsz 26620 Gavilan Dr. 91350
HENRY BALSZ Henry Balsz 26620 GAVILAN DR 91350
Anita Nogales ANITA NOGALES 26614 GAVILAN DR
Frank L. Nogales FRANK G. NOGALES 26614 GAVILAN DR
Kay Wangelio KANG WANG etto 26611 Gavilan Dr 91350
Reynaldo Arroyo / Adriana G. Arroyo 26607 Gavilan Dr. 91350

Friends of the Santa Clara River
660 Randy Drive Newbury Park, California 91320 (805) 498-4323

8-6-04

RECEIVED
PLANNING DIVISION
AUG 10 2004
PLANNING AND BUILDING SERVICES
CITY OF SANTA CLARITA

Community Development
City of Santa Clarita
23920 Valencia Blvd.
Santa Clarita, Ca. 91355

Board of Directors

Ron Bottorff
Chair
Barbara Wampole
Vice Chair
Ginnie Bottorff
Secretary

Affiliated Organizations

California Native Plant Society

Santa Clarita Organization for Planning the Environment (SCOPE)

Sierra Club, Angeles Chapter

Sierra Club, Los Padres Chapter

Surfrider Foundation

Ventura Audubon Society

Re: River Park Project MC#02-175

Dear Sirs:

Please include the following correspondence between our attorney and the Department of Water Resources and their response regarding the timeline for the completion of the Monterey Agreement Environmental Impact Report. We continue to protest that you may not approve projects based on this water transfer were two environmental impact reports have been decertified. This would mean that the water transfer project is proceeding without any CEQA documentation. Such action is precluded by law. 1 2

Further, we also wish to state that none of these documents, nor the current EIR before you address the effects of an earthquake or levee break (such as recently occurred in the Sacramento Delta, news article attached). These emergencies were also not addressed in the Urban Water Management Plan 2000. We ask that the City address how they intend to manage such a water emergency under current water availability scenarios and how water supply would be affected under such an emergency with the additional strain caused by this project. 3 4 5

We ask that the City respond to the recommendations made by the two experts, Kathy Kelly and Jonas Minton who gave testimony regarding State Water project availability at your June 29th hearing. They both suggested that the City analyze the effect of cutbacks that would be required under the worst case historical delivery rate, 13% of Title A amounts in 1991, on existing businesses and residents in the Santa Clarita Valley. Since ground water sources are fully utilized, substantial cutbacks would be required. Even more cutbacks would be required if this project is approved. The City has not addressed this significant impact. 6

We incorporate by reference the testimony of these two experts, heard as Item 1 on June 29th , into the River Park hearing. Their testimony immediately preceded agenda item 2 on River Park the same evening. Many of the questions and responses on this presentation pertained to the River Park hearing, so it is proper to include this testimony in the River Park record. 7

Thank-you for your time.

Sincerely,
RON BOTTORFF, Chair

Attachments :

1. Correspondence from Alyse Lazar to DWR dated May 18th, 2004 re: Status of Monterey Agreement EIR
2. Correspondence from DWR to Alyse Lazar dated June 16th, 2004 re: Status of Monterey Agreement EIR
3. LA Times News Article on Levee break dated June 4th, 2004

LAW OFFICE OF
ALYSE M. LAZAR
Attorney at law
3075 East Thousand Oaks Blvd., Suite 100
Westlake Village, California 91362

Admitted to practice
STATE BAR OF CALIFORNIA
NEW YORK STATE BAR

Telephone: (805) 496-5390
Facsimile: (805) 496-7462

May 18, 2004

Lester Snow, Director
Department of Water Resources
Room 1115-1
P.O. Box 942836
Sacramento, California 94236

RE: New Monterey Agreement EIR

Dear Director Snow:

Pursuant to the Court decision in *Planning & Conservation League v. Department of Water Resources* (2000) 83 Cal.App.4th 892 (hereafter "*PCL*"), the Department of Water Resources is required to prepare a new Environmental Impact Report regarding all aspects of the Monterey Amendments. I understand that you will be overseeing this process.

The Settlement Agreement that was entered into between all of the parties to the *PCL* case on May 5, 2003 set forth various requirements for the EIR. According to Attachment E-1 of this Settlement Agreement, the parties specifically excluded the 41,000 afy entitlements purchased by Castaic Lake Water Agency ("CLWA") emanating from the Monterey Amendments from the list of final transfers. It is therefore my understanding that your office will be evaluating the environmental impacts of this 41,000 afy transfer as part of the Environmental Impact Report for your project (the Monterey Amendments Project.) In fact, page 11, paragraphs III C.4 of the Settlement Agreement mandates DWR to analyze the potential environmental effects relating to CLWA's project ("the Kern-Castaic Transfer").

As you may also be aware, the EIR prepared by CLWA for the 41,000 afy transfer was decertified by the Los Angeles Superior Court on November 1, 2002 in *Friends of the Santa Clara River v. Castaic Lake Water Agency*, Los Angeles County Superior Court Case No. BS 056954. In order for CLWA's new EIR to be legally sufficient and in conformance with the appellate court's decision, it must contain an analysis of the potential environmental effects of the Kern-Castaic Transfer on the entities that have and will continue to lose this 41,000 afy source of water due to the transfer as well as the impacts on the State Water Project ("SWP") system resulting from the movement of this water from its source in Kern County to Santa Clarita. Logically and in conformance with CEQA, both DWR's EIR and CLWA's EIR must contain an analysis of the impacts from this loss of water upon Kern County agricultural users as well as all others affected by the transfer.

I currently represent Friends of the Santa Clara River in the *Friends of the Santa Clara River v. Castaic Lake Water Agency*, litigation. In the Judgment Granting Peremptory Writ of Mandate in the Friends' case, the Court ordered that it " retains jurisdiction until respondent Castaic Lake Water Agency certifies an Environmental Impact Report that complies with the California Environmental

May 18, 2004 letter to Dir. Snow, Dept of Water Resources

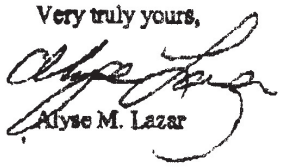
Quality Act and is consistent with the views expressed by the Court of Appeal Opinion filed January 10, 2002, Case No. B 145283."

For these reasons, I am requesting that you provide me with a copy of any analysis performed to date by DWR regarding the potential environmental impacts of the Kern-Castaic transfer, whether in draft or final form.

Additionally, please advise me of the procedural steps that DWR will take before making a determination whether or not to approve the Kern-Castaic transfer as a "final" transfer and the criteria that will be utilized for making this determination. If there is a proposed schedule for the completion of the Monterey Amendments EIR and/or for these procedural steps for determining whether or not to approve the Kern-Castaic transfer as a long-term transfer, please provide me with a copy of same.

I would appreciate receiving this information from you by May 28, 2004. If you have questions regarding the above or would like to discuss the matter, please call me at (805) 496-5390. Thank you for your anticipated assistance. I look forward to hearing from you.

Very truly yours,



Alyse M. Lazar

cc: Delores Brown

STATE OF CALIFORNIA – THE RESOURCES AGENCY
ARNOLD SCHWARZENEGGER, Governor

DEPARTMENT OF WATER RESOURCES
1416 NINTH STREET, P.O. BOX 942836
SACRAMENTO, CA 94236-0001
(916) 653-5791

JUN 1 7 2004

Alyse M. Lazar, Esq.
3075 East Thousand Oaks Boulevard, Suite 100
Westlake Village, California 91362

Dear Ms. Lazar:

In response to your letter of May 18, 2004, the Department of Water Resources (DWR) is preparing an Environmental Impact Report (EIR) on the Monterey Amendments and the Settlement Agreement resulting from the Court of Appeal decision in *Planning and Conservation League v. Department of Water Resources* (2000) 83 Cal.App.4th 892.

DWR's treatment of the transfer of Table A amounts from Kern Country Water Agency to Castaic Lake Water Agency will be governed by the Settlement Agreement. As provided in Paragraph III.C.4 of the Settlement Agreement, the EIR will include an "analysis of the potential environmental impacts relating to (a) the Attachment E transfers, and (b) the Kern-Castaic Transfer, in each case as actions that relate to the potential environmental impacts of approving the Monterey Amendments." Section 1(O) of the Settlement Agreement defines the "Kern-Castaic Transfer" as "the transfer of 41,000 acre feet of water from Kern Country Water Agency to the Castaic Lake Water Agency, approved by DWR on March 31, 1999." DWR has not completed any draft or final analysis regarding these transfers. Attached is an estimated schedule for completion of the EIR.

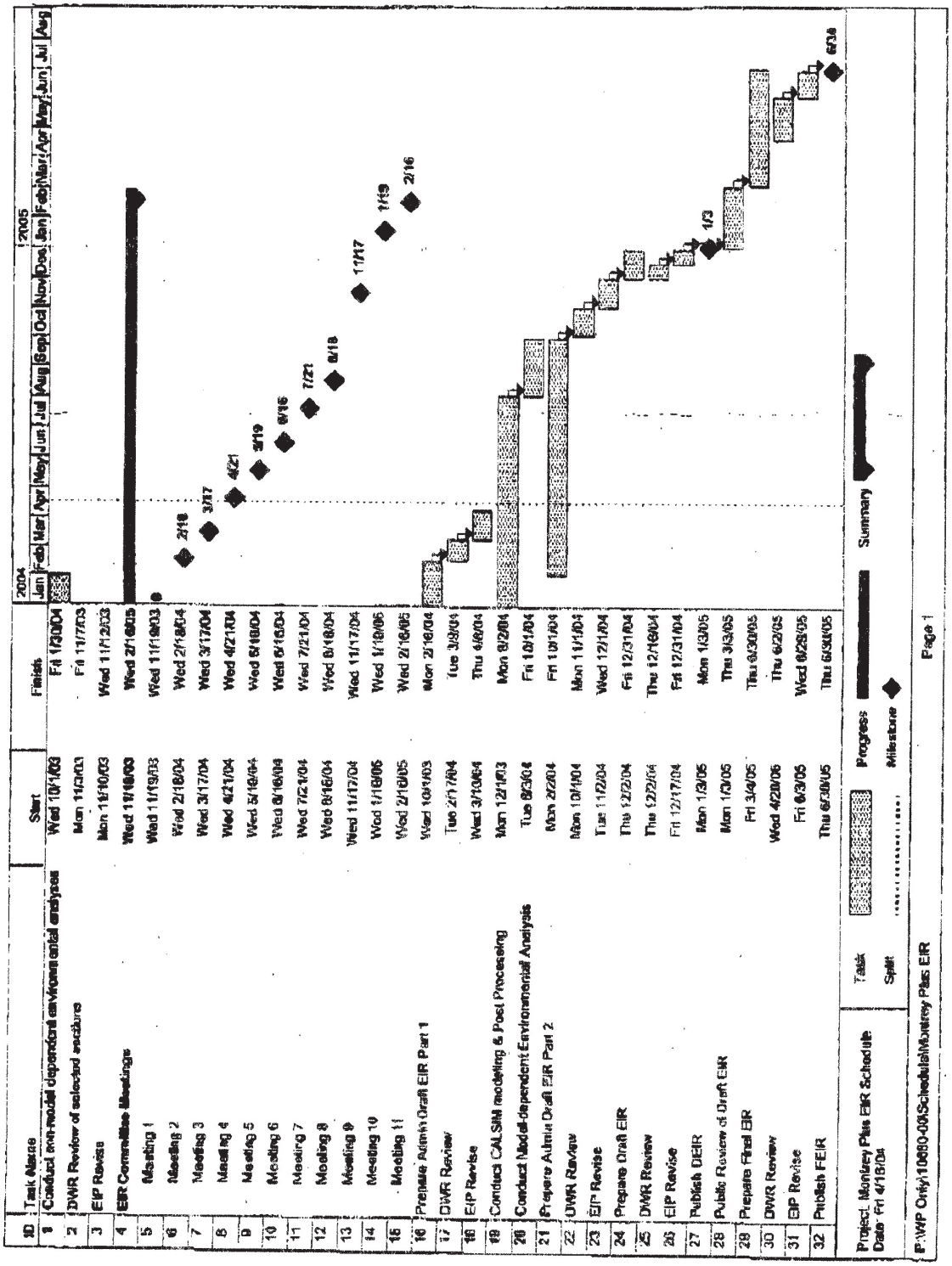
The Settlement Agreement (Section III.E) also provides "with respect to Section III.(C)(4)(b) regarding the Kern-Castaic Transfer, the Parties recognize that such water transfer is subject to pending litigation. The Parties agree that jurisdiction with respect to that litigation should remain in that court and that nothing in this Settlement Agreement is intended to predispose the remedies or other actions that may occur in that pending litigation."

If you would like further information regarding the EIR on the Monterey Amendments and the Settlement Agreement, please contact Delores Brown at (916) 227-2407.

Sincerely,

for Lester A. Snow
Director

Attachment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Task Name
Start
Finish
2004
2005
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug
1 Conduct non-model dependent environmental analyses Wed 10/1/03 Fri 1/30/04
2 DWR Review of selected sections Mon 11/24/03 Fri 11/7/03
3 EIP Revise Mon 11/10/03 Wed 11/12/03
4 EIR Committee Meetings Wed 11/19/03 Wed 2/16/05
5 Meeting 1 Wed 11/19/03 Wed 11/19/03
6 Meeting 2 Wed 2/18/04 Wed 2/18/04
7 Meeting 3 Wed 3/17/04 Wed 3/17/04
8 Meeting 4 Wed 4/21/04 Wed 4/21/04
9 Meeting 5 Wed 5/19/04 Wed 5/19/04
10 Meeting 6 Wed 6/16/04 Wed 6/16/04
11 Meeting 7 Wed 7/21/04 Wed 7/21/04
12 Meeting 8 Wed 8/18/04 Wed 8/18/04
13 Meeting 9 Wed 11/17/04 Wed 11/17/04
14 Meeting 10 Wed 1/19/05 Wed 1/19/05
15 Meeting 11 Wed 2/16/05 Wed 2/16/05
16 Prepare Admin Draft EIR Part 1 Wed 10/1/03 Mon 2/16/04
17 DWR Review Tue 2/17/04 Tue 3/9/04
18 EIP Revise Wed 3/10/04 Thu 4/8/04
19 Conduct CALSIM modeling & Post Processing Mon 12/1/03 Mon 8/2/04
20 Conduct Model-dependent Environmental Analysis Tue 8/3/04 Fri 10/1/04
21 Prepare Admin Draft EIR Part 2 Mon 2/2/04 Fri 10/1/04
22 DWR Review Mon 10/4/04 Mon 11/1/04
23 EIP Revise Tue 11/2/04 Wed 12/1/04
24 Prepare Draft EIR Thu 12/2/04 Fri 12/31/04
25 DWR Review Thu 12/2/04 Thu 12/16/04
26 EIP Revise Fri 12/17/04 Fri 12/31/04
27 Publish DEIR Mon 1/3/05 Mon 1/3/05
28 Public Review of Draft EIR Mon 1/3/05 Thu 3/3/05
29 Prepare Final EIR Fri 3/4/05 Thu 6/30/05
30 DWR Review Wed 4/20/05 Thu 6/2/05
31 EIP Revise Fri 6/3/05 Wed 6/29/05
32 Publish FEIR Thu 6/30/05 Thu 6/30/05
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Date: Fri 4/16/04
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Progress
Milestone
Summary
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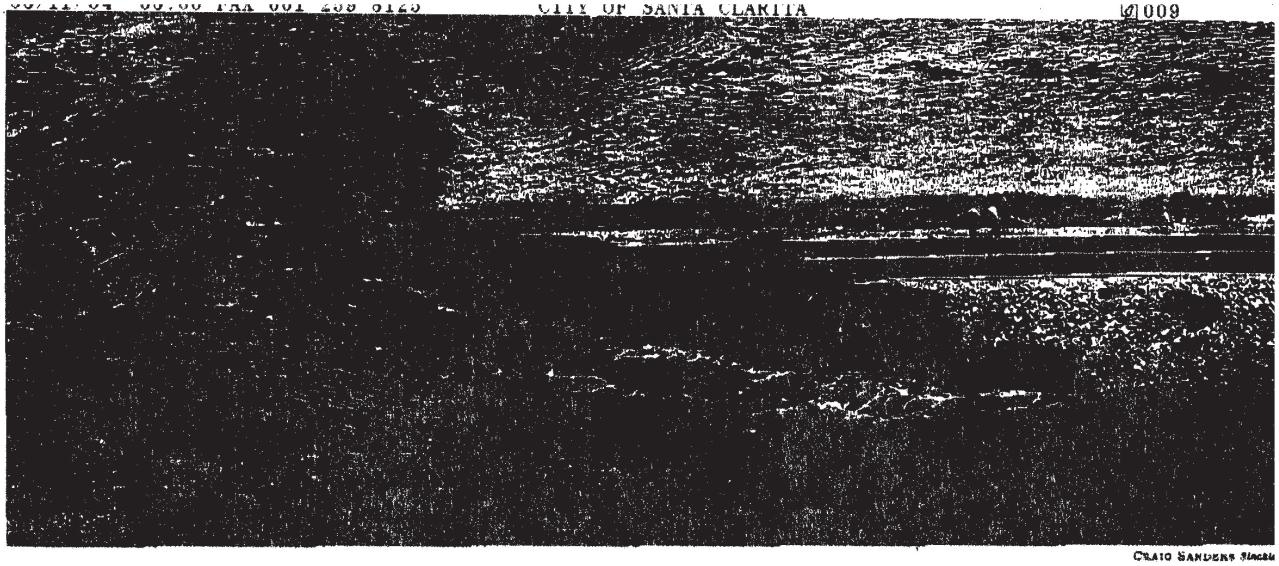
Page 1



CRAIG SANDERS Staff

A TORRENT: *Water pours through an estimated 300-foot break in a levee along the Middle River into low-level farmland about 20 miles west of Stockton.*

Levee Break Forces 300 to Evacuat

San Joaquin Valley farmland is flooded, shutting a rail line. Drinking water supplies for millions could be affected.

By SARA LIN
Times Staff Writer

A levee break in fields west of Stockton on Thursday morning prompted the evacuation of about 300 people from a farming community, and forced federal and state water agencies to slow the pumping of delta water for irrigation and drinking water.

The break, estimated at 300 feet long, was discovered about 8:30 a.m. on the Middle River along Bacon Island Road north of California 4, about 20 miles west of Stockton, said Connie Cassinetto, a spokeswoman for the San Joaquin County Office of Emergency Services.

The amount of freshwater rushing across the low-lying farmlands of man-made Bacon Island is enough to supply 150,000 families for one year. Authorities expect the change in water levels to cause salt water from San Francisco Bay to seep into the San Joaquin-Sacramento River Delta, threatening freshwater fish and the quality of drinking water supplies for cities, including Los Angeles.

The federal Bureau of Reclamation cut its water exports from the delta by 60%, said spokesman Jeff McCracken. The California Department of Water Resources halted its exports from the area completely.

"We need to wait until island flows have stabilized to get decent readings on what salinity levels look like," McCracken said.

After that, he said, state and federal water agencies probably would consider releasing water from storage facilities to freshen the delta.

The break occurred on a stretch known as Upper Jones Tract, close to a main rail line and several pipelines that carry water to the San Francisco Bay Area. The pipes, located a mile north of the break, were not affected by floodwaters. Officials said those pipelines have been submerged before.

At 1:30 p.m., officials at the Burlington Northern and Santa Fe Railway shut down one of its two main lines after water reached the edge of the track.

While trains were being operated at restricted speeds on the second line, officials said they would shut it down i crept closer. Forty trains pass through the area.

The railroad tracks, which wer on raised trestles where a levee b 1980, divide the island's 12,000 roughly in half and are keeping fl ters from contaminating the low tion of the island.

"Those levees in the delta are v and very fragile," said Don Strick spokesman for the Department of Resources.

Most levees were not built prop said, and were created more than tury ago by "farmers pushing d gether."

"Over the years," he said, "more put up dirt and rocks, and then peo a highway on it."

As a result, many of the man-m lands in that region sit more than below sea level.

California Highway Patrol offici a high-pressure fuel line in the floc was shut down, but there were mediate plans to close California 4.

"This mostly affects farmers equipment, and some migrant la borers," Cassinetto said.

Typically, fewer than 100 m workers live in camps in the are marily used to farm row crops suc falfa, she said.

County officials expected water through the break into the night engineers could plug it and begin ing water out.

"When these levees break, it's slow. It's not like a flood," Cassinet A levee can break at any time, she "They're just dirt."

ROBERT TURELL Los Angeles Times

ENGULFED: *Floodwaters surround a farmworker house about three miles from the levee. The occupants were among about 300 people who had to be evacuated.*

es Tell of Laci
's Last Hours

Issues facing voters in November

The Nov. 2 general election ballot will lead with the race for U.S. president but will include 14 California measures, the last of which was qualified Thursday by the secretary of state.

Railroad -- A $9.95-billion bond ... strike and imposes more severe

Jury Deliberations Begin in Killing of Transgender Teen

RECEIVED
PLANNING DIVISION
MAY 19 2004
PLANNING AND BUILDING SERVICES
CITY OF SANTA CLARITA

4/25/04

To: City of Santa Clarita, Planning Commission
From: Dr. Randy Martin, Bridgeport, Valencia
Re: Comment on Riverpart EIR and Development

I would like to limit my comments mostly to the noise element. The EIR does not clearly spell out the impact that the proposed development would have on the residents of Bridgeport, immediately adjacent to Newhall Ranch Road. 1

Residents of Bridgeport, especially those residents who reside on Windward Lane in the Cove, but also those in the other developments which are immediately adjacent to Newhall Ranch Road, will be significantly impacted by the proposed development. The EIR itself states that the noise from Newhall Ranch road would generate noise that would have a significan impact on the project residents located near the road, because the noise would exceed the City's normally acceptable noise standards as defined in the Noise and Land Use Compatibility Guidelines in the City's noise ordinance. 2

But apparently it is not enough for the Planning Commission, that the proposed development does not fall within the standards of the City's own Land Use Plan. Therefore, we must respectfully request that the EIR under discussion must be more complete. T be complete, we would also want to see decibel level studies for current Newhall Ranch Road noise at various hours throughout the day at the current level of usage. Then, for the EIR to be complete it must show the projected decibel levels for these same areas. 3

The study should show levels both outside the homes, in the yards, where children are playing and people are reading and relaxing on their balconies, and also inside the homes, especially late at night, and on Sunday, when most people are either sleeping or trying to relax. The studies should especially address the impact of large trucks and motorcycles on the noise levels, since these types of trucks are currently not using this road. The studies should specifically register noise levels at the stop lights, since noise is often greater during initial acceleration from a full stop. 4

Additionally, the EIR should address the safety issues of children utilizing the streets in this neighborhood. Computations should address how many vehicle trips will utilize the neighborhood streets of Bridgeport to "short cut" from Newhall Ranch Road to McBean. Currently, this is a favorite short cut for dragsters, and teens, sometimes in the middle of the night, speeding through our neighborhood. 5 6

Thank you very much for the opportunity to comment on the Riverpart EIR. The accurate and updated information requested should help you to make a more informed decision when it comes to the critical environmental resources of the River. 7

As a side note, the EIR should also address in it's Open Space element section, where residents who currently utilize this area for birding and hiking, can find a similar, unspoiled, riparian corridor within the City of Santa Clarita. 8

Letter No. 28

SIERRA CLUB
FOUNDED 1892
Angeles Chapter

3435 Wilshire Boulevard
Suite 320
Los Angeles, CA 90010-1904

(213) 387-4287 phone
(213) 387-5383 fax
www.angeles.sierraclub.org

5-7-04

Jeff Hogan
City of Santa Clarita
23920 Valencia Blvd.
Valencia, Ca. 91355

CITY OF SANTA CLARITA
2004 MAY 10 P 1:33
COMMUNITY DEVELOPMENT DEPT.

Re: Riverpark Project, Master Case # 02-175

Sirs:

The Sierra Club wishes to submit the following additional comments on water supply.

First, we object to the inclusion of water that is polluted by ammonium perchlorate as an available supply. We agree with the Newhall County Water District that contaminated water that cannot currently be supplied to the public should not be counted as available for planning purposes until it actually can be served to the public. In fact, a water supply that is not fully permitted and has not received completed environmental review, cannot be counted as an existing water source under section 10910(d)(2) of the California Water Codes. We submit the recently passed Newhall County Water District Resolution 2004-3 in support of our position. 1

Additionally, the City may not include the 41,000 acre feet Monterey Transfer in its calculations for water supply for this new project approval because this violates the Court Order filed June 6th, 2003 in *Planning and Conservation League v. Department of Water Resources* Case No. 95CS03216 (see attached order, item #5, page 3). 2

We wish to inform you that both the SB610 Water Assessment and the Urban Water Management Plan on which you are relying are inaccurate and do not conform to existing legal requirements under the California Water Codes. 3

Sincerely,
Johanna Zetterberg
Conservation Coordinator

cc: Castaic Lake Water Agency, Santa Clarita Division

Final – Approved 1/29/04

RESOLUTION NO. 2004-3
RESOLUTION OF THE BOARD OF DIRECTORS OF
NEWHALL COUNTY WATER DISTRICT
REGARDING WATER SUPPLY AND DEMAND

PREAMBLE

This resolution provides notice to the public that the District intends to protect the rights of its current customers to safe, dependable and adequate domestic water supplies on an ongoing basis and in all water supply assessments and verifications, to utilize the best available knowledge concerning supplies, the current information on which is summarized in the following resolution. After much deliberation, the Board is proposing to adopt the following resolution to send the strongest message possible to the public:

1) That, at least as far as the District is concerned, there is not sufficient current supply of water to meet all current and future demands, especially in times of drought or other emergency;

2) That, as stated in *SCOPE v. County of Los Angeles and Newhall Land and Farming Company* (2003) 106 Cal. App. 4th 715,131 Cal. Rptr 2d 186, the State Water Project (SWP) "entitlements are based on a state water system that has not been completed. There is a vast difference between entitlements and the amount of water that SWP can actually deliver;"

3) That the Urban Water Management Plan 2000 being relied upon in granting entitlements to develop and build is inaccurate in its assessment of current supply; and

4) That in its actions regarding water service, the District will be guided by its decisions as to the available supply based upon the facts set forth in the accompanying resolution.

By adopting this resolution the District is not purporting to amend or change the current regional Urban Water Management Plan 2000 ("UWMP 2000"). By this resolution, however, the District does intend to put members of public and planning agencies with jurisdiction over the Santa Clarita Valley on notice that the continued granting of rights to develop property without proof of adequate water supplies and infrastructure is irresponsible. This resolution also is intended to make the District customers aware of the fact that any loss or damage resulting from city and county planning agencies ignoring the true facts regarding water supply and intentionally allowing additional growth, not supported by adequate supply, will be the responsibility of those planning agencies.

WHEREAS, State Water Project (SWP) water presently constitutes the majority of water served to NCWD customers, and in some areas is the exclusive water available; and

WHEREAS, the remaining water supplies of the District are primarily derived from the extraction of groundwater by wells overlying the Alluvial Aquifer and Saugus Formation; and

WHEREAS, the UWMP 2000 Table 1-4 "Total Existing and Planned Supplies" of water (Exhibit A to this Resolution) is among the factors used by planners to determine whether adequate water supplies exist to meet specific project demands; and

Alluvial Aquifer

WHEREAS, according to the December 10, 2003 CH2M Hill presentation titled "Groundwater Modeling Analysis, Upper Santa Clara River Basin" stated that 700-1000 acre-feet per year of water in the Alluvial Aquifer are currently not available due to Perchlorate pollution; and

WHEREAS, one Santa Clarita Water Company (SCWC) well in the Alluvial Aquifer has been taken out of service due to Perchlorate contamination; and

WHEREAS, the area impacted by the Perchlorate pollution in the Alluvial Aquifer has not been characterized as of the date of this resolution; and

WHEREAS, a Remedial Action Plan for local groundwater affected by Perchlorate pollution is not projected to be complete until August 2005 and certification of final cleanup is not expected until August 2010, according to the November 2003 schedule from the Department of Toxic Substances Control: and

WHEREAS, the December 1986 "Hydrogeologic Investigation: Perennial Yield and Artificial Recharge Potential of the Alluvial Sediments in the Santa Clarita River Valley of Los Angeles County, California" by Richard C. Slade ("Slade") studied 30 wells over a 28-year base period and found a practical perennial yield of 31,600 to 32,600 acre-feet per year from the Alluvial Aquifer before the Perchlorate contamination was found; and

WHEREAS, the 1990 Kennedy/Jenks/Chilton report "Conjunctive Use of the Saugus Aquifer: Castaic Lake Water Agency" stated "from the alluvial aquifer the safe yield is anticipated to be 32,500 acre-feet/year;" and

WHEREAS, many additional public agency reports during the period of 1993-1999 incorporated and referenced the 31,600-32,600 acre-feet per year safe perennial yield figure; and

WHEREAS, the July 2002 Slade report entitled "2001 Update Report: Hydrogeologic Conditions in the Alluvial and Saugus Formation Aquifer Systems" reiterated that perennial yield "represents a long-term average value for annual yield" and introduced the concept of "operational yield" which was defined as "a fluctuating value of pumpage that may be above or below the perennial yield in any given year, and that varies as a function of the availability of other water supplies. The basic intent of the operational yield value is that it should not exceed the perennial yield of the groundwater basin over multi-year wet and dry cycles;" and

WHEREAS, the 2002 Slade report did not quantify in detail a safe yield or a perennial yield, which is defined in the 1986 report as "the quantity of groundwater" that "can be pumped annually without any change in groundwater levels or net change in groundwater in storage over the Base Period" (28 years), and

WHEREAS, the 2002 Slade report did state that the Alluvial Aquifer "on a long-term average basis can be operated at an average pumping volume on the order of 10 percent higher than was reported as a 'practical or perennial yield' in 1986," but the report based that conclusion on "the combination of historical observations and current planning;" and

WHEREAS, the 2002 Slade report referred to "current planning" that included the UWMP 2000 and the future commitment via a MOU between the "Santa Clarita Valley Water Purveyors and the downstream United Water Conservation District to develop a numerical groundwater flow model in order to analyze in greater detail how this aquifer system can be operated;" and

WHEREAS, the numerical flow model is not complete as of the date of this resolution; and

WHEREAS, the 2002 Slade report cited increased recharge from Water Reclamation Plants as a reason for higher potential yields, but the Water Reclamation Plants are not located in areas that would recharge the eastern part of the Alluvial Aquifer system; and

WHEREAS, the 2002 Slade report did not address other factors such as loss of recharge areas due to development and increased flood control channeling; and

WHEREAS, the December 1986 Slade report (referenced above) stated "... urbanization has had a rather startling impact on the availability of areas for recharge.... All recharge to the aquifer system does not occur in the low-flow channels of the river and its tributaries, but infiltrates over much of the alluviated areas which are not within the flood channels of the Santa Clara River system. Paving of these areas has, and will continue to reduce the net effective area for natural recharge to the underlying groundwater system;" and

WHEREAS, the Alluvial Aquifer has been pumped above the safe perennial yield since 1994; and

WHEREAS, the alluvial groundwater level in the eastern basin has been dropping, which may be caused by weather patterns, increased development, increased pumping, or a combination of the foregoing and possibly other factors; and

Saugus Formation

WHEREAS, the December 2003 CH2M Hill presentation (referenced above) stated that 4,000 acre-feet/year of water in the Saugus Formation are currently not available due to Perchlorate pollution; and

WHEREAS, NCWD Well #11, two SCWC wells, and one Valencia Water Company well in the Saugus Formation have been taken out of service due to Perchlorate pollution; and

WHEREAS, the Winter 2003 "Water Currents" newsletter published by Castaic Lake Water Agency states that the four closed Saugus Formation wells have a combined maximum production of 14,500 acre-feet per year; and

WHEREAS, the area impacted by the Perchlorate pollution in the Saugus Formation has not been characterized as of the date of this resolution; and

WHEREAS, a Remedial Action plan for cleanup of Perchlorate in local groundwater is not projected to be complete until August 2005 and certification of final cleanup is not expected until August 2010, according to the November 2003 schedule from the Department of Toxic Substances Control; and

Recycled Water

WHEREAS, Table 1-4 (Exhibit A attached) references recycled water supply amounts up to 17,000 acre-feet per year, but existing facilities only supply 1700 acre-feet per year and new facilities are not planned or budgeted in the NCWD area; and

WHEREAS, the UWMP 2000 states that the Saugus Water Reclamation Plant (WRP) cannot be expanded and both the Valencia WRP and the proposed Newhall Ranch WRP exist on the western edge of the CLWA service area, limiting the areas to which recycled water could be practically provided; and

WHEREAS, to serve the eastern portion of the Valley with reclaimed water, a new WRP would be required; and

WHEREAS, the technical and economic feasibility determination for the potential recycled water use in the CLWA service area has not yet been finalized; and

SWP Water

WHEREAS, the current maximum CLWA "Table A" entitlement to State Water Project (SWP) water is 95,200 acre-feet per year; and

WHEREAS, according to the 2002 State Water Delivery Reliability Report, 90% of the time deliveries can be at or above 30% of the full Table A amount, and 80% of the time deliveries can be at or above 50% of the Table A amount; and

WHEREAS, the reliability criteria established in Chapter 4.0 of UWMP 2000 states that "this criterion requires water supply to be sufficient to meet projected demands 90 percent of the time;" and

WHEREAS, that, as stated in *SCOPE v. County of Los Angeles and Newhall Land and Farming Company* (2003) 106 Cal. App. 4th 715,131 Cal. Rptr 2d 186, the State Water Project (SWP) "entitlements are based on a state water system that has not been completed" and "there is a vast difference between entitlements and the amount of water that SWP can actually deliver;" and

WHEREAS, SWP water deliveries could be interrupted in an emergency; and

Un-Finalized Water Sources

WHEREAS, Table 1-4 (Exhibit A attached) includes supply numbers for new wells in the Saugus Formation, water banking/conjunctive-use, water transfers, and desalination, yet no finalized, approved plans or budgets for these items exist in the CLWA or NCWD area; and

WHEREAS, many of these supplemental supply projects would require extensive infrastructure improvements; and

WHEREAS, California Water Code Division 6 Part 2.6 Chapter 1 (the Urban Water Management Planning Act) Section 10631(c) states that the preparer of an UWMP shall "for any water source that may not be available at a consistent level of use, given specific legal, environmental, water quality, or climactic factors, describe plans to supplement or replace that source with alternative sources or water demand management measures, to the extent practicable" and the UWMP 2000 does not contain detailed information to that end for the projected, but not implemented, new Saugus wells, water banking/conjunctive-use, water transfers, desalination, and recycled water sources; and

WHEREAS, without specific perennial yield figures for the Saugus aquifer, new wells in the Saugus aquifer can not be assumed to provide additional water, but rather only additional pumping points for the same total bank of water from which the current Saugus wells draw.

NOW, THEREFORE, BE IT RESOLVED that, based on the foregoing recitals, the NCWD Board of Directors resolves and makes the following determinations, reserving to itself the right to make changes as new facts, data or studies justify in the opinion of NCWD Board of Directors; for planning purposes, NCWD no longer has confidence in the water supply and availability numbers in Table 1-4 (and identical tables) in the UWMP 2000;

FURTHER RESOLVED, that in response to any inquiry from cities, county, developers or the public generally NCWD will provide the water supply and availability statistics as presented in Exhibit B attached to this resolution.

FURTHER RESOLVED, that the supply from the alluvial aquifer will be based on the perennial yield of 31,600-32,600 acre feet/year as established in the 1986 Slade report. Because the perennial yield is a long-term average based on wet and dry years, no differentiation will be made between wet and dry year. Pending characterization, containment and/or remediation, the current supply will be reduced by the amount of Perchlorate contaminated water (700-1000 acre feet/year at current estimate.) The contaminated water will be counted as "unfinalized supply," with restoration of water supply counted incrementally as remediation to drinking water standards occurs and individual well production is restored with DHS and DTSC approval.

FURTHER RESOLVED, that any increase in pumping not offset by imported supplies or other factors will be supported only for short terms, unless future comprehensive groundwater studies clarify that longer term pumping that pushes averages above the perennial yield will not harm the aquifer.

FURTHER RESOLVED that the numbers over the perennial yield values for the Alluvial Aquifer will not be used for any planning purposes other than emergency planning or when necessary to meet short term demands of existing customers.

FURTHER RESOLVED, pending characterization, containment and/or remediation; that the current supply (7,500-15,000) from the Saugus Formation will be reduced by the amount of Perchlorate-contaminated water, which is currently estimated at between 4,000-14,500 acre-ft. The contaminated water will be counted as "unfinalized supply," with restoration of water supply counted incrementally as remediation to drinking water standards occurs and individual well production is restored with DHS and DTSC approval.

FURTHER RESOLVED, that new columns for "unfinalized additional supply" were added to the planning table in Exhibit B to differentiate between water that is available and water that is only in the conceptual planning stages. Unfinalized additional supply means that conceptual plans have been made, but no budget, approved capital project, or contractual construction or purchase deadline exists. These supplies may be constrained, limited, or voided by economic or legal issues. Water from the UWMP 2000 categories of "Saugus formation new wells," "recycled water," "water

banking/conjunctive use," "water transfers" and "desalination" have been moved to the unfinalized supply columns until they are finalized.

FURTHER RESOLVED, that potential water from new Saugus Formation wells will not be considered new "finalized supply" until it can be shown that the formation has a perennial yield above the total supply specified in Exhibit B for the existing Saugus wells (7,500-15,000 acre-ft/year.)

FURTHER RESOLVED, that until adequate assurances exist, water in the "unfinalized additional supply" column of Exhibit B will not be considered as available.

PASSED AND ADOPTED this ____day of _____, 2004, by the Board of Directors of the Newhall County Water District.

_____
Lynne Plambeck, President of the
Board of Directors of the
NEWHALL COUNTY WATER DISTRICT
ATTEST:

_____
Kenneth J. Petersen, General Manager
NEWHALL COUNTY WATER DISTRICT

Attach: Exhibit A
Exhibit B

STATE OF CALIFORNIA)
) ss.
COUNTY OF LOS ANGELES)

I, KARIN J. RUSSELL, Secretary of the Newhall County Water District, DO HEREBY CERTIFY that the foregoing is a full, true and correct copy of Resolution No. 2004-3 of the Board of Directors of Newhall County Water District adopted at a Special Meeting held on _____, 2004 and that the same has not been amended or repealed.

_____
Karin J. Russell, Secretary,
NEWHALL COUNTY WATER DISTRICT

DATED: _____, 2004

Exhibit A

Table 1-4
Total Existing and Planned Supplies
(acre-feet per year)

Source	Average/Normal Year	Dry-year
Local Supplies		
Groundwater		
Alluvial Aquifer	30,000-40,000	30,000-35,000
Saugus Formation	7,500-15,000	11,000-15,000
Saugus Formation (new wells)*	--	10,000-20,000
Stormwater*	--	--
Recycled Water*	1,700-17,000	1,700-17,000
Imported Supplies		
SWP Supplies	56,800-95,200	37,900-75,800
Water Banking/conjunctive-use*	--	105,000
Water Transfers*	5,200-8,700	3,500-6,900
Desalination*	2,000-5,000	2,000-5,000
Total Supplies	**103,200-180,900**	**201,100-279,700**

*Planned programs for future implementation.

Source: UWMP 2000

Exhibit A to NCWD Resolution 2004-3
Inital: _____
Dated: _____

Exhibit B

Total Existing and Planned Supplies
(acre-feet per year unless noted)

	Current and Finalized Future Supply				Existing Backup Dry Year Supply[8]		Unfinalized Additional Supply[1]			
	Average/Normal Year		Dry Year[2]				Average/Normal Year		Dry Year[2]	
Source	**Range[9]**	**Average**	**Range[9]**	**Average**		*Source*	*Range[9]*	*Average*	*Range[9]*	*Average*
Local Supply						*Local Supply*				
Groundwater						*Groundwater*				
Alluvial Aquifer	**30,750-31,750** [3]	**31,250**	**30,750-31,750** [3]	**31,250**		*Alluvial Aquifer*	*700-1000* [4]	*850*	*700-1000* [4]	*850*
Saugus Formation	**0-5,750** [5]	**2,875**	**0-5,750** [5]	**2,875**		*Saugus Formation*	*4,000-14,500* [4]	*9,250*	*4,000-14,500* [4]	*9,250*
Saugus Formation (new wells)						*Saugus Formation (new wells)*	*10,000-20,000* [6]	*15,000*	*10,000-20,000* [6]	*15,000*
Stormwater						*Stormwater*				
Recycled Water *(NOT potable)*	**1,700**	**1,700**	**1,700**	**1,700**		*Recycled Water (NOT potable)*	*15,300*	*15,300*	*15,300*	*15,300*
Imported Supply						*Imported Supply*				
SWP	**28,560-47,600** [7]	**38,080**	**28,560-47,600** [7]	**38,080**		*SWP*	*0-57,120*	*28,560*	*0-57,120*	*28,560*
Water Banking/conjunctive use					21000 af	*Water Banking/conjunctive use*			*0-84,000*	*42,000*
Water Transfers						*Water Transfers*	*5,200-8,700*	*6,950*	*3,500-6,900*	*5,200*
Desalination						*Desalinization*	*2,000-5,000*	*3,500*	*2,000-5,000*	*3,500*
Total Supply		**73,905**		**73,905**	21000 acre-feet (total, not per year)	*Total Additional Supply incl. Non-Potable only if all Future Projects Approved and Built* [9]		*79,410*		*119,660*
Total Potable Supply		**72,205**		**72,205**	21000 acre-feet (total, not per year)	*Total Additional Potable Supply only if all Future Projects Approved and Built* [9]		*64,110*		*104,360*

Note: All numbers are from UWMP 2000 unless otherwise noted below.

[1] Unfinalized additional supply means that conceptual plans have been made, but no budget, approved capital project, or contractual construction or purchase deadline exists. These supplies may be constrained or limited by economic or legal issues.

[2] Dry Year means a short term period during drought. Supplies listed in these columns should be viewed as contingency planning only and are not considered sustainable on a long-term basis.

[3] Perennial yield (31,600-32,600 af/yr per Slade, 1986) less average of range of loss (850 af/yr) due to perchlorate contamination.

[4] Estimated amount currently lost to perchlorate contamination per 12/2003 CH2MHill presentation and Winter 2003 CLWA "Water Currents."

[5] UWMP 2000-stated supply (7,500-15,000 af/yr based on operational yield) less average of range of loss (9,250 af/yr) from perchlorate contamination.

[6] New Saugus wells will not yield additional water supply beyond the perennial yield of the formation, which has not been quantified.

[7] Per 2002 DWR Reliability Report, 90% of the time deliveries can be made at or above 30% of the full Table A amount, and 80% of the time deliveries can be at or above 50% of the Table A amount. The range in the current supply column reflects 80-90% reliability and in some cases water deliveries will be lower than what is shown. Our current full Table A amount is 95,200 af/yr. 95,200 af/yr minus the average of the "current supply" range (38,080) is shown as unfinalized additional supply. SWP deliveries vary annually.

[8] An additional one-time stored excess of 21,000 acre-ft/ currently exists in a water bank for dry year supply. <u>This amount is not to be counted when planning for future projects.</u> This amount may not reoccur in the future, and is required by court settlements to be provided to current users only. The UWMP 2000 estimated a total of 105,000 acre-feet potential exists for water banking. The remainder (105,000 minus 21,000) is listed in the unfinalized supply column on this table.

[9] Where ranges exist, the midpoint of the range was used for calculating totals.

FILED
ENDORSED

03 JUN -6 PM 3:27

SACRAMENTO COURTS
DEPT. #53

IN THE SUPERIOR COURT OF THE STATE OF CALIFORNIA

FOR THE COUNTY OF SACRAMENTO

PLANNING AND CONSERVATION LEAGUE a California not for profit corporation, PLUMAS COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT, a California public agency; CITIZENS PLANNING ASSOCIATION OF SANTA BARBARA COUNTY, INC., a California not for profit corporation,

Plaintiffs and Petitioners,

v.

DEPARTMENT OF WATER RESOURCES, a California State Agency, et al.,

Defendants and Respondents.

Case No. 95CS03216

ORDER PURSUANT TO PUBLIC RESOURCES CODE SECTION 21168.9

On remand from the Third District Court of Appeal on May 20, 2003, in Department 53 of the Sacramento Superior Court, the Honorable Loren E. McMaster, presiding, this proceeding came on for a status report and joint motion. Petitioners and Plaintiffs, Planning and Conservation League, Plumas County Flood Control and Water Conservation District, and Citizens Planning Association of Santa Barbara County ("Petitioners"), appeared through Antonio Rossmann and Roger B. Moore. Respondent and Defendant, Central Coast Water Authority (CCWA), appeared through Susan F. Petrovich of the Law Firm of Hatch & Parent. Respondent and Defendant, Department of Water Resources (DWR), appeared through Deputy Attorney General Marian E. Moe.

Robert S. Draper of O'Melveny and Myers, LLP and Clifford W. Schulz appeared, respectively, on behalf of the Metropolitan Water District of Southern California and Dudley Ridge Water District, entities that submitted answers to the First Amended Complaint subsequent to the Court of Appeal's final determination in this action and prior to any further order of this Court on remand.

In light of the direction from the Third District Court of Appeal on remand in Planning and Conservation League v. Department of Water Resources (2000) 83 Cal.App.4th 892, this Court hereby makes the following findings:

1. The parties to this lawsuit and other public agencies have engaged in extensive settlement negotiations, mediated by retired Judge Daniel Weinstein of JAMS Dispute Resolution, with the intent to avoid further litigation and associated expenses, to provide for an effective way to cooperate in the preparation of a new environmental impact report (EIR), and to make other specified improvements in the administration and operation of the State Water Project.

2. The mediation has resulted in an executed Settlement Agreement for approval by this Court, attached to this Order as Exhibit A.

3. DWR as lead agency has commenced the preparation of the new EIR.

4. As part of the Settlement Agreement, DWR and the State Water Project (SWP) contractors who are signatories to the Settlement Agreement have agreed that, pending DWR's filing of a return in satisfaction of the Writ of Mandate and this Court's dismissal of the Writ of Mandate, they will not approve any new project or activity (as defined in section VII.A of the Settlement Agreement) in reliance on the 1995 Environmental Impact Report for the Implementation of the Monterey Agreement.

5. This Order is made pursuant to the provisions of Public Resources Code section 21168.9 and pursuant to this Court's equitable powers. This Court finds that the actions described in this Order, including actions taken in compliance with the Writ of Mandate, comprise the actions necessary to assure DWR's compliance with Division 13 of the Public Resources Code. This Court further finds that this Order includes only those

mandates necessary to achieve compliance with Division 13.

THEREFORE, IT IS HEREBY ORDERED as follows:

1. This Court's Final Judgment denying the petition for writ of mandate, entered August 15, 1996, is reversed in accordance with the directive of the Third District Court of Appeal's decision in Planning and Conservation League v. Department of Water Resources (2000) 83 Cal.App.4th 892.

2. This Court's order granting the summary adjudication on the fifth cause of action, entered June 10, 1996, is vacated.

3. The Settlement Agreement attached as Exhibit A is hereby approved.

4. A Peremptory Writ of Mandate directed to Respondents Central Coast Water Authority and DWR shall issue under seal of this Court in the form attached hereto as Exhibit B.

5. In accordance with the Settlement Agreement and this Order, pending DWR's filing of the return in compliance with the Peremptory Writ of Mandate and this Court's Order discharging the Writ of Mandate, DWR and CCWA shall not approve any new project or activity (as defined section VII.A of the Settlement Agreement) in reliance on the 1995 EIR for the Implementation of the Monterey Agreement.

6. In the interim, until DWR files its return in compliance with the Peremptory Writ of Mandate and this Court orders discharge of the Writ of Mandate, the administration and operation of the State Water Project and Kern Water Bank Lands shall be conducted pursuant to the Monterey Amendments to the State Water Contracts, as supplemented by the Attachment A Amendments to the State Water Contracts (as defined in the Settlement Agreement) and the other terms and conditions of the Settlement Agreement.

7. Plaintiffs and petitioners shall recover such costs and attorney's fees as provided in prior court orders and in an amount as determined in the arbitration procedures agreed to in the Settlement Agreement, or as otherwise agreed to by the parties.

8. Except as provided, the Peremptory Writ of Mandate shall not limit or constrain the lawful jurisdiction and discretion of DWR. This Court retains jurisdiction until DWR files a return that complies with the terms of the Writ of Mandate, and this Court issues an order discharging the Writ of Mandate.

IT IS SO ORDERED.

Dated: JUN - 6 2003, 2003

LOREN E. McMASTER

Judge of the Superior Court

Letter No. 27

Thomas R. Haglund, Ph.D.
Consulting Biologist
3627 Valley Meadow Road
Sherman Oaks, CA 91403
818=906-3440

Jeff Hogan
City of Santa Clarita

Re: Riverpark EIR Comments

Dear Mr Hogan:

I am submitting the following comments on the Riverpark EIR for your consideration. I am an aquatic biologist with over 20 years experience on the Santa Clara River (resume attached).

My first comment is a relatively minor comment. The EIR claims to have performed "protocol" surveys for the unarmored threespine stickleback (*Gasterosteus aculeatus williamsoni*). To the best of my knowledge this is no protocol for stickleback surveys, so this statement is misleading. 1

Section 4.6 Biological Resources claims to have found no Western spadefoot toads during surveys, yet the property contains an area well known for Western spadefoots - "behind" the Von's. This site is very well known by most local biologists (F. Havore, pers comm.). It is disconcerting when such obvious species are not located in well known localities, and raises questions about the quality of the surveys. 2

The same section acknowledges that habitat for San Diego horned lizards is present on site based on vegetation surveys, but there is no indication that any survey was specifically conducted for the horned lizards or the harvester ants that are their primary food source. 3 It appears that no general surveys were conducted for amphibians and reptiles. 4 In the absence of such surveys, species known to occur in the area and for which habitat occurs on site must be considered present. For reptiles such as snakes, sensitive species should be considered present if appropriate habitat is present and a survey technique such as pit-fall trapping has not been employed. The presence/absence of snake species is difficult to ascertain with any degree of certainty without extensive fieldwork over several years (see California Department Fish and Game survey protocol for southern rubber boa). 5

While I agree that unarmored threespine sticklebacks do not currently occupy this area, because the riverbed is dry most of the year, the EIR must still address potential impacts to this endangered fish which may seasonally occupy the river and has typically occupies the stream immediately downstream of the project site. 6 Any changes to the flow conditions in this river reach may affect both downstream and upstream areas. I find it difficult to believe that bank stabilization that encroaches on the river will have no flow impacts when the surface water diagrams at various flood stages show bank to bank flow. 7

Water does not flow along hard siding the same way it flows along a natural riverbank and hard-siding does not typically provide the same refuges from flow that natural banks do. 7

It must also be remembered that rivers are systems, and isolated river segments do not function independent of the rest of the river system or drainage. When you alter one portion of a river, the impacts are likely to be seen elsewhere in the drainage as well. Changes in flow, magnitude, duration, temporal extent will all have impacts on the system. Even an increase in incidental runoff from developed property may have an impact. The need to preserve a functioning system in order to preserve an endangered species is acknowledged in the US Fish and Wildlife Service Critical Habitat Designation for the Santa Ana Sucker (*Catostomus santaanae*). This project occurs immediately upstream of habitat that has been essentially continuously occupied by the unarmored threespine stickleback, yet downstream impacts are not addressed at all. 8 9

Lastly the project area undoubtedly provides a corridor for (at least) downstream movement of fish (gene flow). This biologically important function is not addressed. 10

Thank you for your consideration of my comments.

Thomas R. Haglund, Ph.D.

Letter No. 26

RECEIVED
PLANNING DIVISION
MAY 06 2004
PLANNING AND BUILDING SERVICES
CITY OF SANTA CLARITA

May 6th, 2004
City of Santa Clarita
Attn.: Mr. Jeff Hogan
Planning Department

RE: Newhall Land and Farming Company EIR SCH #2001091081 (River Park)

Ongoing degradation of the Santa Clara River Valley is threatening the important ecological values of this rich and diverse area.
The Santa Clara River is important habitat for many endangered species, native birds, plants, amphibians, reptiles, and fish. We have monitored many unlawful violations and environmental abuses in this area. Thus far, regulatory agencies and the City of Santa Clarita have failed to respond to these issues. 1

Newhall Lands AKA; Valencia Company's (Natural River Management Plan NRMP) and the proposed Riverpark project which relies on the Natural River Management Plan is based on inadequate biological data, and fails to consider important concerns. Please see attachment 1 (10 pages), May 2002 letter written to the California Department of Fish and Game addressing the Natural River Management Plan. 2

The Natural River Management Plan did not address side drainage's, and in many area's these tributaries were cleared, ponds were filled and Newhall Land has never mitigated for the loss of this habitat. These side drainage's are a valuable component of the Santa Clara River. We cannot protect the integrity of the Santa Clara River by saving only the bottom of the river. Please see attachment # 2 (25 pages) Where Rivers Are Born prepared by American Rivers. 3

Specific Comments on the proposed Riverpark Project are as follows:

The following comment upon Section 4.6, Biological Resources, of the Riverpark Revised EIR (Impact Sciences, Inc. March 2004), and the technical appendices for that section. The numbers at the beginning of each comment refer to the page number within Sec. 4.6. References to Impact Sciences may be abbreviated as IS in text.

1: the statement that there are only two identified agency-listed sensitive communities on the site is inaccurate and misleading on two levels: first, the 14 natural communities recognized further in the document (pgs. 9 – 17) include two (on p. 16) which do not correspond to the California Department of Fish & Game [hereinafter, CDFG] Natural Heritage Division's list of communities, and thus would not be considered sensitive as defined by the document. But, correctly defined, the so-called "riverwash" might be considered Riversidian alluvial fan sage scrub— a listed sensitive community; and mixed oak/grass more 4 5

accurately would be considered valley oak/coast live oak savannah or grassland, also a listed sensitive community type. The preparers of the document appear to have developed their own substitute nomenclature for sensitive community types, to inaccurately record otherwise sensitive resources, and thereby render them invisible to the lay reader. 5

2: the disturbance of 13 acres along the margin of the river represents a temporal loss of highest habitat values, animal movement corridor, and sensitive vegetation type. The statement makes it sound insignificant, but even a temporary loss of this sort of habitat type is significant, and typically must be mitigated at a greater than 1:1 ratio. 6

4: the statement that significant impacts will be "mitigated" by preservation of other areas is not correct; it is minimization, but not mitigation. The areas not developed do not mitigate for impacts to resources lost to development, and such losses, where they are to sensitive habitats (riparian areas, coastal sage scrub, valley oak savannah) would have to be fully mitigated either by compensatory purchase and conservation easement, or creation and maintenance of like habitat values. Further, the set-aside of land within the project does not minimize specific impacts unless it represents similar habitat values to those lost (that is, chaparral set aside does not minimize or mitigate losses to coastal sage scrub or riparian areas); and it must be set aside for conservation purposes, without further or future development or active use (equestrian trails, recreation sites, etc.). Conservation areas must conserve and protect the natural resources, not merely provide additional human recreational opportunities. 7 8 9

5: Field surveys – according to the document, surveys have been conducted on the site for arroyo toad, red legged frog, and other sensitive species since 1993, and the paragraph states that the technical reports documenting these surveys are included in the appendices to 4.6, but only a few surveys alluded to in this paragraph are included within the appendices provided. Moreover, most of the surveys were conducted only recently, not "since 1993," and by a former employee of the primary consultant firm. The accuracy and qualifications of the surveyors and their reports cannot be evaluated without access to all of the reports promised, but not delivered. 10

18: the language used in pgh. 2 concerning spadefoot observations by passersby remains inaccurate and misleading. A number of local biologists of considerable repute have repeatedly stated to the agencies and local groups that they had observed spadefoot toad on the site in past years, when the road led to school district offices, and that they were breeding within the ponds nearest the western entrance (behind the Vons market). The use of the term "passersby," implies that it might have been someone not skilled in the identification of amphibians, and therefore of little consequence. In point of fact, the ONLY reason that Impact Sciences and their subconsultant, Dave Crawford (a former IS employee) ever found the spadefoot on the site is that the agencies knew of their existence from these earlier reports, and insisted that the consultant repeat their surveys. To say that these surveys "resulted in detection of this 11

species on the site" is absurd. It had been detected years ago and was well-known to occur thereon; the final surveys only provided enlightenment to the consultants. This issue will be addressed in greater detail below, in the discussion of the spadefoot report in the technical appendices. 11

Section 2, Birds, on the same page: in the "common wildlife" discussions, California thrasher, oak titmouse and Nuttall's woodpecker were observed on the site and stated to be representative of their habitat types. Costa's hummingbird also is listed in the species accounts upon which the report was based. All four of these species are listed as California Special Animals by CDFG for areas where they nest, and all of them nest on the site. Inexplicably, though, they are considered only as common wildlife, and all of them are omitted from the sensitive species discussions (starting on p. 26 and in Table 2). 12

19: Mammals: this discussion is based upon at best sketchy data. The methodologies outlined in the one page report in the appendices are inadequate to determine more than the presence of the largest and commonest species, and moreover, were not conducted properly. The techniques used to set up scent stations, in particular, were sloppy and inadequately conducted, and the results should be disregarded. 13 14

26: In the section on Sensitive wildlife species, the corrected statement that twelve, not eleven, special-status species observed omits the four bird species noted above, as having been seen on the site. Moreover, these four species are not included in the "51 potential species"[sic] discussed in Table 2. 15

Table 4.6-2: The first two status accounts, for two species of fairy shrimp, are completely incorrect. They state that "No indication of vernal or other seasonal pools were detected during site surveys." and also that soils are not suitable for seasonal pools. How could the pools within the entry to the property have been overlooked by competent biologists? These pools form every winter, and often hold water for 4 months or more, sustaining breeding spadefoot and other amphibians. Even without water in them, their configuration and bottom substrates would suffice to alert any competent biologist to their seasonal presence. Clearly, the surveys conducted have been inadequate to the task of determining the presence/absence of sensitive aquatic resources, and in the absence of proper investigations, it can only be concluded that the spadefoot ponds on the site certainly might be suitable for fairy shrimp as well, as might the other seasonal pools on the site. 16 17 18

Statements in the status accounts for the horned lizards, whiptail and legless lizard (p. 29) are suspect. These species are have persisted throughout the upland margins of the Santa Clara River, and their presence on the site would be expected. That the surveyors for IS and their subconsultant did not find them is less surprising considering their inabilities to find large ponds in plain sight, and the statements that these species were not observed no doubt more reflect the capabilities of the observers than the status of the species on site. Focused surveys for these species must be conducted by competent, independent biologists. Likewise, the statement on the status of the garter snake, that "little to no ponding occurs on site," is incorrect, and taints the 19 20

entire account.
The table fails to include the black-crowned night heron, another CDFG listed species, commonly reported from the site in the bird survey accounts in the appendices. 20

Least Bell's vireo has recently been reported from the Riverpark area (Dan Cooper, Audubon Society), and occurs elsewhere along the river as a breeding bird (various reports, including Guthrie). 21

35: The statement in the first pgh. that the site supports perhaps 16 – 20 pair of breeding spadefoot is without supporting data or informational value. The person making the statement could not even find the species on the site during at least two prior years of surveys, and only "detected" them after being instructed to do so by the agencies. His observations are based upon one actual day of surveying, during a dry year, and without his having any way to determine where in the breeding cycle he made his observations. Prior reports had noted hundreds of breeding spadefoot on the site, and without any corroborating scientific evidence one way or the other, the estimate given is without biological merit. 22

35-37: The accounts given for various sensitive bird species invariably conclude that the species either don't breed on the site, based upon a lack of observations, or that they were observed during the breeding season, but actual nests were not observed. These statements can only serve to mislead the lay reader into assuming that they mean something they do not. The lack of observed breeding may either reflect the timing of the observations, the lack of effort to find the nests, or the inability of the observers to find nests. Moreover, many of the species listed are very secretive during nesting, and finding their nests would be very difficult. Not finding them does not mean they aren't there. 23

Further, the statements that San Diego black-tailed jackrabbits on the site occupy areas that are occasionally disturbed means that those areas are only moderate in quality for the species implies a knowledge that the writers do not have. IF the species is present within a particular area on the site, then that is where they choose to forage or reside, and therefore it is not "moderate in quality," but rather, it clearly is suitable to their needs. Such meaningless, unsupported value judgements can mislead the reader into concluding that the loss of these habitat areas will not be significant, only "moderate." 24

47: The City has adopted its own policies for the County Significant Ecological Areas (a court-mandated General Plan zoning overlay) within its jurisdiction, but this in no way accords SEA status to the former County overlay. Being an SEA means that project effects to natural resources within the overlay are reviewed by a Technical Advisory Committee (SEATAC), which reports directly to the L.A. Co. Regional Planning Commission. Reports such as this one, which are intended to provide biological information relative to the CEQA process, would be critically and carefully reviewed by SEATAC, and recommendations would be given to insure the integrity of the SEA relative to development approvals. No such process exists within the City of Santa Clarita, and therefore the " 25 26 27

adoption" of the SEAs is symbolic, but essentially meaningless in terms of the intent of the SEA element of the County General Plan. 27

50 – 52: The assumption that less than 100 feet of setback for direct project impacts and grading is warranted because of the disturbed nature of the uplands is motivated by a desire to accommodate the project, not the environment. Encroachment into the riverbed cannot be justified by the condition of the uplands, and revegetation of the graded areas subsequent to their destruction does not minimize the need for at least 100 foot development setbacks. The only methodology that makes sense for river margin developments is site-specific setbacks for habitat types. This requires expertise and knowledge of the resources present and at risk of disturbance, and such an assessment is clearly lacking from this report. 28

In conclusion the Santa Clara River is threatened by ongoing and proposed housing developments, commercial development, industrial development, roads, bridges, mining and major alterations to the banks and tributaries of the Santa Clara River. The cumulative impacts to the Santa Clara River Watershed are staggering. Comprehensive independent studies and surveys must be conducted for the Santa Clara River in order to address the cumulative impacts to our watershed and ensure that the river does not meet the fate that all other rivers in Southern California has.. The Santa Clara River is an important part of California's natural heritage. 29

Teresa Savaikie
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Attachments:
1) Letter written to the California Department of Fish and Game addressing the Natural River Management Plan, May 2002. (10 pages)
2) Where Rivers are Born - A recent report released by American Rivers and the Sierra Club on the importance of tributaries including small unnamed drainage's - (22 pages)
3) Letter from Daniel S. Cooper, Director of Bird Conservation, Audubon California (1 page)
4) Environmental Defense Center press release January 2004, Endangered Unarmored threespined stickleback (2 pages)
5) LA Weekly articles - Gods of Small Things - 20 pages - The City of Santa Clarita was made of the observations that are discussed in this article. .

Attachment ~~H~~

page 1 of 10

#1 - Fish & Game letter submitted May 20, 2002 - Issues related to EA projects within the Santa Clara River / issues related to the Natural River Management Plan

May 20, 2002

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Re: Management of the Santa Clara River

Dear Director Hight,

We would like to thank you for the work of your department to protect the natural resources of the State of California and your attention to the concerns we express in this letter.

Ongoing degradation of the Santa Clara River valley is threatening the important ecological values of this rich and diverse area. On behalf of the undersigned organizations and their members, we submit these comments and concerns about the management of the Santa Clara River.

The Santa Clara River is important habitat for many endangered species, native birds, plants, amphibians, reptiles, and fish. We have monitored many unlawful violations and environmental abuses in this area. Thus far, regulatory agencies have failed to respond to these problems.

Recognizing that the mission of the Department of Fish and Game (DFG) is to manage California's diverse fish, wildlife, and plant resources - and the habitats upon which they depend - for their ecological values and for their use and enjoyment by the public, we urge you to take action to protect the resources of the Santa Clara River. Specifically, we encourage the DFG to:
... Revoke the streambed alteration agreement for Newhall Land and Farming/Valencia Company (ACOE404/CDFG1603). AKA; Valencia Company's Natural River Management Plan NRMP) The agreement, based on inadequate biological data, fails to consider important concerns. A new, amended agreement must be adopted subsequent to a careful environmental impact review. ... Withhold approval on any permits or agreements for the proposed Newhall Ranch project until an unbiased, scientific review, guided by applicable federal and California environmental statutes, can inform necessary protection and mitigation measures for endangered and threatened species. As an important part of California's natural heritage the Santa Clara River should be a high priority for conservation measures and protection from degradation. The California Department of Fish and Game has a responsibility to uphold the Public Trust by protecting wildlife and its habitat. We appreciate your consideration of this letter that describes our concerns about the ongoing Natural River Management Plan, the proposed Newhall Ranch project, and the context for those concerns.

The Santa Clara River
The Santa Clara River, southern California's last truly dynamic big river, boasts one of the largest watersheds in the South Coast region at 1,600 square miles. The Santa Clara River is the longest free-flowing river in southern California, and is the only one that extends from the desert to the coast. The river is of critical biological importance linking several major ecoregions: Coastal Plain, Coast Ranges, Transverse Ranges, and Mojave Desert. The 116-mile-long river rises on the northern slope of the San Gabriel Mountains in Los Angeles County, traverses Ventura County, lined by riparian habitat featuring willow, mulefat, and cottonwood forests - habitats so rare that they still exist in only three to five percent of their original range in the western United States. These streamside habitats are home to 12 federally endangered species among other sensitive native wildlife. Unfortunately, the Santa Clara River and its tributaries are within one of the most rapidly urbanizing watersheds in the state. This makes the area a high priority for monitoring and enforcing environmental regulations.

Wildlife
The Santa Clara River is a key wildlife corridor that connects the Los Padres and Angeles National Forests.
The habitat along the Santa Clara River supports the largest community of riparian-obligate birds between the Santa Ynez River in Santa Barbara County and the Prado Basin in Riverside County. The Audubon Society designated this area as an Important Bird Area. Some of the sensitive bird species that occur within this stretch of the Santa Clara River include: least Bell's vireo, southwestern willow flycatcher, yellow-billed cuckoo, Cooper's hawk, sharp-shinned hawk, merlin, prairie falcon, yellow breasted chat, yellow warbler, common yellowthroat, mountain plover, western burrowing owl, long-eared owl, ferruginous hawk, white-tailed kite,

tri-colored blackbirds, many other sensitive raptors and songbirds.
Mammals observed or expected to occur in this area include: California leaf-nosed bat, small-footed myotis, long-eared myotis, fringed myotis, long-legged myotis, Yuma myotis, pale Townsend's big-eared bat, spotted bat, pallid bat, California mastiff bat, San Diego black-tailed jack rabbit, San Diego desert woodrat, Los Angeles pocket mouse, ringtail, mountain lion, bobcat, coyote, gray fox, American badger, and deer.
Reptiles include: western pond turtle, San Diego horned lizard, California horned lizard, coastal western whiptail, silvery legless lizard, rosy boa, San Bernadino ringneck snake, two-striped garter snake. Insects: riverside fairy shrimp, and San Emigdio blue.
Fish: unarmored threespined stickleback, arroyo chub, Santa Ana sucker, and steelhead trout.
Amphibians occurring include arroyo toad, western spade-foot toad, and California red-legged frog.
Many California native and rare plants are also present.
While this is not an exhaustive list of the remarkable wildlife that inhabits the Santa Clara River area, it exhibits the rich diversity and importance of preserving habitat for these species.

Streambed Alteration Agreement Requires Review and Amendment
Newhall Land and Farming Company (NLF) has been engaged in development activities in the Santa Clara River valley for decades. Such development poses a strong threat to the persistence of native wildlife and natural ecosystems. A Natural River Management Plan (NRMP) was created by Newhall Land and Farming to guide the development of the Santa Clara River valley. Since the plan was created, significant new scientific information has rendered the NRMP inadequate. Year after year, NLF has used an outdated agreement to continue development and inhibit environmental protection on hundreds of acres along the river. The NRMP streambed alteration agreement should be revoked and a comprehensive review of the Newhall Land and Farming Company's development in the Santa Clara River valley must be conducted as mandated by the California Environmental Quality Act (CEQA).

Two key factors have demonstrated the inadequacy of the current NRMP. First, the biological inventories are inadequate and overlooked several important natural resources. And second, the approved Natural River Management Plan does not provide satisfactory mitigation for the negative impact that the development has on the ecosystem.

Inadequate Biological Inventories
The current NRMP was based on surveys conducted by scientists with a conflict of interest. The scientists conducting the surveys were employed by Newhall Land and Farming Company. The biological inventories were never reviewed by independent biologists and they failed to identify many important natural resources that need to be conserved.

Originally, the use of hazing machines during wildlife surveys may have

precluded an accurate count of state and federally protected species. NLF installed more than 30 hazers to scare away nesting birds along sections of the river. Officials estimate that the hazers had been in place for as many as 2 to 5 years. The river provides suitable habitat for two endangered birds, the willow flycatcher and the least Bell's vireo. As federally protected species, the hazing machines may have excluded these birds from surveys and it is likely that the machines also harassed the birds.
Also, an endangered species, the arroyo toad (Bufo microscaphus californicus) was not accounted for in the NRMP despite the fact that it can be found within the boundaries of the area covered by the NRMP. The arroyo toad was listed as a federal endangered species in 1994. The State of California classifies it as a Species of Special Concern. The arroyo toad has been extirpated from approximately 75 percent of its previously occupied habitat. This amphibian is a habitat specialist to the dynamic climatic regime and drainages of the central and southern California coast, and a sensitive indicator to the quality of riparian habitats and stream systems. The major reason for their decline is human alteration and use of arroyo toad habitats that include water storage reservoirs, recreational facilities, flood control structures, agriculture and urbanization. Introduction of predatory non-native fish and wildlife has also impacted the arroyo toad. Studies conducted by Dan Holland on Camp Pendleton revealed that arroyo toads travel up to 1.5 miles from the edge of the riparian ecotone to utilize upland habitats for foraging and burrowing. In upland travel, these toads are vulnerable to predation, entrapment, and human-caused sources of mortality such as roadways. Burrowed toads are often situated a few inches below the soil surface, and can be easily crushed by pedestrian or vehicle traffic.

The first records of the arroyo toads within the vicinity of Newhall Land and Farming development were listed in the California Biodiversity Data Base in 1994. Biologists also reported presence of the arroyo toad in 1996, 1998 (egg cases), and 2000 (tadpoles). The toads in this area have been continuously overlooked by regulation agencies. The U.S. Fish and Wildlife Service failed to include land owned by NLF as critical habitat for the arroyo toad. This is a noteworthy omission since no other river system with arroyo toads lacks such designation. Subsequently, the Fish and Wildlife Service did not address impacts upon the arroyo toad in the Biological Opinions for the development projects.

In April of 2001, four adult arroyo toads were located in field surveys conducted by N.H. Sandburg along the Santa Clara River in the ongoing North Valencia 1 project. The riparian area and the river were incurring heavy impacts from trespassing off-highway vehicle (OHV) traffic, directly impacting burrow substrate in the area where the toads were located. In addition, a flowing tributary adjacent to the area where one toad was located was channeled by heavy equipment and denuded of riparian vegetation. While agencies concur that the arroyo toad exists in the Newhall development area, these agencies have failed to take appropriate regulatory action:
... Newhall Land and Farming disked arroyo toad upland habitat directly above

the site location of four adult toads, which most likely caused take on the arroyo toad. Again, the Fish and Wildlife Service and Army Corps declined to take regulatory action.
... Hundreds of acres of cottonwood and other vegetation types that comprised arroyo toad upland habitat has been removed and replaced by asphalt, parking lots, and roadways. Arroyo toads require and utilize upland habitats wherever accessible for foraging and burrowing. They cannot maintain populations where riparian systems have been lost.
... Large apartment complexes have been constructed directly on upland habitat of the arroyo toads most recently located. The creek directly downstream of the apartment complex has again been channeled by heavy equipment and denuded of riparian vegetation. This creek would have been an important water source and breeding habitat for the toad. The uplands continue to be developed with intensive land manipulations and roadways. Off-road traffic continues on top of breeding, foraging, and burrow habitat in the Santa Clara River bed.
Therefore, new measures must be included in an amended plan that protects the arroyo toad from harm or harassment.

Currently the implementation of the NRMP allows the "take" of endangered species that cannot be ignored. The CEQA, EIR, and NRMP documents did not acknowledge the arroyo toad, and subsequently failed to address impacts upon this endangered species with the result that irrevocable harm and take has undoubtedly occurred. Any new management plan should incorporate new biological surveys conducted by independent scientists.

Unsatisfactory Mitigation and a History of Violations
Second, the approved Natural River Management Plan does not provide satisfactory mitigation for the negative impact that the development has on the ecosystem. Newhall Land and Farming (NLF) has a history of unlawful activities along the Santa Clara River. It is imperative to monitor this company and uphold applicable environmental laws. Some of Newhall's most significant violations to-date include:
1. In 1992, NLF unlawfully channelized Bouquet Creek near the confluence of the Santa Clara River. The company illegally poured concrete in the creek and destroyed habitat along the banks. The concrete was never removed, Newhall paid a fine of only a small portion of the cost of the damage and their wetland mitigation measures have failed miserably.
2. Newhall widened the McBean Parkway Bridge over the Santa Clara River without a permit. As a result Newhall sidestepped laws that would have required them to mitigate for threats to endangered species and habitat destruction.
3. In 2001, Friends of the Santa Clara River reported that NLF dewatered wetlands that were not identified in the Natural River Management Plan or Streambed Alteration Agreement. In the last year, vital wetlands have been destroyed and in a single day hundreds of thousands of amphibian eggs, native fish, acres of cattail/willow habitat have been wiped out.
4. In violation of the Migratory Bird Treaty Act, there have been several

incidents of NLF's activities harming colonies of migratory songbirds. Biologists reported that colonies of redwings, song sparrows, and common yellowthroats along San Francisquito creek were extirpated in June 1999. Without a permit, NLF has installed hazing machines to keep endangered birds such as the least Bell's vireo from breeding and nesting in areas planned for development. Such harassment could be considered a violation of the Endangered Species Act among other laws intended to protect endangered species.

6

The current NRMP has resulted in damage to the biological diversity of the Santa Clara River and its tributaries. A new management plan should account for these violations and incorporate mitigation for problems such as the lost wetlands. The NRMP must be pulled for CEQA review to address the problems described above.

The Newhall Ranch Project

Newhall Ranch is a "new town" proposed by the Newhall Land and Farming Company (also known as the Valencia Company). The project consists of 22,000 dwelling units on nearly 12,000 acres that will house approximately 68,000 people. The project features 323 acres of commercial and business uses, over 5,000 acres of high country and river corridor open areas, an 18-hole golf course, a 15-acre man-made lake, and a 6.9 million gallons-per-day water reclamation plant.

Potential Impacts of the Newhall Ranch Project

The development of the proposed Newhall Ranch will have many environmental impacts that must be addressed. The Newhall Ranch project plan that was created for this area has not provided adequate regulatory measures.

First, the Santa Clara River is a major wildlife corridor that will be fragmented by development. The Santa Clara River and its tributaries serve as major wildlife corridors. Newhall Land and Farming's development has substantially degraded the value of the Santa Clara River as a wildlife corridor. Already the development has hemmed in the Santa Clara River with thousands of homes, condominiums, apartments, drive through restaurants, retail stores, gas stations, car washes and various other commercial and industrial sites within no more then a 100 foot buffer zone from the river.

Second, development in the Santa Clara River valley will change water quality, flow, and may deplete water resources. The Newhall Ranch is being constructed in a flood plain. Such development requires massive alteration to the natural flow of the river. Changes to the river and the riparian habitat surrounding the river will inevitably result in changes in the flow, course, and cleanliness of the river water. This will negatively impact the wildlife in the area. Moreover, the use of water for the new town will deplete local aquifers and lower the water table upon which local vegetation depends. Increased storm runoff and channelization of the river's tributaries will result in higher water velocities and increase the likelihood of flooding. Runoff will also exacerbate water quality problems in the Santa Clara River. The proposed urban area is expected to release millions of gallons of treated sewage water into the river. Currently the

water has a very high level of chemicals that have triggered an investigation by CA Regional Water Quality Control Board to determine whether treatment plant releases are responsible. 7

Third, endangered, threatened and other special status birds, fish, reptiles, and amphibians will be impacted from "take" and habitat destruction. The habitat along the Santa Clara River supports a large community of wildlife that is considered a high priority for protection. Several species that occur in the valley are listed as endangered or threatened pursuant to the federal Endangered Species Act. There are other imperiled species with habitat in this area that are protected under California laws. The Newhall Ranch will threaten these species through habitat destruction and direct "take" of species-that means to harass, harm, hunt, shoot, wound, kill, trap, capture, or collect.

For example, the unarmored threespine stickleback (Gasterosteus aculeatus wiliamsoni), an endangered species, is at risk. The unarmored threespine stickleback is protected both under the federal Endangered Species Act and California law. The stickleback is a small, scaleless, freshwater fish that inhabits the slow and quiet waters of streams and rivers. The stickleback depends on clean, clear water with a good diversity of algae and other plants. Historically, the stickleback was found throughout Southern California, but by 1985 it only remained in a small portion of the upper Santa Clara River drainage in Los Angeles County and the San Antonio Creek drainage in Santa Barbara County. The decline of the stickleback is attributed to urbanization in the Los Angeles area.

The cumulative impacts of the development permitted by the current Natural River Management Plan and the proposed Newhall Ranch will seriously and adversely impact the stickleback population in the San Francisquito Creek. The overall impacts of development on lower San Francisquito Creek are likely to increase the isolation of this population of the unarmored threespine stickleback. This will increase the risk of extirpation of this population. Isolation prevents genetic exchange and the stickleback requires upstream movement in its life strategy. The second potential adverse impact is from water extraction. If the frequency, magnitude and length of time water flows are present in this area are reduced this could harm the stickleback population. Deviation from historical hydrological conditions creates greater impacts on natural ecosystems.

The impacts upon the arroyo toad and unarmored threespine stickleback have not been adequately addressed within the Natural River Management Plan and the proposed Newhall Ranch plan. This is a serious regulatory and legal failing of federal and state jurisdictional agencies. The continuing unregulated impacts of this project may cause the loss of the remaining and increasingly isolated population of arroyo toads and stickleback within the Santa Clara River valley.

Fourth, existing measures have not adequately considered or mitigated for environmental impacts. Unregulated actions by Newhall Land and Farming

continue and have significant negative impacts. These actions include: habitat destruction, take of endangered species, violation of the Migratory Bird Treaty Act, paving, construction, disking, draining of wetlands, channeling streams, introduction of non-native predators, sewage run-off, and pollution. The EIR, CEQA, and NFMA documents are seriously deficient and fail to address many of these critical issues and their cumulative effects.

8

Newhall Ranch Is Already Moving Ahead Prior to Official Approval

Newhall Land and Farming destroyed the Spineflower, an important plant that was once thought extinct. Although the San Fernando Valley Spineflower was once assumed to be extinct, it has been properly identified on the proposed site of the Newhall Ranch. The San Fernando Valley Spineflower is listed as Endangered under the California Endangered Species Act and is a candidate under the federal ESA (Endangered Species Act). Recently, biologists have observed that the activities of NLF have systematically destroyed the habitat and threatened the survival of this rare species. Impacts to rare species, especially rare plants, are extremely difficult and expensive to mitigate. A study by Dr. Peggy Fiedler demonstrated that mitigation measures for rare plant species, such as the Spineflower, have failed over 90 percent of the time.

Major alterations were made to the Santa Clara River prior to preparing the required Environmental Impact Report. In 1992 NLF engaged in major alterations to the Santa Clara River at the proposed Newhall Ranch site. Some controversy exists over whether these alterations took place prior to completing measures required by law. Photos of the streambed alterations compared with overlays of the proposed Newhall Ranch project substantiate that the alterations happened before an adequate environmental review.

Responsibilities of the California Department of Fish and Game
The mandate of the California Department of Fish and Game requires the DFG to uphold environmental laws and ensure that California's diverse wildlife, plants, and their habitat are preserved for their ecological values. As a part of this commitment the Department of Fish and Game must take action to ensure that the Santa Clara River Valley is protected as a part of California's natural heritage. Additionally, due to the sensitive issues around the Newhall Ranch project we are concerned that employees may face retaliatory actions or may be reprimanded for reporting violations. DFG employees who take proactive steps toward assuring that the DFG complies with environmental laws and its mission should be commended. As an interested party in the protection of the Santa Clara River we intend to monitor the actions of the Department of Fish and Game and its compliance and enforcement of environmental laws.

Conclusion
The Newhall Land and Farming's Natural River Management Plan has failed to

protect the diversity and natural resources in the Santa Clara River valley. The plan was approved before important natural resources were identified. These poor management practices are a precursor to the destruction the Newhall Ranch project may impose on the Santa Clara River if approved. The Natural River Management Plan has permitted the destruction of portions of the Santa Clara River and will continue the devastation up the San Francisquito Creek and down the river through the proposed Newhall Ranch project area unless the Department of Fish and Game requires further CEQA review and depends upon sound, unbiased scientific studies to ensure adequate mitigation measures. The Department of Fish and Game needs to take proactive measures to monitor the actions of Newhall Land and Farming Company and must uphold the strictest environmental regulations to protect the biologically important Santa Clara River valley.

9

We urge the Department of Fish and Game to revoke the streambed alteration agreement until the Natural River Management Plan accounts for the impacts described above and withhold new permits until adequate CEQA reviews and mitigation measures can protect the ecological values in this region.

Thank you, again, for your attention to this letter and the concerns expressed above.
Sincerely,

Kris Ohlenkamp
Audubon Society / San Fernando Valley Chapter

David Magney
California Native Plant Society

Peter Galvin
Center for Biological Diversity

Ron Bottorff, Chairman; Barbara Wampole, Vice chair; Teresa Savaike
Friends of the Santa Clara River

Lynne Plambeck
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10

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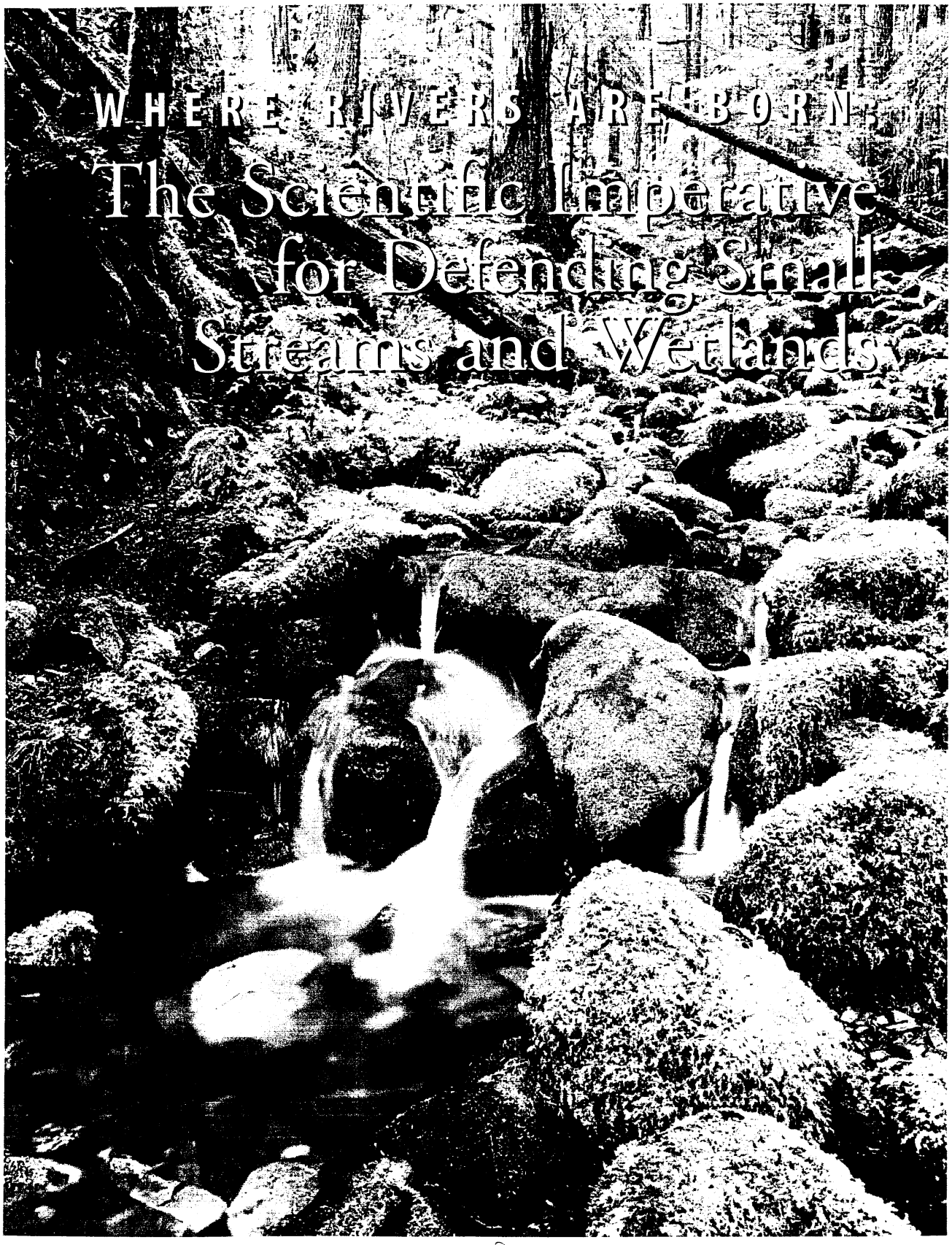

Attachment 2 Page 1 of 12

WHERE RIVERS ARE BORN:
The Scientific Imperative for Defending Small Streams and Wetlands

The following scientists authored *Where Rivers Are Born:*

Judy L. Meyer, Ph.D.
Distinguished Research Professor
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University of Georgia
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Expertise: *River and stream ecosystems*

Louis A. Kaplan, Ph.D.
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Expertise: *Organic matter biogeochemistry and microbial ecology of stream ecosystems*

Denis Newbold, Ph.D.
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Expertise: *Nutrient cycling in stream ecosystems*

David L. Strayer, Ph.D.
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Expertise: *Distributions and roles of freshwater invertebrates including exotic and endangered species*

Christopher J. Woltemade, Ph.D.
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Expertise: *Hydrology, fluvial geomorphology, stream and wetland restoration, and water quality*

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Expertise: *Wetland and restoration ecology*

Richard Beilfuss, Ph.D.
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Expertise: *Wetland hydrology and ecological restoration*

Quentin Carpenter, Ph.D.
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University of Wisconsin-Madison
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Expertise: *Groundwater-fed wetlands*

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Professor of Biology
University of Missouri
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Expertise: *Amphibian conservation biology, wetland ecology*

Mary C. Watzin, Ph.D.
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School of Natural Resources, University of Vermont
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Expertise: *Aquatic ecology and ecosystem management*

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Expertise: *Plant population and community ecology*

American Rivers and Sierra Club, sponsors of this publication, are extremely grateful for the contributions the authors have made in describing the ecological importance of headwater streams and wetlands and the benefits they provide to humans. We extend special thanks to Judy Meyer for coordinating the project. We also thank editors Mari N. Jensen and David Sutton.

This publication was funded by grants from the Sierra Club Foundation, The Turner Foundation and American Rivers and its supporters.

September, 2003

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WHERE RIVERS ARE BORN:

The Scientific Imperative for Defending Small Streams and Wetlands

EXECUTIVE SUMMARY

Our nation's network of rivers, lakes and streams originates from a myriad of small streams and wetlands, many so small they do not appear on any map. Yet these headwater streams and wetlands exert critical influences on the character and quality of downstream waters. The natural processes that occur in such headwater systems benefit humans by mitigating flooding, maintaining water quality and quantity, recycling nutrients, and providing habitat for plants and animals. This paper summarizes the scientific basis for understanding that the health and productivity of rivers and lakes depends upon intact small streams and wetlands.

Historically, federal agencies have interpreted the protections of the Clean Water Act to cover all the waters of the United States, including small streams and wetlands. Despite this, many of these ecosystems have been destroyed by agriculture, mining, development and other human activities. The extent to which small streams and wetlands should remain under the protection of the Clean Water Act is currently (2003) under consideration in federal agencies and Congress. Extensive scientific studies document the significance of these small systems and form the basis for this paper. Further references are provided at the end of the document.

We know from local/regional studies that small, or headwater, streams make up at least 80 percent of the nation's stream network. However, scientists' abilities to extend these local and regional studies to provide a national perspective is hindered by the absence of a comprehensive database that catalogs the full extent of streams in the United States. The topographic maps most commonly used to trace stream networks do not show most of the nation's headwater streams and wetlands. Thus, such maps do not provide detailed enough information to serve as a basis for stream protection and management.

Scientists often refer to the benefits humans receive from the natural functioning of ecosystems as ecosystem services. The special physical and biological characteristics of intact small streams and wetlands provide natural flood control, recharge groundwater, trap sediments and pollution from fertilizers, recycle nutrients, create and maintain biological diversity, and sustain the biological productivity of downstream rivers, lakes and estuaries. These ecosystem services are provided by seasonal as well as perennial streams and wetlands. Even when such systems have no visible overland connections to the stream network, small streams and wetlands are usually linked to the larger network through groundwater.

Small streams and wetlands offer an enormous array of habitats for plant, animal and microbial life. Such small freshwater systems provide shelter,

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food, protection from predators, spawning sites and nursery areas, and travel corridors through the landscape. Many species depend on small streams and wetlands at some point in their life history. For example, headwater streams are vital for maintaining many of America's fish species, including trout and salmon. Both perennial and seasonal streams and wetlands provide valuable habitat. Headwater streams and wetlands also provide a rich resource base that contributes to the productivity of both local food webs and those farther downstream. However, the unique and diverse biota of headwater systems is increasingly imperiled. Human-induced changes to such waters, including filling streams and wetlands, water pollution, and the introduction of exotic species, can diminish the biological diversity of such small freshwater systems, thereby also affecting downstream rivers and streams.

Because small streams and wetlands are the source of the nation's fresh waters, changes that degrade these headwater systems affect streams, lakes, and rivers downstream. Land-use changes in the vicinity of small streams and wetlands can impair the natural functions of such headwater systems. Changes in surrounding vegetation, development that paves and hardens soil surfaces, and the total elimination of some small streams reduces the amount of rainwater, runoff and snowmelt the stream network can absorb before flooding. The increased volume of water in small streams scours stream channels, changing them in a way that promotes further flooding. Such altered channels have bigger and more frequent floods. The altered channels are also less effective at recharging groundwater, trapping sediment, and recycling nutrients. As a result, downstream lakes and rivers have poorer water quality, less reliable water flows, and less diverse aquatic life. Algal blooms and fish kills can become more common, causing problems for commercial and sport fisheries. Recreational uses may be compromised. In addition, the excess sediment can be costly, requiring additional dredging to clear navigational channels and harbors and increasing water filtration costs for municipalities and industry.

The natural processes that occur in small streams and wetlands provide Americans with a host of benefits, including flood control, adequate high-quality water, and habitat for a variety of plants and animals. Scientific research shows that healthy headwater systems are critical to the healthy functioning of downstream streams, rivers, lakes and estuaries. To provide the ecosystem services that sustain the health of our nation's waters, the hydrological, geological, and biological characteristics of small streams and wetlands require protection.

Introduction

Our nation's rivers, from the Shenandoah to the Sacramento, owe their very existence to the seemingly insignificant rivulets and seeps that scientists call headwater streams. Although 19th century explorers often searched for the headwaters of rivers, the birthplace of most rivers cannot be pinpointed. The origins of rivers are many anonymous tiny rills that can be straddled by a 10-year-old child, and no one trickle can reasonably be said to be "the" start of that river. Rather, rivers arise from a network of streamlets and wetlands whose waters join together above and below ground as they flow downstream. As other tributaries join them, creeks grow larger, eventually earning the title "river." The character of any river is shaped by the quality and type of the numerous tributaries that flow into it. Each of the tributaries is, in turn, the creation of the upstream waters that joined to form it.

The ultimate sources of a river often appear insignificant. They could be a drizzle of snowmelt that runs down a mountainside crease, a small spring-fed pond, or a depression in the ground that fills with water after every rain and overflows into the creek below. Such water sources, which scientists refer to as headwater streams and wetlands, are often unnamed and rarely appear on maps. Yet the health of these small streams and wetlands is critical to the health of the entire river network. The rivers and lakes downstream from degraded headwater streams and wetlands may have less consistent flow, nuisance algal growth, more frequent and/or higher floods, poorer water quality, and less diverse flora and fauna.

Historically, federal agencies have interpreted the protections of the Clean Water Act to cover all the waters of the United States, including small streams and wetlands. The current administration is examining whether such streams and wetlands merit protection. In January 2003, the U.S. Environmental Protection Agency (EPA) and the U.S. Army Corps of Engineers announced an "advance notice of proposed rulemaking" to solicit public comments on whether and how to exclude "isolated," intrastate, and non-navigable waters from the scope of the Clean Water Act. Many small streams and wetlands, including headwater streams, could fall into one or more of those categories. At the same time, the agencies instructed their field staff not to enforce the law to protect such waters or, depending on the situation, to seek case-by-case guidance from headquarters before enforcing the Act.

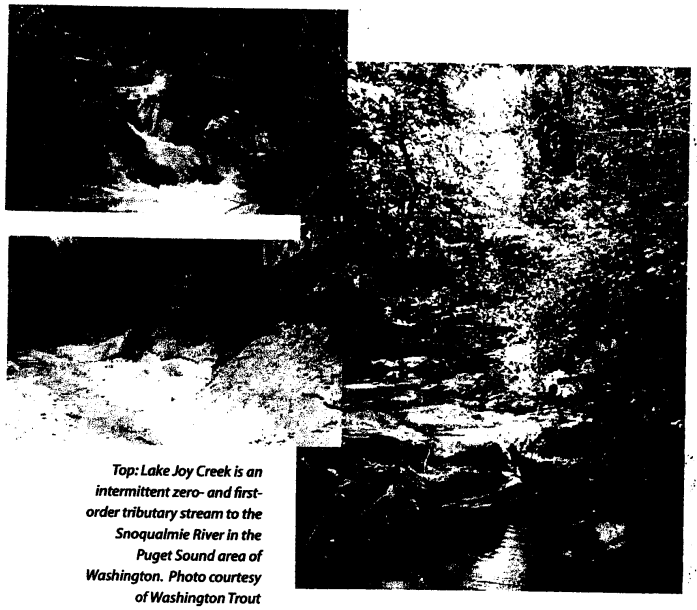
Small streams and wetlands provide crucial linkages between aquatic and terrestrial ecosystems and also between upstream watersheds and tributaries and the downstream rivers and lakes. This paper summarizes the scientific basis for understanding how small streams and wetlands mitigate flooding, maintain water quality and quantity, recycle nutrients, create habitat for plants and animals, and provide other benefits.

Human Beings Depend on Functioning Headwater Stream Systems

Human civilizations and economies are ultimately based on the products and processes of the natural world. While frequently hidden from view, some of the processes integral to the functioning of ecosystems-such as the purification of water and the processing of waste-are crucial to human well-being. Scientists often refer to the benefits humans receive from the functioning of natural ecosystems as *ecosystem services.*

The natural processes that occur in intact headwater streams and wetlands affect the quantity and quality of water and the timing of water availability in rivers, lakes, estuaries and groundwater. For example, the upper reaches of stream networks are important for storing water, recharging groundwater, and reducing the intensity and frequency of

"THE RIVER ITSELF HAS NO BEGINNING OR END. IN ITS BEGINNING, IT IS NOT YET THE RIVER; IN ITS END, IT IS NO LONGER THE RIVER. WHAT WE CALL THE HEADWATERS IS ONLY A SELECTION FROM AMONG THE INNUMERABLE SOURCES WHICH FLOW TOGETHER TO COMPOSE IT. AT WHAT POINT IN ITS COURSE DOES THE MISSISSIPPI BECOME WHAT THE MISSISSIPPI MEANS?"



Top: Lake Joy Creek is an intermittent zero- and first-order tributary stream to the Snoqualmie River in the Puget Sound area of Washington. Photo courtesy of Washington Trout

Cwnter: A primary headwater stream in arid Cienega Creek Preserve, Pima County. Photo courtesy of Alabama Game and Fish Division

Right: A primary headwater stream in Athens County, Ohio. Photo courtesy of Ohio EPA

Bottom: Diagram of stream orders within a stream system. Image created by Sierra Club, based on EPA graphic.

floods. Stream and wetland ecosystems also process natural and human sources of nutrients, such as those found in leaves that fall into streams and those that may flow into creeks from agricultural fields. Some of this processing turns the nutrients into more biologically useful forms. Other aspects of the processing store nutrients, thereby allowing their slow and steady release and preventing the kind of short-term glut of nutrients that can cause algal blooms in downstream rivers or lakes.

The Extent of U.S. Headwater Streams is Underestimated

For many people, *headwater stream* brings to mind a small, clear, icy-cold, heavily-shaded stream that tumbles down a steep, boulder-filled channel. Indeed, there are thousands of miles of such shaded, mountainous headwater streams in the United States. But the term "headwater" encompasses many other types of small streams. Headwaters can be intermittent streams that flow briefly when snow melts or after rain, but shrink in dry times to become individual pools filled with water. Desert headwater streams can arise from a spring and run above ground only a few hundred yards before disappearing into the sand. Other spring-fed headwaters contain clear water with steady temperature and flow. Yet other headwaters originate in marshy meadows filled with sluggish tea-colored water.

No comprehensive study has been conducted to catalog the full extent of streams in the United States. However, on the basis of available maps, scientists have estimated that these smallest streams, called first- and second-order streams, represent about three-quarters of the total length of stream and river channels in the United States. The actual proportion may be much higher because this estimate is based on the stream networks shown on the current U.S. Geological Survey (USGS) topographic maps,

TYPES OF STREAMS

Any one river typically has several different types of sources: *perennial* streams that flow year-round; *intermittent* streams that flow several months during the year, such as streams that come from snowmelt; and *ephemeral* streams that flow at the surface only periodically, usually in response to a specific rainstorm. All these types of streams can be the *headwaters* of a river.

The rivulet of water that flows from a hillside spring and forms a channel is a *first-order stream. Second-order streams* are formed when two first-order channels combine, *third-order streams* are formed by the combination of two second-order streams, and so on.

One way scientists classify streams is the *stream order* system, which assigns streams a number depending upon their location in the network's branching pattern. The term *zero-order stream* refers to swales: hollows that lack distinct stream banks but still serve as important conduits of water, sediment, nutrients, and other materials during rainstorms and snowmelt. Such zero-order streams are integral parts of stream networks. *First-order streams* are the smallest distinct channels.

The term *headwaters* refers to the smallest streams in the network. Scientists often use the term headwaters to refer to zero-, first- and second-order streams. Easily half of the total length of the channels in a stream network can be first-order streams. Such small headwater streams can join a river system at any point along the network. So, a fourth-order stream resulting from the upstream merger of many first-, second-, and third-order streams may flow through a forest and be joined by another first-order stream that meanders out of a nearby marshy meadow.

which do not show all headwater streams. The absence of a comprehensive survey of U.S. streams hinders our ability to estimate the nationwide importance of these systems; it also indicates our need to better understand them.

Studies including field surveys of stream channel networks have found far more headwater streams than are indicated on USGS topographic maps. For example, an on-the-ground survey of streams in the Chattooga River watershed in the southern Appalachian Mountains found thousands of streams not shown on USGS topographic maps. Approximately one-fifth or less of the actual stream network was shown on the USGS map. The missing streams were the smaller ones-the headwaters and other small streams and wetlands. Similar discrepancies have been found at the state level. For example, Ohio's Environmental Protection Agency found that the state's primary headwater streams, although generally absent from USGS topographic maps, comprise more than 80 percent of the total length of the state's streams. Even when small streams are on the map, they are sometimes misclassified: a large number of Ohio streams shown as intermittent on topographic maps are actually perennial.

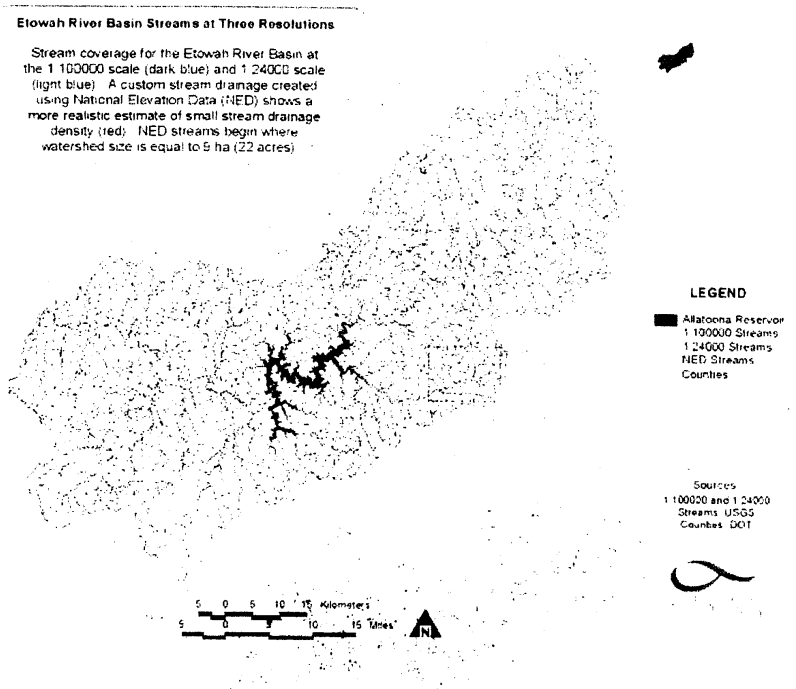
Intact stream networks contain streams that flow year-round and others that flow only part of the time. Compared with the humid-region examples above, stream and river networks in arid regions have a higher proportion of channels that flow intermittently. For example, in Arizona, most of the stream networks-96 percent by length-are classified as ephemeral or intermittent.

Top: Sycamore Creek in Arizona, an arid stream during a dry period. Photo Courtesy of Nancy Grimm

Center: Sycamore Creek (the same stream) after a winter storm. Photo Courtesy of Nancy Grimm

Thus, regional calculations on the extent of small streams grounded in solid evidence show these streams to be underestimated by existing inventories and maps. But actual measurements are not available for the whole nation. Moreover, the topographic maps commonly used as catalogues of stream networks are not detailed enough to serve as a basis for stream management and protection. The very foundation of our nation's great rivers is a vast network of unknown, unnamed, and underappreciated headwater streams.

Sometimes resource managers define a stream based on the size of its watershed, the land area that drains into the stream. For example, Ohio's EPA defines headwater streams as those that drain an area 20 square miles or smaller. Such a definition includes first-, second-, and often third-order streams. Other managers suggest that headwater systems can be defined as those having watersheds of less than one square kilometer, a definition that would generally include only first- and second-order streams. For the purposes of this paper, we consider zero-, first- and second-order streams as headwaters.



Existing tools for cataloging U.S. waters generally omit a large proportion of the headwaters. In this illustration of Georgia's Etowah River Basin, National Elevation Data details, in red, the approximately 40 percent and 60 percent of headwaters not captured by standard cataloging methods. Diagram courtesy of B.J. Freeman, University of Georgia.

Small Streams Provide Greatest Connection Between Water and Land

Within any intact stream and river network, headwater streams make up most of the total channel length. Therefore, such small streams offer the greatest opportunity for exchange between the water and the terrestrial environment. Small streams link land and water in several ways. As a stream flows, it links upstream and downstream portions of the network. In addition, water flows out of and into a channel during events such as floods and runoff from rainstorms. Floodwaters and runoff carry various materials, ranging from insects and bits of soil to downed trees, between land and a channel. Much exchange between land and water occurs in the transition zone along edges of stream channels, called the *riparian zone.*

Water and land also meet in saturated sediments beneath and beside a river channel, a region which scientists call the *hyporheic zone.* Stream water flows within the stream channel and the hyporheic zone. It is in this zone, where stream water makes its most intimate contact with the channel bed and banks, that much of a stream's cleansing action and nutrient processing occurs. This zone is also where groundwater and surface water come into contact.

Ecological processes that occur in hyporheic zones have strong effects on stream water quality. Rivers with extensive hyporheic zones retain and process nutrients efficiently, which has a positive effect on water quality and on the ecology of the riparian zone. Scientific research is illuminating the importance of maintaining connectivity between the channel, hyporheic, and riparian components of river ecosystems. When human actions, such as encasing streams in pipes, sever those connections, the result is poorer water quality and degraded fish habitat downstream.

Wetlands Have Hidden Connections to Streams

Like headwater streams, wetlands are also key components of the nation's network of rivers and streams. Many wetlands, such as marshes that border lakes or streams, have obvious connections to surface waters. Other wetlands, however, seem cut off from stream networks - but that appearance is deceiving. Wetlands are almost always linked to stream networks and other wetlands through groundwater. There are biological connections also; many aquatic and semi-aquatic animals, ranging in size from aquatic insects to raccoons, routinely move between land-locked wetlands, streamside wetlands, and stream channels. Animals often use different parts of the aquatic environment at different points in their life cycle, so groundwater connections and food webs link many wetlands to larger waterways.

Wetlands without obvious surface connections to streams are diverse. Scientists generally distinguish between wetlands that have permanent water and others, called ephemeral wetlands, that are only seasonally wet. At least one out of five wetlands does not have a visible connection to a waterway, and, in some areas, more than half of the wetlands fall into that category. Despite the abundance of such wetlands, the United States has no national inventory of their numbers or locations.

A U.S. Fish and Wildlife Service study of wetlands in 72 areas within the United States found that wetlands without obvious surface connections to waterways are generally small in area, but numerous. All such wetlands are depressions in the ground that hold water, whether from rainwater, snowmelt, or groundwater welling up to the surface. Each region of the United States has unique types of depressional wetlands. Ephemeral wetlands called vernal pools occur in California and the Northeast; the prairie potholes used by ducks and other waterfowl dot the Upper Midwest; and Carolina bays, cypress ponds, and grass-sedge marshes occur in the Southeast.

Top: A vernal pool in Massachusett's Ipswich River Basin during the dry phase in summer. Photo courtesy of Vernal Pool Association

Bottom: The same Ipswich River Basin vernal pool inundated by fall precipitation. Photo courtesy of Vernal Pool Association

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Small Streams and Wetlands Provide Beneficial Ecosystem Services

A headwater stream channel near Toledo, OH relocated to accommodate development. Photo courtesy of Marshal A. Moser

Natural processes that occur in small streams and wetlands provide humans with a host of benefits, including flood control, maintenance of water quantity and quality, and habitat for a variety of plants and animals. For headwater streams and wetlands to provide ecosystem services that sustain the health of our nation's waters, the hydrological, geological and biological components of stream networks must be intact.

Small Streams and Wetlands Provide Natural Flood Control

Floods are a natural part of every river. In times past, waters of the Mississippi River routinely overtopped its banks. Floodwaters carried the sediment and nutrients that made the Mississippi Delta's soil particularly suitable for agriculture. But floods can also destroy farms, houses, roads and bridges.

When small streams and wetlands are in their natural state, they absorb significant amounts of rainwater, runoff and snowmelt before flooding. However, when a landscape is altered, such as by a landslide or large forest fire or a housing development, the runoff can exceed the absorption capacity of small streams. Moreover, the power of additional water coursing through a channel can change the channel itself. Humans often alter both landscape and stream channels in ways that result in larger and more frequent floods downstream.

A key feature of streams and rivers is their shape. Unlike a concrete drainage ditch, a natural streambed does not present a smooth surface for water flow. Natural streambeds are rough and bumpy in ways that slow the passage of water. Particularly in small narrow streams, friction produced by a stream's gravel bed, rocks, and dams of leaf litter and twigs slows water as it moves downstream. Slower moving water is more likely to seep into a stream's natural water storage system-its bed and banks-and to recharge groundwater. Slower moving water also has less power to erode stream banks and carry sediment and debris downstream.

In watersheds that are not carefully protected against impacts of land development, stream channels often become enlarged and incised from increased runoff. Changed channels send water downstream more quickly, resulting in more flooding. For example, after forests and prairies in Wisconsin watersheds were converted to agricultural fields, the size of floods increased. This change in land use had altered two parts of the river systems' equation: the amount of runoff and shape of the stream channel. Cultivation destroyed the soil's natural air spaces that came from worm burrows and plant roots. The resulting collapse of the soil caused more rainfall to run off into streams instead of soaking into the ground. Additional surface runoff then altered the stream channels, thereby increasing their capacity to carry large volumes of water quickly downstream. These larger volumes flow downstream at much higher velocity, rather than soaking into the streambed.

Urbanization has similar effects; paving previously-vegetated areas leads to greater storm runoff, which changes urban stream channels and ultimately sends water more quickly downstream. Covering the land with impermeable surfaces, such as roofs, roads, and parking lots, can increase by several times the amount of runoff from a rainstorm. If land uses change near headwater streams, effects are felt throughout the stream network. In an urban setting, runoff is channeled into storm sewers, which then rapidly discharge large volumes of water into nearby streams. The additional water causes the stream to pick up speed, because deeper

water has less friction with the streambed. The faster the water moves, the less it can soak into the streambed and banks. Faster water also erodes channel banks and beds, changing the shape of a channel. The effect is magnified downstream, because larger rivers receive water from tens, sometimes hundreds, of small headwater basins. When such changes are made near headwater streams, downstream portions of the stream network experience bigger and more frequent flooding.

As regions become more urbanized, humans intentionally alter many natural stream channels by replacing them with storm sewers and other artificial conduits. When larger, smoother conduits are substituted for narrow, rough-bottomed natural stream channels, flood frequency increases downstream. For example, three decades of growth in storm sewers and paved surfaces around Watts Branch Creek, Maryland more than tripled the number of floods and increased average annual flood size by 23 percent.

"ALTERATION OF SMALL STREAMS AND WETLANDS DISRUPTS THE QUANTITY AND AVAILABILITY OF WATER IN A STREAM AND RIVER SYSTEM."

Small Streams and Wetlands Maintain Water Supplies

Headwater systems play a crucial role in ensuring a continual flow of water to downstream freshwater ecosystems. Water in streams and rivers comes from several sources: water held in the soil, runoff from precipitation, and groundwater. Water moves between the soil, streams and groundwater. Wetlands, even those without any obvious surface connection to streams, are also involved in such exchanges by storing and slowly releasing water into streams and groundwater, where it later resurfaces at springs. Because of these interactions, groundwater can contribute a significant portion of surface flow in streams and rivers; conversely, surface waters can also recharge groundwater. If connections between soil, water, surface waters, and groundwater are disrupted, streams, rivers, and wells can run dry. Two-thirds of Americans obtain their drinking water from a water system that uses surface water. The remaining one-third of the population relies on groundwater sources. The quality and amount of water in both of these sources respond to changes in headwater streams.

USGS estimates that, on average, from 40 to 50 percent of water in streams and larger rivers comes from groundwater. In drier regions or during dry seasons, as much as 95 percent of a stream's flow may come from groundwater. Thus, the recharge process that occurs in unaltered headwater streams and wetlands both moderates downstream flooding in times of high water and maintains stream flow during dry seasons.

Headwater streams and wetlands have a particularly important role to play in recharge. These smallest upstream components of a river network have the largest surface area of soil in contact with available water, thereby providing the greatest opportunity for recharge of groundwater. Moreover, water level in headwater streams is often higher than the water table, allowing water to flow through the channel bed and banks into soil and groundwater. Such situations occur when water levels are high, such as during spring snowmelt or rainy seasons. During dry times, the situation in some reaches of the stream network, particularly those downstream, may reverse, with water flowing from the soil and groundwater through the channel banks and bed into the stream. This exchange of water from the soil and groundwater into the stream maintains stream flow. However, if land-use changes increase the amount of precipitation that runs off into a stream rather than soaking into the ground, the recharge process gets short-circuited. This increased volume of stream water flows rapidly downstream rather than infiltrating into soil and groundwater. The consequence is less overall groundwater recharge, which often results in less water in streams during drier seasons.

Therefore, alteration of small streams and wetlands disrupts the quantity and availability of water in a stream and river system. Protecting headwater streams and wetlands is important for maintaining water levels needed to support everything from fish to recreational boating to commercial ship traffic.

Small Streams and Wetlands Trap Excess Sediment

Headwater systems retain sediment. Like the flow of water, movement of sediment occurs throughout a river network. Thus, how a watershed is managed and what kinds of land uses occur there have substantial impact on the amount of sediment delivered to larger rivers downstream. Increased sediment raises water purification costs for municipal and industrial users, requires extensive dredging to maintain navigational channels, and degrades aquatic habitats. Intact headwater streams and wetlands can modulate the amount of sediment transported to downstream ecosystems.

Runoff from rain, snowmelt and receding floodwaters can wash soil, leaves and twigs into streams, where the various materials get broken up into smaller particles or settle out. If natural vegetation and soil cover are disturbed by events and activities such as fires, farming or construction, runoff increases, washing more materials into streams. At the same time, the increased velocity and volume of water in a stream cause erosion within the streambed and banks themselves, contributing additional sediment to the stream system. Moreover, the faster, fuller stream can carry more and larger chunks of sediment further downstream.

"Intact headwater streams and wetlands can modulate the amount of sediment transported to downstream ecosystems."

One study found that land disturbances such as urban construction can, at minimum, double the amount of sediment entering headwater streams from a watershed. A Pennsylvania study showed how, as a 160-acre headwater watershed became more urbanized, channel erosion of a quarter-mile stretch of stream generated 50,000 additional cubic feet of sediment in one year-enough to fill 25 moderate-sized living rooms. In a non-urban watershed of the same size, it would take five years to generate the same amount of sediment. Such studies demonstrate that landscape changes such as urbanization or agriculture, particularly without careful protection of headwater streams and their riparian zones, may cause many times more sediment to travel downstream.

Excess Sediment in Downstream Ecosystems Costs Money

Keeping excess sediment out of downstream rivers and lakes is one ecosystem service intact small streams and wetlands provide. Once sediment moves further downstream, it becomes an expensive problem. Too much sediment can fill up reservoirs and navigation channels, damage commercial and sport fisheries, eliminate recreation spots, harm aquatic habitats and their associated plants and animals, and increase water filtration costs.

Additional sediment damages aquatic ecosystems. Sediment suspended in the water makes it murkier; as a result, underwater plants no longer receive enough light to grow. Fish that depend on visual signals to mate may be less likely to spawn in murky water, thereby reducing fish populations. High levels of sediment suspended in water can even cause fish kills. Even as it settles to the bottom, sediment continues to cause problems because it fills the holes between gravel and stones that some animals call home, smothers small organisms that form the basis of many food webs, and can also smother fish eggs.

Getting rid of sediment is expensive. For example, keeping Baltimore Harbor navigable costs $10 to $11.5 million annually to dredge and dispose of sediment the Patapsco River deposits in the harbor.

Small Streams and Wetlands Retain Sediment

Headwater streams and wetlands typically trap and retain much of the sediment that washes into them. The faster the water travels, the larger the particles it can carry. So, natural obstructions in small streams-rocks, downed logs, or even just a bumpy stream bottom-slow water and cause sediment to settle out of the water column. Wetlands, whether or not they have a surface connection to a nearby stream, are often areas where runoff slows and stops, dropping any debris the water may be carrying. Because headwater streams represent 75 percent or more of total stream length in a stream network, such streams and their associated wetlands retain a substantial

amount of sediment, preventing it from flowing into larger rivers downstream.

Even ephemeral streams can retain significant amounts of sediment. Such small headwater streams expand and contract in response to heavy rains. During expansion, a stream flows over what was a dry or damp streambed. Most of the water at the leading edge of a growing stream, called the "trickle front," soaks into the streambed and does not carry sediment downstream. In a small watershed near Corvallis, Oregon, researchers found that 60 to 80 percent of sediment generated from forest roads traveled less than 250 feet downstream before settling out in stream pools. Headwater streams can store sediment for long periods of time: research in Oregon's Rock Creek basin found that headwater streams could retain sediment for 114 years.

Natural Cleansing Ability of Small Streams and Wetlands Protects Water Quality

Materials that wash into streams include everything from soil, leaves and dead insects to runoff from agricultural fields and animal pastures. One of the key ecosystem services that stream networks provide is the filtering and processing of such materials. Healthy aquatic ecosystems can transform natural materials like animal dung and chemicals such as fertilizers into less harmful substances. Small streams and their associated wetlands play a key role in both storing and modifying potential pollutants, ranging from chemical fertilizers to rotting salmon carcasses, in ways that maintain downstream water quality.

Excess Nutrients Cause Problems in Rivers and Lakes

Inorganic nitrogen and phosphorus, the main chemicals in agricultural fertilizers, are essential nutrients not just for plants, but for all living organisms. However, in excess or in the wrong proportions, these chemicals can harm natural systems and humans.

In freshwater ecosystems, eutrophication, the enriching of waters by excess nitrogen and phosphorus, reduces water quality in streams, lakes, estuaries and other downstream waterbodies. One obvious result is the excessive growth of algae. More algae clouds previously clear streams, such as those favored by trout. In addition to reducing visibility, algal blooms reduce the amount of oxygen dissolved in the water, sometimes to a degree that causes fish kills. Fish are not the only organisms harmed: some of the algae species that grow in eutrophic waters generate tastes and odors or are toxic, a clear problem for stream systems that supply drinking water for municipalities. In addition, increased nitrogen can injure people and animals. Excess nitrogen in the form called nitrate in drinking water has been linked to "blue baby disease" (methemoglobinemia) in infants and also has toxic effects on livestock.

Stream networks filter and process everything from leaves and dead insects to runoff from agricultural fields and animal pastures. Without such processing, algal blooms can ruin living conditions for fish and the quality of drinking water. Here, algae overtakes a lake in Iowa. Photo courtesy of Lynn Betts, USDA NRCS

Headwater Streams Transform and Store Excess Nutrients

Headwater streams and associated wetlands both retain and transform excess nutrients, thereby preventing them from traveling downstream. Physical, chemical and biological processes in headwater streams interact to provide this ecosystem service.

Compared with larger streams and rivers, small streams, especially shallow ones, have more water in physical contact with a stream channel. Therefore, the average distance traveled by a particle before it is removed from the water column is shorter in headwater streams than in larger ones. A study of headwater streams in the southern Appalachian Mountains found that both phosphorus and the nitrogen-containing compound ammonium traveled less than 65 feet downstream before being removed from the water.

In headwater streams and wetlands, more water is in direct contact with the streambed, where most processing takes place. Bacteria, fungi and other microorganisms living on the bottom of a stream consume inorganic nitrogen and phosphorus and convert them into less harmful, more biologically beneficial compounds. A mathematical model based on research in 14 headwater streams throughout the U.S. shows that 64 percent of inorganic nitrogen entering a small stream is retained or transformed within 1,000 yards.

Channel shape also plays a role in transforming excess nutrients. Studies in Pennsylvania have shown that when the forest surrounding headwaters is replaced by meadows or lawns, increased sunlight promotes growth of grasses along stream banks. The grasses trap sediments, create sod, and narrow the stream channel to one-third of the original width. Such narrowing reduces the amount of streambed available for microorganisms that process nutrients. As a result, nitrogen and phosphorus travel downstream five to ten times farther, increasing risks of eutrophication.

"IF HEADWATER STREAMS AND WETLANDS ARE DEGRADED OR FILLED, MORE FERTILIZER APPLIED TO FARM FIELDS OR LAWNS REACHES LARGER DOWNSTREAM RIVERS."

Streams do not have to flow year-round to make significant contributions to water quality. Fertilizers and other pollutants enter stream systems during storms and other times of high runoff, the same times that ephemeral and intermittent streams are most likely to have water and process nutrients. Federal, state and local programs spend considerable sums of money to reduce non-point source inputs of nutrients because they are a major threat to water quality. One principal federal program, the EPA's 319 cost-share program, awarded more than $1.3 billion between 1990 and 2001 to states and territories for projects to control non-point pollution. Failure to maintain nutrient removal capacity of ephemeral and intermittent streams and wetlands would undermine these efforts.

Wetlands also remove nutrients from surface waters. Several studies of riparian wetlands have found that those associated with the smallest streams to be most effective in removing nutrients from surface waters. For example, headwater wetlands comprise 45 percent of all wetlands able to improve water quality in four Vermont watersheds. Another study found that wetlands associated with first-order streams are responsible for 90 percent of wetland phosphorus removal in eight northeastern watersheds. Such studies demonstrate that riparian wetlands, especially those associated with small streams, protect water quality.

As land is developed, headwater streams are often filled or channeled into pipes or paved waterways, resulting in fewer and shorter streams. For example, as the Rock Creek watershed in Maryland was urbanized, more than half of the stream channel network was eliminated. In even more dramatic fashion, mining operations in the mountains of central Appalachia have removed mountain tops and filled valleys, wiping out entire headwater stream networks. From 1986 to 1998, more than 900 miles of streams in central Appalachia were buried, more than half of them in West Virginia.

If headwater streams and wetlands are degraded or filled, more fertilizer applied to farm fields or lawns reaches larger downstream rivers. These larger rivers process excess nutrients from fertilizer much more slowly than smaller streams. Losing the nutrient retention capacity of headwater streams would cause downstream waterbodies to contain higher concentrations of nitrogen and phosphorus. A likely consequence of additional nutrients would be the further contamination and eutrophication of downstream rivers, lakes, estuaries and such waters as the Gulf of Mexico.

Natural Recycling in Headwater Systems Sustains Downstream Ecosystems

Recycling organic carbon contained in the bodies of dead plants and animals is a crucial ecosystem service. Ecological processes that transform inorganic carbon into organic carbon and recycle organic carbon are the basis for every food web on the planet. In freshwater ecosystems, much of the recycling happens in small streams and wetlands, where microorganisms transform everything from leaf litter and downed logs to dead salamanders into food for other organisms in the aquatic food web, including mayflies, frogs and salmon.

Like nitrogen and phosphorus, carbon is essential to life but can be harmful to freshwater ecosystems if it is present in excess or in the wrong chemical form. If all organic material received by headwater streams and wetlands went directly downstream, the glut of decomposing material could deplete oxygen in downstream rivers, thereby damaging and even killing fish and other aquatic life. The ability of headwater streams to transform organic matter into more usable forms helps maintain healthy downstream ecosystems.

Headwater Stream Systems Store and Transform Excess Organic Matter

Intact headwater systems both store and process organic matter in ways that modulate the release of carbon to downstream lakes and rivers. Headwater systems receive large amounts of organic matter, which can be retained and transformed into more palatable forms through decomposition processes. This organic matter is anything of biological origin that falls into, washes into or dies in a stream. Plant parts, such as leaves, twigs, stems and larger bits of woody debris, are the most common of these items. Another source of organic material is dead stream organisms, such as bits of dead algae and bacteria or bodies of insects and even larger animals. Waste products of plants and animals also add organic carbon to water. Water leaches dissolved organic carbon from organic materials in a stream and watershed like tea from a tea bag.

"The ability of headwater streams to transform organic matter into more usable forms helps maintain healthy downstream ecosystems."

Much of the organic matter that enters headwater systems remains there instead of continuing downstream. One reason is that the material often enters headwater streams as large pieces, such as leaves and woody debris, that are not easily carried downstream. In addition, debris dams that accumulate in headwater streams block the passage of materials. One study found four times more organic matter on the bottoms of headwater streams in forested watersheds than on the bottoms of larger streams.

Another reason material stays in headwater streams is that food webs in small streams and wetlands process organic matter efficiently. Several studies have found that headwater streams are far more efficient at transple, one study showed that, for a given length of stream, a headwater stream had an eight-fold higher processing efficiency than a fourth-order channel downstream. Microorganisms in headwater stream systems use material such as leaf litter and other decomposing material for food and, in turn, become food for other organisms. For example, fungi that grow on leaf litter become nutritious food for invertebrates that make their homes on the bottom of a stream, including mayflies, stoneflies and caddis flies. These animals provide food for larger animals, including birds such as flycatchers and fish such as trout.

Headwater Systems Supply Food for Downstream Ecosystems

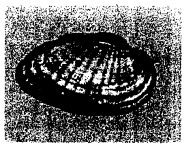
The organic carbon released by headwater streams provides key food resources for downstream ecosystems. Headwater ecosystems control the form, quality and timing of carbon supply downstream. Although organic matter often enters headwaters in large amounts, such as when leaves fall in autumn or storm runoff carries debris into the stream, those leaves and debris are processed more slowly. As a result, carbon is supplied to downstream food webs more evenly over a longer period of time. Forms of carbon delivered range from dissolved organic carbon that feeds microorganisms to the drifting insects such as mayflies and midges that make ideal fish food. Such insects are the preferred food of fish such as trout, char and salmon. One study estimated that fishless headwater streams in Alaska export enough drifting insects and other invertebrates to support approximately half of the fish production in downstream waters.

Processed organic matter from headwater streams fuels aquatic food webs from the smallest streams to the ocean. Only about half of all first-order streams drain into second-order streams; the other half feed directly into larger streams or directly into estuaries and oceans, thus delivering their carbon directly to these larger ecosystems. The health and productivity of downstream ecosystems depends on processed organic carbon-ranging from dissolved organic carbon to particles of fungus, and leaf litter to mayflies and stoneflies-delivered by upstream headwater systems.

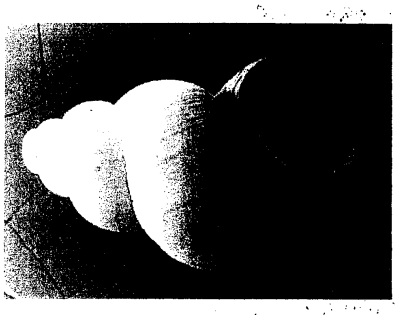
Headwater Streams Maintain Biological Diversity

Headwater Habitats are Diverse

Headwater streams are probably the most varied of all running-water habitats; they range from icy-cold brooks tumbling down steep, boulder-filled channels to outflows from desert springs that trickle along a wash for a short distance before disappearing into sand. As such, headwater systems offer an enormous array of habitats for plant, animal and microbial life.



Top left: Populations of the ellipse mussel (Venustaconcha ellipsiformis) have disappeared from many of its native Midwestern headwaters. Photo courtesy of Kevin Cummings, Illinois Natural History Survey



Top right: A hydrobiid snail [Pyrgulopsis robusta] found in the headwaters of the Snake River in Wyoming. Photo courtesy of Dr. Robert Hershler

Center: Caddis flies and other aquatic insects spend their larval stage in streams, feeding on the algae, vegetation and decaying plant matter. The Brachycentris, a caddis fly found in headwater streams of eastern North America, constructs a protective case out of twigs, leaves and other debris. Photo courtesy of David H. Funk

Bottom: American dippers rely on headwater streams for sustenance, walking along stream bottoms and feeding on insect larvae and crustaceans among the rocks of the streambed. This American dipper was photographed at Tanner's Flat, just east of Salt Lake City. Photo courtesy of Pomera M. France

This variation is due to regional differences in climate, geology, land use and biology. For example, streams in limestone or sandy regions have very steady flow regimes compared with those located in impermeable shale or clay soils. Plants or animals found only in certain regions can also lend a distinctive character to headwater streams. Regionally important riparian plants, such as alder and tamarisk, exercise a strong influence on headwater streams. Headwater streams in regions with beavers are vastly different from those in regions without beavers.

Environmental conditions change throughout a stream network. In wet regions, streams grow larger and have wider channels, deeper pools for shelter, and more permanent flow as they move downstream. In arid regions and even humid regions during dry periods, headwater streams may become smaller downstream as water evaporates or soaks into a streambed. Because marked changes in environmental conditions can occur over very short distances, conditions required by a headwater species may exist for as little as 100 yards of stream. Consequently, local populations of a species may extend over just a short distance, particularly in spring-fed headwaters with sharp changes in environmental conditions along the length of a stream.

With this variety of influences, headwater streams present a rich mosaic of habitats, each with its own characteristic community of plants, animals, and microorganisms.

Headwater Systems Support a Diverse Array of Animals and Plants

There has never been a complete inventory of the inhabitants in even a single headwater stream, much less surveys across many types of headwaters that would permit a thorough understanding of biodiversity in headwater streams. Nevertheless, it is clear that individual headwater streams support hundreds to thousands of species, ranging from bacteria to bats.

The species in a typical headwater stream include bacteria, fungi, algae, higher plants, invertebrates, fish, amphibians, birds and mammals. Headwater streams are rich feeding grounds. Large amounts of leaves and other organic matter that fall or blow into streams, the retention of organic matter in a

channel or debris dams, and the high rates of plant and algal growth in unshaded headwaters all supply food sources for animals such as caddis flies, snails and crustaceans. These animals become food for predators such as fish, salamanders, crayfish, birds and mammals, which, in turn, become prey for larger animals, including herons, raccoons and otters. Many widespread species also use headwaters for spawning sites, nursery areas, feeding areas, and travel corridors. Thus, headwater habitats are important to species like otters, flycatchers, and trout, even though these species are not restricted to headwaters. The rich resource base that headwaters provide causes the biotic diversity of headwater streams to contribute to the productivity of both local food webs and those farther downstream.

Diversity of headwater systems results in diverse headwater plants and animals. Many of these species are headwater specialists and are most abundant in or restricted to headwaters. For example, water shrews live along small, cool streams, feed on aquatic invertebrates, and spend their entire lives connected to headwater streams. Because different headwaters harbor different species, the number of headwater-dependent species across North America is far greater than the number of species in any one headwater.

Headwater specialists often have small geographic ranges. These species, many of which are imperiled, include: species of minnows, darters, and topminnows in southeastern springs and brooks; aquatic snails in spring-fed headwaters in the Great Basin, the Southeast, Florida, and the Pacific Northwest; crayfish in small streams from Illinois and Oklahoma to Florida; and salamanders and tailed frogs in small streams, springs, and seeps in the Southeast and Pacific Northwest. Two factors contribute to specialists' small ranges: their limited ability to move between headwaters and high diversity of headwater habitats. Unlike mobile animals, such as mammals and birds, fully aquatic animals like fish and most mollusks cannot move from one headwater stream to another. As a result, local evolution may produce different species in adjacent headwater systems. Moreover, environmental conditions often differ greatly between adjacent headwater streams and even within the course of a single stream. For example, in a spring-fed headwater stream in western Pennsylvania, one species of caddis fly inhabits headwaters starting at the spring and going downstream about 200 yards. A different species of caddis fly inhabits the stream after that point.

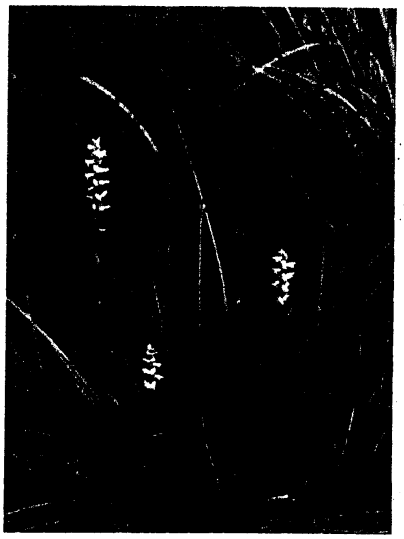
A water shrew (Sorex palustris) in the water's of Oregon's Mt. Hood. Photo courtesy of RB Forbes, Mammal Images Library

Animals may use headwater streams for all or part of their lives. Although many fish species live exclusively in headwater systems, others use headwaters only for key parts of their life cycle. For example, headwaters are crucial for the diversity of salmon stocks in the Pacific Northwest because salmon spawn and rear in headwater streams. In other parts of the country, trispot darters, brook trout and rainbow trout spawn in small streams. Young cutthroat trout use shelter formed by streams' debris dams but move onto larger portions of a stream network as they mature. Intermittent streams can offer special protection for young fish, because the small pools that remain in such streams often lack predators. Still other fish species use headwater streams as seasonal feeding areas.

A coho salmon migrating up a spring-fed tributary of the Snowqualmie River watershed in Washington's Puget Sound region. Many anadromous fish species spawn in headwater streams that are so small as to be omitted from standard USGS topographical maps. Photo courtesy of Washington Trout.

Both permanent and intermittent streams provide valuable habitat for microorganisms, plants and animals. Generally, biodiversity is higher in permanent streams than in intermittent streams, but intermittent streams often provide habitat for different species. Some species that occur in both types of streams may be more abundant in predator-free intermittent streams. For example, because of the lack of large predatory fish, salamanders and crayfish are sometimes more abundant in fishless intermittent streams rather than those with permanent flow. In contrast, for animals such as brook trout that require steady water temperatures and constant water flow, perennial streams provide better habitat.

A westslope cutthroat trout from Deep Creek, a headwater of the Kettle River. Cutthroat trout spawn in headwaters where the young trout seek shelter amid piles of debris, moving on to larger waters for their adult lives. Photo courtesy of Bill McMillan, Washington Trout



Canelo Hills ladies' tresses [Sprianthes delitescens] in a southwestern freshwater marsh known as a cienega. The cienegas of Arizona and New Mexico and Mexico, are the exclusive habitat for this member of the orchid family. Photo courtesy of Jim Rorabaugh, USFWS

Linkages between Headwater and Streamside Ecosystems Boost Biological Diversity

The movement of plants and animals between headwater and streamside ecosystems boosts biodiversity in both areas. Headwater streams are tightly linked to adjacent riparian ecosystems, the zones along a stream bank. Riparian ecosystems have high species diversity, particularly in arid environments where the stream provides a unique microclimate. Typical riparian vegetation depends upon moist streamside soils. Some plants must have "wet feet," meaning their roots have to stretch into portions of soil that are saturated with water. Seeds of some riparian plants, such as those of cottonwood trees found along rivers in the Southwest, require periodic floods to germinate and take root.

The Cleistes, a member of the orchid family, is found in pocosin wetlands of North Carolina. Photo courtesy of Vince Bellis

Another link between stream and land is often provided by insects, such as mayflies, that emerge from streams and provide a vital food resource for animals, including birds, spiders, lizards and bats. For example, insect-eating birds living by a prairie stream in Kansas consume as much as 87 percent of the adult aquatic insects that emerged from the stream each day. Such exchanges between land and water help maintain animal populations across landscapes. In many landscapes, the network of headwater streams is so dense that it offers a nearly continuous system of interconnected habitat for the movement of mobile species that rely on streams and riparian areas.

Biological Diversity of Headwater Systems is Threatened by Habitat Destruction

Because of their small size and intimate connections with surrounding landscape, headwaters and their inhabitants are easily influenced by human activities in watersheds and riparian zones. Changes to riparian vegetation or hydrology, water pollution, or the introduction of exotic species can have profound effects on biota living in headwaters.

Specialized headwater species can be particularly sensitive to habitat destruction because of their small geographic ranges, sometimes as small as a single headwater stream or spring. Thus, human activities have driven some headwater specialists, like the whiteline topminnow, to extinction, and imperiled many others. Furthermore, as the natural disjunction of headwater systems is increased by human activities such as pollution, impoundment, and destruction of riparian vegetation, more populations of headwater specialists may be extirpated.

Many headwater species, including fish, snails, crayfish, insects and salamanders, are now in danger of extinction as a result of human actions. A few dozen headwater species are already listed under the U.S. Endangered Species Act; hundreds of others are rare enough to be considered for listing. Given the diversity and sensitivity of headwater biota, it seems likely that continued degradation of headwater habitats will put more species at risk of extinction.

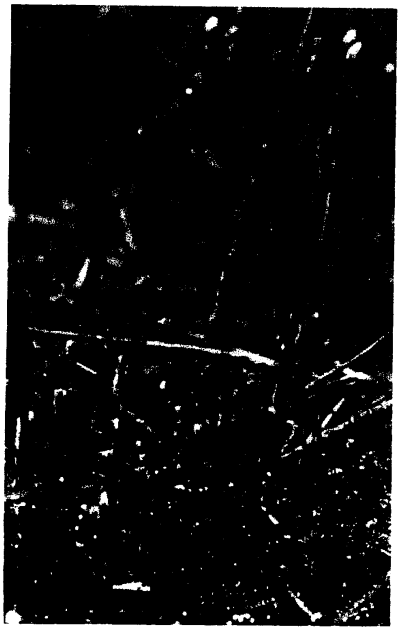
Wetlands Make Key Contributions to Biological Diversity

The presence of wetlands adds another aspect of habitat diversity to headwater systems and therefore increases the variety of species a headwater system may support. Most headwater wetlands are depressions in the ground that hold water permanently or seasonally. Wetlands provide critical habitat for a variety of plants and animals. Scientists usually distinguish between ephemeral and perennial wetlands.

Biodiversity in Ephemeral Wetlands

Some species of plants and animals prefer or require ephemeral wetlands. Certain zooplankton, amphibians, and aquatic plants need the wet phase of an ephemeral wetland to complete all or part of their life cycles. Other species that rely on ephemeral wetlands wait out the aquatic phase, flourishing only when pools shrink or disappear. For example, although adult spotted salamanders are generally terrestrial, during the springtime they trek to vernal pools to breed and reproduce. So-called amphibious plants, including button celery, meadowfoam, wooly marbles and many others do the opposite; although they live in water, they cannot reproduce until water levels drop. Some plants and crustaceans most strongly identified with ephemeral wetlands worldwide, including quillworts, fairy shrimp, and tadpole shrimp, are ancient groups that probably originated at least 140 million years ago. The disappearance of ephemeral wetlands would mean the loss of these highly specialized and ancient groups of plants and animals.

One type of ephemeral wetland found in both California and the Northeast is known as a vernal pool because it generally fills with water in the spring. In California, blooming flowers ring the edges and fill depressions of such pools. Of the 450 species, subspecies, or varieties of plants found in California's vernal pools, 44 are vernal pool specialists. Several such plants are already on the Endangered Species list. If California's vernal pool habitats were completely destroyed, at least 44 species would disappear. Although vernal pool animals are less well known, there appear to be at least as many



Pitcher plants, such as this white top (Sarracenia leucophylla), pictured top left; and sundews, such as this Drosera brevifolia, pictured bottom right; are among the carnivorous plants found in the Carolina Bay wetlands of the Southeastern U.S. Photo courtesy of David Scott/SREL

Although spotted salamanders are generally terrestrial animals, they only breed and reproduce in vernal pools. Photo courtesy of Vernal Pool Association

specialized animals as plants. New species of specialists such as fairy shrimp and clam shrimp continue to be discovered.

Other ephemeral wetlands also make significant contributions to biodiversity. A study of wetlands in the Southeast including cypress-gum swamps, cypress savannas, and grass-sedge marshes, found that plants from one wetland are often very different from those in others nearby. Such differences in nearby habitats increase overall biodiversity in a region. In some cases, differences in periods of wetting and drying appear to be important for the persistence of many species. Different wetting and drying patterns explain some differences between Gromme Marsh and Stedman Marsh, two prairie pothole wetlands in Wisconsin. Although the two marshes are only about 450 yards apart, they have different species of dragonflies; also, Stedman Marsh has damselflies and caddis flies that Gromme Marsh lacks.

A female fairy shrimp from the Ipswich River Basin in Massachusetts. Fairy shrimp spend their entire life cycles in vernal pools. Photo courtesy of Vernal Pool Association

Amphibians are key parts of the food web in small wetlands. Some wetlands are hot spots for amphibian biodiversity; twenty-seven amphibian species, one of the highest numbers of amphibian species known from such a small area, inhabited a 1.2-acre ephemeral wetland in South Carolina. Other small wetlands in the region have been found to have similar numbers of amphibian species, demonstrating how small wetlands are especially important for maintaining the regional biodiversity of amphibians. Larger, more permanent wetlands may be less diverse because they may also be home to predators-such as crayfish and dragonfly larvae-that eat amphibian larvae.

Biodiversity in Fens (a type of perennial wetland)

Plant biodiversity peaks in fens, unique perennial wetlands that occur where groundwater flows to the surface. Fens also provide clean water that supports downstream ecosystems; outflows from such wetlands are critical to the formation of the cold, low-nutrient streams that are ideal for trout. Although fens are rarely inundated, water seeps continuously into root zones.

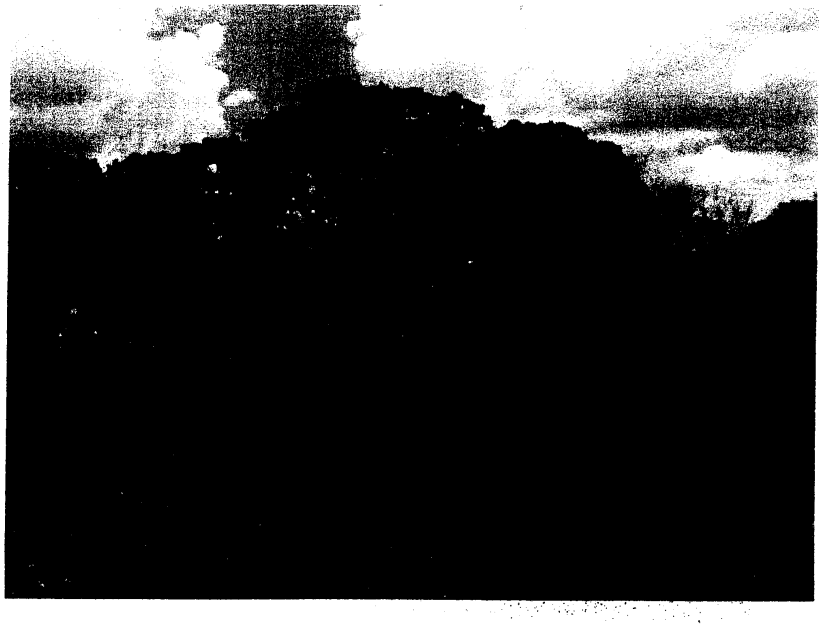
Similar to other wetlands, the small land area covered by fens belies the high biodiversity found within them. For example, in northeastern Iowa, fens contain 18 percent of the state's plant species but cover only 0.01 percent of the land surface. Fens are probably the wetlands with the greatest numbers of plant species. Because groundwater that comes to the surface is typically low in available nutrients, fen plants are often dwarfed and the total mass of vegetation is typically low. As a result, no one species can become dominant and exclude other species.

In the Upper Midwest, more than 1,169 species of plants have been identified in fens, with more than half needing wet conditions. Fens also have

a high proportion of plant species known to occur primarily in pristine sites. Often, such species are listed as rare, threatened or endangered. Of 320 vascular plant species found within fens in northeastern Iowa, 44 percent are considered rare. Fens themselves are imperiled: 160 fens that one researcher sampled in northeastern Iowa were all that remained from 2,333 historic fens.

Because diversity in fens stems from low nutrient availability, overfertilization can harm fens and, in turn, downstream ecosystems. Examining one fen in New York, researchers found the lowest diversity of plants where nitrogen and phosphorus inflows were greatest. Both nutrients came from agricultural activities: phosphorus was entering the fen primarily through surface water flows, while the nitrogen-containing compound nitrate was flowing with the groundwater. Thus, a loss of plant diversity in fens is a clear indication they are receiving excess nutrients, such as can occur when fertilizer runs off a field or urban lawn or water carries animal waste from farmyards. Allowing excess nutrients to enter fens can also damage downstream trout streams because trout prefer cold, low-nutrient streams. Therefore, the low-nutrient conditions of fens require protection from nutrient contamination.

A wood frog (Rana sylvatica) in an autumnal vernal pool in central Pennsylvania. Photo courtesy of Gene Wingert



Fens are unique perennial wetlands that occur where groundwater flows to the surface. Plant biodiversity peaks in fens: Among the 320 vascular plant species found in northeastern Iowa fens, 44% are considered rare. However, fens themselves are imperiled. Pictured is a fen wetland in Illinois. Photo courtesy of Steve Byers, Bluff Spring Fen Nature Preserve

Conclusion

Headwater streams and wetlands abound on the American landscape, providing key linkages between stream networks and surrounding land. Although often unnamed, unrecorded, and underappreciated, small headwater streams and wetlands-including those that are dry for parts of the year-are an integral part of our nation's river networks. Small wetlands, even those without visible surface connections, are joined to stream systems by groundwater, subsurface flows of water, and periodic surface flows. Current databases and maps do not adequately reflect the extent of headwater streams and associated wetlands. The resulting underestimate of the occurrence of such ecosystems hampers our ability to measure the key roles headwater systems play in maintaining quality of surface waters and diversity of life.

"THE PHYSICAL, CHEMICAL, AND BIOTIC INTEGRITY OF OUR NATION'S WATERS IS SUSTAINED BY SERVICES PROVIDED BY WETLANDS AND HEADWATER STREAMS."

Essential ecosystem services provided by headwater systems include attenuating floods, maintaining water supplies, preventing siltation of downstream streams and rivers, maintaining water quality, and supporting biodiversity. These small ecosystems also provide a steady supply of food resources to downstream ecosystems by recycling organic matter.

Small streams and wetlands provide a rich diversity of habitats that supports unique, diverse, and increasingly endangered plants and animals. Headwater systems, used by many animal species at different stages in their life history, provide shelter, food, protection from predators, spawning sites and nursery areas, and travel corridors between terrestrial and aquatic habitats.

Since the 1970s, the federal Clean Water Act has played a key role in protecting streams and wetlands from destruction and pollution. We have made progress toward cleaner water, in part because the law has historically recognized the need to protect all waters of the United States. The health of downstream waters depends on continuing protection for even seemingly isolated wetlands and small streams that flow only part of the year.

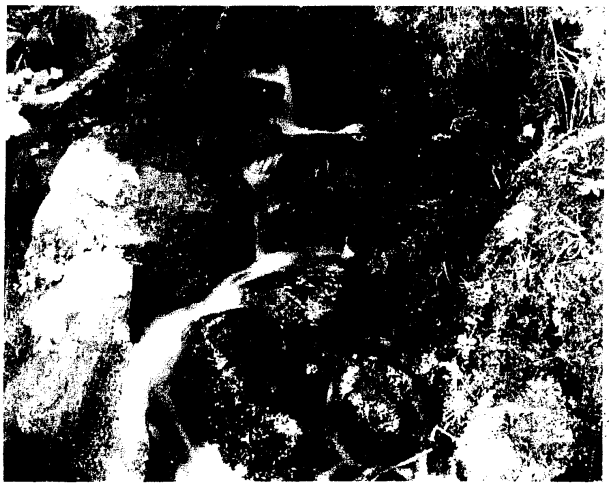


Photo courtesy of Raymond Eubanks.

These small streams and wetlands are being degraded and even eliminated by ongoing human activities. Among the earliest and most visible indicators of degradation is the loss of plant diversity in headwater wetlands. The physical, chemical, and biotic integrity of our nation's waters is sustained by services provided by wetlands and headwater streams.

Today's scientists understand the importance of small streams and wetlands even better than they did when Congress passed the Clean Water Act. If we are to continue to make progress toward clean water goals, we must continue to protect these small but crucial waters. The goal of protecting water quality, plant and animal habitat, navigable waterways, and other downstream resources is *not achievable* without careful protection of headwater stream systems.

S/C_SmallStreamRpt 9/3/03 11:23 AM Page 2

WHERE RIVERS ARE BORN:

The Scientific Imperative for Defending Small Streams and Wetlands

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American Rivers and Sierra Club, sponsors of this publication, are extremely grateful for the contributions the authors have made in describing the ecological importance of headwater streams and wetlands and the benefits they provide to humans. We extend special thanks to Judy Meyer for coordinating the project. We also thank editors Mari N. Jensen and David Sutton.

This publication was funded by grants from the Sierra Club Foundation, The Turner Foundation and American Rivers and its supporters.

September, 2003

Ken Pulskamp, City Manager
Harry Corder, Senior Engineer
23920 Valencia Boulevard, Suite 300
Santa Clarita, California 91355

March 19, 2004

Dear Mr. Pulskamp and Mr. Corder,

This letter is to alert you to the potential presence of the Federally Endangered Least Bell's Vireo (*Vireo bellii pusillus*) in the vicinity of the Bouquet Canyon Bridge (hereafter "the bridge") in Santa Clarita, the site of recently-begun habitat modification.

Although the environmental documentation for the proposed "Riverpark" development (just upstream of bridge) did not record the Least Bell's Vireo, several singing vireos, including one family group with recently-fledged young, were present just downstream of the bridge during summer 2001 (D. Cooper, *unpubl. data*), and patches of suitable habitat extends from here upstream past the bridge, through the proposed Riverpark area. Singing (and presumably nesting) Yellow Warblers (State Species of Special Concern) were also detected during summer 2001 (*Ibid*).

Per the directive of the "Natural River Management Plan" (3.4-2), such habitat modification must be considered "significant" when it involves "disturbance...due to noise, human activity, and emissions from equipment and vehicles."

As such, significant temporary impacts as treated under Mitigation Measure BIO-3 require "pre-construction mapping and field surveys for sensitive riparian breeding birds near construction sites (3.4-2)." They also require that disturbance to the Least Bell's Vireo habitat is not to occur within 300' of a known vireo nest.

In southern California, the Least Bell's Vireo arrives on nesting territory "by the end of March" with 11 March the earliest record for Los Angeles Co. (Garrett and Dunn 1981) and 15 March the earliest for Orange Co. (Hamilton and Willick 1996). The Yellow Warbler arrives (in Los Angeles Co.) in "mid- to late-April" (Garrett and Dunn 1981).

Since the construction activity was initiated in mid-March, before the arrival of both species, it is simply not possible that "pre-construction mapping and field surveys" were done prior to this work.

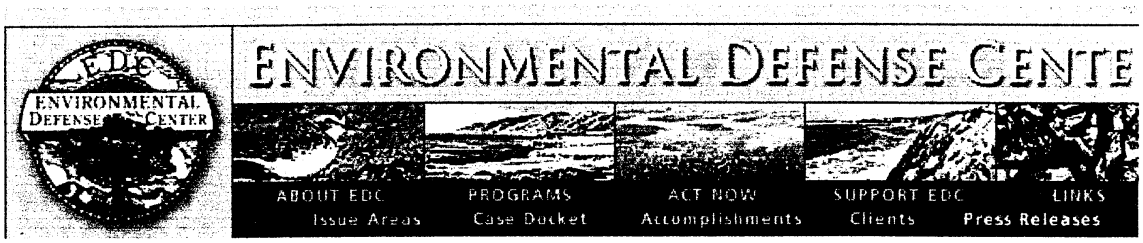
We urge you to postpone work on the Bouquet Canyon Bridge until after late-April, at which time it can be established that neither the Least Bell's Vireo nor the Yellow Warbler have established territories at the site.

In the future, we strongly recommend that work be done *outside* the nesting season (August - February), and *not* be initiated during March – July.

Sincerely,

Daniel S. Cooper, Dir. of Bird Conservation
Audubon California

Cc: Tom Worthington, Impact Sciences



Press Release

January 9, 2004

Contact:

John Buse, EDC (805) 677-2577
Peter Galvin, CBD (707) 986-7805

ENVIRONMENTAL GROUPS APPEAL TO NINTH CIRCUIT TO PROTECT ENDANGERED UNARMORED THREESPINE STICKLEBACK

VENTURA, CA - The Environmental Defense Center ("EDC"), representing Friends of the Santa Clara River, and the Center for Biological Diversity ("CBD") filed notice on January 8, 2004 that they will pursue their claims under the Endangered Species Act to protect a rare and highly endangered fish species before the Federal Ninth Circuit Court of Appeals.

The Unarmored Threespine Stickleback existed historically throughout Southern California's rivers and streams. The fish is now on the verge of extinction due to widespread destruction and modification of its habitat. Today, only a few viable Stickleback populations remain in California, one on the upper Santa Clara River near the proposed site for the Newhall Ranch development in Los Angeles.

In early 2002, EDC and CBD filed suit in federal district court to require the U.S. Fish and Wildlife Service ("FWS") to designate critical habitat for the Stickleback, which was listed as an endangered species in 1970. The lawsuit also challenged FWS's decision to authorize the harming or killing of the Stickleback that would result from the proposed CEMEX gravel mine operation in Soledad Canyon. These claims were dismissed by the Central District Court of California in November of 2003.

The groups' decision to appeal their claims to the Ninth Circuit Court of Appeals is based on the precarious status of the Stickleback and the significant threats it faces from urban sprawl, water pumping and the massive gravel mine proposed in Soledad Canyon. EDC attorney John Buse stated, "The federal government has known for over twenty years that protection of this species' habitat is critical to its survival and recovery, and it is inexcusable that they have failed to take this important step to protect it." Buse added, "A critical habitat designation is essential to protect the Stickleback from the impacts of the Newhall Ranch Development."

Peter Galvin, California Director, for the Center for Biological Diversity, stated "While the unarmored threespine stickleback was once a common species in the LA area, today it is one of the most endangered fish in the United States. Galvin added, "This species will go extinct unless its habitat is

protected."

Designation of critical habitat adds an additional important layer of protection for wildlife listed as endangered or threatened under the Endangered Species Act. Federal agencies are barred from granting permits and funding or authorizing activities that would adversely modify or destroy the habitat areas. Research has shown that species for which critical habitat has been designated are recovering faster than those for which critical habitat has not been designated.

Since 1977, EDC has been serving California's Central Coast as the only nonprofit, public interest environmental law firm between Los Angeles and San Francisco. EDC represents citizen groups in court and before governmental agencies, provides legal counsel, and educates the community on issues involving water quality and watersheds, biodiversity and endangered species, environmental health and justice, land use and open space, offshore oil and gas, and access to public lands. For more information, contact EDC at (805) 963-1622.

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NOVEMBER 22 - 28, 2002

The Gods of Small Things

The Center for Biological Diversity cares as much about the unarmored threespine stickleback as it does a cathedral forest of trees, which is why it is reinventing the environmental movement and could be saving Southern California in the process.

by Susan Zakin

in this week's issue

features

Uncle Andy's Fun Afterlife
Twenty years later, dead or alive, will Andy Kaufman return? DAVE SHULMAN surveys the past, and potential future, of the enigmatic agent provocateur of comedy.

Looking Back...
A new DVD compilation of the glorious and ill-fated *The Richard Pryor Show* takes us back to when Richard Pryor was better than ever. BY FALLING JAMES

...and Ahead
Mitch Hedberg was once thought to be the future of comedy. Now, fans are glad there's still comedy in his future. BY GREG BEATO

news

Blowing Up Government: Some 250 people gather in secret to work on Gov. Arnold's pet project: remaking the way Sacramento works. The effort is full of palace intrigue and battles over threatened fiefdoms. BILL BRADLEY shares details from an early report.

The Air War: L.A.'s prime smog-fighting agency got kicked around by the U.S. Supreme Court last week. Is the squabble over the diesel rule and federal Clean Air Act just the start? HOWARD BLUME looks at what it will take to keep the South Coast Air Quality Management District alive and breathing easily.

Move, Quit or Die: Two weeks ago CHP Officer Thomas Steiner was gunned down in Pomona. MARK

TERESA SAVAIKIE SLAMMED HER FORD ESCORT to a halt on the parkway's outside lane, near the spot where a chunky construction worker was hauling up water from a riverbed. Ignoring the blaring horns of outraged suburban motorists, the barefoot woman, blond and good-looking in a classic Southern California way, approached the worker.

When Teresa Savaikie came up against the developers of Newhall ranch, she called the Center for Biological Diversity. (Photo by Debra DiPaolo)
Enlarge Image

"Don't you know there are fish in there?" she asked him.

"Yeah, I seen some fish," he said.

"Well, you're not supposed to be sucking them up with that hose," she said.

"Hey, I'm just working here. You don't like it, call the city."

She turned the full force of her blue, mascaraed eyes on the guy. "I *need* one of those fish. Do you have a cup or something?"

Savaikie and the fish, a small inconspicuous creature called

CROMER, hanging on the streets of the city with cops and gangbangers, dispels an urban myth about what the killing was all about.

Royal Coke: DOUG IRELAND reveals the real dope about the case of a Saudi prince who beat a rap over smuggling 2 tons (that's right, 4,000 pounds) of cocaine into France. Hint: The war on terror played a big role.

EthicS Dilemma: Look what Gil Garcetti is doing to the L.A. Ethics Commission. Enforcement actions have ground to a halt. The ex–district attorney says he wants to focus on big cases. Sounds reasonable, but such a shift stands to benefit many of Gil's pals, including his son. BY ROBERT GREENE

Plus, HAROLD MEYERSON on Lu Haas; JEFFREY ANDERSON on civil-rights lawyer Angela Oh vs. Inglewood P.D.; and CHRISTINE PELISEK on Compton's rejection of an Indian casino.

columns

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We write, you write...

A CONSIDERABLE TOWN
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Too fast, not furious: JOE DONNELLY gets off with a warning . . . almost.
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Tim and wild Marlayna. By SEVEN McDONALD.

DEADLINE HOLLYWOOD
Poker with *The Simpsons*: Hardball contract talks were all d'oh and no play. BY NIKKI FINKE

DISSONANCE
Photos of Iraqi torture point out the stunning incompetence of the Bush regime at home and abroad. BY MARC COOPER

ROCKIE HOROSCOPE

arts

Crying time: JOHN POWERS finds a surreally funny sob story in Guy Maddin's *The Saddest Music in the World*.

arroyo chub, were about to become unlikely characters in an intense drama playing out in the hinterlands of Los Angeles County, one that may turn out to be the biggest environmental battle of the decade. When the curtain drops, we just might be left with a new definition of wilderness and a new approach to protecting it, or, failing that, a free pass for the kind of development that ignores it.

Mixing a soccer mom and an environmental activist together might not always seem like a recipe for a David Lynch movie, but it was in this case. Indeed, it's safe to say that when Teresa Savaikie got married and moved in 1999 from working-class Highland Park to the *über*-suburb of Valencia, California, she had no intention of walking point for a Heidegger-quoting, Jesuit-fired, philosopher-turned-environmental iconoclast named Kieran Suckling. That was before she knew that the Newhall Land and Farming Company planned to build the largest housing development in Los Angeles County history on the banks of the Santa Clara River. The Santa Clara, which runs for 116 miles from Agua Dulce, a high-desert, Old West-feeling community 44 miles north of Los Angeles, to the Pacific, is the largest natural river left in Southern California. At a time when millions of dollars are being spent to restore some semblance of nature to the much-abused Los Angeles River, it looked like the Newhall Land and Farming Company was about to turn a tree-lined ribbon of water into a concrete garbage can.

For more than a decade, a small cadre of women — old hippies, really — had bucked business-as-usual by fighting development in this outlying suburb of Los Angeles. But they had been relying on the traditional argument that there wasn't enough water to fill hot tubs and water lawns, working on the assumption that Southern California was still like the movie *Chinatown*. Their arguments may yet prove persuasive, but with that strange little fish and other odd animals she noticed in her very back yard, Savaikie came upon something even bigger — her little corner of what could fairly be called a global holocaust.

The Center's Peter Galvin and Kieran Suckling way up the Santa Clara River (Photo by Debra DiPaolo)

Enlarge Image

As it happened, soon after she moved to Valencia, Savaikie saw a bizarre neon-orange-and-black bird outside her window. "I

Eat, drink, die: **McDonald's loves you — the more of you the better. BY ELLA TAYLOR**

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Ask Mr. Gold: **Getting to the meat of the carne asada matter. BY JONATHAN GOLD**

WHERE TO EAT NOW
A list of favorite restaurants **compiled by JONATHAN GOLD and**

thought it had escaped from a cage," she said, laughing. She watched the bird for a few days and realized her mistake. Her husband bought her an Audubon dictionary, where she found a picture of a hooded oriole that matched the creature darting among the palm trees in her neighborhood. "I wish I had never seen that damn bird," she says now. "I went back to the store and got another book, it was called *The Lives of North American Birds*. It had the status of each bird. I realized all these birds were declining. The reason the book kept listing was 'loss of habitat.' Declining brown bird, declining this bird. Everything was declining."

She also discovered that Valencia, a locked-down, affluent Republican suburb that looks custom-built for the mallified masses, is actually a pretty remarkable place. She found out, too, that a lot of what is remarkable about it happens right where Newhall Ranch is set to rise, along the banks of the Santa Clara River.

Life congregates around water, especially in arid and semiarid places like Southern California. Behind phalanxes of oil-seeping auto malls and Home Depots, five federally listed endangered species live on the stretch of the Santa Clara River that runs through Los Angeles County. Their names alone help explain why few knew about them: the unarmored threespine stickleback, the arroyo toad, the Least Bell's vireo, the southwestern willow flycatcher and the slender-horned spineflower.

As an ecosystem, the Santa Clara River is no joke. From the river's headwaters to its outlet at the Pacific, you can find 10 species of plants and animals on the federal endangered-species list, and these are just the plants and animals that someone cared about enough to badger the federal government into protecting. For example, in

MICHELLE HUNEVEN.

San Francisquito Creek that day, Savaikie and her construction-worker helper captured an arroyo chub, a rare fish that doesn't receive federal protection but has been given special status by the state of California.

Although the Newhall Land Company hadn't yet received final approval for Newhall Ranch, it was quietly amputating the Santa Clara and its tributaries, filling in wetlands, building new wells, and pouring concrete to control natural flooding. In smaller subdivisions with names like Avignon and Bridgeport, megahouses were being constructed up to the water's edge. Savaikie worked the phones, telling her story to brand-name environmental groups like the National Audubon Society. They sympathized, but claimed they didn't have the time or money to fight development in every sprawling suburb. And while they gave lip service to protecting endangered species, they didn't get excited about an obscure toad or a 3-inch fish with a weird name. "They kept asking, 'Did you talk to the Center for Biological Diversity?'" Savaikie said.

Photos courtesy National Wildlife Federation and Jim Greaves (bottom)

(Photo by Anne Fishbein)

THAT THE CENTER FOR BIOLOGICAL DIVERSITY would be anyone's idea of a savior belies its roots, which are low-budget and iconoclastic even by environmental-group standards. A dozen years before it would set its sights on Savaikie's fight with Newhall Ranch, the Center's founder, Kieran Suckling, had taken a similarly dramatic left turn. Suckling was in his early 20s, a scruffy intellectual who had been ricocheting around the country on graduate fellowships studying everything from linguistics to

mathematics at Stanford, Columbia, UC Irvine and the State University of New York at Stony Brook. In the summer of 1989, at a gathering of the radical environmental group Earth First! in the Jemez Mountains of New Mexico, Suckling met a fast-talking biologist-cum-politico named Peter Galvin who was studying the precarious existence of the spotted owl in New Mexico's Gila National Forest for the U.S. Forest Service. The meeting with Suckling would prove to be fateful, not just for the two young environmentalists, but for the environmental movement at large.

If the Forest Service knew Galvin better, they might not have been so quick to hire him fresh out of Prescott College in northern Arizona. He is dogged and his interests haven't changed much since bulldozers ripped into the woods behind his house where he used to play cowboys and Indians. "That was the beginning of the high-tech boom on Route 128 outside Boston," he says. "The pace of sprawl was just unbelievable. For a lot of people in my generation the pace of destruction has been so rapid you'd have to be comatose not to notice." Galvin didn't have to work hard to convince Suckling that the Mexican spotted owl should be more vocation than vacation. Having researched the raptor at Prescott College, he knew the owl was in danger of dying out. The studies he and Suckling worked on that summer helped prove it. Galvin, who had been an Earth First! activist as a college student, wanted to do something right away, file papers to get the owl protected under the federal endangered-species act, stage a protest, *something*.

Think bigger, Suckling told Galvin. Over the next 18 months, Suckling and Galvin pulled all-nighters at the University of New Mexico library in Albuquerque, gathering evidence that at least 100 species of plants and animals were facing extinction in the high country surrounding the Gila River watershed, a 70,000-plus-square-mile region stretching from western New Mexico to the Mexican border. In the shadowed folds of New Mexico's canyon country, Suckling and Galvin stumbled onto a phenomenon that fused the aesthetic, scientific and political arguments of traditional conservation around a hard truth: extinction.

For these two, it was a small step from the Gila National Forest to global holocaust. The species circling the drain in New Mexico, were, in fact, only a small part of what scientists everywhere were calling an extinction episode rivaling the end of the dinosaur age. The first hints of an extinction crisis had come in the 1980s, when supercomputers allowed biologists to understand entire landscapes rather than a lagoon here or a forest there. As the studies racked up, they realized that the sixth major extinction episode in four and a half billion years of evolution was under way.

It was no coincidence that the appearance of an unfamiliar bird spurred Teresa Savaikie to learn about extinction. She had grown up in a world in which one-fifth of the world's bird species had already died out. The birds were a portent, the proverbial canaries in the coal mine. E.O. Wilson of Harvard and other scientists predict that an equal proportion of the world's other species are likely to disappear over the next 30 to 50 years. To see the future, all one has to do is look south: Extinctions in rainforests already have increased to between 1,000 and 10,000 times the usual rate of one species per 1 million species a year. Of the world's six great extinctions, this is the first caused by humans. The murder weapons are as varied as contemporary life, from unregulated logging in the Ivory Coast to metastasizing condominiums in Florida.

Spurred by the urgency of extinction, Suckling and Galvin began a conversation that has continued almost without interruption for 13 years. Suckling has become the conceptual thinker behind the Center for Biological Diversity, keeping track of a dense library of information and making connections that turn seemingly isolated cases into big-picture causes. Galvin is more a concrete strategist, politically adept and always fascinated by the quirky habits of pink fish and red-legged frogs.

Suckling and Galvin started slowly at first, filing a petition in 1989 to list the Mexican spotted owl on the endangered-species list, and then one to protect the Northern goshawk in 1991. After that came the deluge: 58 frighteningly well-researched petitions to list everything from an orchid called the Canelo Hills ladies' tresses to the yellow-billed cuckoo. Unfortunately, their tsunami of petitions landed inside the Beltway just when the Clinton administration was trying to sort through hundreds of previously neglected endangered-species listing petitions approved by the first Bush in his final days. To complicate matters, Republicans had gained a majority in Congress in 1994. Industry-friendly politicians from the West, where the majority of high-stakes endangered-species conflicts were brewing, started whittling away at the Endangered Species Act. Many in Congress threatened to rewrite the law so dramatically that it would become virtually impossible to protect species.

Soon Suckling and Galvin's combination of full-on energy and political naiveté — with a soupçon of arrogance — infuriated people across the political compass. Critics ranged from New Mexico cattlemen to then-Secretary of the Interior Bruce Babbitt, who was struggling to change a pattern of misuse of federal lands without being run out of town on a rail by Old West right-wingers.

"There's no question that Kieran and Peter were viewed as huge pains in the rear end," says Don Barry, who was Babbitt's assistant secretary of the interior at the time. "They were totally upending and reorganizing the Fish and Wildlife Service priorities, imposing their own sense of priorities based on what the grassroots groups wanted when we were dealing with national priorities. They kept hitting the accelerator with us."

Nobody would have paid attention to the guys' frenetic paper shuffling if it hadn't been for the one characteristic that truly annoyed the bureaucrats: an ability to win in court that seemed almost uncanny. But there was nothing magical about it. The agency charged with protecting most endangered species, the U.S. Fish and Wildlife Service, has traditionally been weak and underfunded. Once the extinction crisis hit, the beleaguered bureaucrats were simply unable to keep up. For Suckling and Galvin, the legal possibilities seemed inexhaustible. There were lawsuits forcing the agency to list species, lawsuits against the agency for missing deadlines (sometimes by decades), lawsuits to force the agency to actually protect the species it had listed but then ignored.

They might not have known it at the time, but by moving the battlefield from the lobbying halls of Capitol Hill to courtrooms, Suckling and Galvin were leaving their counterparts in the dust by simply catching up with political realities. These days, corporate contributions to candidates outpace those from do-gooder organizations such as the Sierra Club by more than 50-to-1. Congress is no longer friendly to environmental legislation; only one major environmental law had passed since the '70s, the relatively non-controversial Safe Drinking Water Act. With strong laws already in place, and increasingly complex debates that didn't scan with the general public, the best bet now is using the courts to enforce environmental laws to the hilt, supported by increasingly sophisticated scientific research.

The Endangered Species Act is widely regarded as the nation's strongest environmental law. Suckling and Galvin were among the first environmentalists to wield the law as an assault weapon instead of a rapier. The Center relentlessly hounded the Fish and Wildlife Service to protect endangered species and their habitat, regardless of the threat of political fallout.

In environmental lawyer Mark Hughes, Galvin and Suckling found just what they needed. Hughes had tried for years to convince his colleagues at the Sierra Club Legal Defense Fund (now Earthjustice) to bust a move on the Mexican spotted owl. When no action came, he resigned in disgust and founded his own law firm. Galvin, who had a master's degree in conservation

biology, but who is the son of a lawyer, begged, cajoled and charmed Hughes into working for what he and Suckling had taken to calling the Greater Gila Biodiversity Project.

Hughes won an injunction that stopped logging for 18 months on 2.4 million acres of national forests. A judge ordered the U.S. Forest Service to spend that time figuring out how many trees it could cut down without hurting the Mexican spotted owl. It turned out to be a lot less than the Forest Service had in mind. Logging on national forests in Arizona and New Mexico declined 84 percent from 1989 to 2001; much of this shift can be attributed to legal strong-arming by the Center for Biological Diversity, as the group began calling itself.

The Mexican spotted owl case started one of the longest winning streaks in the history of the environmental movement. In a dozen years, the Center for Biological Diversity, which moved to Tucson, Arizona, in 1995, won 80 percent of its cases, roughly twice the rate of most environmental law firms, gaining protection for 288 species in 44 states. It has changed the way 38 million acres are managed in the American West, ended cattle grazing along hundreds of miles of fragile desert rivers, slowed the sprawl of subdivisions, and reduced logging from Alaska to Arizona. Because they deal in protecting plants and animals and because loss of habitat is the most common cause of extinction, the Center has become a one-stop shopping outlet, suing on everything from big dams to the expansion of military installations.

It may sound elementary to make species protection the main thrust of protecting the environment, but, in fact, the Center was making a radical departure from old-line male environmentalists who cared more about conquering mountains than nurturing warm fuzzy animals. Heather Weiner, a Washington, D.C.-based environmentalist, says that until the Center came along, practically the only people aggressively lobbying for endangered species were tough women like her who did battle on the Hill dressed in short skirts and armed with attitude.

Washington, D.C., environmental attorney Eric Glitzenstein, who has litigated on behalf of the Center, believes the group has almost single-handedly pushed endangered-species protection to center stage, edging out more familiar but less pressing issues like pollution, where the big battles have mostly been won. *Fearless* was the word that kept coming up when Nathaniel Lawrence of the Natural Resources Defense Council (NRDC) — a more conservative Washington, D.C.-based conservation group that also specializes in science and litigation — talked about the Center for Biological Diversity. "They are, pound for

pound, dollar for dollar, the most effective conservation organization in the country," Lawrence says.

THE CENTER FOR BIOLOGICAL DIVERsity's rise came at a time when the environmental movement as a whole had lost its footing. The late 1980s and early 1990s were a confusing time for progressive politics in general and above-ground environmentalists in particular. Many environmentalists found themselves wondering what the hell was wrong in their world. "Who's the next David Brower?" was the question asked over and over in rambling phone calls and buzzed late-night, drunken agonizing.

In the 1960s, Brower, the legendary Sierra Club director and "archdruid" profiled by *The New Yorker*'s John McPhee, had democratized the elitist wilderness movement, lobbying Congress with theatrical flourishes and taking on issues like nuclear power that lay outside the stodgy movement's traditional purview. Brower, who was both a creative genius and a towering egoist, attracted a talented lineup to the environmental movement that has not been matched since. He set loose adman Jerry Mander and world-class photographers like Ansel Adams and Eliot Porter to shape the marketing iconography of an idealized America: the Grand Canyon, Yosemite, Yellowstone.

But as environmental groups became institutions with big budgets, they grew vulnerable to the cyclical nature of the public's interest in environmental issues. To support larger staffs and higher overhead through lean times, big groups like the Sierra Club and the Wilderness Society had to rely on the whims of rich patrons and the fads of fickle foundations. They became hesitant to offend friends and enemies alike. Once the province of visionaries, environmentalism became the domain of political lobbyists whose only philosophy was pragmatism.

As it turned out, the environmental movement didn't need another David Brower. It needed a 21st-century Arthur Rimbaud, the tousled, dirty prodigy whose only interest in convention was flouting it. Rimbaud reinvented poetry. Kieran Suckling would do the same with environmentalism.

You wouldn't have known it to see him in action in the early days. Ten years ago, the éminence grise behind the Center for Biological Diversity was in a smack-induced stupor in British Columbia, doing field research on the heroin habits of out-of-work loggers. Logical enough, maybe. Suckling thought he should know the culture in which he was working. The environmental movement, with its quasi-religious overtones, is prone to anointing epic heroes for its epic battles. In those days,

Kieran Suckling was probably not at the top of anyone's list as most likely to be anointed. Paradoxically, it may be just this willingness to go beyond normal limits that helped him become the first truly original thinker that the movement has seen in decades.

Suckling grew up in Massachusetts, Rhode Island, Peru, Ireland and England. His mother is Irish and his father is English, a civil engineer whose work on power plants and pulp mills ensured a peripatetic existence. His parents divorced when he was 12. His loyalties swung to his mother, whom he describes as "a pagan Catholic." Suckling says his mother keeps not only a lock of a sainted aunt's hair but also dirt from her grave, and she prays fervently to an up-close-and-personal Virgin Mary.

This otherworldly bent was not lost on her son. When one of Suckling's many Jesuit uncles returned from a missionary stint in Africa with a hard-to-shake tropical disease, he bequeathed his philosophy books to the impressionable teenager. As an undergraduate at Holy Cross College, Suckling discovered he loved philosophy and befriended Joe Lawrence, a philosophy professor.

"He's intense, he's energetic, he's creative," said Lawrence. "A very interesting question is what in the hell was Kieran Suckling doing at a Catholic school.

"If you think of the Grand Inquisitor chapter in *The Brothers Karamazov*, which was Dostoyevsky's critique of the Jesuits, it makes sense. The Jesuit is the one who realizes that Christ should have accepted the Devil's offer to turn stone into bread — he could have fed the hungry. He should have accepted the offer to make a magical display of his power and reformed the world.

"That desire for achieving a *humanly made* perfect world, that's the Jesuit desire," said Lawrence.

Suckling took up phenomenology, the study of direct experience. He studied linguistics and the deconstruction theory that was ubiquitous in the academy. His conversation is peppered with references to mainstream philosophers like Aristotle and Heidegger, but edgier characters like the French-Algerian philosopher Jacques Derrida, a coyote trickster whose work suggests that meaning is ever-shifting and relational, clearly have influenced him.

Suckling didn't just study experience. He hurled himself into it. You could say he transcended ethics in favor of Kierkegaardian intensity. He became an industrial-strength shoplifter and all-

around grifter, not an illogical lifestyle for a perpetual student from a financially strapped family. Orgies, anarchism and the occasional arrest were de rigueur in the radical environmental movement. Suckling navigated the underworld with apparent ease. When he came back into the mainstream, it would be to fight for the very definition of wilderness.

That fight began with William Cronon of the University of Wisconsin, who is considered one of the environmental movement's leading intellectuals. For years, Cronon has been vocal about his belief that wilderness is a mere intellectual construct. Many rank-and-file environmentalists, drawn to the movement by their quasi-religious fervor for the tangibility of the outdoors, found Cronon's ideas horrifying. At the very least, Cronon's announcement (tantamount to saying "God is dead") was spectacularly poor strategy — especially since he made it rather publicly in *The New York Times Magazine* in mid-1995, when the newly empowered Republican congressional majority was taking a run at the country's basic environmental laws, with a special emphasis on the Endangered Species Act. Cronon's article, or at least its timing, seemed to characterize the anemia and disarray plaguing the movement.

To Suckling, Cronon's ideas seemed outdated, hopelessly pre-postmodern. "This is where I take issue with Cronon and Nash [Roderick Nash, author of *Wilderness and the American Mind*]," says Suckling. "Because Cronon and Nash want to write a biography of wilderness, they have to come up with a concept of wilderness.

"In fact," Suckling contends, "wilderness is antithetical to concept itself. It's where you go to get rid of your concepts. That's what I mean when I say wilderness deconstructs us. It's comforting because you realize you don't need to be in control."

Today, Suckling runs an organization of 30 employees, raises a multimillion-dollar budget, cuts deals with Bush's Interior secretary, Gale Norton, and defends the environmental position on CNN's *Crossfire*. He also puts up with occasional hostility from the media — *The Wall Street Journal* editorial page in particular. He's not afraid to show that under the Lamborghini brain is a nice Irish Catholic boy from Massachusetts. He still refutes Cronon, for lack of a better opponent. But his argument is subtly different. At 37, he talks less about philosophical ambiguity and more about morality.

"Nature isn't moral," says Suckling. "It's our relationship to nature that's moral. A human's engagement with the world is always moral, religious and aesthetic. Heidegger talks about *wissen* and

kennen as words for knowledge: wife and husband. This is more a notion of a caring spouse. A rabbi, Emmanuel Levinas, defines it as the experience of meeting the face. It's the face that says to you, 'Thou shalt not kill.' It's the relationship."

When the Center began its spectacular run of lawsuits, suit-and-die environmentalists worried that a take-no-prisoners assault would give the congressional Republicans an excuse to gut the Endangered Species Act. Those concerns are perhaps elevated now with Republicans owning the House and Senate. Michael Bean, of the Washington, D.C.-based Environmental Defense, which works with corporations to find common ground, is one who believes the Center's aggressive stance could inspire equally aggressive retaliation from opponents.

"They've been successful in getting a lot of species on the endangered-species list," says Bean. "I think that, by itself, doesn't ensure a result that will endure. My view is that lasting solutions to environmental problems require some substantial degree of buy-in from the people who are affected by those decisions. There are just too many ways for disaffected people to undo a particular environmental result."

The Jesuit steel in Suckling, though, remains fired by his absolute conviction that the unprepossessing scrap of habitat for an endangered rat near a highway is as important as a million-acre national forest of cathedral trees. He understood what the professional environmentalists didn't. It's fairly simple, really: People like animals.

NORTHERN CALIFORNIA IS BETTER-known for its groovy environmental ethic, but Southern California's roller-coaster landscape of high mountains and sun-blasted valleys, combined with a forgiving Mediterranean climate, has created a near-perfect petri dish for evolution and natural diversity. That's why Mark Gold, of Heal the Bay in Santa Monica, calls Southern California "the endangered-species capital of the nation."

The hitch is that Southern California's population, now 19 million, is expected to rise 40 percent over the next 30 years. The population of San Bernardino and Riverside counties, the edge habitat between the mountains and the city, is expected to grow even more dramatically, doubling to 6 million by 2025.

"It's a pretty volatile situation," said the NRDC's Lawrence. "I'd draw a parallel between the situation in Southern California and the fight over the spotted owl in the Pacific Northwest 15 years ago."

The Newhall Land and Farming Company intends to do its part to make sure California's population growth comes in on schedule. The company calls the nearly 22,000-home, 60,000-resident city it plans to build Newhall Ranch. Like so many of those evocative names given to nouveau suburbia, this one has a checkered past. A San Francisco auctioneer, some would say carpetbagger, named Henry Mayo Newhall bought the land at bargain-basement prices when its *Californio* owners ran into tax troubles. The 143,000-acre Del Valle land grant became Newhall Ranch in the 1870s.

Newhall Land is a local behemoth. Aside from the proposed Newhall Ranch development, it controls more than 50,000 acres in the state, including L.A. County's largest industrial park, the 4,500-acre Gateway Center. The company, which started the town of Valencia, develops master-planned communities, which it then sells off piecemeal to real estate developers, so the actual landholdings have diminished over time. Company spokeswoman Marloe Laufer downplays the company's influence, saying Newhall Land only owns 25 percent of the town of Valencia, "but we've generated 70 percent of the jobs and sales tax." Everybody else in town readily admits that Newhall has ruled over this part of Los Angeles County for a century, in much the same way as the Spanish *hacendados* who preceded it.

What's striking is how much rural character remains where Newhall Land wants to develop. Once you leave Valencia, you enter an earlier time, California's past as limned by California historian Kevin Starr. The old, elegant Rancho Camulos, once the home of the Del Valles and reputedly the inspiration for Helen Hunt Jackson's 1885 novel *Ramona*, is now a museum sheltered beneath an imposing mountain range. It is as if a time machine threatens to fast-forward from the 1800s to the 21st century, landing this shard of Old California smack in the middle of a Disney theme park Levittown. Only with this machine, there is no going back.

Newhall Land's long history in the region may be one reason the company is behind the curve on urban planning. According to Laufer, its development approach is based on the post-World War II designs of architect Victor Gruen, whom Newhall hired to design its utopian suburban villages.

Gruen, who designed the country's first enclosed mall, was more of an architect than "one of the fathers of new urbanism," as the company likes to bill him. His ideas predate any notion of what is now called sustainable development. For instance, Gruen clustered houses and commercial development around the Santa

Clara River, the way Indians and early settlers settled on rivers in the early days of the West. Today, New Urbanist model cities like Boise, Idaho, and Madison, Wisconsin, are designed to take into account the fragility and value of river corridors by protecting them as natural open space, usually with bike paths and meandering trails.

Of course, when it comes to the old fashioned civic virtues, Lauffer points out that the company has donated land for the hospital, the city center and the local branch of the county library. Newhall also guarantees funds for school construction, Lauffer said. What she failed to mention was that the Sierra Club, the Santa Clarita Organization for Planning and the Environment and a local homeowner's association sued the company in 1993 to force them to provide those guarantees. In any case, few would argue with the proposition that, one way or another, Newhall Land has created a place where a lot of people want to live. But the company's sense of noblesse oblige doesn't appear to extend to the environment. Recently, the California Department of Fish and Game officials accused Newhall Land of deliberately breaking environmental laws in its efforts to ensure approval for its sprawling new development.

In May, state Fish and Game investigator Penelope Liotta filed a search-warrant request alleging that Newhall had deliberately destroyed habitat for a state listed endangered species called the San Fernando Valley spineflower by grading vegetation and planting agaves on the site of a road planned for Newhall Ranch.

"It is my opinion that NLF [Newhall Land and Farming Company] is using the idea of an agave farm as a ruse to justify the systematic destruction of habitat that is consistent with SFVS [spineflower] habitat requirements," Liotta wrote. Liotta requested a search warrant because Newhall Land had consistently denied biologists access to search for endangered species on their land.ä

Documents indicate that this isn't the first time the company has covered up evidence of endangered species on its property. Biological consultant Louis Courtois reported in the 1994 edition of the *California Natural Diversity Database* that arroyo toads lived in sections of the Santa Clara River owned by Newhall Land. In 1995, the U.S. Fish and Wildlife Service placed the toad on the endangered-species list, stating that 75 percent of its habitat had been lost, and of the 22 remaining populations, only six had more than a dozen toads.

This wasn't surprising, given the state of Southern California's rivers. The arroyo toad, which exists only in Southern California

and Baja, survives by burrowing into the loose sand of riverbanks. Arroyo toads cannot penetrate the soil-cement mix that is commonly used when developers want to build houses without leaving a buffer sufficient to protect them from natural flooding.

In 1999, after being hired by Newhall Land, Courtois reported to the U.S. Fish and Wildlife Service that he had not found any arroyo toads in company-sponsored surveys in 1995 and 1999. This letter failed to mention the results he had reported in 1994.

Teresa Savaikie says the company's own environmental impact report, required under California law, showed that the toad had been found under a major traffic artery, McBean Parkway, in 1996. Yet in 1998, the U.S. Army Corps of Engineers and the U.S. Fish and Wildlife Service signed off on a management plan for the river and its tributaries that did not mention the presence of the arroyo toad. Neither Courtois nor Newhall Land admitted that the toad had been found in the river until local environmentalists hired their own biologist, who confirmed that the toads lived in the Santa Clara.

Did the company break the law? Landowners have a legal obligation not to "take" or harm the habitat the species needs to survive, said Rick Farris, a biologist with the Fish and Wildlife Service. Newhall's activities in the Santa Clara River and its tributaries might fall within that definition. It would be difficult to prove in court, but it's hard to believe that Courtois, who failed to return a reporter's phone calls for this article, didn't inform his client that an endangered species lived on their property. Lauffer, meanwhile, contends the river-management plan has already established what Newhall Land is allowed to do on the river. "All of this is kind of moot, all this about frogs and toads," she said.

Federal wildlife officials don't agree. Because the arroyo toad was not included in the river's management plan, agencies are now reviewing the plan to determine if it meets state and federal laws, said Farris. The river-management plan is one of the keys to building the Newhall Ranch development, as well as many smaller developments in the Santa Clara Valley. It basically sets the parameters for everything Newhall Land and other developers can do along the river.

Newhall's public relations materials attempt to depict a company that has become sensitive to its critics. Lauffer points out that Newhall Land's master-planned communities have always contained open space as an amenity. The Newhall Ranch development would cover 19 square miles west of Magic Mountain and include 5.7 million square feet of commercial and

business space inside five "villages." The plan also calls for 6,000 acres of open space. But nearly all of this "open space" is in the mountains that loom over the proposed new city. This steep terrain would be difficult or impossible to develop.

Newhall Land may be trying to satisfy the traditional but outdated "rocks and ice," or scenery based, approach to conservation. The problem, though, is that approach has been one of the factors leading to the current extinction crisis. In the last 20 years, scientists have stressed that rivers and valleys, which contain more food and cover for animals, are often more valuable than the scenic high country traditionally preserved in parks. But to Lauffer, science is eclipsed by one incontrovertible fact. "We actually own the river," she points out.

NEWHALL LAND AND FARMING COMpany may own the Santa Clara, but Teresa Savaikie has adopted the river as her own. "One reporter called me Erin Brockovich without the cleavage," Savaikie says ruefully.

Savaikie enumerates the sins committed by Newhall Land with the zeal of a convert. Indeed, her political activism is of an even more recent vintage than her love for nature. In the summer of 2000, Teresa was walking along San Francisquito Creek looking for warblers when she ran across a forest of tall poles with speakers mounted at the top. "You know those speakers at the old drive-ins? That's what they looked like."

When she returned after a July 4th weekend, Newhall Land had cleared the creek of willows and cattails to make way for a housing development. Savaikie placed a few calls and found out that the drive-in movie speakers were called hazing machines, meant to fool birds into thinking a predator was nearby in order to frighten them away. That way the company could claim it wasn't disturbing any endangered species, like the local Least Bell's vireo.

"They knew they could get away with it because when all these projects came along, nobody knew anything about endangered species. The developers know but we didn't," said Savaikie.

For months she had been calling Peter Galvin, who had moved to Garberville, in Northern California. Galvin hadn't returned her phone calls. Finally, in desperation, she e-mailed another environmentalist who had shown some interest in her problems. He agreed to talk to Galvin for her.

Galvin finally called. "I was absolutely floored," Savaikie said. "I felt like God had called or something." It was the beginning of a

beautiful friendship — and a spate of lawsuits. First, Galvin got the hazing machines removed. Then he found out Newhall Land had successfully lobbied to get its Newhall Ranch and other development sites taken off what is called "critical habitat" for the arroyo toad and another endangered species, a fish called the unarmored threespine stickleback. To date, the Center has eight lawsuits that could affect Newhall Land and Farming Company. "Whenever Teresa gets bored now, she gets Peter and has a conference call," says longtime Valencia environmentalist Lynne Plambeck.

Newhall Land finally began to feel the pressure. For several years, Plambeck and other community activists had been trying to stop Newhall Ranch by arguing that there wouldn't be enough water to meet the needs of 60,000 new residents. Over their protests, the L.A. County Board of Supervisors had approved the Newhall Ranch project in 1999.

But the next year, a Kern County judge halted the project until Newhall could prove it had enough water for the 22,000 homes, as well as business and industrial facilities envisioned for the new city. After the judge's decision, supervisors delayed a new hearing on the development until early 2003. If the company manages to nail down a water supply for Newhall Ranch, it will face a fresh round of opposition. Endangered-species lawsuits will be the only way to force Newhall Land to tailor its development to the needs of toads and birds and obscure flowers that live along the Santa Clara River.

"Without Peter Galvin we wouldn't have a clue about the [Endangered Species Act]," said Sevaikie. "Without the Center, we wouldn't have a prayer."

The Center for Biological Diversity recently bought two acres in Idyllwild to be closer to the ragged edge of sprawl in Southern California, its hot spot. Not that the Center is an unproven entity in California. Back in 1990, a 20-year-old Center wunderkind named Dave Hogan persuaded to get the California gnatcatcher to the federal list of threatened species, which, under the law, provides it almost equal protection as endangered species. The Natural Resources Defense Council followed up with its legal firepower, and before long, the small, blue-gray bird was on the front page of *The New York Times* as the showpiece of Bruce Babbitt's innovative approach to endangered-species conservation. Babbitt hoped to head off the upcoming "train wreck" between the gnatcatcher and booming development in San Diego with something called a habitat conservation plan, which allowed a certain amount of destruction to occur in exchange for protection in other places. The San Diego plan

would eventually cover more than half a million acres and potentially protect 85 species. A similar plan covers most of Orange County. In San Pedro, a smaller swath of land is being managed to protect the Palos Verdes blue butterfly, among other species.

In Idyllwild, the Center's newly hired lawyers, Brendan Cummings and Kassie Siegel, work at the epicenter of the battle over Southern California's last shreds of wildlife habitat. Cummings, Siegel and staff biologist Monica Bond are doing where no national-level environmentalists have gone before — to tedious, mind-numbingly dull local planning and zoning board meetings. So far, the Center has run into the same kind of labor-intensive cases with nickel-and-dime outcomes that made the big national environmental groups shy away. Last year, the Centers lawyers sued over Oak Valley, a proposed 4,400-home development in Riverside County between I-10 and the 60 freeway. They didn't stop the development, but they forced the developer to reduce the size of the project, preserve wetlands, and set aside a wildlife migration corridor for mountain lions and black bears.

"We didn't stop it, but we made it better," says Siegel. "Unfortunately, that's been the history of land-use law."

According to Siegel, the Center is determined to change history by flat out stopping development on 647 acres of Lytle Creek near the Cajon Pass in unincorporated San Bernardino County. Lytle Creek, the lower end of an intermittent canyon stream that flows down from the San Bernardino Mountains, is an illicit dumping ground for trash. Growing around the old tires and broken couches is a patch of perilously rare sage and riverbed habitat for the San Bernardino kangaroo rat, which is on the federal endangered-species list, and the California thrasher. Lytle Creek is the unprepossessing face of 21st-century environmentalism, at least in the U.S. With the extinction crisis overtaking picture-post-card views of nature, vacant lots outside sprawling suburbs have become the new militarized zone.

As it tries to block the transformation of Jack London's rough-hewn California into just another modern convenience, it sometimes seems as if the Center is trying to stop time itself. Occasionally, they succeed not only in stopping time, but turning it back. That is most evident in the Center's impact on federal lands in California, where the political power of the state's real estate developers is not factor. A 1998 lawsuit over the Angeles, Los Padres, Cleveland and San Bernardino national forests forced the U.S. Forest Service to take into account the needs of newly listed endangered species, such as the arroyo toad. That resulted in a whole raft of actions, including closing areas to off-

road vehicles, restricting mining and grazing, and even retrofitting power lines so condors wouldn't get electrocuted when they perched on them.

In the gnarly Charlie Manson outback of the Southern California desert, another Center lawsuit closed 50,000 acres of the Algodones Dunes to off-road vehicles. The Center is currently litigating over the management of the 25-million-acre California Desert Conservation Area, which stretches from the Mexican border almost to Mono Lake. A lawsuit on behalf of 24 endangered species already has forced federal agencies to close off millions of acres in the desert-conservation area to mining, grazing and roads.

If that sounds like a lot, it is. Almost half of the state of California's 163,707 square miles are under litigation brought by the Center for Biological Diversity.

But Galvin says there is something about the Newhall Ranch that feels different, riskier perhaps, with powerful, entrenched opposition and a lot at stake because of the river's biological importance.

"We've never been involved in an issue where we haven't felt we've made a big difference," Galvin said. "But, as my grandmother would say, [illegible]. When we get involved in something, we like to get results and get results fast and get lots of results. The whole Santa Clara River issue is our toughest issue to date. I feel like we're up against this unstoppable juggernaut. Well, not unstoppable, but . . ."

But maybe. A recent court decision favoring the National Association of Homebuilders that rescinded protection for 4.1 million acres of habitat for the red-legged frog in California — protection won by the Center — is evidence that the business community has begun to turn the Center's innovative legal approach against it, lending some credence, perhaps, to Beam's argument against the Center's tactics. For his part, Galvin is acutely aware that the Center for Biological Diversity's $1.8 annual million budget is minuscule compared to the power and money of Southern California's real estate developers. What the Center may have on its side is something less easily quantifiable.

Dodie Hoffman is wheeling her daughter's stroller around the faux New England village called Bridgeport when Teresa [illegible] stops her car to talk. Hoffman says she is shocked to hear that the Newhall Land and Farming Company may have violated the Endangered Species Act. She is equally shocked to learn that her gated community may be harming [illegible]

funny little toads by pumping groundwater to fill its tacky postmodern ode-to-Venice concrete-lined canal. "I was told that they were protected, the animals. That's what the builder told us. We were told that many times," Hoffman says, pausing in her promenade down Bridgeport's impeccably manicured sidewalk. Hoffman probably never heard the word *phenomenology*. She might not care that this obscure discipline has created a new kind of environmental politics. But she would understand if Kieran Suckling told her that his definition of wilderness is the split second when an owl lights on a branch and locks his gaze on yours.

"They will change the game," said John Buse of the Environmental Defense Center in Ventura, which has represented the Center in several cases. "They've brought a new perspective to the battle against sprawl. Even more than that, they're bringing the reality of the extinction crisis home to Southern Californians."

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Facsimile Cover Sheet

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May 6, 2004.

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RE: Heal the Bay Comments on the Draft EIR for Riverpark

Dear Mr. Hogan:

Heal the Bay is a nonprofit environmental group whose mission is to make southern California coastal waters safe and healthy for people and marine life. On behalf of our 10,000 local members, we submit the following comments on the Draft Environmental Impact Report (DEIR), dated February 2004, for the Riverpark Project in Santa Clarita.

The Santa Clara River (River) is the largest wild river remaining in southern California. It provides crucial aquatic ecosystem functions in the region, including groundwater recharge and riparian habitat for endangered and rare species. It is a significant input to southern California's coastal waters at the City of San Buenaventura. It is imperative that development occurring within the Santa Clarita River watershed proceeds in a manner that protects and restores the water quality and aquatic ecosystem functions of this important river system. As lead agency for the review of this proposed project under the California Environmental Quality Act (CEQA), it is the responsibility of the elected officials and city staff of the City of Santa Clarita (City) to ensure that development within City boundaries abides by the requirements of CEQA, the federal Clean Water Act, the state Porter-Cologne Act, the LA County General Plan and the plans and policies of the City designed to protect water quality. 1

Our over-arching concern with this project is that it impinges upon the natural functioning of the River to such an extent that significant, immitigable damage will be done to water quality and aquatic habitat. Specifically: 2

- Significant development occurs within the 100-year floodplain of the River. 3
- There is little or no buffer zone (undeveloped vegetated area) provided between developed areas and the River.
- There are extensive areas of stream bank alteration, in the form of hardened structures for stabilization, including buried bank stabilization, which are known to increase erosion/sedimentation problems and decrease aquatic and riparian habitat. 4
- The water quality analyses are flawed and do not accurately present the true impacts to water quality of the proposed development. 5
- No mitigation is described for impacts to water quality and aquatic or riparian habitat. 6

Our comments and concerns are described in detail below.

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Project Area

The project proposes to develop a 694.4 acre site, with 1183 homes and 40,000 square feet of commercial space. Chapter 1.0 of the DEIR states that 440 acres will be preserved as open space but does not clarify that approximately 330 acres of this is the actual river bed of the Santa Clara River. This should be clarified early in the document, and further calculations of the proportion of the project that will be preserved as open space should not include this area, since this area is virtually undevelopable due to both physical and legal restraints. In fact, the proposed project will build upon approximately 245.4 acres of a 364.4-acre developable site, preserving approximately 119 acres (33%) as open space, including active use parks and landscaped areas. 7 8 9

Grading On Site

The project would require 5.5 million cubic yards of grading plus 3.6 million cubic yards of remedial grading. This is an enormous amount of cut and fill, yet there are no grading restrictions specified in the DEIR. For example, there should be no grading within 100 feet of the River or any tributary, or on steep slopes (steeper that 4:1) during the rainy season. Standards such as these to control impacts due to grading are established in Local Coastal Plans throughout California and should apply to any significant water resource such as the Santa Clara River. Further, the time period over which cut and fill activities would occur is not specified in the DEIR. 10 11

For a proposed project of this magnitude, in intimate proximity to an important waterbody, and including areas of steep gradient, extra precautions are required. At a minimum, there should be absolutely no grading allowed during the rainy season (November through April every year). Heal the Bay has first-hand evidence of the disastrous effect of grading, even at much smaller projects, when a rainstorm occurs.[1] The basic best management practices (BMPs) are not sufficient to prevent massive sediment inputs to creeks when hillsides are graded and exposed to rainfall. Considering the huge volumes of cut and fill proposed for this project, and the presumably extended time period for the construction phase, there should be a strict prohibition on grading during the rainy season and increased requirements for sediment BMPs and BMP inspections to avoid excess sediment runoff to streams during construction. 12 13 14

Destruction of Tributary Streams

At least seven streams on the property would be destroyed by the proposed project. The loss of streams is described in the DEIR, on page 4.2-37, in acres rather than in linear feet. As a result, the loss of streams on-site appears small (0.6 acres under Army Corps of Engineers jurisdiction and 4.6 acres under California Department of Fish and Game jurisdiction) but these areas provide extremely important water quality and aquatic habitat functions. Linear feet is a more appropriate measure of riparian corridors and water courses. Dr. Philip Rundel stated in his written comments on the proposed Ahmanson Ranch project that "Riparian ecosystems are keystone habitats in Southern California and play a critical role in a variety of 15 16 17

[1] See Attachment 1, Heal the Bay Report of Sediment Discharge to Las Virgenes Creek, dated March 4, 2004

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ecosystem processes... these ecosystems act to buffer hydrologic and erosional cycles, control and regulate biogeochemical cycles of nitrogen and other key nutrients, limit fire movements, and create unique microclimates for animal species. Both terrestrial and aquatic wildlife depend on riparian ecosystems with their year-round availability of water, nutrients, food sources, and organic sediments ... It is not surprising, therefore, that riparian ecosystems are centers of high biodiversity. Riparian communities and associated wetland habitats make up less than 1% of the land area of the Santa Monica Mountains of Southern California but are the primary habitat for nearly 20% of the native vascular plant flora."[2] Dr. Rundel referred in these comments to perennial, intermittent and ephemeral watercourses inclusively. 17

Shockingly, no mitigation whatsoever is offered for the destruction of these streams. This is clearly illegal because the destruction of even ephemeral watercourses requires mitigation under the federal Clean Water Act. Some of these streams are classified as waters of the U.S. and so their loss must be mitigated under sections 403 (water quality certification from the Regional Water Quality Control Board) and 404 (permit for discharge of fill or dredge material, issued by the Army Corps of Engineers) of the CWA. Others of these streams fall under the jurisdiction of the California Department of Fish and Game who may also require mitigation under section 1603 of the Fish and Game Code. When applications are made for these certifications, permits and agreements, the responsible agencies may use this legally-binding DEIR to make their mitigation determinations. Therefore the DEIR must contain appropriate mitigation for loss of streams, wetlands and riparian areas in the proposed project. 18 19

The DEIR claims that there will be no significant impacts to the River due to destruction of its tributary streams. Science holds that this is impossible: destroying tributary streams represents a loss of water quality and aquatic habitat functions of the larger river system. The loss of streams due to the proposed project should be described in linear feet as well as acres. Streams are linear landscape features and it is riparian corridor length and their edge effects that provide crucial ecosystem functions, not their area as measured in acres. The impacts of completely burying these tributary streams go well beyond their areal measurements and include complex effects on nutrient and sediment cycling between upland and riparian areas as well as wildlife migration and refugia.[3] The proposed project should be designed to protect and preserve natural drainages and necessary buffer zones (see below). To destroy these watercourses without appropriate mitigation is a violation of the federal Clean Water Act. 20 21 22 23

Lack of Riparian Buffer Zones

Scientific evidence clearly demonstrates that buffer zones, or intact areas of natural vegetation, are crucial to the protection of water quality.[4] These studies show that a minimum 24

[2] See letter from Dr. Philip Rundel to Dennis Hawkins, dated April 26, 2002, Attachment 2.

[3] See above.

[4] See these references: "National Management Measures to Control Nonpoint Source Pollution from Urban Areas" (http://www.epa.gov/owow/nps/urbanmm/index.html, last updated 8/8/2003); Herson-Jones et. al, 1995, cited in the aforementioned EPA document; Wenger, S. J. & Fowler, L. (2000) Protecting Stream and River Corridors. Creating Effective Local Riparian Buffer Ordinances. *Policy Notes*. Public Policy Research Series, Carl Vinson Institute of Governments, the University of Georgia. 1(1):1-2; Wegner, S. (1999) A Review of the

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width of 100 feet of naturally-vegetated buffer zone is required for the buffer to effectively guard against irreversible damage to river systems. The proposed Riverpark project impinges upon the 100-year floodplain of the River and the actual banks of the River, and leaves zero buffer zone between urban residential development tracts and the River itself. There is absolutely no reason why housing needs to be placed in the 100-year floodplain, thus necessitating streambank stabilization measures (i.e. streambank hardening) to then protect those homes in the floodplain. Any development in the Santa Clara River watershed must occur well outside the 100-year floodplain and must maintain, at a minimum, 100-foot vegetated buffers in order to protect the water quality and ecosystem functions of the River.

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Increased Imperviousness on the Proposed Project Site

A key factor in the degradation of stream water quality is the proportion of impervious surfaces versus pervious surfaces in the watershed.[5] Scientific research demonstrates unequivocally that as little as 10% imperviousness leads to degradation of stream functions and water quality. The DEIR must provide a straightforward analysis of increased imperviousness due to the proposed project, including pre- and post-development proportions of impervious surfaces. Estimates of imperviousness for various land use categories are provided but overall imperviousness increases must be calculated and laid out clearly, and those calculations must not include the actual riverbed of the Santa Clara River as open space, since this is the very area that we are attempting to protect from the impacts of development.

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Increased Pollutant Loads to the River

The DEIR includes some numeric estimates of expected changes in pollutant loads to the River due to the proposed project but the analyses are general and too little detail is provided. Specifically:

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- The analyses use loading estimates from the LA County stormwater manual and do not use actual data collected onsite. In the past, the Regional Water Quality Control Board has requested that on-site data be used in these calculations in order to provide a realistic picture of expected water quality impacts and to receive certification under section 403 of the Clean Water Act.[6]
- The pre-development pollutant loading analyses used the LA County "bulk and burn" runoff estimates, which provide unrealistically high flow and pollutant estimates most of the time. Given the return frequency of major fires in the region, it is extremely unlikely that most rain events will generate the equivalent of the amount of water and pollutants estimated in the "bulk and burn" method. We understand that this is the

29

Scientific Literature on Riparian Buffer Width, Extent and Vegetation. Office of Public Service & Outreach, Institute of Ecology, University of Georgia; Basnyat, P., Teeter, L. D., Flynn, K. M., & Graeme Lockaby, B. (1999). Relationships between Landscape Characteristics and Nonpoint Source Pollution Inputs to Coastal Estuaries. *Environmental Management* 23(4):539-549; and US EPA (2002) National Management Measures to Control Nonpoint Source Pollution From Urban Areas-Draft. Office of Wetlands, Oceans and Watersheds. Nonpoint Source Control Branch. Washington D.C.

[5] Center for Watershed Protection, 2003. Impacts of impervious cover on aquatic systems. Watershed Protection Research Monograph 1, 158 pp. http://www.cwp.org/Downloads/

[6] See letter from Melinda Becker to Mr. Dennis Hawkins, dated June 19, 2002, Attachment 3.

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standard calculation used in the LA County stormwater manual but we feel it is imperative that the project proponent also analyze stormwater flow and loadings under normal, non-burned conditions and we urge the City to require such analyses for flow and pollutant loadings in this DEIR, in order to achieve a realistic estimate of pre- and post-development pollutant loads to the River. 29

- The DEIR emphasizes the calculated decreased pollutant loads in the post-development scenario compared to the pre-development scenario. This ignores the increase in overall loadings of constituents such as total nitrogen (+58% per year post-development) and phosphorus (+39% per year post-development), nutrients which contribute to excess algae problems in the Santa Clara River (see Table 4.8.1-12 of the DEIR). The River is listed on the state 303(d) list as impaired by nitrate and nitrite, and already has a nitrogen TMDL approved, which includes neither a wasteload allocation for point sources from the proposed Riverpark development, nor a load allocation for non-point sources from the proposed development. The proposed project must comply with all existing TMDLs or be in violation of the Clean Water Act. Further, certain metals, including copper (which is highly toxic to aquatic life) and lead are also predicted to increase in overall loadings to the River. Both copper and lead may accumulate in aquatic sediments which in turn support aquatic life, therefore increased loadings would negatively impact the aquatic life beneficial use of the River. 30
- The predicted metals concentrations are based on hardness concentrations of 200 mg/l and 400 mg/l but no data are provided in either the DEIR or its appendices to justify these numbers. Hardness may significantly impact the toxicity of metals to aquatic species. If hardness data are used to adjust the metals limits specified in the California Toxics Rule (CTR) then those hardness values should represent critical hardness conditions in runoff to the River, i.e. hardness data should be collected over a long period of time to determine the variability of hardness in the runoff and in the River, and a conservative value, such as the 10th percentile hardness value, should be used. In the absence of these data, the untranslated metals limits provided in the CTR should be used for metals loadings calculations until appropriate hardness data are available. 31
- No numeric estimates are provided for increased pesticide loads to the River. Many pesticides are extremely toxic to aquatic life. The DEIR states that public landscaped areas will conform to an integrated pesticide management plan to minimize pesticide use but no details of such a plan are provided. The DEIR must at a minimum: 32
    1. Provide details of an integrated pesticide management plan that will be implemented, including but not limited to (1) prohibition on any applications of pesticides within 48 hours of an irrigation event or expected rain event, (2) allowing use of pesticides only when a specific pest problem occurs, rather than periodic "maintenance" applications of pesticides, and (3) enforcing a complete ban of certain pesticides, such as those banned by the LA Unified School District or other agencies with public health concerns. 33
    2. Provide information on the percentage of landscaped areas that will be publicly owned, and therefore may be subject to integrated pest management plans, and the percentage of land that will be privately owned and therefore subject to virtually unregulated use of pesticides. 34

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- The proposed water quality BMPs are described only in general terms. Two detention ponds, one grassy swale and an unspecified number of hydrodynamic separator systems are proposed but the sizes, capacities and pollutant removal efficiencies of these BMPs, for specific pollutants of concern, are not specified. Therefore it is impossible to determine whether the BMPs will truly reduce the impacts of anthropogenic pollutants on the River should the development be built. Since the DEIR is the legally-binding CEQA document that determines mitigation for this project, the lack of detailed mitigation proposals renders the DEIR flawed and inadequate. 35
- Some of the proposed water quality BMPs (number unspecified) will be maintained by homeowner associations. This does not ensure ongoing water quality protection because there is no regulatory oversight of these associations. All water quality protection measures should be the responsibility of municipal or county government agencies. Alternatively the homeowners associations should at least be required to sign binding agreements with such government agencies requiring the homeowners associations to perform specific maintenance, monitoring and reporting requirements, depending on the BMP. Without maintenance, monitoring and reporting follow up there is no point in using BMPs since there will be no way of determining whether a given BMP is effective in mitigating water quality impacts. 36

Impacts to Stream Banks and Stream Bed

The exact area of stream bank and stream bed that will be modified by structures must be specified in order to determine required mitigation. These include:

- buried bank stabilizations;
- storm drain outlet structures;
- energy dissipation structures immediately downstream of storm drain outlets; 37
- bridge piers and abutments;
- toe slope reinforcement;
- rip rap;
- gabions and splash aprons; and
- any other unnatural structure placed within the stream bank or stream bed.

Any of these structures or modifications will affect the hydrology of the stream even if only in localized areas. The long-term effects of stream bank/bed modifications include increased scouring, increased erosion, and increased downstream deposition of eroded material, which degrades downstream habitat. The Santa Clara River supports numerous endangered, threatened and rare aquatic species that must be protected from the deleterious erosion and deposition effects of stream bank/bed modifications. 38

The hydrological analyses provided in the DEIR and appendices do not conclusively show that these deleterious effects will not occur. The analyses do not predict into the near future when the effects of natural erosive forces in the River will likely expose the "buried" bank 39

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stabilization and cause it to act hydrologically in the same way that a concrete-walled channel would act. 39

The best ways to avoid increased erosion/deposition effects and to protect properties and utilities from flooding and/or collapse are to (1) keep all structures and utilities outside the 100-year floodplain of the River and (2) use only bioengineering techniques to stabilize banks. Bioengineering utilizes natural plants such as willows and other riparian vegetation to stabilize eroded banks, as well as natural bank grading and stream meanders to ensure protection from flooding and river bank erosion and/or collapse. Bioengineering is preferable because it allows the river to maintain a natural dynamic balance. It also requires less maintenance over time as there are no concrete or other hard structures to eventually fail and be replaced. Bioengineering also provides natural riparian habitat that maintains water quality and wildlife habitat. 40

Cumulative Impacts Analysis

The Cumulative Impacts Analysis, required by CEQA, is inadequate and flawed due to the unrealistic and inaccurate analyses of impacts as discussed above. The true impacts of the proposed development on water quality and aquatic resources in the Santa Clara River are likely much greater than described in the DEIR, therefore the Cumulative Impacts Analysis does not account for the true impacts of the proposed project. 41

Alternative Analysis

The Project Alternatives Analysis, required by CEQA, includes a Santa Clara River Reduced Bank Stabilization Alternative (Alternative 2). From a water quality and aquatic resources perspective, this is clearly the preferred project alternative. Chapter 6.0 of the DEIR shows that that Alternative 2 would result in:

- more open space,
- reduced impacts to biota,
- reduced runoff therefore reduced negative impacts on water quality,
- reduced risk of flooding,
- reduced water demand, and
- reduced wastewater generation. 42

The DEIR further states that "on the basis of environmental impacts alone, this alternative is environmentally superior to the proposed project."[7] However, in the conclusions with regard to Alternative 2, the DEIR states that "Alternative 2 would not provide for flood protection or bank stabilization and does not meet the intent of this objective."[8] This statement is disingenuous because in fact less flood protection and bank stabilization would be needed, since there are no dwellings built within the 100-year floodplain under this alternative project.

[7] See Chapter 6.0 of the DEIR, Project Alternatives, page 6.0-12.
[8] As above, see bullets page 6.0-12.

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The conclusions of this section, and indeed of the DEIR as a whole, should clearly state that Alternative 2, the Santa Clara River Reduced Bank Stabilization Alternative, is the preferred alternative for development of this site. 43

Definition of Waters of the United States

On p. 4.2-5 of the DEIR, the definition of waters of the U.S. begins with: "Although the definition may change in 2003 to exclude non-navigable, isolated water bodies... [followed by the 1986 definition as it currently stands in the Federal Register]." Waters of the U.S. were not re-defined and this phrase should be removed from the DEIR. 44

For these and other reasons we conclude that the DEIR is inadequate to address the impacts of the proposed Riverpark development on the Santa Clara River and should not be approved by the City of Santa Clarita in its present form. If you wish to discuss these issues further please feel free to contact me. 45

Sincerely,

Shelley Luce, D.Env.
Science and Policy Director
Heal the Bay

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Attachment 1. Heal the Bay Report of Sediment Discharge to Las Virgenes Creek, March 4, 2004.

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Report of Sediment Discharge from Construction site east side of Las Virgenes Canyon Road at the intersection of Agoura Road.

March 4, 2004

To Whom It May Concern:

On March 4th Heal the Bay personnel observed massive sediment discharges into Las Virgenes Creek from a large construction and grading site on the east side of Las Virgenes Canyon Road at the intersection of Agoura Road in the City of Calabasas. Massive gullying within the grading portions of the construction site contributed sediment to Las Virgenes Creek via a side channel. The side channel is fed by a culvert that drains the construction site, flows under Las Virgenes Road, and joins with Las Virgenes Creek behind the business office park that houses LA PAZ restaurant at 4505 Las Virgenes Road. The sediment deposit is approximately 300 feet long by 50 feet wide on average and more than 12 inches deep. The photos below demonstrate the severity of the sediment issue and the likelihood of riparian vegetation and biological species loss on site.

The Stream Team and noted ichthyologist Camm Swift have documented the presence of Arroyo Chub in this area and we also have benthic macro invertebrate samples above and below this location. In addition, Las Virgenes Creek was recently placed on the State 303(d) list as being impaired for sediment. This event has increased sediment loading in an already impaired water body. Unless the sediment deposit at this location is immediately cleaned up and adequate construction BMPs are immediately implemented, additional impacts to Las Virgenes Creek will be pushed further downstream. Additionally, this failure at the construction site may have caused elevated nutrient levels in an already impaired water body. Heal the Bay requests that an order to cease and desist all grading activities be immediately issued. Moreover, Heal the Bay requests that a cleanup and abatement order be issued and that the construction contractors be immediately required to install all appropriate BMPs that will prevent a similar illegal discharge and downstream habitat degradation from occurring in the future. Your agency's prompt response to this matter would be most appreciated. Please feel free to call me if you have any further questions. Heal the Bay also respectfully requests that we be notified of all actions regarding this event.

Sincerely,

Mark Abramson
Malibu Creek Watershed Stream Team Manager

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Photo 1: Site Overview

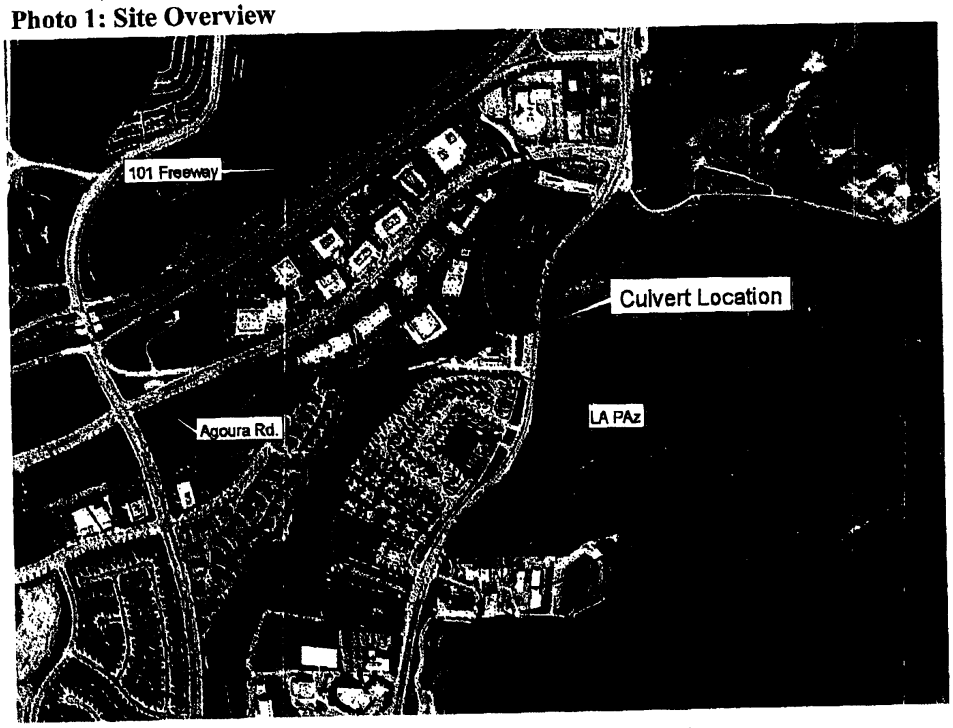
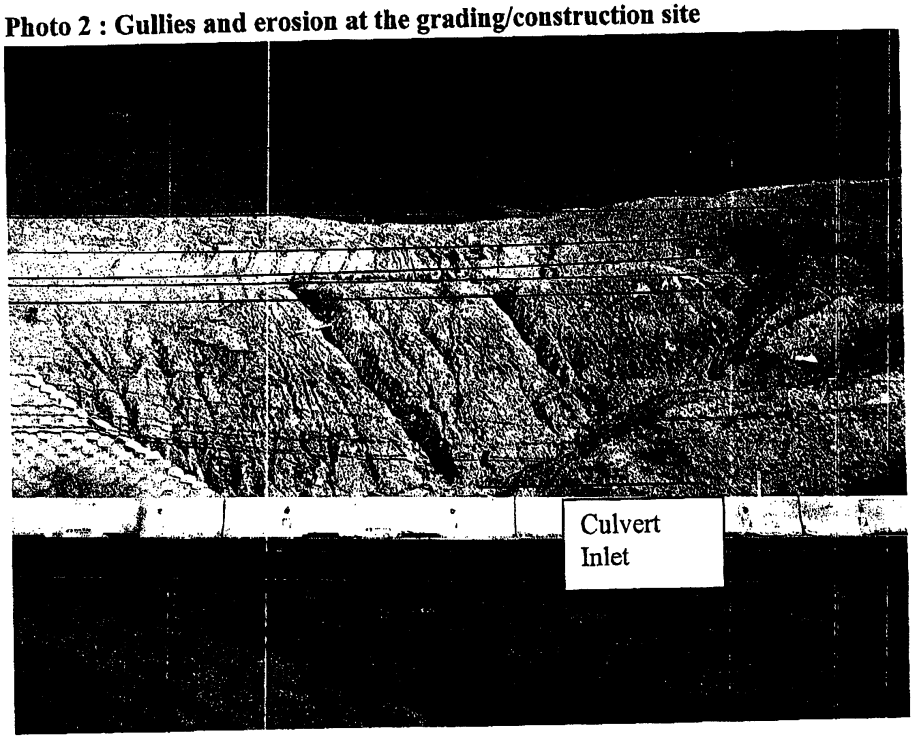


Photo 2 : Gullies and erosion at the grading/construction site



Heal the Bay Comments on Riverpark DEIR

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Photo 3: Side Channel immediately downstream from culvert outlet

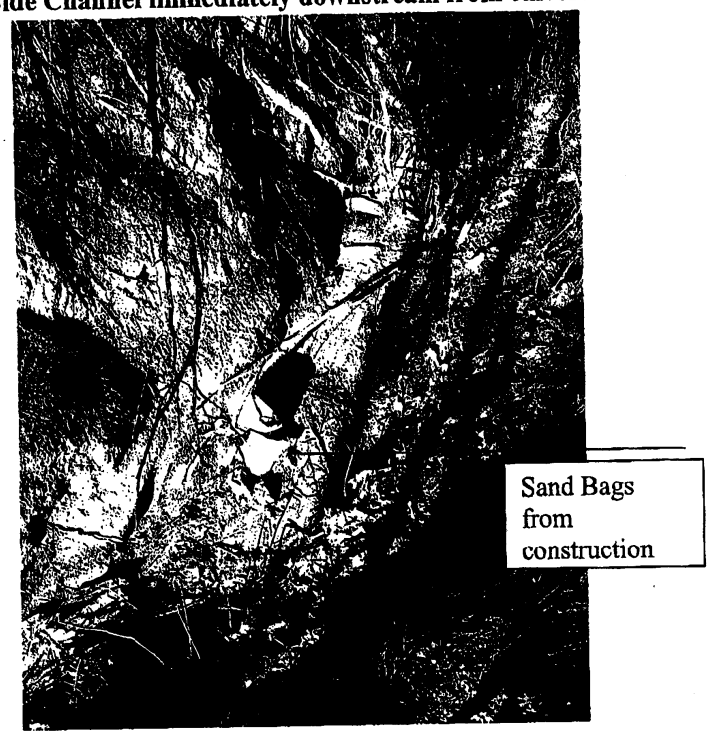
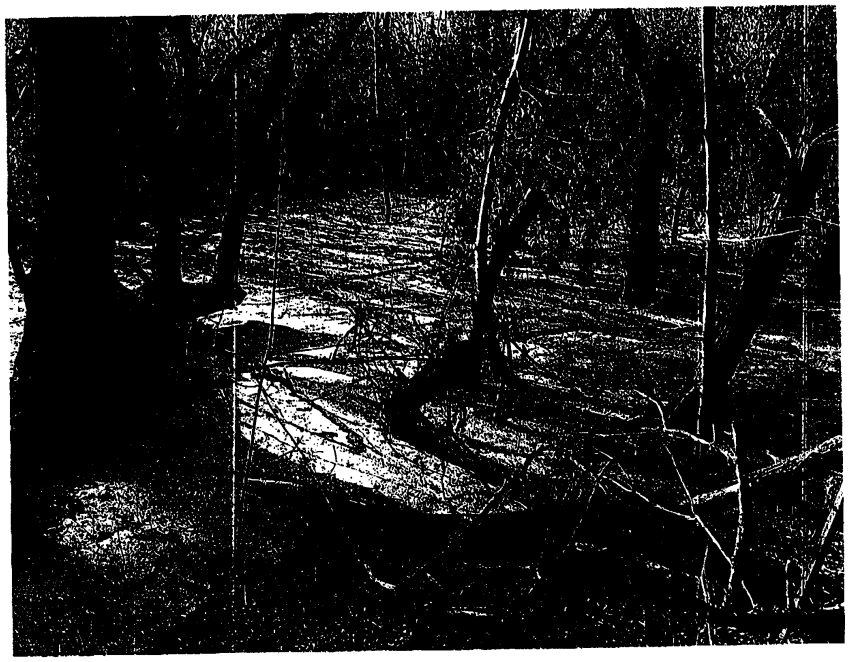


Photo 4: Side Channel near confluence to Las Virgenes Creek. Sediment deposit is approximately 300 ft long by 50 ft wide and 12 inches deep.



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Attachment 2. Letter from Dr. Philip Rundel to Dennis Hawkins, dated April 26, 2002.
(hard copy only)

April 26, 2002

Mr. Dennis Hawkins
County of Ventura
Resource Management Agency
Planning Division
800 South Victoria Avenue, L #1740
Ventura, California 93009

Dear Mr. Hawkins:

With this letter I would like to offer written testimony on the *Ahmanson Ranch Phase "A" Tract Map Supplemental EIR*. As a plant ecologist with extensive experience working on native plant communities in Southern California, I would particularly like to comment on aspects of what I believe to be inadequate treatment and discussion of impacts and mitigation measures for both riparian habitats and rare and endangered species in the project area in section *4.6 Biological Resources*.

Riparian ecosystems are keystone habitats in Southern California and play a critical role in a variety of ecosystem processes. Situated at the interface between terrestrial and aquatic ecosystems, these ecosystems act to buffer hydrologic and erosional cycles, control and regulate biogeochemical cycles of nitrogen and other key nutrients, limit fire movements, and create unique microclimates for animal species. Both terrestrial and aquatic wildlife depend on riparian ecosystems with their year-round availability of water, nutrients, food sources, and organic sediments. In addition to these critical components of food resources, riparian ecosystems provide wildlife with a structural complexity that includes mosaics of shade and sun, shelter, and protected corridors between adjacent plant communities. It is not surprising, therefore, that riparian ecosystems are centers of high biodiversity. Riparian communities and associated wetland habitats make up less than 1% of the land area of the Santa Monica Mountains of Southern California but are the primary habitat for nearly 20% of the native vascular plant flora.

The ecological significance of riparian zones is accentuated in the semiarid mediterranean-climate regions of Southern California where water resources are strongly limiting for plant growth. Riparian communities here occur in an unusually dynamic geomorphic and climatic environment, and these dynamic processes are critical in maintaining the natural ecosystem processes that sustain these ecosystems. Flooding with associated sediment deposition and/or erosion, as well as nonfluvial impacts from adjacent upland areas in the form of fire impacts, landslides, and other large events all provide strong but unpredictable disturbance regimes that are critical in seedling establishment and nutrient cycling for riparian trees and shrubs.

Given the significance of riparian ecosystems, it is disappointing to see lack of consideration given in the EIR to natural ecosystem processes that sustain and are influenced by riparian habitats. To begin with, it is disingenuous to describe riparian habitats only in terms of area covered. As linear landscape features, it is the length of riparian corridors and their extended edge effects that are critical in assessing impacts to these ecosystems, not their area. Little or nothing is mentioned in the EIR with regard to the influence of riparian resources to wildlife and to fluxes of nutrients and sediments between upland and lowland

habitats as mediated by these riparian systems. The impacts of the filling and/or channelization of extensive lengths of East Las Virgenes Creek by the project grading go well beyond the simple impacts described in the EIR.

The EIR describes mitigation of loss of this riparian corridor by the establishment of enhanced or created wetlands and riparian areas at a 5:1 ratio for those impacted. While such a statement sounds appropriate, it ignores the difficulties of such wetland creation. There is a well-established literature for Southern California documenting the general ineffectiveness of artificial wetlands and riparian habitats in providing any of the nature ecosystem structure and services provided by natural wetlands. The EIR avoids any mention of this historical documentation and failure of virtually 100% of such mitigation efforts.

The EIR makes the statement that golf course development adjacent to wetlands and riparian corridors will have no impact in introducing herbicides, pesticides or enriched nutrients to these systems. Such a statement is totally unsupported by any documentation and contrasts with wide experience with such interactions. The degree of chemical and nutrient additions required to keep golf course fairways and greens in top condition will clearly lead to runoff and leaching of these compounds. Without a total separation of the hydrologic drainage areas of golf course and wetlands, negative interactions seem inevitable. Such negative impacts degrade habitat quality, critical for such species as the California red-legged frog, and invariably promote invasive species to the detriment of native species.

The EIR is also deficient in describing mitigation measures to sustain populations of San Fernando Valley spineflower in the project area. Spineflowers are species whose ecology is tied to regular disturbance regimes in their habitats. Nothing in the EIR suggests an understanding of what those natural disturbance regimes would be in the absence of the project. Thus, the establishment of the spineflower "reserves" would be pointless without such an understanding. Does the threat to maintaining spineflower populations come from invasive species or from natural successional processes? What are the natural disturbance regimes to maintain spineflower habitat conditions...fire? ...pocket gopher activity?...grazing? ...erosion? Nothing seems to be known about such spineflower's response to these disturbance factors, but such knowledge is critical to maintain populations of this species. If invasive species are the critical factor that must be controlled, then how will such control be implemented? Herbicides and mechanical control each offer potential impacts detrimental to the spineflower itself. Without more information, the success of any spineflower reserve is unlikely.

The significance of natural biodiversity and rare habitats on the Ahmanson Ranch property should demand that the EIR be far more complete in addressing the critical issues for the survival of rare and endangered species and the maintenance of wetland and riparian habitat quality. Simple declaratory statements mentioning planned mitigation steps are not adequate in dealing with these issues when they lack documentation suggesting that success is likely to be achieved.

Yours sincerely,

Philip W. Rundel, PhD.
Professor

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Attachment3 . Letter from Melinda Becker to Dennis Hawkins, dated June 19, 2002
(hard copy only)

Winston H. Hickox
Secretary for Environmental Protection

California Regional Water Quality Control Board

Los Angeles Region

Over 50 Years Serving Coastal Los Angeles and Ventura Counties
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Gray Davis
Governor

June 19, 2002

Mr. Dennis Hawkins
County of Ventura Resource Management Agency
800 South Victoria Avenue
Ventura, California 93009

Subject: Ahmanson Ranch Project Phase "S" Master Tract Map, Tentative Tract No. 5206
Comments on Water Quality Report and Master Hydrology Study

Dear Mr. Hawkins:

The Los Angeles Regional Water Quality Control Board (Regional Board) staff thank the County of Ventura for extending the public comment period to allow for receipt and review of the revised water quality and hydrology reports for the Ahmanson Ranch project. Regional Board staff have reviewed these documents and met with representatives of the Ahmanson Ranch project on May 17 and June 13. Attachments A and B hereto are written responses provided by the Applicant's consultant, Camp, Dresser & McKee, to Regional Board staff in response to the aforementioned meetings. The second set of responses (Attachment B) was received yesterday afternoon, and staff has not had adequate time to review them. This letter is intended to summarize and highlight some of the more salient, outstanding issues discussed with representatives of the Project Applicant, and does not constitute a final or exhaustive review of the potential impacts to water quality.

Since the certification of the 1992 FEIR, Malibu Creek and the Los Angeles River have been listed on the Clean Water Act, Section 303(d) list due to exceedances of water quality standards for nutrients, coliform bacteria, metals, and pesticides. In addition, the proposed 303(d) list for 2002, includes additional listings for excessive sediment loading. The Los Angeles Regional Water Quality Control Board will be developing Total Maximum Daily Loads (TMDLs) for the watershed, but the DSEIR may be certified before the TMDLs become effective.

The Project Applicant has maintained that the post-development pollutant loadings to Malibu Creek and the Los Angeles River will be less than the pre-development loadings. Regional Board staff have interpreted this commitment to apply to both construction and post-development phases of the project. Loading data provided by the Applicant is very preliminary and not based solely on site-specific data. Given that the commitment to zero increase in pollutant loading is very crucial to our assessment of this project, we will continue to evaluate the potential impacts of the project as new information becomes available.

The comments and recommendation provided herein are referenced by the section headings as presented in the DSEIR. It is our hope that Ventura County will consider incorporating Regional Board staff recommendations into the mitigation plan, where appropriate.

4.5 WATER RESOURCES

4.5.2.3 Project Impacts

Effect WR-1: Construction of the project could result in the runoff of sedimentation and other pollutant that would effect local drainage. However, the implementation of BMPs through a SQUIMP, as required under the RWQCB NPDES regulations would reduce impacts to less than significant.

Effect WR-2: Build-out of the project would result in an increased in impervious surface onsite and potentially affect surface water quality. Given required water quality control devices, this is considered a less than significant impact.

Hydromodification Study Plan

A hydromodification study plan should be prepared describing how the Applicant intends to monitor or predict channel changes and stream aggradations as a result of the proposed development. Although, the revised Water Quality Report did address the issue of impacts to stream channels due to hydromodification and the increased amount of storm water runoff (section 3.4.3), it does not provide sufficient information for us to evaluate the effectiveness of the proposed design controls. The Applicant should conduct a hydrologic study to guide the final design of the storm water management system. The study should be based on the recommendations in the report "Stream Response to Storm Water Best Management Practices in Maryland" (Capuccitti and Page, 2000. Maryland Department of the Environment. Final Deliverable for a US EPA 319 Grant, page 21). To understand how impacted stream channels will respond to changes in the hydrology of the watershed, at a minimum the study should assess stream channel stability in the project area and downstream, including habitat features, determine thresholds of flow and flow duration for channel stability and habitat integrity, and evaluate the likely impacts from predicted stream flows following construction of the project. We expect the study to begin as soon as possible. This study needs to address the semi-arid climate of the project site, rainfall/runoff events with frequencies ranging from 0.5-yr to 100-yr, impacts from peak flow rates, and impacts from the increased flow duration required to release increased total runoff volumes. In addition, it is important that the study include field assessments of impacted stream reaches, including habitat and bed and bank materials, and modeling of stream flow for pre- and post-development based on long term hydrologic data records. In addition, potentially impacted stream reaches should be monitored during and after project construction to detect any negative impacts from the project. If negative impacts are detected after construction is complete, we expect the project to mitigate the damage and retrofit runoff BMPs if necessary

Water Quality Monitoring Program

The project Applicant has stated that the pollutant loadings from the project will be less than pre-development. Regional Board staff have interpreted this to mean that pollutant loadings during both construction and post-development phases will be less than pre-development loadings. This point of clarification is especially important considering the long time period during which grading and construction activities are planned to occur. Regional Board staff will continue to work with the Applicant to verify the assumptions in the pollutant loading models, including calibration with future water quality monitoring programs to ensure no net increase loading. In order to ensure that pollutant loading is not increased, the Applicant has agreed to develop a monitoring program that will incorporate both surface and groundwater monitoring elements. This program must be designed in a manner that will establish existing baseline conditions for constituents of concern (including pesticides); and include approaches for monitoring during construction phase and post development. The program should also include an assessment component, which includes water quality modeling, based on site-specific data, to periodically update the loading estimates and potential impacts.

Restrictions on Earthmoving

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The potential sediment loadings from grading activities, especially grading of slopes during wet weather, are of particular concern. In addition to restrictions provided in the Ventura County Municipal Stormwater NPDES permit and SQUIMP, it is noted that the Draft City of Malibu Local Coastal Program Implementation Plan would restrict grading during wet weather. Although, the project lies outside of the Coastal Zone, we recommend that at a minimum, similar restrictions be applied to this project, since the project will include grading of sloped areas and has the potential to impact downstream coastal waters. A copy of the referenced excerpt from the Draft LCP is provided as Attachment C hereto for informational purposes.

4.15 WATER SUPPLY

4.15.2.3 Project Impacts

Effect WS-1: The project would generate an average daily demand for non-potable water from the TWRF of 1.52 million gallons per day (mgd) and a maximum daily demand of 3.69 mgd. The TWRF is expected to meet this demand, and impacts are considered less than significant.

Potential Groundwater Contamination from Rocketdyne Santa Susanna Field Laboratory.

Although the major source of irrigation water will be reclaimed water from the project and/or the TWRF, we understand that the Applicant intends to use water well No. 1 as a source of supplemental non-potable water. Concerns have been raised that pumping of this well has the potential to draw the contaminant plume from the Rocketdyne Santa Susanna Field Laboratory. Information provided to date has not provided conclusive evidence that the well will not impact the Rocketdyne contaminant plume, and additional information may be required.

4.16 SEWAGE TREATMENT/DISPOSAL

4.16.2.3 Project Impacts

Effect S-1: The net amount of wastewater sent to the TWRF from the proposed development would not create excessive supply and therefore cause the facility to violate the conditions of its Malibu Creek discharge permit. Impacts are considered less than significant.

Impact on TWRF

It is the Regional Board's understanding that the Applicant intends to provide a total of six days of storage for recycled water, consisting of normal operating storage of 2.5 million gallons and an additional 3 days of emergency storage (Water Quality Report, p. 3-10). According to the Applicant, this will provide a contingency for managing excess recycled water resulting from daily fluctuations or major storm events and will not adversely impact Tapia's ability to comply with the provisions of the discharge prohibition. Regional Board staff may request further evaluations to ensure that storage capacity is adequate and will not adversely impact Tapia's ability to comply with its permit requirements.

Biosolids Impact

An assessment on the potential cumulative impact of the biosolids discharged to the TWRF from the Project has not been addressed. Specifically, the impact on the ability of TWRF to meet its current effluent discharge limits given the highly concentrated nature of the liquid fraction within of the biosolids. Although TWRF has options for the

management of the solid portion of the biosolids, the liquids will be managed as effluent, and thus subject to effluent limits.

Summary

In summary, the Applicant has committed to not increasing pollutant loading from the project to Malibu Creek or the Los Angeles River. Loading data provided by the applicant is very preliminary and not based solely on site-specific data. Given that the commitment to zero increase in pollutant loading is very crucial to our assessment of this project, we will continue to evaluate the potential impact of the project, as new information becomes available. Furthermore, the Regional Board staff requests that we be consulted during the development of the mitigation monitoring conditions that pertain to protection of water quality.

Again, Regional Board staff appreciates the opportunity to comment on the DSEIR and related documents. Should you have any questions regarding this response, please contact Rod Collins at (213) 576-6691.

Sincerely,

Mèlinda Becker
Chief, Standards and TMDL Unit 1

Attachments: (3)

ATTACHMENT A

RESPONSES FROM AHMANSON RANCH CONSULTANTS AS RECEIVED BY REGIONAL BOARD STAFF ON JUNE 6, 2002

ATTACHMENT B

RESPONSES FROM AHMANSON RANCH CONSULTANTS AS RECEIVED BY REGIONAL BOARD STAFF ON JUNE18, 2002_

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ATTACHMENT C

EXCEPRT FROM DRAFT CITY OF MALIBU LOCAL COASTAL PROGRAM IMPLEMENTATION PLAN
GRADING ORDINANCE

California Environmental Protection Agency
****The energy challenge facing California is real. Every Californian needs to take immediate action to reduce energy consumption****
****For a list of simple ways to reduce demand and cut your energy costs, see the tips at: http://www.swrcb.ca.gov/news/echallenge.html****
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Letter No. 24

ROSSMANN AND MOORE, LLP

Attorneys at Law

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May 4, 2004

Via facsimile
Jeff Hogan, Associate Planner
Planning and Building Services Department
City of Santa Clarita
23920 Vancia Blvd.
Santa Clarita, CA 91355

Re: Draft Environmental Impact Report for Riverpark Project, #02-175

Dear Mr. Hogan:

This letter provides comments on the above-referencedproject on behalfof the Planning and Conservation League (PCL) and the Citizens Planning Association of Santa Barbara County (CPA). PCL and CPA were two of the plaintiffs whose CEQA challenge resulted in the court-ordered decertification of the original 1995 Monterey Agreement EIR (*Planning and Conservation League v. Department of Water Resources* (2000) 83 Cal.App.4th 892 ("*PCL* decision"). PCL and CPA are also signatories to a court-approved settlement agreement subsequently reached with the Department of Water Resources (DWR), state water contractors, and other interested parties, including the Castaic Lake Water Agency (Castaic). Under this agreement, DWR is preparing a comprehensive statewide environmental review of a revised project designated as "Monterey Plus." (A full copy of that agreement, referred to here as the *PCL* settlement, is posted on the website of the Department of Water Resources at http://www.montereyamendments.water.ca.gov/ and is referenced in appendix 4.8 of the Draft EIR.) 1

The Draft EIR's assessment of water services and water supply reliability (section 4.8 and appendix 4.8) is fatally defective, failing to honor the *PCL* decision and its subsequent settlement agreement. Most glaringly, the analysis in the Draft EIR mistakenly relies upon the permanence of the non-final and highly contested transfer of 41,000 acre-feet of State Water Project Table A Amounts (previously known as "entitlements") from the Kern County Water Agency and one of 2

its member districts to Castaic , despite the absence of a legally adequate EIR supporting either the Monterey Amendments or the transfer based upon article 53 of those amendments. Even worse, the Draft EIR presupposes the finality of that Kern-Castaic transfer in defiance of the contrary understanding in the *PCL* settlement agreement, which excludes it from the list of "final" transfers and requires DWR to conduct a statewide assessment of precisely the same transfer in its pending "Monterey Plus" EIR. The SWP allocation attributed to Castaic in the Draft EIR's analysis of water service expressly presupposes that this transfer can be construed as permanent, and relied upon as a source of deliverable water for the project. (See, e.g., DEIR at pp. 4.8-18, 61, 64 and table 4.8-64.) The 41,00 acre-feet from the contested Kern-Castaic transfer constitutes more than 40 percent of Castaic's permanent Table A amount assumed in the Draft EIR's water reliability calculations. (*Id.* at pp. 64.)

The relevance of the *PCL* decision and subsequent settlement to assessment of the present project is therefore direct and inescapable. In *PCL,* the Third District Court of Appeal found that the Central Coast Water Authority's 1995 EIR "failed to meet the most important purpose of CEQA, to fully inform the decision makers and the public of the environmental impacts of the choices before them." (83 Cal.App.4th at 920.) CCWA improperly served as lead agency in place of DWR and prejudicially failed to analyze the enforcement of the pre-Monterey permanent shortage provision, article 18(b), prior to its elimination from the State Water Project contracts. The appellate court found it unnecessary to adjudicate the other CEQA deficiencies identified by the Monterey plaintiffs, observing that "DWR, with its expertise on the statewide impacts of water transfers, may choose to address those issues in a completely different and more comprehensive manner." (*Id.*)

In *Friends of the Santa Clara River v. Castaic Lake Water Agency* (2002) 95 Cal.App.4th 1373, the Second District Court of Appeal ordered the decertification of Castaic's EIR supporting the proposed Kern-Castaic transfer. The appellate court found that Castaic's EIR violated CEQA by "tiering" from the invalidated Monterey EIR. The court also relied upon the "lead agency" analysis in the *PCL* decision, emphasizing "the importance of the statewide perspective in analyzing the implications of water entitlement transfers for the state and SWP as a whole." (*Id.* at 1384.).

Unfortunately, the Draft EIR simply repeats Castaic's self-serving efforts to portray the 41,000 acre-feet Kern-Castaic transfer as final, rather than subjecting them to the critical scrutiny they deserve. While the Draft EIR concedes that the 41,000 acre-feet transfer, as well as the Monterey Amendments themselves, may still be invalidated (page 4.8-62), it relies on glaring misstatements to perpetuate its imprudent reliance on that transfer.

First, the notion that the *PCL* settlement agreement somehow recognizes the transfer as a *fait accompli* (cf. DEIR, p. 4.8-56) is false and misleading. That *PCL* settlement agreement conspicuously excludes the 41,000-acre Kern/ Castaic transfer from the list that the signatories, including Kern and Castaic, recognize as "final." (*PCL* settlement, §III.D and Attachment E.) The contested Kern-Castaic transfer, and other newly proposed and non-final transfers, cannot proceed

without new environmental analysis satisfying CEQA. (PCL settlement, §VII.A.) Recognizing that this transfer remains subject to pending litigation and potential invalidation in the Los Angeles Superior Court, a circumstance which remains the case today, the *PCL* settlement also requires the new "Monterey Plus" EIR to analyze the 41,000 acre-feet transfer, as well as other transfers facilitated by Monterey Amendments provisions, such as other agriculture-to-urban transfers referenced in Article 53 of those amendments. (*PCL* settlement, § II.C.4.) Reliance on this contested transfer, without the benefit of DWR's statewide "Monterey Plus" EIR, would mirror the "provincial experience" criticized in the *PCL* decision. (83 Cal. App. 3d at p. 918.) That reliance would also create a substantial risk of final decisions based on local analysis that is likely to prove inconsistent with the project decision reached after DWR's "Monterey Plus" EIR. 7 8

Second, CLWA's suggestion, repeated in the EIR, that the Monterey Agreement somehow provides "blanket pre-approval" for this and other Monterey-dependent transfers (*id.* at 4.0-64) also deserves rejection in the strongest possible terms. It cannot be reconciled with the *PCL* decision, which required DWR's forthcoming project decision to be based upon its entirely new statewide EIR. (*PCL*, 83 Cal.App.4th at p. 920.) Nor can it be reconciled with the *PCL* settlement, which authorizes only the interim application of Monterey in tandem with new settlement components, while leaving to DWR the responsibility to make a new project decision following comprehensive statewide review. (*PCL* settlement, §§II, VII.) The Draft EIR's speculation that the transfer is unlikely to be "unwound" (page 4.8-63) cannot be reconciled with the *PCL* decision and settlement agreement. 9

Third, the Draft EIR is equally specious in its assertion that this Monterey-dependent transfer could proceed under present circumstances in the absence of the Monterey Amendments. Kern County Water Agency's speculation that it would have supported the transfer under pre-Monterey Article 41 is inconsequential to that scenario, in which DWR would have had to consent under different circumstances and requirements for public accountability. Moreover, although transfers with DWR approval were available under Article 41 of the pre-Monterey State Water Project contracts, it is highly speculative whether agriculture-to-urban transfers such as those in the NOPs would even have taken place without the Monterey Amendments, since those Table A amounts would have been subject to "agriculture first" cutbacks under pre-Monterey article 18(a). Read in context, such maneuvers would amount to little more than the "straw man" argument considered and rejected in the *Friends* appeal. (95 Cal.App. 4th at p. 1387.) 10 11

Finally, the Draft EIR should not rely upon Castaic's promise to prepare its own separate EIR supporting the Kern-Castaic transfer. As noted in the attached comments sent to Castaic last year, those attempts are also in direct violation of the *PCL* decision and its lead agency principle. 12

Other aspects of the Draft EIR are equally problematic. To provide just several examples, the document relies on a proposed 16,000 acre-foot permanent transfer of Table A amounts from Kern to Castaic (page 4.8-17) that PCL and CPA have already challenged in scoping comments as inconsistent with the *PCL* decision and settlement. It also relies upon a separate 24,000 acre-foot storage agreement that is the subject of a separate judicial challenge. Finally, it relies upon a 2003 13 14 15

reliability report issued by DWR that is the subject of a vigorous and ongoing statewide debate. (See http://swpdelivery.water.ca.gov/commentletters.htm) Applications of the CALSIM II model, another subject pending in DWR's statewide EIR, have been the subject of intense recent criticism, notably that of the CALFED peer review panel. 15 16

In sum, approval of the project under present circumstances would ignore the central teaching of the *PCL* decision that "the dream of water entitlements from the incomplete State Water Project is no substitute for the reality of actual water the SWP can deliver." (*Santa Clarita Organization for Planning the Environment v. County of Los Angeles* (2003) 106 Cal.App.4th 715 717-18.) PCL and CPA urge the County to avoid any reliance on the faulty assumptions in the Draft EIR discussed in this letter. 17

Respectfully,

Roger B. Moore

Counsel for Planning and Conservation League and Citizens Planning Association of Santa Barbara County, Inc.

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August 22, 2003

Via facsimile and U.S. Mail
Mary Lou Cotton, Assistant to the General Manager
Castaic Lake Water Agency
27234 Bouquet Canyon Road
Santa Clarita, CA 91350-2173

Re: Comments on Notices of Preparation for (1) CLWA's Proposed Transfer of 16,000 acre-feet of State Water Project Table A Amount from Kern County Water Agency (including proposed annexations); (2) CLWA's Proposed Transfer of 41,000 Acre-Feet of State Water Project Table A Amount from Kern County Water Agency

Dear Ms. Cotton:

This letter provides comments on the above-referenced Notices of Preparation on behalf of the Planning and Conservation League (PCL) and the Citizens Planning Association of Santa Barbara County (CPA). PCL and CPA were two of the plaintiffs whose CEQA challenge resulted in the court-ordered decertification of the original 1995 Monterey Agreement EIR (*Planning and Conservation League v. Department of Water Resources* (2000) 83 Cal.App.4th 892). Although CPA has separately submitted a broader set of comments, this letter focuses on legal and institutional problems common to both notices, arising from their relationship to the *Planning and Conservation League* decision and subsequent court-approved settlement agreement.

In both notices of preparation (respectively, the "16,000 NOP" and the "41,000 NOP"), the Castaic Lake Water Agency (Castaic) announces its intention to move forward with its own separate environmental review of permanent transfers of State Water Project Table A Amounts, partly drawing on authority conferred in the 1995 Monterey Amendments to the State Water Project contracts. But under the Monterey settlement agreement, which Castaic signed, the court-identified lead agency, the Department of Water Resources (DWR), is already conducting a statewide environmental review of a new "Monterey Plus" project. We strongly urge Castaic to

Exh. B.7 1

refrain from moving forward with these separate project reviews, which are premature and likely to operate at cross-purposes with DWR's statewide review. Moreover, even if Castaic were to proceed now with its own separate EIRs on these permanent transfers, it lacks the institutional authority and statewide accountability to serve as CEQA lead agency under the *Planning and Conservation League* decision.

PCL and CPA received no timely notice of the January 22, 2003 41,000 NOP, even though Castaic was a participant in the Monterey settlement negotiations that were nearing finality at the time of its January 2003 filing. Although the formal scoping deadline has already passed, Castaic has since ignored timely scoping comments from at least two groups (SCOPE and the Sierra Club Angeles Chapter) advising that it should await the preparation of the new Monterey EIR, and that this separate review of a permanent transfer of table A amounts was in likely violation of the lead agency holding in the *Planning and Conservation League* case. In submitting scoping comments on the 16,000 NOP, we therefore find it appropriate to advise Castaic that its separate review following the 41,000 NOP is likewise questionable.

The 16,000 NOP addresses a separate new permanent transfer of an additional 16,000 acre-feet of Table A amounts from Kern County Water Agency to Castaic, through an agreement with Kern's Berrenda Mesa member district. The notice, which recognizes the transfer's relationship to the Monterey Amendments, announces the expected use of this transfer in annexation agreements associated with urban development projects, including Newhall Ranch. The notice also recognizes that the transfer would change the amount of SWP supplies available to several agencies, the location and timing of SWP deliveries, and the utilization and conveyance of storage facilities. (16,000 Initial Study at p. 39.)

The "Monterey Amendments" Problem

Both NOPs are fraught with a glaring "Monterey Amendments" problem. They would engage Castaic prematurely in the study of Monterey-related permanent transfers under the State Water Project contracts, without the benefit of DWR's forthcoming "Monterey Plus" EIR analyzing these amendments. The invalidated 1995 Monterey EIR prepared by the Central Coast Water Authority (CCWA) is the only one that now exists on the Monterey Agreement. Under *Planning and Conservation League* and two sequel decisions addressing Castaic's transfer of Table A amounts, "tiering" or otherwise relying on that EIR would render the approval decision vulnerable to CEQA challenge. However, any attempts by Castaic to conduct a separate Monterey review in advance of DWR's, or to rely on its own hypothetical non-Monterey analysis, would shift rather than solve this fundamental CEQA problem.

In *Planning and Conservation League,* the Third District Court of Appeal found that CCWA's 1995 EIR "failed to meet the most important purpose of CEQA, to fully inform the decision makers and the public of the environmental impacts of the choices before them." (83 Cal.App.4th at 920.) CCWA improperly served as lead agency in place of DWR and prejudicially failed to analyze the enforcement of the pre-Monterey permanent shortage provision, article 18(b),

prior to its elimination from the State Water Project contracts. The appellate court found it unnecessary to adjudicate the other CEQA deficiencies identified by the Monterey plaintiffs after analyzing the defects in the lead agency selection and no project assessment, observing that "DWR, with its expertise on the statewide impacts of water transfers, may choose to address those issues in a completely different and more comprehensive manner." (*Id.*) The court also noted that the deficiencies in the 1995 EIR might be related to the "provincial experience" of CCWA. (*Id.*)

In *Friends of the Santa Clara River v. Castaic Lake Water Agency* (2002) 95 Cal.App.4th 1373, the Second District Court of Appeal ordered the decertification of an EIR prepared by Castaic, supporting its Monterey Amendments-based attempt to permanently acquire 41,000 acre-feet of State Water Project entitlements (now "Table A" amounts) from the Kern County Water Agency and its Wheeler Ridge member district. The appellate court found that Castaic's EIR violated CEQA by "tiering" from the invalidated Monterey EIR. This ruling involved precisely the same transfer that Castaic now attempts to address in its separate 41,000 NOP. That piecemeal approach, however, is in apparent defiance of the expectation of the court of the appeal in the *Friends* case that Castaic would await "action by the DWR complying with the *PCL* decision." (95 Cal.App.4th at p. 1388.)

Another recent Second District appellate decision, *Santa Clarita Organization for Planning and the Environment (SCOPE) v, County of Los Angeles* (2003) 106 Cal.App.4th 715, critically addressed Castaic's characterization of the 41,000 acre-feet transfer. In that case, the County of Los Angeles violated CEQA in its review of the West Creek development project that erroneously assumed that 100 per cent of Castaic's purported 41,000 acre-feet would be available in wet years and 50 per cent in drought years. Drawing on *Planning and Conservation League's* assessment of the historic disparity between Table A amounts and deliverable water, the court concluded that the EIR failed to undertake a "serious and detailed analysis" of State Water Project supplies, and observed that "[t]he dream of water entitlements for the incomplete State Water Project is no substitute for the reality of actual water the SWP can deliver." (*Id.* at pp. 723, 717.)

Both NOPs appear to confuse the legitimacy of Castaic's separate reviews with the distinct issue of the interim operation of the 41,000 acre-feet transfer pending further environmental review. (See Public Resources Code section 21168.9; 16,000 Initial Study at p. 11; 41,000 NOP p. 1.) The trial court did not enjoin interim operation, but left the issue open to further demonstrations that could lead to interim prohibition. The issue of interim operation is pending on appeal in the Second District (2 Civil B164027).

The 16,000 NOP wrongly assumes that the earlier 41,000 acre-feet proposed transfer is already part of Castaic's permanent Table A amounts. (16,000 NOP, p. 1.) That inference of finality is highly misleading. Neither the 41,000 acre-feet nor the 16,000 acre-feet transfer is on the list of Table A amount transfers recognized as "final" in the Monterey Amendments settlement agreement (Attachment E). Such transfers cannot proceed without new environmental analysis satisfying CEQA. (Monterey Settlement Agreement, section VII.A.) That settlement agreement, while recognizing that the remedial issue remains before the Second District, also requires DWR's

"Monterey Plus" EIR to analyze the 41,000 acre-feet transfer, as well as other transfers facilitated by Monterey Amendments provisions, such as other agriculture-to-urban transfers referenced in Article 53 of those amendments. (Section II.C.4.) The new 16,000 NOP, like its predecessor, clearly presupposes the operation of the Monterey Amendments. (16,000 Initial Study at pp. 38-39.)

If Castaic rushes to finality by continuing its separate environmental reviews at this stage, without the benefit of DWR's statewide "Monterey Plus" EIR, its perspective would mirror the "provincial experience" criticized in the *Planning and Conservation League* decision. (83 Cal. App. 3d at 918.) Those attempts would also create a substantial risk of final decisions based on local analysis that may well prove inconsistent with DWR's "Monterey Plus" EIR.

The "Lead Agency" Problem

If Castaic continues with these separate environmental reviews without awaiting DWR's assessment in the "Monterey Plus" EIR, it would violate CEQA's lead agency requirement based upon the well-established standards set forth in *Planning and Conservation League v. Department of Water Resources*. The court in that case could hardly have been clearer that DWR is the "state agency charged with the statewide responsibility to build, maintain, and operate" the State Water Project. (*Id.* at p. 906.; see also Wat. Code, §12930, *et seq.*) Finding that DWR was the only entity with the requisite statewide perspective and expertise to serve as lead agency, the court found it "incongruous to assert that any of the regional contractors" could "assume DWR's principal responsibility for managing the SWP." (*Id.*)

Similarly, the court-approved settlement agreement in *Planning and Conservation League* expressly recognizes DWR's duty as "the State agency responsible for administration and operation of the SWP," as well as its continuing obligation to comply with applicable requirements of CEQA and the Water Code. (Agreement, Section X.B.) The transfer guidelines disclosed to contractors under the settlement agreement also recognize the continuing need to comply with all existing legal requirements, including CEQA, and to honor the lead agency principles identified in the Third District's decision in the Monterey Amendments case. (Agreement, Attachment C.)

These principles apply clearly to the proposed permanent transfers of the Table A amounts referenced in the state project contracts, which require DWR's approval and presuppose the application of Monterey. They also concededly require changes in the amount of supplies available to several water agencies, the "location and timing" of project deliveries, and changed utilization of the project's "conveyance and storage facilities." (16,000 Initial Study at p. 39.) The transfers, which may require the fallowing of farmland in agricultural areas and are associated with proposed annexations linked to some of the more controversial development projects in California, demand the statewide authority and experience that only DWR can provide.

Lastly, neither the NOPs' summary references to other project EIRs nor a hypothetical "non-Monterey" analysis of the transfers can substitute for DWR's new assessment of the

california water impact network

Carolee K. Krieger
president

Dorothy Green
secretary

Joan H. Wells
treasurer

Melinda Chouinard
director

Yvon Chouinard
director

Hap Dunning
director

Michael Jackson
director

Huey Johnson
director

Imaging Spence
director

Via facsimile
Jeff Hogan, Associate Planner
Planning and Building Services Department
City of Santa Clarita
23920 Valencia Blvd.
Santa Clarita, CA 91355

May 4, 2004

RE: The River Park Project, Project No. 02-175

Dear Mr. Hogan:

The California Water Impact Network (C-WIN) objects to the proposed River Park Project relying on a contested transfer of 41,000 acre feet (AF) of SWP allocation from the Kern County Water Agency to the Castaic Lake Water Agency (CLWA) as a reliable source of water supply for the proposed River Valley Project. The Draft EIR's assessment of water services and water supply reliability (section 4.8 and appendix 4.8) is not accurate. The analysis is inappropriately relying on the permanence of a non-final and highly contested transfer of 41,000 acre feet of SWP water from the Kern County Water Agency. This 41,000 acre foot transfer continues to be clouded by ongoing litigation and its very validity is one of the subjects of the forthcoming and very complex EIR known as "Monterey Plus", to be prepared by the state Department of Water Resources. 1

C-WIN is currently a plaintiff in several cases against CLWA opposing proposed transfers that depend on the 41,000 AF transfer mentioned above. Any transfer that is dependent on a water source that is not free and clear is not reliable. C-WIN hereby incorporates our January 1, 2004 objection letter to the CLWA on the Negative Declaration for a proposed 35,000 AF transfer for a Groundwater Banking Project that depends on this same 41,000 AF transfer and the C-WIN February 3, 2004 objection letter to the LA County Regional Planning Department on the proposed West Creek Project #98-008 that depends on this same 41,000 AF transfer. We also incorporate our February 26, 2004 objection letter to the County of Los Angeles Regional Planning Department regarding the proposed River Valley Project No.00-196 that also relies on this 41,000 acre foot transfer. 2 3

The River Park Project, along with many other developments in California, is dependent on the analysis by DWR and its State Water Project Delivery Reliability Report, Final 2002. This Reliability Report has been seriously criticized for overstating actual available supply, questionable modeling and simulations, and lack of proper peer review. C-WIN hereby incorporates this Final Report, including all of the published comment letters in Appendix E. Please make a special note of those letters submitted by Senator Michael Machado, Robert Wilkinson, Arve Sjovold, Joan Wells, Dr. Peter Gleick and myself. 4

C-WIN also incorporates "A Strategic Review of CALSIM II and its Use for Water Planning, Management, and Operations in Central California" submitted by the California Bay Delta Authority Science Program Association of Bay Governments, December 4, 2003. This 5

document raises significant questions as to the reliability of DWR's Delivery Reliability Report. 5

Please reject the proposed River Park Project consisting of 1,183 residential units on the grounds that the proposed water supply is inadequate and unsubstantiated at this time. 6

Please send me any relevant documents that may come out in the future regarding this project. 7

C-WIN hereby incorporates all other comments by reference opposing the Draft EIR on the proposed River Park Project. 8

Sincerely,

Carolee K. Krieger

Carolee K. Krieger
President, C-WIN
808 Romero Canyon Road
Santa Barbara, CA 93108
PH: (805) 969-0824

Letter No. 22

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May 3, 2004

RECEIVED
PLANNING DIVISION
MAY 03 2004
PLANNING AND BUILDING SERVICES
CITY OF SANTA CLARITA

City of Santa Clarita
Planning Department
Attn: Jeff Hogan
via hand delivery

Subject: **Comments on Riverpark DEIR SCH 2002091081**

Mr. Hogan and interested parties:

Listed below are comments from the Sierra Club on the DEIR for Riverpark.

Air:

1. p. 2.0-20 and other portions of the DEIR refer to the 1997 AQMP and attainment goals. All portions of the document and analysis should reflect the new AQMP adopted in 2003. An interim plan was adopted in 1999. (1)

2. Footnotes beginning on p. 2.0-33 refer to the 1993 CEQA Handbook from SCAQMD. The CEQA handbook is under revision, and according to the SCAQMD website as of 4/27/04, many portions of it are obsolete. The consultant should verify that the most up to date information for CEQA analysis were obtained from SCAQMD, rather than just relying on the 1993 Handbook. (2)

3. Section 4.4 in general: The air section provides temperature, rainfall, and air quality information based on the entire South Coast Air Basin. News reports throughout the summer of 2003 indicated the Santa Clarita Valley's air is much worse than the whole South Coast Air Basin, which includes coastal areas. Information in this section should match available data for the Santa Clarita valley. (3)

4. Provide details such as from 2003 daily smog maps provided on the SCAQMD website. See attached page for example. (4)

5. P. 4.4-17 paragraph 2 (and other locations in this section, including 4.4-22) refers to SSAB, which appears to be the Salton Sea Air Basin, which is not relevant to this project. As stated above, Santa Clarita Valley specific information should be used. Air quality, wind, temperatures, rainfall, and inversion patterns are significantly different from the entire South Coast Air Basin. (5)

6. p. 4.4-67 refers to mitigations for construction equipment exhaust (aqueous fuels, cooled gas) but it is not clear if there are any other available diesel exhaust controls. The following excerpt covers selective catalytic reduction technology that was retrofitted on existing diesel busses: (6)

Each older diesel bus can spew hundreds of pounds of NOx, soot, and other pollutants into the air each year, but the test results show that number can be reduced to a mere fraction by installing the ADEC System," said Phil Roberts, president of Extengine Transport Systems of Fullerton, California. "Plus, the retrofit system's cost is substantially lower than buying a new diesel or CNG bus. There just aren't many transit bus operators that can afford to replace their diesel-powered fleets in these days of big budget deficits."

The ADEC System is based on Selective Catalytic Reduction (SCR), which has been used for nearly 35 years in controlling NOx emissions from stationary diesel fueled power plants. The System designed for vehicle applications diffuses minute quantities of a reductant into the exhaust stream after combustion has taken place; the small refill tanks are swapped out periodically as needed.

7. The EIR should comment on all available Diesel controls and why they may or may not be feasible. 7

8. p. 4.4-67 to 69 cover mitigations for air emissions during construction. SCAQMD mandated dust control and grading restrictions are not covered and should be addressed in this section. 8

9. p. 4.7-18 The project is NOT consistent with efforts to minimize air quality impacts because it in fact significantly worsens air quality. 9

10. p.4.7-28 to 30, policy 13.5. This project is inconsistent with City policy for protecting residents from air quality concerns because it worsens the air quality and does not mitigate air impacts to less than significant. The statement on p. 4.7-30 that the project is consistent with policy 13.5 is incorrect. . 10

11. Conclusion / Air comment in general: The Santa Clarita Valley has extremely poor air quality. We are opposed to any project, like this one, that will significantly worsen air quality during construction and during the life of the project. The project should be downsized to reduce the negative air impacts. 11

Noise

12. p.4.5-4 provides a Noise Attenuation table showing the sound dampening effects of various buildings. It lists residences as being similar to offices, with windows open and closed. In the appropriate portion of the noise section, it should be mentioned that many of the residences near the project are from the 1960s and 1970s, with only single-paned double hung windows. This type of construction suffers greatly from noise impacts – much more so than a modern office, for example. 12

Biological Impacts

13. p.4.6-60 and biological resources in general. EIR does not provide information on percent of long term success for habitat restoration efforts. For comparison purposes, publicly available studies indicating whether or not habitat restoration is successful for all plant, animal, bird, reptile, etc. occupants of the area over a long term basis. Merely replacing the native plants does not mean a habitat has been restored. 13

14. p. 4.6-83 Typo/editing error on first line. It is unclear what this paragraph was intended to say. 14

15. p. 4.6-106 Condition 4.6-15 and p. 4.7-64, Policy 4.14 consistency finding: A more strongly worded condition should be provided for lighting impacts. Consider specifying the maximum allowable voltage and also the maximum footprint of lighting in commercial, residential, and open areas. There is currently a lot of glare from commercial lighting immediately adjacent to the river, such as in the Pavillion's parking lot on McBean Parkway. There is also significant negative lighting impact from the Pony Fields adjacent to the river. More specifics and lighting restrictions are needed, and should be based on studies that show the levels that do not affect wildlife and do not affect night skies. 15 16

16. p. 4.6-107 Condition 4.6-18 AND ELSEWHERE dust control is mentioned: Dust control measures should meet or exceed those required by SCAQMD regulations, including new Rule 403 requirements effective in 2005. 17

17. p. 4.6-108 We are opposed to the loss of 25.5 acres of SEA and 280 acres of wildlife habitat. 18

18. p. 4.6-121-122. Proposed projects Las Lomas and the development at Placerita/Sierra highway are not mentioned but would also have major impacts on wildlife areas. 19

19. p.4.7-39 presents a misleading analysis of consistency with City General Plan Policy 3.5 for promoting compatible use within SEAs. The project destroys 25.5 acres of SEA and is inconsistent with Policy 3.5. 20

20. Section 4.6 in general. There is no statement as to the likelihood of success of habitat restoration. Revegitation does not mean a habitat has been replaced. 21

21. Section 4.6 and 4.20 in general do not reveal sufficient details on the actual destructiveness of bank stabilization, which is relevant in deciding the impacts of the project. Drawing 4.20-6 should be provided "to scale." The amount of earth disturbance related to bank stabilization should be quantified (in cubic yards and depth of excavation). See attached photos of nearby bank stabilization work. 22 23 24

22. Section 4.6 on bank stabilization and Section 4.2 (drainage) and 4.8 (water) should provide for more permeable paving or open pavers on paved areas and around trees, permeable concrete or natural rip rap with openings for infiltration on bank stabilized areas to allow for slowing of water flows, water infiltration and groundwater recharge. 25

23. Biologic/Bank Stabilization in general: We are opposed to bank stabilization in general and suggest the project be required to meet aggressive setback requirements such as the 300 ft boundary used by the State of New Jersey. See attached information. At minimum, the project should be downsized and moved back from the river to reduce the need for bank stabilization. 26 27

Traffic

24. p. 4.3-26 makes an incorrect assumption that 90 percent of the residential traffic will stay within the Santa Clarita Valley. Calculations recently presented in the Los Angeles Times and Daily News indicated that 75% of commuters leave the Santa Clarita Valley on a daily basis. The EIR should clarify what percent of the households will have drivers using the 5 and 14 freeways. 28

25. This project is a net increase in traffic and a net worsening of conditions of nearby roadways and intersections. We are opposed to this and suggest the project be downsized to reduce the traffic impacts that will add to the currently deplorable conditions on our streets and in the air. 29

Misc. Policy Consistency / General Comments

26. p.4.7-23 to 25, Policy 6.5 and 8.4 and page 4.7-46 to 47, Policy 8.5 and 8.8: Solar energy is deemed not applicable or infeasible due to need for visible frontage for commercial buildings and potential maintenance issues. Solar panels can be installed in a multitude of directions in this area, and brackets are available to tilt panels in appropriate direction regardless of building orientation. Solar uses were not discussed for residential buildings or any potential community pools or park structures. The project proponent need make an effort to provide for solar power since it is indeed feasible and consistent with city policy. 30

27. p.4.7-128 The EIR makes the incorrect statement that the development is consistent with the City General Plan. For reasons discussed elsewhere is this letter, there are numerous cases of 31

inconsistency and the project should be changed appropriately or additional mitigations should be proposed. 31

28. Section 4.9 (solid waste) in general does not mention the possibility and feasibility of either Material Recovery Facilities or Waste to Energy facilities as aspects of solid waste management. Also, educational material related to waste management should include specifics on source reduction, rather than just recycling, and also should outline the nearby landfill situation and linkage between trash generation and landfill, air, and groundwater pollution. 32

29. General Comment: To facilitate public involvement and review, and due to public concerns over protection of air quality and watershed, and due to past agency investigations and/or Notices to Comply being issues to the project applicant over both air quality (2003 – for dust from grading activities along Soledad) and stormwater (2004 – for sediment discharge to river), an EIR condition should be added that all submittals, permit applications, and required reports and filings be copied to the City of Santa Clarita. This should include all written items called out in the EIR even if they are not normally required to be submitted. In addition, advance notice of biologic work should also be available to citizens, along with the results of any findings, on the same time table as notice is given to regulatory agencies and the City. Finally, a compliance checklist or similar list should be completed and updated at least quarterly to demonstrate compliance with all the requirements of the EIR, including such things as providing public notice/informational brochures. Where no frequency for such activities is listed in the EIR, the compliance plan should specify a frequency that meets or exceeds EIR intent. The City of Santa Clarita shall serve as a clearinghouse for these filings to facilitate public review and oversight of compliance. 33 34 35

Water

See also bank stabilization comments.

30. p.4.7-35 and Policy 7.12 – To be consistent with drought-tolerant and native landscaping requirements the project and mitigation measures should specify minimal use of turf. In particular, turf should not be used on medians or other areas not used for recreational purposes. Where turf is specified, it should be the lowest water-use type available. 36

31. p.4.7-70 and consistency with Policy 7.5, along with Section 4.8 in general: There is inadequate water currently in the Santa Clarita Valley to accommodate this project. The UWMP relied on for this project does not adequately disclose reliability problems with the State Water Project, loss of water due to perchlorate pollution, and provides for unfinalized supplies from water transfers. See attached Resolution 2004-3 from an adjacent water purveyor for details on actual supply vs. potential supply. SB610 and 221 require reliance on actual supplies when assessing if there is adequate water for the project. 37

32. p.4.8-1. Comment: The UWMP has an extremely inadequate section on Water Shortage Contingency Planning and by itself should not be construed as adequate protection in times of drought. 38

33. p. 4.8-4 Provide source of data for rainfall table. The average rainfall of 19+ inches appears to possibly be overstated. Provide more recent data than 1998. The California Groundwater Bulletin from DWR states the average rainfall in the basin is 14-16 inches. A letter from Slade to CLWA indicates rainfall of 18 inches. Both of these references are attached. 39

34. Figures 4.8-5 and 4.8-11, 4.8-19 are not legible. 40

35. p. 4.8-12 makes a statement "when CLWA takes its full 95,200 af/yr allocation." p. 4.8-72 and related pages on SWP water are extremely misleading on the subject of reliability. CLWA never has, and never will, be able to take its full allocation. 41,000 af of the 95,200 af has not yet been finalized and is still subject to an EIR process that has not been initiated. The reliability of the SWP is such that as little as 30% of the allocation can be relied on 90% of the time, and 50% of the allocation can be relied on 80% of the time. Due to growth in Southern California, the 2002 DWR Reliability Report states that historic deliveries cannot be used as adequate predictors of future reliability. See attached NCWD Resolution 2004-3 and supporting presentation for more details. 41

36. p. 4.8-16 incorrectly indicates that if SWP water is curtailed, groundwater will be easily used to make up the difference. Several areas of the Santa Clarita Valley run solely on SWP water. In time of curtailment, there is not immediately available water supply for those areas, and emergency measures will have to be taken. 42

37. p. 4.8-17 and p. 4.8-86 to 87 incorrectly imply that CLWA and the purveyors have documented successful implementation of conservation Best Management Practices. In fact, the 2000 UWMP states that many of the Best Management Practices are "not applicable" and no documented evidence in significant progress toward required conservation activities is available. The Best Management Practices require an annual, statistical report of progress toward their goals, and CLWA and the purveyors have not documented progress towards the 14 conservation BMPs listed in the EIR. 43

38. p.4.8-20 and also 4.8-55 to 62. The correct statement regarding the 41,000 af/yr transfer is that the transfer SHALL NOT BE USED FOR PLANNING PURPOSES. The current maximum CLWA "Table A" amount of State Water Project (SWP) water is 95,200 acre-feet per year, but that amount includes 41,000 acre-feet per year allowed on an interim basis under Section II of the "Settlement Agreement by and among Planning and Conservation League, Plumas County Flood Control and Water conservation District, Citizens Planning Association of Santa Barbara County, Inc. and The State of California Department of Water Resources, Central Coast Water Authority, Kern Water Bank Authority and those State Water Project Contractors identified herein." The Settlement Agreement refers to the case Planning and Conservation League, et al. v. Department of Water Resources, 83 Cal. App.4th 892(2000) which resulted in a write of mandate vacating the certification of the 1995 EIR upon which the transfer of the 41,000 acre-feet of water was based; and the new environmental reviews for the final approval of the 41, 000 acre-feet are not yet complete. The settlement agreement states in Section VII (A) that SWP Contractors shall not "approve any new project or activity in reliance on the 1995 EIR, that was not approved, initiated, or implemented prior to March 26, 2001, and the approval, initiation, or implementation of which would require a separate environmental impact report or negative declaration under CEQA". Additionally, it should be noted that the 41,000 af portion of the 95,200 af/yr net allocation does not meet the definition of "available" water under SB610/221 because it is not yet fully permitted due to the pending EIR. 44

39. p. 4.8-23. NCWD recently requested that CLWA provide details on the allocation due to them and to the other water service areas because it is felt that information is relevant to future planning. CLWA has not yet responded. 45

40. p. 4.8-27 and related pages incorrectly overstate the support for the UWMP. NCWD, the only independent water purveyor in the valley, has passed resolution 2004-3 clarifying the water supply numbers are actually currently lower than presented in the UWMP. Of the other purveyors signing on to the 2000 UWMP, Valencia Water Company is owned by the developer of this project – Newhall Land and Farm / Lennar, and Santa Clarita Water Company is owned by 46

CLWA. According to Ken Peterson, General Manager of NCWD, DWR did not formally approve the UWMP, nor did they issue any written letter of completeness. The facts on ownership of Valencia Water and the lack of support by the independent NCWD are relevant and should be presented in the EIR. The EIR incorrectly states that the outcome of litigation against the UWMP will be irrelevant. If successful, the litigation will show that the UWMP overstated water supplies and based on current population and development in the valley, the water supply may not be adequate for this project. 46

41. p. 4.8-35 refers to perennial yield as a sustainable level of pumping that will not produce an undesirable effect, yet it does not mention what the perennial yield figure is. The perennial yield was defined by Slade to be 31,600-32,600 af/yr. This yield has now been reduced due to perchlorate pollution. See also NCWD Resolution 2004-3. 47

42. p.4.8-37, paragraph 1: Wells in the eastern portion of the aquifer have experienced drops in water levels even in years of normal rainfall. Media coverage of dry wells in the Sand Canyon, Canyon Country, and Aqua Dulce areas has been prevalent. The statement that the aquifer has been "operated within it's operational yield" is extremely misleading because, as used by Slade, operational yield is merely the historical range of annual pumping....i.e. by definition it would be impossible to operate outside the operational yield. 48

43. p. 4.8-43 State levels for perchlorate in drinking water have now been established and this should be reflected in the EIR. 49

44. p. 4.8-53, Table 4.8-3, p. 4.8-91 and remainder of section on perchlorate contamination do not provide relevant information on the amount of perchlorate contamination (700-1000 af/yr lost in Alluvial Aquifer, 4000 af/yr lost in the Saugus formation), the status of the characterization of the plume (still uncharacterized,) and the timeline for expected cleanup (action plan due August 2005, cleanup through 2010 per DTSC.) See NCWD Resolution 2004-3 for more details on this basin-wide issue. 50

45. p. 4.8-53 to 55 do not clearly indicate that none of the currently expanding reclaimed water supplies west of the I-5 will be available to the project. 51

46. p. 4.8-64 Table 4.8-6, column 2 is extremely misleading. The actual percent of allocation that was delivered is shown in the last column. Column 2 merely indicates that CLWA matched its request to what it was told it could get, and then that a high percentage of that pre-determined request was granted. 52

47. p.4.8-85 and related pages on desalination fail to mention many notable local failures or rejections of desalination and present a falsely optimistic picture. San Diego and Long Beach both recently rejected desalination projects, and a desalination project in Santa Barbara has reportedly never become operational. This information and the problems with desalination should be provided in the desalination discussion. 53

48. p. 4.8-90, table 4.8-13. The entire amount recycled water shown in the table is not currently available and should be marked accordingly. The bulk of the recycled water is not yet available, and the expanded capacity is not yet build so it should not be included for SB 610/221 assessment purposes. . Also, the table should illustrate the lost supply due to perchlorate contamination and indicate that portion as being "future supply." 54

49. p. 4.8-91. Table 4.8-15 This table gives no indication of when the "planned future supply" will be available, and if it will be available by the time the project is built. This and other tables on supply 55

do not illustrate supplies lost to perchlorate pollution. It should be corrected and the project approval should be based on actual water supply as defined by SB610/221. 55

50. p. 4.8-100, Table 4.8-22 shows a factor of 0.55 af/yr for each single family residence. This factor is extremely low. Usage for landscaped residences typically is up to 1 af per unit. More information should be provided to explain why the water use is expected to be so abnormally low. For example, provide water use for similar size residences on similar size lots in the Santa Clarita valley to demonstrate if this factor is accurate. This comment also applies to all other EIR references to total water demand for the project. 56

51. General water comment: Owing to the widespread media coverage on water shortages in the west and the lack of build-out of the State Water Project, the EIR should go beyond just what the UWMP plan says and consider and present all available information on the water situation. We are concerned about the buildout of our valley exceeding current water supply, and believe projects should not be built until water is on hand to serve them. 57

Visual Impacts

52. p.4.16-11 incorrectly assumes that viewing audiences will only be motorists and thereby minimizes the impact due to the brief duration that visual impacts will be viewed. The length of time of visible is much longer for trail users and pedestrians in the area. 58

53. p.4.16-19 and section 4.16 in general: Gunnite bank stabilization around bridge abutments and trail access points should be textured if possible to minimize impacts of graffiti and cut glare to trail path users. 59

54. p.4.16-34 Specific wording should be added on lighting to insure it is minimal and properly shielded. The specific allowable voltages and the footprint of lighting should be specified. Currently there are serious negative light impacts along the River, such as at the Pavillion's parking lot on McBean and adjacent to the Pony fields. Additional negative impacts should not be allowed. 60 61

Ridgelines

55. p.4.7-37. Policy 2.1. This project is inconsistent with City General Plan Policy 2.1 because it allows the destruction of secondary ridgelines. Analysis on p. 4.7-38 does not present analysis showing this inconsistency. 62

56. We are opposed to any destruction of secondary ridgelines and the use of an "innovative" designation to condone ridgeline impacts. We suggest the project be revised to avoid ridgeline impacts. 63

Please send a copy of the reply to this letter to the Sierra Club office listed on the letterhead. Thank you for your consideration.

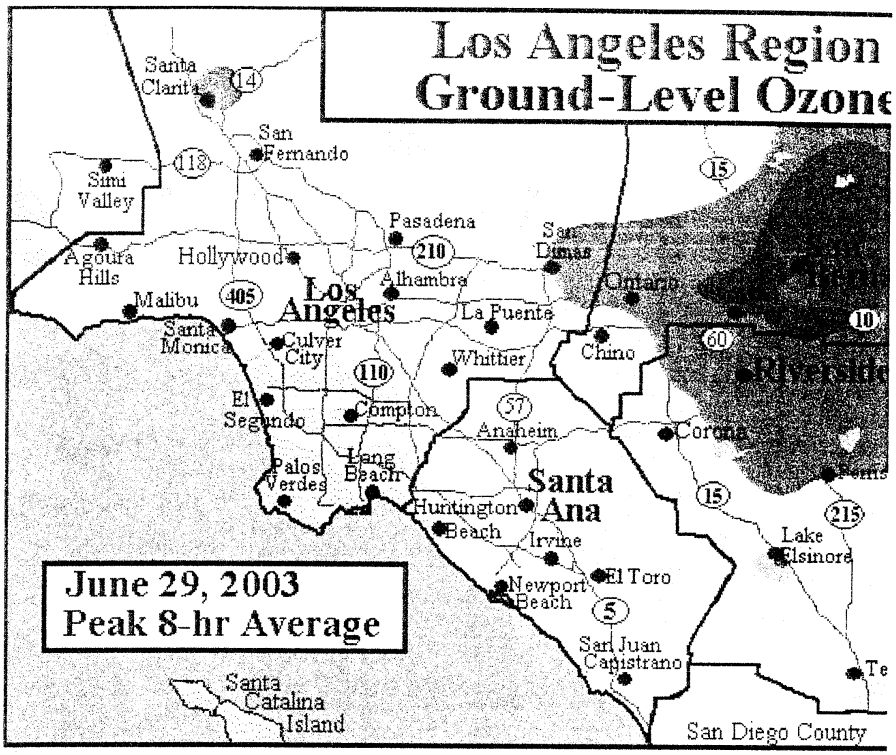
Sincerely,

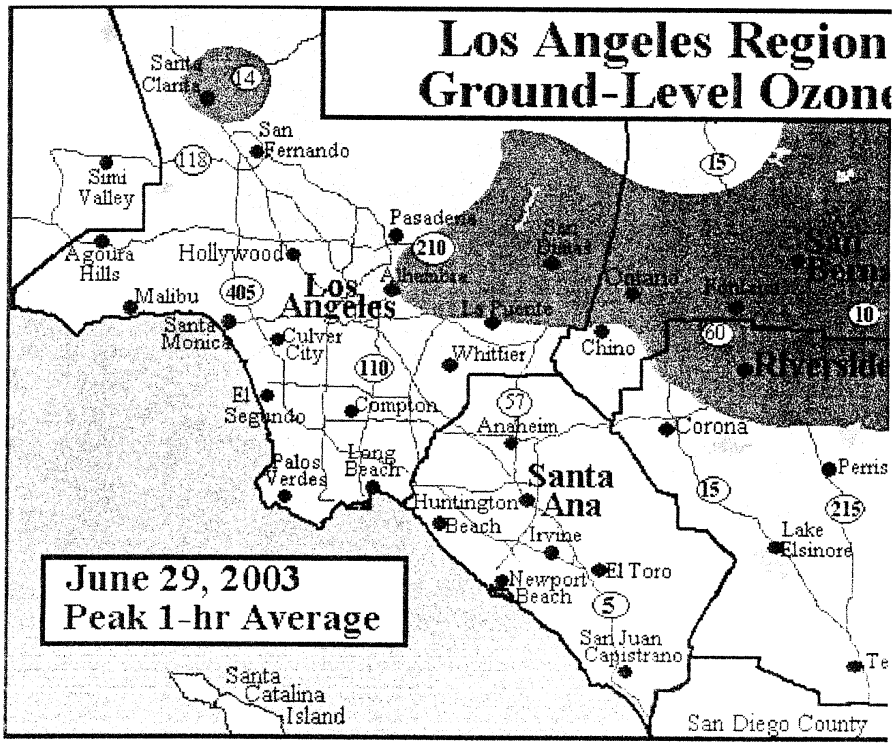
Henry Schultz

List of Attachments on Next Page:

Attachments included:

Ozone Map Sample
Rainfall Alternative Information
NCWD Resolution 2004-3
Presentation for NCWD 2004-3
Bank Stabilization Photos
New Jersey Watershed Protection Information


Los Angeles Region
Ground-Level Ozone
June 29, 2003
Peak 8-hr Average
Santa Clarita
San Fernando
Simi Valley
Agoura Hills
Hollywood
Pasadena
San Dimas
Malibu
Los Angeles
Alhambra
Ontario
La Puente
Santa Monica
Culver City
Whittier
Chino
Riverside
El Segundo
Compton
Anaheim
Corona
Palos Verdes
Long Beach
Santa Ana
Huntington Beach
Irvine
Lake Elsinore
El Toro
Newport Beach
San Juan Capistrano
Santa Catalina Island
San Diego County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Chino
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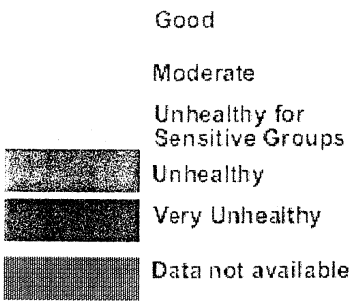
El Segundo
Compton
Anaheim
Corona
Perris
Palos Verdes
Long Beach
Santa Ana
Huntington Beach
Irvine
Lake Elsinore
El Toro
Newport Beach
San Juan Capistrano
Santa Catalina Island
San Diego County

Peak AQI - Ozone



RICHARD C. SLADE & ASSOCIATES LLC
CONSULTING GROUNDWATER GEOLOGISTS

MEMORANDUM

November 16, 2000

To: Mr. Robert Sagehorn
General Manager
Castaic Lake Water Agency
27234 Bouquet Canyon Rd
Santa Clarita 91350-2175

From: Richard C. Slade, Principal Groundwater Geologist
Richard C. Slade & Associates, LLC

Job S2052

Re: Groundwater Extractions,
Alluvial and Saugus Formation Aquifer Systems
Santa Clarita Valley

In response to your request to support Black and Veatch in their preparation of the Urban Water Management Plan, we submit the following work on the alluvial and Saugus Formation aquifer systems in the Santa Clarita Valley:

1. Well Locations

Figure 1 – Map of Wells and Aquifer Systems – illustrates the locations of key municipal-supply water wells and the geologic contacts for the alluvial and Saugus Formation aquifer systems in the Santa Clarita Valley. Specifically denoted on Figure 1 are the locations, municipal-supply ownerships, and well numbers/names for each alluvial-supply well and for each Saugus Formation water well.

2. Rainfall

Long-term rainfall data are available from the Saugus rainfall gage for a period of record of 1883 through 1998. Figure 2 – Total Annual Rainfall – presents a bar chart of the annual rainfall versus time over the period of record. Average annual rainfall over the period of record has been approximately 18 inches as shown on Figure 2.

Historic high rainfall over the period of record was 42.11 inches in 1884, although annual totals in excess of 35 inches were also recorded in 1890, 1978, 1983, and 1998. Historic low rainfall over the period of record was 3.32 inches in 1898, although annual totals less than 8 inches were also recorded in 1885, 1894, 1899, 1900, 1925, 1948, 1950, 1961, 1987, 1990, and 1997.

From these data accumulated rainfall departure values were calculated for each year of rainfall relative to the long-term average and plotted to determine long-term historic trends in rainfall for the region.

6442 COLDWATER CANYON AVE., SUITE 214 • NORTH HOLLYWOOD, CALIFORNIA 91606 • PHONE: (818) 506-0418 • FAX: (818) 506-1343
NAPA VALLEY OFFICE: 176 MAIN ST., SUITE B • ST. HELENA, NAPA VALEY, CALIFORNIA 94574 • TELEPHONE: (707) 963-3914

Santa Clara River Valley Groundwater Basin, Santa Clara River Valley East Subbasin

- Groundwater Basin Number: 4-4.07
- County: Los Angeles
- Surface Area: 66,200 acres (103 square miles)

Basin Boundaries and Hydrology

The Santa Clara River Valley East Subbasin is bordered on the north by the Piru Mountains, on the west by impervious rocks of the Modelo and Saugus Formations and a constriction in the alluvium (DPW 1933), on the south by the Santa Susana Mountains, and on the south and east by the Gabriel Mountains. The surface is drained by the Santa Clara River, Bouquet Creek, and Castaic Creek. Average annual precipitation ranges from 14 to 16 inches.

Hydrogeologic Information

Water Bearing Formations

Groundwater is found in alluvium, terrace deposits, and Saugus Formation. Groundwater in the subbasin is generally unconfined in the alluvium, but may be confined, semi-confined, or unconfined in the Saugus Formation (Slade 2002).

Alluvium. Holocene age alluvium consists of unconsolidated, poorly bedded, poorly sorted to sorted sand, gravel, silt, and clay with cobbles and boulders. These deposits are thickest below the channel of the Santa Clara River and thin laterally away from the channel, and east and west of the community of Acton (Slade 1990; DWR 1993). The maximum reported thickness is 240 feet and specific yield is estimated to range from about 9 to 19 percent (Slade 2002).

Terrace Deposits. Pleistocene age terrace deposits consist of crudely stratified, poorly consolidated, weakly cemented, gravel, sand and silt (Slade 2002). They can be found on the low-lying flanks of the foothills and upper reaches of the Santa Clara River tributaries. Terrace deposits attain a maximum thickness of 200 feet near Saugus, Agua Dulce, and Acton (Slade 1990; DWR 1993). These deposits generally lie above the water table and likely have limited ability to supply groundwater to wells (Slade 2002).

Saugus Formation. The late Pliocene to early Pleistocene age Saugus Formation consists of as much as about 8,500 feet of poorly consolidated, weakly indurated, poorly sorted, sandstone, siltstone, and conglomerate. The lower portion of the Saugus Formation is termed the Sunshine Ranch Member, which consists of as much as 3,500 feet of sand and silt deposited in a brackish marine to terrestrial environment (Slade 2002). Groundwater is not widely produced from this member for municipal and irrigation uses because well yield is typically low, about 100 gpm and the groundwater can be brackish (Slade 2002). The upper member of the Saugus Formation contains lenses of conglomerate and sandstone interbedded with sandy-mudstone deposited in a terrestrial environment (Slade 2002). Wells in the upper member have typically have higher yields, reaching more than 3,000

Final – Approved 1/29/04

RESOLUTION NO. 2004-3
RESOLUTION OF THE BOARD OF DIRECTORS OF
NEWHALL COUNTY WATER DISTRICT
REGARDING WATER SUPPLY AND DEMAND

PREAMBLE

This resolution provides notice to the public that the District intends to protect the rights of its current customers to safe, dependable and adequate domestic water supplies on an ongoing basis and in all water supply assessments and verifications, to utilize the best available knowledge concerning supplies, the current information on which is summarized in the following resolution. After much deliberation, the Board is proposing to adopt the following resolution to send the strongest message possible to the public:

1) That, at least as far as the District is concerned, there is not sufficient current supply of water to meet all current and future demands, especially in times of drought or other emergency;

2) That, as stated in *SCOPE v. County of Los Angeles and Newhall Land and Farming Company* (2003) 106 Cal. App. 4th 715,131 Cal. Rptr 2d 186, the State Water Project (SWP) "entitlements are based on a state water system that has not been completed. There is a vast difference between entitlements and the amount of water that SWP can actually deliver;"

3) That the Urban Water Management Plan 2000 being relied upon in granting entitlements to develop and build is inaccurate in its assessment of current supply; and

4) That in its actions regarding water service, the District will be guided by its decisions as to the available supply based upon the facts set forth in the accompanying resolution.

By adopting this resolution the District is not purporting to amend or change the current regional Urban Water Management Plan 2000 ("UWMP 2000"). By this resolution, however, the District does intend to put members of public and planning agencies with jurisdiction over the Santa Clarita Valley on notice that the continued granting of rights to develop property without proof of adequate water supplies and infrastructure is irresponsible. This resolution also is intended to make the District customers aware of the fact that any loss or damage resulting from city and county planning agencies ignoring the true facts regarding water supply and intentionally allowing additional growth, not supported by adequate supply, will be the responsibility of those planning agencies.

WHEREAS, State Water Project (SWP) water presently constitutes the majority of water served to NCWD customers, and in some areas is the exclusive water available; and

WHEREAS, the remaining water supplies of the District are primarily derived from the extraction of groundwater by wells overlying the Alluvial Aquifer and Saugus Formation; and

WHEREAS, the UWMP 2000 Table 1-4 "Total Existing and Planned Supplies" of water (Exhibit A to this Resolution) is among the factors used by planners to determine whether adequate water supplies exist to meet specific project demands; and

Alluvial Aquifer

WHEREAS, according to the December 10, 2003 CH2M Hill presentation titled "Groundwater Modeling Analysis, Upper Santa Clara River Basin" stated that 700-1000 acre-feet per year of water in the Alluvial Aquifer are currently not available due to Perchlorate pollution; and

WHEREAS, one Santa Clarita Water Company (SCWC) well in the Alluvial Aquifer has been taken out of service due to Perchlorate contamination; and

WHEREAS, the area impacted by the Perchlorate pollution in the Alluvial Aquifer has not been characterized as of the date of this resolution; and

WHEREAS, a Remedial Action Plan for local groundwater affected by Perchlorate pollution is not projected to be complete until August 2005 and certification of final cleanup is not expected until August 2010, according to the November 2003 schedule from the Department of Toxic Substances Control: and

WHEREAS, the December 1986 "Hydrogeologic Investigation: Perennial Yield and Artificial Recharge Potential of the Alluvial Sediments in the Santa Clarita River Valley of Los Angeles County, California" by Richard C. Slade ("Slade") studied 30 wells over a 28-year base period and found a practical perennial yield of 31,600 to 32,600 acre-feet per year from the Alluvial Aquifer before the Perchlorate contamination was found; and

WHEREAS, the 1990 Kennedy/Jenks/Chilton report "Conjunctive Use of the Saugus Aquifer: Castaic Lake Water Agency" stated "from the alluvial aquifer the safe yield is anticipated to be 32,500 acre-feet/year;" and

WHEREAS, many additional public agency reports during the period of 1993-1999 incorporated and referenced the 31,600-32,600 acre-feet per year safe perennial yield figure; and

WHEREAS, the July 2002 Slade report entitled "2001 Update Report: Hydrogeologic Conditions in the Alluvial and Saugus Formation Aquifer Systems" reiterated that perennial yield "represents a long-term average value for annual yield" and introduced the concept of "operational yield" which was defined as "a fluctuating value of pumpage that may be above or below the perennial yield in any given year, and that varies as a function of the availability of other water supplies. The basic intent of the operational yield value is that it should not exceed the perennial yield of the groundwater basin over multi-year wet and dry cycles;" and

WHEREAS, the 2002 Slade report did not quantify in detail a safe yield or a perennial yield, which is defined in the 1986 report as "the quantity of groundwater" that "can be pumped annually without any change in groundwater levels or net change in groundwater in storage over the Base Period" (28 years), and

WHEREAS, the 2002 Slade report did state that the Alluvial Aquifer "on a long-term average basis can be operated at an average pumping volume on the order of 10 percent higher than was reported as a 'practical or perennial yield' in 1986," but the report based that conclusion on "the combination of historical observations and current planning;" and

WHEREAS, the 2002 Slade report referred to "current planning" that included the UWMP 2000 and the future commitment via a MOU between the "Santa Clarita Valley Water Purveyors and the downstream United Water Conservation District to develop a numerical groundwater flow model in order to analyze in greater detail how this aquifer system can be operated;" and

WHEREAS, the numerical flow model is not complete as of the date of this resolution; and

WHEREAS, the 2002 Slade report cited increased recharge from Water Reclamation Plants as a reason for higher potential yields, but the Water Reclamation Plants are not located in areas that would recharge the eastern part of the Alluvial Aquifer system; and

WHEREAS, the 2002 Slade report did not address other factors such as loss of recharge areas due to development and increased flood control channeling; and

WHEREAS, the December 1986 Slade report (referenced above) stated "... urbanization has had a rather startling impact on the availability of areas for recharge.... All recharge to the aquifer system does not occur in the low-flow channels of the river and its tributaries, but infiltrates over much of the alluviated areas which are not within the flood channels of the Santa Clara River system. Paving of these areas has, and will continue to reduce the net effective area for natural recharge to the underlying groundwater system;" and

WHEREAS, the Alluvial Aquifer has been pumped above the safe perennial yield since 1994; and

WHEREAS, the alluvial groundwater level in the eastern basin has been dropping, which may be caused by weather patterns, increased development, increased pumping, or a combination of the foregoing and possibly other factors; and

Saugus Formation

WHEREAS, the December 2003 CH2M Hill presentation (referenced above) stated that 4,000 acre-feet/year of water in the Saugus Formation are currently not available due to Perchlorate pollution; and

WHEREAS, NCWD Well #11, two SCWC wells, and one Valencia Water Company well in the Saugus Formation have been taken out of service due to Perchlorate pollution; and

WHEREAS, the Winter 2003 "Water Currents" newsletter published by Castaic Lake Water Agency states that the four closed Saugus Formation wells have a combined maximum production of 14,500 acre-feet per year; and

WHEREAS, the area impacted by the Perchlorate pollution in the Saugus Formation has not been characterized as of the date of this resolution; and

WHEREAS, a Remedial Action plan for cleanup of Perchlorate in local groundwater is not projected to be complete until August 2005 and certification of final cleanup is not expected until August 2010, according to the November 2003 schedule from the Department of Toxic Substances Control; and

Recycled Water

WHEREAS, Table 1-4 (Exhibit A attached) references recycled water supply amounts up to 17,000 acre-feet per year, but existing facilities only supply 1700 acre-feet per year and new facilities are not planned or budgeted in the NCWD area; and

WHEREAS, the UWMP 2000 states that the Saugus Water Reclamation Plant (WRP) cannot be expanded and both the Valencia WRP and the proposed Newhall Ranch WRP exist on the western edge of the CLWA service area, limiting the areas to which recycled water could be practically provided; and

WHEREAS, to serve the eastern portion of the Valley with reclaimed water, a new WRP would be required; and

WHEREAS, the technical and economic feasibility determination for the potential recycled water use in the CLWA service area has not yet been finalized; and

SWP Water

WHEREAS, the current maximum CLWA "Table A" entitlement to State Water Project (SWP) water is 95,200 acre-feet per year; and

WHEREAS, according to the 2002 State Water Delivery Reliability Report, 90% of the time deliveries can be at or above 30% of the full Table A amount, and 80% of the time deliveries can be at or above 50% of the Table A amount; and

WHEREAS, the reliability criteria established in Chapter 4.0 of UWMP 2000 states that "this criterion requires water supply to be sufficient to meet projected demands 90 percent of the time;" and

WHEREAS, that, as stated in *SCOPE v. County of Los Angeles and Newhall Land and Farming Company* (2003) 106 Cal. App. 4th 715,131 Cal. Rptr 2d 186, the State Water Project (SWP) "entitlements are based on a state water system that has not been completed" and "there is a vast difference between entitlements and the amount of water that SWP can actually deliver;" and

WHEREAS, SWP water deliveries could be interrupted in an emergency; and

Un-Finalized Water Sources

WHEREAS, Table 1-4 (Exhibit A attached) includes supply numbers for new wells in the Saugus Formation, water banking/conjunctive-use, water transfers, and desalination, yet no finalized, approved plans or budgets for these items exist in the CLWA or NCWD area; and

WHEREAS, many of these supplemental supply projects would require extensive infrastructure improvements; and

WHEREAS, California Water Code Division 6 Part 2.6 Chapter 1 (the Urban Water Management Planning Act) Section 10631(c) states that the preparer of an UWMP shall "for any water source that may not be available at a consistent level of use, given specific legal, environmental, water quality, or climactic factors, describe plans to supplement or replace that source with alternative sources or water demand management measures, to the extent practicable" and the UWMP 2000 does not contain detailed information to that end for the projected, but not implemented, new Saugus wells, water banking/conjunctive-use, water transfers, desalination, and recycled water sources; and

WHEREAS, without specific perennial yield figures for the Saugus aquifer, new wells in the Saugus aquifer can not be assumed to provide additional water, but rather only additional pumping points for the same total bank of water from which the current Saugus wells draw.

NOW, THEREFORE, BE IT RESOLVED that, based on the foregoing recitals, the NCWD Board of Directors resolves and makes the following determinations, reserving to itself the right to make changes as new facts, data or studies justify in the opinion of NCWD Board of Directors; for planning purposes, NCWD no longer has confidence in the water supply and availability numbers in Table 1-4 (and identical tables) in the UWMP 2000;

FURTHER RESOLVED, that in response to any inquiry from cities, county, developers or the public generally NCWD will provide the water supply and availability statistics as presented in Exhibit B attached to this resolution.

FURTHER RESOLVED, that the supply from the alluvial aquifer will be based on the perennial yield of 31,600-32,600 acre feet/year as established in the 1986 Slade report. Because the perennial yield is a long-term average based on wet and dry years, no differentiation will be made between wet and dry year. Pending characterization, containment and/or remediation, the current supply will be reduced by the amount of Perchlorate contaminated water (700-1000 acre feet/year at current estimate.) The contaminated water will be counted as "unfinalized supply," with restoration of water supply counted incrementally as remediation to drinking water standards occurs and individual well production is restored with DHS and DTSC approval.

FURTHER RESOLVED, that any increase in pumping not offset by imported supplies or other factors will be supported only for short terms, unless future comprehensive groundwater studies clarify that longer term pumping that pushes averages above the perennial yield will not harm the aquifer.

FURTHER RESOLVED that the numbers over the perennial yield values for the Alluvial Aquifer will not be used for any planning purposes other than emergency planning or when necessary to meet short term demands of existing customers.

FURTHER RESOLVED, pending characterization, containment and/or remediation; that the current supply (7,500-15,000) from the Saugus Formation will be reduced by the amount of Perchlorate-contaminated water, which is currently estimated at between 4,000-14,500 acre-ft. The contaminated water will be counted as "unfinalized supply," with restoration of water supply counted incrementally as remediation to drinking water standards occurs and individual well production is restored with DHS and DTSC approval.

FURTHER RESOLVED, that new columns for "unfinalized additional supply" were added to the planning table in Exhibit B to differentiate between water that is available and water that is only in the conceptual planning stages. Unfinalized additional supply means that conceptual plans have been made, but no budget, approved capital project, or contractual construction or purchase deadline exists. These supplies may be constrained, limited, or voided by economic or legal issues. Water from the UWMP 2000 categories of "Saugus formation new wells," "recycled water," "water

banking/conjunctive use," "water transfers" and "desalination" have been moved to the unfinalized supply columns until they are finalized.

FURTHER RESOLVED, that potential water from new Saugus Formation wells will not be considered new "finalized supply" until it can be shown that the formation has a perennial yield above the total supply specified in Exhibit B for the existing Saugus wells (7,500-15,000 acre-ft/year.)

FURTHER RESOLVED, that until adequate assurances exist, water in the "unfinalized additional supply" column of Exhibit B will not be considered as available.

PASSED AND ADOPTED this ____day of _____, 2004, by the Board of Directors of the Newhall County Water District.

_____
Lynne Plambeck, President of the
Board of Directors of the
NEWHALL COUNTY WATER DISTRICT
ATTEST:

_____
Kenneth J. Petersen, General Manager
NEWHALL COUNTY WATER DISTRICT

Attach: Exhibit A
Exhibit B

STATE OF CALIFORNIA)
) ss.
COUNTY OF LOS ANGELES)

I, KARIN J. RUSSELL, Secretary of the Newhall County Water District, DO HEREBY CERTIFY that the foregoing is a full, true and correct copy of Resolution No. 2004-3 of the Board of Directors of Newhall County Water District adopted at a Special Meeting held on _____, 2004 and that the same has not been amended or repealed.

_____
Karin J. Russell, Secretary,
NEWHALL COUNTY WATER DISTRICT

DATED: _____, 2004

Exhibit A

Table 1-4
Total Existing and Planned Supplies
(acre-feet per year)

Source	Average/Normal Year	Dry-year
Local Supplies		
Groundwater		
Alluvial Aquifer	30,000-40,000	30,000-35,000
Saugus Formation	7,500-15,000	11,000-15,000
Saugus Formation (new wells)*	--	10,000-20,000
Stormwater*	--	--
Recycled Water*	1,700-17,000	1,700-17,000
Imported Supplies		
SWP Supplies	56,800-95,200	37,900-75,800
Water Banking/conjunctive-use*	--	105,000
Water Transfers*	5,200-8,700	3,500-6,900
Desalination*	2,000-5,000	2,000-5,000
Total Supplies	**103,200-180,900**	**201,100-279,700**

*Planned programs for future implementation.

Source: UWMP 2000

Exhibit A to NCWD Resolution 2004-3
Inital: _____
Dated:_____

Exhibit B

Total Existing and Planned Supplies
(acre-feet per year unless noted)

	Current and Finalized Future Supply				Existing Backup Dry Year Supply[8]		Unfinalized Additional Supply[1]			
	Average/Normal Year		Dry Year[2]				Average/Normal Year		Dry Year[2]	
Source	**Range[9]**	**Average**	**Range[9]**	**Average**		*Source*	*Range[9]*	*Average*	*Range[9]*	*Average*
Local Supply						*Local Supply*				
Groundwater						*Groundwater*				
Alluvial Aquifer	**30,750-31,750[3]**	**31,250**	**30,750-31,750[3]**	**31,250**		*Alluvial Aquifer*	*700-1000[4]*	*850*	*700-1000[4]*	*850*
Saugus Formation	**0-5,750[5]**	**2,875**	**0-5,750[5]**	**2,875**		*Saugus Formation*	*4,000-14,500[4]*	*9,250*	*4,000-14,500[4]*	*9,250*
Saugus Formation (new wells)						*Saugus Formation (new wells)*	*10,000-20,000[6]*	*15,000*	*10,000-20,000[6]*	*15,000*
Stormwater						*Stormwater*				
Recycled Water *(NOT potable)*	**1,700**	**1,700**	**1,700**	**1,700**		*Recycled Water (NOT potable)*	*15,300*	*15,300*	*15,300*	*15,300*
Imported Supply						*Imported Supply*				
SWP	**28,560-47,600[7]**	**38,080**	**28,560-47,600[7]**	**38,080**		*SWP*	*0-57,120*	*28,560*	*0-57,120*	*28,560*
Water Banking/conjunctive use					21000 af	*Water Banking/conjunctive use*			*0-84,000*	*42,000*
Water Transfers						*Water Transfers*	*5,200-8,700*	*6,950*	*3,500-6,900*	*5,200*
Desalination						*Desalinization*	*2,000-5,000*	*3,500*	*2,000-5,000*	*3,500*
Total Supply		**73,905**		**73,905**	21000 acre-feet (total, not per year)	*Total Additional Supply incl. Non-Potable only if all Future Projects Approved and Built[9]*		*79,410*		*119,660*
Total Potable Supply		**72,205**		**72,205**	21000 acre-feet (total, not per year)	*Total Additional Potable Supply only if all Future Projects Approved and Built[9]*		*64,110*		*104,360*

Note: All numbers are from UWMP 2000 unless otherwise noted below.

[1]Unfinalized additional supply means that conceptual plans have been made, but no budget, approved capital project, or contractual construction or purchase deadline exists. These supplies may be constrained or limited by economic or legal issues.

[2]Dry Year means a short term period during drought. Supplies listed in these columns should be viewed as contingency planning only and are not considered sustainable on a long-term basis.

[3] Perennial yield (31,600-32,600 af/yr per Slade, 1986) less average of range of loss (850 af/yr) due to perchlorate contamination.

[4] Estimated amount currently lost to perchlorate contamination per 12/2003 CH2MHill presentation and Winter 2003 CLWA "Water Currents."

[5] UWMP 2000-stated supply (7,500-15,000 af/yr based on operational yield) less average of range of loss (9,250 af/yr) from perchlorate contamination.

[6] New Saugus wells will not yield additional water supply beyond the perennial yield of the formation, which has not been quantified.

[7] Per 2002 DWR Reliability Report, 90% of the time deliveries can be made at or above 30% of the full Table A amount, and 80% of the time deliveries can be at or above 50% of the Table A amount. The range in the current supply column reflects 80-90% reliability and in some cases water deliveries will be lower than what is shown. Our current full Table A amount is 95,200 af/yr. 95,200 af/yr minus the average of the "current supply" range (38,080) is shown as unfinalized additional supply. SWP deliveries vary annually.

[8] An additional one-time stored excess of 21,000 acre-ft/ currently exists in a water bank for dry year supply. This amount is not to be counted when planning for future projects. This amount may not reoccur in the future, and is required by court settlements to be provided to current users only. The UWMP 2000 estimated a total of 105,000 acre-feet potential exists for water banking. The remainder (105,000 minus 21,000) is listed in the unfinalized supply column on this table.

[9] Where ranges exist, the midpoint of the range was used for calculating totals.

Initial _____ Date:_____

NCWD

Proposed Resolution 2004-3

Summary & Issues

29 January, 2004

Why are we here?

"For the past three decades, California's population has severely outstripped the state's ability to store water." Maurice Roos, chief hydrologist for the California Department of Water Resources, claimed three years ago that the state lacked sufficient storage capacity to get through two consecutive dry years. Even with continuing conservation efforts and occasional wet Sierra Nevada Winters, experts agree that California will face chronic water shortages in the near future unless something changes." – LA Times, 1/25/04

Introduction

- Overview of Planning and Water
- NCWD's Mission
- Our Concern
- The Numbers
- What's Next

Planning and Water

- Water Districts inform planners how much water supply exists
- State rules (SB610 and SB 221) require planning for large projects be done with "real" water – not conceptual plans
  - Water supplies must be verified in the approval process
  - Water supplies must be available before construction starts
- Approval/denial of projects rests with Planning Agencies, not Water District
- Water District supplies water - <u>if</u> water is available

NCWD Mission Is To...

- Vigorously protect the water supplies of the District - and its customers - from contamination or degradation, including diminished supply,
- Inform the residents of our District about issues and plans which affect the District,
- Adopt strategies and plans to accommodate an expanded customer base, either through the expansion of District territory or the acceptance of new users within District territory,
- Keep other agencies apprised of the ability and plans of the District to accept growth,
- Conduct our business in an open, and honest, and ethical manner. (Above are relevant excerpts from longer mission statement posted online.)

Our Concern:
Real
or
Imaginary
Water?

What is "Real" Water?

- Water Code Section 10910 and Government Code 66473.7 (larger projects)
- Existing water supply...shall be demonstrated by...
  - Written contracts or other proof of entitlement
  - Copies of capital outlay program for financing
  - Permits for construction of infrastructure associated with delivering the water supply
  - Necessary regulatory approvals

Urban Water Management Plan 2000

Table 1-4
Total Existing and Planned Supplies
(acre-feet per year)

Source	Average/Normal Year	Dry-year
Local Supplies		
Groundwater		
Alluvial Aquifer	30,000-40,000	30,000-35,000
Saugus Formation	7,500-15,000	11,000-15,000
Saugus Formation (new wells)*	--	10,000-20,000
Stormwater*	--	--
Recycled Water*	1,700-17,000	1,700-17,000
Imported Supplies		
SWP Supplies	56,800-95,200	37,900-75,800
Water Banking/conjunctive-use*	–	105,000
Water Transfers*	5,200-8,700	3,500-6,900
Desalination*	2,000-5,000	2,000-5,000
Total Supplies	**103,200-180,900**	**201,100-279,700**

*Planned programs for future implementation.

NCWD Resolution 2004-3

	Current and Finalized Future Supply			
	Average/Normal Year		Dry Year[2]	
Source	**Range[9]**	**Average**	**Range[9]**	**Average**
Local Supply				
Groundwater				
Alluvial Aquifer	**30,750-31,750 [3]**	**31,250**	**30,750-31,750 [3]**	**31,250**
Saugus Formation	**0-5,750 [5]**	**2,875**	**0-5,750 [5]**	**2,875**
Saugus Formation (new wells)				
Stormwater				
Recycled Water *(NOT potable)*	**1,700**	**1,700**	**1,700**	**1,700**
Imported Supply				
SWP	**28,560 [7]**	**28,560**	**28,560 [7]**	**28,560**
Water Banking/conjunctive use				
Water Transfers				
Desalination				
Total Supply [8]		**64,385**		**64,385**
Total Potable Supply [8]		**62,685**		**62,685**

- Current and finalized future supply

NCWD Resolution 2004-3

	Unfinalized Additional Supply [1]			
	Average/Normal Year		Dry Year [2]	
Source	Range [9]	Average	Range [9]	Average
Local Supply				
Groundwater				
Alluvial Aquifer	700-1000 [4]	850	700-1000 [4]	850
Saugus Formation	4,000-14,500 [4]	9,250	4,000-14,500 [4]	9,250
Saugus Formation (new wells)	10,000-20,000 [6]	15,000	10,000-20,000 [6]	15,000
Stormwater				
Recycled Water (NOT potable)	15,300	15,300	15,300	15,300
Imported Supply				
SWP	0-66,640	33,320	0-66,640	33,320
Water Banking/conjunctive use			0-84,000	42,000
Water Transfers	5,200-8,700	6,950	3,500-6,900	5,200
Desalinization	2,000-5,000	3,500	2,000-5,000	3,500
Total Additional Supply incl. Non-Potable only if all Future Projects Approved and Built [9]		84,170		124,420
Total Additional Potable Supply only if all Future Projects Approved and Built [9]		68,870		109,120

- Unfinalized additional supply

Alluvial Groundwater

- Alluvial Aquifer is groundwater in our "shallow" water table, just below ground
- Alluvial Groundwater is about half our current, available water supply (NCWD Exhibit B)
- NCWD Clarifications
  - Alluvial groundwater pumping changed to reflect perennial (safe, long-term average) yield
  - Perchlorate contaminated water not counted until after cleanup

Safe Pumping Levels

- Operational Yield Vs. Perennial Yield?
- Work to Date by Richard Slade, hydrologist
  - 1986 Report covered perennial yield
  - 2002 Report addressed operational yield

Perennial Yield

- 1986 Slade report definition:
  - "the quantity of groundwater" that "can be pumped annually without any change in groundwater levels or net change in groundwater in storage over the base period" (28 years)

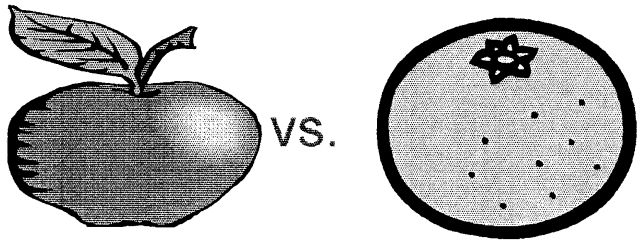
Operational Yield

- 2002 Slade Report definition:
  - "a fluctuating value of pumpage that may be above or below the perennial yield in any given year, and that varies as a function of the availability of other water supplies. The basic intent of the operational yield value is that it should not exceed the perennial yield of the groundwater basin over multi-year wet and dry cycles."

Operational Vs. Perennial Yield

- Operational Yield = actual pumping levels throughout history
  - 20,000 – 45,000 acre-feet per year
  - Still needs to average out to be perennial yield on long term basis, per Slade's 2002 Report
- Perennial Yield = sustainable, long term average that should be maintained

  -31,600-32,600 acre-feet per year per 1986 Slade Report



Future Studies Coming

- New groundwater model under development
  - NCWD to be more involved to ensure end results include "safe" pumping levels for long term
- For now, best safe long-term average is perennial yield

Water Lost to Perchlorate

Groundwater Modeling Analysis
Upper Santa Clara River Basin

Restoring Impacted Water Supplies
Near Whittaker-Bermite

December 10, 2003

presented by

John Porcello/CH2M HILL

→

Restoring lost water supplies

- Saugus: 4,000 AF/yr
- Alluvium: 700-1,000 AF/yr

Perchlorate Treatment Schedule

- Extent of contamination not yet determined
- Per November 2003 DTSC timetable
  - Expect Remedial Action (Cleanup) Plan in August 2005
  - Expect final cleanup in August 2010
- Schedule will vary as study work continues and agencies review and decide on actions they will approve

Alluvial Groundwater Summary

- UWMP
  - Pumping of 30,000-40,0000 acre-feet per year based on operational yield
  - Does not point out necessary qualifier that pumping needs to average out to perennial yield on long term basis
  - Does not account for perchlorate
- NCWD will clarify the following
  - Pumping long term goal is perennial yield (31,600-32,600)
  - Subtract out perchlorate contamination
  - Perchlorate contaminated water will be "counted" as wells brought back on line

Saugus Formation Groundwater

- Groundwater in the Saugus Formation is our "deep" water table. It is located below and is mostly separate from the Alluvial groundwater
- Saugus Groundwater is about 5 % of our current, available water supply (NCWD Exhibit B)
- NCWD Clarifications
  - Perchlorate contaminated water not counted until after cleanup

Water Lost to Perchlorate

Groundwater Modeling Analysis
Upper Santa Clara River Basin

Restoring Impacted Water Supplies
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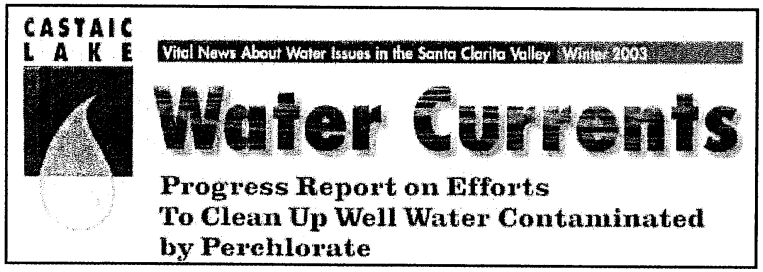

CASTAIC LAKE

Vital News About Water Issues in the Santa Clarita Valley Winter 2003

Water Currents

Progress Report on Efforts To Clean Up Well Water Contaminated by Perchlorate

→

"The four affected Saugus Aquifer wells have a combined capacity of 9000 gallons per minute or about 14,500 acre-feet a year."

Saugus Groundwater Summary

- UWMP
  - Pumping of 7,500-15,000 acre-feet per year based on operational yield
  - No perennial yield numbers available
- NCWD will clarify the following
  - Subtract out perchlorate contamination
  - Perchlorate contaminated water will be "counted" as wells brought back on line
- Additional note
  - Hopeful that new studies will verify total pumping that can be done safely in the Saugus aquifer (possible increase)

State Water Project Water

- Water coming from Northern California in Aqueduct/Pipes
- State Water Project (SWP) water is about 44 % of our current, available water supply (NCWD Exhibit B)
- NCWD Clarifications
  - SWP water supply is highly variable
  - In some areas, SWP water is sole supply, so taking risks is a gamble

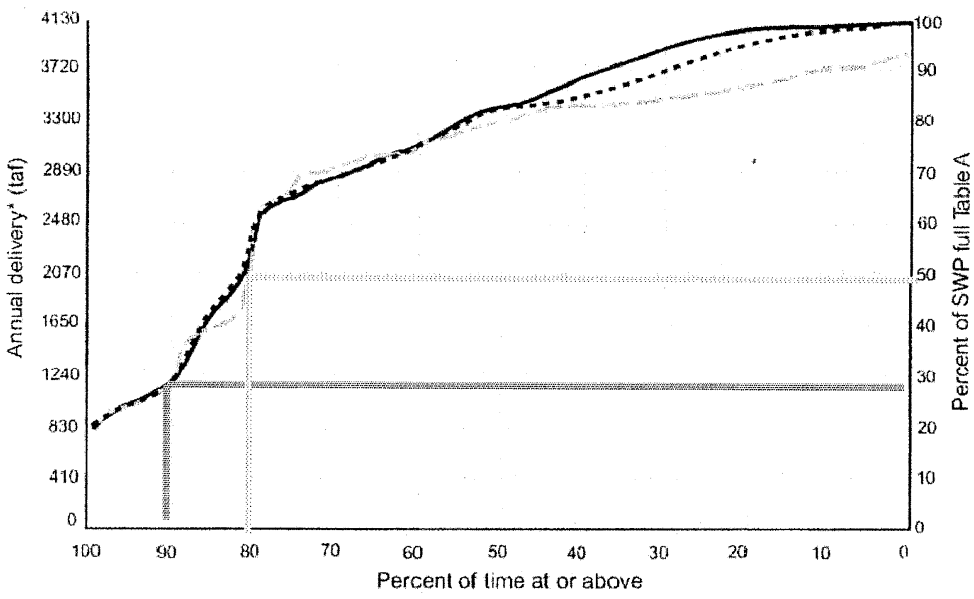
State Water Allocations

- "Table A" or "Maximum Allocation"
- Used to decide who gets what share of the water
  - Percentage of total water in State
  - Same percentage is amount we contribute to paying for system
- What we could get under optimum conditions
  - If all users of SWP water ask for their "maximum allocation" no one will be able to get it
  - System not currently able to deliver total amount of water allocated to everyone
  - Weather conditions and demand limits supply

Our Current Allocation

- Current Allocation is 95,200 acre-feet per year
- We have NEVER gotten 95,200 acre-feet per year
- In the last reporting year we got 64,771 acre-feet
  - 24,000 sent to water bank. After allowances made, this results in a one-time lump sum of 21,000 acre-feet of water limited to use for CURRENT residents only
  - Remaining 40,000+ acre-feet were used

State Water Reliability

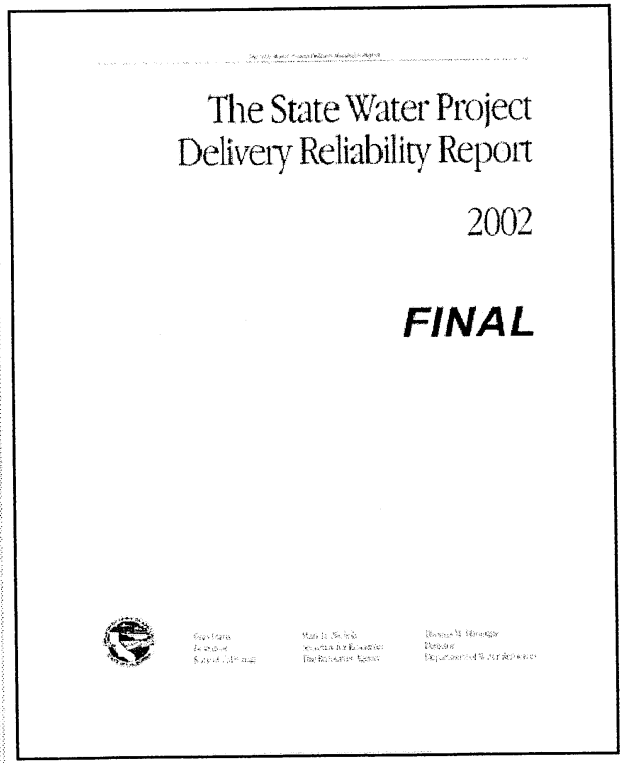


* Annual delivery rounded to nearest 10,000 acre-feet

Figure 1—SWP Delta delivery probability (Table A)

- 90 % of the time we can expect to be at or above 30% of our State allotment
- 80% of the time we can expect to be at or above 50% of our allotment

Past State Water Deliveries Can't Predict Future



The State Water Project
Delivery Reliability Report

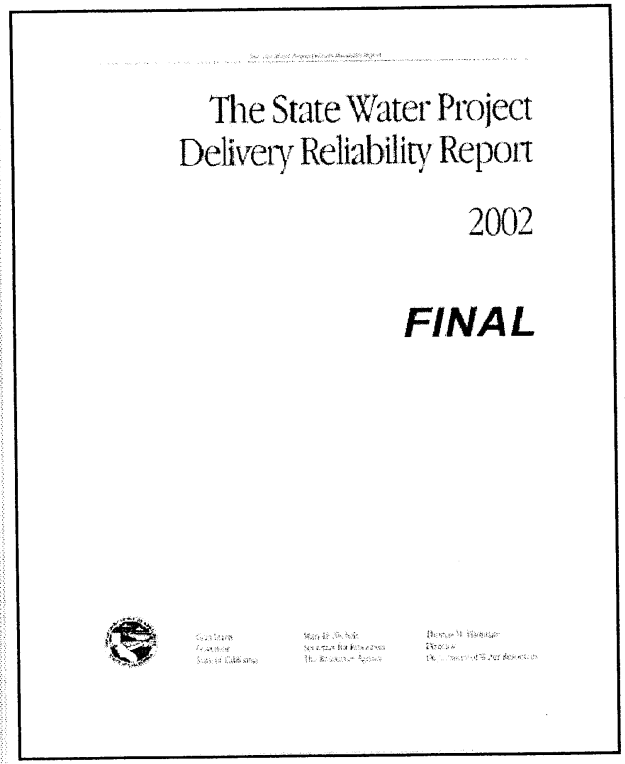
2002

FINAL

Past Deliveries Cannot Accurately Predict Future Deliveries

It is worthwhile to note that actual, historical water deliveries cannot be used with a significant degree of certainty to predict what water deliveries will be. As discussed earlier, there are continual, significant changes over time in the determinants of water delivery: changes in water storage and delivery facilities, in water use by others, in water demand, and in the regulatory constraints on the use of facilities for the delivery of water. Given the very significant historical changes that have occurred, past deliveries are not necessarily good predictors of current deliveries, much less of future deliveries.

Allocation isn't a Guarantee


The State Water Project
Delivery Reliability Report

2002

FINAL

The amounts listed in Table A cannot be viewed as an indication of the SWP water delivery reliability, nor should these amounts be used to support an expectation that a certain amount of water will be delivered to a contractor in any particular time span. Table A is simply a tool for apportioning available supply and cost obligations under the contract.

Interruptions Cripple SWP Supply

- Earthquake or other actions could cause breaks in pipelines
- Droughts can reduce supply to below even 30%
  - In 1991, we got less than 30% of our allocation at the time
- SWP water is not steady state – may be cut off for parts of a year

Legal Actions Confirm Problems

- as stated in 2003 decision 106 Cal.App. 4th 715,131 Cal.Rptr 2d 186, the State Water Project (SWP) "entitlements are based on a state water system that has not been completed. There is a vast difference between entitlements and the amount of water that SWP can actually deliver"

Choices in Reliability Planning

- UWMP uses reliability of "90% of time"
- Some other NCWD reports use reliability of "80% of the time" which predicts a minimum of 50% of our supply (47,600 acre-feet/year)
- If less reliable water is counted on, be warned that we will need tough rationing and conservation in droughts or emergencies

State Water Project Summary

- UWMP
  - Lists range of 37,900-95,200 acre-feet per year (varies in wet and dry years)
  - This is 40-100% of our maximum
- NCWD will clarify the following
  - Use numbers predicted by 2002 State Reliability Report
  - The minimum expected 90% of the time is 28,560 acre-feet per year
  - Draft resolution matches UWMP reliability criteria of "90% of time"

Recycled Water

- Recycled Water is water treated in Wastewater Treatment Plants.
- Treated water is usually clean enough for landscaping and other purposes, but cannot be used to drink. It is "non-potable" water.
- Recycled Water less than 3% of our current, available water supply (NCWD Exhibit B)
- NCWD Clarifications
  - No projects underway to increase supply

Recycled Water Summary

- UWMP
  - Table lists range of 1,700-17,000 acre-feet per year
  - Has note indicating "future implementation"
- NCWD will clarify the following
  - Current supply is 1,700 acre-feet per year
  - Increasing supply will require large budget and long-term planning
    - New or upgraded facilities
    - Extensive delivery system since can't mix with other water in current pipes
    - Likely not feasible in all areas, particularly on east side of valley
  - Supply will be counted as "finalized" when projects underway

Water Banking/Conjunctive Use

- Water Banking relates to contracts to "store" water for use when other supplies run low
- Currently we have one-time (not annual) bank amount of 21,000 acre feet for current users (not for new projects)
- Water Banking is 0% of our recurring annual supply (NCWD Exhibit B)
- NCWD Clarifications
  - Exhibit B and UWMP table is supposed to indicate "acre-feet per year"
  - Current bank is one-time, not annual
  - No projects underway to increase supply

Water Banking Summary

- UWMP
  - Table lists total of 105,000 acre-feet per year as dry year supply
  - Has note indicating "future implementation"
- NCWD will clarify the following
  - Current supply is one-time lump sum of 21,000 acre-feet per year
    - For current users only
    - Not for planning purposes
    - Not an "annual" amount
- Future banking will depend on many factors so is "unfinalized"
  - Arrangement/location to "store" water
  - Availability of "extra" water
  - Legal and environmental clearances

Water Transfers

- Water Transfers are deals to trade or buy other water
- Currently we have no water transfers finalized
- Water Transfers are 0% of our current annual supply (NCWD Exhibit B)
- NCWD Clarifications
  - No transfers underway

Water Transfer Summary

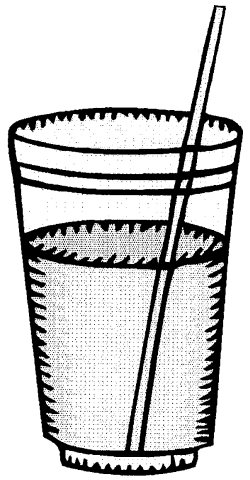
- UWMP
  - Table lists range of 3,500-8,700 acre-feet per year from water transfers, varying with wet and dry years
  - Has note indicating "future implementation"
- NCWD will clarify the following
  - No current transfers exist
  - Future transfers will depend on many factors so supply is "unfinalized"
    - Will not necessarily recur from year to year
    - Legal and environmental clearances

New Saugus Wells

- Concept is that more wells can be put into Saugus Formation
- New Saugus wells are 0% of our current annual supply (NCWD Exhibit B)
- NCWD Clarifications
  - No project underway
  - Unclear if more wells mean more water

New Saugus Well Summary

- UWMP
  - Table lists range of 10,000-20,000 acre-feet per year in dry years
  - Has note indicating "future implementation"
- NCWD will clarify the following
  - No project underway
  - Costly, requires new piping too
  - New wells aren't necessarily more water –
    - More straws in same milkshake
    - Total supply from Saugus not fully studied



Desalination

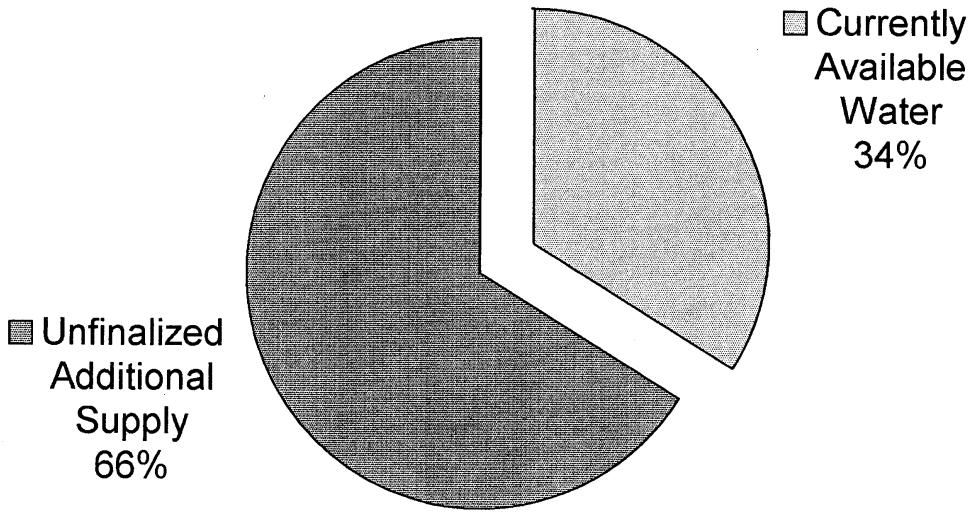
- Desalination will likely entail a deal to participate in building a desalination plant in a coastal community in trade for us getting part of their other water (such as State water)
- Desalination is 0% of our current annual supply (NCWD Exhibit B)
- NCWD Clarifications
  - No project budgeted, planned, or underway

Desalination Summary

- UWMP
  - Table lists range of 2,000-5,000 acre-feet per year from desalination
  - Has note indicating "future implementation"
- NCWD will clarify the following
  - No project is underway
  - Future project will depend on many factors so is "unfinalized"
    - Costly, unproven technology
      - Santa Barbara plant had troubles
    - Legal and environmental clearances

NCWD Summary of Current Supply

Current Vs. Unfinalized Water



Note: Percentages are approximations based on averages from NCWD Resolution Exhibit B

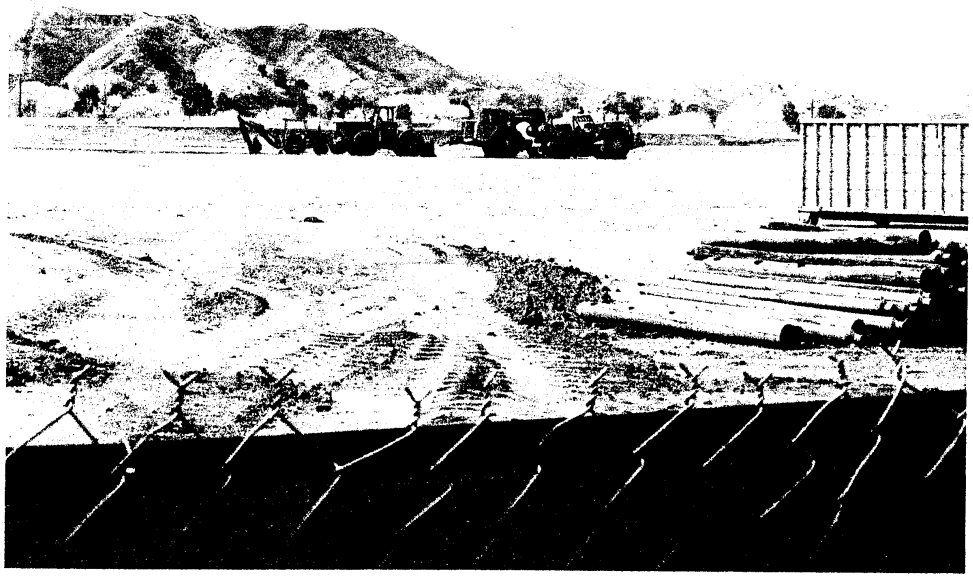
What's Next?

- Numbers to be provided to planners and the public
- Implementation plans to be developed
  - Potentially includes better conservation measures so growth can be accommodated with less demand on water system
  - Schools will be served no matter what, based on legislation/laws
- Water in "Current Supply" columns will increase as justified by new data, new finalized supply, and ongoing perchlorate cleanup
- Note that "new" sources of water likely will cost more

We WON'T Gamble with Our Customer's Water Supply!

New flood control channel installed as part of NLF/Lennar bank stabilization, west of bowling alley along Soledad. 3/1/04.

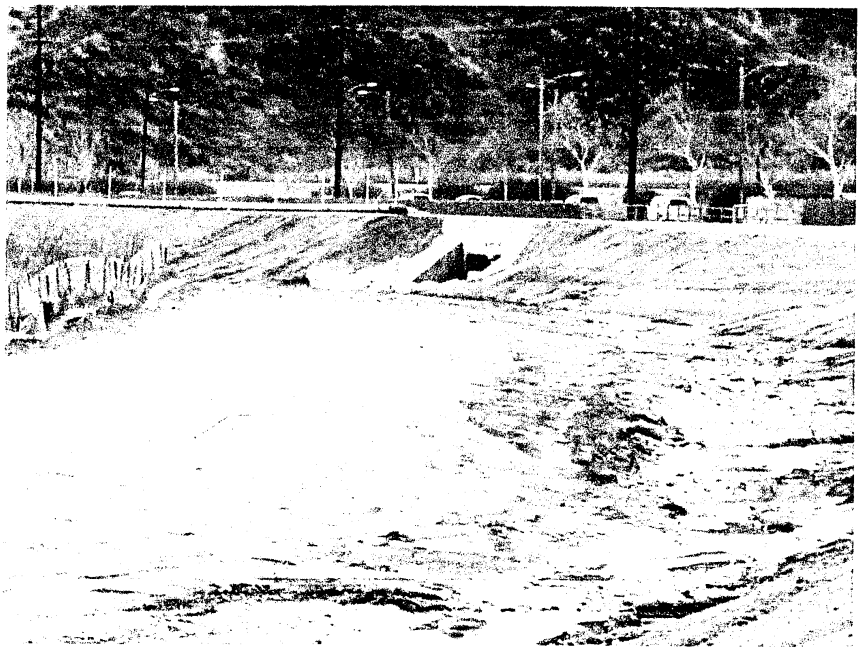
Lennar/NLF bank stabilization project west of bowling alley. 3/1/04.



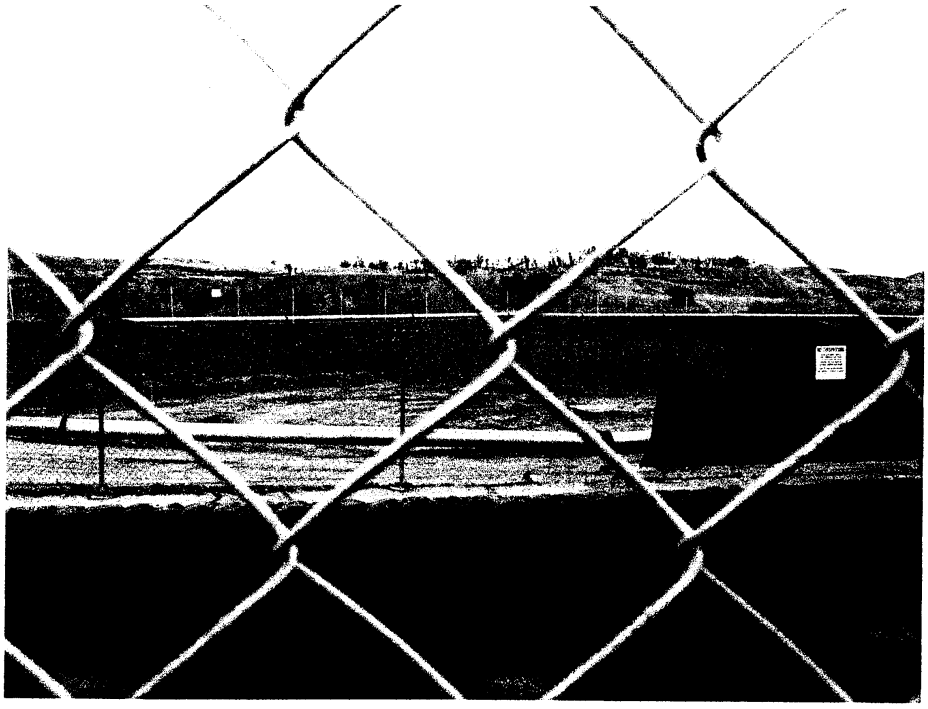
This huge area was natural river/floodplain, just west of bowling alley along Soledad. 3/1/04.

Bank stabilization near bowling alley, along Soledad. Lennar/NLF 3/1/04.

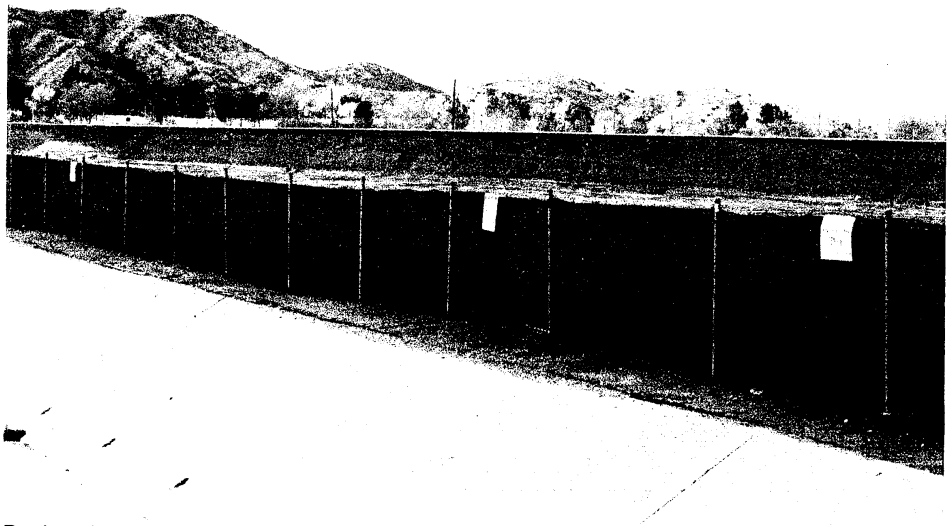
This area was floodplain/riverbed BELOW street level before grading began. Note roof of pickup truck barely visible on street. Estimate height 5-10 feet above street level, 15-20 feet above original natural height?



New culvert and banking west of stabilization area along Soledad. Note elevation of natural riverbed to left, in comparison to street level and in comparison to height of new pad installed to east. 3/1/04.



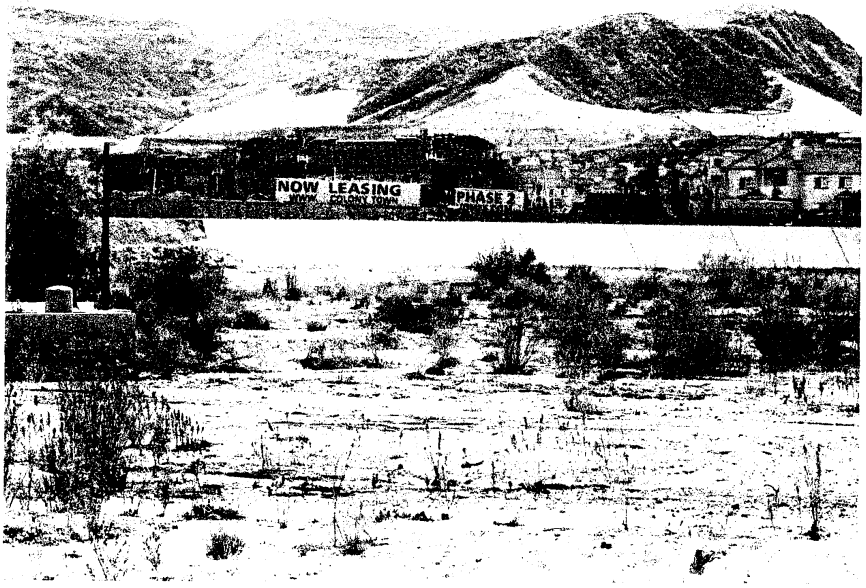
Bank stabilization near bowling alley, along Soledad. Lennar/NLF 3/1/04.



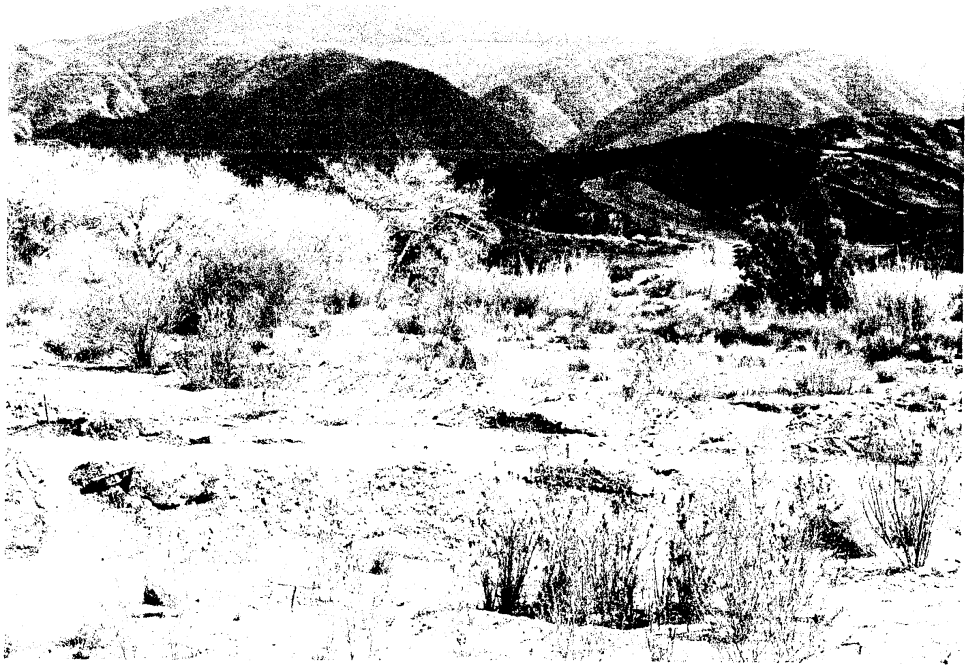
Bank stabilization near bowling alley, along Soledad. Lennar/NLF 3/1/04.

Natural river along Soledad Canyon Rd. 3/1/04

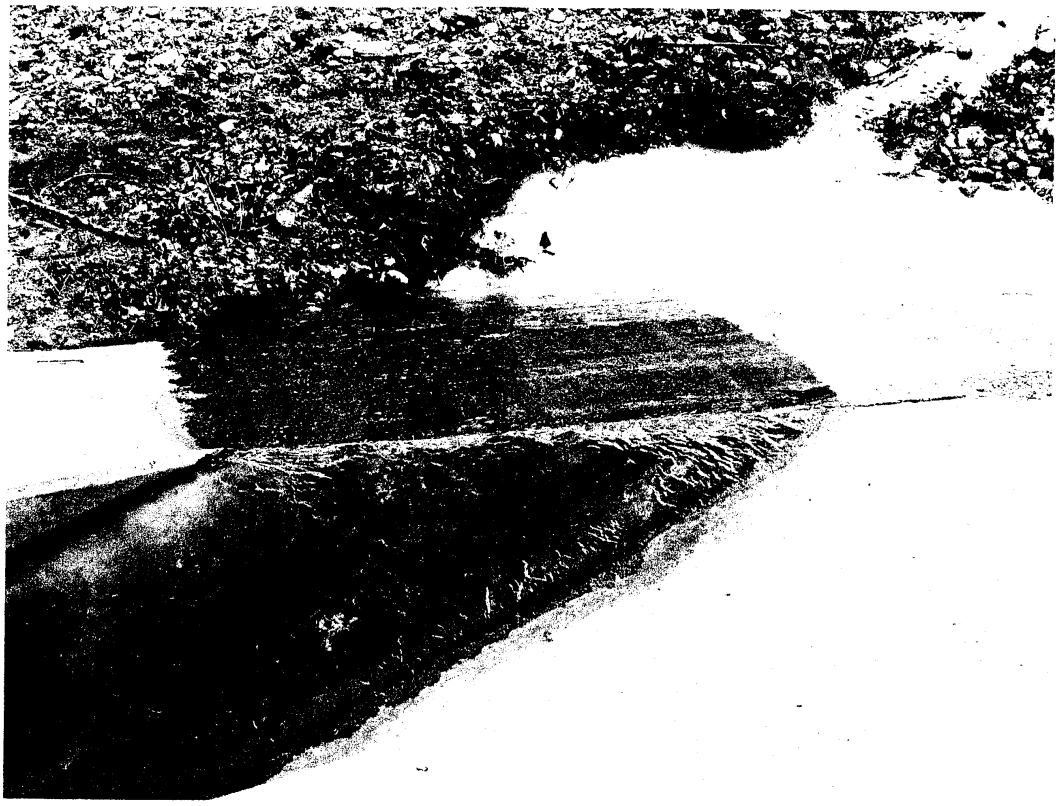
Pony fields N. of Valencia Blvd. 3/1/04. Bank stabilization?? excavation 10-20 feet east of river bank. NLF/Lennar.



Homes built on bank stabilized pads in riverbed east of 14 freeway near btwn Via Princessa and Lost Canyon, as viewed from bike path under 14 freeway.



Natural River north of "Colony Town" east of 14 freeway, along bike path, south of Lost Canyon.



Contamination from condo complex entering river at drain outfall at Nugget Drive off Soledad Canyon Road, east of Sierra Highway. 3/1/04. Reported to City Environmental Services. Resolution unknown.

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State of New Jersey James E. McGreevey, Governor

Press Releases

PO BOX 004
TRENTON, NJ 08625

Contact: Micah Rasmussen
609-777-2600

RELEASE: January 05, 2004

Previous Screen

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Governor McGreevey Announces Most Comprehensive Water Protections in the Nation

300-foot buffer will apply to more than 6,000 miles of waterways

(CLOSTER)— In his strongest move to date to protect New Jersey's drinking water and to stop sprawl, Governor James E. McGreevey today announced the formal adoption of two sets of stormwater rules that protect water quality and preserve the integrity of drinking water supplies statewide.

The rules will minimize the impact hundreds of new development projects, encouraging recharge of rainwater into the ground and controlling development within a 300-foot buffer around more than 6,000 miles of high quality waterways.

"As we stand here today, special interests are asking the courts to overturn our previous actions to protect drinking water and open space. Our actions today demonstrate that we will not back down—our efforts to protect drinking water will only get stronger, not weaker.

"These stormwater rules are the most comprehensive set of water protections in the nation—no other state has required statewide 300-foot buffers around its high quality waters. They will prove to be a critical tool in our fight against sprawl."

Standing near the banks of the Anderson Brook, one of the tributaries of the Oradell Reservoir, the Governor used today's event to highlight a local development project that will have to be extensively redesigned as a result of the stormwater rules in order to prevent the degradation of this tributary to an important drinking water resource. Joining him at the announcement were Department of Environmental Protection (DEP) Commissioner Bradley M. Campbell, Closter Mayor Fred Pitofsky, Rivervale Mayor George Paschalis, and local and statewide environmental advocates.

National and state environmental leaders have hailed New Jersey's new stormwater rules as among the most comprehensive and most protective of any state's rules. While at least six

other states provide for protective buffers and groundwater recharge in certain areas, no other state calls for a 300-foot buffer around all of its C1 waterbodies and no net loss of recharge into underground aquifers.

"This is the most important and significant action taken yet to protect New Jersey's water since the passage of the Freshwater Wetlands Act in 1988," said Jeff Tittel, Executive Director of the New Jersey Chapter of the Sierra Club. "These stormwater rules prove that Governor McGreevey is a national leader in protecting water quality and stopping sprawl. This is a huge victory for our environment."

"With these rules, Governor McGreevey has taken the single, largest step of any state in the nation to protect drinking water, the environment and future generations," said Maya von Rossum, the Delaware River Keeper. "He has set the standard for the rest of the nation to follow. I can think of no better way to bring in the New Year than with these new protections."

The first set of adopted rules updates the state's Stormwater Management Rules for the first time since their original adoption in 1983. The rules provide the basis for municipalities to develop stormwater management plans and also will affect requirements of several state-issued permits such as freshwater wetlands and stream encroachment permits.

The second set of adopted stormwater rules requires municipalities, large public complexes such as hospitals, and highway systems to develop stormwater management programs through the New Jersey Pollutant Discharge Elimination System (NJPDES) permit program. The new NJDPES permits address requirements of the federally mandated Environmental Protection Agency (EPA) Phase II stormwater rules published in December 1999.

One of the most significant provisions of the new rules is the requirement of a 300-foot buffer minimizing new development to protect Category One (C1) waterbodies. C1 protection is the highest form of water quality protection in the state, preventing any measurable deterioration in the existing water quality. The buffers will significantly protect critical drinking water and sensitive ecological resources from degradation by additional pollutants.

The rules provide for some flexibility on the size of the buffers in areas where stormwater management plans have been approved and for minor disturbances around existing development within the 300-foot buffer. The rules also apply the buffer to tributaries of C1 waterbodies within the immediate watershed boundary that are not themselves designated C1 waterbodies.

In total, the buffers will impact 6,093 stream miles – including the 3,307 miles of currently designated C1 rivers and streams and an additional 2,786 miles of non-C1 tributaries to C1 streams.

Since taking office, Governor McGreevey has made C1 protection of important drinking water resources one of his top environmental priorities. Last Earth Day, he designated nine reservoirs totaling more than 7,000 acres and serving over 3.5 million residents as C1 waterbodies. He has also proposed an additional 500 miles of ecologically sensitive streams and rivers for C1 designation.

The Stormwater Management Rules also stress performance standards for ground water

recharge to increase the integrity of the state's aquifers. They establish a goal of maintaining 100 percent of the average annual groundwater recharge for new development projects, a major initiative toward mitigating future droughts and flooding.

In addition to recharge standards, the regulations also stress water quality controls, such as best management practices to reduce runoff of total suspended solids (TSS) by 80 percent and other pollutants up to the maximum extent feasible. The rules promote smart growth techniques, stressing low impact site designs for stormwater management systems that maintain natural vegetation and drainage and reduce clear-cutting and the unnecessary loss of trees. Many of the rules are waived and streamlined in urban areas, however, promoting urban redevelopment while still protecting the environment.

"Some studies estimate that more than half of existing surface water pollution in the state is attributable to non-point source pollution and stormwater runoff," said Commissioner Campbell. "By enacting these rules, Governor McGreevey has kept his promise to take a firm stand against sprawl, calling for common sense strategies to ensure that pollution from development and from everyday litter does not poison our water supplies."

The DEP will issue the new NJDPES permits required by the second set of stormwater rules for all municipalities; large public complexes such as colleges, prisons, and hospitals; and highway systems operated by counties and other government agencies, such as the NJ Department of Transportation and the South Jersey Transportation Authority. All permittees will be required to develop and to adopt stormwater management programs for new development.

In addition, permittees will have to develop public education programs and waste disposal controls for existing developed areas. These regulations affecting existing development address a significant oversight in current regulations that only focus on new development.

One of the most important focuses of this set of stormwater rules is its emphasis on public education. Few people realize the impact of everyday litter on their sources of drinking water. By promoting public awareness campaigns, these rules will help citizens realize that every person plays a critical role in keeping our drinking water safe and clean.

The programs will emphasize common sense steps toward reducing non-point source pollution, such as discouraging unnecessary applications of pesticides, requiring proper disposal of yard and pet waste, retrofitting of storm sewer grates and improving municipal maintenance yard management.

The state developed both sets of stormwater control measures with significant input from regulated communities, including the New Jersey League of Municipalities, the New Jersey County Planners Association, and the Association of New Jersey Environmental Commissions. Developers, mayors, and environmental groups were also heavily consulted in the rulemaking process.

Both sets of rules were originally proposed on January 6, 2003 and were subject to an extensive public comment period. The adopted rules will appear in the February 2, 2004 *New Jersey Register*.

5/3/04

From: Santa Clarita Oak Conservancy
P.O. Box 800520
Santa Clarita, CA 91380-0520

To: Mr. Jeff Hogan, Associate Planner
City of Santa Clarita
23920 Valencia Boulevard, Suite 300
Santa Clarita, CA 91355-2196

Re: Draft Environmental Impact Report for
Riverpark
Project Master Case Nos.02-175
Oak Tree Permit 02-025
State Clearinghouse No. 2002091081

Dear Mr. Hogan:

Thank you for the opportunity to comment on Oak Tree Permit 02-025.

The Santa Clarita Oak Conservancy is excited that the applicant is "saving" 72 of the oak trees on the site especially the rare and single "Blue Oak". 1

However the Conservancy is concerned that the project will remove fifteen of the 87 oak trees on the site and encroach on three more. The problem to save the remaining trees comes from the fact that 5.5 million cubic yards of grading in a flood plain is planned on the site causing the removal of the 15 trees. The 7,500 linear feet of bank and erosion "protection" will prevent the remaining oak tree to be able to absorb the water from the Santa Clara River. As the rapid approach of the Sudden Oak Death that has killed ten of thousands of California oak trees and has arrived in Los Angeles County we must not allow the removal of even one healthy oak tree. Much like the infestion of the Bark Beetle that was "successful" because of lack of water to the pine trees, denying water to oak trees in the flood plain will create a hazardous environment not only to the oak trees on this project but jeopardizing the remaining oak trees in the Santa Clarita Valley to SOD. Please refer to the Pest Alert by the United States Department of Agriculture report # NA-PR-06-01. 2

Please also refer to the "Understanding Our Oak Trees" published by the City of Santa Clarita: "Oak tree have value beyond their aesthetic appeal. They give shade and help reduce air conditioning needs. Their root systems help control soil erosion. They provide shelter from the blistering summer heat and moisture to our atmosphere. ...They represent the best physical examples of our heritage and outdate most of the history of our country. Just think—some of these trees were already 150 years old when George Washington, the Father of our Country was born. They are certainly worthy of our care. Age alone with alterations of the natural environment, such as falling water table, loss of leaf litter normally found 3 4

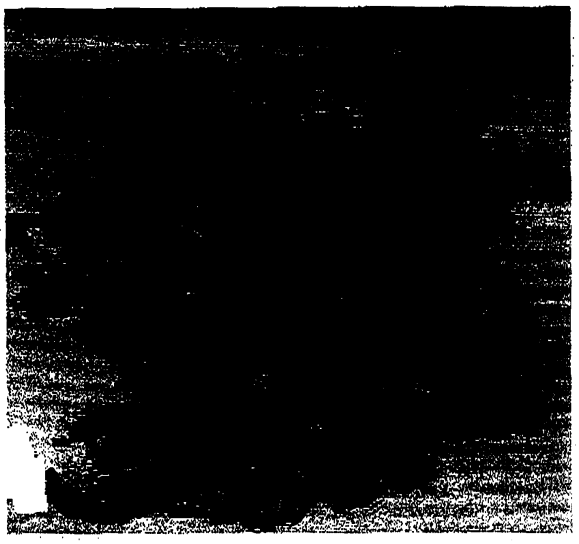
beneath their canopy, and the past agronomic uses of the land, (and now SOD) have weakened the oak and have made them dependent upon proper care..."

4

It is important that the City of Santa Clarita review alternatives that will allow the Cultural and natural resources to remain on this site. The best use would be to continue the Center Park down to the river.

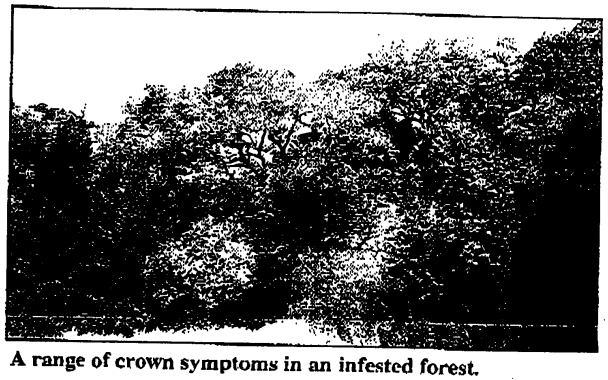
We look forward to continued comments and discussions on this project.

Cynthia Harris
Vice President
Santa Clarita Oak Conservancy



Infected coast live oaks sometimes gradually lose their leaves and fade out slowly. If bleeding oaks and leaf spots on bay laurel or other symptomatic hosts are adjacent to one another, the presence of *Phytophthora ramorum* is likely. Laboratory confirmation is needed, however, since many other pathogens cause similar symptoms.

Leaf and twig dieback symptoms in tanoak.



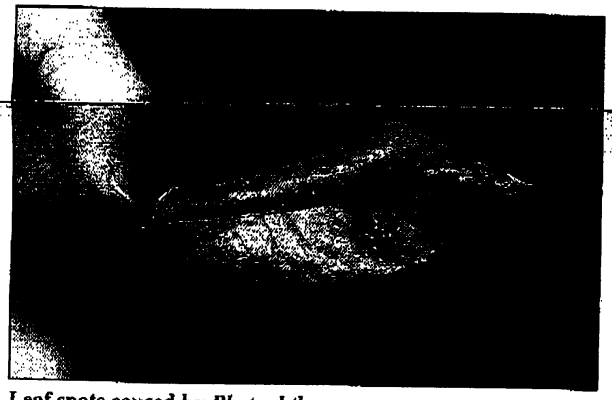
A range of crown symptoms in an infested forest.

On small tanoaks (less than 4 inches diameter at breast height) the first symptom may be a wilting of branch tips. The branch dies back and resprouts with multiple shoots. Eventually, the entire tree dies and resprouts from the base, but the new shoots die back as well.

The pathogen has been linked to tree mortality only for oaks in the red oak group and the related tanoak and madrone. It causes leaf spots and twig dieback in bay laurel and several other species, including rhododendron and huckleberry. Spore levels may build up rapidly on these hosts creating a reservoir of inoculum.

A common saprophytic fungus (*Hypoxylon thouarsianum*), ambrosia beetles (*Monarthrum* spp.), bark beetles (*Pseudopityophthorus* spp.), and other organisms often colonize infected trees.

Other Oak Disorders with Similar Symptoms: Sudden Oak Death can be confused with many other disorders of oaks. Oaks defoliated by insects may appear dead, but leaves usually reflush later in the season. Canker rots, slime flux, leaf scorch, root diseases, freeze damage, herbicide injury, and other ailments may be confused with this disease.



Leaf spots caused by *Phytophthora ramorum* on rhododendron. Leaf spot margins caused by this *Phytophthora* are often fuzzy, rather than sharply defined.

Other insects and fungi colonize diseased trees. These organisms attack trees weakened by many other agents and are not specific to trees killed by *Phytopthora ramorum*.

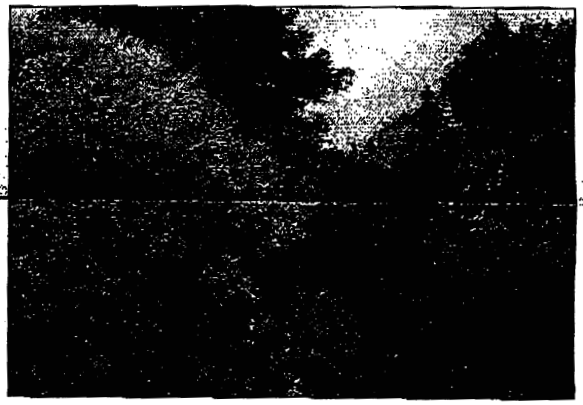
Prepared by:
Susan Frankel, USDA Forest Service, Pacific Southwest Region, 1323 Club Drive, Vallejo, CA 94592

Pest Alert

United States
Department of Agriculture
Forest Service
State and Private Forestry
Northeastern Area
NA-PR-06-01
Revised January 2002

Sudden Oak Death Caused by a New Species, *Phytophthora ramorum*

Tens of thousands of tanoak (*Lithocarpus densiflorus*), coast live oak (*Quercus agrifolia*), California black oak (*Quercus kelloggii*), Shreve oak (*Quercus parvula* var. *shrevei*), and madrone (*Arbutus menziesii*) have been killed by a newly identified species, *Phytophthora ramorum*, which causes Sudden Oak Death. Sudden Oak Death was first reported in 1995 in central coastal California. The pathogen also infects rhododendrons (*Rhododendron* spp.), huckleberry (*Vaccinium ovatum*), bay laurel (*Umbellularia californica*), California buckeye (*Aesculus californica*), and other tree and shrub species, but usually causes only leaf spots and twig dieback on these hosts. The host list is expected to expand as Dr. David Rizzo, University of California at Davis, and Dr. Matteo Garbelotto, University of California at Berkeley, continue their investigations of affected ecosystems.

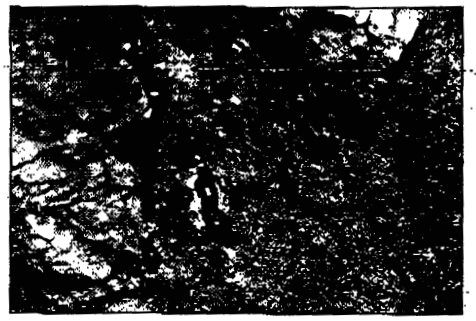


Tree mortality caused by *Phytophthora ramorum*.

The disease is widespread in coastal California and is found commonly in two forest types: in the understory of coast redwood (*Sequoia sempervirens*) forests on tanoak; and in coastal evergreen forests on oaks, madrone (*Arbutus manziesii*), bay laurel, and other species. In California, Southern Oak Death has been confirmed in scattered locations along the Pacific coast north of Monterey County. The pathogen has also been found on dying tanoak in coastal southern Oregon, just north of the California border. Marin and Santa Cruz counties are heavily infested, and dead and dying trees are common in the wildland interface in backyards, parks, and open-space greenbelts.

Symptoms and Impact: On oaks and tanoak, cankers are formed on the stems. Cankered trees may survive for one to several years, but once crown dieback begins, leaves often turn from green to pale yellow to brown within a few weeks.

Black or reddish ooze often bleeds from the cankers, staining the bark, as well as killing the mosses that grow on it. Bleeding ooze may be difficult to see if it has dried or has been washed off by rain.



Bleeding ooze from a canker on an oak.

Necrotic bark tissues surrounded by black zone lines are present under affected bark. Because these symptoms can also be caused by other *Phytophthora* species, laboratory tests must be done to confirm pathogen identity.

Black zone lines under diseased bark in oak.

To report infected trees or to receive additional information, please contact your State or Federal forest health specialist. On the Internet, visit the Sudden Oak Death home page at: www.suddenoakdeath.org. To distinguish this new disease from diseases with similar appearance, visit www.na.fs.fed.us/SOD

Photo Credits: Pavel Svihra, University of California Cooperative Extension, Marin County; Tim Tidwell, California Department of Food and Agriculture; David Rizzo, University of California at Davis; Steve Oak, USDA Forest S...

Letter No. 20

Ventura Coastkeeper

RECEIVED
PLANNING DIVISION
MAY 0 3 2004
PLANNING AND BUILDING SERVICES
CITY OF SANTA CLARITA

May 3, 2004

City of Santa Clarita
Planning Commission

Via Fax: (661) 259-8125

RE: Newhall Land and Farming Company EIR SCH #2001091081 (River Park)

Dear Commissioners:

Thank you for the opportunity to comment on the EIR for the proposed project known as River Park. Ventura Coastkeeper is a non-profit organization dedicated to the protection of coastal and riparian waterways and habitat, of which the Santa Clara River is one of the most important. The spadefoot toad, the unarmored threespine stickleback, you are witnessing today these species going extinct, and yet nothing is being done. This cannot be allowed to happen. 1

The cumulative impacts of development in the Santa Clara River floodplain exacerbate the decline of these species. The Clean Water Act and the Endangered Species Act mandate that this habitat be protected. Least Damaging Practicable Alternatives analysis and an adequate Cumulative Impacts analysis must conducted. This EIR, however, is woefully inadequate. The EIR should include a detailed analysis of the proposed activity's cumulative impacts in light of the impacts of the Natural River Management Plan (NRMP) on the Santa Clara River and its tributaries. In particular, the EIR should evaluate the cumulative loss of riparian and aquatic habitat, elimination of wildlife movement corridors, increased human disturbance, and loss of biological diversity and productivity, among other factors. 2 3

Moreover, the NRMP, far from serving as a model for a permit for the Newhall Ranch project, provides many useful lessons as to what to avoid or do differently in permitting for the River Park project. Specific observations of failings of the Natural River Management Plan include:

- Failed habitat mitigation (e.g. dead or dying riparian vegetation in mitigation areas) with no effective enforcement mechanism to address failure.
- Dead or dying riparian habitat associated with loss of surface and/or subsurface flows with no adequate mechanism to address this problem. 4
- The NRMP has facilitated vehicular access to and human disturbance of the River Rampant and uncontrolled off-road vehicle use in the Santa Clara River, including areas containing unarmored threespine stickleback and arroyo toad habitat. Shooting of birds and wildlife by children from adjacent urban development is prevalent.
- Biological diversity has been greatly diminished. A recent UCLA report noted "marked reductions in total macroinvertebrate taxa and sensitive taxa, and increases in dominant

3600 South Harbor Blvd., Ste 222 • Oxnard, CA 93035 • Phone (805) 382-4540 • Fax (805) 382-4541

Ventura Coastkeeper

taxa (frequently an indicator of stressed conditions) compared to reference sites" in the Santa Clara River below the Valencia treatment plant. 4

The Santa Clara River is southern California's last truly dynamic big river. It boasts one of the largest watersheds in the South Coast region at 1,600 miles, is the longest free-flowing river in southern California, and is the only one that extends from the desert to the coast. Unfortunately, the Santa Clara River and its tributaries are within one of the most rapidly urbanizing watersheds in the state of California, making the area a high priority for monitoring and enforcing environmental regulations. Extensive and uncontrolled urbanization will degrade this pristine river environment. Any alteration of this important area must be approached with the utmost caution so as not to destroy this ecologically and biologically important region. 5

Specifically, the proposed activities of the River Park development threaten to severely degrade the water quality and habitat of in the Santa Clara River by increasing the amount of impervious surfaces, thereby creating significant volumes of contaminated stormwater runoff from the construction to post-development stages. Stormwater pollution will significantly increase the pollutant load in the River, affecting the beneficial uses of the River, as well as the riparian species and wetland habitat. Furthermore, due to the amount of proposed impervious surfaces, the volume of stormwater runoff discharged into the River will increase, and channelization of the River will become necessary to control the amount of runoff. This channelization will destroy both the River habitat as well as the wetlands. Therefore, a more adequate analysis of water quality impacts of the entire project must be considered than is currently presented in the EIR. 6 7

The continued degradation of the Santa Clara River watershed must not be allowed to continue. Ventura Coastkeeper finds many of the proposed mitigations unacceptable in protecting riparian and wetland habitat. Buried bank stabilization in not acceptable. Removing non-native vegetation is not acceptable mitigation to hardening of stream banks. Ventura Coastkeeper acknowledges and understands the need for additional housing. We also understand the need for biological resource and floodplain protection. Resolutions to these issues are not mutually exclusive. Proper planning can allow for both. This EIR, however, does not provide a document that satisfies both concerns. If does not demonstrate adequate environmental protection and is not acceptable for certification. 8 9 10 11

Thank you again for the opportunity to comment. Please feel free to contact me if you have any questions.

Sincerely,

Damon Wing
Programs Director

3600 South Harbor Blvd., Ste 222 • Oxnard, CA 93035 • Phone (805) 382-4540 • Fax (805) 382-4541

Letter No. 19

RECEIVED
PLANNING DIVISION

MAY 0 3 2004

PLANNING AND BUILDING SERVICES
CITY OF SANTA CLARITA

May 3, 2004

City of Santa Clarita
Planning Department
Attn: Jeff Hogan
via hand delivery

Subject: Comments on Riverpark DEIR SCH 2002091081

Mr. Hogan and interested parties:

Listed below are comments from the Santa Clarita Chapter of the Los Angeles County Bike Coalition on the DEIR for Riverpark.

1. P. 2.0-33 any many other sections imply that because trails are provided, cycling will be encouraged. I am attaching a guidance document on the proper design of cycling facilities. Trails are generally for recreational use and without adequate on-street bike lanes to access locations away from trails, the use of bicycles for transportation is hindered. Trails are more dangerous from a both a bike vs. pedestrian or bike standpoint and a car vs. bike standpoint. The use of the "wide sidewalk" type of trail is particularly dangerous and also, we believe, is a liability issue because bicycles are not legally allowed on sidewalks. See attached suggestions for proper bicycle facilities. (1)

2. p. 4.7-19 policies 2.3-2.4, p. 4.7-53 to 54 policies 3.6-3.8, 4.7-63, policy 6.3, p. 4.7-76, policy 7.10 : Regarding consistency with policies on cycling and alternative transportation – by reliance on trails and not providing for bike lanes on surrounding roads leading to the trails, the city and this project in fact limit bicycling to recreational uses from trailheads rather than transportation uses into surrounding areas off site. (2) The City should implement a Bicycle Master Plan. Short segments of trail on one side of the road limit bicycle movement and encourage unsafe travel. Bike lanes are preferable except for long uninterrupted stretches. The EIR makes incorrect findings of consistency as the project is NOT consistent with promoting cycling as alternative transportation. (3) The proponent's (and City's) preference for trails, without steps towards Bicycle Master Planning, is not a substitute for providing facilities that are documented as being safer and more adequate for bike transportation purposes. On p. 4.7-77 the EIR makes an INCORRECT finding regarding consistency with safety requirements for bike routes. Due to the short segments of bike trails along one side the sidewalk areas on Newhall Ranch Road and another short leg on one side of the roadway, users in these areas will have to travel contrary to normal vehicular travel patterns and will be at greater risk than if there were on-street bike lanes on both sides of the road in this area. (4) In addition, multi-use trails are generally less safe due to more car accidents at intersections and more accidents between bikes and walkers/dogs/skaters in other areas. Where trails are used, a separate gravel/dirt area to encourage walkers to stay off the pavement is preferable, and at-grade intersections must be minimized, Again, refer to handout on bikes.

3. p.4.7-22 Policy 5.4. This policy, if stated correctly, conflicts with the circulation element of the General Plan which provides for either bike lanes or bike trails. (5) The right of way for bike trails is identical to the right of way for on-street bike lanes, so no added room for traffic is accomplished by using bike trails. This policy also conflicts with City Resolution 92-102 which allows for bike lanes AND bike trails. See attached resolution and bicycling information.

4. p. 4.12-3. paragraph 4 states that the City "requires parallel class I bike trails adjacent to new major and secondary highways." (6) The circulation element states that EITHER on street bike lanes

or parallel bike trails are allowed. For safety and access reasons, on-street bike lanes are preferable. See bike information packet attached. 6

As of this date we have not had an opportunity to review all trail alignments and crossings/intersections for this project. We reserve the right to comment on and suggest minor changes to them in future submittals. 7

At this time, we would like to emphasize the following points:

a. As pointed out in the attached materials, trails are not the ideal solution for bicycle transportation.

b. Short segments of trail should be discouraged. On short stretches of trail, riders will just stay on the street rather than "cross over" and this is why lanes are preferable in that situation.

c. Street crossings should be grade-separated or there should be loop detectors that pick up bikes and change the signal or there should be a push-button accessible to cyclists traveling in the standard directions. At cross walks, there should NOT be signs that say "stop and walk bike." If a trail uses the cross walk, it should be considered part of the trail and cyclists should be allowed to ride. Both on such crossings and on "sidewalk" type trails, it is important to designate this as a BIKE PATH because bikes are not allowed to ride on sidewalks in California. This is a liability issue if a rider is hit by a car – and – as pointed out in the attachment – cyclists are in danger from cars on such side paths. 8

d. Wherever possible, walkers and horses should be separated from bike lanes by providing a side path for those uses.

e. Though not specifically called out as a project issue, Bouquet Canyon road is the only northbound bike route in the area of the project. Currently this road is served by on street bike lanes to the north. We ask that those bike lanes not be removed to accommodate car traffic until other parallel routes are provided for bicycle transpiration. Also, a serious gap in accommodation for bikes exists in front of the Best Buy/Vons shopping centers near the project. We encourage the City to implement a Bicycle Master Plan to address these and other gap issues so that bicycle routes and trails can be linked and bikes can safely be used as alternative transportation.

Thank you for your consideration of these comments. If you have any questions, call me at 661-670-0332. Please send a reply to me at the address below.

Sincerely,

Maria Gutzeit
Santa Clarita Coordinator
Los Angeles County Bike Coalition
23404 W. Lyons Ave. #257
Newhall, CA 91321

Attachments:
City Resolution 92-102
Bicycle Development Guidelines Packet by Maria Gutzeit (dated 3/9/04)

ATTACH #3

RESOLUTION NO. 92-102

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF SANTA CLARITA, CALIFORNIA SUPPORTING BIKEWAYS AND BIKE LANES WITHIN THE CITY OF SANTA CLARITA

WHEREAS, the City of Santa Clarita has previously adopted and given support to the Santa Clara River Recreation and Water Feature Study which includes an off highway bicycle path; and

WHEREAS, the City of Santa Clarita's Adopted General Plan contains numerous policies and references supporting the incorporation and installation of an integrated bikeway network, both on street and off street, throughout the City; and

WHEREAS, all bicyclists are given certain and specific roadway use opportunities by the State Highways Code and other state and municipal law; and

WHEREAS, the City of Santa Clarita is committed to providing safety and access to all bicyclists and motorized roadway users; and

WHEREAS, the City of Santa Clarita by providing Class I bikeways whenever possible for the bicyclists, does not intent to limit or restrict bicycle users legal and legitimate use on its roadways.

NOW, THEREFORE, BE IT RESOLVED by the City Council of the City of Santa Clarita, as follows: that the Santa Clarita City Council hereby reaffirms its commitment to vigorously support bicycle use within the City limits on both on road and off road bikeways.

Key Points for Bicycle Planning
Maria Gutzeit, Santa Clarita Coordinator for the Los Angeles County Bicycle Coalition. 3/9/04

- Bicycles are not just for recreation. Cyclists need to travel everywhere someone in a car would go – to work, school, shopping, coffee shops, and to other towns.
- Multi-use trails, on-street bike lanes, and bike-friendly side streets need to link together in a network. Regions should adopt Bicycle Master Plans to ensure bicycle transportation is addressed and allow for grant funding of projects.
- Housing and shopping areas isolated by multi-lane high speed roads either deter cyclists all together or force most cyclists to ride on the sidewalk, which is illegal and has a high rate of collisions.
- If used as a substitute for loss of access on the road – trails must be installed before roadway access is lost. This would be the case when road with wide shoulders or bike lanes are restriped to add car lanes. Currently trails are promised but not built, resulting in loss of access for cyclists.
- On-street bike lanes and streets with wide shoulders where bikes can travel are preferred by experienced cyclists because they allow more access to different areas, you can generally travel farther, and it is safer. This arrangement is also much more affordable to build than separate multi-use paths.
- Multi-use trails are less safe than bike lanes on the road. Dogs, joggers with headphones, and young children are some reasons why experienced cyclists have MORE crashes on a trail than on the road.
- Multi-use trails have a HIGHER incidence of car-bike collisions than roadways. The reason for this is that car drivers are not expecting to see bikes on a "sidewalk" and collisions occur at intersection between the trail and roads.
- If multi-use trails are the ONLY option, intersections with roadways must be kept to a bare minimum. At intersections, ramps should be trail width, and bold signage warning both cars and cyclists is important. We STRONGLY dislike signs recommending "walk your bike" in crosswalks because cyclists NEVER do that and it is a potential liability issue whereby a car driver who hits a bike in a crosswalk could argue the cyclist was at fault. Ventura County does NOT use those signs on their Ojai Valley trail, and rather uses signage for car drivers saying "yield to bikes."
- Trails must be wide enough to allow cyclists traveling in both directions, plus joggers and walkers. A separate compacted DG trail is often incentive for walkers to stay separated from the bike lanes.
- Trails intended to accommodate bicycles MUST be paved and maintained.
- For short distances (under 3-5 miles or so) cyclists will generally NOT cross a major thoroughfare to ride on a short stretch of trail located on the opposite side of the street from their direction of travel, particularly if it doesn't link up with where they want to go. It is preferable to have a trail or bike lane on BOTH sides of the road. If it can only be on one side, it should be on the UPHILL side, as cyclists going downhill will likely take their chances with cars rather than cross over to a short trail.
- Bike lanes are a better option than trails in steep areas because there will be a big speed differential between experienced cyclists and walkers/small children. This speed could be very dangerous, and riders would be better off on the road.
- Traffic signal sensors (detector loops in roadway) in right lanes and outside left turn lanes should be the kind specified by CalTrans as being acceptable for picking up bikes. Sensitivity should be adjusted properly and painted indicators on the road help bikes position themselves to make the signal change.

Attachments and references– see following sheet

Bicycle Planning Guidance

"The One True Path" Bicycling Magazine, 7/95

"Meeting the Bike Path Challenge" Bicycle USA, May/June 1995

"Technical Issues with Sidewalks and Sidepaths" John Allen, 2002

CalTrans Traffic Sensor Loop Guidance

"Detection of Bicycles by Quadrupole Loops at Demand-Actuated Traffic Signals" Steven Goodridge

Big Air Geoff Drake

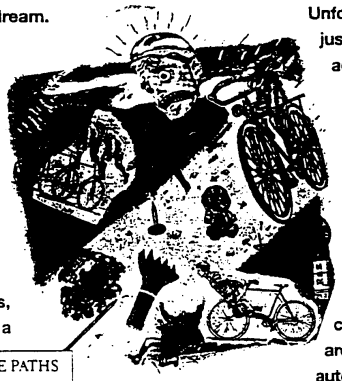
the one true path?

Off-street bikeways aren't a transportation solution

I recently returned from Seattle—the only place I know where cyclists prefer Neoprene to Lycra, and even the racers use fenders.

Several of my aquatic forays took me along one of the nation's first and most prominent rail/trail conversions: The Burke-Gilman, which follows the shore of Lake Washington. Years ago I commuted the length of the BGT daily, and it is no less popular now than it was then. Day and night, this off-street path teems with cyclists, skaters, walkers, and runners. To the casual observer, it is a monument to self-propulsion. A bike advocate's dream.

Or is it? At the risk of being politically incorrect, I must say that off-street bike paths scare the hell out of me. Despite the allure of the mist-bound lake and the quietude that comes in the absence of internal combustion, I could not relax for a second on that path. The experience can only be compared to that of Luke Skywalker dodging alien spacecraft in *Star Wars*. In other words, best not to let your mind drift, even for a moment, or you will end up: (1) having someone's bar-end or skate wheel surgically removed from your anatomy; (2) being the hopelessly outgunned litigant in a suit filed by the mother of the 3-year-old you just ran over; or (3) becoming entangled with the local step aerobics instructor, who decided to do a spontaneous 360-degree spin in the middle of the path in response to a particularly spirited riff on a Kenny G tape.



"BIKE PATHS ARE places of lawlessness. Chaos reigns."

Unfortunately, the BGT is not unique in this way. Although off-street paths are promoted as a pedaler's panacea, they suffer from a host of flaws. For instance:

▷ *Paths are places of general lawlessness.* Because trails are separate from the normal traffic flow (and any means of law enforcement), chaos reigns. Cyclists routinely pedal on the wrong side of the path, wear no helmet, pull U-turns without warning, allow themselves to be towed by German shepherds, etc.

▷ *Paths do not mesh with regular traffic.* Places where bike paths cross normal surface streets are notoriously dangerous. The cyclist generally comes from an unexpected direction, or via a crosswalk. And mentally, the bike-path rider is ill-equipped for the sudden harsh reality of traffic and 2-ton rolling behemoths. Look out.

▷ *Paths go nowhere.* Only through a stroke of luck will an off-street bike path connect you to your destination. Let's face it, unlike supposedly model European cities such as Amsterdam, none of today's cash-strapped U.S. cities have enough resources to build a network of paths that will take you to work, school, the market, or your kid's day care.

I would gladly throw my support behind off-street paths if it could be shown that they have a superior safety record. Unfortunately, statistics dating to the '70s show just the opposite: Bike paths have a higher accident rate per mile than the general roadway. Nonetheless, well-meaning "advocates" across the country continue to lobby, zombielike, for their inclusion on the streets of Gotham.

OK, I can hear the hue and cry building already. But before you rip out the page and wield a pen in anger, let me say this: There is no question that bike paths have played a useful role in the promotion of cycling in this country. Thousands of people are riding today only because they served an auto-free apprenticeship on a bike path.

Without being coddled in this manner, they would never have taken up cycling in the first place. Overall, I support rail/trail conversions for recreational purposes. But let's not confuse this concept with a transportation solution.

And one must also ask the question: What percentage of these bike-path riders graduate to safe cycling on surface streets? What percentage become commuters? Very few, I venture. Because they have been effectively reared in a rubber room, bike-path riders regard the *real world* with fear and loathing. And when they do venture forth into the traffic mix, insular habits take over: cowering at the roadside, using pedestrian crosswalks instead of vehicular turning lanes, or turning left from the right-hand side of the road. In short, they exist in a world apart from normal traffic flow.

Or, you might say they exist in the world of Kenny G.

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Meeting the "Bike Path" Challenge

Five Steps for Making the Multi-Use Trail Movement Work for Road Cyclists

By Noel Weyrich

In the next three or four years, nearly $1 billion in federal transportation dollars will be spent throughout the U.S. on the construction of "multi-use trails," the familiar 10- to 12-foot wide paved or gravel facilities that are often mislabeled "bike paths."

Developed largely by recreational planners, many of these projects have secured funding with ample support from bicyclists. Now, those of us accustomed to road riding must deal with the threats and opportunities that the coming trail-building binge will bring.

On the positive side, more trails will almost certainly turn some non-cyclists into cyclists, giving us a larger constituency for all cycling issues—improved bike parking, better public education and promotion, etc. Some of these born-again bicyclists may well become fresh troops for growing state and local advocacy groups.

Multi-Use Trails Are Not "Bike Paths"

On the downside, multi-use trails, especially when they're erroneously called bike paths, can poison the minds of planners, politicians, and other citizens in strange and dangerous ways. Planners, for instance, increasingly tend to conflate the terms "bicycling" and "trails." As a result, many counties have put together their "comprehensive bike plans" by merely compiling lists of planned trail rights-of-way, ignoring potential on-road accommodations entirely. City councils, having provided a place for bicyclists on a trail, will feel less guilty about banning cyclists from nearby "dangerous" roads. And there is bountiful anecdotal evidence that road cyclists suffer the worst abuse and harassment from motorists while on roads adjacent to sidepaths. Motorists want cyclists out of the way—off the road and on the path, even if the path is jammed with strollers, joggers, and in-line skaters.

These are the pitfalls of the multi-use trail trend. Some hardcore road cyclists may find it hard to swallow, but these thousands of miles of new facilities will have a tremendous impact on conditions for bicycling for many years. It's up to us to make that impact a positive one.

***Build a sidepath and they will come:* signs banning bicyclists from the road.** *Photo by League member Jan Rosenthal, Stillwater, Minn. Jan and Brian Rosenthal are part of the Minnesota Bicycle Coalition, which works to correct this problem.*

In other words, even if you believe that trails are absolute lemons, now is the time to start working to turn them into lemonade.

How to begin? Here's a five-step program for responding locally to the challenge of multi-use trail construction:

1. Watch your language. Never use the word "bike path," and never let anyone use it in your presence! With the rarest of exceptions, none of the new generation of trails will be designed for the exclusive use of cyclists. Almost all of them will be multi-use trails, and, according to The AASHTO Guide for the Development Bicycle Facilities (the engineering profession's "bible" of bikeway design), "In general, multi-use paths are undesirable: bicycles and pedestrians do not mix well." The guide, last revised in 1991, doesn't even mention in-line skaters!

2. Get the story straight. Before opening your mouth on the subject, it's wise to be absolutely clear about the single inherent limitation of multi-use trails: they simply can't accommodate all cyclists at all times, and therefore they are at best a supplement—never a substitute—to on-road bicycle access. Most trails aren't lit in the evening, don't drain well in the rain, and aren't plowed when it snows. Multi-use trails can be impossibly crowded during peak usage hours and can provide a security risk at off-peak times. The paved ones are increasingly dominated by in-line skaters, and the unpaved ones aren't suitable for touring and racing tires.

Research has shown that bicycle crash rates are higher on trails than on roads. Few decisionmakers, however, are willing to believe that trails are "more dangerous" than roads, because cyclists die overwhelmingly from collisions with cars, and there are no cars on trails. There is, however, a very effective way to stand this argument on its head, a tactic I've used successfully in my hometown of Philadelphia. To wit: "If high-speed cyclists are *forced* to use the trail, sooner or later, one of them is going to collide with a baby carriage, a toddler on a trike, or someone's grandmother. We need to improve cycling conditions on the adjacent roads to lure the serious cyclists away from the trail. How can we work together on that?"

3. Protect your rights to the road near trail projects. If a trail is being planned or under construction near where you ride, you want to make sure it won't degrade your road-riding experience once it's completed. One tactic is to meet with the group or agency sponsoring the trail and go over some of the above arguments. Explain how trails can create truly dangerous levels of motorist antagonism toward cyclists riding on nearby roads. Request that "Share the Road with Bicycles" signage goes up on parallel roads as a part of the trail project. If sidepath construction involves also changing a roadway's width, ask for their help in pushing for wide outside right lanes or paved shoulders.

See ***Bike Path*** *on next page*

Amtrak from p. 19

League to provide legislative language and to support it with cost and demand estimates. The League called Morrison Knudsen Corporation, the California Car manufacturer, and found the costs of building in bicycle accommodations to be "relatively inexpensive" but difficult to quantify. The League also cited its own study, "Linking Bicycles with Trains: Opportunities for Amtrak to Increase Ridership and Revenues by Increasing Bicycle Access" to estimate that, if substantial portions of Amtrak's fleet would accommodate bicycles on-board, from nine to 29 million additional trips would be taken annually with resulting revenue gains of $3 to $12 million per year for Amtrak.

The League's position has also been well received by Transportation and Infrastructure Railroad Subcommittee staff on both sides of the aisle. The League is now providing more information in response to staff requests.

The League is positioning its remedy as "all gain, no pain." The many letters that League members have sent to Amtrak and copied to the League have provided important ammunition for bicycle-friendly Amtrak legislation. So to has the League's cry that Amtrak provides the worst bicycling accommodations of any national passenger rail service provider in the developed world. Additionally, Amtrak's customer service ratings have declined precipitously in recent years, including a record 70,000 complaints logged in 1994 at the same time that long-distance train ridership fell by six percent.

What You Can Do

In today's fiscal climate, it's tough for Congress to find opportunities to provide their constituents real benefits for little cost. League members should write or call their congressmen (U.S. House of Representatives, Washington, D.C. 20515, (202) 225-3121) and senators (U.S. Senate, Washington, D.C. 20510) to send this "all gain, no pain" message, particularly those represented by the following congressmen: Bud Shuster (R-PA), Susan Molinari (R-NY), Sue Kelly (R-NY), Sherwood Boehlert (R-NY), Jay Kin (R-CA), Bob Franks (R-NJ), John Mica (R-FL), Jack Quinn (R-NY), Spencer Bachus (R-AL), Norm Mineta (D-CA), Bill Lipinski (D-IL), Jerrold Nadler (D-NY), Nick Rahall (D-WV), Bob Borski (D-PA), and Bud Cramer, Jr. (D-AL).

Amtrak: Steep Grade Ahead

Amtrak's re-authorization takes place within the context of widely reported changes, including route and service consolidations and efforts to fundamentally restructure Amtrak's relationship with the federal government. Responding to pressure to reduce federal operating subsidies and anticipating Congressional action, the Amtrak board and the Clinton Administration have set a goal of eliminating all Amtrak operating subsidies by the year 2002, a feat no national rail passenger system in the world has achieved. Amtrak President and CEO Tom Downs has agreed to this goal but says if Congress expects Amtrak to operate like a private corporation, it must free the railroad from many of the operating constraints Congress has placed upon it and provide the capital to upgrade and modernize the system. If Congressional rhetoric is any indication, Downs will get his first of these two wishes.

Understanding the prevailing Congressional sentiment to reduce the legislative burdens that have been placed on Amtrak, the League is not attempting to use this federal legislation to dictate Amtrak's operating procedures (such as by forbidding bicycle transport charges).

Instead, the League is seeking to bring more paying passengers onto the system by constraining federal Amtrak investments for new coach passenger railcars and overhauling existing cars to ensure on-board bicycle accommodations. (Despite its downsizing, Amtrak still buys new railcars to replace its aging rolling stock and is currently adding 195 new Superliner cars.) Although the League's legislative goals are modest and would clearly benefit Amtrak financially, they still may be very difficult to achieve in this anti-mandates Congressional climate.

—*A. G.*

Bike Path from page 25

4. Use trails and trail plans to advance the on-road cause. The very existence of multi-use trails and long-range trail plans can provide an effective argument that bicycle-friendly road improvements should be made on surrounding roads. Since few trailheads have adequate parking for all trail users on a summer Sunday, trail planners are likely to lend support for on-road bicycle accommodations to ease trail access. And petitioning at a trailhead for this kind of improved on-road access is a much more effective way to organize cyclists than the traditional tactic of leaving literature at bike shops.

5. Push on-road projects before off-road projects in bike planning. Federal transportation law mandates a planning process for bike-ped facilities in every metropolitan region in the U.S. Thanks to the superior resources of recreation and parks planners, many areas are evolving "bike plans" that focus first on trail rights-of-way, and then add tenuous on-road connections from trail to trail. In fact, an ideal bicycle transportation plan is designed in the precisely opposite way. First, an integrated network of on-road bike lanes and/or bike routes is laid out, and then connections to trail rights-of-way are appended. Cyclists in every metropolitan area need to inform planners that a true bicycle *transportation* plan must be organized around the existing on-road transportation infrastructure, rather than a set of off-road recreation facilities.

Trails Shouldn't Spell Our Doom

Politicians and planners got where they are by being reasonable and listening to constituents, and we are fortunate to live in a society with a basic level of respect for personal freedom of choice. For these reasons, trail construction should not spell doom for road riding in any region, but instead should provide new opportunities for non-cyclists to join our ranks and evolve into the next generation of road cyclists.

But road riders who fear the effects of trail construction must get involved in the planning process and register these concerns. Our perspective is not a self-evident one, and nobody will stand up for us if we are not there to stand up for ourselves.

Sidewalk of Revere Beach Parkway, Lynn, Massachusetts. Signs have been posted on the parkway prohibiting bicyclists from riding in the roadway, though Massachusetts law does not permit such a prohibition.

Doug Mink photo

Technical issues with sidewalks and sidepaths

Sidewalk-type bicycle facilities were first built in Europe before the Second World War, when no research base existed. Research dating as far back as 1938 has shown that sidewalk-type facilities have serious civil engineering, safety, operational and liability problems, and that it is far preferable for bicyclists to travel either on the roadway, or on separated paths which are entirely away from roadways.

Europe has many more sidewalk-type facilities than the U.S., having gotten into the habit of building them before there were research results to warn against them. A strong backlash against them has occurred there in recent years in response to crash studies, and to the observation that these facilities are often poorly maintained and allow only for slow travel. A press release by the ADFC (the national German bicyclists' organization) gives an example of the tone of the discussion occurring at present.

Elevated crash risk

Sidepaths have a higher rate of bicycle-motor vehicle collisions than streets have. The research literature overwhelmingly demonstrates this conclusion. [See other Web page with links to research reports] This conclusion may seem surprising at first to people who are not familiar with the research literature. However, the overwhelming majority of car-bicycle collisions-- approximately 90% --involve turning and crossing movements. Sidepaths complicate these movements by placing the bicyclist and motorist out of sight of each other and on conflicting paths at junctions with streets and with driveways.

Bicycle crashes which do not involve motor vehicles are rarely reported to police. However, as shown in all studies which are population-based, bicycle/motor vehicle collisions are only 10% to 20% of injury-producing bicycle crashes. The comparison between sidepaths and roads for crashes which do not involve motor vehicles is extremely unfavorable to sidepaths. In particular, the more restrictive geometrics of sidepaths lead to more single-bike crashes; also, bicyclists can not travel safely at normal speeds in the presence of pedestrians, because pedestrians suddenly and unpredictably change direction. In a collision between a bicyclist and a pedestrian, both are vulnerable, and so pedestrian injury rates also increase greatly from the placing of bicycles on sidewalks.

As first demonstrated in the Cross and Fisher study conducted in the 1970s, and as confirmed for the Boston area in the 1984 Metropolitan Area Planning Commission study posted on this Web site, only a small percentage of car-bicycle collisions on roadways is overtaking collisions. The false belief that car-overtaking-bicycle collisions are the predominant car-bicycle collision type is in large part responsible for the excessive fear of that type of collisions, and the false idea that placing bicyclists on sidewalks will increase safety.

Would any traffic engineer design a divided highway, with two-way traffic on each of two or three parallel roadways? The problem of conflicts at junctions with sidepaths can be reduced only by measures that substantially slow or delay bicyclists, motorists or both. Even the most advanced measures of this type do not succeed in reducing the crash rate to that for riding on streets.

Civil engineering issues

Root damage

Tree roots heave up pavement as they grow. This problem is especially serious for sidepaths because trees will find water more abundant beyond a sidepath than on the street side.

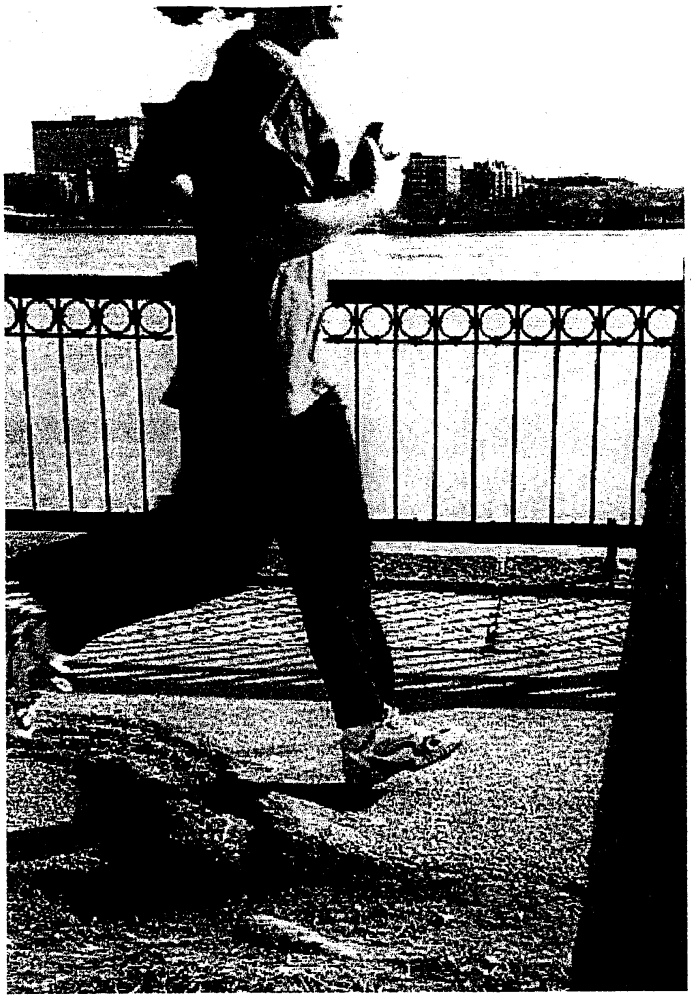
Root damage is an endemic problem on bicycle paths but only rarely a problem in streets. That is because streets are wide enough to shield the soil beneath them from water percolation, and are bordered by deep curbstones which serve as root barriers.

Pedestrians can tolerate pavement heaved up by roots, but for bicyclists it is a serious hazard. A root across the bicyclist's line of travel causes a jolt and possible loss of control. A root that is more nearly parallel to the bicyclist's line of travel can sweep the bicyclist's front wheel to the side, causing a "diversion-type fall" which typically results in injury to the hip, shoulder or head.

An example of root damage on a bicycle sidepath is shown in the photographs below.

Root damage can be prevented by installing root barriers or by removing trees, but these measures are usually not taken.

Root damage on Paul Dudley White bicycle path near MIT's Pierce Boathouse, Cambridge, Massachusetts



Drainage.

Streets are crowned to facilitate water runoff, and are provided with storm grates, catchbasins and storm sewers. Even if a sidepath is sloped to facilitate drainage toward the street, puddling will occur increasingly over the years as the soil settles and as roots heave up the path. When plowed snow blocks drainage to the street, drainage will be completely blocked over long segments of the path.

Snow and ice.

Snow removal from a sidepath is never a successful as from a street. On a street, motor vehicle tires wear away snow, and quickly open up patches of pavement, which facilitate heating by sunlight to complete the melting.

In addition, a more aggressive use of snow-melting chemicals is practical on streets,

where they are carried away in the storm drain system and do not pose a substantial risk of damage to roadside vegetation.

Particularly when drainage is blocked by plowed snow and by heaving up due to tree roots, puddles on the path refreeze into ice, making the path unsafe for bicycle travel. Ice puddles are a far less serious problem in a street, because it is crowned and because of its drainage provisions.

Plowed snow from driveways blocks a path until cleared from the path. No such problem occurs with streets.

All in all: Pedestrians can tolerate heaving by roots and imperfect snow clearance, and can even beat a path for themselves where there is no snow clearance. Bicyclists cannot. After a snowfall, sidepaths remain unusable, and then unsafe, for bicycle travel far longer than streets. An important advantage of on-roadway facilities, aside from greater safety, is that they are relatively inexpensive to construct, and much easier to maintain.

Operational issues

Inevitability of two-way bicycle travel

Many sidepaths or "cycle tracks" are designed based on the faulty assumption that they will carry only one-way traffic on each side of the street. This assumption is highly unrealistic because, with paths behind curbs and sometimes behind parked cars, it is inconvenient to cross the street to enter the path on the other side.

Easy crossing can be accomplished only where there is a curb cut or driveway. Getting to the nearest entry point for the opposite sidepath requires either riding away from the intended destination and then making a U-turn, or riding the wrong way on the sidepath -- the more likely choice. Many of the entry points for the two sides are not opposite one another, and so it will often be necessary to lift the bicycle over a curb, or else ride along the narrowed street to get from one sidepath to the other -- the more likely choice.

Crossing to a street-level bike lane or the opposite travel lane of a normal street poses no such problems.

Bicyclists riding opposite the traffic flow will be subject to the very high risk associated with crossing intersections on the left crosswalk, as described in the studies cited above.

Are pedestrians separated from bicyclists?

When pedestrians share space with bicyclists, there are no reliable rules for overtaking. This is true even if separate parts of the sidepath's width are designated for bicycles and pedestrians.

Consider, for example, the common European practice of striping a sidewalk so the part nearest the street is designated for bicycles. When one bicyclist is overtaking another traveling in the intended direction, the tendency will be for the slower bicyclist to remain in the bikeway, while the faster bicyclist merges to the right -- not to the left as with normal overtaking -- and into the sidewalk area. This confusion puts both of the bicyclists at risk, as well as pedestrians.

A very confusing situation occurs when a "wrong-way" and "right-way" bicyclist approach one another. One or the other bicyclist will have to merge into the area designated for pedestrians. Which bicyclist? The "right-way" bicyclist may feel justified in keeping a straight course on the designated bikeway, but then the "wrong-way" bicyclist will have to pass to the *right* of the "right-way" bicyclist, contrary to the usual traffic rules. Suppose that the "right-way" bicyclist yields to the right as is normal, and the "wrong-way" bicyclist yields to the left, assuming that the "right-way" bicyclist will stay in the designated bikeway? Then they collide head-on. Confusions become far more complicated when bicycle and pedestrian traffic is heavy, and they lead to bicycle-pedestrian collisions as well as bicycle-bicycle-collisions.

By way of comparison, the standard overtaking rules on the roadway are simple and clear: slower traffic keeps right and faster traffic overtakes on the left after looking back to check that there is not another vehicle (bicycle or motor vehicle) already overtaking.

Confused yielding rules, sight obstructions

On the street, through traffic has the right of way over turning traffic. On the sidepath, because of sight line problems, both through bicycle traffic and crossing motor traffic must slow and be prepared to yield, since neither the bicyclist nor the motorist can be sure to see the other in time. The problem occurs because the bicyclist is hidden behind parked cars, or in the right rear blind spot of a motor vehicle which has slowed to turn. It is typical in this situation to install stop signs for the path as well as the road. The example below is from the Route 28 bicycle path in Hyannis. Bicyclists on the path must yield at the stop sign, and turning vehicles must yield at the crosswalk marking.

Sight obstruction by tree, bicyclist in camera position would be in motorist's right rear blind spot; also right-of-way confusion, Route 28 bike path, Hyannis.

Blocking of street by vehicles backed up to exit driveways, and blocking of path by vehicles backed up to enter driveways.

Placing multiple two-way rights of way adjacent to one another creates crossing and turning conflicts like the one illustrated below. To yield to traffic in the roadway, the motorist entering from the left must block the bikeway. To yield to traffic in the bikeway, the motorist coming from the right rear must block the roadway. The standard traffic pattern, with slower traffic on the right and faster traffic in the middle avoids this problem.

On streets, bicyclists can usually safely travel at the speed their legs can propel them, except when required to yield at intersections or under congested conditions. On a sidepath, every driveway and cross street becomes an intersection and bicyclists must slow or stop much more often. The sidepath promotes a false sense of security and bicyclists often do not use appropriate caution.

Car blocking path, Route 28 bike path, Hyannis

Bicyclists will still use the street.

Sidepaths do not eliminate the need or desire of bicyclists to ride in the roadway, for several reasons, some already stated

- the sidepath will not be usable at all times;
- It will not allow fast, uninterrupted travel
- because of the limited number of entry points, bicyclists will often have to ride along the roadway to cross over to the opposite sidepath.
- In many cases, bicyclists preparing turns onto cross streets and driveways will be able to do so much more quickly and with fewer conflicts in the normal traffic flow than from the sidepath.

Bicyclists do not belong on sidewalks

Walking a bicycle in order to avoid challenging traffic conditions is sometimes appropriate, especially for children and novice bicyclists. Without sidepaths, bicyclists still have the option to ride slowly, or walk their bicycles, on sidewalks and to cross intersections as pedestrians if they wish to do so. However, riding in the street is much faster, and adult bicyclists do not put up with slower travel except under unusually difficult conditions.

Pedestrian-type facilities are a hindrance rather than an aid to bicyclists who expect to be able to get to their destinations quickly. These facilities create a chaotic, disorganized traffic pattern and increased risk of crashes.

Appropriate and inappropriate arguments for sidepaths:

Bicycle routing on a sidewalk or sidepath can make sense where traffic conditions are extreme and there is no cross traffic: for example on a highway bridge with high-speed traffic, narrow lanes and no shoulders.

The two most common arguments that have been made for sidepaths are that they are safer, which is incorrect except under unusual conditions, and that people think they are safer. The latter argument, sometimes made naively and sometimes not, frequently becomes a basis for political action, on grounds that people should be encouraged to abandon motorized transportation for bicycling and walking. But construction of facilities that make bicycling more dangerous and slower amounts to shooting oneself in the foot on the encouragement issue, and is unethical.

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Up: Bicycle sidepaths

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don_howe@dot.ca.gov CALNET 464-2634

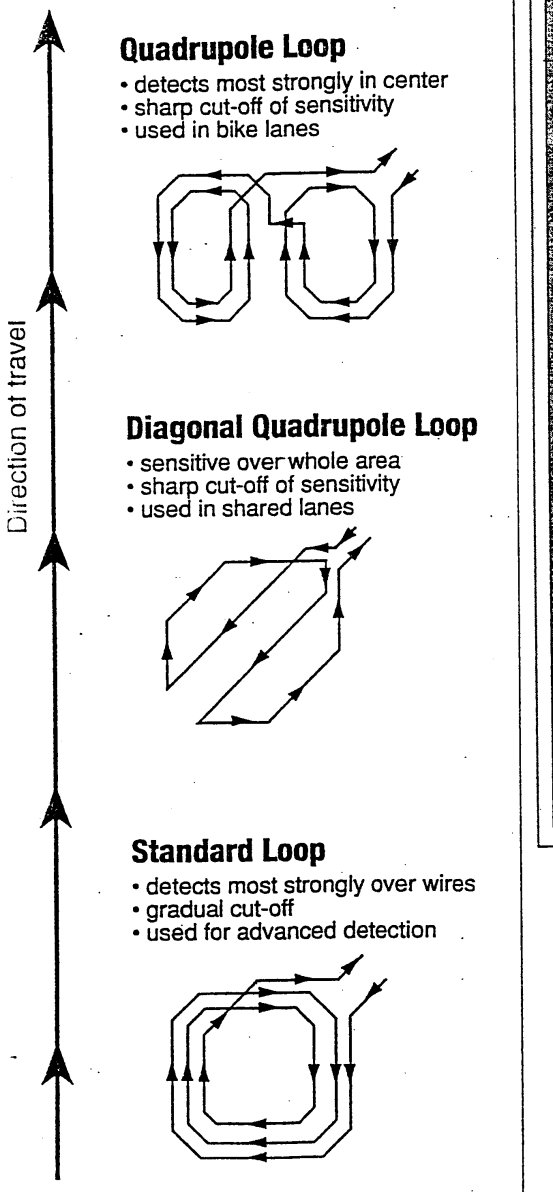
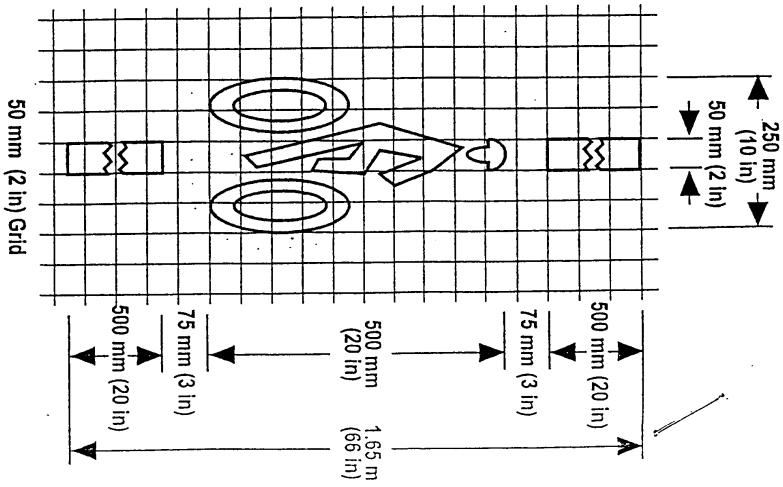


Figure 4-5: Recommended loop types for bicycle detection. In most shared-road situations, the diagonal quadrupole is preferred.

Source: Traffic Signal Bicycle Detection Study; City of San Diego, 1985

BICYCLE LOOP DETECTOR SYMBOL



Signal actuation: Detectors for traffic-actuated signals should be sensitive to bicycles and should be located in the bicyclist's expected path, including left turn lanes. The preferred options for loop detectors are as follows (see figure 4-5):

(1) In shared roadway situations, where the exact location of the bicycle cannot be easily predicted, the diagonal quadrupole loop [TYPE D] is best, since it is bicycle-sensitive over its entire width while being relatively immune to false calls caused by motor vehicles in adjacent lanes.

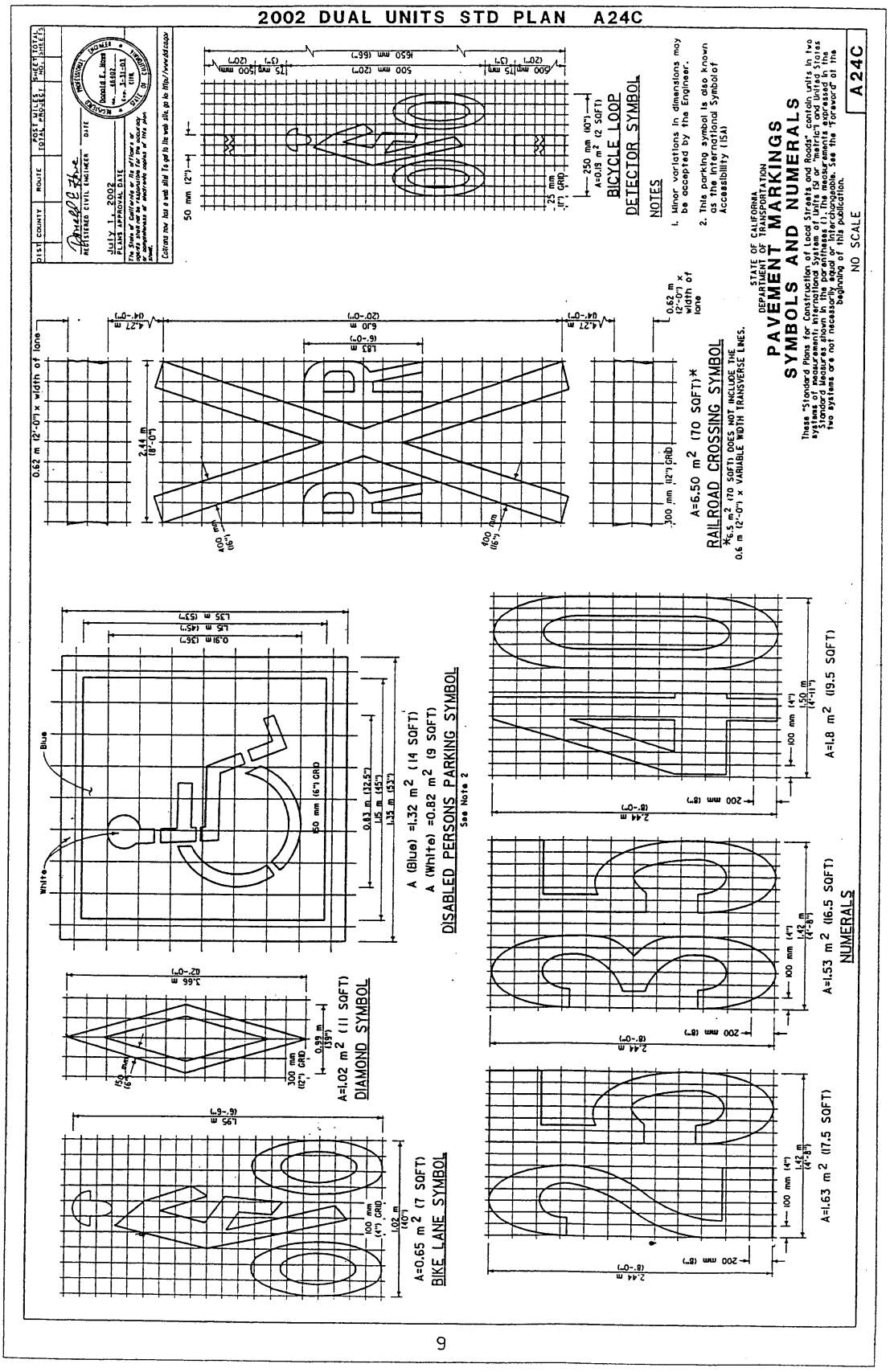
(2) In bicycle lane or bicycle path situations, where the location of the bicycle can be easily predicted, a quadrupole detector [TYPE C or Q] works well, the quadrupole loop is highly sensitive over the center wires, less sensitive over the outer wires and relatively insensitive to motor vehicles in adjacent lanes.

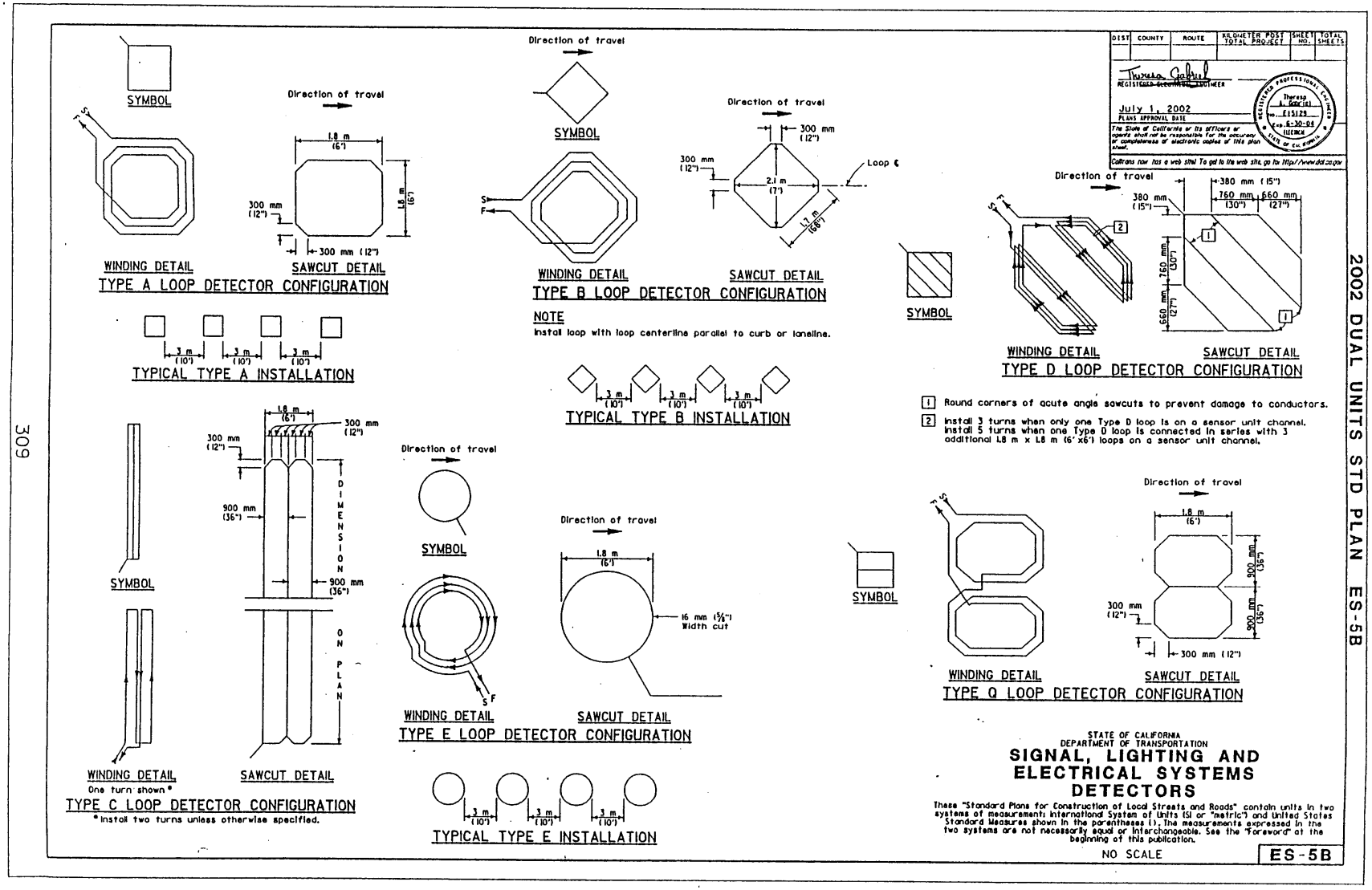
(3) Standard loops [TYPE A] are the least desirable for sensing bicycles. These loops are square or rectangular in shape and are most sensitive over the wires that form the outer boundary of the loop. While some are sensitive enough directly over the wires to detect bicycles, the bicyclist must know just where to stop, and why it's important to stop there.

For this reason, standard loops are the least desirable and should be used only in locations where bicycle traffic is not expected. Some standard loop/amplifier combinations cannot be adjusted to reliably detect bicycles without detecting motor vehicles in adjacent traffic lanes. These loops should be replaced with bicycle-sensitive models.

In special cases, pedestrian activated buttons may be mounted near the curb for bicycle use. This approach may be useful where a bicycle path crosses a highway, for example. However, in most roadway situations, the need for bicyclists to position themselves at intersections according to their destinations (e.g., in left-turn lanes or to the left of a right-turn-only lane) makes such push buttons the least desirable option.

References: Jan 1994 North Carolina DOT "North Carolina Bicycle Facilities Planning and Design Guidelines & Traffic Signal Bicycle Detection Study; City of San Diego, 1985


2002 DUAL UNITS STD PLAN A24C
DIST
COUNTY
ROUTE
POST MILES TOTAL PROJECT
SHEET TOTAL NO. SHEETS
REGISTERED CIVIL ENGINEER DATE
July 1, 2002
PLANS APPROVAL DATE
A24C
STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
PAVEMENT MARKINGS
SYMBOLS AND NUMERALS
NO SCALE
BICYCLE LOOP DETECTOR SYMBOL
NOTES
1. Minor variations in dimensions may be accepted by the Engineer.
2. This parking symbol is also known as the International Symbol of Accessibility (ISA)
RAILROAD CROSSING SYMBOL
DISABLED PERSONS PARKING SYMBOL
See Note 2
DIAMOND SYMBOL
BIKE LANE SYMBOL
NUMERALS


SYMBOL
Direction of travel
1.8 m (6')
300 mm (12")
1.8 m (6')
300 mm (12")
WINDING DETAIL
SAWCUT DETAIL
TYPE A LOOP DETECTOR CONFIGURATION
3 m (10')
3 m (10')
3 m (10')
TYPICAL TYPE A INSTALLATION
Direction of travel
SYMBOL
WINDING DETAIL
Direction of travel
300 mm (12")
300 mm (12")
2.1 m (7')
Loop ℄
1.7 m (68")
SAWCUT DETAIL
TYPE B LOOP DETECTOR CONFIGURATION
NOTE
Install loop with loop centerline parallel to curb or laneline.
3 m (10')
3 m (10')
3 m (10')
TYPICAL TYPE B INSTALLATION
SYMBOL
Direction of travel
380 mm (15")
380 mm (15")
760 mm (30")
660 mm (27")
760 mm (30")
660 mm (27")
WINDING DETAIL
SAWCUT DETAIL
TYPE D LOOP DETECTOR CONFIGURATION
1 Round corners of acute angle sawcuts to prevent damage to conductors.
2 Install 3 turns when only one Type D loop is on a sensor unit channel. Install 5 turns when one Type D loop is connected in series with 3 additional 1.8 m x 1.8 m (6' x6') loops on a sensor unit channel.
SYMBOL
1.8 m (6')
300 mm (12")
900 mm (36")
900 mm (36")
DIMENSION ON PLAN
WINDING DETAIL
One turn shown *
SAWCUT DETAIL
TYPE C LOOP DETECTOR CONFIGURATION
* Install two turns unless otherwise specified.
Direction of travel
SYMBOL
WINDING DETAIL
Direction of travel
1.8 m (6')
16 mm (5/8") Width cut
SAWCUT DETAIL
TYPE E LOOP DETECTOR CONFIGURATION
3 m (10')
3 m (10')
3 m (10')
TYPICAL TYPE E INSTALLATION
SYMBOL
Direction of travel
1.8 m (6')
900 mm (35")
300 mm (12")
900 mm (36")
300 mm (12")
WINDING DETAIL
SAWCUT DETAIL
TYPE Q LOOP DETECTOR CONFIGURATION
DIST | COUNTY | ROUTE | KILOMETER POST TOTAL PROJECT | SHEET NO. | TOTAL SHEETS
REGISTERED CIVIL ENGINEER
July 1, 2002
PLANS APPROVAL DATE
Exp. 6-30-04
The State of California or its officers or agents shall not be responsible for the accuracy or completeness of electronic copies of this plan sheet.
Caltrans now has a web site! To get to the web site, go to: http://www.dot.ca.gov
STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
SIGNAL, LIGHTING AND ELECTRICAL SYSTEMS
DETECTORS
These "Standard Plans for Construction of Local Streets and Roads" contain units in two systems of measurement: International System of Units (SI or "metric") and United States Standard Measures shown in the parentheses ( ). The measurements expressed in the two systems are not necessarily equal or interchangeable. See the "Foreword" at the beginning of this publication.
NO SCALE
ES-5B
2002 DUAL UNITS STD PLAN ES-5B

Detection of Bicycles by Quadrupole Loops at Demand-Actuated Traffic Signals

Steven G. Goodridge, Ph.D.
Member, IEEE

Abstract

Inductive loop sensors, commonly used for detection of traffic at demand-actuated traffic signals, can be configured and adjusted to detect bicycles with metal rims. This article describes how to provide reliable detection of bicycles via inductive loop sensors without generating unacceptable false-positive detection of large vehicles in adjacent lanes.

Introduction

Demand-actuated traffic signals sense the presence of traffic before changing signal phases in order to optimize traffic flow. The main disadvantage of such systems is that a defect in the sensor system can cause it to fail to detect users waiting at a left-turn lane or cross-street. Such failure can cause substantial, indeterminate delay to road users and encourages non-compliance with the signal, which affects safety. Functional operation of the traffic control devices in use is fundamental to protection of individuals' safe and legal passage. Fortunately, good engineering of traffic signal sensors allows virtually all legal vehicle traffic, including bicycles, to be detected reliably using existing technology. Although a number of advanced non-intrusive sensor systems such as video and microwave devices are beginning to be employed for vehicle detection, at the time of this writing (2003) the most reliable and cost-effective method for detecting metal vehicles is the use of inductive loop sensors in the roadway pavement. Inductive loop sensors can reliably detect bicycles with metal rims if they are properly configured and adjusted. A number of communities in the United States, including Bakersfield, California, Santa Cruz, California and Santa Clara County, California, have adopted policies to design and adjust all traffic signal sensors to detect bicycles.

Theory of Operation

Inductive-loop traffic detector systems operate by sensing disturbances to the electromagnetic field over a coil of wire built into the roadway (Figure 1). When a conductive object (typically made of metal) enters the area over the wire loop, the magnetic field generated by alternating electrical current in the signal detector circuit induces weak electrical currents in the conductive object. (The AC frequency may be between 10,000 and 200,000 Hz, typically around 20,000 - 30,000 Hz.) The electrical currents induced in the object generate their own magnetic field that works in opposition to the magnetic field generated by the sensor coil (due to Lenz's Law). This opposition changes the resonant frequency of the sensor circuit by reducing the effective inductance of the sensor coil. This change in resonant frequency (an increase in frequency as the inductance decreases) is detected by the circuit instrumentation in the signal controller cabinet, which then tells the signal control electronics that a vehicle is present.

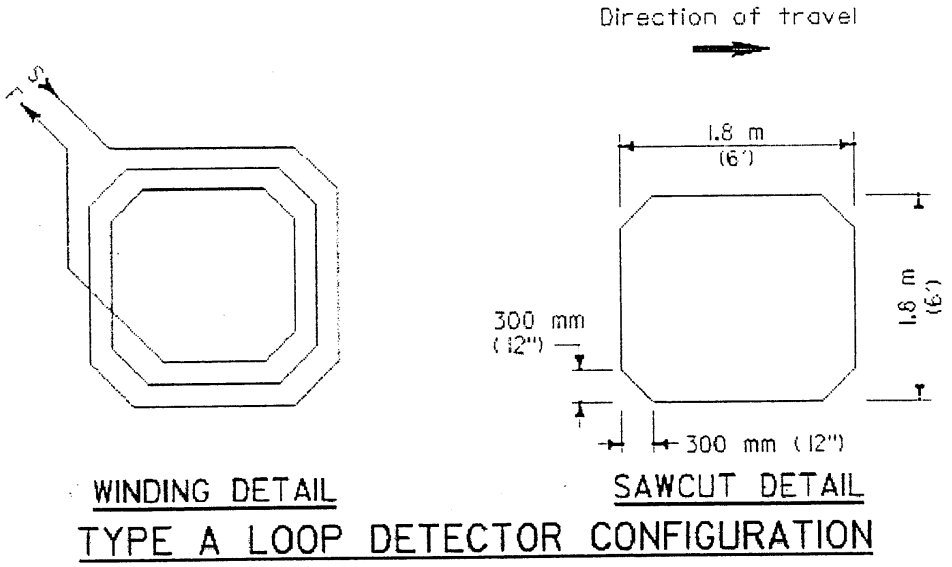


Figure 1: Basic dipole inductive loop sensor. (Source: California DOT)

A number of variables affect the degree to which the introduction of a conductive object will change the inductance of the sensor loop. These variables include:

- The size, shape, and conductivity of the object
- The 3-D orientation of the object with respect to the wires in the loop
- The 3-D position of the object over the loop
- The size and shape of the sensor loop

The combination of these variables create the potential for public confusion about the feasibility and reliability of bicycle detection via inductive loop sensors. Experiments that fail to control for some of these variables often create unreliable results, and have sometimes frustrated efforts to select reliable detection systems for cyclists by leading the engineers and facilities designers to false conclusions. Since bicycles are small vehicles and have less conductive material in them than do automobiles, they are harder to detect with inductive loops. Often the sensor loop is very large or the detector circuitry is not sensitive enough to detect the slight inductance decrease caused by the bicycle. The bicycle may not be aligned for maximum effect, or the loop may be shaped (as in Figure 1) such that large vehicles in adjacent lanes may be detected at the level of circuit sensitivity required to register a bike. Since the time and money invested by most states and municipalities toward bicycle transportation issues is very limited, traffic signal engineers often give up on the problem of bicycle detection before it is fully understood. However, this article will show that careful application of the operational theory allows optimization of inductive loop sensing systems for reliable detection of conductive (including aluminum, steel, and titanium) bicycle rims, without false detections caused by adjacent traffic.

There is a common misconception that an object must be ferrous (include iron) to activate a traffic signal loop sensor, or that a ferrous object will perform better. This misconception is fed by the observation that steel cars are detected by standard loop detectors but small aluminum bicycles (often, but not always) are not. The rationale behind this misconception is rooted in the observation that placing a ferrous core into the center of an inductor coil (such as inside an electromagnet or transformer)

affects the inductance of the coil. But in such ferrous-core coil applications, the inductance of the coil is *increased* by the ferromagnetic effect of the iron, while the typical inductive-loop signal sensors used for traffic signal actuation require the vehicle to cause a *decrease* in inductance. Given the high frequencies at which signal detectors operate and the large conductive silhouette of the car, any effect the iron's properties might have to increase the inductance of the coil are overpowered by the induced electrical eddy currents in the vehicle which serve to reduce the inductance of the coil. There are some rare cases where a steel vehicle wheel positioned in the center of a loop can create a net increase in loop inductance, but most traffic signal sensor circuits will either ignore this increase or treat it as an error condition. It is simply the size and net conductivity of an automobile that makes it easier to detect than a bicycle.

There is another common misconception that because bicycles are smaller than cars, inductive detector loops cannot be designed to detect bicycles. This is absolutely incorrect; simply making the loop smaller puts the loop on a scale that allows easy detection of bicycles. Communities that design inductive loops to detect bicycles make them about six to ten feet long. Unfortunately, the North Carolina Department of Transportation has currently adopted a bicyclist-unfriendly standard loop design that is 60 feet long. This standard needs to be revised in order to allow bicycle detection. If a larger detection area is needed to bridge gaps between cars approaching a signal, the traffic engineer can instead install a second, longer loop behind the small bicycle-sensitive one, and run it on a separate detector circuit. This is standard practice in bicycle-driver-friendly communities.

Inducing Current in Bicycle Rims

Bicycle rims lend themselves well to detection by inductive loop detectors because they provide an excellent conductive loop and are located close to the ground where the loop wires are. By positioning the rims over a straight leg of the loop wire pointed in the same direction (as shown in Figure 2), the magnetic field lines around the wire pass through the profile of the wheels. The integral sum of the magnetic flux density across each wheel's profile determines the induced current around the rim loop and the opposing magnetic field it generates. The larger the area of the wheels in comparison to the area of the sensor loop, and the better the positioning of the wheels to intercept the maximum magnetic flux, the greater the percentage reduction in the sensor loop's inductance. Note that positioning the wheels at a different angle or moving them to either side from the wire reduces their effectiveness.

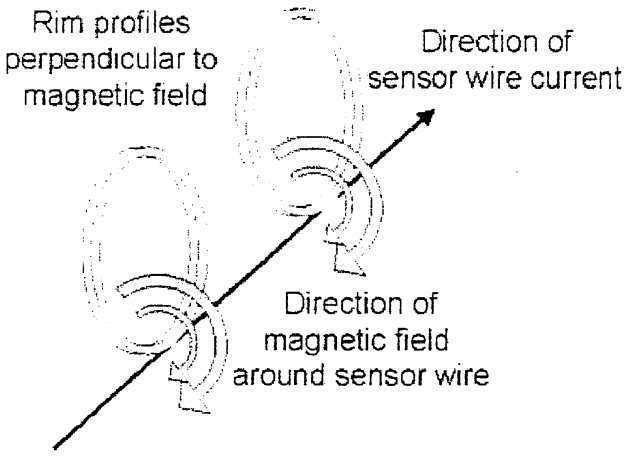


Figure 2: Magnetic field reception by bicycle rims

Improved Loop Design

Bicycles are not the only vehicles that may not be detected by an insensitive loop detector system. Oftentimes a simple dipole loop sensor, especially a large one, will not detect a small car or a motorcycle. But if the traffic signal technician turns up the sensitivity of the detector circuit to detect the small vehicle, it may also detect a large vehicle in an adjacent lane when the sensor's lane is empty. The sensitivity of the dipole loop is actually weakest at its center, and strongest over its perimeter wires, the longest stretches of which are often routed near the lane edges. This makes the dipole loop configuration vulnerable to false positive detection when adjusted to detect small vehicles.

In order to address this reliability problem, many state and local DOTs have switched to a different loop configuration, called a quadrupole loop, as shown in Figure 3. A quadrupole loop is actually two loops wired in a figure-8 pattern side-by-side, in series with a single wire. Because each loop has two magnetic poles, the sensor has a total of four poles, hence the name quadrupole. The two poles are wound in opposite directions, such that whenever the magnetic North is pointing up out of one loop, it is pointing down into the adjacent loop. This creates a tight channelization of magnetic flux from one loop over into the other, resulting in maximum sensitivity over the center of the sensor footprint with much less spillover around the sides. Also note that the center sawcut in the loop, which runs parallel to the direction of vehicle travel, has twice as many conductors in it as the edge sawcuts, and the current runs in the same direction for all of the center-sawcut conductors. This makes the center sawcut the most sensitive place over which to position the bicycle's wheels. The magnetic flux lines around the center wire cut, moving from one coil into the other, will pass through the profile of the bicycle wheels for maximum effect.

From personal experience reported by various cyclists, dipole loops that are successful in detecting bicycles have a very small "sweet spot" (only about 20 mm each side of the wire loop). Quadrapole loops have a sweet spot about four times larger. Even this is smaller than desirable. The quadrapole loop offers at least four significant advantages over the dipole: 1. Improved sensitivity; 2. Lower false positive detection; 3. A larger "sweet spot" over the center wires; 4. More logical placement of the sweet spot (in the center of the lane).

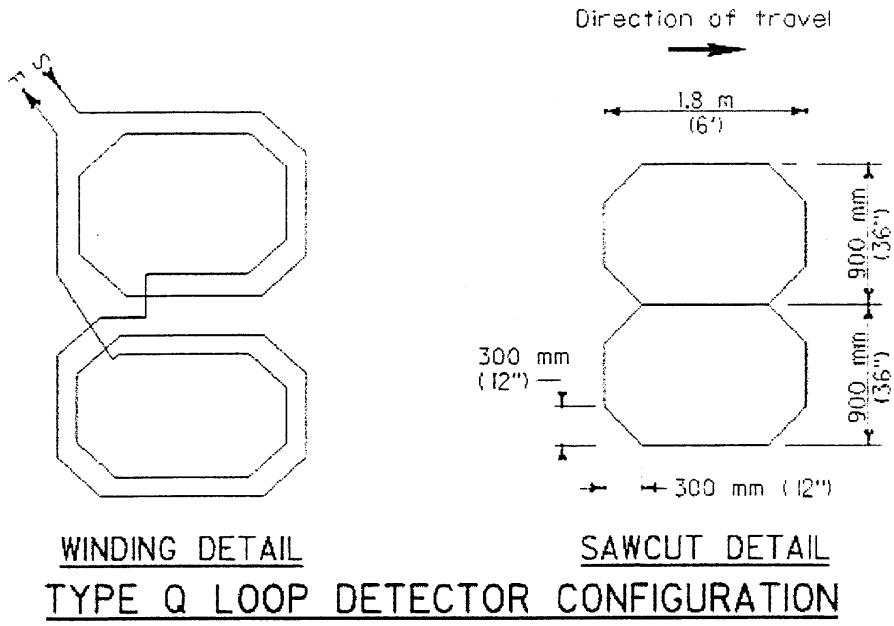


Figure 3: Small quadrupole loop sensor. (Source: California DOT)

The size of the quadrupole loop installation still has an impact on the ability of the sensor system to detect a bicycle. If the loop footprint is very long, such as the NCDOT standard of sixty feet, then the relatively small bicycle wheels will intercept a very small percentage of the magnetic flux generated by the loop. If the loop footprint is a more modest length, (for example six feet as in Figure 3) the larger relative size of the bicycle wheels in the path of the magnetic field will make them easier to detect. In fact, a small quadrupole loop at high sensitivity can usually detect a bicycle anywhere over the detector, not just over the center wire. This is the preferred performance for cyclists. As a compromise, detector circuits for loops as long as 25 feet or more can also be adjusted to detect bicycles over the center wire. If the loop is very much larger, however, there is an increased chance of false detection due to large vehicles in adjacent lanes.

In order to detect a bicycle waiting alone at a signal, the loop should be installed just behind the stop line. Note that it is important not to wire the small-footprint quadrupole in series with another loop sensor, as this will defeat the purpose of using the small loop for sensitivity. If additional, longer loop sensors are to be installed in the traffic lane behind the first one to bridge gaps between vehicles, these loops should be wired to separate detector channels.

Empirical Data

Cyclists' real-world experience with modestly-sized quadrupole (and dipole) loop detectors demonstrates that detection of bicycles with aluminum rims and frames not only is possible, but is no more difficult than with steel components. As an experiment, the author found a pair of quadrupole loop detectors in Cary, North Carolina (at the intersection of Cary Parkway and Two Creeks Drive) that happened to be adjusted sensitive enough to detect a lightweight steel-framed road bicycle (2002 Lemond Zurich) with 700c aluminum wheels positioned over the center sawcut. The author observed the

signal operation to ensure it was working properly on demand, rather than on a timer, and approached the intersection repeatedly from the cross streets when no other traffic was coming, after the signal had been green for the arterial for more than 30 seconds. The signal detected the bicycle and changed the signal phase for the arterial to yellow immediately. Detection reliability was 100%. The author then repeated the experiment with a lightweight aluminum-framed soft-tail suspension mountain bicycle (1999 Gary Fisher Sugar) with 26" aluminum rims. Detection was again 100% reliable.

In cities where signal technicians regularly adjust loop sensors to detect bicycles, the technicians will often use just aluminum rims, without the rest of the bicycle, to test the sensitivity of the sensor. This is more convenient for the technicians than carrying a bicycle just for this purpose. Since the sensors can be set to detect just the aluminum rims minus the frame, the sensors can also detect bicycles with frames that are made from more exotic materials that have little or no electrical conductivity, or have shapes that do not provide a wide loop profile for interception of magnetic flux. Cyclists with carbon-fiber bicycle frames but aluminum wheels have reported being detected by sensitive quadrupole loops.

Common Rim Materials

Most quality adult bicycles feature aluminum rims, which are excellent conductors. Lower quality bicycles and some older bicycles feature steel rims. Steel rims have lower conductivity than aluminum rims, per pound, but perform adequately for detection over a properly adjusted quadrupole loop sensor. Extremely low-weight wheels constructed of carbon fiber with no metal in the rim are sometimes used by racing cyclists for competitions. Carbon fiber is a conductor, but the loop conductivity of the wheel is affected by the materials used to bond it into shape. Very few cyclists use carbon fiber wheels for general utilitarian or recreational use on public roadways, however, because of their very high cost and somewhat lower durability than metal wheels.

The Diagonal Quadrupole

A disadvantage of the conventional quadrupole loop design shown in Figure 3 is that it under marginal operating conditions (a low-conductance bicycle, a low-sensitivity setting, or a large loop footprint) it requires the bicycle wheels to be positioned in a precise location (over the center wire) for detection to occur reliably. To eliminate this requirement, the diagonal quadrupole loop (Figure 4) was developed for better detection of narrow vehicles. This loop is designed with the poles farther apart and the loops at an angle to provide fairly uniform sensitivity across the width of the sensor, making it easier for cyclists to be detected. The way the sweet spot between the two loops sweeps diagonally across the footprint of the detector virtually guarantees that either the front or back wheel will cut across the magnetic field and be detected regardless of the bicyclist's lateral position over the loop.

There are two potential disadvantages to the diagonal quadrupole. First, it can be less sensitive than the conventional quadrupole to motor vehicles with a high undercarriage, such as tractor-trailers, but this may be rectified by placing a conventional quadrupole behind the diagonal quadrupole. Second, the sawcuts are more complex and acute, and may result in faster deterioration of the pavement surface by weakening it more than the would standard quadrupole cuts, but liberal application of pavement sealant can mitigate this. The diagonal quadrupole is desirable in places where bicycle position will be laterally distributed.

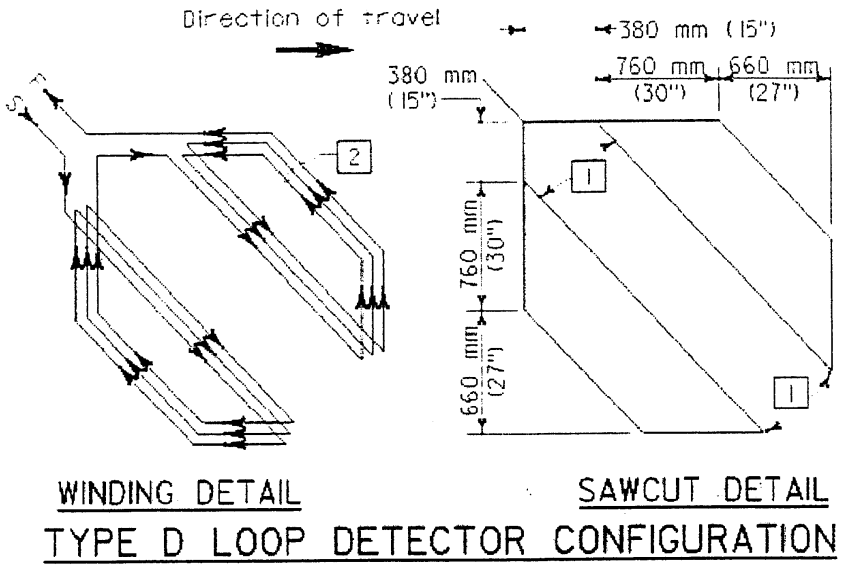


Figure 4: Diagonal quadrupole pattern (Source: California DOT)

Assistive Markings for Quadrupole Loops

When a roadway is repaved over the loop sawcuts, a cyclist cannot determine the location of the conventional quadrupole sensor's center wires, and as a result may not be able to position the bicycle's rims for detection. Some cyclists may not be aware of the best part of the loop for detection, or may not be aware of the function of inductive sensors in the first place. In order to address this problem, proposed Revision 2 of the 2000 edition of MUTCD specifies roadway markings to identify the center of the loop to cyclists (Figure 5), and specifies a road sign (Figure 6) to educate road users about the purpose of the markings.

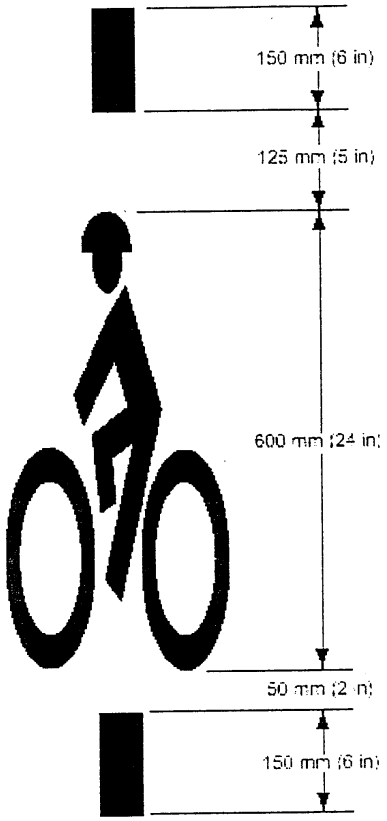
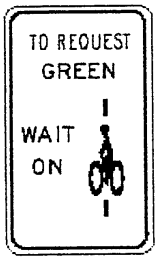


Figure 5: Stencil for marking location of most sensitive portion of traffic sensor (Source: 2000 MUTCD, Rev. 2)



R10-15

Figure 6: Informational sign describing optimum use of traffic sensor (Source: 2000 MUTCD, Rev. 2)

Detector Circuit Sensitivity

Detection of a bicycle over a well-designed quadrupole loop requires that the detector circuit be adjusted more sensitive than what is typically required for automobile detection. A bicycle can generate as little as 1% as much change in the loop inductance as an automobile does, especially for a poorly designed loop, because the car covers so much more area of magnetic flux, and has a high net conductivity. However, many commercially available detectors provide adequate sensitivity to accomplish this. According to Jim Magerkurth of US Traffic Corporation, a detector should provide an inductance change sensitivity level down to 0.0025% to reliably detect bicycles. Examples of such detectors include the US Traffic Corporation 262 series rack-mount detectors, which offer nine sensitivity levels. Shelf-mount detectors with this sensitivity include the US Traffic Corporation 921-2, 910 and 913 units. Such modern inductive loop detectors vary in price from $100 to $250. Note that some other models of detector systems on the market offer sensitivity to only 0.01% inductance change; such detectors should be avoided for bicycle-sensitive loop installations.

Good detectors can be adjusted to detect bicycles on quadrupole loops. As described by one signals

expert:

> *It is always possible to set a detector's sensitivity to pick up a bicycle. The trade-off is in longer detection times and the possibility of false detections from vehicles in adjacent lanes. Most people who set signal detectors use the lowest sensitivity setting that will pick up cars reliably. I advocate using the highest setting that will avoid picking up vehicles in adjacent lanes. Digital circuits used in modern detectors can use high sensitivity settings without unacceptable increases in detection times. Unfortunately, there are still a lot of old detectors out there, and most people who work on signals use principles based on the performance characteristics of old detectors.*
>
> - Bob Shanteau, PhD, PE, Registered Traffic Engineer (Source: Rec.Bicycles.FAQ)

Summary

Detection of bicycles by demand-actuated traffic signal sensors is important at cross streets, left-turn-only lanes and other travel lanes where cyclists may become stuck, unable to get a green light. Compact (not much longer than a bicycle) quadrupole loop detectors, located near the stop line and operated by suitably sensitive detector circuits, can reliably detect most bicycles waiting at traffic signals without generating false positive detection of vehicles in adjacent lanes due to spillover. Detection does not depend on the bicycle being made of iron, but the loop conductivity of the rims is important. As the quadrupole loop footprint increases in length, the chances that it may detect large vehicles in adjacent lanes increase. Many existing quadrupole loop installations with lengths of 20 feet are able to detect bicycles but operate acceptably. Quadrupole footprints that are much longer can also be adjusted to detect bicycles, but result in progressively increased probability of spillover effects. NCDOT standards that specify very long loop sizes should be revised to include a short bicycle-sensitive loop near the stop line. Lane markings that show cyclists where to position their bicycle maximize the capability of the sensor.

For more information:

"How to Turn Signals Green"

"Traffic Signals", http://www.bikeplan.com/signal.html

Alan Wachtel, "Re-Evaluating Signal Detector Loops", *Bicycle Forum* #50

John Forester, *Bicycle Transportation*, Second Edition, MIT Press, 1994

John Allen, "Traffic Signal Actuators: Am I Paranoid?"

Letter No. 18

SCOPE
Santa Clarita Organization for Planning and the Environment
TO PROMOTE, PROTECT AND PRESERVE THE ENVIRONMENT, ECOLOGY AND QUALITY OF LIFE IN THE SANTA CLARITA VALLEY
POST OFFICE BOX 1182, SANTA CLARITA, CA 91386

5-3-04

Jeff Hogan
Planning Dept.
City of Santa Clarita
23920 Valencia Blvd.
Santa Clarita, Ca. 91355

RECEIVED
CITY CLERK'S OFFICE
2004 MAY -3 P 5:2
CITY OF SANTA CLARITA

Re: River Park Project MC 02-175, SCH#2002091081

Dear Mr. Hogan:

Please find below our initial comments on the environmental impact report. We will be submitting additional comments and back up documents.

Biology

We are concerned about the adequacy of the biological surveys. As the City is well aware, this same environmental consultant (Impact Sciences) prepared the EIR for Newhall Ranch and did not disclose the spine flower(See attached LA Times article). Presence of the spade foot toad was not disclosed on this project even though many people were well aware of its existence. We request that *independent* new surveys for the arroyo toad be conducted according to required protocol. It has also come to our attention that Lou Courtois, the biologist on the previous project, ignored data regarding the toad and did not use required survey protocols. (See Attachments as listed.) Spadefoot toads were sighted in San Francisquito Canyon in 2001 and the sightings were confirmed by Scott Harris, Dept. of Fish and Game. Additional unmitigated impacts to the California fully protected Black-tailed jack rabbits, 1 2 3

We request disclosure of all confidentiality agreements between the developer and the consultants involved with this project. 4

Status reports on the Natural River Management Plan are required each April. We request that these reports be included by reference in the EIR. We further request that and independent firm, not Impact Sciences, be hired to perform the oversight. Impact Sciences is now conducting all environmental review for Newhall/Lennar projects and providing mitigation oversight. This creates a situation rife with conflicts of interest that no honest business entity would tolerate. 5

We request that public notification be required when additional surveys are conducted under such mitigation so that the public can be assured that proper protocols are followed. 6

Further, the City must address the cumulative impacts to the Santa Clara River watershed. Such impacts have been extensive and devastating. They include impacts to endangered species, water supply and water quality, and air pollution which the City itself has asserted during the CEMEX mine proceeding. We hereby submit and incorporate by reference all documents submitted and research conducted by the City of Santa Clarita and known to exist in its files, of public documents. regarding impacts to the Santa Clara River. We attach the recent Santa Clara River cumulative impact letter submitted by multiple organizations (see attached letter). These cumulative impacts must be addressed. 7

Water

Although an SB610 Assessment is provided, it neglects to adequately disclose current water demand from previously approved, but not yet built projects as found in the County the development monitoring system. The demand in the SB610 Assessment is only for existing connections and does not adequately disclose approved, but unbuilt projects. Up to date figures must be included in the water supply assessment and the water section of the EIR. 8

The water demand stated in the SB610 analysis is in fact less than that currently now being used according to the 2003 Santa Clarita water Supply report). Water used for agriculture must be included as existing demand according to the water code. Also, as the County is well aware, some 7000AF of the agricultural withdrawal was relied on to approve the Newhall Ranch specific Plan, so demand for this water already exists. 9

The SB610 analysis also includes water from the Saugus Aquifer that is polluted by ammonium perchlorate. This is contrary to requirements of the law regarding what can be counted as existing water supply (See section 10910(d)(1) and (2). We have attached documents that indicate the reduction in supply from that pollution and ask that this section be corrected. 10

Further, the SB610 analysis relies on the 41,000 acre foot water transfer for which there is no certified Environmental Impact Report. The EIR was decertified by the 2nd District Appellate Court in 2002 (*Friends of the Santa Clara River v. Castaic Lake Water Agency*). This is contrary to Section 10910(d)(2)((D). 11

We believe that it is improper to count the 41,000 acre foot water transfer from Kern County for planning purposes until the two decertified Environmental Impact Reports have been completed and approved by the respective lead agencies and the Courts.. It was clear that the neither the Courts nor the settlement agreement intended that this water transfer would be used to approve new projects, but only that water from it could be used for existing customers. Neither the Court nor the City of Santa Clarita may rely on the unpublished decision included in the Administrative record which merely addresses use of the transfer by current residents. We will be entering a number of supporting documents into the administrative record to provide the basis for this statement of fact. 12

Ammonium Perchlorate Pollution

At a public hearing. the project proponent stated that the water from contaminated wells closed due to excessive levels of ammonium perclorate pollution should be counted because they will be back on line in a year. 13

There is no supporting documentation to collaborate that statement. We have attached the DTSC clean-up schedule for your reference. Additionally, the process for well head clean up used in other localities does not clean to the state health goal level of 6ppb. The process in used in Puente Valley requires a brine line. The Santa Clarita Valley does not have a brine line. The Sanitation Districts recently investigated the cost of building a brine line during hearings to establish a TMDL for chlorides with the Regional Water Quality Board. They estimated the cost to be approximately $50 million. There is no funding for such a project. Condemnations and property acquisitions necessary to build the brine line would take years. 13

The second process put forward by the water agencies is bio remediation. This is still an experimental process requiring Dept. of Health Services certification before it can be used in the Santa Clarita Valley. Such certification normally takes two years. 14

Additionally, there is concern that, because of the mineral composition of the ground water in the Santa Clarita Valley, the proposed clean-up process will raise the levels of nitrates in the effluent. Ground water in the Santa Clarita Valley has been experiencing rising levels of nitrates (an indication of over draft) for the last several years. Many wells are well over the half mark to the maximum contaminant level allowed. Further increases in nitrate levels would not be acceptable. 15

Santa Clarita Valley Water Supply Report

This report was required of the water Agencies by Supervisor Antonovich beginning in 1999 to help evaluate the water supply in the Santa Clarita Valley. Disclosure of the water production reports is also required by the 1987 update to CLWA's enabling legislation (Water Code Chapter 103 Section 15.2(a)). It is important for the Commission to review the latest water production figures because of the substantial number of new units that are now requesting water service (an estimated 2000 to 4000 units). Such rapid increases in water demand must be evaluated before new approvals are granted. 16

It is now May of 2004 and this water supply report has not been released to the City or the public.

We assert that the Commission will not be able to adequately evaluate the water supply for this huge project without obtaining answers to the above issues. We therefore request that the issues be addressed and documentation supplied during the course of these hearings.

The City may not rely on an SB610 Assessment or and Urban Water Management Plan that it knows to be inaccurate.

We continue to protest the reliance on water withdrawals from the Santa Clara River in excess of safe yields. Water levels are dropping in wells in the eastern reaches and tributaries, an indication of overdraft, even though rainfall measured 24 inches last year, 10 inches above normal. Reliance on groundwater that will over draft the basin is contrary to the LA County General Plan, the Santa Clarita Area wide Plan and the City General Plan. (See attached documents.). Withdrawal in excess of safe yield that affects endangered species may also be contrary to SB610. There is no completed base line study on the Santa Clara River. Studies submitted to the public utilities commission show average production to be approximately 17

28,000 Acre Feet. Production has far exceed that amount over the last seven years (see Bachman study attachment). 17

Increased use of imported water and its affects on water quality were not addressed. Reliance on larger amounts of imported water may make compliance with the Chloride TMDL impossible. It already will result in the exceedance of health standards for Trihalomethane pollution in areas that must depend on higher ratios of imported water. 18

We request that these issues be addressed and that a Subsequent or Supplemental EIR be prepared and recirculated before this project is approved. 19

Hillside Management

This project proposes removal of a significant ridgeline. That ridgeline currently buffers and existing neighbor hood from the traffic and air pollution and would buffer this community from the significant impacts in those areas that will occur if the Newhall Ranch Road extension is approved. This project does not conform to the Hillside Ordinance of the City of Santa Clarita. It does not propose any amenities that would not otherwise be required as significant impacts under federal and state law. Therefore the City may not approve removal of the significant ridgeline. 20

Innovative Application Not Circulated

Apparently the applicant submitted an "Innovative Application" for the Ridgeline Ordinance at the April 20th meeting of the Planning Commission on this project . However, this application was not included, nor was it circulated in the Environmental Impact Report. Therefore, the impacts that would arise from any proposed change to make the project "innovative or move the project to comply with the hillside ordinance were not addressed in the EIR, nor provided as an alternative. We request that we receive a copy of this application and that any changes due to this proposal be properly circulated to the public to allow for adequate comment. 21

We propose an innovative alternative that would move the entire project back from the flood plain of the Santa Clara River and preserve both the River and provide oak tree avoidance. It would also provide mitigation areas for species such as the rare Black-tailed jack rabbit, the spadefoot toad Lizard. 22

Flood Hazard

The map of the project Significant Ecological Area, figure 4.6-6 of the additional Revised Biological Resources Information Document shows a severe constriction of river flow by this project and the project on the opposite bank, also owned by Newhall Land and Farming (Lennar Corp.). This constriction will cause back up of flood flows upstream of the project and increased velocity and erosiveness of flows downstream of the project (see attached Army Corps article from the New York Times.) Increased velocity will affect downstream property owners and jurisdictions. 23

As the City is already aware, the current constriction at Bouquet Bridge caused by a reduced bridge span, caused considerable damage to the bridge in the 1997 El Nino event, resulting in a huge cost (some $600,000) to the tax payers. We incorporate by reference all information 24

currently in the City files regarding previous flood damage. We believe that the constriction caused by illegal extension of the flood plain into the river by the project on the opposite bank must be addressed as a safety/flood hazard issue in this Environmental document. 25

Conclusion

We oppose this project in its current configuration. We request that a project alternative be submitted that adheres to the City's Hillside Ordinance and preserves a greater portion of the floodplain. This would also serve as mitigation for the impacts to the many rare and endangered species impacted by this project. Given the Santa Clarita Valley's current water supply problems, Lennar Corp. should also be required to provide a "no net loss" offset program for the proposed water usage on the project. This could include re-planting high water use landscape areas with lower water use, drought tolerant natives, a toilet replacement program, use of gray water, etc. Lastly, public and alternative non-auto modes of transportation must be incorporated into the project design to reduce air pollution. 26 27 28 29

In the past, the City has allowed changes to the project design without re-circulating the environmental document. Under such a method, by the time the project is approved, no one in the public can be sure exactly what is being proposed and how impacts are being addressed. We request in advance that changes (including those that have already occurred) be re-circulated and public comment allowed, before the project is approved. 30

Thank-you for your time.

Sincerely,

Larry Kanner

Attachments as indicated in the text and listed below

Attachments

1. LA Times Article on Newhall's failure to disclose

2. Arroyo toad occurance map,news articles on sitings, DFG letter
3. Cumulative Impact Letter
4. SB 610 Definition of existing water supplies
5. Reports showing continued contamination of the Saugus Aquifer and quantifying loss of production.
6. Water AGency reports indicating safe "perennial yeild is 32,000 AF and chart on water pumpage in the Santa Clara River
7. Rainfall and well level data
8. Bachman, PhD Hydrologist submittal to the PUC re: Santa Clara River
9. US Army Corps of Engineers article indicating impacts from flood flow constriction in a river system.

3/24/2003

Questions Surround Newhall Project

L.A. County supervisors plan to vote Tuesday. But opponents say the developer failed to provide accurate environmental data.

By Richard Fausset
Times Staff Writer

Los Angeles County supervisors will consider granting final approval to the 21,600-home Newhall Ranch project Tuesday, nearly three years after a judge forced the developer to prove it has enough water for the massive subdivision.

But some of the project's most serious complications spring from a different source — the discovery on the site of the endangered San Fernando Valley spineflower and fallout from an investigation into the developer's alleged destruction of the plant.

In county government, details of the spineflower case have led to a disagreement over the trustworthiness of Newhall Land & Farming Co.'s latest environmental reports, which supervisors will consider Tuesday. County biologist Daryl Koutnik said the planning staff is comfortable with the documents, but the supervisors' ecological advisory committee doubts whether the company's new environmental reports are complete.

"We're not dealing with a company here that is willing to divulge its information," committee member Frank Hovore said at a January meeting. "So why should we believe this information is even credible?"

The discovery of the plant on the development site was announced in May 2000, a few days before Kern County Superior Court Judge Roger D. Randall temporarily blocked supervisors' initial approval of the project.

More recently, the Los Angeles County district attorney's office investigated allegations that the developer destroyed some spineflowers, but dropped its probe in February as part of a settlement with Newhall.

The company asserts it did nothing wrong.

But others are not convinced. In a letter to her Los Angeles County colleagues this month, Ventura County Supervisor Kathy Long said public records provide "a clear picture of Newhall deliberately withholding spineflower discoveries from regulatory agencies, censoring consultant's conclusions made available to the public, and targeting spineflower colonies for destruction."

Others say the controversy has exposed flaws in Los Angeles County's environmental reporting procedures.

A state Assembly bill has been introduced to address the issue, and last week Supervisor Michael Antonovich introduced a motion to study changes locally.

If the supervisors are now wary of the system used to analyze Newhall Ranch, some opponents wonder why the board is considering a final vote on the project Tuesday.

> *'People are saying, "What else are these people not telling us?" '*
> **Teresa Savalkle,** Friends of the Santa Clara River

Such problems pose new challenges for officials who were already dealing with complex issues stemming from the proposal.

Despite a series of lawsuits that complicated the water rights picture, Newhall believes it has developed one of the most detailed water supply plans ever, with water coming from four sources — including purchases from a private company in Kern County, which critics see as a dangerous step toward privatization of California water.

Effect Reanalyzed

On Randall's orders, the company reanalyzed the project's effect on traffic, aquatic life and a wildlife corridor.

If supervisors sign off on the reports, they will still have to be approved by the Kern County court.

But the spineflower issue has provided new ammunition for critics who say that Newhall cannot be trusted to protect the fragile resources of the Santa Clarita Valley, one of Southern California's fastest-growing suburbs.

"People are saying, 'What else are these people not telling us?' " said Teresa Savalkie, a member of the group Friends of the Santa Clara River.

For Newhall, which has promised to create a preserve for the flowers as part of the settlement, the outcry is part of "a very concerted campaign on the part of a small group of people to make an issue of trust," spokeswoman Marlee Lauffer said.

"There have certainly been things that in retrospect we might have done differently," she said. "But never with any kind of intent."

The county advisory group, the Significant Ecological Area Technical Advisory Committee, is concerned that the new environmental reports were prepared by consultants hired by Newhall who were required to sign confidentiality agreements with the company.

The agreements forbid the consultants from discussing their findings with anyone, including government officials.

In the spineflower case, Newhall consultants who signed the agreements refused to be interviewed by state Department of Fish and Game investigators.

Citing such concerns, Ventura County — which filed the 1998 lawsuit to delay the project — has threatened a second legal action against Los Angeles County if the project is approved.

The Newhall Ranch property, which borders Ventura County on the west, caused officials there to fear that the project will encourage sprawl and overburden local roads and water supplies.

Santa Clarita environmentalists say the spineflower case is reminiscent of other controversies involving Newhall Land & Farming Co.

In 1991, a Newhall subsidiary pleaded no contest to charges of illegally altering the Santa Clara riverbed and jeopardizing the habitat of two endangered species, the least Bell's vireo songbird and the unarmored three-spined stickleback fish.

In a court settlement, the company agreed to pay $94,600 in fines and conduct $300,000 in habitat restoration.

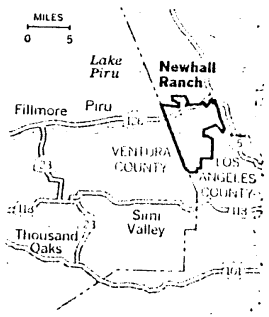
In 2000, environmentalists alleged the company was using electronic noisemakers to scare away endangered birds so they would not be found during surveys.

Newhall contended the machines were not used during the surveys, but during construction, for the safety of the birds. The U.S. Fish and Wildlife Service investigated the matter but declined to file charges.

Arroyo Toad

Questions about the spineflowers have led the advisory committee to doubt Newhall's assertion that another endangered species, the arroyo toad, has not been found on the Newhall Ranch property, Hovore said.

Because the frog has been found upstream and downstream of the development site on the Santa Clara River, the committee thinks the toad's presence within the project property is "likely," although Newhall's paid consultant did not find it there.



"We asked [the consultants] if there are arroyo toads [on the property] and they said, 'No, there are not,' " Hovore said at the meeting. "Well, how do we know they are telling the truth? They're under a confidentiality agreement."

County planner Lee Stark said Hovore's concerns were unfounded.

The documents under review need not go into so much detail, Stark said, because the company will have to conduct more in-depth surveys when it builds specific tracts on the property.

Lauffer said confidentiality agreements are common in the development industry and have no bearing on the reports.

"The whole issue has been blown so far out of proportion that it's ridiculous," she said. "All pertinent information is made public."

Anaheim Rethinks Motel Stay Ordinance

Hermosa Beach on Edge After Slaying

In a city of few

that the child died from as-
phyxiation and head

Impact Sciences, Inc.
112-16

Riverpark FEIR
December 2004

NRMP
Arroyo Toad Report
L E G E N D
Impact Sciences Arroyo Toad Sighting May 2001
Southwestern Pond Turtle Observation
Two-striped Garter Snake Observation
NRMP Survey Area
126
14
126
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FORMA
Figure 5
SPECIAL-STATUS
SPECIES LOCATIONS

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112-16

Capriati rallies for French title
SPORTS

Discover Toronto's history, hockey
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Employment guide to success
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EXPANDED COVERAGE
Daily News
Published in the Santa Clarita Valley
at 24800 Avenue Rockefeller, Valencia

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SANTA CLARITA
SUNDAY

WEATHER
Mostly sunny
Highs: 88-94
Lows: 55-62
Back of Viewpoint

signalwatch.com JUNE 13, 2004 ONE DOLLAR

Toad report overlooked

Sighting not used in key habitat decision

y Kathleen Sweeney
aff Writer

SANTA CLARITA — The rare 2-ch, greenish-gray toad recently found ong the banks of the Santa Clara iver was first spotted in the river ven years ago by a biologist now con-ucting surveys for Santa Clarita's rgest developer.

In 1994, Louis Courtois saw the royo southwestern toad east of the olden State (5) Freeway, according to e California Natural Diversity Data-se. But the U.S. Fish & Wildlife Ser-ce didn't discover the report until st month, after The Newhall Land and Farming Company's property was excluded from a critical habitat area for the toad — in part because the amphibian hadn't been found on its property.

"Somehow, it (the 1994 report) was overlooked," said Rick Farris, a senior biologist for the U.S. Fish & Wildlife Service. "We have no explanation why it wasn't accounted for."

The sighting of the endangered toad wasn't the last made by Courtois and other biologists working for the developer, records show.

According to Newhall Land's environmental impact report on its North Valencia I project, the toad was found in 1996 west of McBean Parkway and along the upper San Francisquito Creek — near the same area it was found two years prior. The report notes there is moderate potential for the toad in the area and good habitat.

In 1998, Frank Hovore, a biologist working for Newhall Land on its Westcreek and North Valencia II projects, was watching what he believed were arroyo toad eggs in San Francisquito Creek. Then, a large storm swept through the area, washing away the eggs.

In 1999, Courtois, surveying the Santa Clara River east of McBean Parkway for a Castaic Lake Water Agency project, concluded the toad didn't appear within the reaches of this project. But the U.S. Fish & Wildlife Service rejected that finding, saying the surveys weren't conducted within protocol, were incomplete, were conducted during adverse conditions or during a season of severe weather conditions and reporting requirements weren't fulfilled.

"You based your conclusions upon your inability to hear calling arroyo toads because of the 'overwhelming presence of other . species.' We do not agree that the inability to hear arroyo toads over background noise of other species necessarily results in the conclusion that the arroyo toads are absent from site," Fish & Wildlife officials wrote in a letter to Courtois.

See TOAD / Page 4

Riverpark FEIR
December 2004

Management proposal filed

TOAD / From Page 1

In 2000, while surveying land east of I-5 for an endangered fish — the unarmored threespined stickleback — for the Fish & Wildlife Service, Courtois identified six arroyo toads, but didn't report the finding until March 23 — after the critical habitat was identified for protection.

Farris said because the finding was made under a permit for work on the stickleback, law didn't require he immediately report the findings.

"It's possible that it wouldn't have had an effect," on the critical habitat designation, he said.

Nancy Sandburg, a biologist hired by the Center for Biological Diversity and Friends of the Santa Clara River, has since January discovered more than 10 arroyo toads along the Santa Clara River and San Francisquito Creek.

Lois Grunwald, Fish & Wildlife Service spokeswoman, said Newhall Land's property was excluded from the critical habitat area because the company submitted a Natural Rivers Management Plan outlining how the developer will protect any endangered species discovered on the property.

That plan didn't address the arroyo toad because surveyors didn't find evidence of the species, said Marlee Lauffer, Newhall Land spokeswoman. The company also was unaware of Courtois' 2000 findings until he reported it in March.

Because of the recent findings, although Newhall hasn't received Sandburg's report, the company is surveying for arroyos in the area again.

"If it is identified, there are mitigation measures that can deal with it," Lauffer said.

Dan Holland, an ecologist/herpetologist who studied the toads for five years at Camp Pendelton in northern San Diego County, discovered that arroyo toads can be present in a habitat without being seen.

"If you only go out and stand on the bridge and listen for the arroyo toad, that's not how to search for them," Holland said. "You may not find them even if they are there."

Temperature, available food, water flow and the time of year can either drive toads into the open or keep them buried in the sand along river banks. Usually, adults only come out at night.

The toad lives in rivers that have shallow pools adjacent to sandy terraces, and breeding occurs on large streams with persistent water from late March until mid-June, officials said.

The toad has lost about 75 percent of its historical habitat because of urbanization, dam construction beginning in the late 1900s and other activities, officials said. Because of habitat destruction, only eight drainages remain where they will live. The toad became a federally endangered species in January 1995.

While developers insist the river management plan will protect the toad, Holland said construction can disrupt habitat areas in several ways.

Building homes in the upland areas increases predators, such as raccoons, and eliminates habitat around the river where the toads travel.

Concrete soil river bank stabilization can suffocate buried toads, off-road vehicles or pedestrians following trails can squash the toads.

Also, a change in water velocity — which occurs when neighborhoods drain into waterways — will make the river or creek bed less suitable for the toad to lay eggs.

The Army Corps of Engineers and the U.S. Fish and Wildlife Service are reviewing th Newhall Land project permit and the river management plar a process that will take sever months.

Aaron Allen, senior projec manager for the Army Corp said Newhall Land is preparin a biological assessment of th management plan that will spe cifically address the possibl impacts for the toads. Once tha assessment is complete, th Corps and Fish & Wildlife Se vice will reinitiate consultatio on the project.

Until then, Newhall Land ha stopped construction, Alle said.

"All the information that i coming to light is all new infor mation to us," he said. "An that's why we are reinitiatin consultation for the species a this time."

SIX SIGHTINGS

Chronology: Biologists have documented six sightings since 1994 of the endangered arroyo southwestern toad.

Date	Location observed	Biologist
1994	East of Golden State (5) Freeway	Louis Courtois
1996	West of McBean Parkway and upper San Francisquito Creek	Unidentified
1998	San Francisquito Creek	Frank Hovore
2000	East of I-5 at Castaic Junction	Louis Courtois
2001	Critical habitat established	
2001	San Francisquito Creek and the Santa Clara River	Nancy Sandburg

Sources: U.S. Fish & Wildlife Service, The Newhall Land and Farming Company's environmental impact reports.

STATE OF CALIFORNIA-THE RESOURCES AGENCY
DEPARTMENT OF FISH AND GAME
South Coast Region 5
4949 View Ridge Avenue
San Diego, California 92123
(619) 467-4201

GRAY DAVIS, Governo

RECEIVED
JUL 06 2000

May 30, 2000

Mr. Ross Pistone
Newhall Land & Farming Co.
23823 W. Valencia Blvd
Valencia , CA 91355

Dear Mr. Pistone,

The California Department of Fish & Game (the Department) has reviewed the Verification Request Letter (VRL) and supporting documentation for the Decoro Bridge over San Francisquito Creek. This project is covered under Streambed Alteration Agreement 5-502-97, for projects under the Natural River Management Plan (NRMP) for the Santa Clara River and its tributaries. The following mitigation measures need to be incorporated into the document before the we can approve the project.

1. The Department has received information indicating the presence of Western Spadefoot toad (*Scaphiopus hammondi*), a state species of special concern, within the project area. This particular species was not included in the NRMP, possibly due to lack of information regarding it's presence in the area. This past year has provided optimal conditions for the Western Spadefoot, and unknown populations have been documented. Thought it will be impossible to survey for Western spadefoot during the proper time of year (January through May) on phase I of the project the species should be surveyed for prior to phase II. If the toad , tadpoles or eggs are found suitable measures should be implemented to salvage them. Salvaged specimens should be relocated to suitable habitat free from future project disturbance. Following mitigation measure BIO-1 (b) and BIO-2 will help minimize impacts to Western spadefoot, but the department will work with Valencia to develop the appropriate measures, and expand the NRMP to include this species.

2. Updated (Spring 2000) bird survey dates needs to be submitted for the project area. Surveys shall be conducted during the appropriate time of year, and include all species present. The Surveys shall be submitted to the Department for review and approval prior to commencing project activities. In the future the most recent bird surveys shall be submitted to the Department with the VRL's for project under the NRMP.

3. If project activities are proposed during the breeding season (March 15- September 1) surveys to detect nesting birds (not just listed or otherwise sensitive birds) shall be conducted as described in mitigation measure BIO-3(b). This measure was intended to protect all nesting birds. Section 3503 of the Fish and Game code state

"It is unlawful to take, possess or needlessly destroy the nest of any bird, except as otherwise provided by this code or any regulation adopted pursuant thereto." Breeding bird surveys shall be completed no earlier than 7 days prior to commencing activities. This is to ensure birds do not move into the area and begin nesting between the time survey are completed and construction begins. If work is going to be completed outside the breeding season, then nesting bird surveys will not be required.

4. If nesting birds are found, the nest sites shall be flagged/fenced and no construction activities shall occur within 300 feet of the nest(500 feet for raptors) until after the nest has fledged. The results of the pre-construction surveys including nest locations shall be submitted to the Betty Courtney of the Department upon survey completion. This information should be transmitted by fax to 661-263-8306. If birds begin nesting in habitat areas adjacent to the project site following the commencement of project activities, then work will not be stopped next to the new nest site. The stated project approach included the installation and use of electronic bird repelling devices along the northern and southern work limits prior to the start of the breeding/nesting season . This was intended as a safeguard to minimize bird activity with the defined work area. The Department does not approve of the placement of these type of devices.

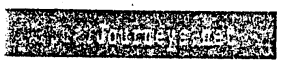
5. Project submitted under the NRMP were approved conceptually by the Department, since detailed CEQA review was to be completed by the lead agency for each individual project. The CEQA document needs to be submitted with the VRL for Department review, in order to adequately assess project impacts. Therefore, on future projects falling within the NRMP, the Department will require a copy of the CEQA document to be submitted with the VRL.

Thank you for you assistance in these matters. If you have any further questions please contact Betty Courtney, of my staff at (661) 263-8306.

Sincerely,

Morgan

C.F. Raysbrook
Regional Manager
Morgan Webb Per
Chuck Raybrook.



SCOPE

U.S. Army Corps of Engineers, Los Angeles District
Regulatory Branch – Ventura Field Office
ATTN: CESPL-CO—2004-00004-AOA
2151 Allesandro Drive, Suite 255
Ventura, California 93001
E: aaron.o.allen@usace.army.mil

VIA ELECTRONIC MAIL AND U.S. MAIL

Re: Comments on Public Notice/Application Number 2004-00004-AOA

December 15, 2003

Dear Mr. Allen:

The California Native Plant Society, Center for Biological Diversity, Environmental Defense Center, Environment Now, Friends of the Santa Clara River, Santa Clarita Organization for Planning and the Environment ("SCOPE"), San Fernando Valley Audubon Society, Audubon California, and Santa Clarita Sierra Club Group, VisualJourneys, and Ventura Coastkeeper (collectively referred to as the "Coalition") are all public interest organizations dedicated to water quality, air quality, habitat and open space conservation, as well and the quality of life for people who value these things. Our members and staff have long been concerned about the fate of the extremely significant biological resources of the Santa Clara River watershed. On behalf of our members, staff, and members of the public with an interest in protecting these resources, the Coalition submits the following comments on **Public Notice/Application Number 2004-00004-AOA** for the issuance of wetlands fill permit under Section 404 of the Clean

Water Act ("the Permit") for the Tapie and Spring Canyons east of Canyon Country, California ("Spring Canyon Project" or "Project").

I. Introduction

The Santa Clara River is southern California's last truly dynamic big river. It boasts one of the largest watersheds in the South Coast region at 1,600 miles, is the longest free-flowing river in Southern California, and is the only one that extends from the desert to the coast. The river is of critical biological importance linking several major ecoregions. It is also lined by riparian habitats so rare that they exist in only three to five percent of their original range in the western United States, and are home to twelve federally endangered species. Unfortunately, the Santa Clara River and its tributaries are within one of the most rapidly urbanizing watersheds in the state of California, making the area a high priority for monitoring and enforcing environmental regulations. Over twenty United States Army Corps of Engineers ("ACOE" or "Army Corps" or "Corps") permits have been issued in the area, paving the way for extensive urbanization and degradation of this pristine environment. Any alteration of this important area must be approached with the utmost caution so as not to destroy this ecologically and biologically important region.

Nevertheless, the Spring Canyon Project application, which proposes to discharge dredged or fill material into a tributary of the Santa Clara River, is supported by extremely limited substantive environmental analysis or documentation. Specifically, the application lacks an Environmental Impact Statement ("EIS"), a Least Environmentally Damaging Practicable Alternatives ("LEDPA") analysis, or a Cumulative Impacts ("CI") analysis. Furthermore, to the Coalition's knowledge, the Corps has not granted a hearing on this Permit application, or *any* other Section 404 permit application since at least 1998. As such, the Coalition strongly urges the Corps to extend or reopen the comment period once the necessary EIS, LEDPA, and CI analyses are completed and circulated to the public. Furthermore, the Coalition requests that the Corps grant a hearing to discuss the significant impacts associated with the Spring Canyon Project Permit and other proposed projects along the Santa Clara River.

II. Since the Application Materials Contain Insufficient Information for Meaningful Public Comment, the Public Comment Period Should be Extended and a Hearing Should be Granted

As discussed herein in further detail, there is insufficient information contained in the Public Notice/Application for the public to comment meaningfully on every aspect of the proposed Project. Environmental assessment documents referred to in the Permit application, which will eventually be submitted in support of the application, are not current, completed, or available for review. Specifically, the Permit application lacks an Environmental Assessment ("EA"), and a LEDPA analysis. Clearly the environmental impacts of the proposed Project and its alternatives need to be considered by the Army Corps, as well as commenting agencies and members of the affected public. In fact, the purpose of the public comment period is to provide the Corps with feedback on those

very assessments. Without the EA and LEDPA, the Corps' sister agencies and the public have little factual information about the Project on which to base substantive comments, and the comment period is rendered meaningless. Please note that while these and other deficiencies will be addressed in further detail below, it is impossible for the public to comment *fully* upon these issues at this point, given the incomplete information supplied by the application materials.

A. The Environmental Assessment is not Complete or Available for Review and Public Comment

Army Corps staff has indicated that an Environmental Assessment will be prepared for this Project pursuant to National Environmental Policy Act, 42 U.S.C. §§ 4321 et seq. ("NEPA") requirements. The EA will address more specific environmental impacts than those covered in the application. The Coalition asserts that an EA is insufficient for a project of this size and location, and that a full Environmental Impact Statement is required (*see* Section II below). Nevertheless, even the EA being conducted *pursuant to this Permit application* will not be completed during the comment period nor released to the public. As a result, no comments will be received on the Project's environmental impacts identified therein. The Corps has essentially denied the public any opportunity to provide feedback on the Project's environmental effects. If the Corps is to provide a meaningful chance for the public to comment on the entire Permit application, the EA must be made available for public comment when it is completed and incorporated into the Permit application.

Currently, the Permit application is incomplete; it contains virtually no assessment of the environmental effects of the proposed Project, provides no meaningful information on which to submit substantive comments, and fails to comply with the applicable laws. The application therefore must be denied.

B. The Required LEDPA Analysis is not Complete or Available for Review and Public Comment

The Federal Water Pollution Control Act, 33 U.S.C. 1251 et seq. ("Clean Water Act" or "CWA"), requires each applicant for a Section 404 permit to conduct a LEDPA analysis. 33 U.S.C. 1344(b)(1); 40 C.F.R. 230.10(a); *see* Section 404(b)(1) Guidelines for Specification of Disposal Sites for Dredged or Fill Material, 40 C.F.R. Part 230. Specifically, the CWA prohibits the discharge of dredged or fill material, and also the issuance of a Section 404 permit, if there is "a practicable alternative to the proposed discharge which would have a less adverse impact on the aquatic ecosystem, so long as the alternative does not have other significant adverse impacts." 40 C.F.R. 230.10(a). The LEDPA analysis is a critical portion of the application process, which serves as a good faith attempt to find ways to reduce the Project's impacts. In order to receive a Section 404 permit, the applicant must "demonstrate that the proposed project design is the least environmentally damaging practicable alternative." PN, p. 4.

However, while ACOE staff has indicated that the Permit applicant is currently drafting a LEDPA analysis, that document, like the EA, will not be completed or made available to the public during the public comment period. The Permit application merely states, "less damaging alternative designs include a smaller development that reduces impacts to waters of the United States, alternative location for the proposed development and the no federal action alternative (environmental baseline)." PN, p. 4. These alternatives are sweeping generalizations that provide the public with virtually no specific information. As such, it is impossible to evaluate the impacts of these alternatives.

Because no LEDPA analysis is available for review, no comments can be received or considered on any proposed alternatives identified therein. The Corps has essentially denied the public any opportunity to provide feedback on the environmental effects of the proposed alternatives to determine whether they are less damaging than the initial proposal and/or do not have other significant impacts themselves. If the Corps is to provide a meaningful chance for the public to comment on the entire Permit issuance, the LEDPA, as part of the Project application, must be made available for public comment when it is completed. Until then, the current Permit application is incomplete; it contains virtually no assessment of the proposed Project's alternatives and their environmental effects, provides no meaningful information on which to submit substantive comments, and the application must be denied.

C. The Public Comment Period Must be Reopened and a Hearing Granted in order to Allow for Meaningful Public Comment

Public participation in the CWA permitting process is of primary importance. "Congress enacted public participation rules understanding that 'these regulations would do more than pay lip service to public participation; instead 'the public must have a genuine opportunity to speak on the issue of protection of its waters' on federal, state and local levels.'" *Natural Resources Defense Council, Inc. v. U.S. EPA,* 859 F.2d 156, 177 (D.C. Cir. 1988). By failing to release the LEDPA and EA for public comment, the Corps denies the public a genuine opportunity to submit substantive comments on the Permit application and the Project's potential environmental impacts. The public must therefore be afforded the opportunity to comment on the EA and LEDPA analysis submitted in support of the Project's Section 404 application. Without these analyses, the public cannot sufficiently comment on the protections of its waters, and the public participation requirements are rendered meaningless.

Furthermore, the Spring Canyon Project is proposed in an area where numerous other development projects are proposed or occurring. Based on information available to the Coalition, at least twenty (20) ACOE permitted projects are proposed or exist along the Santa Clara River or its tributaries. These projects affect well over 3,000 acres of land, 12 acres of waters of the U.S., and 2.25 acres of wetlands. Nevertheless, the Corps has not conducted a cumulative impacts analysis for the Spring Canyon Project or the Santa Clara River region as a whole. Instead of requiring a complete EIS with a detailed CI analysis, the Corps consistently determines that EAs are sufficient for each individual project. However, EAs lack the detailed CI analysis. As a result, cumulative impacts are

not initially identified as significant, and are essentially ignored throughout the remainder of the Permit process.

Moreover, it is the Coalition's understanding that despite evident public concern, the Corps has not granted a *single* hearing on any of these permits issued in the Santa Clara River region since the August 1998 EIS drafted for the Valencia Company's Natural River Management Plan ("NRMP") project. By failing to conduct sufficient environmental review and/or release it to the public, as well as failing to hold hearings, the Corps has consistently excluded the public from participating in the Permit process in any meaningful way.

Therefore, the Coalition urges the Army Corps to extend or reopen the comment period on this Project once the required analyses have been completed, made available to the public, and other application deficiencies have been corrected. Furthermore, the Coalition requests that the Army Corps grant a hearing on this Permit to address the significant public concern regarding this Project.

III. The Army Corps Must Prepare an EIS on the Issuance of the Permit

The Public Notice of the Permit application states that a "preliminary determination has been made that an environmental impact statement ["EIS"] is not required for the proposed work." PN, p.2. The cursory conclusion that this massive 548-acre/542-unit Project will not have a significant impact on the environment is nonsensical. It is clear at this juncture that the ACOE must prepare an EIS on the issuance of this Permit.

The National Environmental Policy Act requires that an EIS be prepared for all "major Federal actions significantly affecting the quality of the human environment." 42 U.S.C. § 4332(2)(C). Whether a significant effect on the environment exists at a project site requires the consideration of two broad factors: "context and intensity." *See* 40 C.F.R. § 1508.27; 42 U.S.C. § 4332(2)(C). These factors are discussed in turn below.

A. Context

In determining whether a federal action is "significant," NEPA's implementing regulations require the Corps to analyze the significance of an action "in several contexts such as society as a whole (human, national), the affected region, the affected interests, and the locality. Significance varies with the setting of the proposed action. For instance, in the case of a site-specific action, significance would usually depend upon the effects in the locale rather than in the world as a whole. Both short- and long-term effects are relevant." 40 CFR 1508.27(a).

It is indisputable that the issuance of a 404 Permit for this Project mandates the preparation of an EIS when viewed in the context of Los Angeles County, Ventura County, the Southern California region, and/or nationally. This Project, when combined with the other projects either permitted or completed, will turn one of the last pristine

areas in Southern California into dense urban development destroying one of the most important areas for the preservation of biological diversity and protection of water quality in the region. Additionally, the growth inducing and cumulative impacts of this Project, which will be discussed in further detail below, will be devastating to the environment and have not been adequately disclosed by the PN.

The Santa Clara River is southern California's last truly dynamic big river. It boasts one of the largest watersheds in the South Coast region at 1,600 miles, is the longest free-flowing river in Southern California, and is the only one that extends from the desert to the coast. The river is of critical biological importance linking several major ecoregions: Coastal Plain, Coast Ranges, Traverse Ranges, and Mojave Desert. The 116 mile-long river rises on the northern slope of the San Gabriel Mountains in Los Angeles County, traverses Ventura County, lined by riparian habitat featuring willow, mulefat, and cottonwood forests – habitats so rare that they exist in only three to five percent of their original range in the western United States. These streamside habitats are home to twelve (12) federally endangered species among other sensitive wildlife habitat. Unfortunately, the Santa Clara River and its tributaries are within one of the most rapidly urbanizing watersheds in the state making the area a high priority for monitoring and enforcing environmental regulations.

In the context of both the Southern California region as well as nationally, any alternation of this important area, including the discharge dredged or fill material into a tributary of the Santa Clara River, must be approached with the utmost caution so as not to destroy this ecologically and biologically important area. The preparation of an EIS is therefore required to prevent further loss of important natural resources in Los Angeles County, benefiting both the Southern California region and the nation as a whole.

B. Intensity

An EIS is required for actions that threaten a severe or intense impact on the environment. 40 C.F.R. 1508.27 (b). The factors the Corps must consider in determining the intensity of the action are set forth at 40 C.F.R. § 1508.27(b). These include whether the action is related to other actions with individually insignificant but cumulatively significant impacts; the degree to which the proposed action affects public health or safety; unique characteristics of the geographic area such as proximity to historic or cultural resources, park lands, prime farmlands, wetlands, wild and scenic rivers, or ecologically critical areas; the degree to which the effects on the quality of the human environment are likely to be highly controversial; the degree to which the possible effects on the human environment are highly uncertain; the degree to which the action may adversely affect an endangered or threatened species or its habitat that has been determined to be critical under the Endangered Species Act, and; other factors.

Furthermore, the Corps must consider the effects of the Permit *over the entire project area*, because it is clear that the project could not occur but for the issuance of this 404 Permit by the Corps. 33 C.F.R. § 325, Appendix B 7(b)(2). The factors the ACOE should consider in its determination to prepare an EIS are discussed below.

i. *The Issuance of the Section 404 Permit is "Significant" and Requires an EIS because the Proposed Project will have Significant Cumulative Impacts on the Santa Clara River*

A federal action is considered significant and thus requires an EIS when it is "reasonable to anticipate a cumulatively significant impact on the environment." 40 C.F.R. 1580.27(b)(7). NEPA regulations define cumulative impact as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time." 40 CFR § 1508.7.

Based on the information contained in the PN, the environmental impact of this Project can only be considered to be extremely intense. The Spring Canyon Project is proposed in an area where numerous other urbanization projects exist. While NEPA even recognizes the cumulative impact of numerous but minor actions, the projects proposed along the Santa Clara River are more than minor – they are large-scale housing developments. Furthermore, the impact of the 548-acre Spring Canyon Project combined with the other projects along the Santa Clara River is anything but minor. Together these urbanization projects constitute a major impact on the river – one that threatens to devastate the entire watershed. As noted above, collectively, the projects along the Santa Clara River affect well over 3,000 acres of land, 12 acres of waters of the U.S., and 2.25 acres of wetlands. However, the Project proposal virtually ignores any direct, indirect and cumulative effects.

The Army Corps is fully aware of the potential cumulative impacts of extensive development along the Santa Clara River as evidenced by their EIS for the NRMP project. That EIS identifies the following environmental impacts as unavoidable: degradation of ambient air quality, loss of native habitats and adverse effects on flora and fauna; potential reduction in the quality of natural surface and groundwaters, reduction in natural vistas and visual amenities. Draft Environmental Impact Statement/ Environmental Impact Report, 404 Permit and 1603 Streambed Alteration Agreement for Portions of the Santa Clara River and its Tributaries, applicant: Valencia Company, December 1997 ("Valencia Co. EIS"), Ch. 4, p. 4-2. However, the Corps also concludes that that project's impacts "could combine with the similar impacts associated with the continued development of the region outside land owned by Valencia Company. The combination of these impacts may elevate smaller, less significant impacts (e.g. impacts to water quality and habitat) to potentially significant cumulative impacts." Id. at Ch. 4, p.4-3. Specifically, the Corps asserts that

> potentially significant cumulative impacts could occur due to the combined impacts of the proposed 404 permit/1603 Agreement and the following nearby projects: Tesoro del Valle, Newhall Ranch Specific plan; Valencia Commerce Coalition, South Fork Channel Clearing;

> Circulation Element Amendment, and LA County Pre-EL Nino Channel Clearing. Impacts of grater concern include loss of riparian wildlife habitat due to nearby stormwater runoff, water quality changes due to urban stormwater runoff, and effects on habitat for the unarmored three-spined stickleback and least Bell's vireo.

Id. at Ch. ES p. ES-11. The ACOE further states that the issuance of a Section 404 permit "would facilitate, in part, the occurrence of these impacts, because the permit would allow the installation of the necessary infrastructure for continual development." Id. at Ch 4-3. Despite their clear awareness of the potential cumulative effects caused by their issuance of the 404 Permit, the Corps failed to require a cumulative impacts analysis for the Spring Canyon Project.

(a) The Effects of Urbanization on the Santa Clara River are Significant

The impacts of urbanization resulting from large-scale development such as that occurring along the Santa Clara River are devastating. The Spring Canyon Project proposes to temporarily or permanently disturb "265.6 acres of the upland habitat," almost fifty percent of the total 548-acre site. PN, p 3. Turning natural vegetated areas into impervious surfaces such as houses, driveways, sidewalks, and roads will cause much of this "disturbance" thus generating increased stormwater runoff.

Studies and research conducted by "Regional agencies, academic institutions, and universities have identified storm water and urban runoff as significant sources of pollutants to surface waters in Southern California... Development and urbanization increase pollutant load, volume, and discharge velocity" by converting natural pervious ground, which has the ability to absorb rainwater runoff and remove pollutants, to impervious surfaces such as roadways, which act as pollution highways. *California Regional Water Quality Control Board, Los Angeles Region, Order No. 01-182, NPDES Permit No. CAS004001, Waste Discharge Requirements for Municipal Storm Water and Urban Runoff Discharges Within the County of Los Angeles, December 13, 2001* ("LA County MSWP"), p. 4.

Furthermore, the "increased volume, increased velocity, and discharge duration of storm water runoff from developed areas has the potential to greatly accelerate downstream erosion and impair stream habitat in natural drainages. Studies have demonstrated a direct correlation between the degree of imperviousness of an area and the degradation of its receiving waters. Significant declines in the biological integrity and physical habitat of streams and other receiving waters have been found to occur with as little as 10 percent conversion from natural to impervious surfaces. Percentage impervious cover is a reliable indicator and predictor of potential water quality degradation expected from new development." LA County MSWP, p.5

Alone, this Project virtually guarantees watershed and water quality degradation of the Santa Clara River. However, when the Spring Canyon Project is considered together with the numerous other projects on the river, the fate of the river is set in stone. As a result of the combined development pressure along its edges, the last free-flowing pristine river in Southern California will suffer intense habitat and water quality degradation from urban and stormwater runoff. Therefore, the Corps must prepare an EIS to assess the cumulative impact of the Spring Canyon Project, combined with the other development projects in the area, on the Santa Clara River and the surrounding habitats. Additionally, it is notable that the Corps has *never* undertaken an assessment of the cumulative impacts of *all* development projects and proposals on Santa Clara River and its tributaries. The Coalition recommends the Corps conduct a region-wide cumulative impacts analysis. Such an analysis would better inform the Corps about the potential effects along the river, and reduce the amount repetitive analysis required by individual cumulative impact analyses.

ii. *The Issuance of the Section 404 Permit without Considering Cumulative Impacts or Conducting a Hearing is a "Significant" Action and Requires an EIS because it May Establish a Precedent of Lenient Environmental Review for Future Permits.*

A federal action is considered significant and thus requires an EIS when it "may establish a precedent for future actions with significant effects." 40 C.F.R. 1580.27(b)(6). Issuing the Spring Canyon Permit without considering the cumulative impacts of the Project or conducting a hearing on the environmental effects and Project alternatives threatens to set a precedent of lenient environmental review for future 404 permits.

The Corps' Section 404 permitting process is defective. Despite their clear awareness of the cumulative impacts of each additional project that proceeds as a result of their permitting authority, the Corps has failed to require EISs for most projects. With the sole exception of the NRMP project, the Corps habitually relies on less intensive EAs to assess project impacts; the Coalition understands that the Corps will utilize this same flawed process for the Spring Canyon Project. However, Environmental Assessments fail to adequately analyze cumulative impacts. Based on the EA's inadequate cumulative impact analysis, analyzers conclude that an EIS is unnecessary.

Furthermore, as noted above, the Coalition believes that the Corps has not granted a single hearing on any of the permits issued in the Santa Clara River region. When the Corps fails to conduct the appropriate environmental review, the public is unable to fully comment on substantive environmental concerns. A public hearing is their only recourse, their only opportunity to voice their concerns about the Project and the Corps' permitting process. As a result of consistently failing to conduct the appropriate environmental review or grant public hearings, the Corps continually ignores cumulative impacts in direct violation of NEPA.

The Corps has already established a precedent of conducting lenient EAs instead of the more comprehensive EIS, which includes a cumulative impacts analysis. By issuing Spring Canyon's Section 404 Permit, again without conducting the appropriate environmental review or a hearing, the Corps legitimates their flawed process and establishes a precedent for future permit applications. Therefore, they must break this pattern by conducting an EIS for this and future projects that adequately assess the cumulative impacts of each projects combined with other projects along the river.

iii. *The Issuance of the Section 404 Permit is "Significant" and Requires an EIS because the Proposed Project will have Significant Impacts on the Wild and Scenic Santa Clara River*

In determining whether an action is significant and an EIS is necessary, NEPA requires that the Corps consider the unique characteristics of the geographic area in which the action is proposed, including its proximity to wetlands, wild and scenic rivers, and ecologically critical areas. 40 C.F.R. 1508.27(b)(3). As noted above (Section II(A)), the Santa Clara River is Southern California's last truly wild river. Its watershed contains rare and important wetland and other habitats found in few other places in the nation. Furthermore, the river is on the edge of the vast urban metropolis of the City of Los Angeles, and provides one of the last natural scenic areas in the county. The river is lined by hiking trails enjoyed by California residents and visitors. The proposed Project will result in massive urbanization of this natural area thereby significantly affecting this unique geographic region. Therefore, the Corps must prepare an EIS to consider the impacts of the Project on this unique geographic area with its wild and scenic river.

iv. *The Issuance of the Section 404 Permit is "Significant" and Requires an EIS because the Proposed Project May Jeopardize Federally Listed Endangered or Threatened Species*

In order to legally issue the Permit, the Army Corps must make a finding that the Project will not jeopardize the continued existence or adversely modify the critical habitat of any federally listed species. 40 C.F.R. § 230.10(b). The Army Corps has an independent duty under Section 7 of the Endangered Species Act ("ESA") to insure that any action authorized, funded, or carried out by the agency is not likely to jeopardize the continued existence of a listed species or result in the destruction or adverse modification of critical habitat (16 U.S.C. § 1536).

Based on a 2001 survey for the San Fernando Valley spineflower and the slender-horned spineflower, the Corps determined that the Project would not impact these two federally listed endangered or threatened species. This single and outdated survey is a woefully inadequate basis on which to determine the non-existence of the spineflowers.

Furthermore, the application makes a general claim that no other federally listed endangered or threatened species would be affected by the Project, but fails to indicate the basis, if any, for this determination. It fails to acknowledge that a significant number of other federally listed endangered or threatened species exist in the Santa Clara River

watershed, such as the endangered southwestern willow flycatcher (*Empidonax trailii extimus*) and least Bell's vireo (*Vireo bellii pusillus*), the threatened Santa Ana sucker (*Catostomus santaanae*), the endangered arroyo toad (*Bufo microscaphus californicus*). Thus, the application does not address the effect of the proposed Project on those species.

The Corps has a duty to make diligent efforts to identify any endangered or threatened species affected by the issuance of the 404 Permit, and they have failed. They must prepare an EIS to ensure the proposed Project will not affect the spineflowers or any other endangered or threatened species, including but not limited to those mentioned in this letter.

(a) The Application Failed to Analyze the Potentially Significant Effects of the Spring Canyon Project on the Unarmored threespine stickleback

The proposed Project will result in the complete destruction of 265 acres of extremely valuable and sensitive wildlife habitat. Nevertheless, it lacks any discussion of the Project's effects on the endangered Unarmored threespine stickleback (*Gasterosteus aculeatus williamsoni*) ("stickleback" or "UTS"), which is present only in northwestern Los Angeles County and western Santa Barbara County. This fish subspecies was listed as Endangered on October 13, 1970 (35 FR 16047), and is protected under the provisions of the Endangered Species Act of 1973 as amended. The likelihood that the Spring Canyon Project will jeopardize the continued existence of this listed species alone necessitates the preparation of an EIS.

Unarmored threespine sticklebacks are small fish (up to 6 centimeters) inhabiting slow moving reaches or quiet water microhabitats of streams and rivers. Favorable habitats usually are shaded by dense and abundant vegetation but in more open reaches algal mats or barriers, such as rock or fallen wood, may provide refuge for the species. Sticklebacks feed on insects, small crustaceans, and snails, and to a lesser degree, on flat worms and nematodes. Sticklebacks reproduce throughout the year with a minimum of breeding activity occurring from October to January. Reproduction occurs in areas with adequate aquatic vegetation and gentle flow of water where males establish and vigorously defend territories. The male builds the nest of fine plant debris and algal strands and courts all females that enter his territory; a single nest may contain the eggs of several females. Following spawning, the male defends the nest and, after approximately six days, the newly hatched fry. Sticklebacks are believed to live for only one year.

The UTS is a highly imperiled species whose decline has been well documented for the past several decades. The 1980 proposed rule designating critical habitat for the species states the following "Research commissioned or conducted by the Unarmored Threespine Stickleback Recovery Team indicates that the present status of this fish is precarious. Negative impacts resulting in or contributing to complete elimination of populations in various river systems are documented from large-scale impoundments, stream channelization, increased water turbidity, introduction of non-native competitors

and predators, and from water pollution of several kinds. Many of these impacts are corollary to increased urbanization in the Los Angeles Basin area." Proposed critical habitat designation, 45 Federal Register 76012.

Pollutants contained from any runoff or wastewater discharge from the Project, including polluted storm water would cause a negative impact on any stickleback population present downstream from the Project, possibly resulting in death or injury to one or many individual fish. UTS are documented to be extremely sensitive to pollution impacts associated with the effects of urbanization as noted in the 1980 proposed rule designating critical habitat, "Their survival would be affected adversely by activities greatly modifying water current, depth or vegetation, such as large scale impoundment, and by any activities resulting in serious increase of turbidity or even moderate increase of chemical burden, such as the addition of chlorinated water or chemicals for the control of algae or weeds." *Id.*

As stated in the proposed critical habitat designation, the stickleback requires clear water for its mating rituals, any introduction of silt or other debris that would discolor the water, or increase its opacity, would interfere with, or even completely disrupt the stickleback's successful reproduction. Such debris discharge is essentially guaranteed if the Corps issues the applicants Section 404 Permit. Furthermore, continuous modification of the river channel and banks, introduction of pollutants associated with urbanization, such as chlorine from water treatment facilities, and pesticides and fertilizer from landscaping will have severe detrimental affect on the stickleback.

Accordingly, the discharge of dredged or fill material pursuant to the proposed 404 Permit, as well as the highly polluted runoff that can be expected from the Spring Canyon Project are likely to harm any stickleback in the Santa Clara River in the vicinity of the Project. Alone, the fact that the Corps failed to analyze the potential impacts of the Permit and the proposed Project on this species necessitates an EIS to conduct this critical analysis.

v. The Issuance of the Section 404 Permit is "Significant" and Requires an EIS because the Effects of the Proposed Project Are Highly Controversial

Much controversy exists in the Santa Clara River watershed over the extensive development as evidenced by the numerous comments letters submitted on various development projects in the area. Comments have been submitted on the Spring Canyon Project by numerous other organizations, including South Coast Wildlands and Santa Clarita Sierra Club Group, and members of the Coalition have submitted comments on the majority of the other projects along the Santa Clara River. Additionally, even litigation has surrounded the following projects: Newhall Ranch, West Creek, and Pony League Fields. It is clear that from the numerous comments and lawsuits that development projects along the Santa Clara River are highly contested and controversial.

As such, the Corps is required to prepare an EIS prior to determining whether to issue or deny this Section 404 Permit application.

vi. The Issuance of the Section 404 Permit is "Significant" and Requires an EIS because the Effects of the Proposed Project Are Uncertain

As discussed in detail in Section II, the Permit application is incomplete. The Corps has failed to provide the public with adequate documentation of the environmental impacts of this Project, including the LEDPA analysis, and the EA. Further, the application lacks the required endangered species and cumulative impacts analysis. As such, it is clear that the effects of the proposed Project remain uncertain. Because the impacts are the subject of disagreement and uncertainty, the ACOE must prepare an EIS and make it publicly available for comment prior to determining whether to issue or deny this Section 404 Permit application.

IV. The 404 Permit Must Be Denied Because The Proposed Project is Insufficient to Document Compliance with the 404(b)(1) Guidelines

The ACOE's level of environmental review of direct, indirect, and cumulative impacts to waters of the U.S. and biological resources is grossly insufficient to satisfy the requirements of the CWA's 404 (b)(1) Guidelines. It has not been demonstrated that the Project is the Least Environmentally Damaging Practicable Alternative as required by the CWA implementing regulations, nor has it been demonstrated that the Project will not cause or contribute to the violation of applicable water quality standards, violate any toxic effluent standard under 33 C.F.R. § 1317, or jeopardize the continued existence of any federally listed species or adversely modify critical habitat under 40 C.F.R. § 230.10(a-b). It also has not been demonstrated that the Project will not cause significant degradation to waters of the U.S. as required by 40 C.F.R. § 230.10(c). The specific and extensive factual findings required to make these determinations have not been made as required by 40 C.F.R. § 230.11. Therefore the Permit application must be denied.

A. The Proposed Project is Not the Least Environmentally Damaging Practicable Alternative (40 C.F.R. 230.10(a))

As discussed above, the application lacks a LEDPA analysis as required by the 404(b)(1) Guidelines. 40 C.F.R. 230.10(a). Nevertheless, it is clear that the proposed Project is clearly *not* the least environmentally damaging practicable alternative. Practicable alternatives include "activities that do not involve a discharge of dredged or fill material into the waters of the United States" or discharges "of dredged or fill material at other location in waters of the United States or ocean waters." 40 C.F.R. 230.10(a)(1).

The Spring Canyon Permit applicant has the option to build its Project in a less ecologically sensitive area, reduce the size of the Project and increase the amount of open space, increase mitigation measures, or forgo building altogether. Until these options are

considered, the Corps cannot make a determination that the proposed Project is the LEDPA, and therefore must deny the Permit.

i. Environmental Impacts have not been Avoided, Minimized, and Mitigated to the Maximum Extent Practicable

No serious effort has been made by the applicant to avoid, minimize, and mitigate the impacts of the Project to wetlands and wildlife.

(a) Wetlands

Although the application addresses wetland mitigation, the applicant has not adequately described the proposed wetland mitigation plan. The application merely states that "to compensate for permanent impacts to 2.39 acres of waters of the United States that supports alluvial scrub habitat, the applicant proposes to restore and enhance approximately 4.78 acres of waters of the United States and adjacent upland habitat in the proposed preservation areas in the project area." PN, p. 4. No further description is offered for how this mitigation measure was determined or why additional avoidance, minimization, and mitigation has not been required, especially in light of the applicant's planned effect on the waters of the United States. Such restoration efforts may be inadequate in size and/or location. Furthermore, the proposal to "restore and enhance approximately 4.78 acres of waters of the United States and adjacent upland habitat in the proposed preservation areas in the project area" provides no assurance that any mitigation will in fact be accomplished.

In 1994, U.S. Fish and Wildlife Service ("FWS") completed a report evaluating thirty wetland creation projects authorized through the Corps section 404 program (DeWeese 1994).[1] Twenty-two of these projects ranged in age from three to five years old, and eight projects were greater than five years old at the time of the study. FWS found that the value of the habitat created, which included the local wildlife species that would be expected to use the habitat, was low. This was especially the case for seasonal wetlands that had a habitat value of only 40 percent of what existed previously. The study concluded that, of the 600 acres of proposed mitigation, half were meeting less than 75 percent of the mitigation conditions. Thus, the evidence suggests that creating healthy and productive wetlands is not as facile and straightforward as the applicant asserts.

In 2001, the National Research Council released a report entitled "Compensating for Wetland Losses Under the Clean Water Act" (National Research Council 2001).[2] This study concludes that the goal of no net loss has not been achieved through the Corps

[1] DeWeese, J. 1994. An evaluation of selected wetland creation projects authorized through the Corps of Engineers section 404 program. U. S. Fish and Wildlife Service, Sacramento, California. 90 pp. plus appendices.

[2] National Research Counci 2001. Compensating for wetlands under the Clean Water Act. National Academy Press. Available at http://www.nap.edu/. This study is hereby incorporated by reference and a copy will be provided to the Army Corps upon request.

regulatory program. The study points out that created wetlands are almost universally less valuable as wildlife habitat than naturally occurring wetlands. Finally, the study concludes that wetlands restoration and mitigation proposals often fail or are never carried out because the Army Corps lacks any enforcement or monitoring mechanism, so applicants often do not follow through on promised mitigation packages. Between 1986 and 1997, the nation continued to lose approximately 60,000 acres of wetlands per year.[3]

In light of these disturbing facts, if the Army Corps is to even consider permitting the destruction of some of the most valuable remaining streams, drainages, and wetlands in the Santa Clara River basin, it must increase mitigation ratios. Equally as important, the Army Corps must specify an enforceable mitigation-monitoring plan, which will ensure compliance, and that success criteria are met. Until this occurs, the 404 Permit must not be issued because impacts have in fact not been avoided, minimized, and mitigated to the maximum extent practicable. In the alternative, if the Corps does not deny the Permit application outright, it must prepare an EIS on the effect of the Permit issuance.

(b) Wildlife

The Permit application addresses impacts to wildlife in a cursory and conclusory fashion. There is no analysis of or mitigation for proposed for impacts to wildlife. The Santa Clara River is an extremely important habitat for numerous plant and animal species, and analysis of the projects effects on the wildlife is crucial.

The Santa Clara River is a key wildlife corridor that connects the Los Padres and Angeles National Forests and the San Gabriel and Sierra Pelona Mountains. Continued and uncontrolled development in the area will result in habitat loss and fragmentation causing the disturbance or even decimation of numerous native species. Habitat fragmentation disturbs the natural movement of animals through the habitat corridors affecting the food chain as well as the herbivore-plant interactions.

The habitat along the Santa Clara River supports the largest community of riparian-obligate birds between the Santa Ynez River in Santa Barbara County and the Prado Basin in Riverside County. The Audubon Society designated this area as an Important Bird Area. Some of the sensitive bird species that occur within this stretch of the Santa Clara River include: least Bell's vireo, southwestern willow flycatcher, yellow-billed cuckoo, Cooper's hawk, sharp shin hawk, merlin, prairie falcon, yellow breasted chat, yellow warbler, common yellowthroat, mountain plover, western burrowing owl, long-eared owl, ferruginous hawk, white-tailed kite, tri-colored blackbirds, and many other sensitive raptors and songbirds.

Additionally, the Santa Clara River basin supports a diverse mammal population. Mammals observed or expected to inhabit in this area include: California leaf-nosed bat, small-footed myotis, long-eared myotis, fringed myotis, long-legged myotis, Yuma myotis, pale Townsend's big-eared bat, spotted bat, pallid bat, California mastiff bat, San

[3] Id.

Diego black-tailed jack rabbit, San Diego desert woodrat, Los Angeles pocket mouse, ringtail, mountain lion, bobcat, coyote, gray fox, American badger, and deer. Reptiles include: western pond turtle, San Diego horned lizard, California horned lizard, coastal western whiptail, silvery legless lizard, rosy boa, San Bernadino ringneck snake, and two-striped garter snake. Insects include: riverside fairy shrimp, and San Emigdio blue.

The river, itself, is home to various aquatic species including unarmored threespined stickleback, arroyo chub, Santa Ana sucker, and steelhead trout. Amphibians occurring include: arroyo toad, western spade-foot toad, and California red-legged frog. Many California native and rare plants are also present in the river habitat. The Santa Clara River area supports many plant communities that are recognized as "rare and worthy of consideration" (California Natural Diversity Database, 2002). They include: southern willow scrub, southern sycamore alder riparian woodland, southern cottonwood willow riparian forest, southern riparian scrub, southern coast live oak riparian forest, and Riversidean alluvial fan scrub. Additionally other rare plant species that have the potential to be present within the Santa Clara River floodplain include: Nevins barberry (*Berberis nevinii*) a federally and state listed endangered shrub and a California Native Plant Society list 1B species, the slender-horned spineflower (*Dodecahema leptoceras*), a federally and state listed endangered annual species and a CNPS list 1B species, and a potentially new taxa of sunflower (*Helianthus* sp. *nova*) has been discovered on the Newhall Ranch property along the Santa Clara River, but the species has yet to be described. The slender mariposa lily (*Calochortus clavatus* var. *gracilis*), and Mason's neststraw (*Stylocline masonii*) are all CNPS list 1B plants that have the potential to be present in the floodplain. Amphibians present in the river include: arroyo toad, western spade-foot toad, and the California red-legged frog. Many California native and rare plants are also present in the river habitat.

While the above list is not exhaustive of the incredible wildlife that inhabits the Santa Clara River area, it exhibits the rich diversity and importance of preserving habitat for these species. Nevertheless, despite the diverse wildlife populations present in the Project area and surrounding areas, apparently no comprehensive and current wildlife surveys have even been conducted. Surveys must be conducted according to USFWS or CDFG or other scientifically accepted protocols for all special-status species that may inhabit the Project area. This should be done pursuant to an EIS on the Army Corps' issuance of the Permit. However, this information should be part of the 404 application package, as the Army Corps has an independent duty to insure that impacts to wildlife have been avoided, minimized and mitigated to the maximum possible, and the public has a right and an interest in commenting upon the proposal. The comment period should be extended and/or reopened so that the public has a chance to comment upon the impacts to wildlife. Additionally, further mitigation must be proposed once additional information on impacts has been supplied through the EIS processes.

C. The Proposed Project has not Demonstrated that it will not Cause or Contribute to Violations of Water Quality Standards or Toxic Effluent Standards (40 C.F.R. 230.10(g)(1-2)

Section 404(b) Guidelines prohibit discharges from the proposed Project that cause or contribute to violations of water quality standards or toxic effluent standards. 40 C.F.R. 230.10(g)(1-2). However, the Permit application wholly fails to address proposed or potential discharges from the Project.

The Santa Clara River is listed as an impaired water body on the Clean Water Act 303(d) list for the following pollutants: (1) Ammonia, (2) Chloride, (3) Coliform, (4) Nitrate/Nitrite, and (5) Organic enrichment. The River is not achieving water quality standards for these pollutants, and thus, by definition, is not supporting its designated beneficial uses. Nevertheless, the Permit application fails to mention the river's 303(d) listing or analyze the Project's impact on water quality standards. These are pollutants that are potentially discharged from storm water runoff associated with industrial activities. The Corps' Permit may not legally authorize the discharge of these impairing pollutants above water quality standards and therefore the Permit application must assess the impacts of the Project on water quality. 40 CFR § 131.12.

While the Corps or the applicant may argue that compliance with California's Construction General Permit ("CGP") will insure the ***Project*** will not impair water quality, the 2003 CGP Guidance Document (attached hereto as Appendix 1) clearly states that "the best assurance of complying with receiving water limits is to prevent or limit runoff of all polluting substances from constriction sites through effective BMPs [Best Management Practices]." State Water Resources Control Board, *Construction Storm Water Sampling and Analysis Guidance Document*, August 2003 ("CGP Guidance Document"), Section 3.5, What are the Applicable Water Quality Standards. Furthermore, the State Water Resources Control Board notes that the monitoring program in the CGP cannot insure compliance with water quality standards at an individual site. The Guidance Documents states that "[w]hile sampling and analysis as required by the CGP may be a useful tool in pointing to areas of concern, it is also important to recognize the limitations of sampling in the storm water context and to use it as a diagnostic tool rather than as conclusive evidence of compliance or non-compliance with the CGP." *Id.* at Section 1.3, Purpose of Sampling and Analysis. Therefore the Army Corps cannot rely on a Section 404 permitees' compliance with the CGP to insure compliance with water quality standards. As demonstrated in Section III, extensive stormwater and urban runoff can be expected from the completed Project, which will almost certainly contribute to the violation of water quality standards and/or toxic effluent limits. (*See* Section III(B)(i)). Therefore, the application does not comply with 401(b)(1) Guidelines and must be denied.

D. The Proposed Project has not Demonstrated that it will not Impact the Endangered Unarmored Three Spine Stickleback, or other Federally Endangered or Listed Species (40 C.F.R. 230.10(g)(3))

As discussed above in Section III, the application fails to analyze the Project's effects on the endangered stickleback or other federally listed endangered or threatened species as required by NEPA. The CWA requires a similar analysis of the effects on

endangered species. Specifically, the Corps is prohibited from issuing a permit that jeopardizes threatened or endangered species. 40 C.F.R. 230.10(g)(3). The Corps has not demonstrated that the Project will not impact these species. Therefore, the application does not comply with 401(b)(1) Guidelines and must be denied.

E. The Proposed Project has not Demonstrated that its Discharges will not Cause or Contribute to Significant Degradation of the Waters of the US (40 C.F.R. 230.10(e))

Just as the application fails to include a LEDPA analysis, a discussion of water quality impacts, or impacts on numerous endangered or threatened species, it also fails to demonstrate that the Project's discharge of dredged or fill material will not cause or contribute to degradation of waters of the United States. CWA implementing regulations prohibit the Corps from issuing a permit where such degradation will occur. 40 C.F.R. 230.10(e). Until the applicant can demonstrate that the Project's discharges will not result in water quality degradation, the Corps may not issue this Section 404 Permit.

Furthermore, as discussed in the previous section, the impacts of urbanization are severe. If approved, this Section 404 Permit will essentially authorize the development of over two hundred acres of natural area and significantly increase the amount of impervious surfaces (streets, homes, driveways, etc.), and ultimately storm water and urban runoff into the Santa Clara River and its tributaries. This runoff, especially when combined with the runoff from other development projects along the river, has the potential to significantly degrade the Santa Clara River and/or its tributaries, all waters of the United States. Therefore, because they have not demonstrated the Project will not contribute to river degradation, the application does not comply with 401(b)(1) Guidelines and must be denied.

VI. The Proposed Project is Not in the Public Interest

In order to issue the Permit, the Army Corps must make a finding pursuant 33 C.F.R. § 320.4 that the issuance of a permit for this Project is in the public interest. Even if issuance of the Permit were otherwise lawful, which it is not, it is clear that the issuance this Permit is *not* in the public interest. The proposed Project would destroy one of the most important ecological areas in Los Angeles County, and essentially insure the build-out of the region. The applicant will profit economically, but the public will bear the burden of the destruction of our precious natural heritage.

On a more fundamental level, this Project represents suburban sprawl at its worst. Some may argue that growth is inevitable. Even so, the growth permitted by the Corps should be "smart growth" centered in already developed areas, where the environmental impacts are less severe and where public transportation and other public services can be provided. At any rate, the Corps cannot and should not rubber stamp permit applications that are inadequate, as is the case here. The ACOE as a trustee agency has discretionary permitting authority over the land and resources that are the subject of the 404 permit

application. The ACOE should exercise that authority in the public interest and deny the requested Permit.

VII. Conclusion

The Coalition thanks you for the opportunity to comment on this Permit and strongly urges the Corps to extend or reopen the comment period once the necessary EIS, LEDPA, and cumulative impacts analysis are completed and circulated to the public. Furthermore, the Coalition requests that the Corps grant a hearing to discuss the significant impacts associated with the Spring Canyon Permit and other proposed projects along the Santa Clara River.

Sincerely yours,

/s/
Illene Anderson
California Native Plant Society

/s/
Lynne Plambeck
SCOPE

/s/
Peter Galvin
Center for Biological Diversity

/s/
Daniel Cooper
Audubon California

/s/
John Buse
Environmental Defense Center

/s/
Henry Schutz
Santa Clarita Sierra Club Group

/s/
Dave Myerson
Environment Now

/s/
Kris Ohlenkamp
San Fernando Valley Audubon Society

/s/
Ron Bottoroff
Friends of the Santa Clara River

/s/
Damon Wing
Ventura Coastkeeper

/s/
Andrew Harvey
VisualJourney

Appendix 1: State Water Resources Control Board, *Construction Storm Water Sampling and Analysis Guidance Document*, August 2003.

Guidebook for Implementation of Senate Bill 610 and Senate Bill 221 of 2001

to assist water suppliers, cities, and counties in integrating water and land use planning

Prepared by the California Department of Water Resources

October 8, 2003

Section 5 - Code Citations
Step One: Documenting wholesale water supplies

Water Code section 10910

(d)(1) The assessment required by this section shall include an identification of any existing water supply entitlements, water rights, or water service contracts relevant to the identified water supply for the proposed project, and a description of the quantities of water received in prior years by the public water system, or the city or county if either is required to comply with this part pursuant to subdivision (b), under the existing water supply entitlements, water rights, or water service contracts.

(2) An identification of existing water supply entitlements, water rights, or water service contracts held by the public water system, or the city or county if either is required to comply with this part pursuant to subdivision (b), shall be demonstrated by providing information related to all of the following:

(A) Written contracts or other proof of entitlement to an identified water supply.

(B) Copies of a capital outlay program for financing the delivery of a water supply that has been adopted by the public water system.

(C) Federal, state, and local permits for construction of necessary infrastructure associated with delivering the water supply.

(D) Any necessary regulatory approvals that are required in order to be able to convey or deliver the water supply.

(e) If no water has been received in prior years by the public water system, or the city or county if either is required to comply with this part pursuant to subdivision (b), under the existing water supply entitlements, water rights, or water service contracts, the public water system, or the city or county if either is required to comply with this part pursuant to subdivision (b), shall also include in its water assessment pursuant to subdivision (c), an identification of the other public water systems or water service contract holders that receive a water supply or have existing water supply entitlements, water rights, or water service contracts, to the same source of water as the public water system, or the city or county if either is required to comply with this part pursuant to subdivision (b), has identified as a source of water supply within its water assessments.

Guidebook for Implementation of Senate Bill 610 and Senate Bill 221 of 2001

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SCAG: QUALITY OF LIFE IS DECLINING
NEWS

Cedric
is back for more in 'Barbershop 2'

NFL MAY SEE YOUTH MOVEMENT
SPORTS

EXPANDED COVERAGE
Daily News

Published in the
Santa Clarita Valley
at 24800 Avenue Rockefeller, Valencia

6 04259 00002 8

SANTA CLARITA
EDITION

WEATHER
Mostly sunny
Highs: 66-73
Lows: 42-48
Air quality: Good
For details, see back of Business

Online: santaclarita.dailynews.com
FRIDAY, FEBRUARY 6, 2004
DESIGNATED AREAS HIGHER 50¢

Bermite cleanup slowed

Federal funds to fix munitions site dry up

By Susan Abram
Staff Writer

SANTA CLARITA — The flow of federal funding for studies of the contaminated soil and groundwater on the former Bermite site is uncertain this year, which means the U.S. Army Corps of Engineers might finish the work it has started and leave the actual cleanup to the landowners.

The announcement came Wednesday Group meeting in which Army Corps project engineer Larry Sievers said federal funding for further testing on the 996-acre property, including well drilling, seems questionable given the nation's budget constraints.

But a lack of funding will not impede on any cleanup plans, officials emphasized.

we're in line for a balance share of it, but because the budget is really tight this year, it doesn't look like we're going to get it," Sievers said.

About $1 million is left of the $4.8 million that has been allocated since 2001 for testing, Sievers said. Funding is provided by both federal and local agencies such as the Castaic Lake Water

Whittaker Corp., which operated the explosives factory until 1987, is finishing the work left after the current owner of the land in the center of Santa Clarita dropped its plans to build 2,911 homes.

Last year, engineers began drilling several wells near a suspected hot spot where the Army Corps discovered groundwater that contained 58,000 parts

rocket fuel propellant shown to be dangerous in concentrations as low as 1 part per billion, according to the federal Environmental Protection Agency.

The wells allow investigators to measure the size and scope of the pollution as well as help determine the best way to clean it up.

In addition, Whittaker began work on a pilot program designed to find the best way to rid the defunct factory's soil of perchlorate. State officials believe the

...ong@dailynews.com

Slow progress on site cleanup

BERMITE / From Page 1

chemical has leaked into the ground and contaminated Santa Clarita's backup supply for drinking water. Five municipal wells have been shut down because of the perchlorate levels.

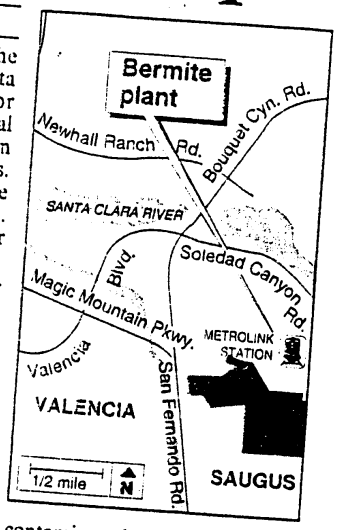
"The good news is we've done a lot of work," Sievers said. "We're beginning to assemble our conceptual model."

Sara Amir of the state Department of Toxic Substances Control agreed that the Army Corps has taken the project far enough so that other agencies can take over. She said the pace of the investigations and testing has been encouraging.

"The Army Corps has done a lot of work already," she said. "Whittaker will be doing a lot of groundwater monitoring and well installation. What (the Army Corps) had planned was to install some very deep monitoring wells, and it would have been good, but if they don't get it now, they can get to it later on."

The Santa Clarita City Council has said the city's best chance of quickly cleaning up Bermite and the city's water supply was if Cherokee Investment Partners, a North Carolina-based firm that specializes in working with contaminated properties, would come and build a mix of homes and commercial developments on the land.

However, Cherokee's bid for the land has stalled because of the $65 million worth of liens on the property. The company has been unable to come to terms with all the lien holders, Cherokee officials have said.



Susan Abram, (661) 257-5257
susan.abram@dailynews.com

OPERABLE UNIT SCHEDULE FOR THE FORMER WHITTAKER-BERMITE FACILITY
22116 WEST SOLEDAD CANYON ROAD
SANTA CLARITA

November 2003
(Reproduced from DTSC Original Schedule)

OPERABLE UNIT	WORKPLAN DUE	INVESTIGATION REPORT	FINAL RI REPORT DUE	FINAL FS REPORT DUE	DRAFT RAP DUE	FINAL RAP DUE	EXPECTED DATE OF CERTIFICATION
OU1	Complete	Complete	Dec. 2003	Dec. 2003	Jan 2004	Mar 2004	June 2005
OU2/OU6	Complete	Aug. 2003	Dec. 2003	May 2004	Sept 2004	Nov. 2004	Nov 2006
OU3	July 2003	Jan. 2004	May 2004	Sept. 2004	Jan. 2005	Mar. 2005	Mar 2007
OU4	Jan. 2004	July 2004	Jan. 2005	Mar. 2005	July 2005	Sept. 2005	Nov. 2006
OU5	Dec. 2003	May 2004	Sept. 2004	Dec. 2004	Mar. 2005	May 2005	May 2007
OU7 Alluvium	June 2003	Jan. 2004	June 2004	Dec. 2004	June 2005	Aug. 2005	Aug. 2010
OU7 Saugus	July 2003	Jan. 2004	June 2004	Dec. 2004	June 2005	Aug. 2005	Aug. 2010

S:\PBS\ADVANCE\PTABELA\Agency Meetings\DTSC OU Clean Up Schedule.doc

Los Angeles District

Citizens Advisory Group Update on City of Santa Clarita, CA

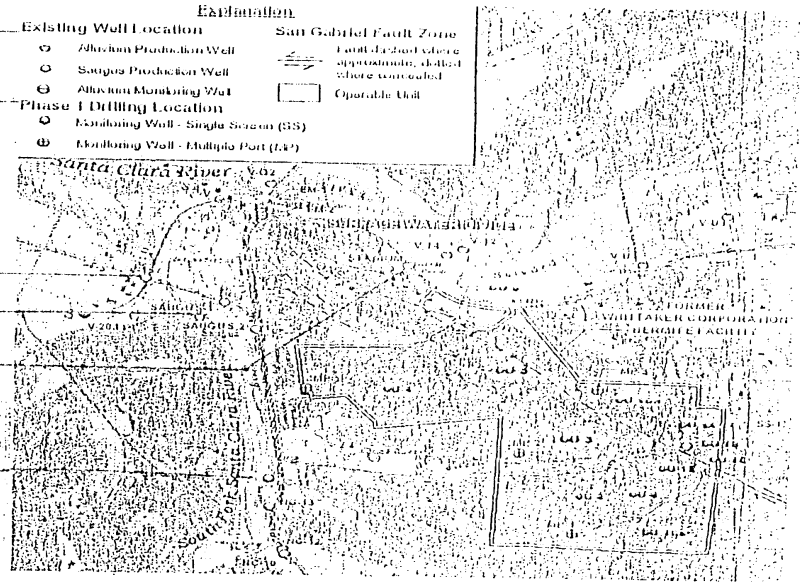
Eastern Santa Clara Subbasin Groundwater Study

December 10, 2003
Larry Sievers
213 452 3989
Larry.A.Sievers@usace.army.mil

Los Angeles District

Impacted Production Wells

Well ID	Total Cased Depth (ft)	Formation Perforated	Maximum Concentration (µg/L)
Inactive since 1997/1998:			
V-157	2,014	Saugus	Perchlorate = 14 TCE = 3.8
Saugus-1	1,640	Saugus	Perchlorate = 42 TCE = 3.9
Saugus-2	1,612	Saugus	Perchlorate = 47 TCE = 1.3
NC-11	1,136	Saugus	Perchlorate = 23 TCE = ND
Recently on inactive status:			
Stadium	~150	Alluvium	Perchlorate = 5.9 TCE = ND



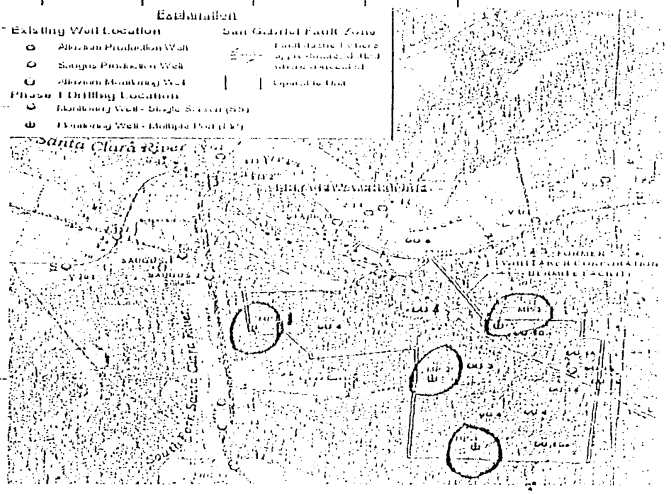
V-157
Saugus 1&2
Stadium
NC-11

Los Angeles District

Perchlorate - MP Wells

Screen	MP-1			MP-2			MP-4			MP-3		
	Elev.	Rd. 1	Rd. 2	Elev.	Rd. 1	Rd. 2	Elev.	Rd. 1	Rd. 2	Elev.	Rd. 1	Rd. 2
1	935	20.9	23.7	1,101	58,200	64,500 J	1,022	3.5/ ND	ND/ ND	1,260	ND	ND
2	785	9.1/ 9.7	114/ 113	897	53,700/ 44,600	13,200 J	827	ND	ND	1,176	7.8	ND
3	645	14.9	29.9	827	21,400	72.2 J	485	ND	ND	997	18.7/ 23.6	ND
4	429	2 J	ND	657	99.6	ND/ 1.06 J	309	ND	ND	829	18.5	ND/ ND
5	344	2.5 J	ND	336	ND	4.5 J	209	ND	ND			
6	193	1.8 J	ND	201	267	33,400 J /23,800						
7	13	ND	ND									
8	-47	3.7 J	2 J									
9	-233	6.6	ND									
10	-363	ND	ND									

Concentration reported in µg/L
Elev. = MP port elevation in feet msl
J = Estimated value
ND = Not detected

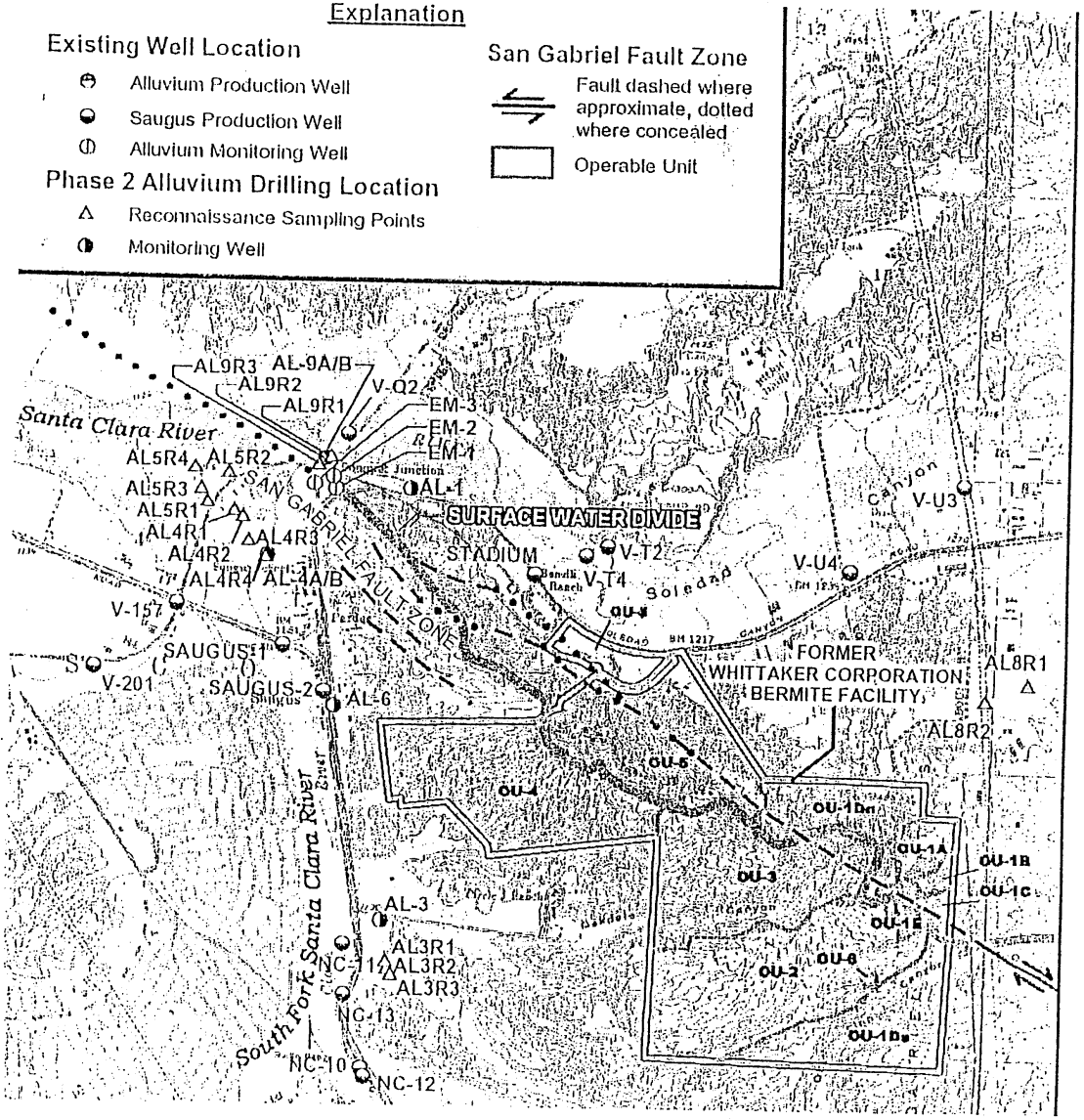


Los Angeles District

Perchlorate - AL Recon

Sampling Point	AL-4		AL-5		AL-9	
	Depth	Conc.	Depth	Conc.	Depth	Conc.
R1	56	3.6	46	2.9 J	40	30.3
R1	66	2.7 J	56	2.0 J	47	38.9
R2	56	6.9	46	ND	41	17.6/18.0
R2	81	2.0 J	56	ND	51	31.2
R2	-	-	76	ND	-	-
R3	56	8.8	46	ND	-	-
R3	66	4.9/4.6	56	ND	-	-
R4	56	12.9	46	ND	-	-
R4	77	2.6 J	56	ND	-	-

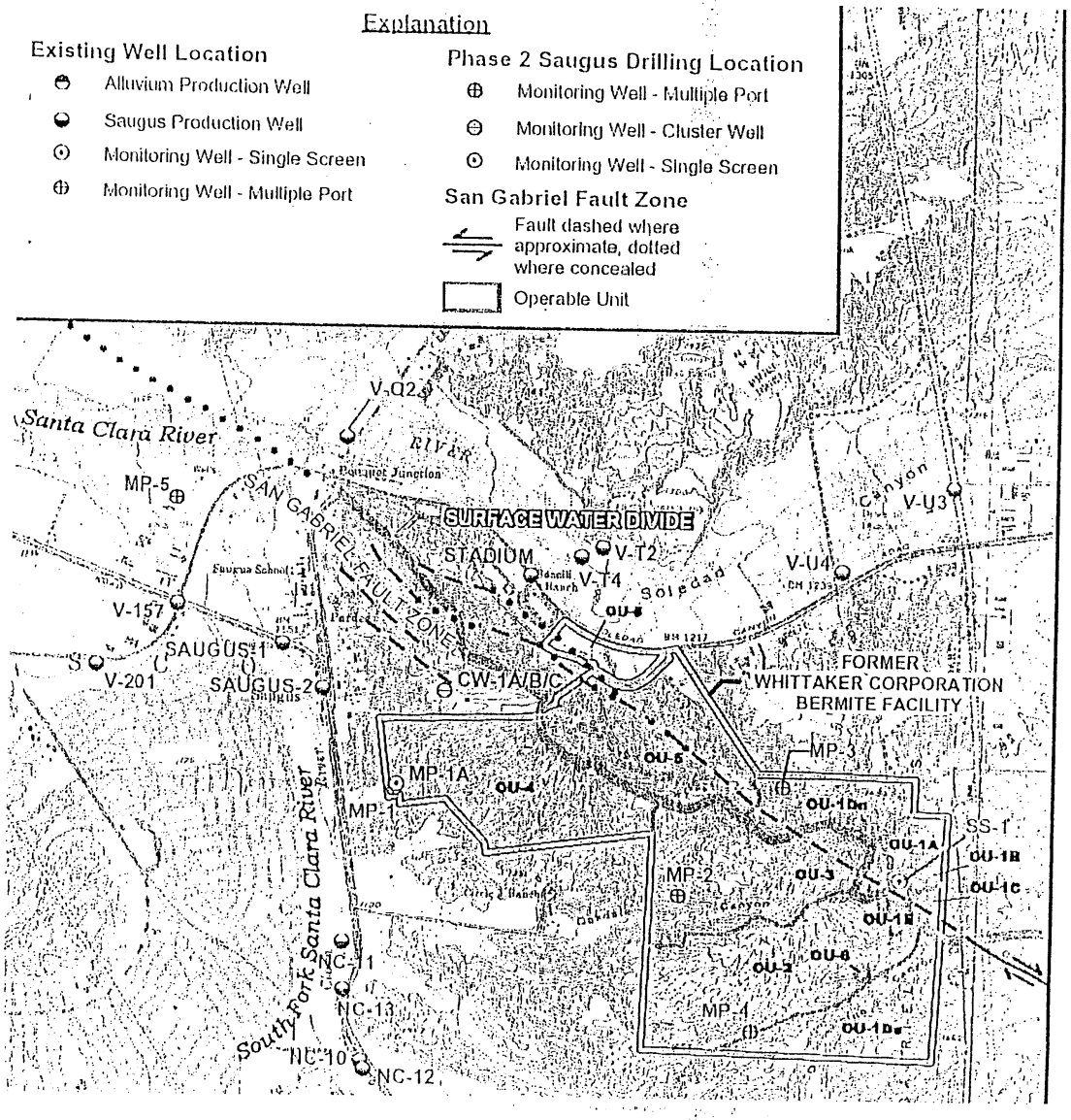
Conc. = reported in µg/L
Depth = in feet below ground surface
J = Estimated value
ND = Not detected



Alluvium

Phase 2 Monitoring Well Locations

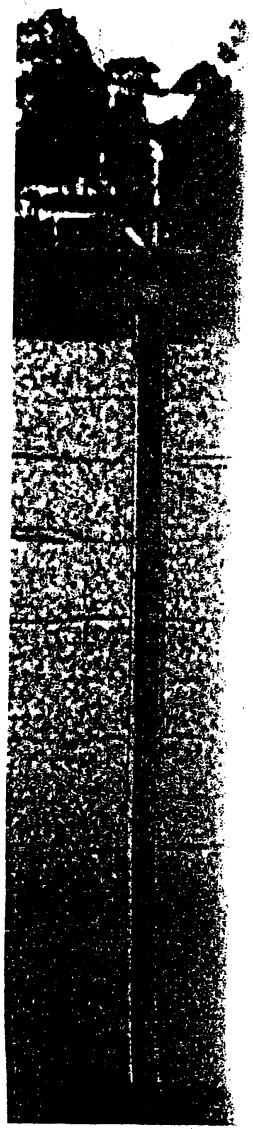
Will be sampled again in Jan 04



Saugus Formation

Phase 2 Monitoring Well Locations

Will be sampled again in Jan 04



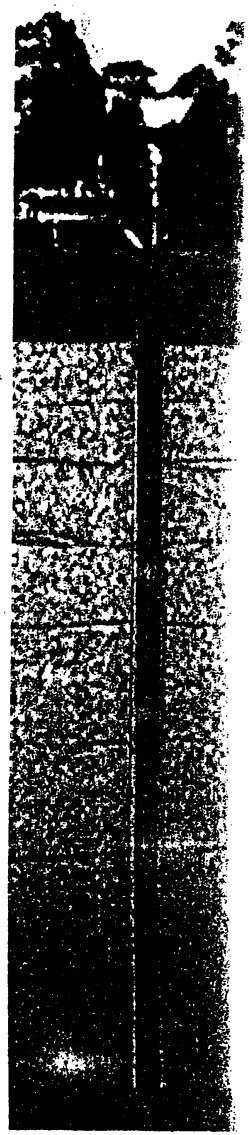
Groundwater Modeling Analysis
Upper Santa Clara River Basin

Restoring Impacted Water Supplies Near Whittaker-Bermite

presented by

John Porcello/CH2M HILL

December 10, 2003



Objectives and Methods

- Evaluate pumping strategies for impacted wells that meet specific goals
  - Restoring lost water supplies
    - Saugus: 4,000 AF/yr
    - Alluvium: 700-1,000 AF/yr
  - Protecting downgradient wells
- Develop and apply groundwater flow model

FREDERIC A. FUDACZ (SBN 050546)
ANDREW J. YAMAMOTO (SBN 138884)
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Telephone: (213) 612-7800
Facsimile: (213) 612-7801

Attorneys for Plaintiffs and Counter-Defendants Castaic Lake Water Agency; Newhall County Water District; Santa Clarita Water Company; and Valencia Water Company

UNITED STATES DISTRICT COURT

CENTRAL DISTRICT OF CALIFORNIA

CASTAIC LAKE WATER AGENCY; NEWHALL COUNTY WATER DISTRICT; SANTA CLARITA WATER COMPANY; and VALENCIA WATER COMPANY,

Plaintiffs,

vs.

WHITTAKER CORPORATION; SANTA CLARITA LLC; REMEDIATION FINANCIAL, INC.; and DOES 1-10, Inclusive,

Defendants.

SANTA CLARITA, L.L.C.,

Counter-Claimant,

vs.

CASTAIC LAKE WATER AGENCY; NEWHALL COUNTY WATER DISTRICT; SANTA CLARITA WATER COMPANY; and VALENCIA WATER COMPANY

Counter-Defendants.

Case No.: 00-12613AHM(RZx)

PLAINTIFFS' AND COUNTER-DEFENDANTS' CASE MANAGEMENT PROPOSAL; DECLARATION OF PROFESSOR E. JOHN LIST IN SUPPORT OF PLAINTIFFS' AND COUNTER-DEFENDANTS' CASE MANAGEMENT PROPOSAL; and DECLARATION OF ANDREW J. YAMAMOTO IN SUPPORT OF PLAINTIFFS' AND COUNTER-DEFENDANTS' CASE MANAGEMENT PROPOSAL ATTACHED

222638_2.DOC

WHITTAKER CORPORATION,

Counter-Claimant,

vs.

CASTAIC LAKE WATER AGENCY; NEWHALL COUNTY WATER DISTRICT; SANTA CLARITA WATER COMPANY; and VALENCIA WATER COMPANY

Counter-Defendants.

I, E. John List, Ph.D., P.E., declare as follows:

1. I received a Masters in Engineering from the University of Auckland, New Zealand. I received a Ph.D. in Applied Mechanics and Mathematics from of the California Institute of Technology.

2. After completing my doctorate, I spent three years on the faculty of the University of Auckland. In 1969, I moved to Caltech, serving as Professor of Environmental Engineering Science from 1978 to 1997 and as Executive Officer for Environmental Engineering Science from 1980 to 1985. Presently, I am Professor Emeritus of Environmental Engineering Science at Caltech. I am also President of Flow Science Incorporated and Principal Consultant of Environmental Defense Sciences.

3. I have consulted with more than 400 industrial organizations, consulting engineers, and government agencies. I have co-authored three books, including the award winning Handbook of Groundwater Development, and published over forty articles on fluid dynamics and environmental sciences. I have provided written, verbal or deposition testimony as an expert witness in over 10 cases. I am currently serving as a jointly designated independent peer review expert in the case entitled U.S. Environmental Protection Agency v. General Electric. A true and correct copy of my resume is attached as Exhibit "A" hereto.

4. I have reviewed many scientific reports and other documents related to the Whittaker Bermite Facility and the perchlorate problem in the groundwater found in the Saugus Formation in the Santa Clarita Valley. The documents that I reviewed include public documents on the former Whittaker Bermite Facility from the Department of Toxic Substances Control's Glendale Office and technical reports prepared by consultants hired by Santa Clarita LLC and/or the Whittaker Corporation. This

Bermite Facility from the Department of Toxic Substances Control's Glendale Office and technical reports prepared by consultants hired by Santa Clarita LLC and/or the Whittaker Corporation. This declaration is based on my review of the scientific evidence regarding the Whittaker Bermite Facility, and if called to testify as an expert witness in this action, I would and could competently testify to the following.

5. Reports on the Whittaker Bermite Facility prepared by consultants hired by Santa Clarita LLC and/or the Whittaker Corporation indicate that explosive products and rocket fuels were blended or used at the facility from 1934 to 1987. The explosive products and/or rocket fuels contained ammonium perchlorate and potassium perchlorate.

6. The available data show that the groundwater elevation in Saugus Formation at the former Whittaker Bermite Facility is higher than at the locations of Plaintiffs' impacted Saugus Formation groundwater wells: NC-11, Saugus 1 and 2, and VWC-157 (collectively, "Impacted Wells"). The Impacted Wells are located about one mile from the Whittaker Bermite Property.

7. Various reports, the majority prepared by consultants hired by Santa Clarita LLC or Whittaker Corporation, confirm that perchlorate is present in the soil, groundwater, and surface-water runoff at the former Whittaker Bermite Facility.

8. Subsurface water generally flows from regions of higher groundwater elevation to regions of lower groundwater elevation. The groundwater elevation at the former Whittaker Bermite Facility is higher than at the Impacted Wells making the Impacted Wells down gradient of the former Whittaker Bermite Facility. Water quality tests have also found perchlorate in the Impacted Wells west of the facility.

9. Large-scale use of perchlorate is generally associated with the manufacture or use of explosives and solid fuel propellants. I am aware of no evidence suggesting that the property between the former Whittaker Bermite Facility and the Plaintiffs' impacted wells was used to manufacture or use explosive or solid propulsion fuels.

10. Perchlorate is not a naturally occurring chemical in California. Perchlorate is very mobile in aqueous systems and can persist for many decades under typical groundwater and surface water conditions because it does not react in low concentrations with other available constituents.

11. Based on my review of the reports prepared by consultants hired by Santa Clarita LLC or Whittaker Corporation, it appears clear that perchlorate from the former Whittaker Bermite Facility is the source of the perchlorate found at the Plaintiffs' groundwater wells. Although I am aware that one might hypothesize that there are alternate sources of the perchlorate reaching the Impacted Wells, I am aware of no plausible source of the perchlorate in the Impacted Wells besides the Whittaker Bermite Facility.

12. Perchlorate naturally will continue its down-gradient migration and may spread to other groundwater wells until response actions are implemented to abate the spread of perchlorate.

13. It is my professional judgment that the pumping of groundwater from the Impacted Wells, and treatment of the water to remove perchlorate, should be implemented promptly to help retard the spread of the perchlorate plume(s) emanating from the Whittaker Bermite Facility. Delaying such a groundwater treatment program will likely allow the plume(s) to spread.

I declare under penalty of perjury that the foregoing is true and correct.

Executed within the United States on June 1, 2001.

E. John List, Ph.D., P.E.

ERICSON JOHN LIST
President, Flow Science Incorporated
Professor *Emeritus* of Environmental Engineering Science
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PERSONAL

Citizenship:	U.S.A. Passport No. 031734111
Birthdate:	March 27, 1939
Place of Birth:	Whakatane, New Zealand
Home Address:	251 South Orange Grove Blvd., Pasadena, CA

EDUCATION

1965	Ph.D.	California Institute of Technology (Applied Mechanics and Mathematics)
1962	M.E. (Civil Eng.)	University of Auckland, N.Z.
1962	B.Sc. (Mathematics)	University of Auckland, N.Z.
1961	B.E. (First Class)	University of Auckland, N.Z.

POSITIONS HELD

Dr. List is currently President of Flow Science Incorporated and Principal Consultant at Environmental Defense Sciences. He was Professor of Environmental Engineering Science at the California Institute of Technology from 1978-1997. He joined the faculty at Caltech in 1969 as an Assistant Professor, after spending three years as a lecturer and senior lecturer at the University of Auckland. For the period 1980-1985, he was Executive Officer for Environmental Engineering Science at Caltech.

TEACHING EXPERIENCE

Fluid mechanics, turbulent diffusion, density-stratified flow, flow in porous media, introductory oceanography and meteorology, classical applied mathematics, singular perturbations, non-linear waves, mathematical programming and simulation, probability and statistics, solid mechanics, hydrologic transport processes, environmental fluid mechanics.

RESEARCH INTERESTS

Turbulent diffusion, buoyancy-modified flows, particle coagulation, coastal ocean and estuarine processes, transient flows, flow in porous media.

EXHIBIT A

INSTITUTE AFFAIRS

Professor List has served on sixteen different administrative and faculty committees, including a term as Vice-Chair of the Faculty (1979-81), and chair of the following Faculty Committees: Athletics and Physical Education (1975-79), Curriculum (1981-84), Membership and Bylaws (1979-81), and Nominating (1978-79). He served on the JPL Classified Research Oversight Committee for a period of six years.

EDITOR

Journal of Hydraulic Engineering, American Society of Civil Engineers, 1984-1989

MEMBERSHIP

Fellow of American Society of Civil Engineers
Chair, Hydrologic Transport and Dispersion Committee, 1983-84
Chair, Awards Committee, Hydraulics Division, 1994
Co-Chair, Third International Symposium on Stratified Flows, 1987
Consulting Engineers Association of California
Chair, Engineering Excellence Committee, 1989

AWARDS AND RECOGNITION

Fulbright Scholar, 1962
National Science Foundation Award for Special Creativity, 1982
Who's Who in America
Who's Who in Engineering
Who's Who in the West

REGISTRATION

Professional Civil Engineer No. 36791, State of California
Professional Engineer No. 20646, State of South Carolina

VISITING COMMITTEES

University of California, Irvine, School of Engineering, 1983, 1989
Stanford University, Palo Alto, Department of Civil Engineering, 1984
University of British Columbia, School of Engineering, 1990

BOARDS

Flow Science Incorporated, Pasadena, California (Chair) 1982-Present
City of Pasadena, Blue Ribbon Commission 1976-1978
Environmental Defense Sciences, Pasadena, California 1997-Present

CONSULTING

Professor List has consulted with more than 400 industrial organizations, consulting engineers and governmental agencies, including PetroBras, Southern California Edison, Chevron, IBM Corporation, Exxon, Cargill Corporation, City and County of San Francisco, City of Seattle, City of San Diego, City of Los Angeles, Los Angeles County, Sacramento County, U.S. Corps of Engineers, U.S. Navy, Metropolitan Water District of Southern California, City and County of Honolulu, Southern Nevada Water Agency. He has authored reports in the following areas of work: geothermal flows, river control modeling, power plant cooling systems, brine and wastewater diffusers, dredge spoil disposal, river dispersion, solar heat storage systems, reservoir destratification and mixing, well testing and failure, pulsation control and water hammer, pipeline failure, groundwater mass balance, ocean current and temperature analysis, acoustic resonance in piping systems, gas transfer, ocean dispersion, and biodegradation of organo-chlorines.

PUBLICATIONS

Professor List is co-author of the texts *Mixing in Inland and Coastal Waters* (Academic Press, 1979), *Turbulent Buoyant Jets and Plumes* (Pergamon Press, 1983), and *Handbook of Groundwater Development* (Wiley, 1990). In addition, he is the author or co-author of the following refereed publications :

[1] "Steady flow of precipitation to an infinite series of tile drains above an impervious layer," *J. Geophys. Res.*, **29**: 3371-3381, 1964.

[2] "A quasi-stable density-stratified flow in a saturated porous medium," *Proc. 2nd Aus. Conf. Fluid Mech.*, Auckland, N.Z., December 1965.

[3] "Lateral dispersion in saturated porous media," *J. Geophys. Res.*, **72**: 2531-2541, 1967 (with N.H. Brooks).

[4] "A two-dimensional sink in a density-stratified porous medium," *J. Fluid Mech.*, **33**: 529-543, 1968.

[5] "An exact solution for a diffusive flow in a porous medium," *J. Fluid Mech.*, **36**: 17-19, 1969.

[6] "Laminar momentum jets in a stratified fluid," *J. Fluid Mech.*, **45**: 461-574, 1971.

[7] "A technique for smoothing river flows during hydro-electric power production," *Water Resources Research*, **7**(6): 1437-1447, 1971 (with R.B. Tattle).

[8] "Energy and the environment in Southern California," *Engineering and Science*, **35**(2): 14-17, 1971.

[9] "A study on disposal of brine in an estuary," *J. Water Polln. Cont. Fed.*, **45**(11): 2335-2344, 1973 (with A.B. Pincince).

[10] "Turbulent entrainment in buoyant jets and plumes," *J. Hyd. Div.*, ASCE, **99**(HY9):1461-1474, September 1973 (with J. Imberger).

[11] "Turbulence measurements in a two-dimensional buoyant jet using laser-Doppler velocimetry," *Proc. LDA Symposium*, Tech. Univ. of Denmark, Copenhagen, August 1975 (with N.E. Kotsovinos).

[12] "Hydraulic modeling of thermal outfall diffusers - Interpretation of results," *Proc. XVI IAHR Congress*, Sao Paulo, Brazil, July 1975 (with R.C.Y. Koh).

[13] "Variations in coastal temperatures on the Southern and Central California coast," *J. Geophys. Res.*, **81**(12):1971-1979, April 1976 (with R.C.Y. Koh).

[14] "Spreading of buoyant discharges," *Proc. 9th Intern. Conf. Heat and Mass Transfer*, Int. Centre for Heat and Mass Transfer, Dubrovnik, Yugoslavia, 171-182, September 4, 1976 (with J.-C Chen).

[15] "Plane turbulent buoyant jets - Part 1: Integral properties," *J. Fluid Mech.*, **81**(1): 25-44, June 9, 1977 (with N.E. Kotsovinos).

[16] "Turbulent jets and plumes," *Ann. Rev. of Fluid Mech.*, **14**:189-212, 1982.

[17] "Formation of frontal waves in density-induced fluid spreading," *Symposium on Flows in Stratified Fluids*, ASME Winter Annual Meeting, Boston, MA,1983.

[18] "Monte Carlo simulation of particle coagulation in continuous size distributions, I: Brownian motion and fluid shearing," *J. Fluid Mech.*, **143**: 367-385, 1984 (with H.J. Pearson and I.A. Valioulis).

[19] "Monte Carlo simulation of particle coagulation in continuous size distributions, II: Interparticle forces and the quasi-equilibrium hypothesis," *J. Fluid Mech.*, **143**: 387-411, 1984 (with I.A. Valioulis and H.J. Pearson).

[20] "Numerical simulation of a sedimentation basin, I: Model development," *Env. Sci. Tech.*, **18**: 242-247, 1984 (with I.A. Valioulis).

[21] "Numerical simulation of a sedimentation basin, II: Design application," *Env. Sci.Tech.*, **18**:248-253, 1984 (with I.A. Valioulis).

[22] "Collision efficiencies of diffusing spherical particles accounting for hydrodynamic, van der Waal's and electrostatic forces," *Adv. Colloid and Interf. Sci.*, **20**:1-20, 1984 (with I.A. Valioulis).

[23] "A numerical evaluation of the stochastic completeness of the kinetic coagulation equation," *J. Atmos. Sci.*, **41**(16):2516-2529, 1984 (with I.A. Valioulis).

[24] "Statistical and spectral properties of tracer concentration in round buoyant jets," *Int. J. Heat and Mass Trans.*, **30**(10):2059-2071, 1987 (with P.N. Papanicolaou).

[25] "Turbulence structure near a sharp density interface," *J. Fluid Mech.*, **189**: 189-209, 1988 (with I.A. Hannoun and H.J.S. Fernando).

[26] "Turbulent mixing at a shear-free density interface," *J. Fluid Mech.*,**189**:211-234, 1988 (with I.A. Hannoun).

[27] "Investigations of round vertical turbulent buoyant jets," *J. Fluid Mech.*, **195**: 341-391, 1988 (with P.N. Papanicolaou).

[28] "The Third International Symposium on Density-Stratified Flows," *J. Hydr. Eng., Proc. ASCE*, **114**(2):125-133, 1988 (with G. Jirka).

[29] "Large-scale structure in the far field of buoyant jets," *J. Fluid Mech.*, **209**: 151-190, 1989 (with D. Papantoniou).

[30] "Diffusion and dispersion in coastal waters," *J. Hydr.Eng.*, **116**(10):1158-1179, 1990 (with G. Gartrell and C.D. Winant).

[31] "Kinetic analysis of virus adsorption and inactivation in batch experiments", *Water Resources Research*, **29**(7):2067-2085, 1993 (with S. Grant and M. Lidstrom).

[32] "An experimental investigation of vertical mixing in two-layer density- stratified shear flows," *Oceans and Atmospheres*, **19**:147-174, 1993 (with G. Sullivan).

[33] "Transition from jet plume dilution to ambient turbulent mixing," *Recent Res. Advances in the Fluid Mechanics of Turbulent Jets and Plumes*, 1-11, 1994 Kluwer Publishers (with Regina Dugan).

[34] "On mixing and transport at a sheared density interface ", *J. Fluid Mech.* 273:213-239, 1994 (with G. Sullivan).

[35] "Sudden pressure drop and pipeline failure - Case studies," Hydraulics of Pipelines, ASCE, pp.339-355, 1994

COPY

VOLUME I — REPORT TEXT

HYDROGEOLOGIC INVESTIGATION
PERENNIAL YIELD
and
ARTIFICIAL RECHARGE POTENTIAL
of the
ALLUVIAL SEDIMENTS
in the
SANTA CLARITA RIVER VALLEY
of
LOS ANGELES COUNTY, CALIFORNIA

FOR
UPPER SANTA CLARA WATER COMMITTEE
MEMBERS: LOS ANGELES COUNTY WATERWORKS
DISTRICT NO. 36 — VAL VERDE
NEWHALL COUNTY WATER DISTRICT
SANTA CLARITA WATER COMPANY
VALENCIA WATER COMPANY

AFFILIATE: CASTAIC LAKE WATER AGENCY

DECEMBER 1986

RICHARD C. SLADE
CONSULTING GROUNDWATER GEOLOGIST

a larger degree in the shallow wells of the alluvium compared to wells in the underlying Saugus Formation.

The Saugus Formation ranges in thickness between at least 1500 feet and at least 5000 feet from the northerly to the southerly sides of the San Gabriel fault, respectively. Little is known of the hydrogeology and water-yielding characteristics of the Saugus Formation.

2. Groundwater flows from east to west across the alluvium in the river valley; April 1945 represents the all-time water level high, while November 1965 represents the all-time water level low in much of the alluvium. In general, 1985 water levels are 10 to 30 feet lower than the 1945 levels. Water levels west of Castaic Junction have remained high throughout the period of record.

3. Groundwater in storage in the alluvium has ranged from a high in April 1945 of 201,000 ac-ft, to a low of 107,000 ac-ft in November 1965; at present (Fall 1985) groundwater in storage is approximately 176,400 ac-ft. Because the theoretical maximum storage capacity in the alluvium is 239,900 ac-ft, there is a theoretically available storage capacity of 63,500 ac-ft between the 1985 storage and the theoretically maximum possible storage.

4. Though historic groundwater extraction data are somewhat contradictory, groundwater production for 1985 was: 24,103 ac-ft from the alluvium, using 59 active wells; and 4892 ac-ft from the underlying Saugus Formation, using 8 active wells. The numbers, locations, and annual production from wells actively used by private homeowners, industries and/or commercial establishments are not known; it is probable that total annual production from these sources does not presently exceed a few hundred ac-ft/yr.

5. For our base period of study of 1957-58 through 1984-85, we calculate a practical perennial yield for the alluvium of 31,600 to 32,600 ac-ft per year.

6. Alluvial groundwater quality ranges from a natural calcium-bicarbonate character on the east near Lang to a degraded sodium-sulfate character west of Castaic Junction. Generally, TDS increases in the

their annual extractions are not metered. Because the cumulative total production by these private pumpers is not considered to be large, it has not been included in our perennial yield assessment.

Prior to 1954, alluvial groundwater production accounted for almost 100 percent of the total water production in the study area. However, in 1954, this percentage decreased to approximately 95 percent because in that year Newhall County Water District constructed the first of six wells which tap the Saugus Formation for domestic use. By 1985, production from the Saugus Formation approached 16 percent of total groundwater extractions (refer also to Table 2).

In recent years, there have been several shifts in the supply/demand usage of water in the region. Groundwater extractions from the Saugus Formation have gradually increased to about 15 percent of the total local production, while total extractions (alluvium plus Saugus Formation) have declined slightly. Water usage has shifted toward a greater proportion for urban uses, with a reduction for agricultural uses, as the region has become urbanized. In the future, it is projected that local alluvium production will remain relatively constant with more water going to urban uses as the agriculture is phased out, and there will be greater use of groundwater from the Saugus Formation.

Urbanization has had a rather startling impact on the availability of areas for recharge, however. All recharge to the aquifer system does not occur in the low-flow channels of the river and its tributaries, but infiltrates over much of the alluviated areas which are not within the flood channels of the Santa Clara River system. Paving of these areas has, and will continue to reduce the net effective area for natural recharge to the underlying groundwater system.

calculated values of average annual pumpage and average annual change in storage.

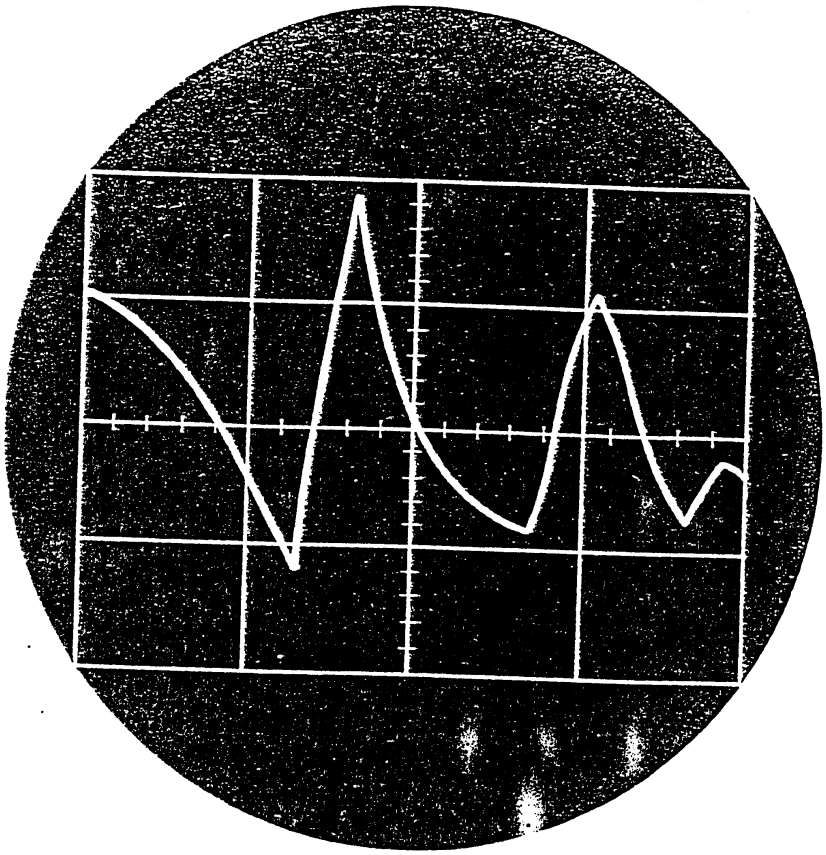
To determine the average annual groundwater production from the alluvial sediments in the Valley, files at the major water purveyors concerning present and historic production were obtained. These data vary widely in their apparent level of accuracy. For example, some of the data do not date back to 1957-58, other data are based on electrical consumption at the pump and not on actual metered gallonage, while other data are only estimates based on the number of persons using the water. Regardless, during the 28-year base period 1957-58 to 1984-85, we estimate the average annual groundwater production from the alluvial sediments in the Santa Clarita Valley to have been approximately in the range of 31,000 to 32,000 acre-feet per year.

In addition, at the beginning of the base period, the quantity of groundwater stored in the alluvial sediments was calculated to be approximately 159,688 acre-feet. By 1985, the quantity of groundwater in storage in the alluvium had been increased to 176,409 acre-feet (see Table 8). The increase in the quantity of water in storage in the alluvium is thus 16,721 acre-feet. This increase is the total quantity of groundwater added to storage during the 28-year Base Period as a result of excess precipitation. Hence, the average annual net change in groundwater in storage was determined by dividing the total quantity of water added to storage by the length of the Base Period, or +597 acre-feet per year.

The perennial yield is the quantity of groundwater what can be pumped annually without any change in groundwater levels or net change in groundwater in storage over the Base Period. This may be computed by determining the average annual pumping during the Base Period (31,000 to 32,000 acre-feet), and adding or subtracting from this value, that amount

WATER-RESOURCES INVESTIGATION USING ANALOG MODEL TECHNIQUES

IN THE SAUGUS-NEWHALL AREA LOS ANGELES COUNTY, CALIFORNIA



UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WATER RESOURCES DIVISION

OPEN-FILE REPORT
Menlo Park, California
1972
PREPARED IN COOPERATION WITH THE NEWHALL COUNTY WATER DISTRICT

Because of the lack of data only four short-term deep-well hydrographs were available to use in the non-steady-state verification of the Saugus aquifer (pl. 7). The measurements indicate that in the area south of the San Gabriel fault and east of Castaic Junction, the potentiometric surface produced by the model is too flat (pl. 7). This was also indicated by the steady-state run. The model-based heads shown on plate 7 are correct south of Castaic Junction but are about 70 feet low at Newhall. This is shown by the discrepancy between the two hydrographs for well 4N/16W-35L1 (pl. 7). Because there are no water-level measurements for the area north of the San Gabriel fault and Castaic Junction, it is not known whether or not the potentiometric surface shown for that area is correct.

In view of the lack of definitive data for the Saugus aquifer, it is felt that this layer of the model is adequately verified for present needs. The hydrologic parameters used to model the Saugus aquifer are initial estimates. Consequently, before more detailed information about the Saugus aquifer can be obtained from the model, additional studies of the hydrologic characteristics of the aquifer should be made. With present data only general information can be deduced regarding the ground-water flow network in the Saugus aquifer.

A comparison of the assumed steady-state potentiometric surface (pl. 6). with the 1963 potentiometric surface (pl. 7) shows that in the model the Saugus aquifer has undergone a decline in head over most of the area of the aquifer. This decline is due to pumping from the Saugus aquifer and to water-level declines in the overlying alluvial aquifer. The model-generated hydrographs on plate 7 indicate that the declines in the Saugus aquifer have been similar to those that occurred at adjacent points in the alluvial aquifer. This suggests that future pumping from or artificial recharge to one of the aquifers will have an effect on the head in the other aquifer. Head changes in the Saugus aquifer, however, are generally less than the corresponding changes in the alluvial aquifer. This is due to the low vertical component of permeability between the two aquifers and lesser quantities of pumping from the Saugus aquifer than from the alluvial aquifer.

WATER BUDGET

Table 5 shows the water budgets for the steady-state and the non-steady-state model. All quantities of inflow and outflow used in the model are shown. Under steady-state conditions the quantity of inflow to the model must equal the quantity of outflow. As shown, the total inflow and total outflow are both equal to about 25,000 acre-feet per year. Surface-water recharge and underflow are the major sources of inflow, and ground-water discharge is the principal outflow.

In the water budget for the non-steady-state condition the figures shown are the total quantities of inflow or outflow which occurred in each area during the 23-year study period. When the ground-water storage depletion is added to the inflow data, the total inflow must equal the total outflow within the limits of accuracy of the model. As shown, these totals agree within 5.2 percent or about 44,000 acre-feet. Surface-water recharge and underflow are still the main sources of inflow, but ground-water pumpage is by far the greatest source of outflow from the basin.

MODEL READOUTS

The major water purveyors in the Saugus-Newhall area are presently considering the effects of various water-resources management practices in order to arrive at management techniques that will make the best use of the existing and future water resources of the areas. The analog model was used to supply information about the response of the aquifers to each of the following conditions:

1. What are the effects of loss of natural floodwater recharge to the aquifers?

2. What are the effects on the aquifers of artificial recharge of imported water?

3. What are the effects on the aquifers of increased pumpage to meet future water requirements?

Effects of Loss of Floodflow

Because water levels in the alluvial aquifer respond to variations in surface-water recharge, information about the effects of an extended drought during which no floodflow recharge occurs is of value.

To simulate an extended drought, the model was run for the 1945-67 period under the following conditions:

1. The surface-water recharge to the model did not exceed steady-state surface-water recharge.

2. Loss of floodflow recharge to the aquifers will cause large water-level declines which will decrease the quantity of ground-water discharge in the Santa Clara River below Castaic Junction. This ground-water discharge cannot be decreased by more than the original steady-state ground-water discharge. To simulate this limit in the model, the induced recharge in the area was not allowed to exceed the value of the steady-state ground-water discharge.

3. The aquifers were assumed to be in steady-state conditions at the beginning of the drought.

4. All other hydrologic parameters were maintained at the values which were normally used in the non-steady-state model during the 1945-67 study period.

Under these conditions the model produced the hydrographs shown in figure 9. Because the transmissibility in the model does not vary as a function of head, these hydrographs represent the theoretical response of the basin to the conditions set forth above. Under actual field conditions the decrease in transmissibility with decline in head would cause the alluvial aquifer to be dewatered sooner than indicated by the hydrographs in figure 9. The hydrographs do indicate, however, that without the effects of floodflow recharge most of the alluvial aquifer could not support the modeled rate of ground-water pumpage for more than 14 to 18 years after steady-state conditions. The aquifer would support this pumpage for an even shorter perio of time if the basin were not at steady-state condition at the beginning of the drought. The benefit the basin receives from floodflow recharge can be seen by comparing the hydrographs produced by the model for the alluvial aquifer under 1945-67 historic conditions with the hydrographs for the no-floodflow condition.

The loss of floodflow recharge in the alluvial aquifer causes head declines in the Saugus aquifer. As shown by the hydrographs in figure 10, after 23 years the no-floodflow condition produces declines in the Saugus aquifer about 100 feet below those of the normal condition. These declines do not produce complete dewatering of the aquifer because of its large saturated thickness.

Effects of Artificial Recharge

The Upper Santa Clara Valley Water Agency has contracted with the State of California for delivery of northern California water to meet future water requirements in the study area. The quantities of imported water tentatively will range from 1,600 acre-feet per year in 1971 to 41,500 acre-feet per year in 1990 but could be increased somewhat if required (table 6). One management procedure under consideration proposes that all water imported between 1971 and 1980 be artificially recharged to defer the cost of treatment facilities. The channel of the Santa Clara River between Solemint and Saugus was chosen as a possible site for artificial recharge on the basis of the hydrology of this area and the proposed alinement of a 36-inch diameter pipeline. The analog model was used as an aid in determining the effects of the recharge on the aquifers.

CONCLUSIONS

A second model run was made to show the effects on the basin of the conditions imposed in the previous run without artificial recharge in the Santa Clara River. The hydrographs produced under these conditions are shown on plate 9.

The model indicated that the alluvial aquifer would be dewatered in the upper and lower Soledad Canyon areas prior to 1980. This is primarily due to the heavy pumping in the lower Soledad Canyon area between 1970 and 1980 which is not compensated for by artificial recharge as it was in the previous run. After 1980 the hydrographs for this run and the previous run are almost parallel with the previous run water levels between 10 and 50 feet higher than those for this run.

In the Saugus aquifer the hydrographs for this run are between 10 and 30 feet lower than the corresponding hydrographs for the previous run. In general the removal of the artificial recharge from the alluvial aquifer does not produce a significant change in water levels in the Saugus aquifer. The same management problems are produced by this set of conditions as were produced in the previous run, the major differences being that the problems occur as much as 10 years sooner. These model-generated readouts are subject to the same limitations as are the readouts from the previous run (page 54).

CONCLUSIONS

On the basis of the study of the hydrology of the area and the readouts from the analog model the following conclusions have been reached:

1. The alluvial aquifer has been the source of most of the ground water pumped in the area. The quality of water in this aquifer is readily affected by small quantities of inflow of either better or poorer quality water because of the relatively small quantity of ground water in storage in the aquifer. The water in this aquifer can in turn affect the chemical quality of the water in the Saugus aquifer. Urbanization will place additional stress on both aquifers by increasing the quantity of poor-quality sewage effluent and good-quality imported water available for recharge into the alluvial aquifer. In addition, heavy pumping from the Saugus aquifer to meet future water demands could drastically reduce the ground-water discharge from the basin. This could result in the buildup of salts within the basin because of the lost flushing action of the ground-water discharge.

These conditions substantiate the belief that a proper water-quality management program must be established within the basin. This should include the initiation and operation of a systematic periodic water-quality sampling program. These data can then be used to evaluate the effects on the basin of the above water-quality considerations.

2. The ability of the alluvial aquifer to accept artificial recharge is dependent on the storage space available within the aquifer. In the Saugus-Newhall area the space available for recharge in the alluvial aquifer varies widely depending on the quantity of surface-water recharge that occurs each year. To determine how much artificial recharge could take place each year, a water-level measuring program should be initiated in the lower Soledad Canyon area. Using these measurements and other data, estimates of the space available for the storage of water in the aquifer in the coming year could be made. This would facilitate obtaining the proper quantities of imported water for artificial recharge each year.

3. The model indicates that under historic pumping conditions the full entitlement of imported water to the year 1980 probably could not be artificially recharged in the 3.5-mile reach of the Santa Clara River below Solemint. This is due to the lack of storage in the alluvial aquifer. When an estimated maximum pumping rate to 1990 is distributed so the pumping near the artificial recharge reach is greatly increased, it seems possible to artificially recharge all the imported water to be delivered prior to 1980.

4. On the basis of readouts from the analog model it seems that the maximum quantities of pumping that might be demanded of the alluvial aquifer to 1990 cannot be supplied by that aquifer. To meet the maximum water requirements of the area, either more water must be imported than was used in the model run or pumping from the Saugus aquifer must be increased. However, the model indicates that increased pumping from the Saugus aquifer causes large head declines in that aquifer and induces declines in the alluvial aquifer. In the model declines were large enough to greatly diminish the ground-water discharge from the alluvial aquifer and to eliminate all natural outflow from the Saugus aquifer. If this condition were allowed to continue unchecked, water-quality problems could develop in the basin because of the imbalance of salts being carried in and out of the basin.

As a result, pumping in the Saugus aquifer cannot be increased indiscriminately without producing detrimental effects in both aquifers. A proper choice of pumping patterns in the Saugus and alluvial aquifers could minimize the adverse effects of increased pumpage. However, further interrogation of the model is required to determine whether or not the Saugus aquifer can support the proposed rate of pumping without dewatering the alluvial aquifer.

5. The Saugus aquifer is a potentially large source of ground water with an estimated maximum of 6 million acre-feet of recoverable water in storage. Further study of this aquifer is required to delineate the areas of poor water quality and to determine more accurately the transmissibility and storage coefficients of the aquifer. Future studies of the Saugus aquifer should give prime consideration to the area north of Castaic Junction and the San Gabriel fault because few hydrologic data are available for this area. With greater knowledge of this aquifer the ground-water basin model could be updated to give more precise information about the response of this aquifer to various ground-water management practices and to more accurately determine the potential for future utilization of the aquifer.

STUDY CODE NO. 1610-9-J-1

State of California
The Resources Agency
DEPARTMENT OF WATER RESOURCES
Southern District
Water Projects Branch

PRELIMINARY EVALUATION OF STATE WATER PROJECT GROUND WATER STORAGE PROGRAM: SANTA CLARA RIVER VALLEY BASINS

-by-

Evelyn Tompkins
Graduate Student Assistant

This Technical Information Record (TIR) was prepared to document information developed during a reconnaissance-level investigation of the Santa Clara River Valley Ground Water Basins to determine if inclusion of these basins in the State Water Project Future Supply Program is feasible. Therefore, it should be considered as prelim inary and subject to revision. This is primarily an internal office document with distribution limited to the cooperating agencies only.

February 1979

basins. Ground water is classed mainly as desirable for domestic and irrigation uses. TDS concentrations range from 260 mg/l to 500 mg/l.

Ground Water Use

The volume of ground water in storage is reduced by: pumped extractions, consumptive use of water by phreatophytes, and the outflow of rising water to Eastern Basin.

Currently, water demand is met entirely by pumped extractions; however, by 1980 imported water will be needed to meet the projected demands of an increasing population. Annual extractions were estimated to be 14.8 cubic hectometres (12,000 acre-feet) per year.

Storage Capacity

Ground water in storage between high and low water levels was estimated to be 19.7 cubic hectometres (16,000 acre-feet). Specific yield is approximately 20 percent.

The ground water level is often at or near the surface during storm flows. Therefore, the river channel alluvium has little capacity for further recharge immediately after heavy rains.

EASTERN BASIN

Description

Eastern Basin is downstream from Acton Basin and lies almost entirely within Los Angeles County. The basin is separated from Acton Basin by an impermeable bedrock constriction. Eastern Basin is composed of water-bearing deposits occurring along the Santa Clara River between the towns of Lang and Blue Cut and in the numerous canyons tributary to this area. The water-bearing deposits cover an approximate surface area of 11 655 hectares (29,000 acres).

The major aquifers in the basin are the Saugus Formation and the river channel alluvium. Only 1 067 metres (3,500 feet) of the Saugus Formation contribute to ground water development. This formation has been faulted, folded, and eroded. The river channel alluvium ranges from a few metres in thickness to about 61 metres (200 feet) thick near the town of Saugus.

Newhall-Saugus is the largest population center for the basin as well as for the whole Santa Clara River Valley.

Ground Water Occurrence

Ground water in the alluvium is unconfined, while ground water in the Saugus Formation is confined. Ground water moves westward. The San Gabriel and Holser Faults cross the water-bearing sediments and cause a water level differential of approximately 3 to 6 metres (10 to 20 feet).

No measurable subsurface inflow occurs from Acton Basin; inflow from Acton Basin occurs as rising water only. Outflow occurs either as subsurface outflow or as rising water. Rising water outflow was estimated to average 13 cubic hectometres (10,600 acre-feet) per year. The subsurface outflow was estimated to be 0.3 cubic hectometre (240 acre-feet) per year.

Percolation of precipitation, streamflow and the return flows of irrigation water recharge the basin. To a minor extent, inflow is derived from the semi-permeable formations which flank the main ground water basin. Other sources of recharge water for the basin are sewage and industrial waste effluents.

[redacted]ality

[redacted]dely ranging ground water conditions in this basin may cause localized variations [redacted]m the favorable water quality of the basin. Ground water quality for domestic [redacted] ranges from suitable in most areas of the basin to unsuitable in the western [redacted]ion. Ground water is generally suitable for irrigation of all but the most [redacted]tive crops.

TDS ranges from 600 mg/l to 1 800 mg/l. The concentration of mineral constituents in the ground water increases westward along the basin. Concentrations of chlorides and nitrates are generally lower than 100 mg/l and 45 mg/l respectively.

Ground Water Use

Wells tapping the alluvium are very productive with yields up to 7 570.8 litres (2,000 gallons) per minute. Well extractions from both the alluvium and the Saugus Formation average 28.7 cubic hectometres (23,300 acre-feet) per year. Near Blue Cut, the Newhall Land and Farming Company pumps and exports from 4.9 to 8 cubic hectometres (4,000 to 6,500 acre-feet) per year to Piru Basin for agricultural purposes.

Storage Capacity

No data is available for the total storage capacity of the basin or the current volume in storage; however, data does indicate the basin has an available capacity of 24.7 cubic hectometres (20,000 acre-feet). The safe yield was estimated at 28.5 cubic hectometres (23.100 acre-feet) per year.

PIRU BASIN

Description

Piru Basin is the easternmost basin lying entirely within Ventura County between the towns of Blue Cut and Fillmore. The ground water basin covers a surface area of about 2 843 hectares (7,025 acres).

Piru Basin is comprised of two principal aquifers: alluvium beneath the flood-plains and permeable freshwater-bearing zones in the San Pedro Formation. Over most of the basin the thickness of the alluvial aquifer ranges from 26 to 70 metres (85 to 200 feet). The alluvium consists of fluvial sand and gravel of Recent and

Conjunctive Use of the Saugus Aquifer

Castaic Lake Water Agency

January 1990
K/J/C 884605.00

Kennedy/Jenks/Chilton

CLWA. Consequently, the water is currently utilized for agricultural lease operations within the Devil's Den Water District.

The SWP release pattern from its storage reservoirs is based on maintaining a supply of water to satisfy demand in a drought. Consequently, SWP entitlements are subject to cutbacks at times. To assess potential future reductions, Reiter created a model of the SWP supply available for release using a Monte-Carlo iteration, a random analysis, to project precipitation. Historical hydrologic data are incorporated into the analysis. Because the State plans to develop additional sources of water in the future, the Reiter model includes scenarios for each projected yield increase. The expected increases are 60,000 acre-feet/year in 1991, 300,000 acre-feet/year in 1995 and 300,000 acre-feet/year in 2000. Based on the method of determining reductions discussed in Chapter 3, the potential reductions to CLWA's deliveries (assuming full entitlement amounts were requested), and thus the projected water available for CLWA's use, are calculated for each scenario.

The sources of groundwater available to users within CLWA's boundaries in the future will continue to be the alluvial and Saugus aquifers. From the alluvial aquifer the safe yield is anticipated to be 32,500 acre-feet/year, a portion of which will be used for agricultural purposes and, therefore, is not available for M&I use. The Saugus aquifer production is anticipated to be 11,000 to 22,000 acre-feet/year of which the assumption is made that 10,000 acre-feet/year is allocated for use by the water purveyors and 2,000 acre-feet/year is utilized by other water users.

In addition to groundwater and imported water, reclaimed water will be available for CLWA's use. A reclaimed water system with a maximum capacity of 8,600 acre-feet/year is planned for construction in a phased program. It is anticipated that reclamation will begin in 1992 and will increase until reaching the maximum in 1999. The reclaimed water will be used for landscape irrigation, and, therefore, will most likely be utilized from May through September.

From Table 4-1 and Figure 4-1, it can be seen that, based on Reiter's analysis, the supply does not meet the demand every year. The remaining 1,000 to 10,000 acre-feet/year of unused Saugus water is available for development by CLWA for use in the years of shortfall. Development of additional supplies in the Saugus aquifer will be considered in the following chapters.

Final Report

Reclaimed Water System Master Plan

Castaic Lake Water Agency

September 1993
K/J 894012.00

Kennedy/Jenks Consultants

CHAPTER 3

EXISTING AND PROJECTED WATER SUPPLY AND DEMAND

In order to evaluate the need for reclaimed water, water supplies and demands were projected into the future. This chapter describes the existing and future water supplies, demands, and facilities within the Castaic Lake Water Agency (CLWA) service area.

EXISTING WATER SUPPLY, DEMAND AND FACILITIES

Water Supply

Water demands in the Santa Clarita Valley are currently met by two sources: the State Water Project (SWP) and local groundwater supplies. The estimated average total supply available for municipal and industrial (M&I) and agricultural uses is 98,000 to 109,000 acre-feet per year, depending on the yield available from the local groundwater aquifers. CLWA purchases State water and wholesales it to four domestic water purveyors, these being the Los Angeles County Waterworks District No. 36, the Newhall County Water District, the Santa Clarita Water Company and the Valencia Water Company. The approximate boundaries of the water purveyors are shown on Figure 3-1. CLWA has SWP entitlements of 41,500 acre-feet per year for M&I uses. In addition, SWP agricultural entitlements of 12,700 acre-feet per year have been transferred to CLWA from the Devil's Den Water District in Kern and Kings Counties. To date, the Devil's Den entitlements have not been used within the CLWA service area.

In addition to imported water, local groundwater supplies have been developed by domestic water purveyors and by agricultural water users. Two fresh-water bearing aquifers, the alluvial and Saugus aquifers, underlie CLWA's boundaries and form the Eastern Groundwater Basin of the Santa Clara River Valley Basin.

The alluvial aquifer lies above the Saugus aquifer and is comprised of the alluvial sediments along the river and its major tributaries. The maximum thickness of the alluvium is about 200 feet. A large number of wells penetrate this upper aquifer, and, historically, most water extracted from the groundwater basin has been from the alluvial aquifer. The perennial yield of the aquifer is considered to be 32,500 acre-feet, a portion of which is used for agricultural purposes and is increasingly available for M&I uses as agricultural land is developed for urban use.

Much less information is known about the Saugus aquifer. Historically, few wells penetrated the Saugus aquifer. However, as water demands in the valley have increased, more wells have been drilled into the aquifer. The anticipated annual

VALENCIA WATER COMPANY

WATER MANAGEMENT PROGRAM

DECEMBER, 1995

TABLE III-1

WATER SOURCES FOR SANTA CLARITA VALLEY

SOURCE Acre-Feet per Year	Minimum	Maximum
Santa Clara River Alluvium	31,600	32,600
Saugus Formation Normal Pumping	11,000	22,000
Saugus Short Term Overdraft	20,300	None
State Project Water		
CLWA Table A Entitlement[1]	43,360	54,200
TOTAL CURRENT RESOURCES	106,260	108,800
Reclaimed Water Potential	10,000	10,000
TOTAL WATER RESOURCES AVAILABLE	116,260	118,800
NON DOMESTIC & OTHER		
Agricultural uses	12,000	5,000[3]
Pitchess Honor Rancho	2,000[2]	3,000[3]
NET WATER RESOURCES FOR M & I	102,260	110,800

[1] Entitlements are subject to drought related cutbacks. Maximum cutback on Table A is estimated to be 20%. CLWA plans a conjunctive use program to mitigate the effects of State Project Water cutbacks which are shown in the column designated as minimum. This requires Saugus Short Term Overdraft.

[2] Estimated current use.

[3] Estimated future use.

Castaic Lake Water Agency

Draft

Integrated Water Resources Plan
Water Demand and Supply Evaluation

February 1998

MONTGOMERY WATSON

BOOKMAN-EDMONSTON
ENGINEERING, INC.

Pumping from the Saugus Aquifer has varied from about 3,900 acre-ft/yr up to 14,800 acre-ft/yr. In 1996, Saugus pumping was about 8,200 acre-ft/yr. Installed pumping capacity can produce 15,000 to 16,000 acre-ft/yr from the Saugus Aquifer.

In 1991, groundwater was pumped into the CLWA distribution system because of SWP supply deficiencies and the cost of water was less than purchasing State Drought Bank water. By moving groundwater from areas of adequate supply into areas with limited groundwater, the local water community illustrated a major element of a conjunctive use program.

Estimated Dry Period Groundwater Production Capability

Slade (1984) reported that the perennial yield of the Alluvial Aquifer is about 32,000 acre-ft/yr. This yield is the historical annual production adjusted for a minor change in storage. Because of he limited storage capacity in the Alluvium, this groundwater source may be limited in dry periods. Wells in the Alluvium near the eastern reaches of the Santa Clara River are known to have groundwater levels which decline during consecutive dry years by as much as 100 feet, reducing pumping capacity. A series of winter storms recharge the aquifer and result in water level recovery.

The data reviewed for the Pardee area (located near Bouquet Canyon Road and the Santa Clara River) shows that in 1990 and 1991, groundwater levels did not decline as much as those in the easterly areas. In 1991, the Valencia Water Company increased its pumping to offset limited SWP water supplies. Valencia Water Company reported delivery of about 5,000 acre-ft/yr into the CLWA distribution system. Total pumping from the Alluvium by Valencia Water Company in 1991 was about 9,900 acre-ft/yr, as reported to the State Water Resources Control Board.

Based on historical data, the Alluvial Aquifer east of Castaic Junction can support production of at least 20,400 acre-ft/yr as shown in Table 3-2.

Table 3-2
1991 Alluvial Groundwater Production
East of Castaic Junction

Water Purveyor	Annual Production (acre-ft/yr)
Newhall CWD	1,900
Santa Clarita WC	5,900
Valencia WC [1]	10,400
Wayside Honor Rancho	2,200
Total	20,400

1. Includes 500 acre-ft pumped in 1991 by Newhall Land & Farming Co. east of Castaic Junction.

PROPOSED FINAL

Supplemental Water Project Environmental Impact Report

SCH # 98041127

FEBRUARY 1999

3.2 SURFACE WATER, WATER USE, GROUNDWATER

Surface Water. The primary drainage course in the CLWA area is the Santa Clara River. Principal tributaries to the Santa Clara River include Mint Canyon, Bouquet Canyon, San Francisquito Canyon, Castaic Creek Canyon, Oak Spring Canyon, Sand Canyon, and Potrero Canyon. Water flow in the stream canyons is ephemeral, and diminishes rapidly after most rainfall events. Surface water resources include the Santa Clara River, Bouquet Reservoir, and Castaic Lake. Water (both imported and naturally occurring) is diverted from Pyramid Lake located a few miles to the north, through hydroelectric power generation facilities, into Castaic Lake. Water quality in the Santa Clara River is generally poor due to high concentrations of total dissolved solids, however, water in Pyramid Lake, Castaic Lake, and Bouquet Reservoir is suitable for municipal use. Primary flood hazard areas occur in and along natural drainage channels, such as the Santa Clara River and its tributaries, and in areas where sheetflow may occur during high intensity rainfall (CLWA 1988, 1998; Slade 1986).

Water Supplies. The existing local water supply in the CLWA service area is groundwater extracted from the alluvial aquifer and from the underlying Saugus Formation aquifer. Historically, groundwater has been the primary source of water in the Santa Clarita Valley. Since 1980, local groundwater supplies have been supplemented with imported water from the SWP. From 1984 to 1996, historic SWP entitlement has averaged 24,568 acre-feet per year (AFY) (including deliveries to Devil's Den in Kern County and Kings County), which is 45 percent of the existing 54,200 AFY entitlement.

Groundwater. Large quantities of water are pumped from relatively shallow wells in the highly permeable alluvial aquifer. Although this alluvial aquifer is the smaller of the two-aquifer systems, as measured by storage capacity, most water wells within CLWA are drilled into the alluvial aquifer. Slade (1986) estimated the perennial yield of the alluvial aquifer to be from 31,600 AFY to 32,600 AFY. The maximum historic quantity of water stored in the alluvium has been estimated to be approximately 201,000 acre-feet, following substantial rainfall in 1945 (CLWA 1998). Recharge amounts are highly variable, depending on annual precipitation with documented annual water level recoveries of 70 feet or more. Dry years have resulted in water level drops of approximately 100 feet, particularly in Soledad Canyon. However, groundwater levels have remained near the ground surface in the vicinity of Castaic Junction, due to the east-

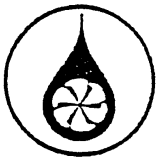
SANTA CLARITA VALLEY WATER REPORT
1999

Castaic Lake Water Agency

Los Angeles County Waterworks District #36

Newhall County Water District

Santa Clarita Water Company



Valencia Water Company

Prepared by: The Upper Santa Clara Valley Water Committee
February 2000

Executive Summary

Santa Clarita Valley Water Report 1998

This annual report provides factual information about the current water resources within the Santa Clarita Valley. The Upper Santa Clara Valley Water Committee, (Committee) whose members are responsible for ensuring that Valley residents have a safe, adequate and reliable water supply, prepared this report.

The Santa Clarita Valley is served by four retail water purveyors: Los Angeles County Waterworks District 36, Newhall County Water District, Santa Clarita Water Company and Valencia Water Company. The Castaic Lake Water Agency (CLWA) provides imported water from California's State Water Project to the four purveyors for distribution. These five entities meet regularly as the Upper Santa Clara Valley Water Committee to coordinate the beneficial use of water in the Valley.

This report provides information about the area's geology, the local groundwater basin, imported water supplies, water quality, precipitation, recycled water, existing and projected water demand and an overall outlook of water supply and demand.

In 1998, the Committee reports a total water supply of approximately 107,000 acre-feet per year and an existing water demand of 48,858 acre-feet. The Santa Clarita Valley currently has a surplus of supply of about 58,142 acre-feet over existing demand. The Committee projects this condition to continue for the foreseeable future given the overall availability of local and imported water supplies, the levels of precipitation both locally and regionally, the favorable operating condition of the groundwater basin and the existing facilities in place to deliver water throughout the valley.

Water Supplies include groundwater from the shallow Alluvial Aquifer and the underlying deeper Saugus Formation and imported water from the State Water Project. The following summarizes the water resources of the Valley in 1998:

Alluvial Aquifer

- The annual perennial yield for the Alluvial Aquifer is 32,500 acre-feet per year. This quantity of water represents an amount of water that can be pumped annually from the aquifer on a long-term basis and during dry year conditions without causing an undesirable result.

Section I

Introduction

Section I.A Background

For most residents of the Santa Clarita Valley (Valley), domestic water service is provided by four retail water purveyors. They are Los Angeles County Waterworks District 36, Newhall County Water District, Santa Clarita Water Company, and Valencia Water Company. The Castaic Lake Water Agency (CLWA) is a wholesaler that obtains water from California's State Water Project. CLWA draws water from Castaic Lake where it is filtered and disinfected at two treatment plants before distribution to the purveyors. These five entities meet regularly as the Upper Santa Clara Valley Water Committee (Committee) to coordinate the beneficial use of water in the Valley. Their respective service areas are shown in **Figure I-1**.

The Committee was officially formed in 1967 when its members requested the United States Geological Survey (USGS) to prepare a joint water resources study of the Santa Clara River Watershed. The purpose of the Committee was to consult with the USGS regarding the study, to assist with the accumulation of data, and to continue working toward coordinating water management programs for the area. The study was completed in 1972 by S. G. Robson of the USGS and provides the initial baseline information of the valley's groundwater resources.

Over the years, the Committee has continued to review and document the availability of water resources in the region. Past studies have assessed the condition of the local groundwater aquifers, their hydro-geologic character, aquifer storage capacity, perennial yield and recharge rate and the potential for conjunctive use of both groundwater and imported water resources.

Other efforts have included developing drought contingency plans, evaluating the impact of landfills on the groundwater basin, coordinating emergency response

Section II

Water Supplies

Historically, local groundwater extracted from the Alluvial and Saugus Aquifers has been the primary source of water in the Santa Clarita Valley. However, local groundwater supplies since 1980 have been supplemented with imported water from the State Water Project. This Section describes the geologic setting of the Santa Clarita Valley, the local and imported water supplies, water quality, precipitation records and recycled water programs.

Section II.A Eastern Groundwater Basin

Figure II-1 shows the approximate boundaries of the Eastern Groundwater Basin, which is the largest and most developed groundwater body of the Upper Santa Clara River HA. It is an alluvial-valley aquifer-stream system. The basin consists of Holocene Alluvium, Pleistocene terrace deposits, and the Plio-Pleistocene Saugus Formation.

Information on the hydrologic conditions of the groundwater basin comes from three previous studies. Robson (1972) evaluated the availability, quantity, and potential for development of the groundwater resources of the Saugus-Newhall area. Slade (1986) conducted an evaluation of the hydrologic conditions of the Alluvial Aquifer underlying the Santa Clarita Valley and its potential for artificial recharge. In 1988, Slade conducted a hydrologic evaluation of the Saugus Formation, its quantity, and potential for development.

Section II.A.1.a. Alluvial Aquifer - General

The Holocene Alluvium exists extensively on the valley floor and becomes restricted at the narrow channels of the river's tributaries in the upper reaches. The Alluvium is deepest along the center of the present river channel, with a

values where the alluvium is thickest in the center of the valley and generally west of Bouquet Canyon.

The amount of groundwater in storage in the Alluvium can vary considerably because of the effects of recharge and discharge from the aquifer. Based on an Alluvial area of 16,410 acres, variable thickness, and specific yield of 9 to 16 percent, it has been estimated that the theoretical maximum amount of groundwater that could be held and retrieved in usable storage is 240,000 acre-feet. Based on historical fluctuations in groundwater levels, calculated volumes of groundwater in storage in the Alluvium have ranged from a high of 201,000 acre-feet in April 1945 to a low of 107,000 acre-feet in November 1965.

Three of the four water companies pump local groundwater in addition to purchasing imported water from CLWA. The Los Angeles County Waterworks District 36 presently has no operating groundwater extraction facilities. Also, the County of Los Angeles and the Newhall Land and Farming Company pump from the Alluvial Aquifer to service their own lands.

In 1986, the Committee hired Richard C. Slade and Associates to study the Alluvial Aquifer and determine, among other things, the aquifer's hydrogeologic condition, perennial yield, storage capacity and potential for artificial recharge. Based on historical pumpage and hydrologic conditions over a 28 year base period (1957-58 through 1984-85), Slade estimated that the annual perennial yield for the Alluvial Aquifer is 31,600 acre-ft to 32,600 acre-ft per year (one acre-ft is +/- 325,900 gallons). Based on the results of that hydrogeologic report and the operating experience of its members, the Committee has adopted a perennial yield of 32,500 acre-ft per year. This quantity represents the amount of water that can be pumped annually from the aquifer on a long-term basis, including fluctuations above and below the perennial yield amount during wet and dry year conditions, without causing an undesirable result. Undesirable results could include long-term groundwater level decline (and associated decline in groundwater storage), degradation of water quality in the aquifer, or land

SANTA CLARITA VALLEY WATER REPORT
2002

PREPARED BY:

Castaic Lake Water Agency

Los Angeles County Waterworks District #36

Newhall County Water District

Valencia Water Company

April 2003

Table II-7
Total Water Supplies
(Acre-Feet)

Year	Sources of Supply									
	Water Retailors			Agriculture, Irrigation, & Miscellaneous Uses			Total Per Source			Total Per Year
	Alluvial Aquifer	Saugus Form.	SWP	Alluvial Aquifer	Saugus Form.	SWP	Alluvial Aquifer	Saugus Form.	SWP	All Sources
1980	16,625	4,569	1,125	14,831	20	0	31,456	4,589	1,125	37,170
1981	14,056	4,950	5,816	16,737	20	0	30,793	4,970	5,816	41,579
1982	8,684	3,569	9,659	13,184	521	0	21,868	4,090	9,659	35,617
1983	8,803	3,398	9,185	11,483	454	0	20,286	3,852	9,185	33,323
1984	12,581	3,809	10,996	14,737	640	0	27,318	4,449	10,996	42,763
1985	12,519	4,140	11,823	12,828	575	0	25,347	4,715	11,823	41,885
1986	12,418	4,975	13,759	11,787	510	0	24,205	5,485	13,759	43,449
1987	12,630	4,962	16,285	10,012	599	0	22,642	5,561	16,285	44,488
1988	12,197	6,404	19,033	9,451	524	0	21,648	6,928	19,033	47,609
1989	13,978	7,217	21,618	9,743	542	0	23,721	7,759	21,618	53,098
1990	13,151	8,302	21,613	10,725	559	0	23,876	8,861	21,613	54,350
1991	17,408	14,417	7,968	9,779	500	0	27,187	14,917	7,968	50,072
1992	16,897	10,458	13,911	10,694	466	987	27,591	10,924	14,898	53,413
1993	19,808	10,151	13,393	10,318	459	443	30,126	10,610	13,836	54,572
1994	20,068	11,531	14,389	13,065	494	311	33,133	12,025	14,700	59,858
1995	20,590	8,087	16,996	13,874	473	6	34,464	8,560	17,002	60,026
1996	24,681	7,373	18,093	13,757	813	780	38,438	8,186	18,873	65,497
1997	25,273	6,752	22,148	14,326	993	1,067	39,599	7,745	23,215	70,559
1998	23,898	4,706	20,254	12,750	849	12	36,648	5,555	20,266	62,469
1999	27,240	2,728	27,282	16,166	988	20	43,406	3,716	27,302	74,424
2000	25,216	3,193	32,579	14,433	887	3	39,649	4,080	32,582	76,311
2001	22,055	3,267	35,369	15,218	873	0	37,273	4,140	35,369	76,782
2002	22,097	4,360	41,768	16,006	800	0	38,103	5,160	41,768	85,031

NEWHALL COUNTY WATER DISTRICT

Summary of Annual Rainfall

October 1st Thru September 30th

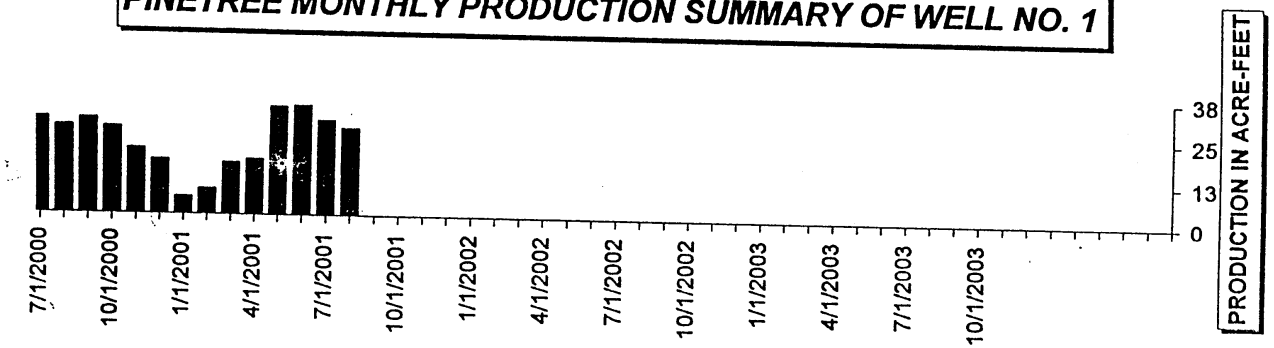
(Totals in inches)

	1986-87	1987-88	1988-89	1989-90	1990-91	1991-92	1992-93	1993-94	1994-95
Oct	0.68	3.47	0.00	0.86	0.00	0.50	1.55	0.57	0.78
Nov	1.55	1.25	0.92	0.37	0.63	0.00	0.00	0.75	0.71
Dec	0.24	4.80	6.74	0.00	0.01	5.59	7.25	1.76	1.94
Jan	2.11	3.37	0.89	2.89	1.11	3.28	17.11	0.48	21.98
Feb	0.62	3.49	4.13	4.23	5.72	16.64	11.73	5.31	1.93
Mar	1.69	1.16	1.30	0.22	11.33	9.73	4.27	2.33	8.30
Apr	0.14	3.98	0.30	0.48	0.00	0.15	0.00	0.42	0.72
May	0.10	0.09	0.00	0.88	0.00	0.34	0.00	0.00	0.26
Jun	0.00	0.00	0.00	0.00	0.00	0.00	0.65	0.00	0.76
Jul	0.09	0.00	0.00	0.00	0.00	0.30	0.00	0.00	0.00
Aug	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sep	0.00	0.10	0.62	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL	**7.24**	**21.71**	**14.90**	**9.93**	**18.80**	**36.53**	**42.56**	**11.62**	**37.38**

	1995-96	1996-97	1997-98	1998-99	1999-00	2000-01	2001-02	2002-03	2003-04
Oct	0.00	1.30	0.00	0.33	0.00	1.13	0.22	0.00	1.10
Nov	0.00	1.06	3.73	1.39	0.00	0.00	3.18	3.01	0.63
Dec	2.33	8.70	6.72	1.39	0.05	0.00	1.30	5.85	2.57
Jan	2.97	6.64	3.49	2.08	1.21	5.84	1.55	0.00	
Feb	6.73	0.23	22.00	0.65	9.43	10.76	0.51	9.03	
Mar	2.08	0.00	5.15	3.00	3.15	3.38	0.38	2.38	
Apr	0.13	0.00	2.28	3.78	2.10	2.56	0.05	2.35	
May	0.68	0.00	5.50	0.00	0.00	0.00	0.12	1.70	
Jun	0.00	0.00	0.06	0.48	0.00	0.00	0.01	0.00	
Jul	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.02	
Aug	0.00	0.00	0.00	0.00	0.31	0.00	0.00	0.00	
Sep	0.00	0.53	0.21	0.01	0.00	0.00	0.02	0.00	
TOTAL	**14.92**	**18.51**	**49.14**	**13.11**	**16.25**	**23.67**	**7.34**	**24.34**	**4.30**

Newhall County Water District

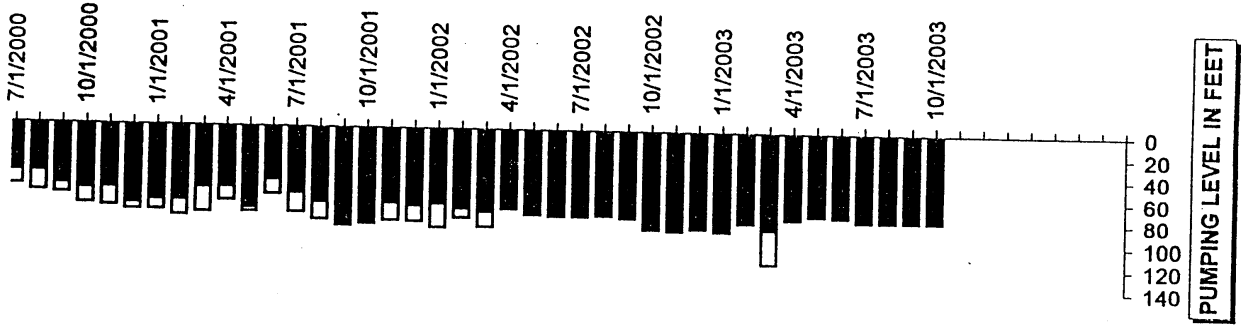
PINETREE MONTHLY PRODUCTION SUMMARY OF WELL NO. 1



For October 2003

Current Month's Production (AF):	**0.00**
AVG GPD	0
"July 1 Thru June 30"	
TOTAL TO DATE (AF)	0.00
PREVIOUS YEAR (AF)	0.00
Comparative Ratio	**0.0%**

WELL NO. 1



TIMED GPM	0
STATIC LEVEL	80
PUMPING LEVEL	0
TOP OF BOWLS	**160**
WEATHER:	
AVG HIGH	90.8
AVG LOW	57.3
PRECIPITATION	0.10
TOTAL PRECIPITATION SINCE OCT 1st	0.10

Newhail County Water District
PINETREE MONTHLY PRODUCTION SUMMARY OF WELL NO. 3
WELL NO. 3
PRODUCTION IN ACRE-FEET
90
60
30
0
10/1/2003
7/1/2003
4/1/2003
1/1/2003
10/1/2002
7/1/2002
4/1/2002
1/1/2002
10/1/2001
7/1/2001
4/1/2001
1/1/2001
10/1/2000
7/1/2000
PUMPING LEVEL IN FEET
0
20
40
60
80
100
120
140
10/1/2003
7/1/2003
4/1/2003
1/1/2003
10/1/2002
7/1/2002
4/1/2002
1/1/2002
10/1/2001
7/1/2001
4/1/2001
1/1/2001
10/1/2000
7/1/2000
For October 2003
Current Month's Production (AF): 14.84
AVG GPD 156,032
"July 1 Thru June 30"
TOTAL TO DATE (AF) 138.43
PREVIOUS YEAR (AF) 220.18
Comparative Ratio -37.1%
TIMED GPM 525
STATIC LEVEL 102
PUMPING LEVEL 113
TOP OF BOWLS 135
WEATHER:
AVG HIGH 90.8
AVG LOW 57.3
PRECIPITATION 0.10
TOTAL PRECIPITATION SINCE OCT 1st 0.10

Newhall County Water District
PINETREE MONTHLY PRODUCTION SUMMARY OF WELL NO. 4
For October 2003
Current Month's Production (AF): 0.0
AVG GPD 0
"July 1 Thru June 30"
TOTAL TO DATE (AF) 0.00
PREVIOUS YEAR (AF) 0.00
Comparative Ratio 0.0%
TIMED GPM 0
STATIC LEVEL 104
PUMPING LEVEL 0
TOP OF BOWLS 165
WEATHER:
AVG HIGH 90.8
AVG LOW 57.3
PRECIPITATION 0.10
TOTAL PRECIPITATION SINCE OCT 1st 0.10
PRODUCTION IN ACRE-FEET
80
60
40
20
0
10/1/2003
7/1/2003
4/1/2003
1/1/2003
10/1/2002
7/1/2002
4/1/2002
1/1/2002
10/1/2001
7/1/2001
4/1/2001
1/1/2001
10/1/2000
7/1/2000
WELL NO. 4
PUMPING LEVEL IN FEET
0
20
40
60
80
100
120
10/1/2003
7/1/2003
4/1/2003
1/1/2003
10/1/2002
7/1/2002
4/1/2002
1/1/2002
10/1/2001
7/1/2001
4/1/2001
1/1/2001
10/1/2000
7/1/2000

21

WATER LEVEL GRAPH

Revised 12/1/03

BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF CALIFORNIA

Application of Valencia Water Company)		
(U342-W) seeking approval of its updated)		
Water Management Program as ordered in)		
Commission Resolution W-4154 dated)		
August 5, 1999)	Application No.	A-99-12-025

DIRECT TESTIMONY OF

STEVEN B. BACHMAN

IN SUPPORT OF THE PROTEST BY VENTURA COUNTY TO APPLICATION OF VALENCIA WATER COMPANY FOR APPROVAL OF ITS UPDATED WATER MANAGEMENT PROGRAM

DUE: April 10, 2000

TESTIMONY OF STEVEN B. BACHMAN

Q.: PLEASE STATE YOUR NAME.

A.: I am Steven B. Bachman.

Q.: DR. BACHMAN, WHAT IS YOUR EDUCATIONAL AND PROFESSIONAL BACKGROUND?

A.: I have a doctor of philosophy degree from the University of California, Davis in geological sciences. Prior to that, I earned a masters degree in geological sciences from the University of California, Los Angeles and a bachelor of science degree in aeronautical engineering from the University of Washington. I have worked professionally as a geologist for 26 years and am a registered geologist in California. After my Ph.D., I was an assistant professor at Cornell University for four years. I then formed a consulting group in San Diego for Nekton, Inc. and two years later started my own consulting company, Crouch, Bachman, and Associates, Inc. in Santa Barbara. In 1990 I joined Integrated Water Technologies, Inc. ("IWT") as vice president, where I subsequently became president.

I began working for myself four years ago, while continuing to consult for IWT. As part of my consulting, in 1993 I became Groundwater Manager for United Water Conservation District ("United Water") in Ventura County, a position I continue to hold. United Water oversees groundwater management for most of the groundwater basins of Ventura County. Last year. I was retained as groundwater consultant to Calleguas Municipal Water District ("Calleguas"), the major wholesaler of State Water Project water ("State water") to Ventura County. For Calleguas, I oversee groundwater management issues, including effects of their joint Aquifer Storage and Recovery program with the Metropolitan Water District of Southern California. As part of this work for United Water and Calleguas, I maintain and operate the U.S. Geological Survey numeric groundwater model used by Ventura County agencies to determine potential effects of future surface xvater and groundwater management strategies. In 2000, I became a director for Montecito Water District.

My experience in groundwater projects in California, Nevada, and Arizona includes artificial recharge planning and implementation, groundwater management, groundwater quality studies, aquifer studies, groundwater modeling, groundwater recharge studies, wetlands treatment, and expert witness on groundwater. I have authored/co-authored over 50 geologic articles, including the recent book California Groundwater Management, funded by the U.S.

Environmental Protection Agency ("U.S. EPA") and published by the Groundwater Resources Association, and I lecture statewide on groundwater management. I have been president of the Society of Sedimentary Geologists (SEPM) - Pacific Section, associate editor of the journal Geology of the Geological Society of America, and chair of the Subcommittee on Groundwater Management of the Association of California Water Agencies ("ACWA"). I am presently chair of ACWA's Groundwater Committee, for which I have been testifying and providing technical guidance to the California State Water Resources Control Board on differentiating surface water from groundwater.

My recent projects include planning new artificial recharge projects for the Oxnard Plain, working on solving the overdraft of the Las Posas basin, characterizing nitrate contamination in the Oxnard Plain Forebay, cooperating in a long-range weather prediction study by United States Geological Survey, National Oceanographic Atmospheric Administration and Scripps, providing technical guidance to Orange County Water District on implementing a new groundwater model, and providing expert testimony on groundwater issues.

Q.: HAVE YOU EVALUATED WHETHER THERE IS AN ADEQUATE WATER SUPPLY FOR USE BY VALENCIA WATER COMPANY IN THE FUTURE?

A.: Yes. I have taken demand projections used by Castaic Lake Water Agency ("CLWA"), the State Water Project Contractor for Valencia Water Company's ("Valencia") service area, and compared those projections to available supplies of local groundwater and imported State water.

Q.: HOW HAVE YOU DETERMINED FUTURE DEMAND?

A.: I used the mid-range demand curve that is in the CLWA Draft Integrated Water Resources Plan Water Demand and Supply Evaluation, dated February 1998 ("IWRP"), that shows steadily increasing demand for urban uses and decreasing demand for agricultural water. (Attached to this testimony, as Exhibit 1, is a true and correct copy of Figure 2-1 from the IWRP[1].)

Q.: WHAT VALUES ARE YOU USING FOR FUTURE SUPPLY?

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[1] Only excerpts of the relevant pages from various reports are attached. Full reports are available upon request.

A.: The supply consists of State water from CLWA and local groundwater from both the Alluvial (shallower) Aquifer and the Saugus Aquifer. This includes:

1. for State water, a supply of CLWA's full entitlement of 95,200 acre-feet per year ("AFY") during wet and normal periods and a 50 percent entitlement of 47,600 AFY during dry years. (Exhibit 2, Valencia's Water Management Program, dated December 16, 1999 ("VWMP"), Figures III-1 and III-2.);
2. for the Alluvial Aquifer, 32,600 AFY of perennial yield (Exhibit 3, Hydrogeologic Investigation Perennial Yield and Artificial Recharge Potential of the Alluvial Sediments in the Santa Clarita River Valley of Los Angeles County, California, December 1986, published by hydrologist Richard Slade ("1986 Slade Report"), p. 91), with a maximum yield of 25,000 AFY in dry years (Exhibit 4, IWRP, pp. 3-7 and 3-8) and 40,000 AFY in wet or normal years. (Exhibit 2, VWMP, Figure III-2.) This dry year yield varies from Valencia's dry year yield of 32,500 AFY (Exhibit 2, VWMP, Figure III-2), because pumping of 40,000 AFY in wet years and 32,500 AFY in dry years exceeds the perennial yield, which must average 32,600 AFY. In addition, CLWA's IWRP reported Slade as saying that "the entire Alluvial Aquifer has the capability of yielding about 25,000 acre-ft/yr for multiple dry years." (Exhibit 4, IWRP, p. 3-8.);
3. 1,700 AFY of reclaimed water (Exhibit 2, VWMP, Figure III-2);
4. no State Drought Water Bank supply, as supported by Wallace G. Spinarski's testimony filed herein; and
5. the Saugus Aquifer supplies the remaining demand, as it is the only additional source.

Q.: ARE THE PROPOSED AQUIFER PUMPING LEVELS IN VWMP'S FIGURE III-2 REALISTIC?

A.: As stated in the previous answer, the pumping levels proposed in the Alluvial Aquifer of 40,000 AFY in wet years and 32,500 AFY in dry years exceed both the perennial yield and the capacity of the aquifer to supply water during dry years. Therefore, I believe that these pumping levels are too high. In my analysis, I used the rates of 40,000 AFY in wet years and 25,000 AFY in dry years, as did the IWRP. (Exhibit 5, IWRP, Table 3-7.)

The VWMP assumes production from the Saugus Aquifer of 20,000 AFY in wet years and 41,000 AFY in dry years, which includes 30,000 AFY of dry year firming supplies from the Saugus. (Exhibit 2, Figure III-2; and Exhibit 6, VWMP, p. 15.) These projections far exceed the wet year recharge of 21,000 AFY and

average dry year recharge of 12,000 AFY. (Exhibit 7, IWRP, pp. 3-2, 3-3 and Hydrogeologic Assessment of the Saugus Formation in the Santa Clarita Valley of Los Angeles County, California, February 1988 ("1988 Slade Report"), pp. 95-97, collectively.) Valencia's average Saugus pumping of 30,500 AFY compares to average recharge of 16,500 AFY. As I discuss later, pumping even at the recharge rate of 16,500 AFY may exceed the perennial yield of the aquifer.

Q.: HAVE YOU COMPARED THE SUPPLY AND DEMAND NUMBERS?

A.: Yes. Supply and demand must be compared over a series of wet and dry cycles to realistically examine the water supply. I used the climatic conditions from the 51-year period from 1944 to 1994 to test potential conditions for the water supply from 2000 to 2050. In other words, the actual climatic conditions from the year 1944 were applied to the year 2000, 1945 conditions to the year 2001, and so on. This is similar to the technique used by the U.S. Geological Survey when constructing their regional groundwater model for the Calleguas-Santa Clara area. For this analysis, northern California river runoff for each year was used as the indicator of State water availability, and local precipitation for each year was used as an indicator of wet or dry conditions for groundwater usage. (Exhibit 8, Santa Clarita Valley Water Report 1999 ("1999 Water Report"), Figure II-15.) Please see Appendix to this testimony for details of analysis.

For the analysis, it is assumed that: purveyors use 95,200 AFY of State water in wet or normal years and 47,600 AFY in dry years; recycled water supplies of 1,700 AFY are used every year; and the Alluvial Aquifer is pumped at its maximum rate of 40,000 AFY in wet years and 25,000 AFY in dry years. If there is a shortfall in supply, then it is assumed that the shortfall is pumped from the Saugus Aquifer.

Q.: WHAT IS THE RESULT OF YOUR COMPARISON OF SUPPLY AND DEMAND?

A.: The total demand for water in 2000 in the basin is approximately 70,500 AFY (Exhibit 1, IWRP, Figure 2-1.) This demand will grow to approximately 105,500 AFY by 2010 and 146,500 AFY by 2020. Supply matches demand until about 2011, when supply goes from a general surplus to a general deficit. After 2011, the general excess demand is met by increased pumping of the Saugus Aquifer. (Exhibit 9, Chart - Water Supply Sources Necessary to Meet Demand.) This increased pumping overdrafts the Saugus Aquifer by pumping at rates higher than the aquifer can be recharged. (Exhibit 10, Chart - Groundwater Pumping of Saugus Aquifer, 1980 to 2050.) I have used the years 2011 (onset of perpetual Saugus

overdraft) and 2020 (planning horizon of the VWMP) as illustrations in the following table. The complete analysis for all years is indicated in Exhibit 10.

Supply/Demand (AF)	2011		2020	
Demand	110,000		146,500	
State Water Project		47,600		47,600
Reclaimed Water		1,700		1,700
Pumping of Alluvial Aquifer		25,000		25,000
Required Pumping of Saugus Aquifer		35,700		72,200
Accumulated Overdraft of Saugus		23,700		249,664

With dry years in both northern and southern California in the year 2011, a reduced supply of 47,600 AFY of State water and 25,000 AFY of water from the Alluvial Aquifer would be available. In this case, 35,700 AFY would be pumped from the Saugus Aquifer, well above either the wet year or dry year recharge of 21,000 AFY and 12,000 AFY, respectively. By the year 2020, 72,200 AFY must be pumped from the Saugus Aquifer. These high production rates from the Saugus create an accumulated overdraft of 249,664 acre-feet by 2020.

I have summarized the results of this analysis in three diagrams. The required Saugus Aquifer pumping is shown in Exhibit 10. As indicated, the stress on the Saugus Aquifer increases as demand continues to increase. To meet this demand, the Saugus will have to be pumped at levels up to 85,000 AFY during wet years. (Exhibits 9 and 10.) Although the application to the Public Utilities Commission ("PUC") states that the Saugus Aquifer will be pumped up to 40,000 AFY during dry years, in fact, the Saugus will have to be pumped at rates up to 100,000 AFY in dry years. (Exhibit 10.) By the 2040s, the Saugus Aquifer will be pumped at an average rate of above 80,000 AFY. When this is compared to annual recharge rates in the Saugus of 12,000 (dry) to 21,000 (wet) AFY, it is clear that there will be substantial overdrafting of the Saugus Aquifer. If the aquifer is pumped at a higher rate than it can be recharged, water levels will drop. At some point, this dropping water level will cause problems.

Q.: WHAT TYPES OF PROBLEMS COULD OCCUR AS WATER LEVELS DROP?

A.: The first problem generally encountered is that other pumpers in the basin must pump groundwater from deeper depths, increasing pumping costs. Then, additional work must be performed to lower pumps in the wells. As water levels drop, wells may actually have to be redrilled to deeper depths. However, several additional problems may occur at the same time. (Exhibit 11, Steven Bachman, et al., California Groundwater Management (1997), pp. 6-7.) Poorer quality water from deeper parts of the aquifer may be pulled into the wells. The overdrafting wells will act as sinks in the basin, creating groundwater gradients that may allow toxic chemicals from nearby contamination sites to flow towards and enter the wells. Finally, dewatering of the aquifer may cause compaction in the aquifer and result in surface subsidence. Such subsidence occurs in some California basins, with a good example being only a few miles away near Lancaster. There is potential liability to water producers and their customers if overpumping causes surface rupture of streets, pipelines, and buildings.

Q.: WHAT IS THE POTENTIAL FOR SUBSTANTIAL OVERDRAFTING OF THE SAUGUS AQUIFER, GIVEN THE SUPPLY AND DEMAND IN THE SANTA CLARITA VALLEY?

A.: A systematic overdraft of the Saugus Aquifer begins in 2011. (Exhibits 9 and 10.) By the year 2050, the accumulated overdraft will exceed the purported 1.4 million AFY of groundwater stored in the Saugus Aquifer. (Exhibit 10-A, Chart - Overdraft of Saugus Aquifer.) The 1.4 million AFY is an estimate of all groundwater stored to a depth of approximately 2500 feet within the Saugus Aquifer. (Exhibit 12, 1988 Slade Report, p. 79.) In general, only a portion of an aquifer can be drained without causing deleterious impacts to the groundwater quality, aquifer, and the overlying lands. Clearly, there is the potential for serious overdraft of the Saugus Aquifer, with all its associated problems.

Q.: AT WHAT RATE IS IT SAFE TO PUMP THE SAUGUS AQUIFER?

A.: We do not presently know the safe yield of the Saugus Aquifer. I have been attempting to persuade the purveyors in the Santa Clarita area to construct a groundwater flow model to test various pumping scenarios -- a way to analyze the effects of changing pumping. Short of that approach, the effect on the aquifer of past pumping can be used to determine if *present* pumping rates are overpumping

the aquifer. For instance, if water quality degrades in the basin, the basin may already be pumped beyond a safe limit.

Q.: IS THERE ANY EVIDENCE THAT WATER QUALITY IN THE BASIN HAS DEGRADED FROM PAST PUMPING OF THE BASIN?

A.: The water quality of the Saugus Aquifer, as measured by total dissolved solids (TDS), has generally deteriorated with increased pumping. This trend suggests that the vastly increased pumping of the Saugus Aquifer proposed by Valencia and the other water purveyors in the Santa Clarita area will continue to degrade groundwater quality. The trend also suggests that water quality under heavy pumping may reach levels where the water cannot be used directly for drinking water purposes.

Q.: HOW DID YOU DETERMINE THAT WATER QUALITY IN THE SAUGUS AQUIFER HAS CHANGED?

A.: I looked at Saugus Aquifer water quality data obtained from the California Department of Health Services data on drinking water wells. In addition, I used field conductivity measurements from 1998 and 1999 provided by Valencia to bring the records current. I then plotted TDS and annual well production on time graphs for each well for which information was available to examine water quality trends. I then analyzed these trends.

Q.: HOW HAS THE WATER QUALITY CHANGED IN THE SAUGUS AQUIFER WITH INCREASED PUMPING?

A.: I first looked at trends from individual wells. TDS levels were generally in the range of 400 to 500 milligrams per liter (mg/l) in the early 1960s when much of the Saugus Aquifer pumping started. (Exhibit 13, Chart - Newhall County Water District (NCWD) Well No. 9; Exhibit 14, Chart - NCWD Well No. 10; Exhibit 15, Chart - Valencia (VWC) Well No. 157; and Exhibit 16, Chart - VWC Well No. 158.) As pumping increased in the 1960s to mid 1970s, several wells showed significant water quality deterioration during that time period, with well NCWD No. 9 changing from levels around 500 mg/l to nearly 1,200 mg/l (Exhibit 13) and well VWC No. 158 changing from just over 500 to 1,200 mg/l. (Exhibit 16.) As pumping decreased in the late 1970s and early 1980s, water quality improved in some wells. (Exhibits 13 and 16.) In other wells, there was a steady increase in TDS during this period. (Exhibits 14, 15; and Exhibit 17, Chart - VWC Well No. 160.)

It is also possible to look at TDS averages from all the wells and compare these averages to total Saugus Aquifer pumping during the period. First, I calculated a two-year average TDS for each well. If there were no samples taken during any two-year period, I interpolated between the preceding and following two-year averages. I then averaged the two-year value from each of the wells to arrive at an overall average for the period. Average TDS levels were then plotted with corresponding Saugus pumping rates. (Exhibit 18, Chart - Water Quality (TDS) vs Pumping, Saugus Aquifer.) Exhibit 18 shows the same trend as seen in many individual wells. Average TDS levels were between 450 and 500 mg/l in the 1961 to 1962 period. As overall pumping of the Saugus Aquifer increased in the 1960s to mid 1970s into the 6,000 to 8,000 AFY range, average TDS consequently increased into the 700 to 800 mg/l range. As Saugus pumping decreased back into the 4,000 AFY range in the late 1970s and early 1 980s, average TDS decreased back into the 500 mg/l range.

Q.: HAS THIS DETERIORATION IN SAUGUS AQUIFER WATER QUALITY OCCURRED AGAIN MORE RECENTLY?

A.: Yes. The trend of deteriorating water quality with increasing pumping reappeared in the late 1980s and 1990s as Saugus Aquifer pumping climbed to the 12,000 to

14,000 AFY range. (E.g., Exhibits 13, 14, 15 and 17.) At the same time, average TDS values rose to the 700 to 800 mg/i range during this increased pumping. (Exhibit 18.) TDS levels have improved slightly in two wells as pumping stopped in those wells in the last several years (Exhibits 13 and 14), but have increased rapidly in other wells. (Exhibits 15, 17; Exhibit 19, Chart - VWC Well No. 159; and Exhibit 20, Chart - VWC Well No. 201.) The average TDS shown on Exhibit 18 indicates the rapid deterioration in water quality in the 1990s.

Q.: CAN THESE PAST TRENDS BE USED TO PREDICT THE EFFECT OF INCREASED PUMPING OF THE SAUGUS AQUIFER IN THE FUTURE?

A.: Yes. Both the VWMP and my demand/supply analysis include pumping the Saugus Aquifer at rates several times higher than historic pumping. I have combined the projected Saugus pumping rates from Exhibit 10 with the TDS and pumping rates from Exhibit 18 into a new chart. (Exhibit 21, Chart - Water Quality (TDS) vs Projected Pumping, Saugus Aquifer, 1961 to 2050.) The left side of Exhibit 21 shows how TDS has changed with past pumping, whereas the right side of the chart shows increased pumping in the future. Although it is not possible to predict with accuracy how TDS levels would change with this increased pumping, extreme caution should be used with any scenario of increased Saugus pumping. Water quality deterioration in the 1 990s certainly indicates that the changes in water quality can occur rapidly, even in a significantly less stressful pumping scenario.

I believe that it would be imprudent to increase Saugus Aquifer pumping at rates so much higher than historic levels. With danger signs obvious, the prudent approach is a step-wise increase in pumping, at levels much less than proposed by Valencia Water Company and required by demand/supply analysis. Such a slow step-up in pumping is recommended in the CLWA Integrated Water Resources Plan, at a rate of about 1,000 AFY with an accompanying artificial recharge program (Exhibit 1 to Slivinski's declaration, page 5-3). Such a plan would not mitigate water quality or other problems, but could identify them before they reach unacceptable levels. If problems were identified, then pumping would be curtailed to lower levels.

However, the levels of Saugus Aquifer pumping required to meet the supply and demand that I have identified herein do not allow the luxury of a slow step- wise

approach to increased pumping. Instead, Saugus pumping would have to be increased from an average level of around 9,000 AFY in the 1 990s to 38,000 AFY in the 2010s to 82,000 AFY in the 2040s, a nearly ten-fold increase in pumping.

Q.: COULD PROBLEMS WITH THE SAUGUS AQUIFER AFFECT DOWNSTREAM USERS?

A.: Yes, they may. This analysis has shown the significant portion of future supplies that must come from the Saugus Aquifer. If the Saugus fails to yield these high pumping rates either because the yield of the aquifer is lower or there are water quality problems that curtail usage, Valencia and other purveyors would have to rely more heavily on the State Water Project or Alluvial Aquifer pumping. Since the VWMP assumes maximum State water deliveries already (Exhibit 2, Figure III-2), the Alluvial Aquifer would be a likely source. However, since the Alluvial Aquifer is being used at its perennial yield already, any additional pumping would "mine" the aquifer, lowering water levels in the aquifer. Any lowering of groundwater levels would affect the Santa Clara River, which flows directly over the Alluvial Aquifer and is the primary recharge source for the aquifer. Lowering of groundwater levels induces additional recharge from the river, decreasing the flow in the river to downstream users. Because the Santa Clara River is the primary recharge source for the aquifers in Ventura County, this could significantly reduce recharge in the Ventura County aquifers.

Q.: ARE THERE ANY OTHER PROBLEMS EVIDENT IN THE SAUGUS AQUIFER THAT COULD AFFECT USE OF THE AQUIFER FOR DRINKING WATER?

A.: There is a significant area of perchlorate contamination to the east of the wells that pump from the Saugus Aquifer. The perchlorate has seeped into the Saugus Aquifer and has flowed westward towards the wells, shutting down 25 percent of the total Saugus Aquifer wells.

Q.: WHAT IS THE STATUS OF THIS TOXIC RELEASE?

A.: The perchiorate contamination is coming from the Porta Bella property (former Whittaker-Bermite site) (testimony of Sayareh Amir ("Amir") and Richard

McJunkin ("McJunkin") filed herein), a former military ordinance manufacturing facility. The perchlorate is used in the manufacturing of solid rocket fuel. The perchlorate has contaminated a significant area of the soils that rest directly on the Saugus Aquifer. The perchlorate has penetrated the Saugus and has moved approximately 2 miles toward the Saugus production wells. (Exhibit 23, Map - Perchlorate Sources and Contaminated Wells.) The production wells encroached upon by the migrating contaminant have shown concentrations of perchlorate of between 9 micrograms per liter (µg/l) to 45 µg/l. The current provisional action level for drinking water for perchlorate is 18 µg/l. (Testimony Amir and McJunkin.)

The extent of the perchlorate contamination in the Saugus Aquifer is not yet known, largely because there is a lack of wells to monitor west of well VWC No. 157. (Exhibit 23; and testimony of Amir and McJunkin.) Perchlorate that is still in the soils at the contamination site will be "a long-term source of contamination" that will continue to reach the aquifers as rains and runoff push the contaminants in the soil into the groundwater system. (Testimony of Amir and McJunkin.)

Q.: HOW DOES THE PERCHLORATE PROBLEM AFFECT SAUGUS AQUIFER PRODUCTION?

A.: As of March 2000, the full extent and severity of the contamination of the groundwater by perchlorate has not been determined. Current studies may show that other wells of the Saugus Aquifer are vulnerable to the migrating perchlorate. A combination of natural groundwater quality and aquifer properties constrains the areas in which new Saugus wells might be sited away from the known areas of contamination. The better quality Saugus groundwater is generally restricted to an area that trends parallel to, and just east of Interstate 5. (Exhibit 24, Map - Areas of Good Quality Water in Saugus Aquifer.) It is this area, adjacent to the South Fork of the Santa Clara River and its confluence with the main branch of the Santa Clara River, that is being contaminated by perchlorate.

The contamination of the Saugus Aquifer with perchiorate raises a major problem for water purveyors in the Santa Clarita Valley. During the early and mid-i 990s, the Saugus Aquifer provided the purveyors between 7,400 to 11,500 AFY of groundwater. (Exhibit 25, 1999 Water Report, Table III-5.) In 1999, production

from the Saugus dropped to approximately 2,700 AFY, and wells were taken out of production. The areas that contain the good quality water in the Saugus (Exhibit 24) have been partially compromised by the contamination, and larger areas may also be eliminated from production as the perchiorate continues to migrate into the aquifer. The application to the PUC shows that the purveyors plan to pump the Saugus at 20,000 AFY during wet years, with pumping up to 40,000 AFY. (Exhibit 2, VWMP, Figure III-2; and Exhibit 6, VWMP, p. 15.) Because of the known contamination to the groundwater, both of these goals are problematic. The time required to characterize the extent of contamination, remediate the perchlorate in the soils that continue to pollute the aquifer, and then to remediate the aquifers themselves will likely be many years, especially since the technology to remediate the groundwater is only in a developmental stage. (Testimony of Amir and McJunkin.)

Q.: WHAT IS THE PROBABILITY FOR PERCHLORATE CONTAMINATION?

A.: The concentration of perchlorate in the production wells probably represents the leading edge of a much larger plume of higher concentrations of perchlorate. The total area of the Saugus Aquifer contaminated by the perchlorate has yet to be fully defined. We do know that the contaminant has migrated a minimum of 2 miles through the subsurface and over land to contaminate the vital pumping areas. (Exhibit 23.) Since the groundwater gradients in the contaminated area in the Saugus are towards the west, the contaminant is likely to continue to migrate further west and northwest. Time of travel from the soil contamination sites to the deep Saugus wells implies that the contaminant has been moving between 1 to 3 feet per day within the Saugus Aquifer. This implies that the perchlorate could impact Valencia's well No. 201 as early as next year. Further down gradient is Valencia's well No. 160.

APPENDIX TO TESTIMONY OF STEVE B. BACHMAN

This Appendix further explains Exhibit 2.

Exhibit 2: The years 1944 to 1994 were used in the demand/supply projections because the period represents an approximately zero cumulative departure with respect to the Santa Clarita Valley. (Exhibit 26, 1999 Water Report, Figure II-17.) This also avoids the dramatic 1929 to 1934 drought in northern California. Figure II-15 (Exhibit 8) provides data for local wet and dry conditions. The hydrology classification of wet, normal, or dry in northern California comes from Figure 3-4, Sacramento Four River Unimpaired Runoff (1906 to 1996), from Volume 1 of the California Water Plan Update Bulletin 160- 98, attached as Exhibit 27. This provides data for the years 1944 to 1994, which become the years 2000 to 2050 in the projection.

Agricultural pumping was reduced from 12,000 AFY to 5,000 AFY as per CLWA's IWRP, pages 2-5 and 2-6, attached as Exhibit 28. The fraction of Alluvial to total agricultural pumping was held constant through the analysis at 0.8, which was the average for the period 1980 to 1999.

The column "Purveyors GW Demand-Total" is calculated as total demand *less* agricultural GW demand *less* reclaimed water *less* State water available. (See Exhibit 9, p. 2.) If this number is less than zero, it is recorded as zero. The purveyors Alluvial pumping is calculated as all of the total purveyors GW demand up to the dry or wet limit of 25,000 AFY or 40,000 AFY *less* the agricultural Alluvial pumping (agricultural *plus* purveyors Alluvial cannot exceed 25,000 or 40,000, respectively). The purveyors Saugus GW demand equals the total purveyors GW demand *less* the purveyors Alluvial pumping.

The Saugus overdraft for each year is calculated by comparing Saugus pumping to Saugus recharge of 21,000 AFY (wet year) or 12,000 AFY (dry year). If Saugus pumping exceeds the recharge appropriate for that year, the excess pumping is added to the overdraft. If Saugus pumping is less than the recharge amount, the difference is subtracted from the overdraft. The "Saugus Overdraft" column is a running total of the annual overdrafts. The overdraft is never less than zero, because the aquifer is considered to be full at zero.

Exhibit 1

Castaic Lake Water Agency

Draft

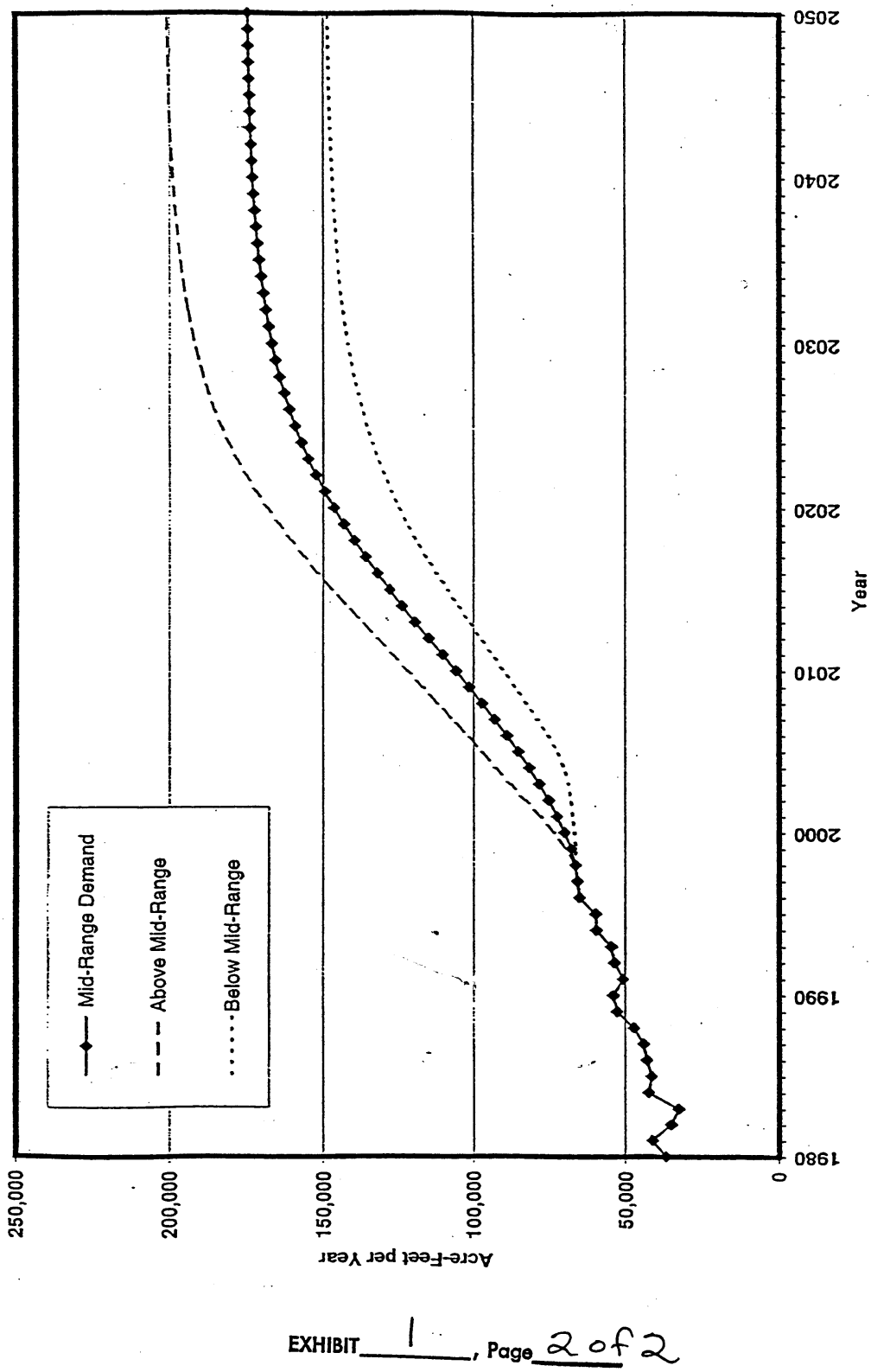
Integrated Water Resources Plan Water Demand and Supply Evaluation

February 1998

MONTGOMERY WATSON

BOOKMAN-EDMONSTON ENGINEERING, INC.

EXHIBIT 1, Page 1 of 2



Projected Water Demand
Figure 2-1

EXHIBIT 1, Page 2 of 2

Exhibit 2

VALENCIA WATER COMPANY

WATER MANAGEMENT PROGRAM

DECEMBER 16, 1999

Valencia Water Company

EXHIBIT 2, Page 1 of 3

SANTA CLARITA VALLEY WATER SUPPLIES

FIGURE III-1

FULL SUPPLY	
ALLUVIUM	40,000
SAUGUS	20,000
SWP	95,200
RECYCLED	1,700
	156,900 AF

DRY YEAR	
ALLUVIUM	32,500
SAUGUS	11,000
SWP	47,600
RECYCLED	1,700
	92,800 AF
FIRMING SUPPLIES	50,000
	142,800 AF

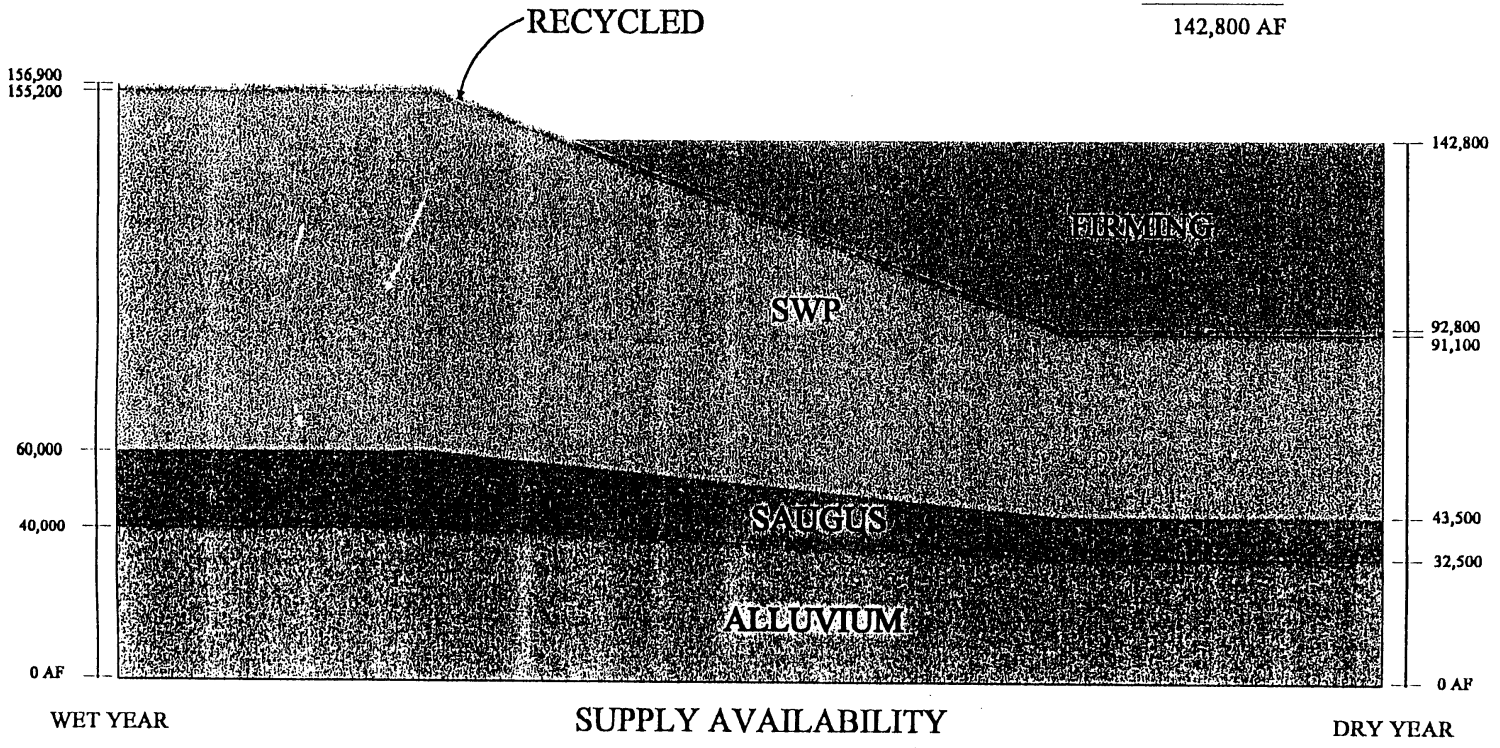


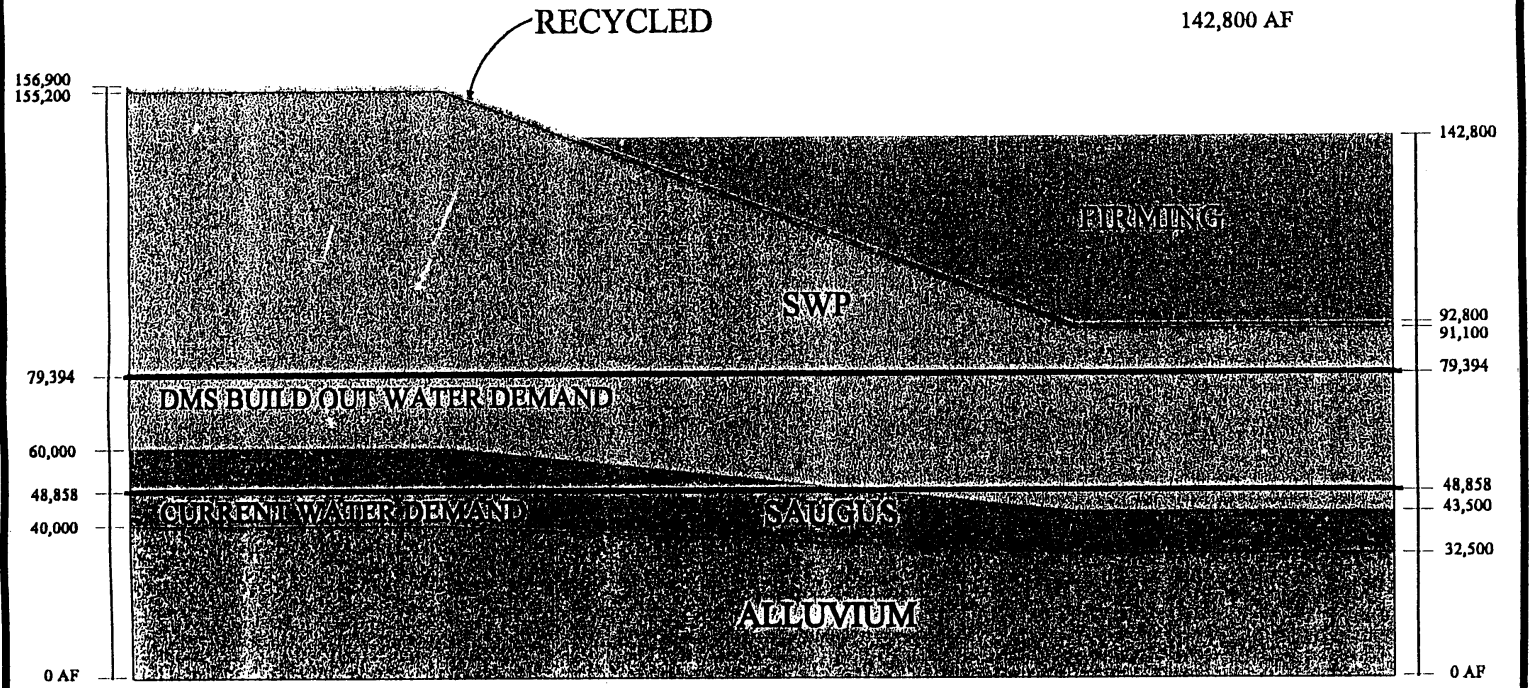
EXHIBIT 2, Page 2 of 3

SANTA CLARITA VALLEY WATER SUPPLIES

FIGURE III-2

FULL SUPPLY	
ALLUVIUM	40,000
SAUGUS	20,000
SWP	95,200
RECYCLED	1,700
	156,900 AF

DRY YEAR	
ALLUVIUM	32,500
SAUGUS	11,000
SWP	47,600
RECYCLED	1,700
	92,800 AF
FIRMING SUPPLIES	50,000
	142,800 AF



*Current water demand of 48,858 acre-feet as reported in Table III-5 of the 1998 Water Report.

EXHIBIT 2, Page 3 of 3

Exhibit 3

VOLUME I — REPORT TEXT

HYDROGEOLOGIC INVESTIGATION
PERENNIAL YIELD
and
ARTIFICIAL RECHARGE POTENTIAL
of the
ALLUVIAL SEDIMENTS
in the
SANTA CLARITA RIVER VALLEY
of
LOS ANGELES COUNTY, CALIFORNIA

FOR
UPPER SANTA CLARA WATER COMMITTEE
MEMBERS: LOS ANGELES COUNTY WATERWORKS
DISTRICT NO. 36 — VAL VERDE
NEWHALL COUNTY WATER DISTRICT
SANTA CLARITA WATER COMPANY
VALENCIA WATER COMPANY

AFFILIATE: CASTAIC LAKE WATER AGENCY

DECEMBER 1986

RICHARD C. SLADE
CONSULTING GROUNDWATER GEOLOGIST

EXHIBIT 3, Page 1 of 4

Change in Groundwater Storage. Change in groundwater storage is that amount of groundwater in the rock or sediments that increases or decreases over a specified length of time. During the drought years 1945 to 1977, water levels in the Santa Clarita Valley fell, and during the years of excessive precipitation, 1977-78 to 1982-83, water levels rose until the underground storage area was essentially filled and additional water flowed out of the basin. The difference in the elevation of the water table in the alluvium, or the amount of groundwater in storage at the beginning and at the end of the selected base period of study, reflects the surplus or the deficiency that occurred in the alluvium over the base period.

Computation of the change in groundwater stored in the alluvial aquifer at the beginning and at the end of the base period required a determination of several factors including the volume of sediments available, the saturated thickness of these sediments, and the specific yield of the alluvial materials which store, transmit, accept, and release groundwater to pumping wells. This has been provided previously in the report section discussing groundwater storage.

Computation of Perennial Yield. In summary, the steps required to compute the perennial yield of the Santa Clarita alluvial aquifer system are as follows:

1. Select the base and mean hydrologic periods.
2. Determine the average annual quantity of groundwater extracted by wells from the alluvial sediments.
3. Find the difference between the quantity of groundwater in storage at the beginning and at the end of the selected base period.
4. Find the average annual change in storage from the value found in Step 3.
5. The perennial yield is then the algebraic sum of the

EXHIBIT 3, Page 2 of 4

calculated values of average annual pumpage and average annual change in storage.

To determine the average annual groundwater production from the alluvial sediments in the Valley, files at the major water purveyors concerning present and historic production were obtained. These data vary widely in their apparent level of accuracy. For example, some of the data do not date back to 1957-58, other data are based on electrical consumption at the pump and not on actual metered gallonage, while other data are only estimates based on the number of persons using the water. Regardless, during the 28-year base period 1957-58 to 1984-85, we estimate the average annual groundwater production from the alluvial sediments in the Santa Clarita Valley to have been approximately in the range of 31,000 to 32,000 acre-feet per year.

In addition, at the beginning of the base period, the quantity of groundwater stored in the alluvial sediments was calculated to be approximately 159,688 acre-feet. By 1985, the quantity of groundwater in storage in the alluvium had been increased to 176,409 acre-feet (see Table 8). The increase in the quantity of water in storage in the alluvium is thus 16,721 acre-feet. This increase is the total quantity of groundwater added to storage during the 28-year Base Period as a result of excess precipitation. Hence, the average annual net change in groundwater in storage was determined by dividing the total quantity of water added to storage by the length of the Base Period, or +597 acre-feet per year.

The perennial yield is the quantity of groundwater what can be pumped annually without any change in groundwater levels or net change in groundwater in storage over the Base Period. This may be computed by determining the average annual pumping during the Base Period (31,000 to 32,000 acre-feet), and adding or subtracting from this value, that amount

EXHIBIT 3, Page 3 of 4

of groundwater which represented the average annual change in storage.

Because there was more water in storage at the end of the Base Period (1985) than at the beginning of the Base Period (1958), the annual net change in storage (+597 ac-ft) must be added to the average annual pumping (31,000 to 32,000 ac-ft). Thus, the practical or perennial yield of the alluvial sediments in the Santa Clarita Valley area is in the range of 31,600 to 32,600 ac-ft/yr.

Review of the literature indicates other values of perennial yield by different investigators. These other values include: a DWR (June 1964 and February 1979) value of 23,100 ac-ft/yr for the Eastern Basin, although they do not state whether this number is solely for the alluvium or for both the alluvium and the Saugus Formation; Hackel and Associates (1964), who reported a combined annual yield of 33,250 ac-ft/yr for both the alluvium and the Saugus Formation; and Bookman-Edmonston Engineering, Inc. (1976 and 1983) who report a value of 35,100 to 35,200 ac-ft/yr, as modified from USGS data, for the yield of the alluvium. Variations in these numbers relate to differences in total outcrop area of the alluvium being considered and to differences in the base period of study selected by each investigator.

SOILS CONDITIONS AND ARTIFICIAL RECHARGE

GENERAL RECHARGE METHODS

By definition, artificial recharge is the practice of deliberately augmenting the natural processes of infiltration of precipitation and streamflow through soils materials, thereby replenishing a groundwater reservoir via man-made

EXHIBIT 3, Page 4 of 4

Exhibit 4

Castaic Lake Water Agency

Draft

Integrated Water Resources Plan
Water Demand and Supply Evaluation

February 1998

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ENGINEERING, INC.

EXHIBIT 4, Page 1 of 3

Pumping from the Saugus Aquifer has varied from about 3,900 acre-ft/yr up to 14,800 acre-ft/yr. In 1996, Saugus pumping was about 8,200 acre-ft/yr. Installed pumping capacity can produce 15,000 to 16,000 acre-ft/yr from the Saugus Aquifer.

In 1991, groundwater was pumped into the CLWA distribution system because of SWP supply deficiencies and the cost of water was less than purchasing State Drought Bank water. By moving groundwater from areas of adequate supply into areas with limited groundwater, the local water community illustrated a major element of a conjunctive use program.

Estimated Dry Period Groundwater Production Capability

Slade (1984) reported that the perennial yield of the Alluvial Aquifer is about 32,000 acre-ft/yr. This yield is the historical annual production adjusted for a minor change in storage. Because of he limited storage capacity in the Alluvium, this groundwater source may be limited in dry periods. Wells in the Alluvium near the eastern reaches of the Santa Clara River are known to have groundwater levels which decline during consecutive dry years by as much as 100 feet, reducing pumping capacity. A series of winter storms recharge the aquifer and result in water level recovery.

The data reviewed for the Pardee area (located near Bouquet Canyon Road and the Santa Clara River) shows that in 1990 and 1991, groundwater levels did not decline as much as those in the easterly areas. In 1991, the Valencia Water Company increased its pumping to offset limited SWP water supplies. Valencia Water Company reported delivery of about 5,000 acre-ft/yr into the CLWA distribution system. Total pumping from the Alluvium by Valencia Water Company in 1991 was about 9,900 acre-ft/yr, as reported to the State Water Resources Control Board.

Based on historical data, the Alluvial Aquifer east of Castaic Junction can support production of at least 20,400 acre-ft/yr as shown in **Table 3-2.**

Table 3-2
1991 Alluvial Groundwater Production
East of Castaic Junction

Water Purveyor	Annual Production (acre-ft/yr)
Newhall CWD	1,900
Santa Clarita WC	5,900
Valencia WC [1]	10,400
Wayside Honor Rancho	2,200
Total	20,400

1. Includes 500 acre-ft pumped in 1991 by Newhall Land & Farming Co. east of Castaic Junction.

The area west of Castaic Junction has never been stressed by intense pumping but it is believed to be capable of producing at least 12,000 acre-ft/yr based on current production. The supply in this area is not greatly affected by drought because it is replenished from wastewater effluent, irrigation return flow and the westward movement of groundwater causing the basin water levels remain high. This water would require blending with other supplies to reduce the salinity of delivered water if used for potable purposes.

Discussions with Slade (1997) indicate that the entire Alluvial Aquifer has the capability of yielding about 25,000 acre-ft/yr for multiple dry years. A full aquifer with about 140,000 acre-ft of water in storage, pumped at this rate, would provide water for five to six years, assuming no inflow to the basin. Production at this level and duration would most likely reduce water levels in the upper portions of the basin in the vicinity of Soledad Canyon.

Saugus Formation production capability is less defined. Slade (1997) estimates that the Saugus Formation is capable of producing up to 40,000 acre-ft/yr over a period of five to six dry years. This production level is currently unproven because there are not sufficient wells to operate at this extraction rate. Since current production capabilities only allow about 15,000 to 16,000 acre-ft/yr of production, a significant number of new wells would be required to pump 40,000 acre-ft/yr. It is recommended that any program to construct additional Saugus Formation wells be implemented in stages and be fully evaluated before proceeding to subsequent stages.

IMPORTED WATER SUPPLIES

CLWA obtains imported water supplies from the State Water Project (SWP) which is managed by the Department of Water Resources (DWR). CLWA is one of 29 agencies holding a long-term contract with the State of California for SWP water. SWP water originates from rainfall and snowmelt in northern and central California. Runoff is stored in Lake Oroville, which is the project's largest storage facility. The water is then released down the Feather River to the Sacramento River and the Sacramento-San Joaquin Delta. Water is diverted from the Delta into the Clifton Court Forebay, and then pumped into the 444-mile-long California Aqueduct. SWP water is temporarily stored in San Luis Reservoir, which is jointly operated by the DWR and the U.S. Bureau of Reclamation. Prior to delivery to CLWA, SWP supplies are stored in Castaic Lake which is located at the end of the West Branch of the California Aqueduct. **Figure 3-6** shows the location of the primary water storage and delivery facilities of the SWP.

The following discussion of the SWP supply includes CLWA's contract entitlement, current supply planning activities including the CALFED Program, supply reliability, and water quality.

Water Supply Contract Entitlement

Each contracting agency is entitled to a maximum annual amount of SWP water as specified in Table A of the agency's SWP contract. Initially, 31 agencies contracted for SWP water with total combined entitlements of 4,230,000 acre-ft/yr. Contract amendments in the 1980s have reduced the number of contractors to 29 agencies with combined entitlements of 4,217,786 acre-ft/yr. The term of the contract is through the year 2035 and is renewable after that year.

Exhibit 5

Table 3-7
Current Water Supply Operating Plan
(acre-ft/yr)

Source	Wet Year	Average Year	Dry Year
Alluvial Aquifer Groundwater	40,000	32,000	25,000
Saugus Formation Groundwater	5,000	10,000	16,000 [1]
State Water Project Entitlement Deliveries	54,000	41,000	18,000
Water Bank and Transfers [2]	0	0	20,000
Water Conservation [3]	17,000	17,000	17,000
Total Supply	116,000	100,000	96,000

Notes:

1. Saugus Formation groundwater production is currently limited to about 16,000 acre-ft/yr by installed well capacity. The aquifer should be capable of producing up to 40,000 acre-ft/yr with additional wells.
2. Water Bank purchases and other dry year transfers are assumed to be about 20,000 acre-ft/yr. Actual amounts would depend on the amount of water made available to the Water Bank and other programs.
3. Water conservation is estimated to be ten percent of future mid-range demand.

Table 3-8
Future Water Supply Needs

Demand Condition	Future Demand [2]	Maximum Water Supply Needs [1] - (acre-ft/yr)		
		Wet Year	Average Year	Dry Year
Minimum	149,000	33,000	49,000	53,000
Mid-Range	175,000	59,000	75,000	79,000
Maximum	201,000	85,000	101,000	105,000

Note:

1. Water supply needs are the difference between future demands and available supplies from Table 3-7. The water supply needs incorporate the CLWA goal of 10 percent conservation as shown in Table 3-7.

Exhibit 6

VALENCIA WATER COMPANY

WATER MANAGEMENT PROGRAM

DECEMBER 16, 1999

Valencia Water Company

EXHIBIT 6, Page 1 of 4

deliver up to 1,700 acre-feet of water for non-potable use. Valencia encourages the use of recycled water as an important program to maximize current supplies in meeting overall water needs for the Valley.

5) Firming Water: Firming water supplies are defined as alternate short term supplies (1 to 3 years) made available to the local purveyors to be used when imported water is reduced during drought conditions. For purposes of Valencia's WMP, three firming supply options are included in this report. They are: 1) acquiring additional SWP entitlement, 2) the Drought Water Bank, operated by the State of California, and 3) local supply augmentation.

In 1999, CLWA acquired 41,000 acre-feet of SWP Table A Entitlement (via a permanent transfer) from Kern County Water Agency and its member unit the Wheeler Ridge-Maricopa Water Storage District. This transfer was completed under the terms of the Monterey Agreement, in which agricultural SWP Contractors agreed, on a willing seller willing buyer basis, to make available 130,000 acre-feet of entitlement for permanent transfer to urban SWP Contractors. By this permanent transfer, CLWA SWP Table A Entitlement is 95,200 acre-feet per year. In CLWA's *IWRP*, additional imported water was identified as one component of an overall plan to increase the reliability and availability of water within its service area. For the foreseeable future, this transfer increases their total supply while providing a significant "drought buffer" even in times of shortage.

The State Drought Water Bank is implemented as needed by an executive order of the Governor or a finding by DWR's Director that water deliveries will be curtailed. The purpose of the Bank is to help California's urban, agricultural and environmental interests meet their water supply needs during water short years. This procedure was used successfully in 1991, 1992 and 1994 when DWR purchased water from willing sellers and sold the water to willing buyers under a set of allocation guidelines. Although CLWA's allocation of imported water was

reduced in 1991, it did not participate in the Drought Water Bank program because other alternate supplies were available to meet Valley water demands. For purposes of planning, CLWA's *IWRP* identified short-term deliveries of 20,000 acre-feet or more of water purchased from the state's Drought Water Bank in dry years if needed, to augment the Valley's water supplies.

It is important to note that there are several other state programs in place that CLWA can utilize to "firm up" SWP supplies when they are reduced. A partial listing of programs includes the Supplemental Water Purchase Program, the Interruptible Water Service Program and the SWP Turn-back Pool. These programs are discussed in detail in Section 3, page 3-16 of CLWA's *IWRP*. In summary, these programs provide substantial opportunity for CLWA to increase its water supply and effectively implement water management activities to enhance supply reliability.

Local supply augmentation includes demand management programs (voluntary and mandatory rationing programs) and conjunctive use of stored local groundwater. For planning purposes, the WMP assumes that Valencia customers could voluntarily conserve 10 percent from their normal usage. This is reasonable since Valencia customers, during the last drought in 1991, voluntarily conserved over 20 percent.

As discussed in item 2 above, the Saugus Formation could produce up to 40,000 acre-feet of water per year. This assumes approximately 30,000 acre-feet of water could be withdrawn on a short term basis from the Saugus Formation in addition to the dry year recharge rate of 11,000 acre-feet. In order to achieve this level of production, existing agricultural wells could be converted for domestic use and/or new wells could be constructed.

At the present time, the Valley's primary supplies of groundwater, imported water and recycled water are adequate to meet existing and projected demands for the

foreseeable future. As water demands increase, Valencia, CLWA and the other purveyors will analyze and determine the most beneficial mix of supply options available on a short term basis to meet customer demands. In summary, Valencia's WMP has identified approximately 50,000 acre-feet of firming water supplies (excluding 10 percent voluntary conservation) that is available to Valencia and the other purveyors to be used if and when SWP supplies are reduced.

6) Future Water Sources: Water supply and facilities for the Valley have increased incrementally over the years in order to keep pace with customer demands. It is not reasonable for service providers to build all that is necessary and acquire water rights to accommodate projected water demands twenty to thirty years in the future. CLWA and the local purveyors plan for new supplies and facilities a minimum of 3 to 5 years ahead of need. In its *IWRP*, CLWA addressed opportunities to increase the sources of both local and imported water supplies over time. These programs include:

Acquisition of Additional SWP Entitlements. CLWA has recently purchased under the Monterey Agreement an additional entitlement of 41,000 acre-feet. In the near term, this additional supply of water will provide added reliability to CLWA's base water supplies. At the present time, additional SWP entitlement is available and CLWA is evaluating the benefits of acquiring additional entitlement along with other programs such as water banking and other storage opportunities needed for planned growth within the Valley.

Devils Den Ranch Groundwater. CLWA is studying the potential to develop groundwater supplies from property it owns on the west side of the San Joaquin Valley near the Kings-Kern County line. Known as the Devil's Den Ranch, water from this groundwater basin could be pumped into the California Aqueduct and delivered to CLWA.

Water Conservation. CLWA will continue to develop and implement its comprehensive water conservation program in cooperation with the four retail agencies. The major emphasis will be on landscape water conservation activities. Based on empirical data on the impact of conservation measures in other cases, which range from 10 to 20 percent, a minimum 10 percent reduction in water demand through conservation is expected.

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Exhibit 7

Castaic Lake Water Agency

Draft

Integrated Water Resources Plan
Water Demand and Supply Evaluation

February 1998

MONTGOMERY WATSON

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ENGINEERING, INC.

EXHIBIT 7, Page 1 of 7

CLWA service area, particularly portions of Soledad and Bouquet Canyons, are not underlain by the Saugus Formation and alluvial deposits are relatively thin.

Alluvial Aquifer

Large quantities of water are pumped from relatively shallow wells in the highly permeable Alluvial Aquifer. Although it is the smaller of the two aquifer systems as measured by storage capacity, most water wells within CLWA are drilled into the Alluvial Aquifer. The maximum historic quantity of water stored in the Alluvium has been estimated to be approximately 201,000 acre-ft following periods of substantial rainfall in 1945 (Slade, 1986). Over one-half of this storage is located along the Santa Clara River below Soledad Canyon. The remaining Alluvial storage is equally divided between Soledad Canyon and the other main tributaries (Castaic Valley, San Francisquito Canyon, and Bouquet Canyon).

Recharge to the Alluvial Aquifer is primarily from the percolation of streamflow in the Santa Clara River and its tributaries. The amounts of flow and streamflow recharge are highly variable. When large quantities of surface water are available during wet years, the Alluvial Aquifer system is readily recharged, with documented water level recoveries of 70 feet or more. A significant water level drop of up to 100 feet is experienced following a series of dry years. These water level declines are particularly significant in Soledad Canyon.

The groundwater levels in the vicinity of Castaic Junction have remained near the ground surface, even during periods of deficient rainfall. This is due to the east-to-west movement of groundwater, a possible restriction to groundwater movement, and a continual supply of water from the Valencia Water Reclamation Plant. The groundwater levels west of Castaic Junction remain near ground surface, even during dry years. Pumping has not stressed this part of the Alluvial Aquifer. Slade (1986) calculated a perennial yield from the Alluvial Aquifer based on a period from 1957-58 through 1984-85 to be from 31,600 acre-ft/yr to 32,600 acre-ft/yr.

Saugus Formation

The Saugus Formation contains much greater quantities of groundwater than does the Alluvial Aquifer. Slade (1988) reported that approximately 1.41 million acre-ft of potentially usable groundwater is contained from depths of 500 feet to 2,500 feet in the Saugus Formation. To date, few water wells have been drilled into the Saugus Formation and information on the characteristics of this aquifer is limited. Available data indicate that the highest yield potential of the Saugus Formation (based on aquifer depth, aquifer transmissibility, and water quality) are generally located along, and southerly of, the Santa Clara River, between its confluence with Bouquet Canyon Creek and Castaic Creek. The Saugus Formation appears shallower and exhibits a lower transmissivity north of the San Gabriel Fault, although water well data available in this area are limited.

Slade (1988) indicates that the principal source of recharge to the Saugus Formation is from precipitation on exposed outcrops and direct infiltration from the overlying saturated alluvium of the Santa Clara River channel. Preliminary estimates of the combined potential recharge from these two sources range from 20,000 to 22,000 acre-ft/yr in wet periods, and from 11,000 to

13,000 acre-ft/yr in dry periods. Slade (1988) further states that south of the San Gabriel Fault, wells with depths of 1,500 to 2,500 feet are anticipated to produce 1,500 to 2,000 gallons per minute (gpm). It was recommended that new wells be spaced at least 1,000 feet apart to minimize mutual interference. Wells north of this fault will be shallower and have lower yields.

Since a principal source of recharge to the Saugus is from the Alluvial Aquifer system, heavy pumping of the Saugus will eventually affect the Alluvium. The low vertical permeability between the two aquifer systems greatly restricts this interflow. Consequently, groundwater in the Saugus Aquifer is less readily replenished. Potential methods to improve recharge of the Saugus Aquifer are discussed in Section 4.

Groundwater Quality

Groundwater quality is, in part, dependent on the quality of surface water which recharges the groundwater basin. In the main stem of the Santa Clara River and its larger tributaries, surface flows generally rank fair in terms of water quality standards. Total dissolved solids (TDS) typically ranges from 400 to 700 milligrams per liter (mg/l).

Water in the Alluvial Aquifer generally increases in salinity as it moves westerly from recharge areas to the areas of rising groundwater downstream from Castaic Junction near Blue Cut. The TDS concentrations in these Alluvial Aquifers increase from approximately 400 mg/l in the upstream areas to approximately 1,000 mg/l or greater in the vicinity of Castaic Junction. Downstream from that point, groundwater quality is similar to the quality of rising groundwater discharged to the Santa Clara River, which contains TDS in the range of 1,000 mg/l to 3,000 mg/l. Near Castaic Creek, the groundwater quality is impacted by poor quality surface water flowing from Charlie Canyon.

Deep wells in the Saugus Aquifer typically have TDS concentrations ranging from about 400 mg/l in the upstream areas to approximately 1,000 mg/l in the vicinity of Interstate Highway 5. Extremely high salinities of 1,000 mg/l to over 3,000 mg/l TDS, are found in the southerly portion of the basin (generally southwest of Newhall near the Saugus Formation edge). Although insufficient data are available, similar high salinities may occur in other peripheral areas of the basin where there is inadequate flow to flush out accumulated salts.

Several new water quality problems have been observed in Southern California recently that could affect groundwater supply availability: MTBE and perchlorate. Methyl-tertiary-butyl-ether (MTBE) is a compound that is added to gasoline to improve air quality. Groundwater contamination is most commonly associated with leaking underground fuel tanks and petroleum product pipelines. Because MTBE is highly soluble in water, does not adsorb well to soil particles and is not readily biodegradable, it can percolate through the ground into underground aquifers at rates similar to that of water. The extent of contamination in the Santa Clarita Valley is not currently known; however, 36 leaking tank sites are under various stages of investigation or remediation according to recent Regional Board data. MTBE is likely to be a more significant issue in the future.

VOLUME I — REPORT TEXT

HYDROGEOLOGIC ASSESSMENT

OF THE

SAUGUS FORMATION
in the
SANTA CLARA VALLEY
of
LOS ANGELES COUNTY, CALIFORNIA

FOR

CASTAIC LAKE WATER AGENCY

LOS ANGELES COUNTY WATERWORKS DISTRICT NO. 36 — VAL VERDE

NEWHALL COUNTY WATER DISTRICT

SANTA CLARITA WATER COMPANY

VALENCIA WATER COMPANY

FEBRUARY 1988

RICHARD C. SLADE

CONSULTING GROUNDWATER GEOLOGIST

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001

to be considered as usable, these potential aquifers were selected from electric logs and only between the depths of 500 ft (to preclude capturing groundwater from the alluvium) and: the base of fresh water in the Saugus Formation; or a maximum depth of 2500 ft (the deepest existing Saugus well is 2000 ft deep), whichever is shallower.

Current groundwater production (1986) represented only 0.40 percent of the total volume of usable storage in the Saugus Formtion.

6.0 POTENTIAL RECHARGE

Principal recharge sources to the Saugus for our calculations were deep percolation of direct precipitation solely on the outcrop area of the Saugus Formation and terrace deposits; and direct infiltration from saturated alluvium within only the Santa Clara River channel and only where this alluvium directly overlies Saugus strata. Such calculations provided an estimate of the minimum amount of recharge to the Saugus.

As a preliminary estimate, we believe the combined potential sources from these two sources ranges between approximately 20,000 and 22,000 ac-ft/yr in wet periods and 11,000 to 13,000 ac-ft/yr in dry periods.

Such potential recharge causes a re-pressurization of the confined Saugus aquifers. Historic extractions have caused no discernible or definitive trends in the piezometric levels of graphed wells since records began. Piezometric levels have been rising in wells since the late-1960's, possibly as a result of recharge from years of excess rainfall in this period.

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This preliminary assessment of the minimum amount of potential recharge to the Saugus Formation incorporates only portions of the two main forms of deep percolation and recharge into these strata. As such, this preliminary assessment should not be construed as a rigorous determination of the perennial yield of the Saugus, with such determination not being a part of the scope of work.

Furthermore, because so much of the Saugus Formation (both laterally and vertically) contains no active water wells and/or has never contained any water wells, the vast majority of the aquifer system has never been stressed; indeed, for much of the region, there are no definitive hydrogeologic data at all. A meaningful evaluation of the perennial yield of this formation must await, as yet unavailable, long-term water level and water quality data and a data base that includes actual data from wells northerly of the Holser and San Gabriel faults.

It is also noteworthy that the natural losses of groundwater via subsurface leakage from the alluvium into underlying strata, including the Saugus Formation, occur continuously and wherever there are relatively permeable strata underlying saturated alluvium; even in dry years, the lower portions of the alluvium still contain groundwater. The leakage losses are natural and cannot be terminated because it would require an infinite number of wells to totally dewater all of the alluvium on a permanent basis.

In our method of assessing the perennial yield of the overlying alluvium (Slade, December 1986), we considered only the change in water levels vs. groundwater extraction from the alluvium for a specific

time period. These water levels are known to change in response to many conditions, including rainfall, basin inflow, and basin outflow (losses). Thence, inherent to the perennial yield assessment of alluvium are the natural losses from the alluvium to the Saugus Formation.

7.0 NEW WELLS

7.1 Priority Locations. Plate 10 - Recommended Drilling Areas - has been prepared on a regional basis to show general locations, on a first-order priority, for new wells. Available data have been analyzed to provide these regional priority locations to be considered for future wells by the purveyors.

However, prior to drilling, it is recommended that a site-specific evaluation be provided of electric logs proximal to any prospective future well site in order to confirm the distribution and continuity of coarse-grained channel deposits. This is also important because zones of deposition of coarse grained Saugus strata are known to have varied widely in geologic time, both vertically and horizontally. Such site-specific subsurface data can be briefly reviewed and summarized in a letter to provide final details for test hole/final well specifications.

If more than one well is desired in a given area, construction should be conducted in phases, with the first well drilled, completed, developed, and thoroughly tested prior to selecting the final sites and design criteria for additional wells in that given area. New wells should be spaced at least 1000 ft apart, based on mutual drawdown interference criteria.

7.2 Anticipated Yields. New Saugus Formation water wells in the region southerly of the San Gabriel fault

EXHIBIT 7, Page 7 of 7

Exhibit 8

SANTA CLARITA VALLEY WATER REPORT
1999

Castaic Lake Water Agency

Los Angeles County Waterworks District #36

Newhall County Water District

Santa Clarita Water Company

Valencia Water Company

Prepared by: The Upper Santa Clara Valley Water Committee
February 2000

EXHIBIT 8, Page 1 of 2

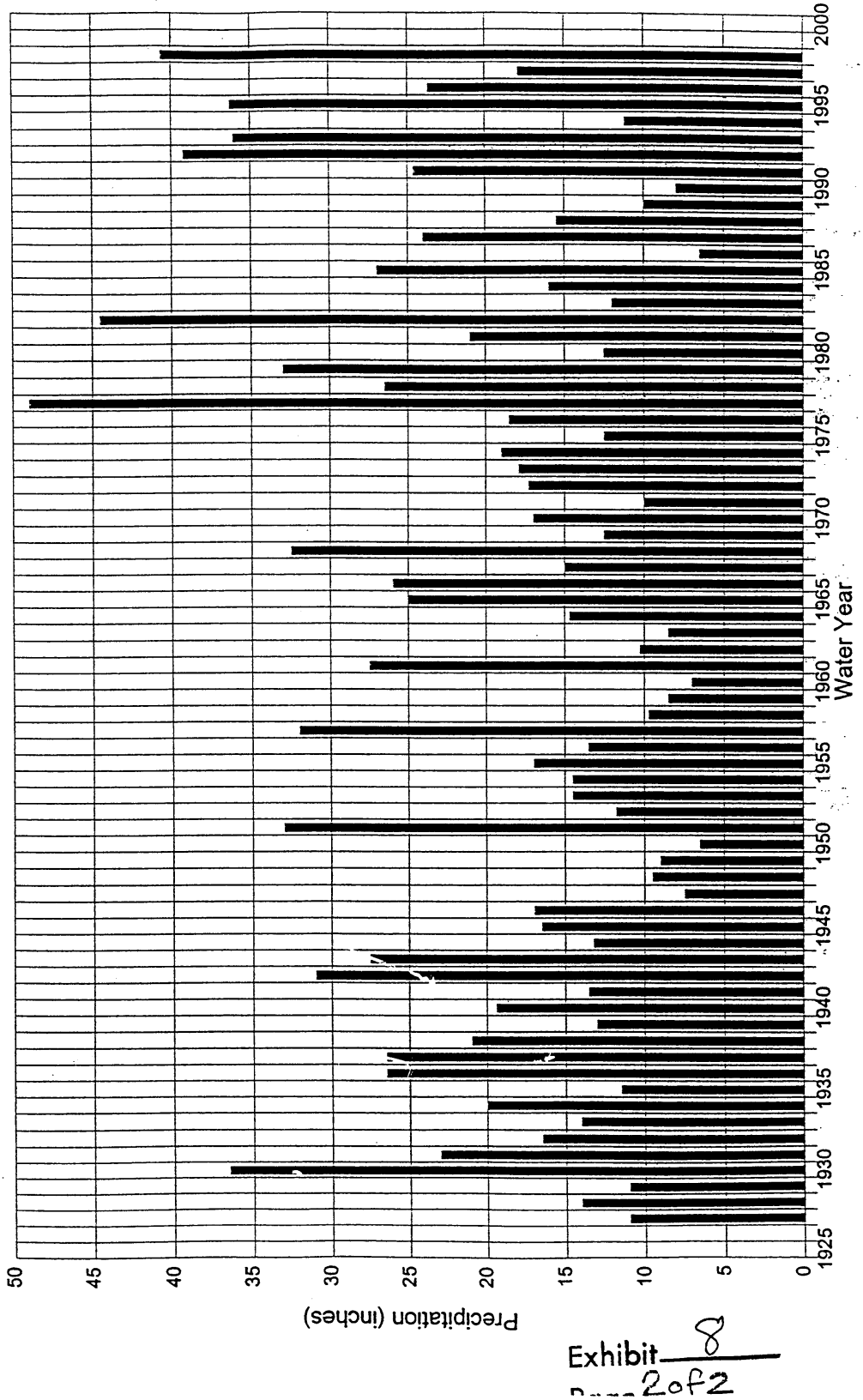

Figure II-15

Exhibit 8
Page 2 of 2

Exhibit 9

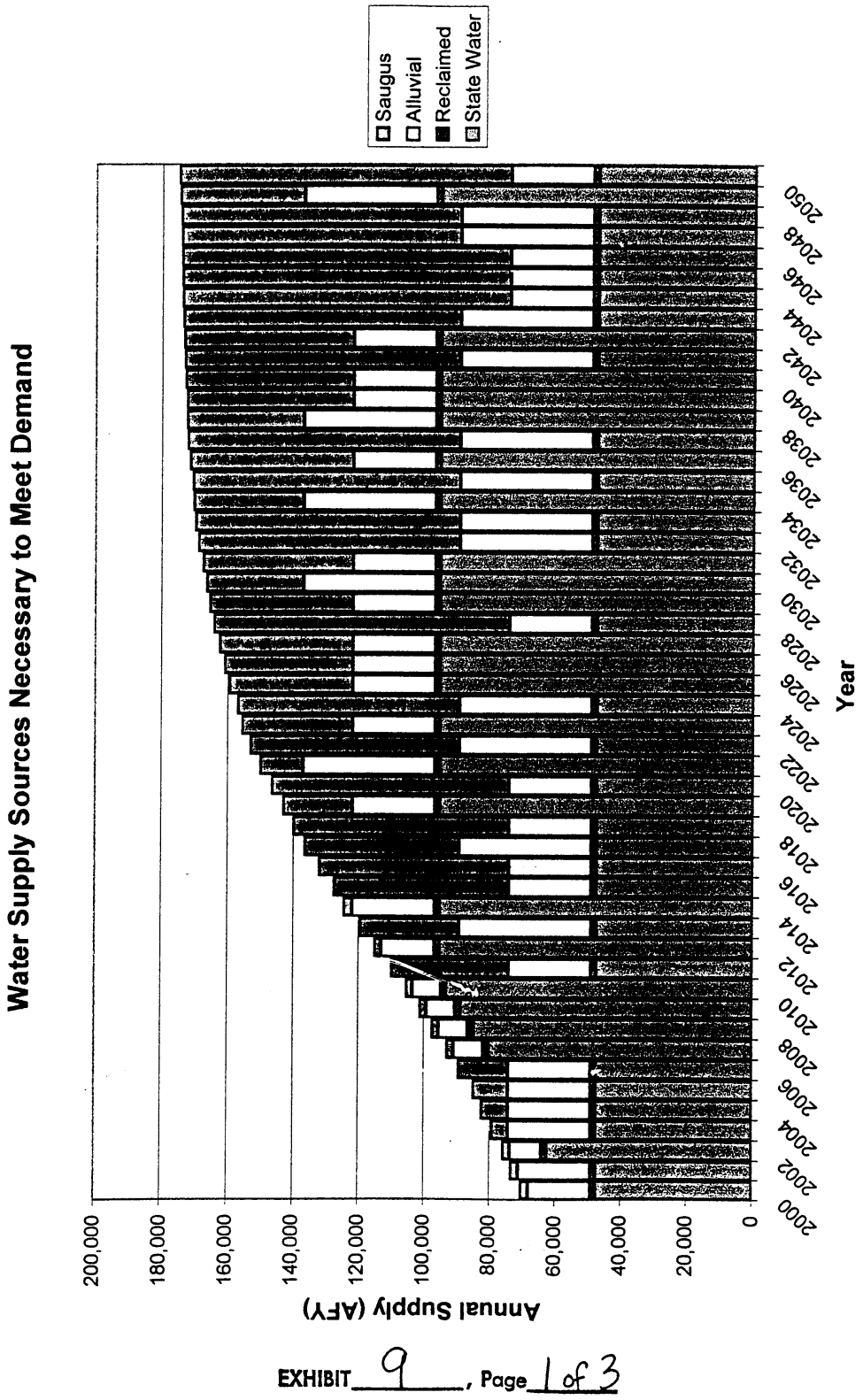

EXHIBIT 9, Page 1 of 3

Santa Clarita Area Demand vs Supply

Year	Hydrology N Calif	Hydrology Local	Total Demand	Agricultural GW Demand Total GW	Agricultural GW Demand Alluv Aq	Agricultural GW Demand Saugus Aq	Recl Water	State Water Proj Available	Purveyors GW Demand Total	Purveyors GW Demand Alluv	Purveyors GW Demand Saugus	Total Alluv Aq	Total Saugus Aq	Saugus Overdraft
2000	Dry	Dry	70,500	12,000	9,600	2,400	1,700	47,600	9,200	9,200	-	18,800	2,400	-
2001	Dry	Dry	73,500	11,860	9,488	2,372	1,700	47,600	12,340	12,340	-	21,828	2,372	-
2002	Normal	Dry	76,000	11,720	9,376	2,344	1,700	95,200	-	-	-	9,376	2,344	-
2003	Dry	Dry	79,500	11,580	9,264	2,316	1,700	47,600	18,620	15,736	2,884	25,000	5,200	-
2004	Dry	Dry	82,500	11,440	9,152	2,288	1,700	47,600	21,760	15,848	5,912	25,000	8,200	-
2005	Dry	Dry	85,000	11,300	9,040	2,260	1,700	47,600	24,400	15,960	8,440	25,000	10,700	-
2006	Dry	Dry	89,500	11,160	8,928	2,232	1,700	47,600	29,040	16,072	12,968	25,000	15,200	3,200
2007	Wet	Wet	93,000	11,020	8,816	2,204	1,700	95,200	-	-	-	8,816	2,204	-
2008	Wet	Dry	87,500	10,880	8,704	2,176	1,700	95,200	-	-	-	8,704	2,176	-
2009	Wet	Dry	101,250	10,740	8,592	2,148	1,700	95,200	-	-	-	8,592	2,148	-
2010	Normal	Dry	105,500	10,600	8,480	2,120	1,700	95,200	-	-	-	8,480	2,120	-
2011	Dry	Dry	110,000	10,460	8,368	2,092	1,700	47,600	50,240	16,632	33,608	25,000	35,700	23,700
2012	Wet	Dry	115,000	10,320	8,256	2,064	1,700	95,200	7,780	7,780	-	16,036	2,064	13,764
2013	Dry	Wet	119,500	10,180	8,144	2,036	1,700	47,600	60,020	31,856	28,164	40,000	30,200	22,964
2014	Wet	Dry	124,500	10,040	8,032	2,008	1,700	95,200	17,560	16,968	592	25,000	2,600	13,564
2015	Dry	Dry	127,500	9,900	7,920	1,980	1,700	47,600	68,300	17,080	51,220	25,000	53,200	54,784
2016	Dry	Dry	132,000	9,760	7,808	1,952	1,700	47,600	72,940	17,192	55,748	25,000	57,700	100,484
2017	Dry	Wet	136,500	9,620	7,696	1,924	1,700	47,600	77,580	32,304	45,276	40,000	47,200	126,664
2018	Dry	Dry	140,000	9,480	7,584	1,896	1,700	47,600	81,220	17,416	63,804	25,000	65,700	180,364
2019	Wet	Dry	143,000	9,340	7,472	1,868	1,700	95,200	36,760	17,528	19,232	25,000	21,100	189,464
2020	Dry	Dry	146,500	9,200	7,360	1,840	1,700	47,600	88,000	17,640	70,360	25,000	72,200	249,664
2021	Wet	Wet	150,000	9,060	7,248	1,812	1,700	95,200	44,040	32,752	11,288	40,000	13,100	241,764
2022	Dry	Wet	153,000	8,920	7,136	1,784	1,700	47,600	94,780	32,884	61,916	40,000	63,700	284,464
2023	Wet	Dry	155,500	8,780	7,024	1,756	1,700	95,200	49,820	17,976	31,844	25,000	33,600	306,064
2024	Dry	Wet	157,000	8,640	6,912	1,728	1,700	47,600	98,060	33,088	65,972	40,000	67,700	352,764
2025	Wet	Dry	159,500	8,500	6,800	1,700	1,700	95,200	54,100	18,200	35,900	25,000	37,600	378,364
2026	Wet	Dry	161,000	8,360	6,688	1,672	1,700	95,200	55,740	18,312	37,428	25,000	39,100	405,464
2027	Wet	Dry	162,500	8,220	6,576	1,644	1,700	95,200	57,380	18,424	38,956	25,000	40,600	434,064
2028	Dry	Dry	164,250	8,080	6,464	1,616	1,700	47,600	108,870	18,536	88,334	25,000	89,950	512,014
2029	Wet	Dry	165,500	7,940	6,352	1,588	1,700	95,200	60,880	18,648	42,012	25,000	43,600	543,614
2030	Wet	Normal	166,500	7,800	6,240	1,560	1,700	95,200	61,900	33,760	28,040	40,000	29,600	552,214
2031	Wet	Dry	167,800	7,660	6,128	1,532	1,700	95,200	63,040	18,872	44,168	25,000	45,700	585,914
2032	Dry	Normal	169,000	7,520	6,016	1,504	1,700	47,600	112,180	33,984	78,196	40,000	79,700	644,614
2033	Dry	Wet	170,000	7,380	5,904	1,476	1,700	47,600	113,320	34,096	79,224	40,000	80,700	704,314
2034	Wet	Wet	170,500	7,240	5,792	1,448	1,700	95,200	66,360	34,208	32,152	40,000	33,600	716,914
2035	Dry	Wet	170,750	7,100	5,680	1,420	1,700	47,600	114,350	34,320	80,030	40,000	81,450	777,364

EXHIBIT 9, Page 2 of 3

2036	Wet	Dry	171,500	6,960	5,568	1,392	1,700	95,200	67,840	19,432	48,208	25,000	49,600	814,964
2037	Dry	Wet	172,250	6,820	5,456	1,364	1,700	47,600	116,130	34,544	81,586	40,000	82,950	876,914
2038	Wet	Wet	172,500	6,680	5,344	1,336	1,700	95,200	68,920	34,656	34,264	40,000	35,600	891,514
2039	Wet	Dry	172,500	6,540	5,232	1,308	1,700	95,200	69,060	19,768	49,292	25,000	50,600	930,114
2040	Wet	Dry	173,000	6,400	5,120	1,280	1,700	95,200	68,700	19,880	49,820	25,000	51,100	989,214
2041	Dry	Wet	173,250	6,260	5,008	1,252	1,700	47,600	117,690	34,992	82,698	40,000	83,950	1,032,164
2042	Wet	Dry	173,500	6,120	4,896	1,224	1,700	95,200	70,480	20,104	50,376	25,000	51,600	1,071,764
2043	Dry	Wet	173,750	5,980	4,784	1,196	1,700	47,600	118,470	35,216	83,254	40,000	84,450	1,135,214
2044	Dry	Dry	174,000	5,840	4,672	1,168	1,700	47,600	118,860	20,328	98,532	25,000	99,700	1,222,914
2045	Dry	Dry	174,125	5,700	4,560	1,140	1,700	47,600	119,125	20,440	98,685	25,000	99,825	1,310,739
2046	Dry	Dry	174,250	5,560	4,448	1,112	1,700	47,600	119,390	20,552	98,838	25,000	99,950	1,398,689
2047	Dry	Wet	174,375	5,420	4,336	1,084	1,700	47,600	119,855	35,664	83,991	40,000	85,075	1,462,764
2048	Dry	Wet	174,500	5,280	4,224	1,056	1,700	47,600	119,920	35,776	84,144	40,000	85,200	1,526,964
2049	Wet	Wet	174,750	5,140	4,112	1,028	1,700	95,200	72,710	35,888	36,822	40,000	37,850	1,543,814
2050	Dry	Dry	175,000	5,000	4,000	1,000	1,700	47,600	120,700	21,000	99,700	25,000	100,700	1,632,514

EXHIBIT 9, Page 3 of 3

Exhibit 10

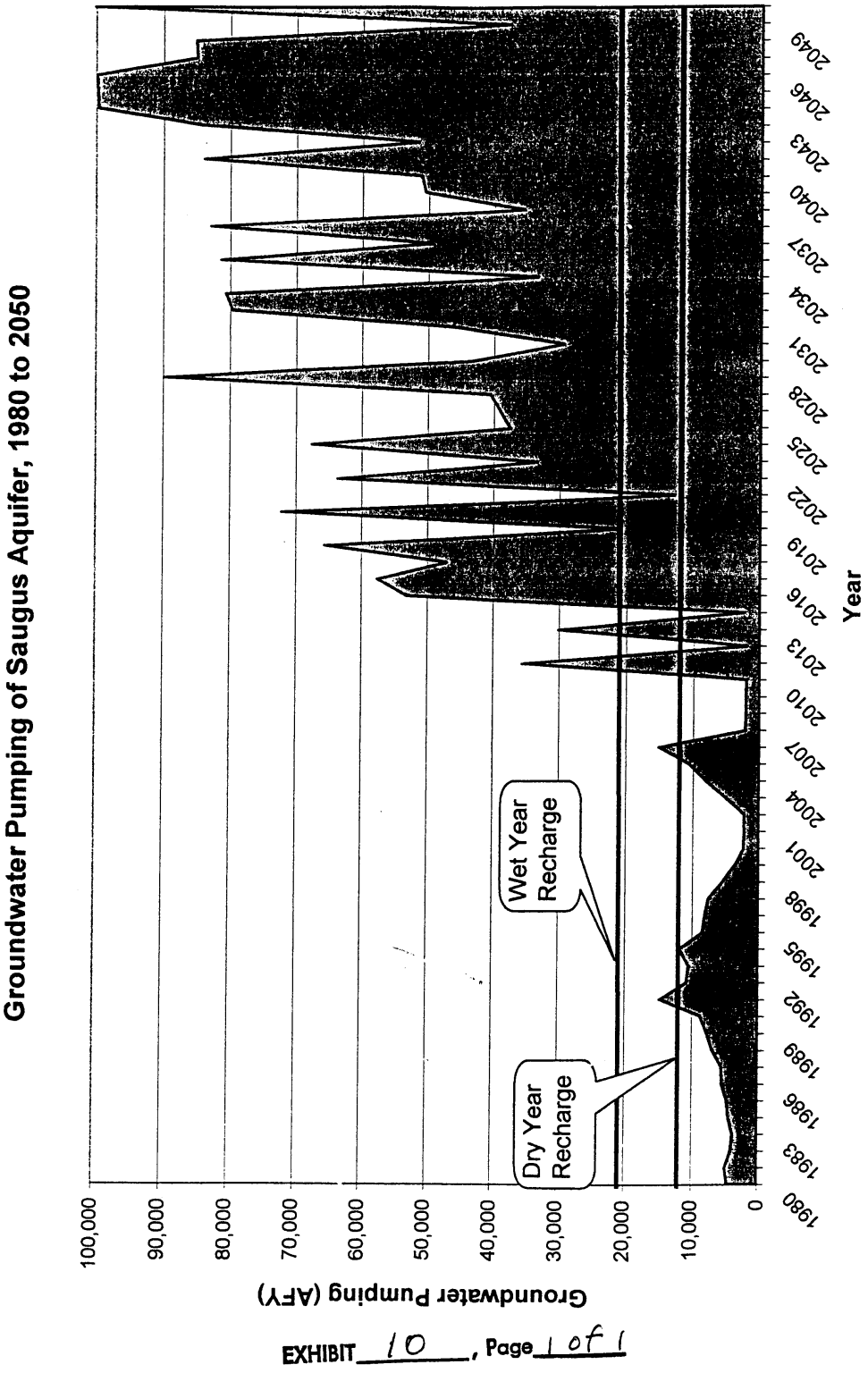
Groundwater Pumping of Saugus Aquifer, 1980 to 2050
Groundwater Pumping (AFY)
100,000
90,000
80,000
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
Wet Year Recharge
Dry Year Recharge
1980
1983
1986
1989
1992
1995
1998
2001
2004
2007
2010
2013
2016
2019
2022
2025
2028
2031
2034
2037
2040
2043
2046
2049
Year
EXHIBIT 10 , Page 1 of 1
EXHIBIT _____, Page 1 of 1

Exhibit 10-A

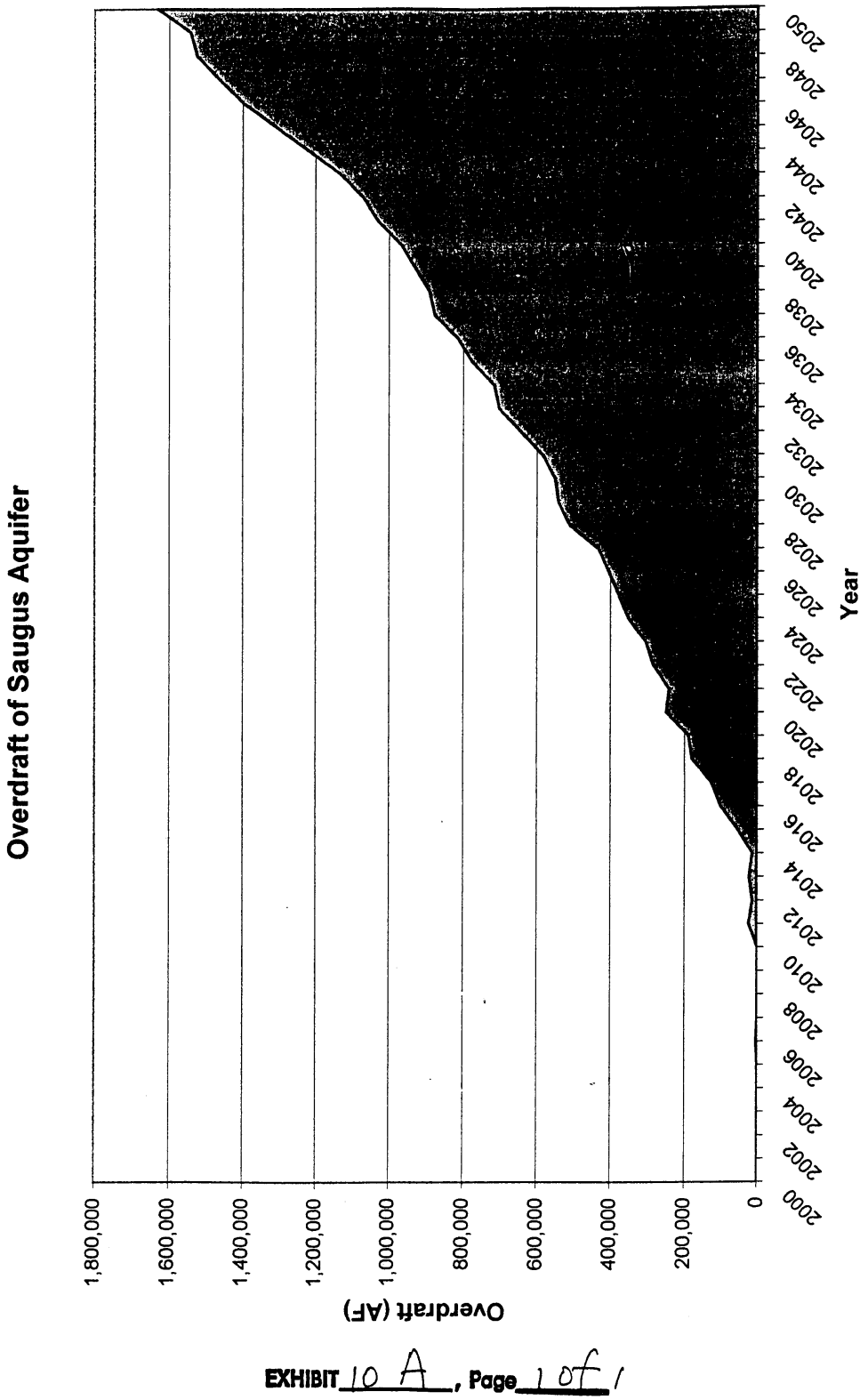
Overdraft of Saugus Aquifer
Overdraft (AF)
1,800,000
1,600,000
1,400,000
1,200,000
1,000,000
800,000
600,000
400,000
200,000
0
2000
2002
2004
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
2026
2028
2030
2032
2034
2036
2038
2040
2042
2044
2046
2048
2050
Year
EXHIBIT 10 A, Page 1 of 1
EXHIBIT _____, Page 1 of 1

Exhibit 11

Groundwater Resources Association of California

CALIFORNIA GROUNDWATER MANAGEMENT

Steve Bachman, Carl Hauge, Kevin Neese, Anthony Saracino

EXHIBIT 11, Page 1 of 3

If wells are too close to each other, their cones of depression can interfere with each other, causing reduced yields and possible legal consequences. The extent of the cone of depression of each well should be considered in any groundwater management plan.

Aquifer Tests

Aquifer tests are conducted to determine hydraulic characteristics of the aquifer materials. The characteristics are transmissivity and storativity (see "Technical Definitions," page 9). These values are then used to estimate the amount of groundwater that can be produced by a well. Aquifer tests are often called "pump tests," but a pump test actually is conducted by an electric company to determine pump efficiency.

During the most common type of aquifer test, the depths to groundwater in the pumping well and an observation well or wells are measured at frequent intervals. The difference in the water levels in the pumping well and the observation wells gives a good indication of the shape of the cone of depression. The data are then used to determine the storativity and transmissivity of the aquifer. Results of the calculations can then be used to estimate well yields and the effects of pumping the well on nearby wells.

Perennial Yield or Safe Yield

The terms "safe yield" and "perennial yield" have been used interchangeably in the past. Perennial yield is the average quantity of water that can be extracted from an aquifer or groundwater basin over a period of time without causing undesirable results. Undesirable results include permanently lowered groundwater levels, subsidence or degradation of water quality in the aquifer. If water management in the basin changes, the perennial yield of the basin may change.

The term "safe yield" is a technical definition of basin yield that has been adopted by the courts to define the legal rights to extract groundwater in a basin. In most of the adjudicated basins in California, safe yield is a fixed amount that is determined by the court and is characterized as being equivalent to net groundwater recharge. In one basin, "operational" safe yield includes whatever temporary surplus can be stored in the basin. In the San Gabriel, Chino and Mojave basins, it is not limited; pumpers simply pay to replace the extra amount of groundwater extracted.

Subsidence

Groundwater extraction from an aquifer can result in compaction of the fine sediments within the aquifer system (Figure 5). Compaction of these clays and silts leads to subsidence of the land surface that can change the gradients in rivers, streams, and canals

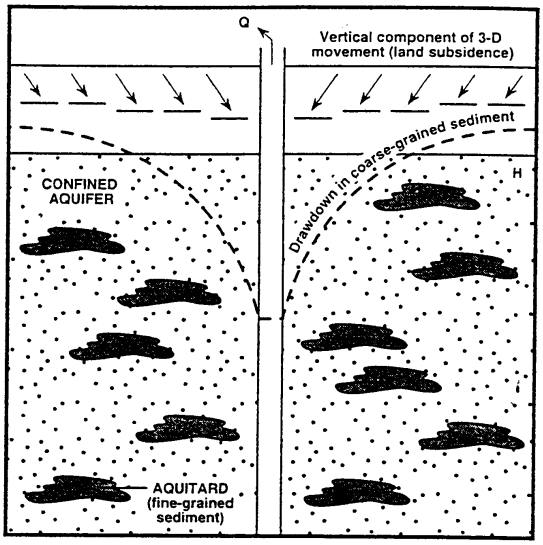

Figure 5: Land subsidence.

and cause structural damage to highways, bridges, and buildings. Compaction of these fine sediments reduces the total amount of groundwater stored in the aquifer system. That part of the aquifer system that yields water readily to wells, however, is not compacted. The coarser sediments, consisting of sands and gravels, are not compacted. These sediments continue to be usable as an aquifer that can be recharged and from which groundwater can be extracted by wells. Figure 6 shows areas of subsidence in the United States.

Groundwater management plans should include provisions to monitor for land subsidence. The simplest monitoring might include annual surveying of a network of benchmarks, either by spirit leveling or by use of global positioning system techniques. If subsidence is noted, the agency may decide to mitigate by some means, compensate for damages, reduce groundwater extractions, or cease entirely.

EXHIBIT 11, Page 2 of 3

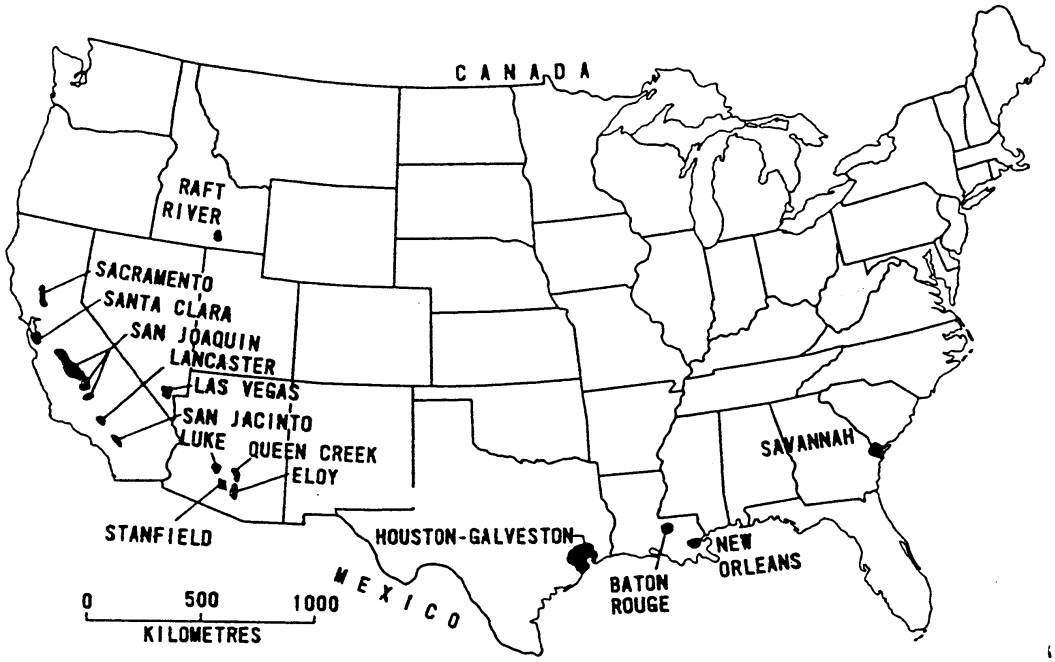

Figure 6: Areas of land subsidence from groundwater withdrawal in the United States.

Overdraft

Overdraft is the condition of a groundwater basin or aquifer in which the amount of water extracted exceeds the amount of water that recharges the basin over a period of years during which average precipitation and water management in the basin remain approximately the same.

Droughts or periods of abnormally low rainfall do not cause overdraft. Droughts lower the amount of water in storage in the groundwater reservoir, just as they lower the amount of water in storage behind dams. When the drought is over and all other conditions being equal, the water in storage behind the dam, as well as in the groundwater reservoir, returns to normal (Figure 7).

Overdraft is a term that should be used cautiously. In some areas of California, projections of water supply versus water demand show that if average conditions prevail, long-term water shortages will occur. Such long-term shortages may or may not be met by overdrafting groundwater basins.

EXHIBIT 11, Page 3 of 3

Exhibit 12

VOLUME I — REPORT TEXT

HYDROGEOLOGIC ASSESSMENT

OF THE

SAUGUS FORMATION
in the
SANTA CLARA VALLEY
of
LOS ANGELES COUNTY, CALIFORNIA

FOR

CASTAIC LAKE WATER AGENCY

LOS ANGELES COUNTY WATERWORKS DISTRICT NO. 36 — VAL VERDE

NEWHALL COUNTY WATER DISTRICT

SANTA CLARITA WATER COMPANY

VALENCIA WATER COMPANY

FEBRUARY 1988

RICHARD C. SLADE

CONSULTING GROUNDWATER GEOLOGIST

EXHIBIT 12, Page 1 of 3

comparison, our assignment of specific yield values for the alluvium which overlies the Saugus Formation ranged between 9 and 16 percent (Slade, December 1986).

USABLE GROUNDWATER IN STORAGE

This final step calculated the total estimated volume of usable groundwater in storage in the Saugus Formation by multiplying the total surface area of each storage unit, by the average sand thickness of each sand thickness interval within each of the subunits, by the specific yield value assigned to that sand thickness interval.

Table 6 - Summary of Usable Groundwater in Storage - presents the results of our computations. It identifies the usable quantity (volume) of groundwater in storage in the Saugus Formation between the depth limits of 500 feet and either: 2500 feet; or the base of fresh water within the Saugus Formation, whichever is shallower. As seen on Table 6, the total estimated amount of groundwater in storage in the sands and gravels which constitute the potential aquifers within the Saugus Formation is approximately 1.41 million acre-feet. Storage Unit No. 1 (northerly of the San Gabriel fault) has approximately 130,500 acre-feet of usable groundwater in storage (about 9 percent of the total); Unit No. 2 (between the two faults) and Unit No. 3 (southerly of the Holser fault) each has approximately 641,000 acre-feet of usable groundwater in storage (about 45 percent of the total for each).

In comparison to the calculated 1.41 million acre-feet of usable groundwater in storage in the sand and gravel aquifers of the Saugus, Robson (1972) for the U. S. Geological Survey reported a total storage capacity for the entire Saugus Formation of approximately 6 million acre-feet.

EXHIBIT 12, Page 2 of 3

TABLE 6 - SUMMARY OF USABLE GROUNDWATER IN STORAGE

STORAGE UNIT NO.	LOCATION OF STORAGE UNIT	STORAGE SUBUNIT DESIGNATIONS	TOTAL SURFACE AREA (acres)	RANGE OF SAND THICKNESS (ft)	RANGE OF SPECIFIC YIELDS (%)	USABLE GROUNDWATER IN STORAGE (ac-ft)
1	Northerly of San Gabriel fault	1A - 1Db	7,607	0 to 440	7	130,540
2	Between the two faults	2A - 2O	13,980	0 to 1400	5-8	641,330
3	Southerly of Holser fault	3A - 3H	16,501	0 to 1240	5-8	641,240
		TOTALS	39,088			1,413,110

EXHIBIT 12, Page 3 of 3

Exhibit 13

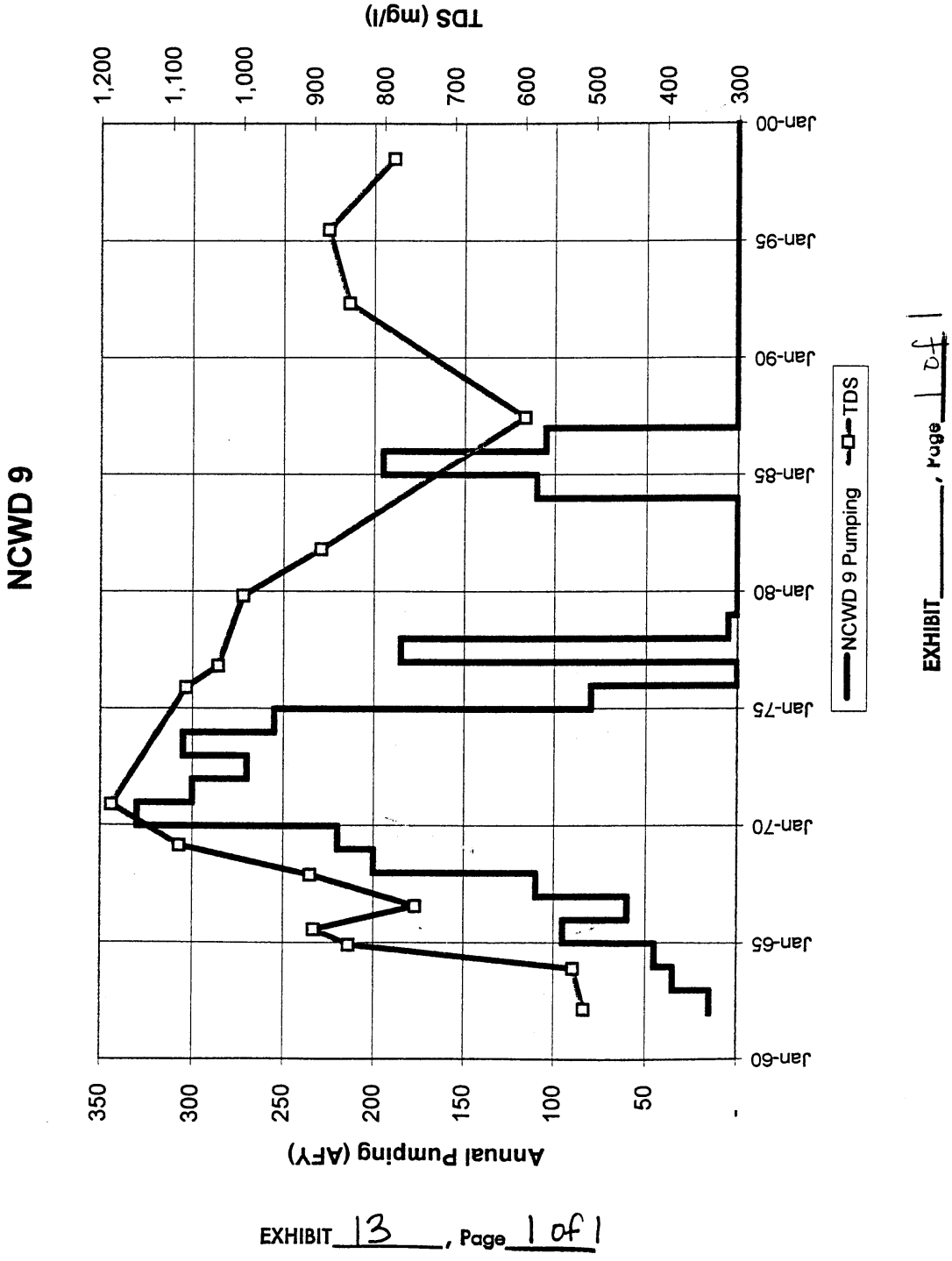
NCWD 9
Annual Pumping (AFY)
TDS (mg/l)
350
300
250
200
150
100
50
-
1,200
1,100
1,000
900
800
700
600
500
400
300
Jan-60
Jan-65
Jan-70
Jan-75
Jan-80
Jan-85
Jan-90
Jan-95
Jan-00
NCWD 9 Pumping
TDS
EXHIBIT 13 , Page 1 of 1

Exhibit 14

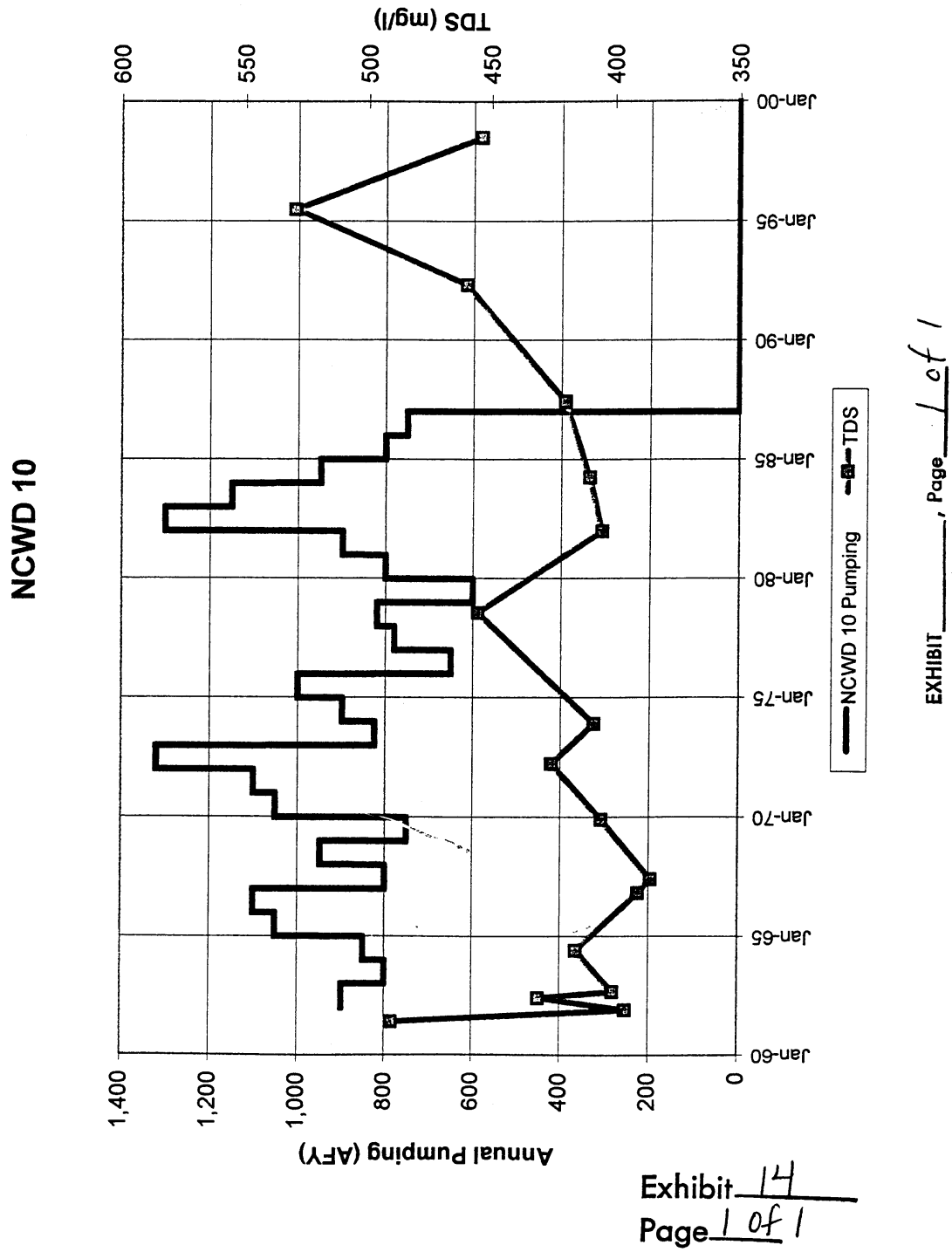
NCWD 10
Annual Pumping (AFY)
TDS (mg/l)
1,400
1,200
1,000
800
600
400
200
0
600
550
500
450
400
350
Jan-60
Jan-65
Jan-70
Jan-75
Jan-80
Jan-85
Jan-90
Jan-95
Jan-00
NCWD 10 Pumping
TDS
EXHIBIT ____, Page 1 of 1
Exhibit 14
Page 1 of 1

Exhibit 15

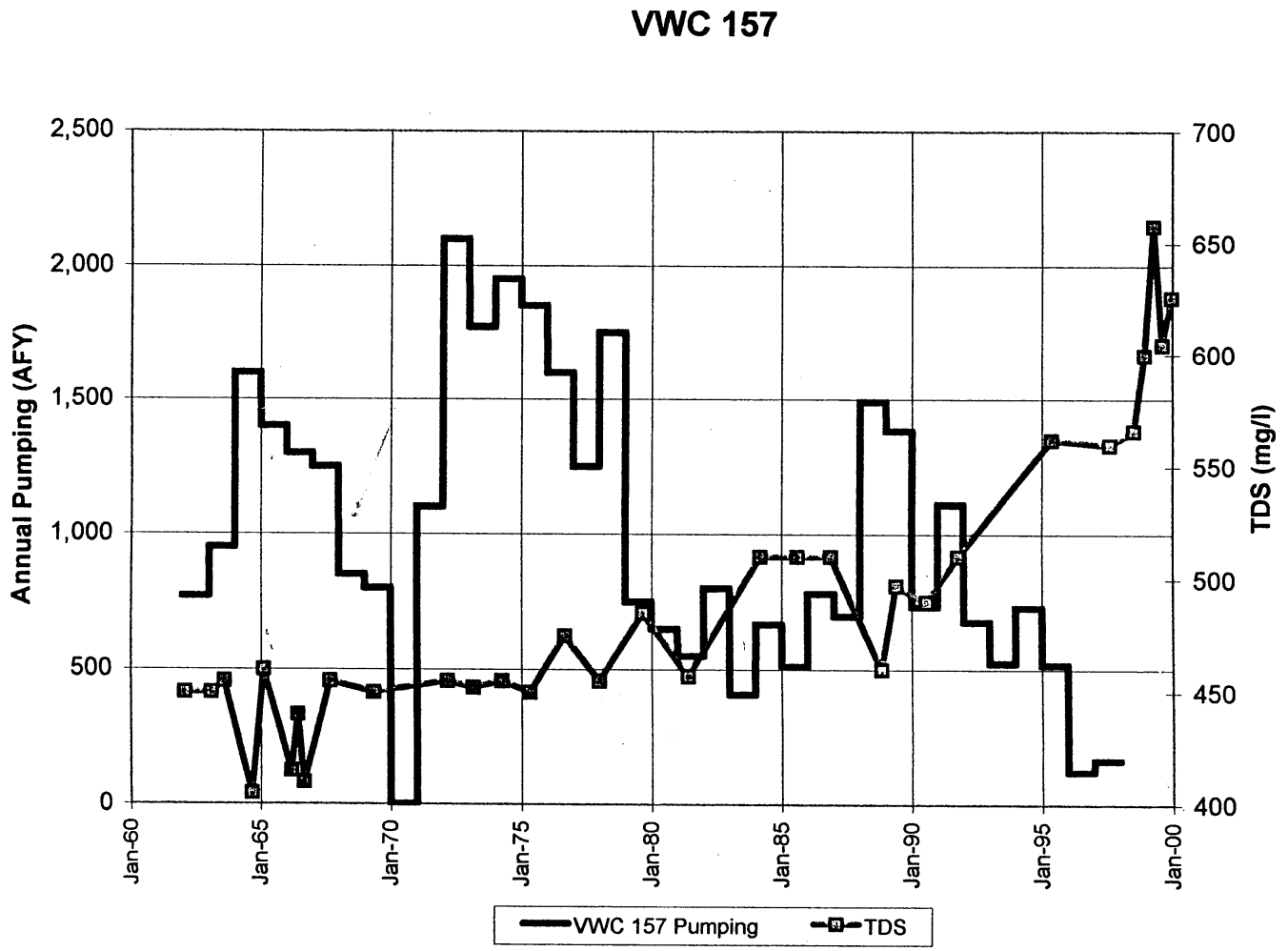

Exhibit 15
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Exhibit 16

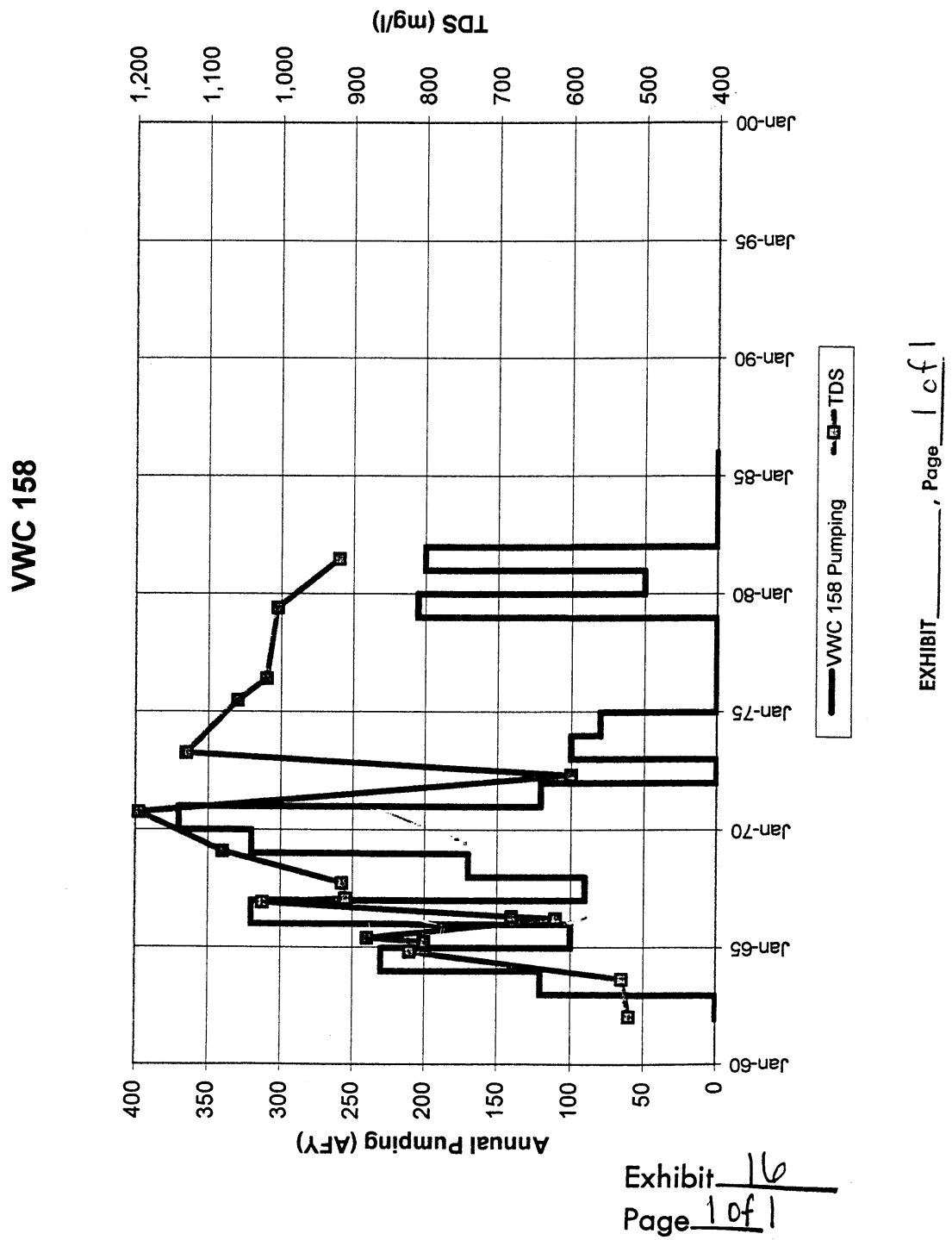

VWC 158
Annual Pumping (AFY)
TDS (mg/l)
0
50
100
150
200
250
300
350
400
400
500
600
700
800
900
1,000
1,100
1,200
Jan-60
Jan-65
Jan-70
Jan-75
Jan-80
Jan-85
Jan-90
Jan-95
Jan-00
VWC 158 Pumping
TDS
EXHIBIT_____, Page 1 of 1
Exhibit 16
Page 1 of 1

Exhibit 17

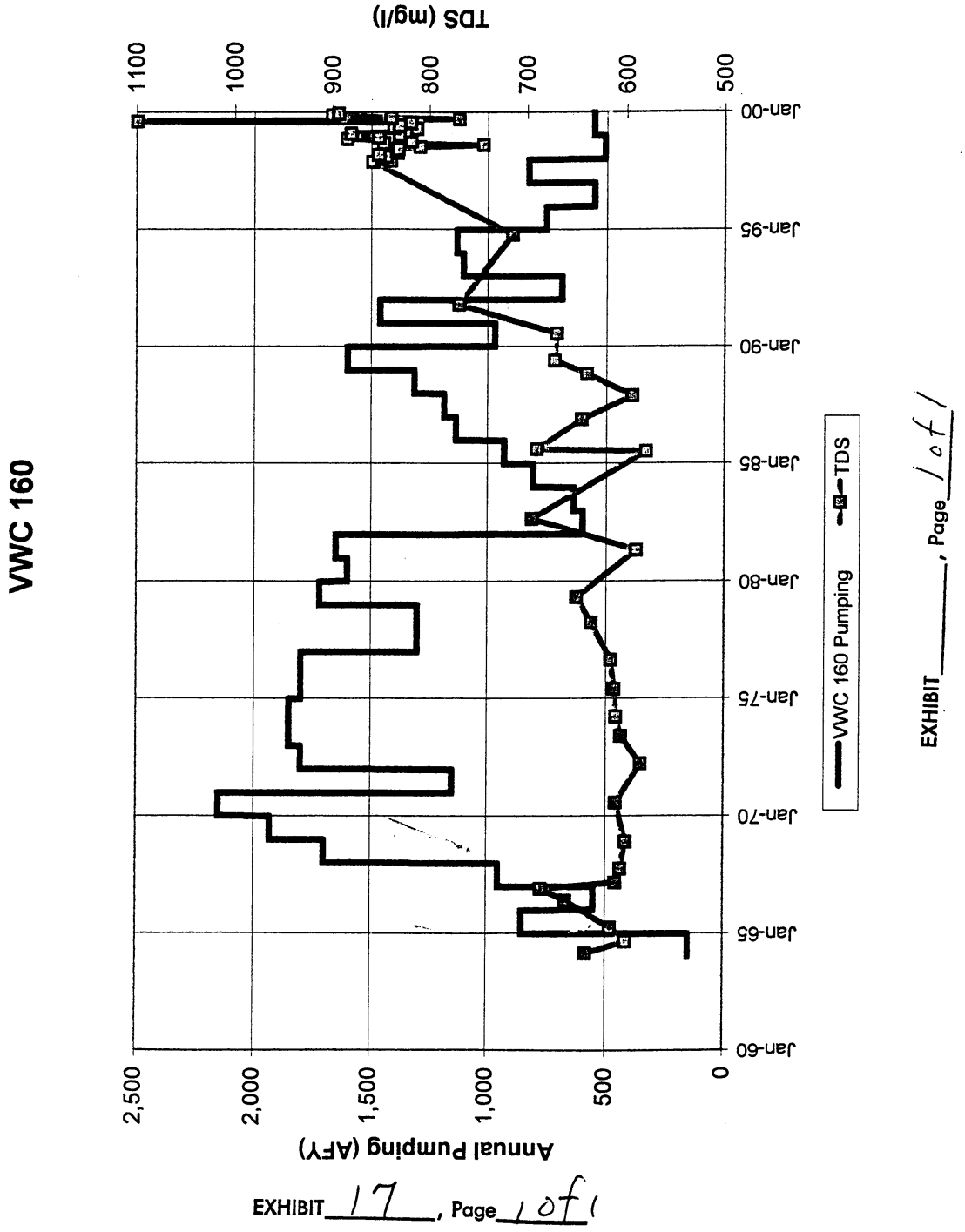

VWC 160
Annual Pumping (AFY)
2,500
2,000
1,500
1,000
500
0
TDS (mg/l)
1100
1000
900
800
700
600
500
Jan-60
Jan-65
Jan-70
Jan-75
Jan-80
Jan-85
Jan-90
Jan-95
Jan-00
VWC 160 Pumping
TDS
EXHIBIT 17, Page 1 of 1
EXHIBIT _____, Page 1 of 1

Exhibit 18

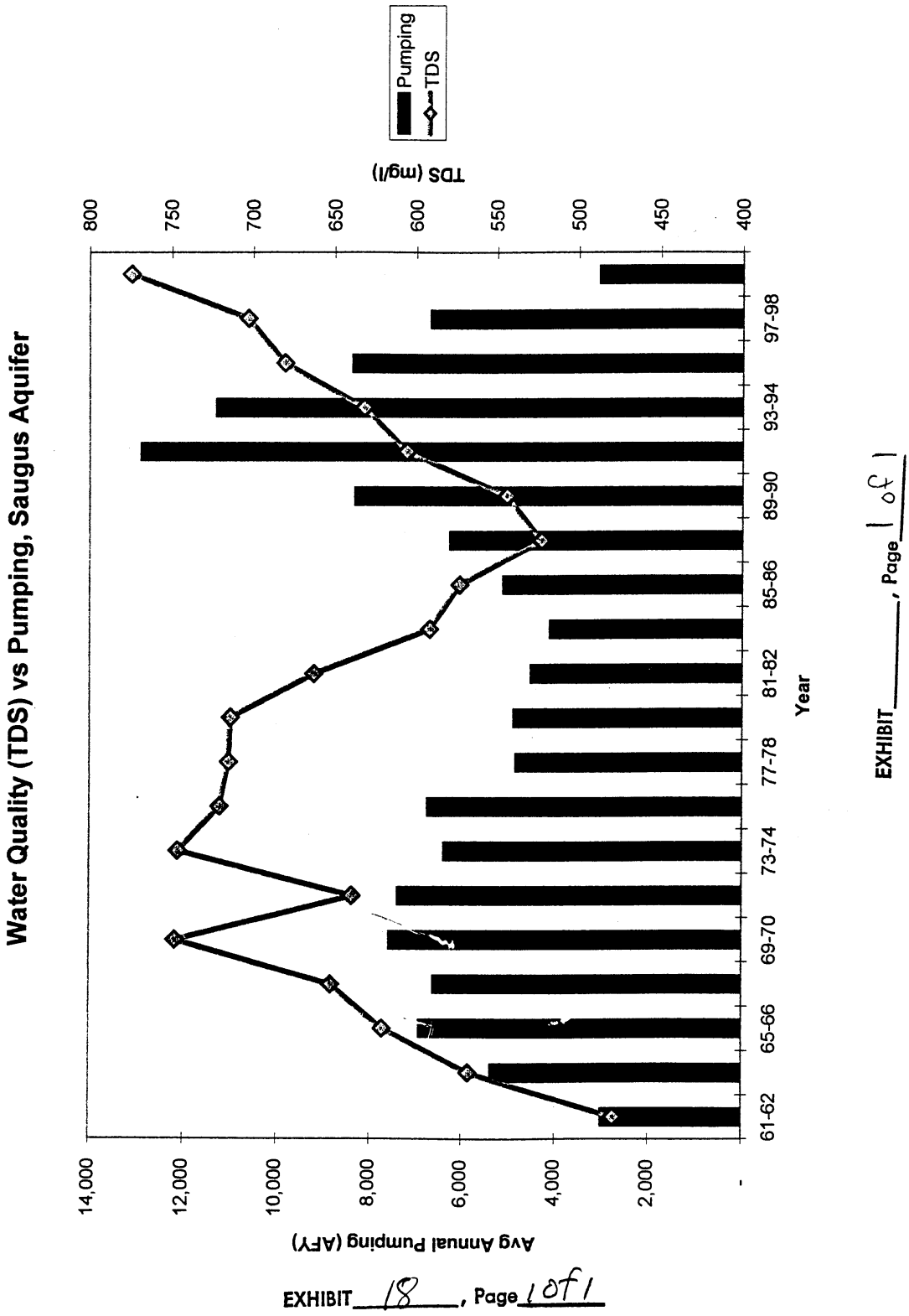

Water Quality (TDS) vs Pumping, Saugus Aquifer
Avg Annual Pumping (AFY)
TDS (mg/l)
Year
Pumping
TDS
14,000
12,000
10,000
8,000
6,000
4,000
2,000
-
800
750
700
650
600
550
500
450
400
61-62
65-66
69-70
73-74
77-78
81-82
85-86
89-90
93-94
97-98
EXHIBIT 18, Page 1 of 1
EXHIBIT _____, Page 1 of 1

Exhibit 19

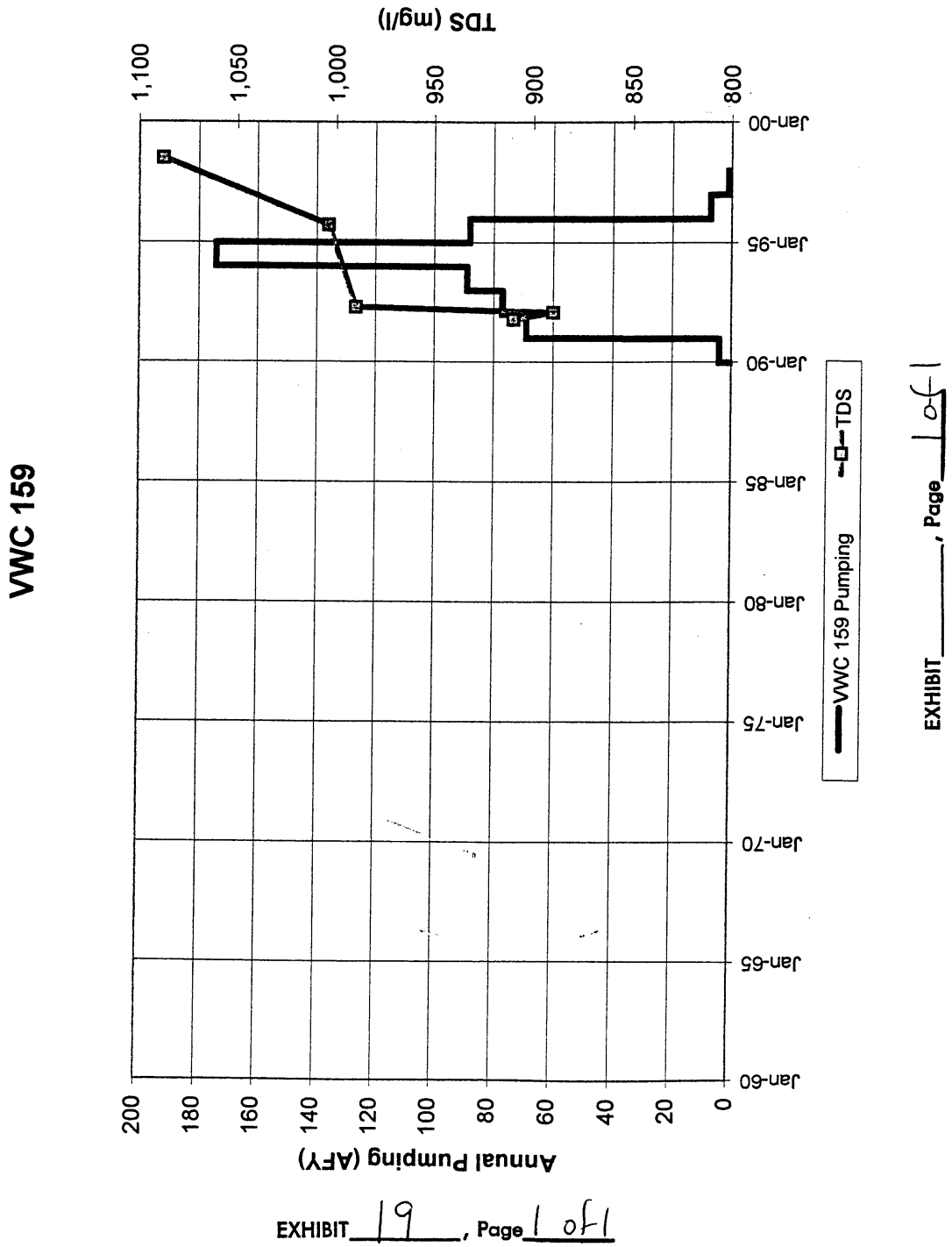

VWC 159
Annual Pumping (AFY)
TDS (mg/l)
0
20
40
60
80
100
120
140
160
180
200
800
850
900
950
1,000
1,050
1,100
Jan-60
Jan-65
Jan-70
Jan-75
Jan-80
Jan-85
Jan-90
Jan-95
Jan-00
VWC 159 Pumping
TDS
EXHIBIT 19, Page 1 of 1
EXHIBIT _____, Page 1 of 1

Exhibit 20

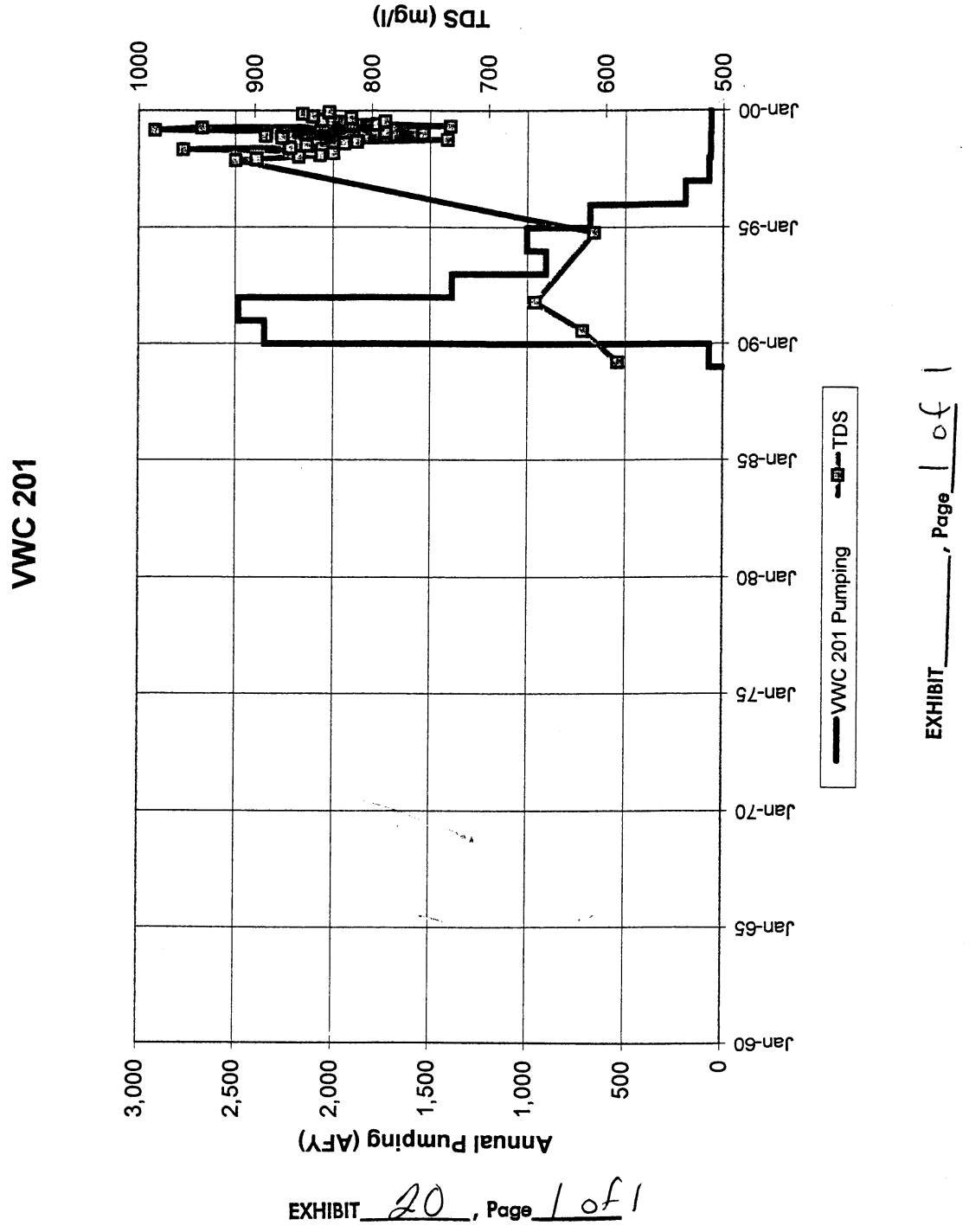

VWC 201
Annual Pumping (AFY)
TDS (mg/l)
3,000
2,500
2,000
1,500
1,000
500
0
1000
900
800
700
600
500
Jan-60
Jan-65
Jan-70
Jan-75
Jan-80
Jan-85
Jan-90
Jan-95
Jan-00
VWC 201 Pumping
TDS
EXHIBIT 20 , Page 1 of 1
EXHIBIT _____ , Page 1 of 1

Exhibit 21

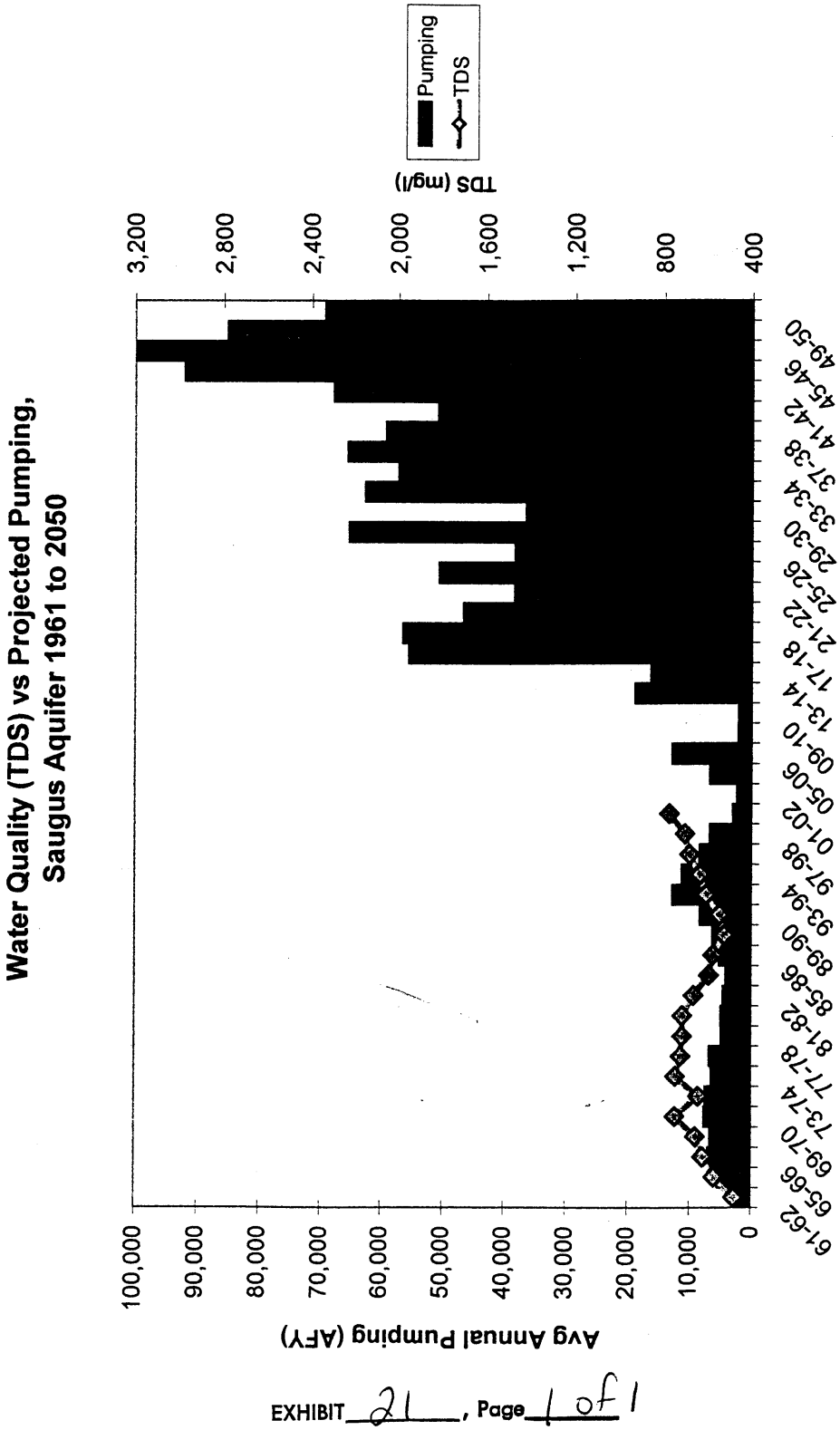

Water Quality (TDS) vs Projected Pumping,
Saugus Aquifer 1961 to 2050
Avg Annual Pumping (AFY)
100,000
90,000
80,000
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
TDS (mg/l)
3,200
2,800
2,400
2,000
1,600
1,200
800
400
Pumping
TDS
61-62
65-66
69-70
73-74
77-78
81-82
85-86
89-90
93-94
97-98
01-02
05-06
09-10
13-14
17-18
21-22
25-26
29-30
33-34
37-38
41-42
45-46
49-50
2-Year Period
EXHIBIT 21, Page 1 of 1
EXHIBIT _____, Page 1 of 1

Exhibit 22

Castaic Lake Water Agency

Draft

Integrated Water Resources Plan
Water Demand and Supply Evaluation

February 1998

MONTGOMERY WATSON

BOOKMAN-EDMONSTON
ENGINEERING, INC.

EXHIBIT 22, Page 1 of 3

Alluvial Aquifer

The Alluvial Aquifer system historically has provided the principal source of water supply in the CLWA service area, and will continue to be an important supply in the future. The Alluvial Aquifer, however, is limited in extent and depth and has a rather modest storage volume of about 200,000 acre-ft. Inspection of groundwater production and groundwater elevations in the Alluvial Aquifer indicates that with two or three years of reduced precipitation, groundwater production from the Alluvial Aquifer could be counted on to produce approximately 25,000 acre-ft/yr, of which 5,000-10,000 acre-ft/yr is higher salinity water located westerly of Castaic Junction. In normal and wet periods, production from the Alluvial Aquifer is estimated to be 32,000 acre-ft/yr and as much as 40,000 acre-ft/yr, respectively.

The three methods of increasing supply from this aquifer during these periods include: (1) modest over-pumping of the Alluvial Aquifer during wet years to create storage space so that the capture of runoff is increased; (2) increased recharge with Castaic Reservoir storm inflows; (3) groundwater recharge with imported SWP supplies. The existing recharge capability also needs to be maintained and the river bottoms in recharge areas should remain unpaved.

Increasing groundwater production to lower the water levels during wet periods increases the ability to capture storm water. However, it also increases the risk of having inadequate supplies in dry periods. Therefore, an evaluation should be performed to determine if the procedure is reasonable and to determine the quantities of water salvaged.

Increased urbanization in the CLWA area could have two effects on the Alluvial Aquifer. Increased urbanization of the hill and canyon area will result in an increase in runoff from these less permeable areas to the very permeable Santa Clara River. This could increase infiltration into the groundwater and prove beneficial. Additionally, urbanization can bring with it increased risk of contamination, and serious consideration should be given to a program to protect the quality of the groundwater resources.

Saugus Aquifer

The second source of groundwater production in the Santa Clarita Valley is from the Saugus Aquifer. The Saugus Aquifer is currently capable of producing about 16,000 acre-ft/yr in dry years based on current installed well capacity. During wet years, about 5,000 acre-ft/yr of water is produced to meet water demands in local areas that do not have access to other water supplies.

The Saugus Aquifer has not been fully developed, but available data indicates a strong possibility that it can provide a reliable local dry year supply, if managed properly. High yielding wells exist in the aquifer producing high flow rates of good quality water. Unsuccessful wells have also been constructed in the Saugus Aquifer and those unsuccessful wells help to define the areas of probable high production. Estimates of recharge to the Saugus prepared by Slade (1988) indicate that recharge may range between 11,000 - 13,000 acre-ft in dry years, increasing to 20,000 - 22,000 acre-ft/yr in wet periods. Therefore, a long-term sustained yield between those quantities appears possible. Slade (1997) has indicated that the Saugus should be capable of producing as much as 40,000 acre-ft/yr during an dry period of five to six years. However, since

there are currently not sufficient wells to produce this amount of water, staged construction of additional wells in conjunction with careful monitoring is recommended. The Saugus Aquifer has recently experienced some localized water quality problems (perchlorate) due to industrial discharges. These water quality problems could impact the future use of the Saugus Aquifer.

The best operation of the Saugus Aquifer would involve minimal use when other supplies (such as imported water) are plentiful, and increased pumping during dry periods. The water levels in the Saugus Aquifer will recover during wet periods when recharge is higher and pumping is reduced. Additional use of Saugus Aquifer storage could be developed by aquifer recharge through injection wells (or injection/extraction wells) during periods of surplus water supply.

For supply planning purposes in this study, it is assumed that dry year production from the Saugus Aquifer can be increased from its current 16,000 acre-ft/yr to 40,000 acre-ft/yr over the next twenty years. This would be accomplished through staged construction of new wells and related facilities. It is conservatively assumed that the maximum annual production from the Saugus would be increased at a rate of about 1,000 acre-ft/yr (the equivalent of about one 1,500 gpm well per year). This rate could be increased if the hydrogeologic response to increased pumping indicates a higher potential. Wet year production would likely increase from 5,000 to 10,000 acre-ft/yr over the same period. A recharge program would be essential for reaching this level of production from the Saugus Formation.

Recycled Water

Recycled water is available from two existing water reclamation plants and, in the future, a third plant could be constructed in conjunction with a proposed development. CLWA prepared a draft *Reclaimed Water System Master Plan* dated September 1993. This report recommended development of 9,100 acre-ft of recycled water from the Valencia plant. The major use is for irrigation of golf courses, parks, and schools. In addition, future development projects could include increase potential use by 6,500 acre-ft/yr. This additional use would be served by the proposed third reclamation plant.

Currently identified use indicates that a total of about 15,000 acre-ft of recycled water can be developed for use within the Agency. Based on anticipated downstream environmental considerations, this amount may represent approximately the maximum potential use of recycled water within CLWA. Additional recycled water is expected to be produced in the future but plans have not yet be prepared. It is assumed that recycled water use could increase to about 24,000 acre-ft/yr. To develop this level use is an ambitious program requiring a total commitment on the part of the Agency and local water purveyors. CLWA plans to begin construction of the initial phase of the recycling project in 1998.

State Project Water, Existing Contracts

As discussed in Section 3, CLWA has existing contract entitlement to 54,200 acre-ft/yr of SWP water. Current reliability estimates prepared by DWR indicate average deliveries of 41,000 acre-ft/yr based on use of 1922-1993 hydrology and current SWP facilities. In dry periods which occur about once in every 20 years, the yield of the SWP supplies is 18,000 acre-ft/yr. In

Exhibit 23

Perchlorate Sources and Contaminated Wells

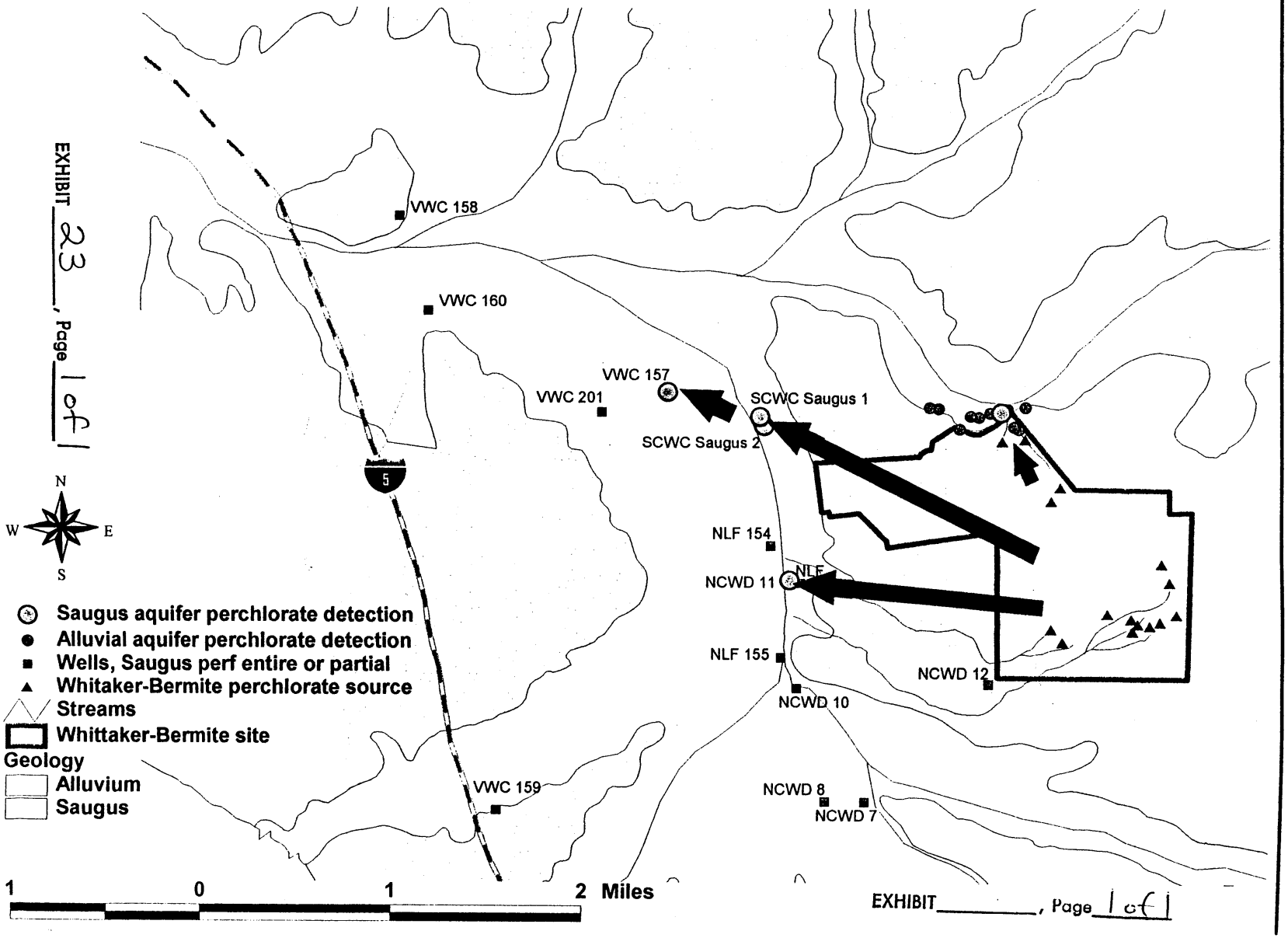


Exhibit 24

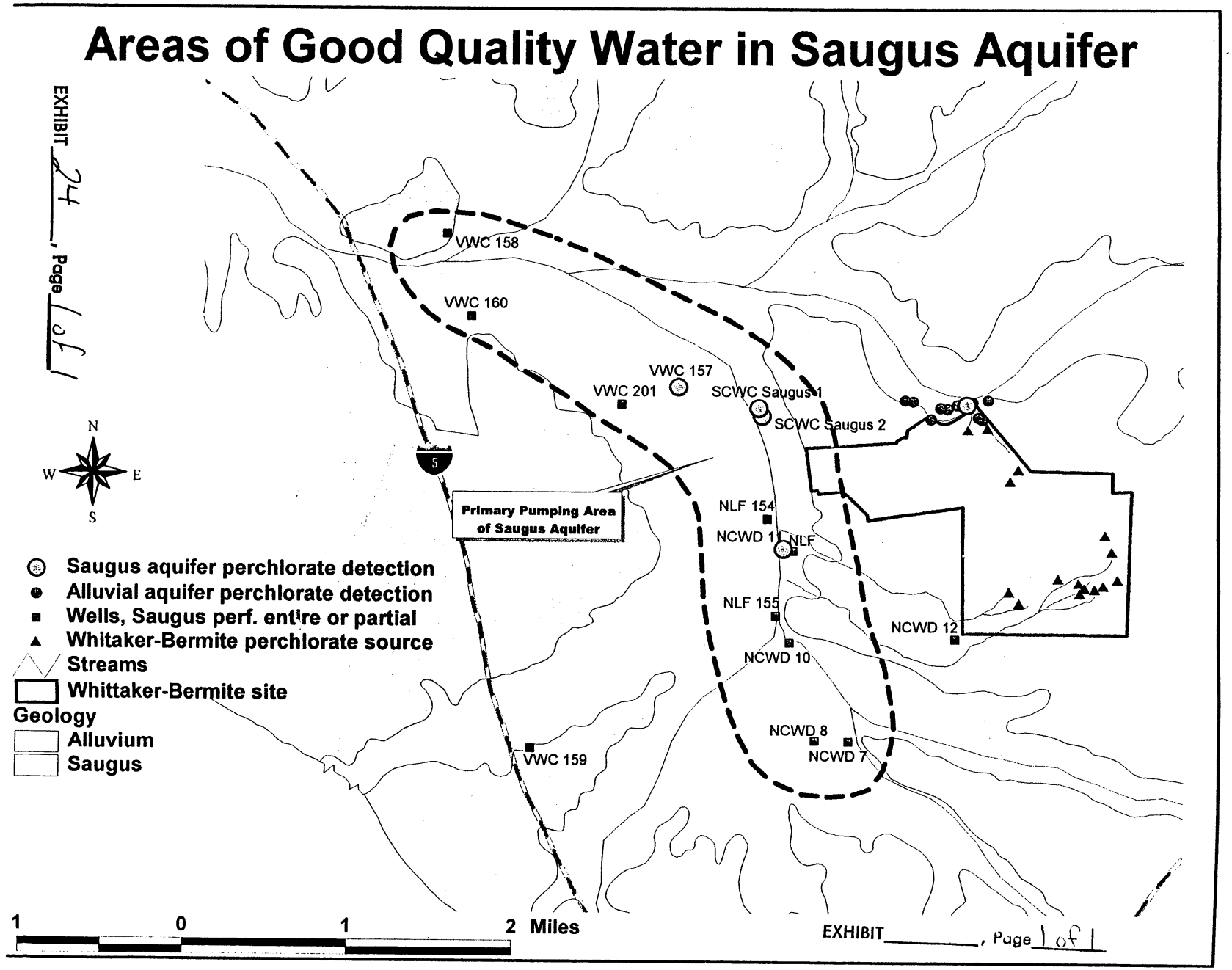

Areas of Good Quality Water in Saugus Aquifer
EXHIBIT 24, Page 1 of 1
VWC 158
VWC 160
VWC 157
VWC 201
SCWC Saugus 1
SCWC Saugus 2
5
N
W
E
S
Primary Pumping Area of Saugus Aquifer
NLF 154
NCWD 11
NLF
NLF 155
NCWD 12
NCWD 10
NCWD 8
NCWD 7
VWC 159
Saugus aquifer perchlorate detection
Alluvial aquifer perchlorate detection
Wells, Saugus perf. entire or partial
Whitaker-Bermite perchlorate source
Streams
Whittaker-Bermite site
Geology
Alluvium
Saugus
1 0 1 2 Miles
EXHIBIT _____, Page 1 of 1

Exhibit 25

SANTA CLARITA VALLEY WATER REPORT
1999

Castaic Lake Water Agency

Los Angeles County Waterworks District #36

Newhall County Water District

Santa Clarita Water Company

Valencia Water Company

Prepared by: The Upper Santa Clara Valley Water Committee
February 2000

EXHIBIT 25, Page 1 of 2

Total Water Production
Water Purveyors (a)
Acre-Feet Per Year

	Sources of Supply						
Year	Alluvial Aquifer	% of Total	Saugus Formation	Saugus % of Total	State Project Water	State Project % of Total	Total
1980	16,625	74%	4,569	20%	1,125	5%	22,319
1981	14,056	57%	4,950	20%	5,816	23%	24,822
1982	8,684	40%	3,569	16%	9,659	44%	21,912
1983	8,803	41%	3,398	16%	9,185	43%	21,386
1984	12,581	46%	3,809	14%	10,996	40%	27,386
1985	12,519	44%	4,140	15%	11,823	42%	28,482
1986	12,418	40%	4,975	16%	13,759	44%	31,152
1987	12,630	37%	4,962	15%	16,285	48%	33,877
1988	12,197	32%	6,404	17%	19,033	51%	37,634
1989	13,978	33%	7,217	17%	21,618	50%	42,813
1990	13,151	31%	8,302	19%	21,613	50%	43,066
1991	17,408	44%	14,417	36%	7,968	20%	39,793
1992	16,897	41%	10,458	25%	13,911	34%	41,266
1993	19,808	46%	10,151	23%	13,393	31%	43,352
1994	20,068	44%	11,531	25%	14,389	31%	45,988
1995	20,590	45%	8,087	18%	16,996	37%	45,673
1996	24,681	49%	7,373	15%	18,093	36%	50,147
1997	25,273	47%	6,752	12%	22,148	41%	54,173
1998	23,898	49%	4,706	10%	20,254	41%	48,858
1999	27,240	48%	2,728	5%	27,282	48%	57,250

(a) Includes LACWD 36, NCWD, SCWD, VWC

EXHIBIT 25, Page 2 of 2

Table III - 5

Exhibit 26

SANTA CLARITA VALLEY WATER REPORT
1999

Castaic Lake Water Agency

Los Angeles County Waterworks District #36

Newhall County Water District

Santa Clarita Water Company

Valencia Water Company

Prepared by: The Upper Santa Clara Valley Water Committee
February 2000

EXHIBIT 26, Page 1 of 2

Santa Clarita Valley Precipitation
Cumulative Departure from the Mean
Newhall CWD Gage

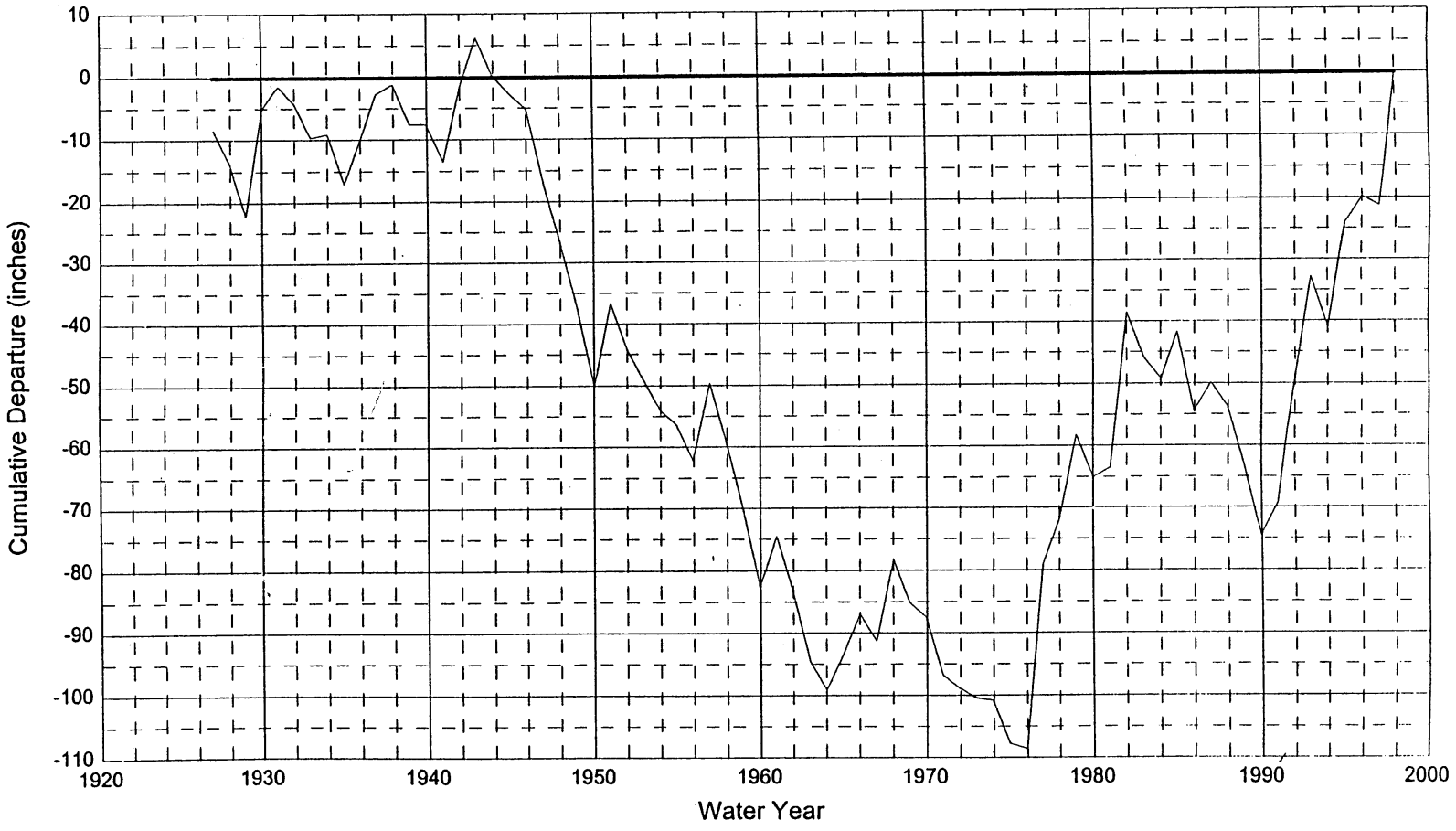
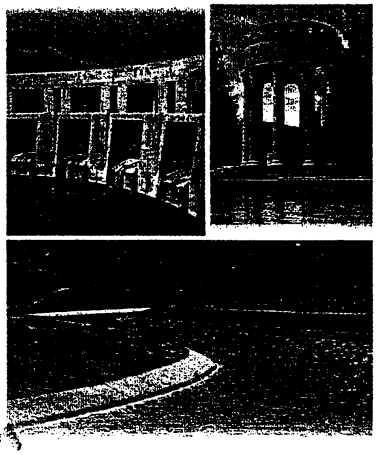


EXHIBIT 26, Page 2 of 2

Figure II-17

C:\LSCE\Projects\Valencia\ValPrcpFromCompany.wb3

Exhibit 27



California Water Plan Update Bulletin 160-98

Volume 1

November 1998

Pete Wilson
Governor

Douglas P. Wheeler
Secretary for Resources
The Resources Agency

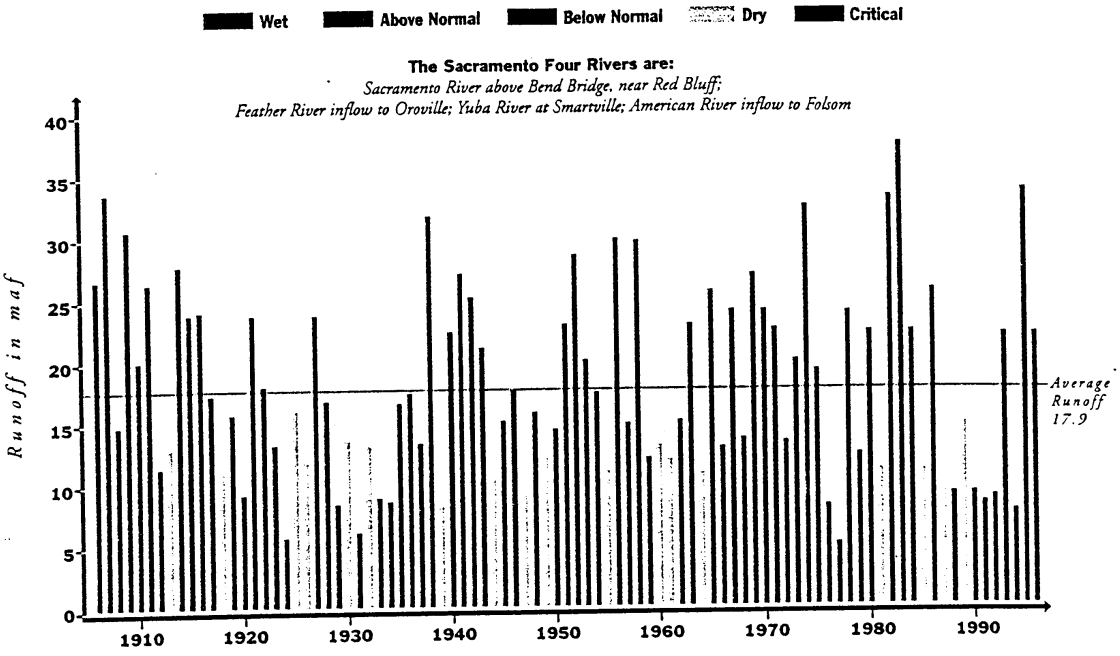
David N. Kennedy
Director
Department of Water Resources

EXHIBIT 27, Page 1 of 2

FIGURE 3-4

Sacramento Four Rivers Unimpared Runoff

The WR 95-6 year types are:



Climatic Variability

California's water development has generally been dictated by extremes of droughts and floods. The six-year drought of 1929-34 established the criteria commonly used to plan storage capacity or water yield of large Northern California reservoirs.

The influence of climatic variability on California's water supplies is much less predictable than the influences of geographic and seasonal variability, as evidenced by the recent historical record of precipitation and runoff. For example, the State's average annual runoff of 71 maf includes the all-time low of 15 maf in 1977 and the all-time high (exceeding 135 maf) in 1983. Floods and droughts occur often, sometimes in the same year. The January 1997 flood was followed by a record-setting dry period from February through June and the flooding of 1986 was followed by six years of drought (1987-92).

Figures 3-4 and 3-5 show the estimated annual unimpaired runoff from the Sacramento and San Joaquin River basins to illustrate climatic variability. Because these basins provide much of the State's water supply, their hydrologies are often used as indices of water year classification systems (see sidebar, page 3-8).

Droughts of Recent Record. Numerous multi-year droughts have occurred in California this century: 1912-13, 1918-20, 1922-24, 1929-34, 1947-50, 1959-61, 1976-77, and 1987-92. In order to provide water supply reliability, major reservoirs are designed to maintain and deliver carryover storage through several years of drought. The 1929-34 drought established the criteria commonly used to design the storage capacity and water yield of large Northern California reservoirs. Many reservoirs built since this drought were sized to maintain a reliable level of deliveries should a repeat of the 1929-34 hydrology occur. Even a single critical runoff year such as 1977 can be devastating to water users with limited storage reserves, who are more dependent

EXHIBIT 27, Page 2 of 2

Exhibit 28

$2 Billion Ecosystem Program: Gains and Losses, Too

Ten years ago, the Sacramento-San Joaquin Delta ecosystem was on the verge of collapse. Several fish were placed on the endangered species list, and others were being considered for listing.

Today, the Delta watershed is the focal point of the nation's largest ecosystem restoration program. More than 1.4 million acre-feet of water — equivalent to the annual needs of 7 million people — has been shifted from farms and cities to the environment. Also, $2 billion has been committed to restore and rehabilitate fishery habitat.

This unprecedented commitment is already paying off. Populations of native fish species at risk from water project operations have stabilized or increased.

- The return rate of fall-run Chinook salmon on the Sacramento River is among the highest in 30 years. Winter-run have experienced a nine-fold increase since 1991. Spring-run salmon, which numbered 500 to 1000 in the mid-90's, increased to twenty-four-thousand in 1998.

- The $2 billion committed to ecosystem restoration will develop hundreds of habitat improvement programs. More than 250 such projects are in various stages of implementation and hundreds more are in the planning stages.

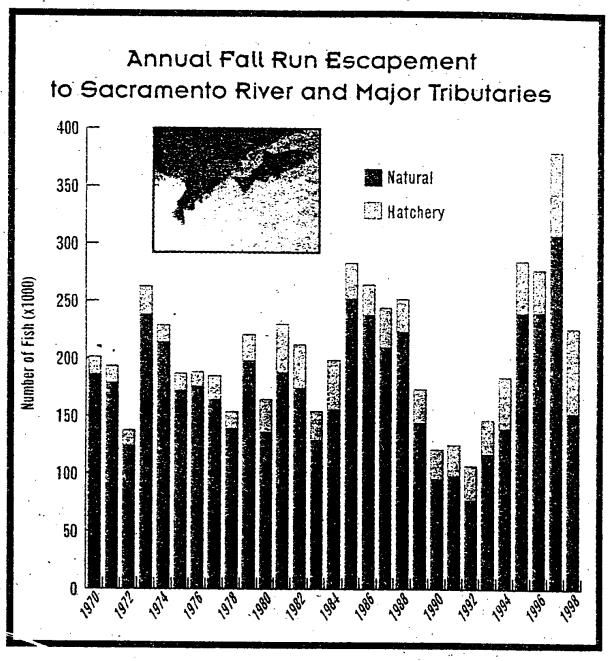
Now it's the people who rely on the Delta for their water who face crisis.

- California water policy has become a zero-sum game due to federal regulatory actions. Water gains for the fish are water losses for the economy. Cities and farms already have lost about one-third of their drought-year supplies. New federal regulations may double those losses.

- The economy is now increasingly vulnerable to water shortages. If the drought of 1987-92 were to recur, under current conditions farmers south of the Delta dependent on federal water supplies could face three straight years without any water deliveries.

- Industries from San Diego to the Silicon Valley could face sizable water shortages. Urban areas dependent on state and federal water supplies could face cuts of 55% from the state and 65% shortfalls from the federal government.

- California's irrigated agriculture will suffer. For example, Kern County, the nation's fourth-largest agricultural economy, could lose 1.5 million acre-feet of its state water supply over the course of a six-year drought due to the new regulatory restrictions.



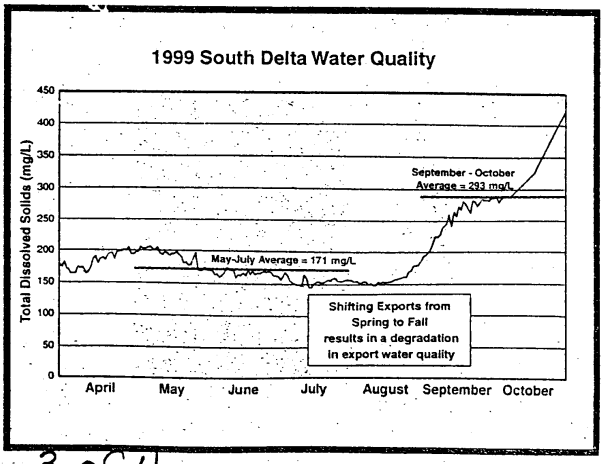


EXHIBIT 4, Page 3 of 4

The Time for Action is Now

The 1987-92 drought was the most severe and sustained water shortage in more than 50 years. It highlighted the state's vulnerability to recurring dry periods. The more recent Delta smelt crisis underscored the water system's vulnerability even in wet periods.

Despite growing evidence of the severity of California's water supply and water quality crisis, recent responses to the problem have not been encouraging.

The CALFED Bay-Delta Program's draft plan does not balance the needs of people and the ecosystem. It fails to pursue realistic solutions aggressively. Federal regulators continue their single-minded pursuit of environmental programs at the expense of Californians' water user needs.

Californians need to persuade state and federal leaders to address these critical water issues. We must:

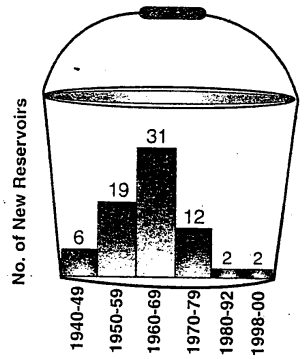
- Approve Proposition 13, the $1.97 billion water bond on the March 2000 ballot. This measure would restore 1 million acre-feet of water to cities and farms during a dry year.

- Restore balance to the CALFED Bay-Delta plan, so that both economic and environmental water needs are met fairly.

- Aggressively support programs to identify and construct additional water storage facilities, both in aquifers and new off-stream reservoirs. New supplies not only meet the needs of people and fish, but provide needed flexibility to our water system.

- Construct facilities necessary to make our water supplies reliable once again. Reservoirs north of the Delta were full during the Delta smelt crisis but the water could not be delivered to areas of need.

- Move from a water supply system driven by regulations to one that is flexible and provides multiple benefits for the environment and the economy.



Californians traditionally have acted to provide the necessary water supplies for their state. But such actions have declined sharply in recent years. Existing water supplies are insufficient to reliably meet present needs, much less those projected for the future.

Prepared by the
Association of California Water Agencies
JANUARY 2000

EXHIBIT 4, Page 4 of 4

CERTIFICATE OF SERVICE

STATE OF CALIFORNIA, COUNTY OF VENTURA

I hereby certify that I have this day served a copy of the **DIRECT TESTIMONY OF STEVEN B. BACHMAN IN SUPPORT OF THE PROTEST BY VENTURA COUNTY TO APPLICATION OF VALENCIA WATER COMPANY FOR APPROVAL OF ITS UPDATED WATER MANAGEMENT PROGRAM** on all known parties to Application No. A-99-12-025 by mailing a properly addressed copy by first-class mail, with postage prepaid, to each party named below in the service list.

Executed on April 7, 2000, at Ventura, California.

SHEILA L. DELEO

SERVICE LIST

Bertram D. Patrick
California Public Utilities Commission
Division of Administrative Law Judges
505 Van Ness Avenue, Room 5110
San Francisco, California 94102-3214
(Two copies)

Daniel R. Paige
California Public Utilities Commission
Water Advisory Branch
320 West Fourth Street, Suite 500
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Barbara Ortega
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320 West Fourth Street, Suite 500
Los Angeles, California 90013

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Water Advisory Branch
505 Van Ness Avenue, Room 3106
San Francisco, California 94102-3214

Robert J. DiPrimio, President
Valencia Water Company
24631 Avenue Rockefeller
Valencia, CA 91355

The New York Times

The High Risks of Denying Rivers Their Flood Plains

Losing trust in levees, experts now favor more natural flood controls.

By WILLIAM K. STEVENS

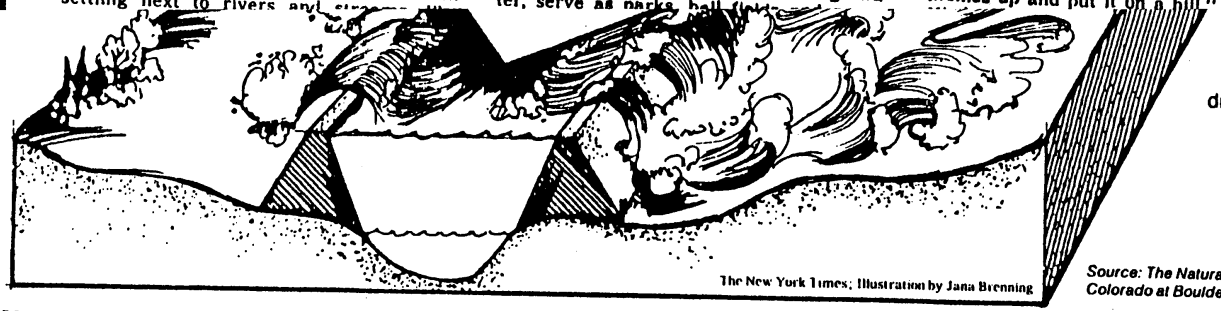
For decades Americans have insisted on settling next to rivers and [illegible]

serving or restoring its ecosystems and letting water flow as freely as possible so that natural flood-control mechanisms can work.

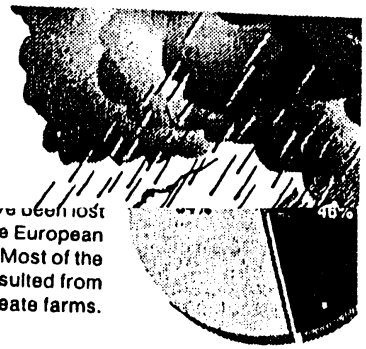
Across the country, states and communities are exploring alternatives to dikes, levees and flood walls. They are acquiring wetlands to serve as natural flood basins. They are sculpturing the plain to create detention areas for flood waters. They are preserving stretches of flood plain in urban areas which, in between periods of high water, serve as parks, ball fields [illegible]

Sometimes, he said, this means that developed areas "need to be cleared out so the river can flood, as we know it will, without damaging property." In other instances less drastic measures can suffice.

One obvious limitation to the new strategy is that many communities have long since committed themselves to living on the flood plain, and with traditional structural methods of flood control. "We can't pick Des Moines up and put it on a hill," said [illegible]



The New York Times; Illustration by Jana Brenning



since European settlement. Most of the loss resulted from drainage to create farms.

Source: The Natural Hazards Research and Applications Information Center, University Colorado at Boulder

[illegible] AT WORK

3359

Riverpark FEIR
December 2004

Impact Sciences, Inc.
112-16

Letter No. 17

Friends of the Santa Clara River

660 Randy Drive, Newbury Park, California 91320-3036 • (805) 498-4323

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Ventura County Environmental Coalition

Wishtoyo Foundation

April 29, 2004

Mr. Jeff Hogan, Associate Planner
City of Santa Clarita
23920 Valencia Boulevard Suite 300
Santa Clarita, CA 91355-2196

Re: Riverpark Project EIR

Dear Mr. Hogan,

Friends of the Santa Clara River offers the following comments on the Riverpark Project Environmental Impact Report.

Once again, those of us who have attempted over the years to care for the Santa Clara River are confronted with a large development project which cannot avoid having significant and degrading impacts on the River ecosystem. 1

The unprecedented growth in the Santa Clara watershed over the last few decades has caused an array of cumulative impacts to flora and fauna, not to mention air quality, water quality, aethetics, traffic and nearly every other category addressed by the California Environmental Quality Act. 2
Continued encroachment by development into the River floodplain and terrace lands has resulted in habitat loss and fragmentation which have been cited by many experts as the major causes for the decline of species and loss of biological diversity (Noss, 1987; Beier and Loe, 1992; Beier et al, 2002; Forman et al, 2003). 3
Further, the continued filling and channelization of the River has altered and is altering the hydrology of the watershed, increasing storm runoff and decreasing water quality (the River is now impaired for ammonia, chloride, coliform, nitrate/nitrite and organic enrichment). 4 5 6
These cumulative impacts have not been adequately addressed in the subject EIR nor in other EIRs for projects in the Santa Clara watershed. 7
Continuing failure to address and to act on these impacts is, we believe, turning a large section of the River, in and around Santa Clarita, into a biological "dead zone". 8

The Santa Clara River is the largest and one of the last undammed and relatively natural riverine systems remaining in southern California. 9
Considering the southern California region as a whole, the U. S. Fish and Wildlife Service (Faber et al, 1989) has estimated that 95 to 97 percent of riparian communities have been eliminated due to human influences.

Damage occurs primarily because (1) the river is channelized by hardening its banks; (2) riparian and terrace habitats have been lost and fragmented; (3) urban edge effects, including illegal ORV use, degrade riparian biological values; (4) adequate buffer zones protecting the riparian corridor have not been provided; and (5) the function of the river terrace area as wildlife habitat or wildlife corridor is eliminated. 10 11 12 13 14

We are submitting two scientific studies in support of the statement that urban development degrades adjacent biological resources. The first (Kelly et al, 1993) is a paper by two University of California Riverside scientists entitled "Buffer Zones for Ecological Reserves in California: Replacing Guesswork with Science". This paper shows that even nature reserves over a mile in width suffer urban edge effects at their centers - and of course the Santa Clara River riparian corridor is much narrower than these reserves and even more susceptible to such effects. The second (Rottenborn, 1999) is a paper by a Stanford University scientist entitled "Predicting the impacts of urbanization on riparian bird communities". This paper shows impacts to bird communities out to a distance of 500 meters, or over 1500 feet, from the urban edge. 15

More studies are definitely needed on the impacts of development on riparian ecosystems. For the Santa Clarita area, in particular, where development is anticipated over 20 miles of the River and tributaries, what we really have is an experiment on a large scale with the fate of the River ecosystem in the balance. Creating larger buffer zones to conserve more of the riparian community is a must. To quote from the closing sentence in the Stanford paper: "The single most important step that can be taken to conserve riparian communities in the face of urbanization is to minimize development in and along floodplains by maintaining broad buffers of undeveloped land between developed areas and riparian habitats." 16 17 18

The Riverpark project will have impacts bringing into play the City's General Plan policies on Significant Ecological Areas. Policy 5.3 under Goal 5 states "New development must be sensitive to the Significant Ecological Areas through utilization of creative planning techniques to avoid and minimize disturbance of these and other sensitive areas." **Only by creating an adequate buffer zone around Riverpark can this policy be effectively implemented.** We suggest that among the most creative planning techniques which could and should be used here is the development and adoption of a Floodplain/Terrace Avoidance Alternative for Riverpark. The EIR Alternative 2 is a step in that direction but considers only the Q50 floodplain instead of the floodplain and terrace areas which are steadily becoming rarer in the River corridor and which provide high quality habitat for such species as the spadefoot toad and arroyo toad. 19 20

Besides larger buffer areas, establishing the east terminus of the River trail at Santa Clarita Parkway would greatly help in protecting riparian resources. Continuing the trail beyond the Parkway will negatively impact the eastern portion of the project area which has significant biological value. These impacts are related to increased disturbance by humans, ORVs and domestic animals. 21 22

Thank you for considering these comments.

Sincerely,

Ron Bottorff

References:
Beier, P. and S. Loe, *A checklist for evaluating impacts to wildlife movement corridors,* Wildlife Society Bulletin 20:434-440, 1992.
Faber, et al, *The Ecology of Riparian Habitats of the Southern California Coastal Region: A Community Profile, U.S. Department of the Interior,* Biological Report 85(7.27), September 1989
Forman. R.T.T. *Land Mosaics: The Ecology of Landscapes and Regions*, Cambridge University Press, 1995.
Kelly, Patrick J. and John T. Rotenberry, *Buffer Zones for Ecological Reserves in California: Replacing Guesswork with Science*, in *Interface Between Ecology and Land Development in California*, Southern California Academy of Sciences, 1993.
Noss, R. F., *Protecting natural areas in fragmented landscapes,* Natural Areas Journal 7:2-13, 1987.
Rottenborn, S.C. *Predicting the impacts of urbanization on riparian bird communities*, Biological Conservation 88 (1999).

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Buffer Zones for Ecological Reserves in California: Replacing Guesswork with Science

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Abstract. An integral part of any habitat conservation plan is the design and establishment of one or more ecological reserves to provide for the continued existence of threatened or endangered species. As a consequence of rapid urbanization, however, potential reserve areas in southern California often abut areas of intense human use. Although the extension of undesirable anthropogenic disturbance beyond urban boundaries into potential reserve habitat (sometimes referred to as "edge effects") can be identified, currently little scientific attention is being paid to reserve buffering. The importance of understanding boundary processes cannot be understated: areas near boundaries may be unsuitable for protected species, hence reducing the effective size of a reserve. Furthermore, this reduction disproportionately affects relatively smaller reserves (which have a higher perimeter/area ratio) that are characteristic of a fragmented landscape. We describe several approaches to quantifying edge effects at the urban/wildland interface; such research can obviate the use of guesswork in the design of buffer zones for nature reserves.

Keywords: Coastal sage scrub; core area model; *Dipodomys stephensi*; domestic cat; *Felis catus*; edge effect; habitat conservation plan; habitat fragmentation; reserve design; Riverside; SLOSS; Stephens' kangaroo rat.

Introduction

Ecologists and environmentalists are alarmed by the global rates of contemporary habitat destruction and biodiversity loss. This environmental degradation is primarily a consequence of continued exponential growth of the human population and the subsequent increased demand on space and natural resources (Western 1989; Ehrlich and Wilson 1991; Soule 1991a; Western 1992). Inescapable consequences of such population growth and habitat loss are increasing fragmentation and isolation of remaining natural habitat, and, ultimately, reduction of the natural world to a series of ecological reserves.

These reserves, whether their final boundaries are determined by design or by the residual of unregulated habitat loss, may vary in size from small habitat fragments in an urban landscape (e.g., Soule et al. 1988) to large national parks, national forests, and wilderness areas (e.g., Salwasser et al. 1987; Salwasser 1991). Although some reserves will be of ecosystem proportions, the size distribution of protected areas worldwide is heavily biased towards smaller reserves (Pellew 1991). Whether any reserve is of a sufficient size and appropriate configuration to viably support species populations or communities of special interest, however, has become a matter of considerable debate. Much attention has been focused on what has become known as the SLOSS (Single-Large-Or-Several-Small) question (Diamond 1975; Simberloff and Abele 1976; Diamond 1976; Soulé and Simberloff 1986; Simberloff 1988; Quinn and Harrison 1988).

In regions that are undergoing rapid urbanization, such as much of Southern California, the question of preplanning the establishment of reserves of sufficient size and configuration to maintain population or community viability is often moot, because of high land values and the extent of pre-existing habitat fragmentation. Instead, we often inherit a parcel of natural land abutting or embedded in an urban landscape. The boundaries of these parcels may be permeable to a variety of external forces that may be destabilizing to the specific attributes that we wish to preserve in the reserve. We contend that reserve establishment in urbanized California is a pointless exercise in crisis management if those reserves are going to be gradually eroded away by external forces. Boundary processes must therefore be of paramount importance from the outset of the conservation planning process.

The importance of understanding boundary processes cannot be understated because the effective size of an ecological reserve is almost always smaller than the area contained within the reserve's administrative boundary. Thus, the ultimate fate of any reserve depends on the magnitude of impacts from processes occurring at its boundaries (see Schonewald-Cox and Bayless 1986; Schonewald-Cox 1988; Schonewald-Cox et al. 1992). In his essay "The Eternal External Threat," Daniel Janzen (1986, p. 303) advises preserve managers: "Above all, be a field biologist who works with your preserve's neighbors to keep out what should be kept out." A reserve boundary that is unresistant to deleterious external influences is doomed to degradation by diffusion-like processes. Only the portion of the reserve that withstands degradation remains as the effective or core area reserve. The effective size or core area is a function of the cumulative magnitude of impacts resulting from penetration of the reserve boundary by external forces. Such "edge effects" have been studied in tropical forests (Janzen 1983, 1986; Lovejoy et al. 1986; Laurance 1990, 1991a, 1991b), temperate forests (Wilcove 1984; Temple 1986; Wilcove et al. 1986; Andren and Angelstam 1988), and in simulation models (Buechner 1987; Stamps et al. 1987). However, despite the significant role of urbanization in habitat fragmentation and biodiversity loss, there has yet been little research on edge effects in more urbanized situations (but see Soule et al. 1988; Bolger et al. 1991; Langen et al. 1991; Soule et al. 1992; Alberts et al. 1993; Sauvajot and Buechner 1993; Scott 1993). Although the appropriate size of a reserve is always relative to the specific conservation context, the impact of edge effects is particularly significant for small reserves because of their larger perimeter to area ratios (see below). Extensive habitat fragmentation, as we have in southern California today, precludes the luxury of establishing large reserves for many sensitive species. Therefore, reserve buffering must be adequately addressed in the reserve design phase of any habitat conservation planning process in this region.

We describe several approaches to quantifying edge effects at the urban/wildland interface in California. Our goal is to develop a methodology that is explicitly scientific. It involves the systematic collection of relevant data to ascertain whether edge effects do, indeed, exist, and to develop and test specific hypotheses about the underlying mechanisms that may be responsible for producing those effects.

Theory

We wish to develop an approach that emphasizes processes across the boundaries between reserves and adjacent land-use elements in a landscape mosaic (explicitly following Wiens et al. 1985). The boundary we are most concerned with is the "administrative boundary," the geographical limits to the authority of reserve managers (the legal boundary; see Schonewald-Cox 1988). The concern is how boundaries affect the exchanges or redistribution of materials, energy, and organisms between the reserve and adjacent parcels.

Dynamics across landscape boundaries are due to the action of "vectors," physical forces or animals that actively move material or energy in the system. Vectors are important because they may impose non-random, directional fluxes of materials. When evaluating the potential effects of animal vectors, it becomes necessary to understand individual behavior and movements, home ranges and space use patterns, foraging behavior, and diet.

The degree to which a boundary deflects the movements of vectors may be expressed as a boundary's "permeability," and it may be considered as the degree to which a reserve is "buffered" from a particular vector across that boundary. Permeability or buffering is a function of characteristics of both the boundary and the vectors taken together.

The likelihood that a boundary will be crossed by an animal vector is related to the density of animals outside (or within) a reserve. While the probability that an individual will encounter and perhaps cross a boundary is a function of its movement patterns and position with respect to the boundary, increases in population density produce a dramatic increase in the collective probability of boundary encounter. Thus, there is likely to be a clear density-dependence to cross-boundary movements.

We have already noted that small reserves have larger perimeter-to-area ratios than large reserves. This comparative quantity is not actually a ratio (which are dimensionless), but an index of the amount of perimeter per unit area. We prefer to call this index the 'relative edge' and express it in meters per hectare. A circular reserve will have the least amount of relative edge possible for reserves of equal area. Since the movement or diffusion of vectors across a boundary is directly related to the length of the boundary, in general reserves with high relative edge will have less buffering (more flux) than those with low.

The relationship between perimeter and area has been further refined in the development of the Core-Area Model by Laurance and Yensen (1991). In essence, they derive a shape index (SI) that describes the degree to which any given perimeter-area ratio (relative edge) departs from that of a circle of the same area. Combining the shape index with an edge function (d, the distance to which a disturbance vector penetrates a boundary, in meters) they derived an expression to calculate the core

area of any habitat fragment (in hectares). The authors point out that the only crucial assumption of the Core-Area Model is that d is unimodal.

Conservation in Urbanizing California

In southern California, urbanization of what was formerly wildlands is proceeding rapidly, resulting in extensive habitat fragmentation. Large-scale habitat fragmentation is almost automatically a precursor to conflicts between endangered species preservation and land development. There are a number of mechanisms for resolving such conflicts under the state and federal Endangered Species Acts. One of the most common routes to conflict resolution at this time is by application for a federal Incidental Take or 10(a) Permit through the development of a Habitat Conservation Plan (HCP) for the affected species. HCPs typically involve the establishment of ecological reserves ranging in size from a few hundred to thousands of hectares. The goal of the HCP process is to ensure the continued existence of a sensitive species while allowing some 'incidental take' by an otherwise lawful activity, such as land denaturation and development (cf. Soule 1991b), to continue (Bean et al. 1991; Beatley 1992). As a consequence of rapid urbanization, however, potential reserve areas in southern California are often adjacent to areas of intense human use. Although the extension of undesirable anthropogenic disturbance beyond urban boundaries into potential reserve habitat can be identified, currently little scientific attention is being paid to reserve buffering (in essence, the calculation of d_{max}).

The Buffer Design Process

Buffer design needs to be regarded as a key component of any integrated management strategy for sensitive species. The use of conservation easements and active management practices (habitat manipulation, alien predator control, provision of corridors for, or barriers to, wildlife movement, etc.) are other important components of an integrated management strategy, which can be implemented after potential impacts have been identified and quantified. Therefore, the first step in the buffer design process is the identification and, if possible, ranking of potential impacts.

The process should proceed as though a worst-case scenario exists; the reserve is isolated and suboptimal in size, and the sensitive species distribution is, at least initially, contiguous with the "impact boundary" at a completely permeable administrative boundary. This describes the situation where a housing development or an industrial park directly abuts an unfenced reserve boundary. Obviously, our concern is with the distance to which negative external influences extend into the reserve interior, and thus reduces the effective size of the reserve, and how we might change the permeability of that boundary to reduce vector movement.

The critical questions are:

1. What external forces or processes likely to have a negative impact on the protected species, community or resources in question are operating at the reserve boundary (i.e., what vectors are present)?

2. To what extent are those external forces likely to penetrate the boundary and result in negative impacts on the protected population(s) or community (i.e., how permeable is the boundary)?

3. Can these forces be ranked in terms of likely negative impact to produce a prioritized list of buffering requirements?

4. Are these potentially negative forces amenable to scientific hypothesis testing?

5. How do we collect data to evaluate hypotheses?

6. How do we mitigate for both general and specific impacts (i.e., how do we alter boundary permeability)?

We illustrate this process in a consideration of buffering requirements for the establishment of reserves for the endangered Stephens' kangaroo rat (*Dipodomys stephensi*) in the context of a long-term Habitat Conservation Plan that is being developed by Riverside County (RECON 1990, the short-term HCP). Roughly, that plan envisions three to seven independent reserves, each consisting of 500-2,000 ha.

One likely component of that HCP is the Motte Rimrock Reserve (a part of the University of California Natural Reserve System), a 515 ha ecological reserve located 30 km south of the city of Riverside (Fig. 1). Although, it is surrounded on all sides by major highways and dispersed urbanization, it contains a diverse flora and fauna including a number of sensitive species. Its irregular shape results in a relative edge of about 39 m/ha (perimeter = 20.125 km); since a a circular reserve of the same area would have a relative edge of 15.6 m/ha (Fig. 2), the Motte has an SI value of 2.5. If we run the

Laurance and Yensen Core-Area Model with SI = 2.5 and an arbitrary edge function of $d = 100$ m, we find that approximately 40% of the total area of the Motte would be lost to this hypothetical disturbance. Since no part of the reserve is more than 625 m from an edge, the Motte may not have any core area for certain external impacts, such as far-ranging domestic dogs.

We have hypothesized that the following forces have the potential to operate across reserve-urban interfaces in Riverside County to the detriment of Stephens' kangaroo rats:

1. Introduction of alien predators (particularly domestic cats).
2. Increased levels of nighttime illumination.
3. Increased sound and vibration levels.
4. Trespass (pedestrian, equestrian and off-road vehicle) and associated habitat alteration.
5. Introduction of competitors (commensal rats and mice).
6. Garbage disposal and pollution drift (e.g., pesticides etc.).
7. Disease transmission from domestic or commensal animals to wildlife.
8. Shooting (effects on community dynamics: e.g. mortality of natural predators, such as coyotes).

Our ranking of these forces as to their impact on Stephens' kangaroo rat populations is tentative, other

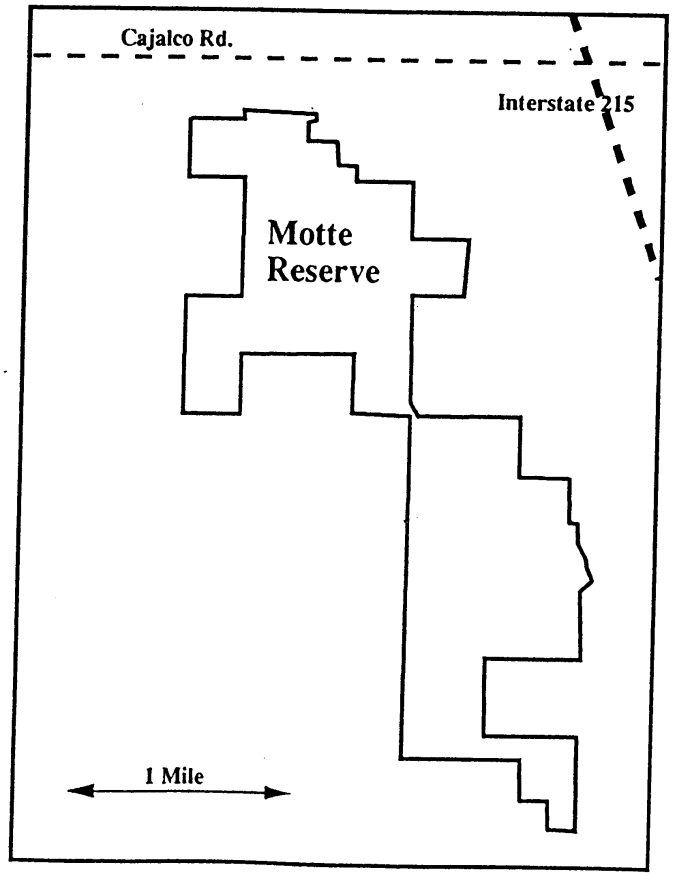

Figure 1. Map showing boundary of the Motte Rimrock Reserve. Adapted from Mayhew and Carlson (1990).

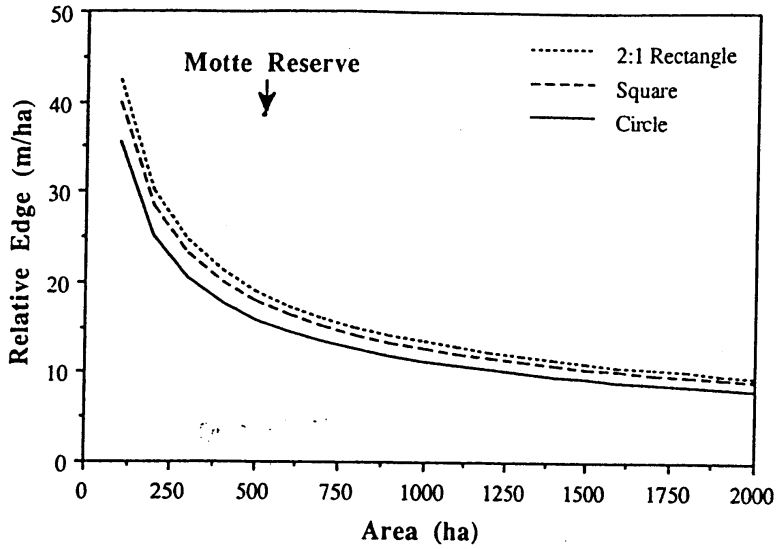

Figure 2. Perimeter/Area (relative edge) as a function of Area for three hypothetical reserve configurations: a circle, a square and a 2:1 rectangle. The relative edge for the Motte Reserve (arrow, ca. 39 m/ha) is at least twice the value for any of the three hypothetical reserve shapes for the same area.

than that we consider the impact of domestic cats (*Felis catus*) as likely to be highly significant. To study the penetration of these vectors into potential reserves, we suggest the use of two approaches:

Empirical non-specific approach

This involves documenting that, indeed, a statistically detectable edge effect exists and certainly represents the minimum degree of sampling and analysis that should be implemented for any reserve design. It should typically involve replicated censuses of target species (or communities) at set distances from hypothetical reserve boundaries under different impact situations. For example, we could calculate kangaroo rat burrow densities as a function of distance from a reserve boundary and contact with external forces. If linear or non-linear regression reveals a consistent relationship between population density and distance from the reserve boundary, an empirically-determined buffer zone (of width *d* meters) for the cumulative impacts can be proposed (Fig. 3). However, that buffer width will be only appropriate for the specific species and edge type under investigation.

Mechanistic hypothesis testing approach

To develop the most appropriate and effective buffer requires the identification of specific mechanisms likely to produce any pattern identified in the previous step. In essence, each of the forces we identified as potentially operating across boundaries to affect kangaroo rat populations serves as a hypothesis that can be tested. Although not always testable under a strict experimental regime, we can nonetheless collect data in such a way as to use strong inference about the influence of any particular mechanism.

As an example, we hypothesize that the predation of house-based domestic cats on kangaroo rat populations is a significant edge-related impact. To examine this hypothesis, we would attempt two approaches: predation documentation and cat movement studies.

House-based cats, unlike their feral cousins, are cooperative in that they often bring home prey items. The prey can be identified and the diet quantified through the help of cooperative pet owners. A variety of studies of this type have been performed throughout the world, most notably in Great Britain. In an English village, for example, domestic cats were responsible for at least 30% and perhaps 50% of the mortality of all sparrows in a one year period (Churcher and Lawton 1987, 1989). Considering the high levels of cat ownership in the U.S., their ability to survive as feral animals, and their innate hunting abilities, the potential of cats as a destabilizing force in ecological reserves is enormous. Studies on the diet of house-based and feral cats in southern California would indicate levels of predation pressure not only on kangaroo rats but also on a variety of other sensitive species (e.g., California gnatcatcher, *Polioptila californica*).

Determining the spatial distribution of feline predation in relation to reserve boundaries is obviously impor-

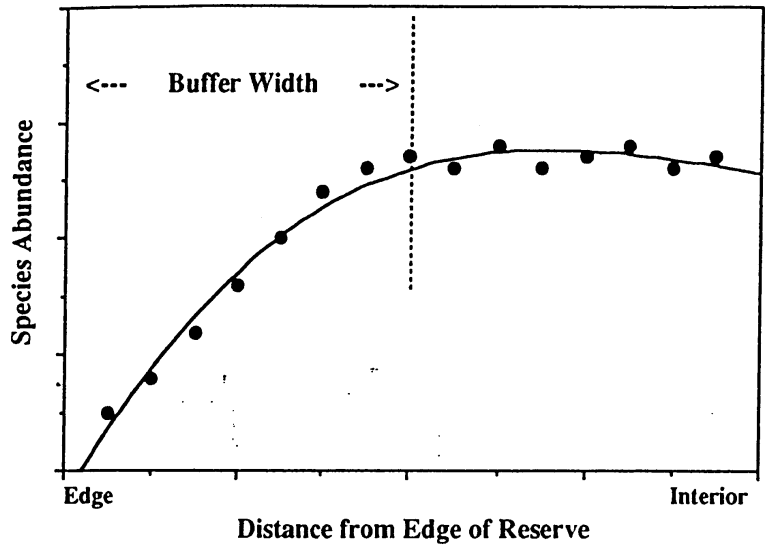

Figure 3. Empirical determination of buffer zone width (*d*) through censusing/sampling at set distances from the reserve boundary. If regression reveals a relationship between population density and distance from the edge of the reserve, a buffer zone of width *d* meters can be proposed for the cumulative impacts.

tant for buffer consideration. Observations in the field in Riverside County of domestic cats more than a mile from human dwellings (P. Kelly, personal observation) hint of the potential for feline impact deep within reserve boundaries. Movements of both house-based and feral cats can be studied using radio telemetry. The study should be designed to provide information on the degree of reserve penetration by gender, age-class and ownership status. Analysis of movement distributions should provide guidelines on buffering requirements for this particular edge effect.

Mitigation Recommendations

The result of non-specific and mechanistic approaches to buffering determination can provide a rationale for appropriate mitigation to counter edge effects. A number of mitigation avenues are available for use. For example, in a large reserve a sacrificial zone of open space equivalent to the buffer width identified in an empirical analysis might be incorporated within the boundaries of the initial reserve design; alternatively, such a zone could be imposed external to a proposed reserve boundary. If specific external impacts can be identified, inappropriate land use options can be limited within a specified distance of reserve boundaries (e.g., through conservation easements or restrictive covenants); if possible or appropriate, barriers can be constructed to block or curtail access by negative influences.

The external forces impinging on ecological reserves are identifiable in California's urbanized regions. However, an important point is that those same forces will impact different taxa in different ways. Appropriate buffering and management for one sensitive species will not necessarily apply to another sensitive taxon that may even use the same habitat. For example, studies on habitat fragments in San Diego indicated that native rodents were usually absent from smaller fragments whereas the bird fauna was not as affected (see Soule et al. 1988; Bolger et al. 1991; Langen et al. 1991; Soule 1991b; Soule et al. 1992). Soule and his colleagues also inferred that the presence of coyotes (*Canis latrans*) is a stabilizing influence, controlling the depredations of gray foxes (*Urocyon cineroargenteus*), domestic cats, and other mesopredators. Studies in Arizona also indicate that coyotes seem to exert a stabilizing influence by controlling the depredations and movements of house-based cats (Goldsmith et al. 1991). For these reasons, the introduction of coyotes has been proposed to control the impacts on California least terns (*Sternus antillarum*) and light-footed clapper rails (*Rallus longirostris*) by urban populations of red foxes (*Vulpes fulva*), another alien predator (Zembal 1993). In the San Joaquin Valley, on the other hand, coyotes are a destabilizing influence in kit fox (*Vulpes macrotis*) recovery efforts (Scrivner et al. 1991).

Conclusions

A comprehensive scientific approach to the issue of reserve buffering in California is long overdue. As we move into an era of multi-species conservation planning, rigorous determination of buffering requirements for ecological reserves will become more difficult and more important. The development of a large-scale HCP is an extremely expensive undertaking: costs are about $25 million in the case of the Coachella Valley fringe-toed lizard (*Uma inornata*) and likely much higher for the Stephens' kangaroo rat HCP (see Beatley 1992). The tremendous costs involved demand that buffering be thoroughly addressed early in the reserve design process. The procedure we have described is very flexible and can be adapted to meet the specific needs of most reserve design situations in California.

To develop a buffering protocol we recommend:

1. Identification and ranking (if possible) of those external forces likely to impact the sensitive population(s) or community (communities) in question.

2. An empirical non-specific approach; censusing sensitive species at set distances from reserve boundaries, under varying impact conditions, to estimate the penetration and impact of negative external forces on the protected population(s).

3. Mechanistic hypothesis testing; study of the most significant forces (e.g. alien predators or competitors, trespass, runoff, light, noise, vibration, etc.) to quantify individual impacts.

4. Adoption of mitigation management practices that maximize buffering but minimize future costs. Public policies affecting conservation programs are subject to sudden change so it is important to minimize reliance on the future availability of funding for management.

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Literature Cited

Alberts, A.C., A.D. Richman, D. Tran, R. Sauvajot, C. McCalvin, and D.T. Bolger. 1993 Effects of habitat fragmentation on of native and exotic plants in Southern California coastal scrub. *In* J.E. Keeley, ed. Interface between ecology and land development in California. Southern California Academy of Sciences, Los Angeles, CA.

Andren, H. and P. Angelstam. 1988. Elevated predation rates as an edge effect in habitat islands: experimental evidence. Ecology 69:544-547.

Bean, M.J., S.G. Fitzgerald, and M. A. O'Connell. 1991. Reconciling conflicts under the Endangered Species Act: the Habitat Conservation Planning experience. World Wildlife Fund, Baltimore, MD 109 p.

Beatley, T. 1992. Balancing urban development and endangered species: the Coachella Valley habitat conservation plan. Environmental Management 16:7-19.

Bolger, D.T., A.C. Alberts, and M.E. Soulé. 1991. Occurrence patterns of bird species in habitat fragments: sampling, extinction, and nested species subsets. American Naturalist 137:155-166.

Buechner, M. 1987. Conservation in insular parks: simulation models of factors affecting the movement of animals across park boundaries. Biological Conservation 41:57-76.

Churcher, P.B. and J.H. Lawton. 1987. Predation by domestic cats in an English village. Journal of the Zoological Society of London 212:439-455.

Churcher, P.B. and J.H. Lawton. 1989. Beware of well-fed felines. Natural History (July):40-47.

Diamond, J.M. 1975. The island dilemma: lessons of modern biogeographic studies for the design of natural reserves. Biological Conservation 7:129-146.

Diamond, J.M. 1976. Island biogeography and conservation: strategy and limitations. Science 193:1027-1029.

Ehrlich, P.R. and E.O. Wilson. 1991. Biodiversity studies: science and policy. Science 253:758-762.

Goldsmith, A., W.W. Shaw, and J. Schelhas. 1991. The impacts of domestic dogs and cats on the wildlife of Saguaro National Monument. University of Arizona School of Renewable Natural Resources: Final Report for National Park Service (western region).

Janzen, D.H. 1983. No park is an island: increase in interference from outside as park size increases. Oikos 41:402-410.

Janzen, D.H. 1986. The eternal external threat. Pp. 286-303 *in* M.E. Soulé, ed. Conservation biology: the science of scarcity and diversity, Sinauer Associates, Sunderland, MA.

Langen, T.A., D.T. Bolger, and T.J. Case. 1991. Predation on artificial bird nests in chaparral fragments. Oecologia 86:395-401.

Laurance, W.F. 1990. Comparative responses of five arboreal marsupials to tropical forest fragmentation. Journal of Mammalogy 71:641-653.

Laurance, W.F. 1991a. Edge effects in tropical forest fragments: application of a model for the design of nature reserves. Biological Conservation 57:205-219.

Laurance, W.F. 1991b. Ecological correlates of extinction proneness in Australian tropical rain forest mammals. Conservation Biology 5:79-89.

Laurance, W.F. and E. Yensen. 1991. Predicting the impacts of edge effects in fragmented habitats. Biological Conservation 55:77-92.

Lovejoy, T.E., R.O. Bierregaard, Jr., A.B. Rylands, J.R. Malcolm, C.E. Quintela, L.H. Harper, K.S. Brown, Jr., A.H. Powell, G.V.N. Powell, H.O.R. Schubart, and M.B. Hays. 1986. Edge and other effects of isolation on Amazon forest fragments. Pp. 257-285 *in* M.E. Soulé, ed. Conservation Biology: the science of scarcity and diversity. Sinauer Associates, Sunderland, MA.

Mayhew, W.W. and B.A. Carlson. 1990. User's handbook for the Motte Rimrock Reserve. University of California, Natural Reserve System, Motte Rimrock Reserve, CA. 65 p.

Pellew, R.A. 1991. Data management for conservation. Pp. 505-522 *in* I.F. Spellerberg, F.B. Goldsmith, and M.G. Morris, eds. The scientific management of temperate communities for conservation. Blackwell Scientific Publications, London.

Quinn, J.F. and S.P. Harrison. 1988. Effects of habitat fragmentation and isolation on species richness: evidence from biogeographic patterns. Oecologia 75:132-140.

RECON. 1990. Short-term habitat conservation plan for the Stephens' kangaroo rat. (Regional Environmental Consultants, 7460 Mission Valley Road, San Diego, CA 92108).

Salwasser, H. 1991. In search of an ecosystem approach to endangered species conservation. Pp. 247-265 *in* K.A. Kohm, ed. Balancing on the brink of extinction: the Endangered Species Act and lessons for the future. Island Press, Covelo, CA.

Salwasser, H., C. Schonewald-Cox, and R. Baker. 1987. The role of interagency cooperation in managing for viable populations. Pp. 159-173 *in* M.E. Soulé, ed. Viable populations for conservation. Cambridge University Press, Cambridge.

Sauvajot, R.M. and M. Buechner 1993. Effects of urban encroachment on wildlife of the Santa Monica mountains. *In* J.E. Keeley, ed. Interface between ecology and land development in California. Southern California Academy of Sciences, Los Angeles, CA.

Schonewald-Cox, C.M. 1988. Boundaries in the protection of nature reserves. BioScience 38:480-486.

Schonewald-Cox, C.M. and J.W. Bayless. 1986. The boundary model: a geographical analysis of design and conservation of nature reserves. Biological Conservation 38:305-322.

Schonewald-Cox, C., M. Buechner, R. Sauvajot, and B.A. Wilcox. 1992. Cross-boundary management between national parks and surrounding lands: a review and discussion. Environmental Management 16::273-282.

Scott, T.A. 1993. The effect of housing construction on birds in an oak woodland along the wildland urban interface. *In* J.E. Keeley, ed. Interface between ecology and land development in California. Southern California Academy of Sciences, Los Angeles, CA.

Scrivner, J.H., T.P. O'Farrell, T.T. Kato, and K.L. Hammer. 1991. Reintroduction of the endangered San Joaquin kit fox onto Naval Petroleum Reserve #1 in California. Presentation at American Society of Mammalogists 71st Annual Meeting, Kansas State University, 15-19 June, 1991.

Simberloff, D.S. 1988. The contribution of population and community biology to conservation science. Annual Review of Ecology and Systematics 19:473-511.

Simberloff, D.S. and L.G. Abele. 1976. Island biogeography theory and conservation practice. Science 191:285-28.

Soulé, M.E. 1991a. Conservation: tactics for a constant crisis. Science 253:744-750.

Soulé, M.E. 1991b. Land use planning and wildlife maintenance: guidelines for conserving wildlife in an urban landscape. Journal of the American Planning Association 57:313-323.

Soulé, M.E., A.C. Alberts, and D.T Bolger. 1992. The effects of habitat fragmentation on chaparral plants and vertebrates. Oikos 63:39-47.

Soulé, M.E., D.T. Bolger, A.C. Alberts, J. Wright, M. Sorice, and S. Hill. 1988. Reconstructed dynamics of rapid extinctions of chaparral-requiring birds in urban habitat islands. Conservation Biology 2:75-92.

Soulé, M.E. and D.S. Simberloff. 1986. What do genetics and ecology tell us about the design of nature reserves? Biological Conservation 35:19-40.

Stamps, J.A., M. Buechner, and V.V. Krishnan. 1987. The effects of edge permeability and habitat geometry on emigration from patches of habitat. American Naturalist 129:533-552.

Temple, S.A. 1986. Predicting impacts of habitat fragmentation on forest birds: a comparison of two models. Pp. 301-304 *in* J. Verner, M.L. Morrison, and C.J. Ralph, eds. Wildlife 2000: modeling habitat relationships of terrestrial vertebrates, University of Wisconsin Press, Madison, WI.

Western, D. 1989. Population, resources, and environment in the twenty-first century. Pp. 11-25 *in* D. Western and M. Pearls, eds. Conservation for the twenty-first century. Oxford University Press, Oxford.

Western, D. 1992. The biodiversity crisis: a challenge for biology. Oikos 63:29-38.

Wiens, J.A., C.S. Crawford and J.R. Gosz. 1985. Boundary dynamics: a conceptual framework for studying landscape ecosystems. Oikos 45:421-427.

Wilcove, D.S. 1985. Nest predation in forest tracts and the decline of migratory songbirds. Ecology 66:1211-1214.

Wilcove, D.S., C.H. McLellan, and A.P. Dobson. 1986. Habitat fragmentation in the temperate zone. Pp. 237-256 *in* M.E. Soule, ed. Conservation biology: the science of scarcity and diversity. Sinauer Associates, Sunderland, MA.

Zembal, R. 1993. The need for corridors between coastal wetlands and uplands in southern California. *In* J.E. Keeley, ed. Interface between ecology and land development in California. Southern California Academy of Sciences, Los Angeles, CA.

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Predicting the impacts of urbanization on riparian bird communities

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Abstract

In 1995, birds were surveyed in riparian woodlands along a gradient of urbanization in the Santa Clara Valley, CA, USA, in order to determine the relationships between riparian bird communities and urbanization. Bird species richness and density decreased at a location as the number of bridges near that location increased and as the volume of native vegetation decreased. Species richness also increased as the distance to the nearest building and the width of the riparian habitat increased. Canonical correspondence analysis confirmed that bird community structure was influenced strongly by these variables. Many individual species responded significantly to variables associated with urbanization, most having lower densities on more urbanized sites. Whereas previous studies have demonstrated substantial effects of urbanization on bird communities in the habitats being directly altered, this study indicates that urbanization on lands adjacent to intact riparian woodlands has substantial impacts on riparian bird communities. © 1999 Published by Elsevier Science Ltd. All rights reserved.

Keywords: Urbanization; Birds; Riparian; Canonical correspondence analysis

1. Introduction

The influence of urbanization on bird communities has been examined in a number of studies (e.g. Emlen, 1974; DeGraaf and Wentworth, 1981; Beissinger and Osborne, 1982), most finding that urbanization has profound effects on bird species richness, abundance, and community composition. Low levels of development may increase bird species richness somewhat as additional resources, such as ornamental vegetation, artificial roosting or nesting sites, and anthropogenic food sources, are made available (Lancaster and Rees, 1979; Aldrich and Coffin, 1980; Blair, 1996). However, intense urbanization results in a depauperate bird community dominated by a few species that are common and widespread.

Relatively little attention has been paid to the impacts of urbanization on riparian bird communities. In Florida, Smith and Schaefer (1992) found bird species richness to be higher in riparian habitats in rural areas than in urban areas during summer and found that housing density on adjacent lands influenced riparian bird communities. Similarly, Cubbedge and Nilon (1993) reported variation in the densities of individual species among riparian habitats adjacent to different land use types in Minnesota. These studies indicate that urbanization has important impacts on riparian bird communities.

Urban impacts on riparian systems are worthy of further study for a number of reasons. First, they support very high numbers of plant and animal species (Knopf et al., 1988; Naiman et al., 1993). In arid regions in particular, riparian ecosystems are critical in maintaining high biodiversity on a regional scale (Johnson et al., 1977; Stevens et al., 1977; Knopf, 1985). Despite their importance to biodiversity, riparian systems have been severely degraded by anthropogenic activities. In California, for example, > 95% of the riparian vegetation that was present prior to European settlement of the state has been destroyed or significantly degraded (Smith, 1977; Katibah, 1984). In turn, this habitat degradation has caused substantial declines in the populations of many riparian-associated animal species (Gaines, 1974; Ohmart, 1994), necessitating protection of the remaining riparian habitat.

In arid regions, urbanization usually occurs along rivers at low elevations, where bird species richness and the number of regionally rare species are higher than in any other habitat type in a watershed (Knopf, 1985; Finch, 1989). In 1994–1995, a study of the effects of

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adjacent land use on riparian bird communities in the Santa Clara Valley of California showed that the proportion of native versus exotic vegetation, proximity to a building or bridge, and the amount of development around a riparian plot were closely associated with the distribution of riparian birds among 24 sites along a gradient of urbanization (Rottenborn, 1997). The objective of the present study was to determine the relationships between these urbanization-associated variables and bird species richness, density, and community structure on a much larger number of plots along a longer urbanization gradient in order to predict the effects of further urban sprawl and to conserve the bird communities in the Santa Clara Valley.

2. Methods

2.1. Plot selection and bird recording

The Santa Clara Valley is located between the Diablo and Santa Cruz Mountain Ranges at the southern end of the San Francisco Bay in California, USA. The northern and central portions of the valley are heavily urbanized; suburban areas surround this urban core, and agricultural/grassland areas are present in the southern part of the valley. Within this relatively broad, flat valley, study plots were selected along Coyote Creek, Los Gatos Creek, and the Guadalupe River, three of the largest streams in the study area. They are relatively narrow (mostly < 15 m wide), low-gradient, and slightly meandering, and are crossed by a number of bridges. The narrow (mostly < 80 m wide) corridors of mature woodland that remain along the banks represent some of the most valuable riparian habitat in the San Francisco Bay area (US Army Corps of Engineers, 1986).

Eighty-three plots were selected randomly along the lower reaches of these streams where the native riparian habitat tends to be dominated by Fremont cottonwood *Populus fremontii* and several species of willows *Salix lucidum*, *S. laevigata*, *S. lasiolepis*, and *S. exigua*. Fifteen of these plots, located in areas where the vegetation had been degraded considerably, were excluded from this study. The remaining 68 plots were located adjacent to a number of different land use types along a gradient of urbanization, ranging from heavy industry to agricultural land and open space in more rural areas. Each plot center was at least 75 m from the nearest bridge, and all plots were separated by at least 150 m. The center of each plot was located as close as possible to the center of the riparian corridor, usually at the stream edge.

Birds were surveyed five times on each plot from 23 May to 13 July 1995. The variable circular-plot method (Reynolds et al., 1980) was used to count the number of individuals of each species recorded within 70 m of each plot center for a period of 5 min. All surveys were conducted during the 4 h immediately following sunrise. Only birds within the riparian corridor were counted, and bird densities were determined from the dimensions of the corridor within each 70 m-radius plot. Most of the birds recorded on these surveys were thought to be breeding, or at least oversummering, in the riparian corridors of the study area. Noise from traffic or flowing water was not thought to have a significant effect on the detection of birds during these surveys.

2.2. Measurement of environmental variables

At each plot, a number of environmental variables were measured for use in multiple linear regression models predicting the densities of individual bird species. The diameters of all woody stems > 1 cm in diameter were measured within a radius of 35 m from the plot center (excluding areas outside the riparian corridor). The stem density of all woody plants (TOTSTDEN) and of native (NATSTDEN) and exotic (EXOSTDEN) species, as well as the proportion of stems that were native (NATPROST), were calculated. Because there were several bird species whose abundance might be related directly to the presence or abundance of live oaks *Quercus agrifolia* and *Q. wislizenii*, the density of oak stems (OAKSTDEN) was also calculated for each plot.

For the purposes of measuring habitat structure, five non-overlapping subplots 10 m in diameter were established on each plot, randomly positioned within 35 m of the plot center. Vegetation volume and foliage height diversity were measured at 10 stations along each of two transects in each subplot, laid out approximately parallel and perpendicular to the stream channel. Total vegetation volume (TOTALTVV) and the volume of native (NATIVTVV) and exotic vegetation (EXOTITVV) were measured using a 4.5 m pole following the methods of Mills et al. (1991). The number of stations having vegetation within 11 different vertical strata (0–0.5, 0.6–1.0, 1.1–2.5, 2.6–4.0, 4.1–6.5, 6.6–9.0, 9.1–12.0, 12.1–18.0, 18.1–24.0, 24.1–32.0, and > 32 m), determined using the pole or a range finder (Erdelen, 1984), was used to calculate foliage height diversity (FOLHTDIV; MacArthur and MacArthur, 1961).

Using the graduated pole (for low canopies) or a clinometer, canopy height (CANOPYHT) was measured at the upstream and downstream ends of the transect running parallel to the channel on each subplot, for a total of 10 measurements/plot. At these same 10 locations, a spherical densiometer was used to measure canopy cover (CANOPCOV) facing north, south, east, and west at each point for a total of 40 measurements/plot. All structural vegetation parameters were measured from June to early August.

The area of the portion of a 50 m radius circle around each plot center that fell within the riparian corridor (including the stream channel) was used as a surrogate for riparian corridor width (RIPWIDTH), as the irregular shape of the corridor on some plots precluded direct measurement of corridor width. Cats were counted during bird surveys, and cat density (CATDENS) was determined according to the variable circular-plot method.

Within a radius of 500 m of the plot center, the percent cover by pavement (PAVED500), buildings (BUILD500), and total artificial surface (ARTIF500) were estimated using aerial photos. In addition, the distance from the plot center to the nearest building (DISTBUIL), paved road (DISTPAVE), and bridge crossing the stream (DISTBRID) were measured and the number of bridges crossing the stream within 500 m of the plot center (BRIDG500), as measured along the center of the stream channel, was determined.

2.3. Data analysis

The total number of bird species observed on each plot during the study period was calculated. Because adjacent land use and urbanization may influence species belonging to different migratory status groups in different ways (Rottenborn, 1997), I distinguished permanent residents and summer residents recorded on each plot. For the purposes of this study, summer residents were defined as those species for which nearly all individuals winter south of the study area, mostly Neotropical migrants. Permanent residents were defined as those species for which a substantial proportion of the population is present in the study area year-round. The density of birds on each plot (in terms of the number of individuals recorded within the effective detection distance per 10 ha per census) was calculated by season for these two groups and for all species combined.

Stepwise multiple regression was used to relate patterns of variation in a subset of nine environmental variables to the observed patterns of species richness (after square root transformation) and density among plots, both overall and separately for permanent and summer residents, by finding the regression models containing the optimal combination of explanatory environmental variables. These nine environmental variables (Table 4), found to be closely associated with riparian bird community structure based on a previous study (Rottenborn, 1997), measured native and exotic vegetation characteristics, riparian corridor width, and the degree of urbanization surrounding the bird-survey plots. The stepwise forward selection method used in these regressions included only those variables which were significant in the model at $p < 0.01$.

A bootstrap technique was used to test the sensitivity of these regression models to variation in the plots used to construct the models. From the pool of 68 plots, I randomly selected plots one at a time, with replacement of each selection back into the pool of potential plots, until I had a "bootstrap dataset" consisting of 68 plots. I created 20 such bootstrap datasets and then used each one in a stepwise multiple regression, using the forward selection process to identify environmental variables significant to the model ($p < 0.05$). I then counted the number of bootstrap regression models in which each environmental variable was included as significant. If the variables selected as significant in the original model were selected repeatedly in the bootstrap models, then confidence in the results of the original regression model would be high. Conversely, if the variables selected in the bootstrap models were consistently different from those in the original model or showed no consistency, then the actual importance of the variables selected in the original model would be questionable. This bootstrap technique was carried out separately for each of the six stepwise multiple regressions involving species richness or total density.

Canonical correspondence analysis (CCA) was used to identify the environmental variables that were most strongly associated with the structure of the entire riparian bird community and to determine the locations of species along axes composed of this subset of nine environmental variables. For these ordinations, species data consisted of the density of each bird species recorded on at least four plots at each of the 68 plots. Correlations among environmental variables were also calculated. A Monte Carlo simulation with 99 permutations was used to test the significance of the overall ordination and each of the first two axes.

Although CCA gives some information on the habitat associations of individual bird species, its main goal is to find the environmental variables that best explain the structure of the overall bird community. Therefore, stepwise multiple regression was used to identify the environmental parameters most important in determining the distribution of individual bird species among the plots. In these regressions, the densities of each species recorded on at least four plots were regressed against the entire suite of 20 environmental variables that were measured, and forward selection was used to identify the variables that were significant in each regression ($p < 0.01$).

3. Results

Of 75 bird species recorded on the 68 plots (Table 1), 52 were considered permanent residents and 23 were summer residents. Species richness ranged from eight to 30 species/plot, and density ranged from 141.7 to 593.7 individuals/10 ha. Most species were rare or sparsely distributed in the study area; 31 species were recorded

Table 1
Bird species recorded on 70 m-radius riparian plots ($n = 68$ plots)

Species	No. of plots	Mean density[a]	Species	No. of plots	Mean density[a]
Anna's hummingbird *Calypte anna*[c]	68	25.18 ± 1.32	American kestrel *Falco sparverius*[c]	13	1.27 ± 0.36
American robin *Turdus migratorius*[c]	66	30.15 ± 1.60	Green heron *Butorides virescens*[c]	12	1.58 ± 0.47
Bushtit *Psaltriparus minimus*[c]	65	54.42 ± 2.82	Wilson's warbler *Wilsonia pusilla*[b]	11	1.51 ± 0.47
House finch *Carpodacus mexicanus*[c]	60	31.00 ± 2.21	Barn swallow *Hirundo rustica*[b]	10	0.91 ± 0.32
Song sparrow *Melospiza melodia*[c]	56	16.85 ± 1.27	American crow *Corvus brachyrhynchos*[c]	10	1.41 ± 0.45
California towhee *Pipilo crissalis*[c]	55	17.72 ± 1.37	Steller's jay *Cyanocitta stelleri*[c]	10	2.40 ± 0.75
Black-headed grosbeak *Pheucticus melanocephalus*[b]	54	23.99 ± 2.11	Brewer's blackbird *Euphagus cyanocephalus*[c]	9	4.09 ± 1.73
Northern mockingbird *Mimus polyglottos*[c]	52	8.04 ± 0.78	Western tanager *Piranga ludoviciana*[b]	9	0.70 ± 0.26
Bewick's wren *Thryomanes bewickii*[c]	51	13.72 ± 1.16	Red-winged blackbird *Agelaius phoeniceus*[c]	8	1.60 ± 0.53
Black phoebe *Sayornis nigricans*[c]	51	13.55 ± 1.31	Red-tailed hawk *Buteo jamaicensis*[c]	8	0.69 ± 0.25
Pacific-slope flycatcher *Empidonax difficilis*[b]	49	21.34 ± 2.12	Rock dove *Columba livia*[c]	7	3.01 ± 1.17
Western scrub-jay *Aphelocoma californica*[c]	48	10.49 ± 1.06	Turkey vulture *Cathartes aura*[c]	7	0.86 ± 0.34
European starling *Sturnus vulgaris*[c]	47	18.11 ± 1.77	Western wood-pewee *Contopus sordidulus*[b]	7	1.29 ± 0.51
Chestnut-backed chickadee *Poecile rufescens*[c]	41	12.86 ± 1.45	Dark-eyed junco *Junco hyemalis*[c]	6	1.16 ± 0.52
Mourning dove *Zenaida macroura*[c]	38	14.53 ± 1.98	California thrasher *Toxostoma redivivum*[c]	6	1.73 ± 0.70
Black-chinned hummingbird *Archilochus alexandri*[b]	37	15.96 ± 2.24	American goldfinch *Carduelis tristis*[c]	5	1.26 ± 0.56
Lesser goldfinch *Carduelis psaltria*[c]	36	9.39 ± 1.49	Violet-green swallow *Tachycineta thalassina*[b]	5	0.53 ± 0.26
Downy woodpecker *Picoides pubescens*[c]	36	8.23 ± 1.10	Hutton's vireo *Vireo huttoni*[c]	5	0.85 ± 0.39
Warbling vireo *Vireo gilvus*[b]	35	10.83 ± 1.50	Common yellowthroat *Geothlypis trichas*[c]	4	0.70 ± 0.37
Mallard *Anas platyrhynchos*[c]	30	8.45 ± 1.28	Willow flycatcher *Empidonax traillii*[b]	4	0.32 ± 0.16
Bullock's oriole *Icterus bullockii*[b]	29	4.31 ± 0.70	Western kingbird *Tyrannus verticalis*[b]	3	0.16 ± 0.10
Nuttall's woodpecker *Picoides nuttallii*[c]	27	6.08 ± 1.06	Acorn woodpecker *Melanerpes formicivorus*[c]	3	0.82 ± 0.47
Brown-headed cowbird *Molothrus ater*[c]	26	6.12 ± 1.10	Great egret *Ardea alba*[c]	3	0.28 ± 0.17
Oak titmouse *Baeolophus inornatus*[c]	26	8.14 ± 1.39	Black-crowned night-heron *Nycticorax nycticorax*[c]	3	0.27 ± 0.16
Yellow warbler *Dendroica petechia*[b]	26	6.62 ± 1.23	Pied-billed grebe *Podilymbus podiceps*[c]	3	0.24 ± 0.13
Spotted towhee *Pipilo maculatus*[c]	25	7.28 ± 1.26	Tree swallow *Tachycineta bicolor*[b]	2	0.08 ± 0.06
Belted kingfisher *Ceryle alcyon*[c]	24	3.24 ± 0.67	Hairy woodpecker *Picoides villosus*[c]	2	0.41 ± 0.33
Swainson's thrush *Catharus ustulatus*[b]	21	3.70 ± 0.84	Common merganser *Mergus merganser*[c]	2	0.25 ± 0.20
California quail *Callipepla californica*[c]	20	6.02 ± 1.19	Brown creeper *Certhia americana*[c]	2	0.57 ± 0.43
Cliff swallow *Petrochelidon pyrrhonota*[b]	18	3.74 ± 1.14	Olive-sided flycatcher *Contopus cooperi*[b]	2	0.17 ± 0.12
Allen's hummingbird *Selasphorus sasin*[b]	17	3.31 ± 0.85	Western bluebird *Sialia mexicana*[c]	1	0.07
N. rough-winged swallow *Stelgidopteryx serripennis*[b]	16	2.04 ± 0.68	Great horned owl *Bubo virginianus*[c]	1	0.17
Ash-throated flycatcher *Myiarchus cinerascens*[b]	16	3.27 ± 0.81	Western screech-owl *Otus kennicottii*[c]	1	0.09
Red-shouldered hawk *Buteo lineatus*[c]	15	1.50 ± 0.38	American coot *Fulica americana*[c]	1	0.56
White-breasted nuthatch *Sitta carolinensis*[c]	15	3.20 ± 0.77	Cooper's hawk *Accipiter cooperii*[c]	1	0.09
Hooded oriole *Icterus cucullatus*[b]	14	2.58 ± 0.70	American redstart *Setophaga ruticilla*[b]	1	0.19
Northern flicker *Colaptes auratus*[c]	14	3.13 ± 0.82	Yellow-breasted chat *Icteria virens*[b]	1	0.06
House sparrow *Passer domesticus*[c]	13	3.07 ± 0.85			

[a] Density = number of individuals 10 ha (± standard error).
[b] Indicates summer resident.
[c] Indicates permanent resident.

on fewer than 10 plots, and only 19 species were recorded on more than half of the 68 plots.

3.1. Species richness and density multiple regression models

The three regression models for species richness were highly significant, having three to four significant variables in each model and with r^2 values of 0.58–0.77 (Tables 2 and 3). Each of the three regression models for density had only two significant variables lower and r^2 values (0.25–0.34) than the models for species richness, but all were still highly significant.

Native vegetation volume (NATIVTVV), which was highly correlated (negatively) with exotic vegetation volume (EXOTITVV, Table 4), was included in all six models and was positively associated with species richness and density. The number of bridges within 500 m of a plot (BRIDG500) was the most important variable in all five of the models in which it appeared, explaining more of the variation in each model than any other variable. In the only model in which BRIDG500 did not appear, the distance to the nearest bridge (DISTBRID), which was highly correlated (negatively) with the number of bridges near a plot, was the most important variable. In all models, species richness and density decreased as the number of bridges near a plot or proximity of a plot to the nearest bridge increased. Total species richness and permanent resident species richness increased significantly as the distance to a

Table 2
Regression coefficients and y-intercepts for multiple regression equations of species richness (SR) and density (DENS) versus environmental variables[a]

	Intercept	BRIDG500	NATIVTVV	DISTBUIL	RIPWIDTH	DISTBRID	F[b]
Total SR	3.67	−0.20b	0.29b	0.01b	0.001a	–	51.5c
Permanent resident SR	3.61	−0.15b	0.18b	0.01b	–	–	29.8c
Summer resident SR	1.37	−0.19b	0.33a	–	0.001b	–	27.2c
Total DENS	226.35	−24.80b	56.66a	–	–	–	20.2c
Permanent resident DENS	148.64	–	32.20a	–	–	0.07a	11.4c
Summer resident DENS	33.31	−9.59a	23.51a	–	–	–	16.6c

[a] Letters following the regression coefficients indicate the significance of each variable in the overall regression equation (a, $p < 0.01$, b, $p < 0.001$, c, $p < 0.0001$).
[b] F-values are for tests of significance of the overall regression equations.

Table 3
Proportion of variance (r^2) explained by variables selected in multiple linear regressions of riparian bird species richness and density. Separate results for permanent residents, summer residents, and all species. The proportion of variance explained by the model containing all significant variables is given in the total section

	Species richness			Density		
	Permanent	Summer	Total	Permanent	Summer	Total
BRIDG500	0.41	0.35	0.49	–	0.21	0.25
NATIVTVV	0.05	0.08	0.14	0.08	0.13	0.13
DISTBUIL	0.12	–	0.09	–	–	–
RIPWIDTH	–	0.13	0.05	–	–	–
DISTBRID	–	–	–	0.18	–	–
Total	0.58	0.56	0.77	0.26	0.34	0.38

Table 4
Correlations among environmental variables used in multiple linear regressions of bird species richness and density and in canonical correspondence analyses

	NATS-TDEN	EXOS-TDEN	NATI-VTVV	EXOT-ITVV	ARTI-F500	DIST-BUIL	DIST-BRID	BRID-G500	RIPW-IDTH
NATSTDEN	1.00	−0.13	0.42	−0.35	−0.16	0.21	0.18	−0.14	0.11
EXOSTDEN	–	1.00	−0.24	0.34	0.13	−0.17	−0.01	0.13	−0.23
NATIVTVV	–	–	1.00	−0.63	−0.19	0.28	0.29	−0.26	0.29
EXOTITVV	–	–	–	1.00	−0.08	−0.15	−0.18	0.13	0.02
ARTIF500	–	–	–	–	1.00	−0.55	−0.15	0.33	−0.45
DISTBUIL	–	–	–	–	–	1.00	0.15	−0.28	0.19
DISTBRID	–	–	–	–	–	–	1.00	−0.57	0.17
BRIDG500	–	–	–	–	–	–	–	1.00	−0.31
RIPWIDTH	–	–	–	–	–	–	–	–	1.00

building (DISTBUIL) increased, while total species richness and summer resident species richness increased significantly with increasing riparian corridor width (RIPWIDTH).

The bootstrap regressions confirmed that the original regression models were not very sensitive to variations in the plots used to construct the models (Table 5). The variables found to be significant in the original models were selected as significant in 14–20 of the bootstrap models. In contrast, variables that were not included as significant in the original models appeared in no more than 10 of the bootstrap models. These results indicate that the variables found to be significant in the original models were indeed the variables most closely associated with species richness and density.

3.2. Canonical correspondence analysis

The results of the CCA of the riparian bird community appear in Fig. 1 as a biplot of the species scores

along the first two axes of the ordination. Although there was little overall variance in the species data, as noted by the relatively low eigenvalues for the first two axes (0.25 and 0.08), the ordination explained this variance fairly well. The first two axes explained 14 and 5% of the variance in the species data, respectively, and the vectors for the environmental variables and the species scores together explained 49% of the variance in the species–environment relationships along the first axis and 17% of the variance on the second axis. The species-

Table 5
Results of the bootstrap regressions of species richness (SR) and density (DENS) vs environmental variables

	BRIDG500	NATIVTVV	DISTBUIL	RIPWIDTH	DISTBRID	Other[b]
Total SR	20[a]	20	18	16	–	6
Permanent resident SR	20	19	15	–	–	8
Summer resident SR	20	18	–	20	–	10
Total DENS	17	20	–	–	–	10
Permanent resident DENS	–	14	–	–	20	10
Summer resident DENS	16	19	–	–	–	8

[a] For each of the variables that were included as significant in one of the original regression models, this table gives the number of bootstrap equations (out of a total of 20) in which the variable appeared as significant ($p < 0.05$)
[b] Other indicates the maximum number of bootstrap equations in which a variable that was not included as significant in the original model was found to be significant.

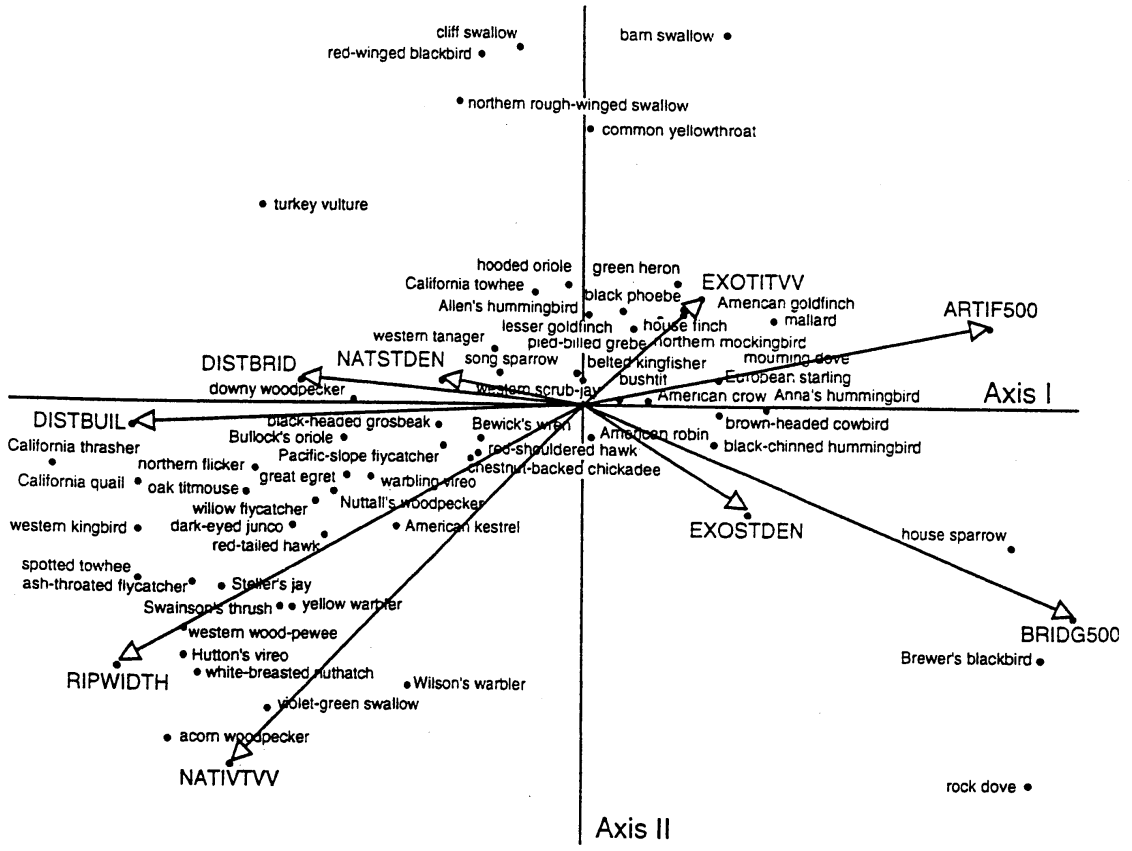

Fig. 1. Canonical correspondence analysis ordination diagram for the riparian bird community. Points correspond to the scores of individual species as a function of the axes, which are linear combinations of environmental variables. Arrows represent the environmental variables included in the model best representing the distribution of the species among the plots. The lengths of the arrows indicate the relative importance of each environmental variable in the model, and the direction of each arrow relative to the axes indicates how well the environmental variable is correlated with each axis. The location of each bird species relative to the arrows indicates the environmental conditions associated with the occurrence of each species.

environment correlations, indicating the ability of the environmental variables to explain the variation in bird community composition, were 0.87 for the first axis and 0.73 for the second. The overall ordination and the first and second axes were significant ($p = 0.01$).

Native vegetation volume (NATIVTVV), riparian corridor width (RIPWIDTH), distance to a building (DISTBUIL), number of bridges (BRIDG500), and percent cover by artificial surface around a plot (ARTIF500), the most important variables in the multiple regressions of species richness and density, were again the variables most strongly associated with bird community structure (Fig. 1). The first axis of the ordination was influenced primarily by number of bridges (BRIDG500) and artificial surface cover (ARTIF500) in one direction and by native vegetation volume (NATIVTVV), riparian corridor width (RIPWIDTH), distance to a building (DISTBUIL), and distance to a bridge (DISTBRID) in the opposite direction. This axis seems to separate the plots in narrow riparian corridors and in the most heavily urbanized areas from plots in less urbanized areas and/or in broader riparian corridors. Most of the species on the positive end of this axis are urban-adapted species, while many of those on the negative end are sensitive to human disturbance or require specific habitat features that are not present in highly urbanized areas.

Axis II was affected most strongly by native vegetation volume. Many of the species on the positive end of axis II, which is negatively correlated with native vegetation volume, are species generally associated with early-seral habitats. With the exception of rock dove, house sparrow, and Brewer's blackbird, the species on the negative end of axis II are generally associated with structurally complex habitats.

3.3. Multiple linear regression models for individual bird species

Of the 61 bird species that were recorded on at least four plots, significant regression models ($p < 0.01$) were constructed for 48 species (Table 6); the r^2 values for these significant models ranged from 0.08 to 0.64. In contrast, the densities of 13 species were not significantly related to any of the environmental variables ($p > 0.01$). Of the 21 environmental variables used in these analyses, 17 were included in models for at least one species. The variables that were significant in the most models, and which therefore seemed to be important to the most species, were the number of bridges within 500 m (BRIDG500), riparian corridor width (RIPWIDTH), total vegetation volume (TOTALTVV), and distance to the nearest bridge (DISTBRID).

Based on the results of the CCA and these regressions, the species whose populations are likely to decline as a result of increasing urbanization in the study area ("sensitive" species) and those whose populations are likely to remain stable or increase as a result of urbanization barring extensive habitat destruction ("tolerant" species) were identified (Table 7).

4. Discussion

4.1. Patterns of association between birds and urbanization

Changes in riparian bird communities resulting from urbanization may be caused by a number of factors. The most extreme impacts on riparian bird communities, which result from the outright destruction of riparian vegetation, are due primarily to the loss of structural resources (Rottenborn, 1997). However, where riparian woodlands remain intact, other urbanization-related factors may influence these bird communities. This study differs from most previous studies of the effects of urbanization on birds in one major respect: whereas most studies have examined the direct effects of habitat alteration, this study focused on the ways in which intact remnants of riparian habitat have been affected by urbanization on adjacent lands.

Variation in avian species richness, density, and community structure was closely related to environmental variables associated with urbanization. Plots closer to developed areas generally had lower species richness than those farther from development, and the densities of a number of species increased as proximity to roads and buildings decreased. The percent cover by buildings or by all artificial surfaces within 500 m of a plot was associated with the densities of some species but was not as important as the distance to the nearest building or road. Although some urban-adapted species, such as mourning dove and northern mockingbird, were positively associated with the percent cover by artificial surface around these plots, most species were negatively related to these variables. These results are similar to those of Friesen et al. (1995), who found that the density of housing around forest patches in Ontario was strongly associated with the species richness and abundance of Neotropical migrants nesting in the woodlots, indicating that urbanization can have substantial impacts on habitat remnants that are not directly altered.

Along streams in the Santa Clara Valley, cat density tends to be higher adjacent to residential and industrial areas than adjacent to undeveloped agricultural areas (Rottenborn, 1997). The number of people intruding into riparian corridors is probably also higher where setbacks between riparian habitats and developed areas are narrow and where housing density is higher on adjacent lands. Birds using riparian corridors very close to roads and buildings may be affected by noise and

Table 6
Significant ($p < 0.01$) positive (+) and negative (−) relationships between habitat/land use variables and bird densities

	CANOPCOV	CANOPHT	FOLHTDIV	TOTALTVV	NATIVTV	NATSTDEN	NATPROST	EXOSTDEN	OAKSTDEN	DISTPAVE	DISTBUIL	DISTBRID	BUIL D500	PAVED500	ARTIF500	BRIDG500	RIPWIDTH	r^2
Great egret												+						0.263
Green heron						+												0.121
Black-crowned night-heron																		ns[a]
Turkey vulture												+						0.094
Mallard						+							−					0.203
Red-shouldered hawk		+										+						0.210
Red-tailed hawk											+							0.128
American kestrel												+						0.093
California quail				+									−				+	0.557
Rock dove											−					+		0.365
Mourning dove						+												0.081
Black-chinned hummingbird							−						+					0.172
Anna's hummingbird											−							0.094
Allen's hummingbird																		ns
Belted kingfisher																		ns
Acorn woodpecker																		ns
Nuttall's woodpecker				+												−		0.320
Downy woodpecker											+					−		0.143
Northern flicker		+													−			0.238
Western wood-pewee		+							+	+								0.231
Willow flycatcher																		ns
Pacific-slope flycatcher	+			+												−		0.322
Black phoebe					−							−						0.102
Ash-throated flycatcher								−			+						+	0.346
Western kingbird		−				−							−				+	0.577
Hutton's vireo									+				−					0.340
Warbling vireo	+									+						−		0.246
Steller's jay		+						+									+	0.228
Western scrub-jay																		ns
American crow																		ns
Swainson's thrush					+					+								0.307
American robin	+															−		0.239
Violet-green swallow																	+	0.139
N. rough-winged swallow			−												−			0.484
Cliff swallow		−		−														0.321
Barn swallow			−	−														0.575
Chestnut-backed chickadee					+													0.148
Oak titmouse									+						−		+	0.521
Bushtit					+											−		0.228
White-breasted nuthatch	+								+		+						+	0.610
Bewick's wren				+						+								0.359
California thrasher		−		+													+	0.305
Northern mockingbird													+					0.128
European starling																		ns
Yellow warbler					+			−	−				−				+	0.582
Common yellowthroat																		ns
Western tanager																		ns
Spotted towhee				+					+					−	−		+	0.640
California towhee																−		0.194
Song sparrow						+										−		0.354
Dark-eyed junco								+			+							0.263
Black-headed grosbeak	+															−		0.392
Red-winged blackbird	−											+						0.468
Brewer's blackbird																+		0.267

(Table continued on next page)

Table 6–*contd.*

	CANOPCOV	CANOPHT	FOLHTDIV	TOTALTVV	NATIVTVV	NATSTDEN	NATPROST	EXOSTDEN	OAKSTDEN	DISTPAVE	DISTBUIL	DISTBRID	BUILD05D	PAVED05D	ARTIF05D	BRIDG05D	RIPWIDTH	r^2
Brown-headed cowbird																		ns
Hooded oriole																		ns
Bullock's oriole			+				+									−		0.212
House finch																		ns
Lesser goldfinch								−				+						0.127
American goldfinch												+						0.081
House sparrow							−									+		0.326

[a] ns, multiple regression model contains no significant variables.

movements of people and domestic animals on adjacent lands (Reijnen et al., 1995, 1996), influences that would not be as great in riparian corridors far from developed areas. Although this study does not identify a minimum buffer width required for the maintenance of the integrity of riparian bird communities, these results indicate that broader buffers better maintain riparian bird species richness.

Bird species richness and density were negatively related to the abundance and proximity of bridges. This relationship may be a direct result of disturbance from traffic, noise, or human ingress, or a result of barriers to free movement across gaps between sections of riparian habitat (Lens and Dhondt, 1994; Machtans et al., 1996). Alternatively, the abundance of bridges may be simply a proxy variable for the overall degree of urbanization around a plot, therefore representing a number of different factors acting in concert to influence riparian bird communities. Bridge locations did not seem to be influenced significantly by topography or other natural features that might impact these riparian bird communities.

Of the species that were negatively associated with the abundance or close proximity of bridges, sedentary species such as song sparrow and California towhee might be affected by the fragmentation of riparian corridors by bridges, and species such as great egret, American kestrel, black-headed grosbeak, warbling vireo, and Pacific-slope flycatcher may be averse to the noise and disturbance associated with bridges. Three species were positively associated with bridge abundance; rock dove and house sparrow are exotic species that nest under bridges, while Brewer's blackbird is an abundant urban-adapted species in the study area.

The positive relationship of bird species richness and density with native vegetation is to be expected since exotic vegetation is often deficient in structural and dietary resources required by many native animal

Table 7
Predicted sensitivity of bird species to urbanization in the Santa Clara Valley

Tolerant species[a]	
Mallard	American crow
Red-shouldered hawk	Bushtit
Rock dove	American robin
Mourning dove	Northern mockingbird
Anna's hummingbird	European starling
Black-chinned hummingbird	California towhee
Allen's hummingbird	Dark-eyed junco
Belted kingfisher	Brewer's blackbird
Black phoebe	Brown-headed cowbird
Northern rough-winged swallow	Hooded oriole
Barn swallow	House finch
Cliff swallow	House sparrow
Western scrub-jay	
Sensitive species	
Pied-billed grebe	Chestnut-backed chickadee
Green heron	Oak titmouse
Black-crowned night-heron	White-breasted nuthatch
Great egret	Bewick's wren
Turkey vulture	Swainson's thrush
Red-tailed hawk	California thrasher
American kestrel	Warbling vireo
California quail	Hutton's vireo
Acorn woodpecker	Yellow warbler
Downy woodpecker	Common yellowthroat
Nuttall's woodpecker	Wilson's warbler
Northern flicker	Western tanager
Ash-throated flycatcher	Black-headed grosbeak
Western wood-pewee	Spotted towhee
Willow flycatcher	Song sparrow
Pacific-slope flycatcher	Red-winged blackbird
Western kingbird	Bullock's oriole
Violet-green swallow	Lesser goldfinch
Steller's jay	American goldfinch

[a] Abundance of "tolerant" species is expected to increase or remain stable in riparian habitats following urbanization, while abundance of "sensitive" species is expected to decline following urbanization.

species (Anderson et al., 1977; Mills et al., 1989). The abundance of exotic vegetation in riparian areas in the Santa Clara Valley is substantially higher in urban areas adjacent to residential and industrial lands than in rural areas adjacent to agricultural land (Rottenborn, 1997). Likewise, the width of the riparian corridor was significant in several regression models and in the CCA. While some species may actually have been attracted to larger expanses of habitat, broader corridors likely contained greater habitat heterogeneity and more later-successional tree species (at the edges of the corridors) than narrow ones, and broader strips of riparian woodland may have provided a greater buffer from human influences to birds nesting in the interior of the corridor.

Examination of the CCA and the significant relationships between environmental variables and the densities of individual bird species revealed several patterns. Neotropical migrants, such as Swainson's thrush, yellow warbler, western wood-pewee, Wilson's warbler, willow flycatcher, and warbling vireo, were positively related to broad riparian corridors and high native vegetation volume and negatively related to variables associated with intense development. Although a few Neotropical migrants that use exotic vegetation frequently (e.g. black-chinned hummingbird, Allen's hummingbird, and hooded oriole) were present in heavily urbanized areas, the majority of Neotropical migrants seemed to show an aversion to riparian habitat in developed areas, as has been reported elsewhere (Friesen et al., 1995).

Species that glean insects from foliage or bark showed a strong preference for less urbanized areas, possibly reflecting low insect densities on heavily urbanized plots having abundant exotic vegetation (Mills et al., 1989). In contrast, ground-foraging and seed-eating species showed no clear patterns of distribution relative to urbanization. Most cavity-nesting species displayed a clear negative association with more urbanized plots; this may be due to a shortage of older trees with cavities or to competition with European starlings, which were positively associated with urbanization. Most of the species that nest on or near the ground, including California thrasher, California quail, spotted towhee, and Bewick's wren, were also negatively related to urbanization, possibly due to predation by cats and other predators in urban areas.

4.2. *Conservation of bird diversity in riparian habitats*

In many areas, urbanization is likely to continue to spread in the next century (US Department of the Interior, 1994), subjecting riparian systems currently in rural or natural areas to detrimental impacts. The foregoing relationships allow one to predict how further urbanization could affect riparian bird communities in the future. Thus, the densities of most obligate riparian species, Neotropical migrants, foliage and bark-foraging insectivores, ground-nesting birds, native cavity-nesters, and oak-associated species are likely to decline with the encroachment of bridges, adjacent development, and other elements of built landscapes.

However, some of the detrimental effects of urbanization on riparian bird communities can be minimized with proper planning. The single most important step that can be taken to conserve riparian bird communities in the face of urbanization is to minimize development in and along floodplains by maintaining broad buffers of undeveloped land between developed areas and riparian habitats. Habitat restoration efforts, particularly those that broaden riparian corridors and link fragments of riparian habitat, would augment habitat area and enhance the value of existing habitat by further buffering riparian birds from human influences outside the corridor. Where development has occurred in close proximity to riparian habitats, efforts to minimize direct human disturbance of riparian plant and bird communities (e.g. by restricting access to riparian habitats) and replace exotic plants with native species would also benefit riparian bird communities.

Acknowledgements

This work was supported financially by grants from the Santa Clara Valley Audubon Society and D. and K. Blau, and by P. R. Ehrlich. I thank P. R. Ehrlich, C. Boggs, A. E. Launer, L. Moses, B. N. K. Davis, J. Marchant, and an anonymous reviewer for comments on an earlier draft of the manuscript.

References

Aldrich, J.W., Coffin, R.W., 1980. Breeding bird populations from forest to suburbia after thirty-seven years. American Birds 34, 3–7.

Anderson, B.W., Higgins, A.E., Ohmart, R.D., 1977. Avian use of saltcedar communities in the lower Colorado River valley. In: Johnson, R.R., Jones, D.A., (Eds.). Importance, Preservation, and Management of Riparian Habitats. US Department of the Interior Forest Service General Technical Report RM-43, pp. 128–136.

Beissinger, S.R., Osborne, D.R., 1982. Effects of urbanization on avian community organization. Condor 84, 75–83.

Blair, R.B., 1996. Land use and avian species diversity along an urban gradient. Ecological Applications 6, 506–519.

Cubbedge, A.W., Nilon, C.H., 1993. Adjacent land use effects on the flood plain forest bird community of Minnesota Valley National Wildlife Refuge. Natural Areas Journal 13, 220.

DeGraaf, R.M., Wentworth, J.M., 1981. Urban bird communities and habitats in New England. Transactions of the North American Wildlife Conference 46, 396–413.

Emlen, J.T., 1974. An urban bird community in Tucson, Arizona: derivation, structure, regulation. Condor 76, 184–197.

Erdelen, M., 1984. Bird communities and vegetation structure: I. Correlations and comparisons of simple and diversity indices. Oecologia 61, 277–284.

Finch, D.M., 1989. Habitat use and habitat overlap of riparian birds in three elevational zones. Ecology 70, 866–880.

Friesen, L.E., Eagles, P.F.J., Mackay, R.J., 1995. Effects of residential development on forest-dwelling Neotropical migrants songbirds. Conservation Biology 6, 1408–1414.

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Gaines, D.A., 1974. A new look at the nesting riparian avifauna of the Sacramento Valley, California. Western Birds 5, 61–80.

Johnson, R.R., Haight, L.T., Simpson, J.M., 1977. Endangered species vs. endangered habitats: a concept. In: Johnson, R.R., Jones, D.A. (Eds.), Importance, Preservation, and Management of Riparian Habitat: a Symposium, US Department of the Interior Forest Service General Technical Report RM-43, pp. 68–79.

Katibah, E.F., 1984. A brief history of riparian forests in the Central Valley of California. In: Warner, R.E., Hendrix, K.M. (Eds.), California Riparian Systems: Ecology, Conservation, and Productive Management. University of California Press, Berkeley, pp. 23–29.

Knopf, F.L., 1985. Significance of riparian vegetation to breeding birds across an altitudinal cline. In: Johnson, R.R., Ziebell, C.D., Patton, D.R., Ffolliott, P.F., Hamre, R.H. (Eds.), Riparian Ecosystems and their Management: Reconciling Conflicting Uses, US Department of the Interior Forest Service General Technical Report RM-120, Fort Collins, CO, pp. 105–111.

Knopf, F.L., Johnson, R.R., Rich, T., Samson, F.B., Szaro, R.C., 1988. Conservation of riparian ecosystems in the United States. Wilson Bulletin 100, 272–284.

Lancaster, R.K., Rees, W.E., 1979. Bird communities and the structure of urban habitats. Canadian Journal of Zoology 57, 2358–2368.

Lens, L., Dhondt, A.A., 1994. Effects of habitat fragmentation on the timing of Crested Tit *Parus cristatus* natal dispersal. Ibis 135, 147–152.

MacArthur, R.H., MacArthur, J.W., 1961. On bird species diversity. Ecology 42, 594–598.

Machtans, C.S., Villard, M.-A., Hannon, S.J., 1996. Use of riparian buffer strips as movement corridors by forest birds. Conservation Biology 10, 1366–1379.

Mills, G.S., Dunning Jr., J.B., Bates, J.M., 1989. Effects of urbanization on breeding bird community structure in southwestern desert habitats. Condor 91, 416–429.

Mills, G.S., Dunning Jr., J.B., Bates, J.M., 1991. The relationship between breeding bird density and vegetation volume. Wilson Bulletin 103, 468–479.

Naiman, R.J., Decamps, H., Pollock, M., 1993. The role of riparian corridors in maintaining regional biodiversity. Ecological Applications 3, 209–212.

Ohmart, R.D., 1994. The effects of human-induced changes on the avifauna of western riparian habitats. Studies in Avian Biology 15, 273–285.

Reijnen, R., Foppen, R., ter Braak, C., Thissen, J., 1995. The effects of car traffic on breeding bird populations in woodland: III. Reduction of density in relation to the proximity of main roads. Journal of Applied Ecology 32, 187–202.

Reijnen, R., Foppen, R., Meeuwsen, H., 1996. The effects of traffic on the density of breeding birds in Dutch agricultural grasslands. Biological Conservation 75, 255–260.

Reynolds, R.T., Scott, J.M., Nussbaum, R.A., 1980. A variable circular-plot method for estimating bird numbers. Condor 82, 309–313.

Rottenborn, S.C., 1997. The impacts of urbanization on riparian bird communities in central California. Ph.D. dissertation, Stanford University.

Smith, F., 1977. A short review of the status of riparian forests in California. In: Sands, A. (Ed.), Riparian Forests in California: Their Ecology and Conservation. Institute of Ecology publication 15, pp. 1–2.

Smith, R.J., Schaefer, J.M., 1992. Avian characteristics of an urban riparian strip corridor. Wilson Bulletin 104, 732–738.

Stevens, L.E., Brown, B.R., Simpson, J.M., Johnson, R.R., 1977. The importance of riparian habitat to migrating birds. In: Johnson, R.R., Jones, D.A., (Eds.), Importance, Preservation, and Management of Riparian Habitats: A Symposium. US Department of the Interior Forest Service General Technical Report RM-43, Fort Collins, CO, pp. 156–164.

US Army Corps of Engineers, 1986. Interim feasibility report and environmental impact statement: recommended plans for flood control, Coyote and Berryessa Creeks.

US Department of the Interior, 1994. The impact of federal programs on wetlands; vol. II, a report to Congress by the Secretary of the Interior. Washington, DC.

Letter No. 16

23840 Bennington Drive
Valencia, CA 91354-2600
April 29, 2004

Mr. Jeff Hogan
Planning Department, Ste. 302
City of Santa Clarita
23920 Valencia Blvd.
Santa Clarita, CA 91355

RECEIVED
PLANNING DIVISION
APR 30 2004
PLANNING AND BUILDING SERVICES
CITY OF SANTA CLARITA

Dear Mr. Hogan:

Thank you for taking my phone call a few minutes ago…yes, voicing my opinion in writing, hopefully, will serve my views in a more permanent way.

I strongly object to the proposed Riverpark Plan and it's 1,179 housing units. As mentioned in my phone call, the Newhall Ranch corridor *currently* is extremely busy and noisy at commuter times of day (4:30 a.m.-8:30 a.m. and again from 3:30 p.m. to 7:00 p.m.) and is projected to become even busier once the Cross Valley Connector is completed. Adding 1,179 homes and the corresponding traffic congestion, air pollution, and noise level increase, i.e., the entire EIR impact, can only add to our valley's pollution woes. I live in the Northbridge development, sadly backing on to Newhall Ranch Road, and already feel hemmed in from traffic/noise, exhaust fumes, etc. from the current expanded housing, the soon-to-be-built out Creekside communities, the current Plum Canyon developments (with a huge number of homes *still* to be completed), and now, the proposed Riverpark community. 1 2

I'm sure many other residents of this terrific city wish further development could be slowed or curbed and concentration be put on working with L.A. County to expand the I-14 and I-5 corridors to enable our residents an easier/faster route to higher paying positions to support our ever-increasing cost of housing here. It's truly a myth that these exist in any certain numbers here. So, if our residents continue to head to the south for jobs and we continue to crowd our valley with further building, what will we all see, breath or move through (if we can move at all!)? Bet no one's considered polling local doctors to see the increase in the number of asthmatic/breathing condition cases that have cropped up in the past 8-10 years. 3

Thanks for hearing my opinion.

Sincerely,

Sheryol L. Neill

Letter No. 15

Tuesday, April 28, 2004

Planning Commission and
City Counsel
City of Santa Clarita
23920 Valencia Blvd.
Santa Clarita, CA 91355

Subject: Riverpark Development

To Whom It May Concern:

I have been a resident of Santa Clarita (Saugus) since 1976. I have seen Bouquet Canyon grow from a two-lane road to its present maximum size. Growth is good, but planned, organized growth is needed. I voted for cityhood to stop the "unplanned" type of growth that the Riverpark development represents.

This proposed development greatly concerns me for six main reasons:

- Adding more congestion to Bouquet Canyon, Newhall Ranch Road and the main intersection of Valencia Blvd./Soledad Canyon Road and San Fernando/Bouquet Canyon Road.
- The overcrowding of Emblem School and Bridgeport Elementary Schools and no additional accommodations for new middle schools/high schools.
- Adding to the existing noise and air pollution of lower Bouquet Canyon Road.
- Potential flood damage.
- Lack of water available for more development.
- Loss of wildlife habitat.

1

I realize that **AFFORDABLE** apartment housing is needed, but feel that putting high-density housing in the already strained "center" of town is serving no purpose other than that of the developer. Apartments should be located closer to the freeways and they should be **AFFORDABLE**. The biggest complaint I hear from people regarding lack of apartments is that people can't afford what is being built here.

2

When the developers were showing the Planning Commission and City Counsel members their proposed development area, I'm positive that it was viewed in the afternoon before homebound commute traffic begins.

3

Currently the traffic from 6:30 a.m. – 8:30 a.m. (minimum) on Bouquet Cyn. towards Newhall Ranch Rd. and the Valencia Blvd. Intersection on any given weekday is bumper-to-bumper coming down the canyon. Added with the congestion of cars coming in and out of the Emblem tract, we already have a commute nightmare. This doesn't even address the late afternoon to early evening traffic with cars attempting to turn left from Newhall Ranch Rd. to Bouquet Cyn. First, you must wait while the traffic lights cycle several times to be able to make a "legal" left-hand turn. In addition to that, you have people going straight, making U-turns between Burger King and the shopping center. I'm concerned that adding this development will bring us back to the days where it took 10-15 minutes to get from Soledad Cyn Rd./ Valencia Blvd. up Bouquet Cyn. Rd. to Espuella. The extension of Newhall Ranch Road will not alleviate the traffic going up Bouquet Cyn Rd. and will increase the congestion on Newhall Ranch Road.

4

Since I live in the Emblem tract I'm greatly concerned with regards to the safety factor facing the traffic coming in and out of our tract. Emblem school is a wonderful neighbor. But it has grown over the years and the traffic patterns have become almost unbearable for those of us living in the "U" routing system through the tract to "drop off" kids going to school. Most of the parents coming into our neighborhood are fine, but some come barreling down our street like it's their own

5

6

personal race track, not taking into account that people live here and children are walking to school. You take a risk with your life and vehicle if, God forbid, you want to back out of your driveway during the morning school rush. Putting more students into Emblem would be disastrous. 6

And, what about Jr. High and High Schools? Where will these new students go? We're always being asked to be taxed more and more to expand our schools. Why aren't developers being required to build Middle Schools and High Schools? 7

When I moved to Saugus, it was a peaceful, quiet community. You could sit in your backyard in the evening and all you would hear would be the coyotes and Saugus Speedway on Saturday nights. Noise pollution was non-existent. Now, with the widening of Bouquet Canyon – sitting in my yard has become anything but a peaceful experience. All evening long you hear cars racing up and down Bouquet, like a daily Speedway. It frightens me to think of what the noise will be like if the ridgeline is altered any and more people are "dumped" into our roads. This doesn't even address the air pollution! How about an AQMD study with regard to traffic pollution? 8 9 10

As a reminder to the Planning Commission and City Counsel, the Santa Clara River is a natural flood control riverbed. I don't know how many of you lived in Santa Clarita during the end of the 80's or early 90's when we had a strong El Nino. As a reminder, the torrent of rain causing natural flooding in this same riverbed was so strong that it washed out part of Soledad Canyon Road. What will it do to a housing development built on a flood plain? 11

There are currently so many concerns and questions with regard to our supply of water and a water table that is becoming polluted and dwindling. How on earth can we be considering more development when we're already being asked to conserve water? Also, the cost of water continues to rise because we don't have enough water available to existing residence. 12 13

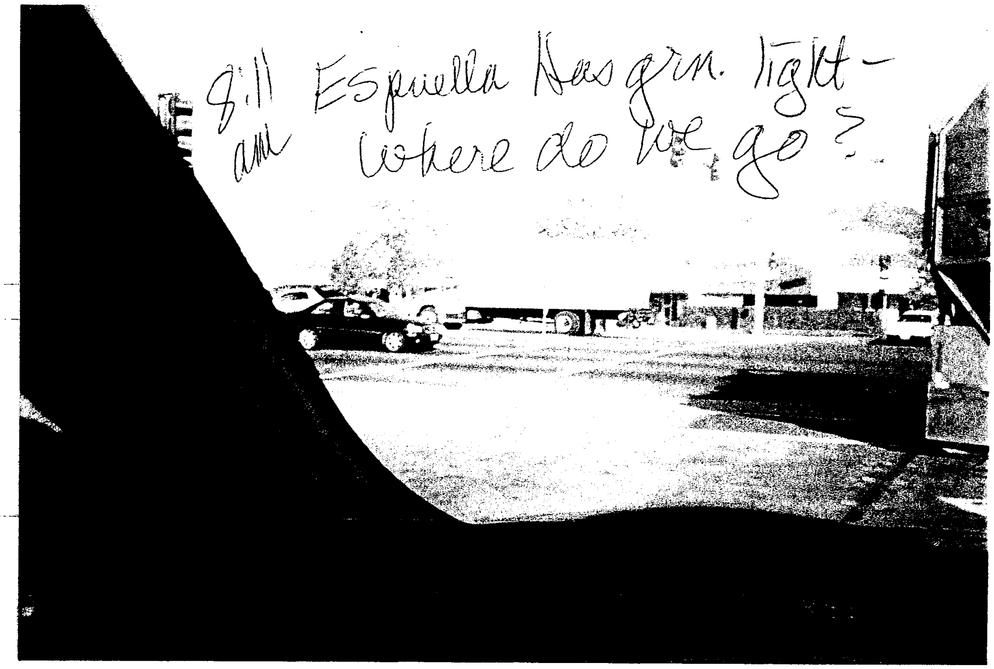
What will happen to the small amount of wildlife that continues to use the ridge as their habitant? Where will the coyotes and rattlesnakes go? This doesn't even address the concern over endangered species that make the flood plain their home. 14 15

The final thing that concerns me most is that I don't feel the people are being listened to. How can a builder already be putting in stakes for grading and also "building roads" when permits have not yet been granted? Newhall, Land and Farming has been good for our community. They currently hold a lame duck status by their sale to a developer who is well known for creating strip malls and mass housing developments. This is a poorly planned project for what it will do to the infrastructure of lower Bouquet Canyon. 16

Sincerely,

Mary Stelow

Mary Stelow
22553 Paraguay Dr.
Santa Clarita (Saugus), CA 91350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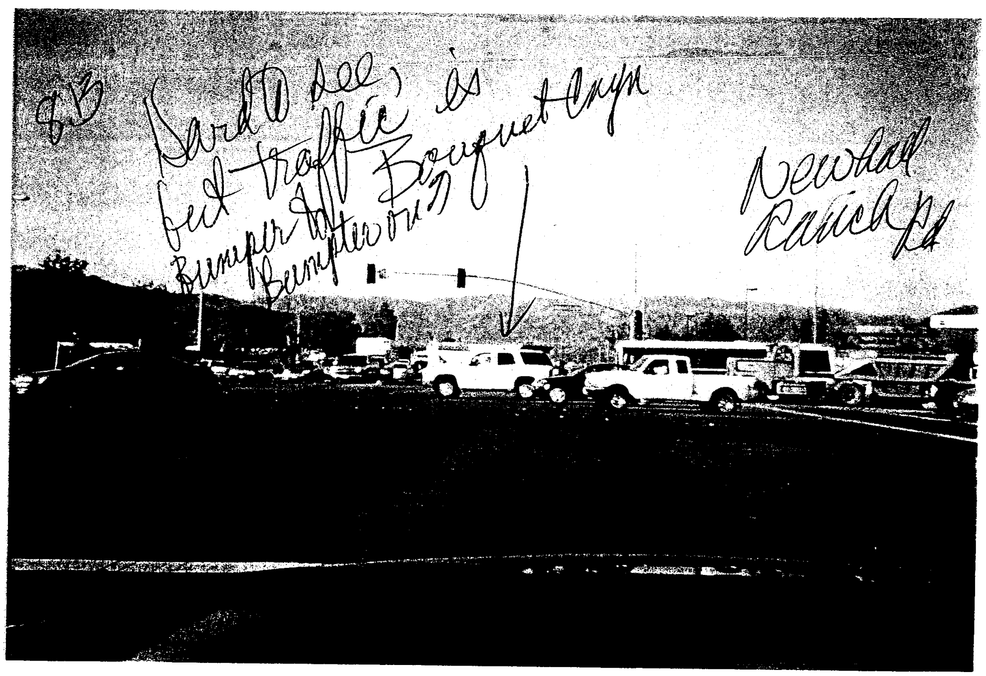
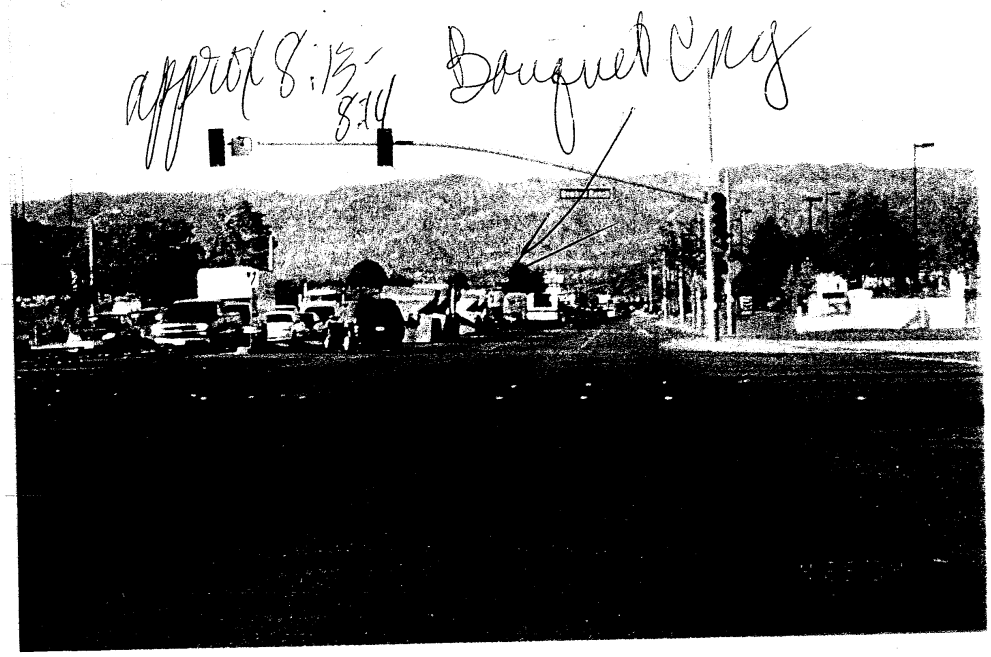
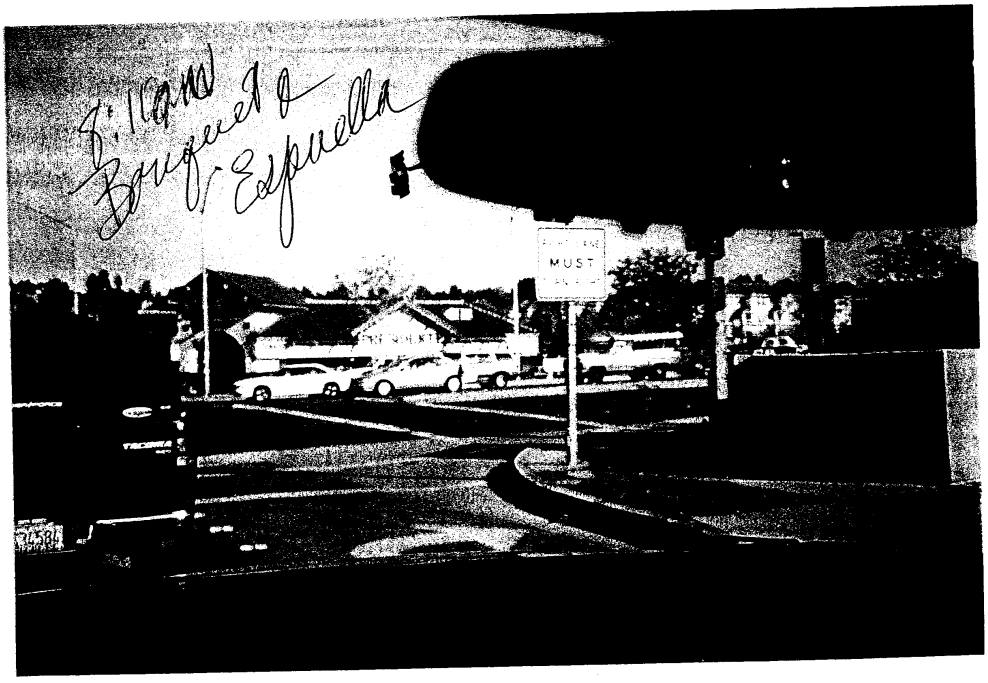
where do we go?

4/25/04.

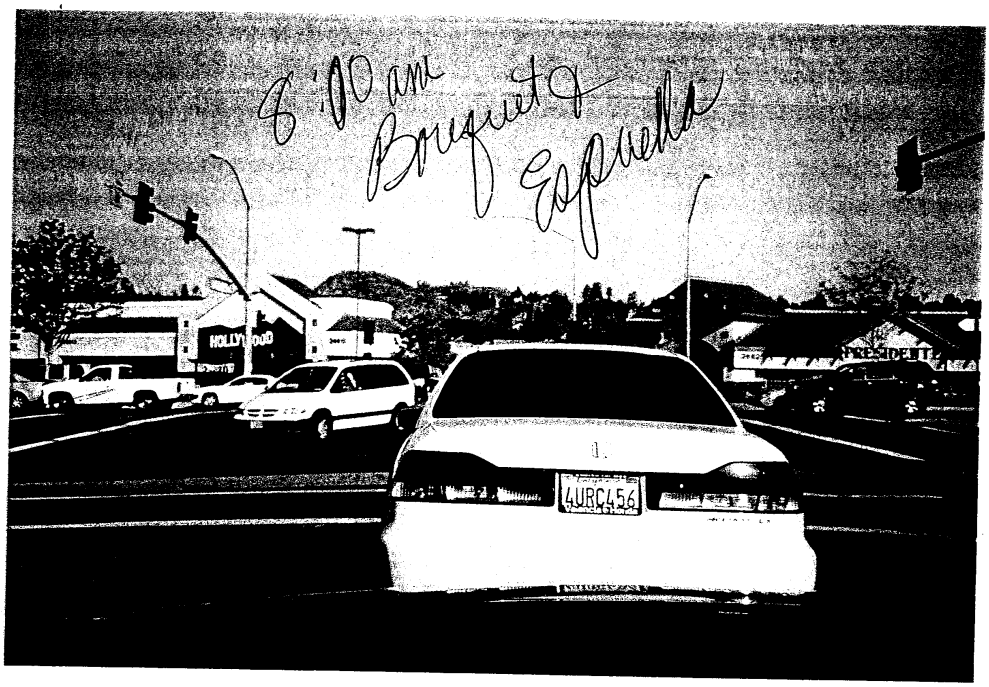

8:13
Hard to see,
but traffic is
Bumper to Bumper on Bouquet Cnyn
Newhall Ranch Rd

4/25/04





4/26/04



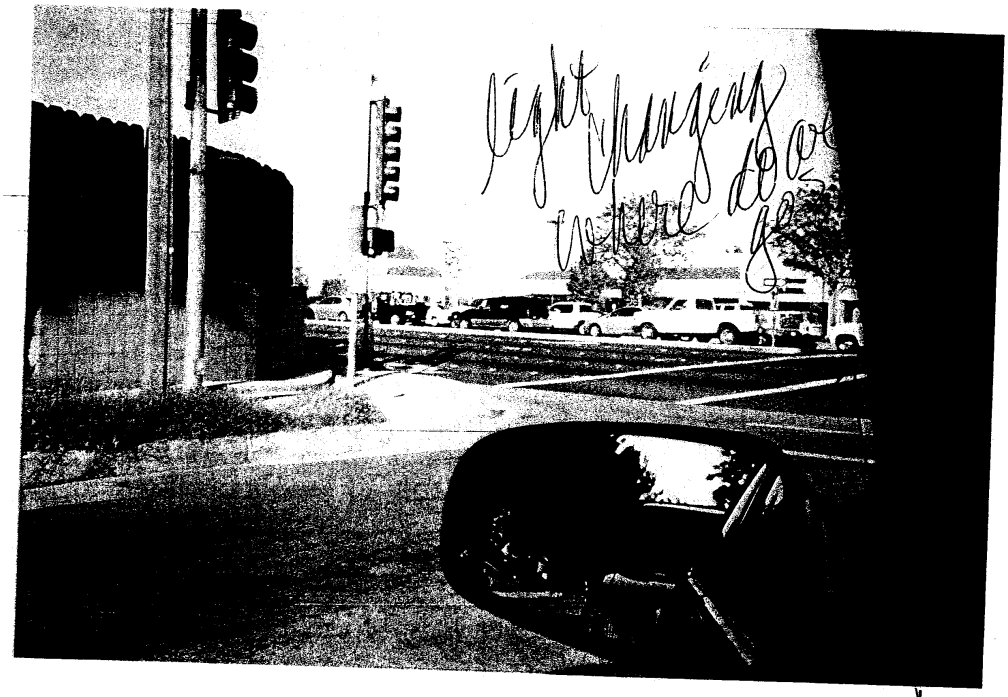
4/27/04

4/27

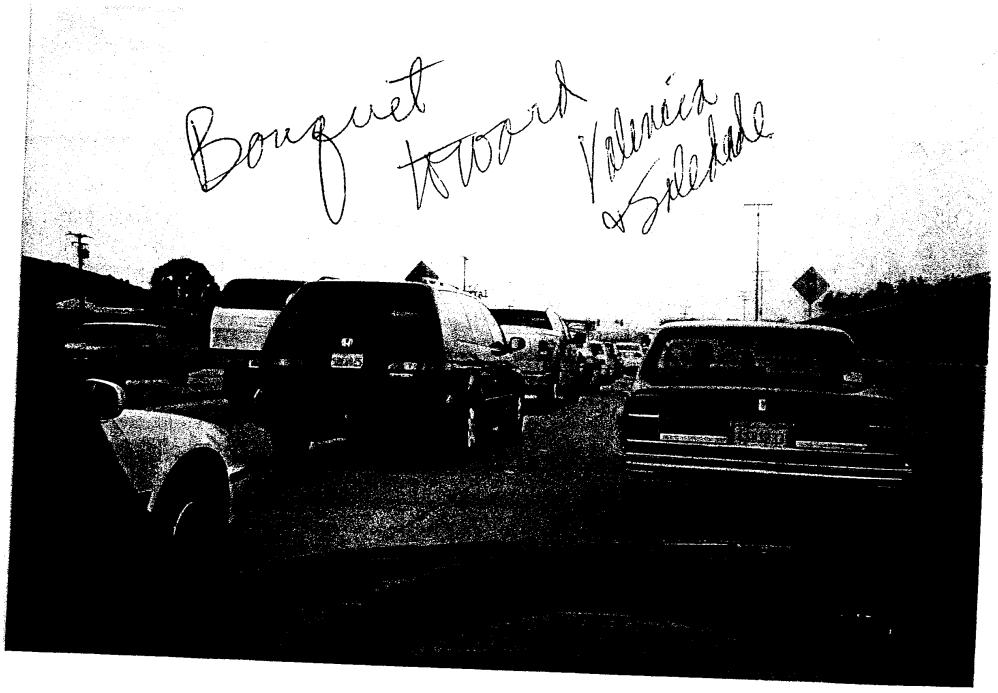
Bauquet Ave grn. light

4/27

Traffic Jumpter to Jumpter 11 Bauquet



8:20 AM


Bouquet toward Valencia & Soledad
8:20 AM

Letter No. 14

4/11/2004

RECEIVED
PLANNING DIVISION
APR 14 2004
PLANNING AND BUILDING SERVICES
CITY OF SANTA CLARITA

Jeff Hogan Associate Planner
City of Santa Clarita
23920 Valencia Blvd. Suite 300
Santa Clarita, CA.91355

Dear Sir:

I am writing to you about the planned site of Riverpark. After reviewing the EIR I cannot see where the City will be able to come up with the additional funds to hire more officers and widen the roads as is suggested. I know that the cross-valley connector is important but I cannot see the City putting its self into debt for the upgrades just so the developer will finish the road. 1 2

If you would live up Bouquet and try going to work at 6:30 in the morning you would be frustrated as all of us are with the traffic as bad as it is. As a resident of the Emblem track I worry about the ridgeline also there is no reason for this to be touched. The buildings are going to be on the roadside not the ridge. It does not need to be cut down, 30-50 feet. 3

This is one reason we moved here. It is like a little bit of country in the city. We see hills not rooftops. I don't think anyone has considered us we pay your salary and we should not have to put up with the dust, noise, and all the small and large animals that are going to be coming our way once this gets started. Also there is the element of crime with that Many apts. and homes. We are getting enough small things happening in the neighborhood. Now you want more people to come in the area. 4

How about the school we have already been told Emblem school will have to take all the children that's not bad, except that our roads need attention now what is going to happen when they are used for up to 500 trips a day or more. Remember this is an old track one of the first here. It's always a nightmare when school is starting or ending during the year. Try coming here one day most of the people cannot get out of their driveways till the traffic is gone. 5

We could probably live with the houses but the apt. Will not be accepted. Cut these out and leave 450 houses and you could have a nice area, I left the San Fernando Valley because of too many people. I remember coming here as a child to visit my uncle at his Business in Saugus, Haags garage also to the Benz ranch it's a shame all that's there is houses. 6

Please keep the ridgeline the same as it is. No apts. We do not need all this with Plum Cyn. It takes me 45 to 1 hr. every morning to go to San Fernando to work. Wonderful 15 miles. Please think about it.

Louise Hartwell
22570 Los Tigres Dr.
Santa Clarita, CA 91350

Letter No. 13

South Coast
Air Quality Management District
21865 Copley Drive, Diamond Bar, CA 91765-4178
(909) 396-2000 • www.aqmd.gov

RECEIVED
PLANNING DIVISION
MAY 05 2004
PLANNING AND BUILDING SERVICES
CITY OF SANTA CLARITA

FAXED: APRIL 30, 2004

April 30, 2004

Mr. Jeff Hogan
City of Santa Clarita
Planning & Building Services Department
23920 Valencia Blvd., Suite 300
Santa Clarita, CA 91355

Dear Mr. Hogan:

Draft Environmental Impact Report (DEIR) for Riverpark Panhandle Project: Santa Clarita

The South Coast Air Quality Management District (SCAQMD) appreciates the opportunity to comment on the above-mentioned document. The following comments are meant as guidance for the Lead Agency and should be incorporated in the Final Environmental Impact Report.

Pursuant to Public Resources Code Section 21092.5, please provide the SCAQMD with written responses to all comments contained herein prior to the certification of the Final Environmental Impact Report. The SCAQMD would be happy to work with the Lead Agency to address these issues and any other questions that may arise. Please contact Charles Blankson, Ph.D., Air Quality Specialist – CEQA Section, at (909) 396-3304 if you have any questions regarding these comments.

Sincerely

Steve Smith

Steve Smith, Ph.D.
Program Supervisor, CEQA Section
Planning, Rule Development & Area Sources

Attachment

SS: CB

LACO40303-02
Control Number

Draft Environmental Impact Report (DEIR) for Riverpark Panhandel Project: Santa Clarita

1. Project Emissions and Mitigation: On pages 4.4-67 and 4.4-68 of the DEIR, the lead agency lists two mitigation measures that could reduce project emissions by substantial amounts, but they have been deemed technologically infeasible by the lead agency, as stated on page 4.4-68. These measures are: 4.4-8, All on- and off-road construction equipment would use aqueous fuel, and 4.4-9, All on- and off-road construction equipment would employ cooled exhaust gas recirculation technology. Based on information from the URBEMIS 2002 model, these two measures could potentially reduce NO_X emissions by 54 percent, CO and VOC emissions by up to 90 percent, and PM10 emissions by 85 percent or more. Though the lead agency describes these measures as infeasible, it nevertheless includes their control efficiencies in the mitigated constructed emissions in Table 4.4-22. The lead agency justifies this approach by stating on page 4.4-68, "However, if these mitigation measures are found feasible at the time of construction, … the project's emissions would be reduced substantially." Given the uncertainty of the feasibility of mitigation measures 4.4-8 and 4.4-9, it is inappropriate for the lead agency to claim emission reduction credit from them. The SCAQMD, therefore, recommends that the control efficiencies associated with these two mitigation measures be removed from the mitigated emissions in Table 4.4-22, unless the lead agency is willing to require implementation of these measures. 1

2. Proposed Mitigation Measures: It is recommended that the lead agency modify some of the mitigation measures already incorporated into the project, as stated on page 4.4-65 of the DEIR, as well as add new measures. The lead agency proposes to use methanol- or natural gas-powered mobile equipment and pile drivers instead of diesel if readily available at competitive prices. It also proposes to use propane- or butane-powered on-site mobile equipment instead of gasoline if readily available at competitive prices. The SCAQMD recommends that these two measures be modified to include the use of compressed natural gas-powered equipment with oxidation catalysts instead of diesel-powered engines, or if diesel equipment has to be used, to use particulate filters, oxidation catalysts and low sulfur diesel as defined in SCAQMD Rule 431.2, i.e., diesel with less than 15 ppm sulfur content. 2

Other mitigation measures that the SCAQMD recommends include: 3

- Trucks hauling dirt, sand, gravel or soil are to be covered in accordance with Section 23114 of the California Vehicle Code.
- Construction access roads leading to the main roads should be paved to avoid dirt being carried on to the roadway.
- Truck routes to be redirected to avoid residential areas and schools.

3. CALINE4 and CAL3QHC: The lead agency used the simplified screening method presented in the BAAQMD CEQA Guidelines, December 1999, to complete the CO hotspots analysis. The BAAQMD CEQA Guidelines state that a full CALINE4 analysis should be completed for proposed projects that generate over 10,000 vehicle trips per day. The draft EIR states in Section 4.3 Traffic/Access that the project would generate 13,000 average trips per day. Since SCAQMD does not recommend the use of the BAAQMD 4

simplified screening method, and BAAQMD does not recommend using its simplified screening method for projects of the magnitude proposed, SCAQMD recommends that the lead agency use either CALINE4 or CAL3QHC to analyze the CO hotspots for the Final EIR. 4

The CO hotspots analysis should be completed according to the methodology prescribed by the *Transportation Project-Level Carbon Monoxide Protocol (CO Protocol)* by the Institute of Transportation Studies, UC Davis, revised December 1997. The CO Protocol may be downloaded from the California Department of Transportation website at http://www.dot.ca.gov/hq/env/air/coprot.htm. CALINE4 can also be downloaded from the California Department of Transportation website at: http://www.dot.ca.gov/hq/env/air/calinesw.htm. CAL3QHC can be downloaded from Caliifornia Environmental Protection Agency website at http://www.epa.gov/scram001/tt22.htm. 5

4. EMFAC 7G and CO Hotspots Analysis: The lead agency used EMFAC 7G emissions factors in the CO hotspots analysis. Please note that EMFAC 2002 was released by CARB in April 2003 as the official motor vehicle emission factor model and became the only approved motor vehicle emission factor model on June 30, 2003, according to Federal Register, Volume 68, Number 62, April 1, 2003. Please remodel the CO concentrations with EMFAC 2002 emission factors for the Final EIR. The model is available on the ARB website at: www.arb.ca.gov/msei/on-road/latest_version.htm 6

Letter No. 12

COUNTY OF LOS ANGELES

DEPARTMENT OF PUBLIC WORKS

"To Enrich Lives Through Effective and Caring Service"

JAMES A. NOYES, Director

900 SOUTH FREMONT AVENUE
ALHAMBRA, CALIFORNIA 91803-1331
Telephone: (626) 458-5100
www.ladpw.org

ADDRESS ALL CORRESPONDENCE TO:
P.O. BOX 1460
ALHAMBRA, CALIFORNIA 91802-1460

IN REPLY PLEASE
REFER TO FILE: WM-4

April 29, 2004

RECEIVED
PLANNING DIVISION

APR 30 2004

PLANNING AND BUILDING SERVICES
CITY OF SANTA CLARITA

Mr. Jeff Hogan
Associate Planner
City of Santa Clarita
23920 Valencia Boulevard, Suite 300
Santa Clarita, CA 91355-2196

Dear Mr. Hogan:

RESPONSE TO NOTICE OF COMPLETION/AVAILABILITY
DRAFT ENVIRONMENTAL IMPACT REPORT
RIVER PARK PROJECT
CITY OF SANTA CLARITA

Thank you for the opportunity to provide comments on the subject document, which we received on March 9, 2004. The project proposes to develop 6 parcels of land into 439 single-family lots, 744 multifamily units, 2 commercial lots, a private street, recreation, a water quality basin, a park, river trail, bridge, open space, and Santa Clara River lots. The 695.4 acre project site is located at the terminus of Newhall Ranch Road, east of Bouquet Canyon Road between the Castaic Lake Water Agency property and Soledad Canyon Road in the City of Santa Clarita. We have reviewed the submittal and offer the following comments:

Environmental Programs

Section 4.2, "Flood," should address the following. All development projects which fall into one of the Standard Urban Storm Water Mitigation Plan (SUSMP) project types, characteristics, or activities, must obtain SUSMP approval by the appropriate agency. (1)

Section 4.9, "Solid Waste Disposal," should address the following. Table 4.9-1 of the Environmental Impact Report (EIR), regarding existing landfill capacities based on the County's 1997 Countywide Siting Element, is outdated and contains incorrect information. The EIR section should be revised using the County's 2002 Annual Report Countywide Siting Element Assessment update. (2)

Notwithstanding, as projected in the 1997 Countywide Siting Element, approved by a majority of the cities in the County of Los Angeles with a majority of the population and by the County Board of Supervisors, a shortfall in permitted daily landfill capacity may be experienced in the County within the next few years. The development activities associated with the proposed project and the postdevelopment operation over the life of the proposed project will increase the generation of solid waste and negatively impact the solid waste management infrastructure in the County. Therefore, in addition to the mitigation measures included in Section 4.9, mitigation measures to divert solid waste for this project should include, but are not limited to: 3

- Implementation of requirements to divert at least 50 percent of construction debris from the landfills.
- Implementation of the City's "curbside residential and commercial recycling" for inhabitants after project build-out. 4
- Implementation of the City's "yard-trimming recycling" for inhabitants after project build-out. 5

Moreover, the existing hazardous waste management (HWM) infrastructure in this County is inadequate to handle the hazardous waste currently being generated. The proposed project may generate household hazardous waste, which could adversely impact existing HWM infrastructure. This issue should be addressed and mitigation measures provided. 6

Section 4.15, "Human Made Hazards," should address the following. Should any operation within the subject project include the construction, installation, modification, or removal of underground storage tanks, our Environmental Programs Division must be contacted for required approvals and operating permits. If any excavated soil is contaminated by or classified as hazardous waste by an appropriate agency, the soil must be appropriately managed and disposed. 7

If you have any questions, please contact Mr. Wilson Fong at (626) 458-3581.

Flood Maintenance

The project site is in an area close to a soft-bottom channel, storm drain, and catch basins maintained by Public Works.

Page I-2 of the introduction mentions the different types of water quality improvements and Best Management Practices that will be included as part of the project. Water quality detention basins and grassy swales have the potential to become vector breeding grounds if not designed to drain within 72 hours. For more specific information, we suggest the developer contact the appropriate vector control agency for the project area. Also, detention basins and grassy swales have the potential to be classified a riparian habitat area. Once the plans and specifications have been prepared, we will be able to provide more specific comments to the project. At that time, maintenance responsibility will have to be determined for each water quality improvement. 8

If you have any questions, please contact Mr. Jerry Burke at (626) 458-4114.

Geotechnical and Materials Engineering

The proposed project will not have significant environmental effects from a geology and soils standpoint, provided the appropriate ordinances and codes are followed. The project is located within a mapped potentially liquefiable area, per the State of California Seismic Hazard Zone Map, Mint Canyon Quadrangle. However, a liquefaction analysis is not warranted at this time. Detailed liquefaction analyses, conforming to the requirements of the State of California Division of Mines and Geology Special Publication 117, must be conducted at the tentative map and/or grading/building plan stages. 9

If you have any questions, please contact Mr. Amir M. Alam at (626) 458-4925.

Land Development

Hydrology, SUSMP, Sewer, and Water Review

A drainage concept/SUSMP report is required to assess drainage and SUSMP impacts and to determine appropriate mitigation. We recommend that this report not be approved until Public Works has reviewed and approved the drainage concept/SUSMP report. We also recommend that a copy of the drainage concept/SUSMP report, once approved, be included in the environmental document. 10

The Draft Environmental Impact Report (DEIR) shall require a sewer area study be submitted to determine if the proposed and existing sewerage system within the City of Santa Clarita servicing this project have adequate capacity to accept all tributary area sewer discharges. This tributary area shall include, but not be limited to, the proposed 11

flows from the project site and tributary flows from adjacent city areas and, if applicable, all other tributary areas beyond the City's boundaries. The sewer area study shall be approved by the City and/or agencies having jurisdiction of the tributary area. If the system is found to have insufficient capacity, upgrade of the proposed and existing sewerage system is required to the satisfaction of all affected agencies. In addition, the sewer deficiencies shall be addressed in the final environmental documents. 11

Per the DEIR, Section XIII Utilities (g): The proposed project may create a need for local or regional water supplies. Further analysis is required in the EIR. 12

Pursuant to recent legislation related to Senate Bill 221 and Senate Bill 610, the DEIR shall address the adequacy of the regional water supply to ensure availability of water for the new development without adversely affecting existing users. The document shall provide for review the water supply assessment and water supply verification from water purveyors of the project. We recommend the assessment and verification from water purveyors be addressed prior to certification of the DEIR. 13

If you have any questions, please contact Mr. Timothy Chen at (626) 458-4921.

Transportation Planning

The proposed project will not have any significant impacts on County of Los Angeles highways. 14

If you have any questions, please contact Mr. Hubert Seto at (626) 458-4349.

Programs Development

Section 4.12-12 states that when the bike trail is completed, it will "provide an integral link with existing and planned regional trails within the County of Los Angeles, including the San Francisquito Creek Trail and the Pacific Crest Trail in eastern Santa Clarita Valley." The County of Los Angeles does not currently operate and maintain any bike paths, lanes, or routes in the vicinity of the proposed project. Would this project benefit the County's network of bike trails? 15

Section 4.12-27 states that "new residents of the proposed project are expected to use the City of Santa Clarita's and the County's existing and proposed trail systems in the Santa Clarita Valley area as they are constructed." What existing County trails are referred to here? 16

Who will pay for construction of the bike trails, lanes, and/or routes? 17

Who will fund the on-going maintenance of the bike trails, lanes, and or routes? 18

All bike paths, lanes, and/or routes must conform to the standards set forth in Chapter 1000 of the State of California Department of Transportation Highway Design Manual. 19

All plans pertaining to bikeways (preliminary and final) must be reviewed and concurrence must be given by the Public Works' Bikeway Coordinator who can be reached at (626) 458-3941. 20

Increasing the extent of bike paths within the County of Los Angeles is a main goal as it increases our vast network of already existing trails.

If you have any questions, please contact Mr. Richard Yribe at (626) 458-3919.

Traffic and Lighting

In order to complete our review, the following should be included in the traffic study:

- The County's methodology should be used when evaluating the County and/or County/city intersections. The study should address the cumulative impacts generated by this and nearby developments and include a Level of Service analysis for the affected intersections. If traffic signals or other mitigation measures are warranted at the affected intersections, the developer should determine its proportionate share of traffic signal or other mitigation costs. A copy of our Traffic Impact Analysis Report Guidelines is enclosed. 21

- The traffic analysis should include a scenario in which the Newhall Ranch Road/Golden Valley Road extension is not completed. For this scenario, the following intersection shall be added to the study as alternate routes may be used. It should be noted that as indicated in the County's Traffic Impact Analysis Report Guidelines, building permits for the project will be withheld until assumed transportation circulation improvements are in place. 22

  Golden State (I-5) Freeway SB Ramps at Valencia Boulevard

- The traffic count data sheets and the Intersection Capacity Utilization calculation sheets for the County and/or County/city intersections. 23

- The latest revision of the tentative tract map for the project showing site access points and internal circulation.

24

If you have any questions, please contact Ms. Jennifer Frary of our Traffic Studies Section at (626) 300-4792.

Waterworks & Sewer Maintenance

Waterworks

25

The proposed project is not within any of the County of Los Angeles Waterworks Districts and, therefore, no comments are offered.

Sewer Maintenance

The Waterworks & Sewer Maintenance Division is responsible for the operation and maintenance of the local sewers within the unincorporated area of the County of Los Angeles. Therefore, the entire project will be required to be annexed to the Consolidated Sewer Maintenance District. This will be in addition to County Sanitation Districts of Los Angeles County's requirements. The EIR should discuss the collection and disposal of the wastewater that would be generated by the proposed project.

26

If you have any questions, please contact Ms. May Hong at (626) 300-3322.

Watershed Management

San Gabriel River/Santa Clara Watersheds

27

The proposed project should include investigation of watershed management opportunities to maximize capture of local rainfall on the project site, eliminate incremental increases in flows to the storm drain system, and provide filtering of flows to capture contaminants originating from the project site.

On pages ES-4, ES-5, and ES-22, the notion that less sediment to the Santa Clara River is an environmental benefit has not been established. In fact, downstream erosion may worsen and beaches may become depleted of sand. We suggest considering debris carrying systems or open drainage conveyances to reduce the number or size of debris basins.

28

Runoff increases from a developed site since there are less permeable surfaces and landscape irrigation increases. In particular, smaller storms that would have been fully absorbed on site now contribute incremental increases to surface runoff. Groundwater is not recharged at the same rate. We suggest using permeable hard surfaces for driveways, patios, and parking lots. We also suggest that bank lining not be impermeable. For example, ungrouted rip rap is not a water-tight, sealed material. 29 30 31 32

The project will be subject to National Pollutant Discharge Elimination System (NPDES) requirements. Best Management Practices and SUSMPs will be required for the project. We suggest that water quality basins be designed to percolate as much runoff as possible. At the same time, provisions must be taken to safeguard ground water quality. We also suggest that land designated as a significant ecological area and land within the river corridor not be disturbed or destroyed. 33

If you have any questions please contact Mr. Bruce Hamamoto at (626) 458-5918.

Water Quality

The proposed project should fully assess and incorporate all appropriate Best Management Practices to enhance quality of urban runoff and stormwater. The project shall comply with all the requirements of the NPDES Municipal Storm Water Permit issued by the Los Angeles Regional Water Quality Control Board to the County of Los Angeles and local agencies, including, but not limited to, Parts IV.D. and IV.E., Development Planning and Development Construction.

The following should be reviewed to assure your project is in compliance with the NPDES Permit. 34

- The NPDES Municipal Storm Water Permit can be viewed on the web at http://www.swrcb.ca.gov/rwqcb4/html/programs/stormwater/la_ms4_final/FinalPermit.pdf
- The Standard Urban Storm Water Mitigation Plan Manual can be viewed or downloaded from the web at http://www.ladpw.org/wmd/npdes/table_contents.cfm

- The 2002 list of Impaired Water Bodies can be found on the web at http://www.swrcb.ca.gov/tmdl/docs/2002reg4303dlist.pdf.

Coastal Los Angeles County and the Upper Santa Clara River Watershed are in Region 4. The Antelope Valley area of Los Angeles County is in Region 6B.

- More information on Total Maximum Daily Loads (TMDLs) can be found on the following web sites: http://www.swrcb.ca.gov/tmdl/tmdl.html and also at http://www.swrcb.ca.gov/rwqcb4/html/meetings/tmdl/tmdl.html.

- Handbooks that can offer a better understanding of Best Management Practices can be viewed or downloaded from the web at http://www.cabmphandbooks.net/

35

If your project is located within an incorporated city, please contact your local Building and Safety Office for requirements specific to your project.

If you have any questions, please contact Mr. Frank Kuo at (626) 458-4350.

If you have any questions regarding the environmental review process of Public Works, please contact Ms. Massie Munroe at (626) 458-4359.

Very truly yours,

JAMES A. NOYES
Director of Public Works

ROD H. KUBOMOTO
Assistant Deputy Director
Watershed Management Division

MM:kk
D:\EIR372_River Park Project.doc

Enc.

Traffic Impact Analysis Report Guidelines

January 1, 1997

Prepared by the County of Los Angeles
Department of Public Works

James A. Noyes
Director of Public Works

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JHC:ce
T-2/ACCESS2
(01/22/99)

I. Introduction

The County of Los Angeles Department of Public Works has established the following Guidelines for the preparation of Traffic Impact Analysis (TIA) reports. The purpose of these Guidelines is to establish procedures to ensure consistency of analysis and the adequacy of information presented and timely review by County staff. It is strongly recommended that the applicant's traffic engineer consult with County staff before beginning the study to establish the scope and basic assumptions of the study and any deviations from these Guidelines to avoid unnecessary delays or revisions. For assistance in the TIA scoping process, the Traffic and Lighting Division, Traffic Studies Unit, can be contacted at (626) 458-5909.

II. Requirements

Generally, the Department staff is concerned with adverse impacts on traffic if:

1. Traffic generated by a project considered alone or cumulatively with other related projects, when added to existing traffic volumes, exceeds certain capacity thresholds of an intersection or roadway, contributes to an unacceptable level of service (LOS), or exacerbates an existing congested condition.

2. Project generated traffic interferes with the existing traffic flow (e.g., due to the location of access roads, driveways, and parking facilities).

3. Proposed access locations do not provide for adequate safety (e.g., due to limited visibility on curving roadways).

4. Nonresidential uses generate commuter or truck traffic through a residential area.

5. Project generated traffic significantly increases on a residential street and alters its residential character.

A traffic report must be prepared by a registered Civil or Traffic Engineer. A traffic report is generally needed if a project generates over 500 trips per day or where other possible adverse impacts as discussed in the Analysis and Impact Section (see page 4) of these Guidelines are identified. Before a full review is conducted, the County staff will check the completeness of the TIA report using the attached check list (Exhibit A). If the report is missing any of the check list items, it will be returned for revision.

III. TIA Report Contents

A. Project Description

The following information is required:

1. A description of the project, including those factors which quantify traffic generators, e.g., dwelling units, square feet of office space, persons to be employed, restaurant seats, acres of raw land, etc. For residential developments, the description should indicate the type of residence, (e.g., one level or townhouse condominiums, and if its use is for families, adults or retirees).

2. A plot plan showing proposed driveways, streets, internal circulation, and any new parking facilities on the project site.

3. A vicinity map showing the site location and the study area relative to other transportation systems.

4. A brief history of the projects that are part of the phased Master Plan or a parent tract/parcel map.

B. Transportation Circulation Setting

The following information is required:

1. <u>Existing and Proposed Site Uses</u>

   A description of the permitted and/or proposed uses of the project site in terms of the various zoning and land use categories of the County, and the status and the usage of any facilities currently existing on the site.

2. <u>Existing and Proposed Roadways and Intersections</u>

   A description of existing streets and roadways, both within the project site (if any) and in the surrounding area. Include information on the roadway classifications (per the Highway Plan), the number of lanes and roadway widths, signalized intersections, separate turn lanes, and the signal phases for turning movements.

Existing daily directional and peak-hour through and turning traffic volumes on the roadways surrounding and/or logically associated with the project site, including Secondary and Major highways and freeways. Local streets affected by the project should also be shown. Each report shall include appendices providing count data used in the preparation of the report. The source and date of the traffic volume information shall be indicated. Count data should not be over one year old. Since peak volumes vary considerably, a ten percent daily variation is not uncommon, especially on recreational routes or roadways near shopping centers; therefore, representative peak-hour volumes are to be chosen carefully.

All assumed roadways and intersections or any other transportation circulation improvements must be identified and discussed. The discussion should include the scope and the status of the assumed improvements including the construction schedule and financing plan. It should be noted that all assumed roadways and intersections or any other transportation circulation improvements will be made a condition of approval for the project to be in place prior to the issuance of building permits. If assumed improvements do not get built on time due to an unforeseeable condition, traffic conditions for a different assumed highway network or other mitigation measures will be considered if a traffic study is submitted with a different assumed network or other measures are recommended to mitigate the traffic impact in question.

C. Analysis and Impact

The following information is required:

1. Trip Generation Analysis

Tabulate the estimated number of daily trips and a.m. and p.m. peak-hour trips generated by the proposed project entering and exiting the site. Trip generation factors and source are to be included. The trip generation rates contained in the latest edition of the Institute of Transportation Engineers Trip Generation manual should generally be used, except in the case of condominiums/townhomes when the following rates should be used per unit:

	ADT	A.M.-Peak	P.M.-Peak
		Outgoing/Incoming	Outgoing/Incoming
Condominiums/ Townhomes	8.0	0.48/0.06	0.26/0.47

There may be a trip reduction due to internal and/or pass-by trips. Internal trip reduction can only be applied for mixed-use types of developments and pass-by trip reduction for retail/commercial types of developments. Internal or pass-by trip reduction assumptions will require analytical support based on verifiable actual similar developments to demonstrate how the figures were derived and will require approval by the County.

2. Trip Distribution

Diagrams showing the percentages and volumes of the project and nearby project's a.m. and p.m. peak-hour trips logically distributed on the roadway system must be provided. The Regional Daily Trip Distribution Factors (Exhibit D-3) contained in the Congestion Management Program (CMP) Land Use Analysis Guidelines shall be referenced for regional trip distribution assumptions. If it is assumed that new routes will alter traffic patterns, adequate backup including traffic distribution maps must be provided showing how and why these routes will alter traffic patterns.

The study area should include arterial highways, freeways, and intersections generally within a one-mile radius of the project site.

Note: This distance may be greater than one-mile for rural areas depending on the proximity to nearby signalized intersections and the availability of master plan access routes.

3. Related Projects List

A list of related projects that are approximately within a one-and-a-half mile radius of the project site and would reasonably be expected to be in place by the project's build out year must be included in the report. Related projects shall include all pending, approved, recorded, or constructed projects that are not occupied at the time of the existing traffic counts.

The County of Los Angeles Department of Regional Planning (DRP) and other public agencies (if necessary) should be contacted to obtain the latest listings. A table and a map showing the status, project/zone change/conditional use permit/parcel map/tract number, and the location of each project must be provided. For a computer printout of the listing of all filed projects within the County, Land Development Management Section of the DRP, at (213) 974-6481 can be contacted.

4. **LOS Analysis**

If it appears that the project's generated traffic alone or together with other projects in the area could worsen the LOS of an intersection or roadway, a "before" and "after" LOS analysis is necessary. The Intersection Capacity Utilization (ICU) or Critical Movement Analysis are two methods often used to assess existing and future LOS at intersections.

If the ICU planning method is used, a maximum of 1,600 vehicles per hour per lane should be used (2,880 vehicles per hour should be used for dual left-turn lanes) and a ten percent yellow clearance cycle should be included. Intersection LOS analysis and calculation work sheets, as well as diagrams showing turning volumes shall be included in the report for the following traffic conditions.

(a) Existing traffic;
(b) Existing traffic plus ambient growth to the year the project will be completed (preproject);
(c) Traffic in (b) plus project traffic;
(d) Traffic in (c) with the proposed mitigation measures (if necessary);
(e) Traffic in (c) plus the cumulative traffic of other known developments; and
(f) Traffic in (e) with the proposed mitigation measures (if necessary).

The project's impact on two-lane roadways should also be analyzed for all of the above traffic conditions if those two-lane roadways are used for access. LOS service analysis contained in the Highway Capacity Analysis, Chapter 8, Two-Lane Highways, should be used to evaluate the project's impact. For simplified analysis, use the established significant impact thresholds for two-lane roadways as shown on page 7.

5. Significant Impact Threshold

For intersections, the impact is considered significant if the project related increase in the volume to capacity (v/c) ratio equals or exceeds the threshold shown below.

INTERSECTIONS		
Preproject		Project /C Increase
LOS	V/C	
C	0.71 to 0.80	0.04 or more
D	0.81 to 0.90	0.02 or more
E/F	0.91 or more	0.01 or more

The project is deemed to have a significant impact on two-lane roadways when it adds the following percentages based on LOS of the preproject conditions.

TWO-LANE ROADWAYS				
		Percentages Increase in Passenger Car Per Hour (PCPH) by Project		
		Preproject LOS		
Directional Split	Total Capacity (PCPH)	C	D	E/F
50/50	2,800	4	2	1
60/40	2,650	4	2	1
70/30	2,500	4	2	1
80/20	2,300	4	2	1
90/10	2,100	4	2	1
100/0	2,000	4	2	1

6. **Analysis Discussion**

Discuss conclusions regarding the adverse impacts caused by the proposed project on the roadway system. If the cumulative traffic impact of this and other projects require mitigation measures, such as traffic signals, then estimate the percent share using the project percent share formula given in the Section III D of the TIA Guidelines. When the proposed project and other nearby developments are expected to significantly impact adjacent roadways, the developer may be required to enter into a secured agreement to contribute to a benefit district to fund major roadway and bridge improvements in the region. Also, for all recommendations to increase the number of travel lanes on a street or at an intersection as a mitigation measure, the report must clearly identify the impacts associated with such a change such as whether or not additional right of way will be required and whether it is feasible to acquire the right of way based on the level of development of the adjacent land and buildings (if any).

Discuss other possible adverse impacts on traffic. Examples of these are: (1) the limited visibility of access points on curved roadways; (2) the need for pavement widening to provide left-turn and right-turn lanes at access points into the proposed project; (3) the impact of increased traffic volumes on local residential streets; and (4) the need for road realignment to improve sight distance.

Projects which propose to amend the County's General Plan Land Use and substantially increase potential traffic generation must provide an analysis of the project at current planned land use versus proposed land use in the build out condition for the project area. The purpose of such analysis is to provide decision makers with the understanding of the planned circulation network's ability to accommodate additional traffic generation caused by the proposed General Plan Land Use amendments.

D. Traffic Models and Model Generated TIA's

Computerized traffic models are planning tools used to develop future traffic projections based on development growth patterns. The Department currently operates two traffic models, one for the Santa Clarita Valley and another for the Ventura Corridor area. The Department can test proposed development project traffic impacts for the public in these areas for a fee. For assistance in the traffic modeling, the Planning Division, Transportation Planning/Assessments Section, can be contacted at (626) 458-4351.

For TIA's prepared using data from outside traffic modeling, the following information is required:

1. The type of modeling software used to generate the traffic analysis report data (i.e., TRANPLAN, EMME/2, etc.).

2. The list of land use assumptions by traffic analysis zones (TAZ's) and their sources used in the traffic model in lieu of a related projects list.

3. A copy of the computerized roadway network assumed to be in place at the time of the project. Streets should be color-coded by street type. Also, TAZ's and their corresponding centroidal connectors, as well as number of lanes should be displayed.

4. The list of trip generation rates used in the traffic model and their sources.

5. Model runs (plots) identifying both the with and without project scenarios. The volumes displayed on the plots should be in 100's for Average Daily Vehicle Trips (ADT) and 10's for peak-hour plots.

E. Traffic Signals

The following information is required:

Traffic signal warrant analysis using the State of California Department of Transportation (Caltrans) Peak-Hour (Figures 9-8 and 9-9 of Caltrans Traffic Manual) and Estimated Average Daily (Figure 9-4 of Caltrans Traffic Manual) Traffic Warrant Analysis should be provided. If the installation of signals is warranted with the addition of the project's traffic, then the installation will be the sole responsibility of the project. If it is warranted with cumulative traffic of the project and other related projects, the following formula should be used to calculate the project percent share.

$$\text{Project Percentage Share} = \frac{\text{Project Traffic}}{\text{Project+Other Related Projects Traffic}}$$

The project percent share should be based on the peak-hour volumes that warrant signals. If both peak hours satisfy the installation of signals, the average of the two peak-hour volumes should be used in the percent share analysis.

F. Mitigation Measures

The following information is required.

Identify feasible mitigation measures which would mitigate the project and/or other related projects' significant impacts to a level of insignificance. Also, identify those mitigation measures which will be implemented by others. Those mitigation measures that are assumed to be implemented by others will be made a condition of approval for the project to be in place prior to issuance of building permits. Mitigation measures may include, but are not limited to, the following:

1. Traffic Engineering Techniques.

a. Locate access points to optimize visibility and reduce potential conflict.
b. Design parking facilities to avoid queuing into public streets during peak arrival periods.
c. Provide additional off-street parking.
d. Dedicate visibility easements to assure adequate sight distance at intersections and driveways.
e. Signalize or modify traffic signals at intersections.
f. Install left-turn phasing and/or multiple turning lanes to accommodate particularly heavy turning movements.
g. Widen the pavement to provide left- or right-turn lanes to lessen the interference with the traffic flow.[1]
h. Widen intersection approaches to provide additional capacity.
I. Prohibit left turns to and from the proposed development.
j. Restrict on-street parking during peak hours to increase street capacity.[1]

2. Contribute to a benefit district to fund major capital improvements

[1] Physical roadway improvements to improve capacity should be considered before considering parking restrictions.

a. Construct a grade separation.
b. Improve or construct alternate routes.
c. Complete proposed routes shown on the Los Angeles Highway Plan.
d. Improve freeway interchanges (bridge, widening, modifications, and etc.).

3. **Transportation System Management (TSM) Techniques**[2]

a. Establish flexible working hours.
b. Encourage employee use of carpools and public transportation (specific measures must be indicated).
c. Establish preferential parking for carpools.
d. Restrict truck deliveries to Major and Secondary highways and encourage deliveries during the off-peak hours.
e. Establish a monitoring program to ensure that project traffic volumes do not exceed projected traffic demand.

Note: When it appears that other jurisdictions will be impacted by a development, the Department will request that the involved jurisdiction also review the TIA. A written response from that jurisdiction should be provided with appropriate follow-up to the lead County agency.

G. CMP Guidelines

The following information is required:

Where the project meets the criteria established in the County of Los Angeles' CMP Land Use Analysis Guidelines, a CMP analysis must be provided. A copy of the latest Guidelines will be available upon request. A CMP TIA is required for all projects required to prepare an Environmental Assessment based on local determination or projects requiring a traffic study.

[2] Contributions to a benefit district and/or TSM techniques may not be used to lower LOS in the capacity calculations.

The geographic area examined in the TIA must include the following, at a minimum.

- All CMP arterial monitoring intersections (see Exhibit B of the Guidelines), including freeway on- or off-ramp intersections, where the proposed project will add 50 or more trips during either the a.m. or p.m. peak hours.
- Main line freeway monitoring locations (see Exhibit C of the Guidelines) where the project will add 150 or more trips, in either direction, during the a.m. or p.m. weekday peak hours.
- Caltrans must also be consulted to identify other specific locations to be analyzed on the State highway system.

If, based on these criteria, the TIA identifies no facilities for study, no further traffic analysis is required.

JHC:ce
T-2/ACCESS
(01/07/99)

Attach.

EXHIBIT A
TRAFFIC IMPACT ANALYSIS REPORT CONTENTS CHECK LIST

Note: Before a full review is conducted, PW's staff will check the completeness of the Traffic Impact Analysis Report. If the Report is missing any of the items listed below, it will be returned for revision.

CONTENT	YES/ NO	COMMENT
Site Plan • Access locations • Interior circulation		
Trip Generation Rates • Institute of Transportation Engineers (ITE) trip generation rates • Documentation for alternate rates		
Trip Distribution • Regional • Local project (am/pm) • Local related projects(am/pm)		
Traffic Counts • Taken within one year • Date/Time		
Discounting • Internal trip discounts for mixed use developments • Pass-by trip discounts for commercial/retail developments • Backup		
Level of Service Calculations • Intersection Capacity Utilization (ICU) or Criteria Movement Analysis • 10 percent yellow clearance for ICU planning method • 1,600 vehicles per lane (vpl); 2,880 vpl for dual left-turn lanes for ICU planning method • Calculation sheets • Scenarios as required per Guidelines • Existing/Future lane configurations		
Signal Warrant Analysis • Peak-hour/Average Daily Traffic per the State of California Department of Transportation standards		
Mitigation Measures • Project impacts • Cumulative developments impacts • Projects percent share of the cost to mitigate cumulative development impacts		
Congestion Management Program Analysis		

JHC:ce
T-2/ACCESS3
02/22/99

Letter No. 11

COUNTY OF LOS ANGELES

FIRE DEPARTMENT

1320 NORTH EASTERN AVENUE
LOS ANGELES, CALIFORNIA 90063-3294
(323) 890-4330

RECEIVED
PLANNING DIVISION
MAY 03 2004
PLANNING AND BUILDING SERVICES
CITY OF SANTA CLARITA

P. MICHAEL FREEMAN
FIRE CHIEF
FORESTER & FIRE WARDEN

April 23, 2004

Jeff Hogan, Associate Planner
City of Santa Clarita
Department of Planning and Building Services
23920 Valencia Boulevard
Santa Clarita, CA 93155

Dear Mr. Hogan:

NOTICE OF AVAILABILITY OF A DRAFT ENVIRONMENTAL IMPACT REPORT FOR THE RIVERPARK PROJECT (STATE CLEARINGHOUSE NO. 2002091081) – "SANTA CLARITA" (EIR #1947/2004)

The Draft Environmental Impact Report for the proposed Riverpark Project has been reviewed by the Planning Division, Land Development Unit, and Forestry Division of the County of Los Angeles Fire Department. The following are their comments:

PLANNING DIVISION:

Figure 4.13-1, Fire Station Locations, depicts the locations of two fire stations incorrectly. Fire Station 126 is shown much closer to the project site than its true location, although its address is given correctly in the text. It is about 1.35 miles from the intersection of Bouquet Canyon and Newhall Ranch Roads. The location shown for Fire Station 124 is the former temporary site. The new permanent location is at 25870 Hemingway Avenue, Stevenson Ranch, approximately ¾ mile to the north. 1

It should be noted that the response distances quoted are to the nearest major intersection, not to the center of the development. Additional travel distance/time would be required to reach Areas A, B, C, and D. 2

Section 4.13.4.d, Operational Impacts, says that "The Fire Department serves the site from Station 111." It is incorrect to say that any particular station serves a site. As stated in Section 4.13.3a, while Station 111 is the closest existing fire station, many stations would respond to a major incident such as a structure fire or a brush fire. Moreover, the crew of Fire Station 111 may not be available when an incident occurs at the project site. 3

In the same section, the statement that a fire station site is not required within this development is attributed to a fire prevention inspector. This statement was made in an email from Debbie Aguirre, Supervising Analyst, on June 13, 2003. 4

LAND DEVELOPMENT UNIT/GENERAL REQUIREMENTS:

The following comments regarding this project are in addition to the conditions that were detailed in the letter dated November 12, 2002. (EIR #1517/2002) (See enclosed copy of letter). 5

SERVING THE UNINCORPORATED AREAS OF LOS ANGELES COUNTY AND THE CITIES OF:

AGOURA HILLS	BRADBURY	CUDAHY	HAWTHORNE	LA MIRADA	MALIBU	POMONA	SIGNAL HILL
ARTESIA	CALABASAS	DIAMOND BAR	HIDDEN HILLS	LA PUENTE	MAYWOOD	RANCHO PALOS VERDES	SOUTH EL MONTE
AZUSA	CARSON	DUARTE	HUNTINGTON PARK	LAKEWOOD	NORWALK	ROLLING HILLS	SOUTH GATE
BALDWIN PARK	CERRITOS	EL MONTE	INDUSTRY	LANCASTER	PALMDALE	ROLLING HILLS ESTATES	TEMPLE CITY
BELL	CLAREMONT	GARDENA	INGLEWOOD	LAWNDALE	PALOS VERDES ESTATES	ROSEMEAD	WALNUT
BELL GARDENS	COMMERCE	GLENDORA	IRWINDALE	LOMITA	PARAMOUNT	SAN DIMAS	WEST HOLLYWOOD
BELLFLOWER	COVINA	HAWAIIAN GARDENS	LA CANADA FLINTRIDGE	LYNWOOD	PICO RIVERA	SANTA CLARITA	WESTLAKE VILLAGE
							WHITTIER

Access roads shall be maintained with a minimum of ten (10) feet of brush clearance on each side. Fire access roads shall have an unobstructed vertical clearance clear-to-sky. Oak trees overhanging fire access roads shall be maintained to provide a vertical clearance of 13 feet, 6 inches. 5

COMMERCIAL:
Development may require fire flows up to 5,000 gallons per minute at 20 pounds per square inch residual pressure for up to a five-hour duration. Final fire flows will be based on the size of buildings, their relationship to other structures, property lines, and types of construction used. Fire hydrant spacing shall be 300 feet and shall meet the following requirements:

1. No portion of lot frontage shall be more than 200 feet via vehicular access from a public fire hydrant.
2. No portion of a building shall exceed 400 feet via vehicular access from a properly spaced public fire hydrant.
3. Additional hydrants will be required if hydrant spacing exceeds specified distances.
4. When cul-de-sac depth exceeds 200 feet on a commercial street, hydrants shall be required at the corner and mid-block.
5. A cul-de-sac shall not be more than 500 feet in length when serving land zoned for commercial use.
6. A Fire Department approved turning area shall be provided at the end of a cul-de-sac.

Turning radii shall not be less than 32 feet. This measurement shall be determined at the centerline of the road. A Fire Department approved turning area shall be provided for all driveways exceeding 150 feet in length and at the end of all cul-de-sacs. All on-site driveways shall provide a minimum unobstructed width of 28 feet, clear-to-sky. The on-site driveway is to be within 150 feet of all portions of the exterior walls of the first story of any building. Driveway width for commercial developments shall be increased when any of the following conditions will exist: 6

1. Provide 28 feet in width when a building has three or more stories, or is more than 35 feet in height above access level. The height of the building is measured from the lowest point of access to the height of the eaves. Also, for using fire truck ladders, the centerline of the access roadway shall be located parallel to, and within 30 feet of an exterior wall on one side of the proposed structure.
2. Provide 34 feet in width when parallel parking is allowed on one side of the access roadway/driveway. Preference is that such parking is not adjacent to the structure.
3. Provide 42 feet in width when parallel parking is allowed on each side of the access roadway/driveway.
4. Any access way less than 34 feet in width shall be labeled "Fire Lane" on the final recording map, and final building plans.
5. For streets or driveways with parking restrictions: The entrance to the street/driveway and intermittent spacing distances of 150 feet shall be posted with Fire Department approved signs stating "NO PARKING – FIRE LANE" in three-inch high letters. Driveway labeling is necessary to ensure access for Fire Department use.

Should any questions arise regarding subdivision, water systems, or access, please contact Inspector Marvin Dorsey at (323) 890-4243.

FORESTRY DIVISION:
The statutory responsibilities of the County of Los Angeles Fire Department, Forestry Division include erosion control, watershed management, rare and endangered species, vegetation, fuel modification for Very High Fire Hazard Severity Zones or Fire Zone 4, archeological and cultural resources, and the County Oak Tree Ordinance.

The loss of Oak tree habitat should be mitigated for pursuant to the provisions of the City of Santa Clarita's Oak Tree Ordinance. In order to limit the threat of wildfire, the use of native/low fuel volume plants should be mandatory in the landscape plan for this project. The proposed project contains an SEA (Significant Ecological Area). Creative environmental design to protect and preserve this sensitive area is recommended. 7 8 9

This property is located within the area described by the Forester and Fire Warden as a Very High Fire Hazard Severity Zone or Fire Zone 4. The development of this project must comply with all Very High Fire Hazard Severity Zone code and ordinance requirements for fuel modification. 10

As required by Section 1117.2.1 of the County of Los Angeles Fire Code, a fuel modification plan, a landscape plan, and an irrigation plan shall be submitted with any subdivision of land or prior to any new construction, remodeling, modification or reconstruction where such activities increase the square footage of the existing structure by at least 50% within a 12-month period and where said structure or subdivision is located within an area designated as a Very High Fire Hazard Severity Zone or within Fire Zone 4. 11

A fuel modification plan, a landscape plan, and an irrigation plan shall be developed and approved prior to construction. Said plans shall be reviewed and approved by the County of Los Angeles Fire Department, Forestry Division. Specific questions regarding fuel modification requirements should be directed to the Fuel Modification Office at (626) 969-5205. 12

The remaining statutory responsibilities of the County of Los Angeles Fire Department, Forestry Division have been addressed. However, careful consideration to the long-term significant cumulative impacts of this project should be considered for future development in the City of Santa Clarita. 13

If you have any additional questions, please contact this office at (323) 890-4330.

Very truly yours,

David R. Leininger

DAVID R. LEININGER, CHIEF, FORESTRY DIVISION
PREVENTION BUREAU

DRL:sc

Enclosure

ENCLOSURE

(323) 890-4330

November 12, 2002

Julie Berger, Project Planner
Impact Sciences, Inc.
30343 Canwood Street, Suite 210
Agoura Hills, CA 91301

Dear Ms. Berger:

NOTICE OF PREPARATION OF A DRAFT ENVIRONMENTAL IMPACT REPORT FOR THE RIVER PARK PROJECT, 1,009 DWELLING UNITS, "SANTA CLARITA" (EIR #1517/2002)

The Notice of Preparation of a Draft Environmental Impact Report for the proposed River Park Project has been reviewed by the Planning Section, Land Development Unit, and Forestry Division of the County of Los Angeles Fire Department. The following are their comments:

PLANNING DIVISION:

The information about fire protection service appearing in the Sand Canyon Joint Venture Environmental Impact Report (EIR), which you faxed us on 11/22/02, is still largely valid. Some additions and clarifications are noted below.

- New Fire Station 126 is now in operation. (The first paragraph on Page 4.13-4 speaks of it in the future). It is temporarily located at 27400 Tourney Rd., Valencia, CA 91355 until Spring, 2003, when the permanent fire station will be opened on Citrus Street at Magic Mountain Parkway. Fire Station 126 is staffed by a 4-person engine company. Fire Station 73 now has one 3-person engine company as well as the truck company. All other stations' resources in the Santa Clarita Valley are the same as they were at the time of the Sand Canyon Joint Venture EIR. Station 124 has been relocated to 25870 Hemingway Avenue, Stevenson Ranch, CA 91381.

- The terms "first alarm fire response" (in the Summary) and "primary fire protection service" (Page 4.13-2) are undefined and should be avoided. Different kinds of incidents receive different numbers and types of response units in the first alarm. It is not quite accurate to identify specific stations as the ones that will "serve" the project site. The closest available District response units are dispatched as needed to an incident anywhere within the District's territory. It is more accurate to identify certain stations as the closest, and, therefore, most likely to respond to an incident at the site.

- The information you provided on funding methods of service expansion to new development is correct. Please note that the developer fee is calculated to cover the *full* cost of equipment as well as construction and land for new stations (Page 4.13-4). This fee, or an in-lieu donation, constitutes mitigation in full of growth impacts.

The jurisdictional station for this project is Station 111. It is approximately 0.6 miles or 1.7 minutes from the intersection of Bouquet Canyon Road and Newhall Ranch Road. Dependent upon access and estimated response times, the Fire Department may require a site within this tract for fire station at the east-end of their project to adequately protect this tract and the surrounding community. The Fire Department has an existing need for an additional fire station in this area, and this project would exacerbate this need. We would need a detailed map showing the location of proposed land uses and existing and proposed roads to calculate response distances/times from existing stations for a full analysis of impacts.

Nationally recognized response time targets for urban areas are five minutes for a basic life support unit (e.g., engine company) and eight minutes for an advanced life support unit (e.g., paramedic squad). The Fire Department is currently meeting these standards. The average response time in the City of Santa Clarita during 2001 was 5 minutes, 40 seconds. It should be noted that the city encompasses rural and undeveloped areas as well as urban areas.

Any development would increase service demand on the existing fire protection resources in the general area. Additional manpower, equipment, and facilities are needed in the area now. Mitigation of this increase in service would be met through the City of Santa Clarita's developer fee program for fire protection facilities and equipment, if access and response times to the east end of the project are found to be adequate.

The Fire Department does not compute ratios of firefighters to residents or building area.

LAND DEVELOPMENT UNIT -- GENERAL REQUIREMENTS:

The proposed development may necessitate multiple ingress/egress access for the circulation of traffic, and emergency response issues. The Department may condition future development to provide additional means of access. The development of this project must comply with all applicable code and ordinance requirements for construction, access, water mains, fire flows and hydrants.

This property is located within the area described by the Forester and Fire Warden as a Fire Zone 4, Very High Fire Hazard Severity Zone (VHFHSZ). All applicable fire code and ordinance requirements for construction, access, water mains, fire hydrants, fire flows, brush clearance and fuel modification plans, must be met.

Specific fire and life safety requirements for the construction phase will be addressed at the building fire plan check. There may be additional fire and life safety requirements during this time.

Every building constructed shall be accessible to Fire Department apparatus by way of access roadways, with an all-weather surface of not less than the prescribed width, unobstructed, clear-to-sky. The roadway shall be extended to within 150 feet of all portions of the exterior walls when measured by an unobstructed route around the exterior of the building.

When a bridge is required, to be used as part of a fire access road, it shall be constructed and maintained in accordance with nationally recognized standards and designed for a live load sufficient to carry a minimum of 75,000 pounds.

The maximum allowable grade shall not exceed 15% except where the topography makes it impractical to keep within such grade, and then an absolute maximum of 20% will be allowed for up to 150 feet in distance. The average maximum allowed grade, including topography difficulties, shall be no more than 17%. Grade breaks shall not exceed 10% in 10 feet.

When involved with a subdivision, Fire Department requirements for access, fire flows and hydrants are addressed during the subdivision tentative map stage.

Fire sprinkler systems are required in some residential and most commercial occupancies. For those occupancies not requiring fire sprinkler systems, it is strongly suggested that fire sprinkler systems be installed. This will reduce potential fire and life losses. Systems are now technically and economically feasible for residential use.

HIGH-DENSITY RESIDENTIAL:

Development may require fire flows up to 5,000 gallons per minute at 20 pounds per square inch residual pressure for up to a five-hour duration. Final fire flows will be based on the size of the buildings, their relationship to other structures, property lines, and types of construction used. Fire hydrant spacing shall be 300 feet and shall meet the following requirements:

1. No portion of lot frontage shall be more than 200 feet via vehicular access from a public fire hydrant.

2. No portion of a building shall exceed 400 feet via vehicular access from a properly spaced fire hydrant.

3. When cul-de-sac depth exceeds 200 feet, hydrants will be required at the corner and mid-block.

4. Additional hydrants will be required if the hydrant spacing exceeds specified distances.

Turning radii shall not be less than 42 feet. This measurement shall be determined at the centerline of the road. A Fire Department approved turning area shall be provided for all driveways exceeding 150 feet in length and at the end of all cul-de-sacs. When serving land zoned for residential uses having a density of more than four units per net acre:

1. A cul-de-sac shall be a minimum of 34 feet in width and shall not be more than 700 feet in length.

2. The length of the cul-de-sac may be increased to 1,000 feet if a minimum of 36 feet in width is provided.

3. A Fire Department approved turning area shall be provided at the end of a cul-de-sac.

All on-site driveways shall provide a minimum unobstructed width of 26 feet, clear-to-sky. The on-site driveway is to be within 150 feet of all portions of the exterior walls of the first story of any building. The 26-feet width does not allow for parking, and shall be designated as a "Fire Lane," and have appropriate signage. The 26 feet in width shall be increased to:

1. Provide 34 feet in width when parallel parking is allowed on one side of the access way.

2. Provide 36 feet in width when parallel parking is allowed on both sides of the access way.

3. Any access way less than 34 feet in width shall be labeled "Fire Lane" on the final recording map, and final building plans.

4. For streets or driveways with parking restrictions: The entrance to the street/driveway and intermittent spacing distances of 150 feet shall be posted with Fire Department approved signs stating "NO PARKING - FIRE LANE" in three-inch high letters. Driveway labeling is necessary to ensure access for Fire Department use.

SINGLE-FAMILY DWELLING UNITS:

Single-family detached homes shall require a fire flow of 1,250 gallons per minute at 20 pounds per square inch residual pressure for a two-hour duration. Fire hydrant spacing shall be 600 feet and shall meet the following requirements:

1. No portion of lot frontage shall be more than 450 feet via vehicular access from a public fire hydrant.

2. No portion of a structure should be placed on a lot where it exceeds 750 feet via vehicular access from a properly spaced public fire hydrant.

3. When cul-de-sac depth exceeds 450 feet on a residential street, hydrants shall be required at the corner and mid-block.

4. Additional hydrants will be required if hydrant spacing exceeds specified distances.

Fire Department access shall be provided to within 150 feet of all portions of the exterior walls of the first story of any single unit. If exceeding 150 feet, provide 20-feet, paved width "Private Driveway/Fire Lane" to within 150 feet of all portions of the exterior walls of the unit. Fire Lanes serving 3-4 units shall be increased to 24 feet in width, and if serving 5 or more units, the Fire Lane shall be increased to 26 feet. A Fire Department approved turning area shall be provided for all driveways exceeding 150 feet in length and at the end of all cul-de-sacs. Streets or driveways within the development shall be provided with the following:

1. Provide 36 feet in width on all collector streets and those streets where parking is allowed on both sides.

2. Provide 34 feet in width on cul-de-sacs up to 700 feet in length. This allows parking on both sides of the street.

3. Provide 36 feet in width on cul-de-sacs from 701 to 1,000 feet in length. This allows parking on both sides of the street.

4. For streets or driveways with parking restrictions: The entrance to the street/driveway and intermittent spacing distances of 150 feet shall be posted with Fire Department approved signs stating "NO PARKING - FIRE LANE" in three-inch high letters. Driveway labeling is necessary to ensure access for Fire Department use.

5. Turning radii shall not be less than 32 feet. This measurement shall be determined at the centerline of the road.

6. A Fire Department approved turning area shall be provided, at the end of a driveway of 300 feet or more in length.

LIMITED ACCESS DEVICES (GATES ETC.):

All access devices and gates shall meet the following requirements:

1. Any single gate used for ingress and egress shall be a minimum of 26 feet in width, clear-to-sky.

2. Any gate used for a single direction of travel, used in conjunction with another gate, used for travel in the opposite direction, (split gates) shall have a minimum width of 20 feet each, clear-to-sky.

3. Gates and/or control devices shall be positioned a minimum of 50 feet from a public right-of-way, and shall be provided with a turnaround having a minimum of 32 feet of turning radius. If an intercom system is used, the 50 feet shall be measured from the right-of-way to the intercom control device.

4. All limited access devices shall be of a type approved by the Fire Department.

5. Gate plans shall be submitted to the Fire Department, prior to installation. These plans shall show all locations, widths and details of the proposed gates.

TRAFFIC CALMING MEASURES:
All proposals for traffic calming measures (speed humps/bumps, traffic circles, roundabouts, etc.) shall be submitted to the Fire Department for review, prior to implementation.

Should any questions arise regarding design and construction, and/or water and access, please contact Inspector J. Scott Greenelsh at (323) 890-4235.

FORESTRY DIVISION:
The statutory responsibilities of the County of Los Angeles Fire Department, Forestry Division include erosion control, watershed management, rare and endangered species, vegetation, fuel modification for Very High Fire Hazard Severity Zones or Fire Zone 4, archeological and cultural resources and the County Oak Tree Ordinance. Potential impacts in these areas should be addressed.

If you have any additional questions, please contact this office at (323) 890-4330.

Very truly yours,

DAVID R. LEININGER, FORESTRY DIVISION
PREVENTION BUREAU

DRL:lc

Letter No. 10

COUNTY SANITATION DISTRICTS
OF LOS ANGELES COUNTY

1955 Workman Mill Road, Whittier, CA 90601-1400
Mailing Address: P.O. Box 4998, Whittier, CA 90607-4998
Telephone: (562) 699-7411, FAX: (562) 699-5422
www.lacsd.org

JAMES F. STAHL
Chief Engineer and General Manager

March 29, 2004

File No: 26-00.04-00

RECEIVED
PLANNING DIVISION
MAR 3 1 2004
PLANNING AND BUILDING SERVICES
CITY OF SANTA CLARITA

Mr. Jeff Hogan, Associate Planner
Planning & Building Services Department
City of Santa Clarita
23920 Valencia Boulevard, Suite 300
Santa Clarita, CA 91355

Dear Mr. Hogan:

Vesting Tentative Tract Map No. 53425, Master Case No. 02-175, Riverpark Project

The County Sanitation Districts of Los Angeles County (Districts) received a Draft Environmental Impact Report for the subject project on March 3, 2004. The proposed development is located within the jurisdictional boundaries of District No. 26. We offer the following updated information regarding sewerage service:

1. The Districts' 24-inch diameter Bouquet Canyon Relief Trunk Sewer, located in Bouquet Canyon Road, conveyed a peak flow of 6.4 million gallons per day (mgd) when last measured in 2003. (1)

2. A 9 mgd expansion of the Valencia Water Reclamation Plant (WRP) (one of the two WRPs in the Santa Clarita Valley Joint Sewerage System (SCVJSS)) will be completed in late-2004. The SCVJSS currently processes an average flow of 18.1 mgd. (2)

If you have any questions, please contact the undersigned at (562) 699-7411, extension 2717.

Very truly yours,

James F. Stahl

Ruth I. Frazen

Ruth I. Frazen
Engineering Technician
Planning & Property Management Section

RIF:rf

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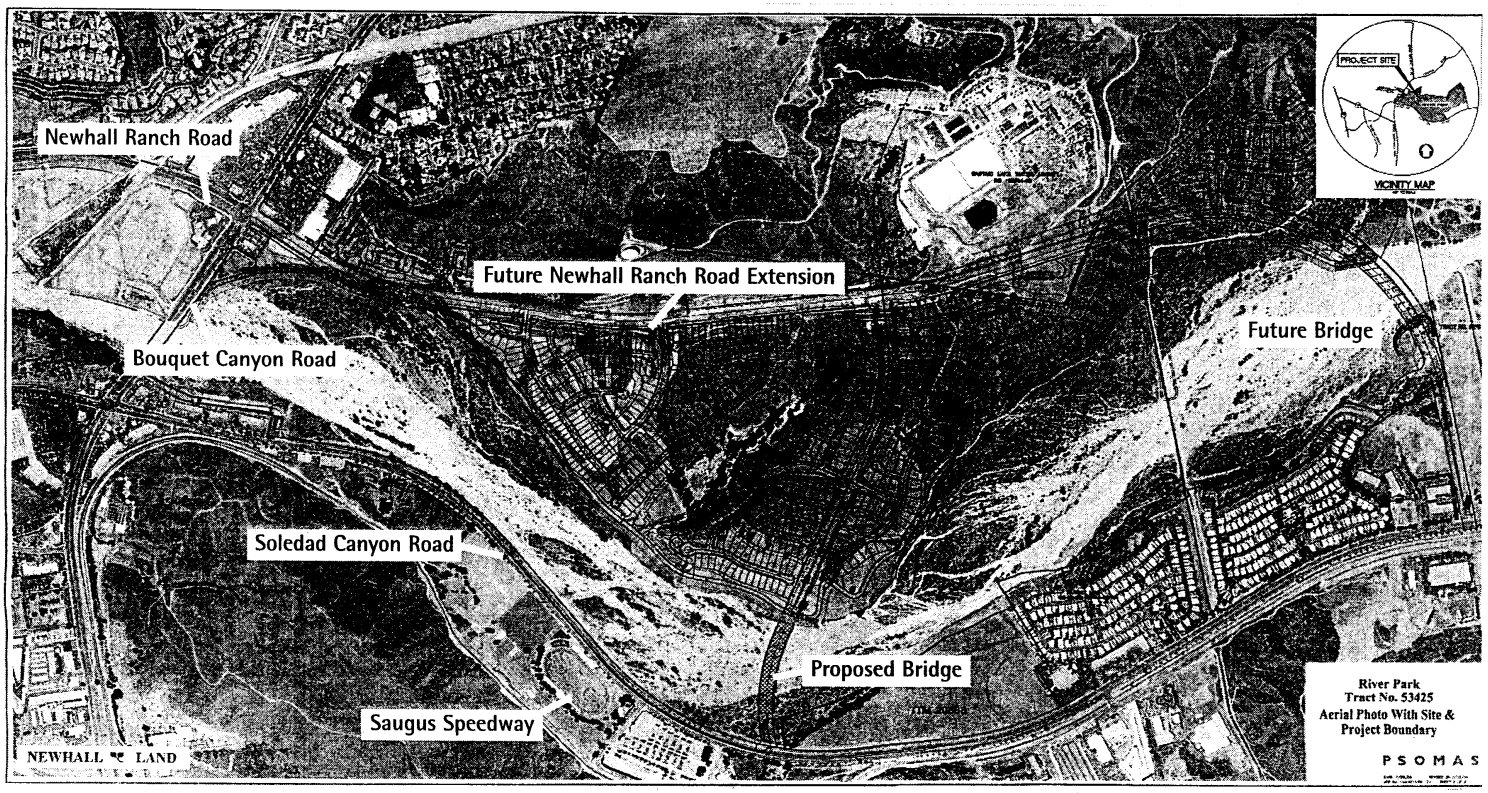
Proposed River Park Project Plans Announced



Aerial photo of the proposed River Park project, shows site and project boundary. The project is bordered on the north by the future Newhall Ranch Road extension. The road, a link in the Cross Valley Connector, will cross the river via a future bridge and join Golden Valley Road. A second river crossing is proposed at the project's midpoint.

By Rena' Cherrick
Staff Writer

In Jurassic Park-fashion, an excursion of 4x4s ascended up steep terrain and skirted through sandy riverbeds during a site tour of the Riverpark Project last week. Scheduled by the city's Planning Commission, it was an opportunity to acquaint individuals with the proposed site and educate the pub- spectacular view, as they are located near the riverbed, said Marlee Lauffer, vice president of communications for Newhall Land. However, many are concerned the river will be lost while others are concerned homes will face potential floods in the future. For homes located in the river's 100-year flood zone, precautions have been taken and new technology utilized- nector of Interstate 5 and the 14 freeway. In the future, the Santa Clarita Parkway will be completed to join the development to Soledad Canyon, but isn't currently scheduled for completion in this project.

As part of a vast valley of cascading hills and breathtaking views, the area also boasts of two Native American Village sites. One will be preserved while the other- ment," Lauffer said. However, a small number, approximately 15 oaks, will need to be relocated to another area. Three of these are heritage oak trees.

This area is also home to the Arroyo Toad, listed as an endangered species. In recent years, it has disappeared from 76 percent of its original historic range. With public trails and a 29-acre park, developers are confident they can-

Aerial photo of the proposed River Park project, shows site and project boundary. The project is bordered on the north by the future Newhall Ranch Road extension. The road, a link in the Cross Valley Connector, will cross the river via a future bridge and join Golden Valley Road. A second river crossing is proposed at the project's midpoint.

By Rena' Cherrick
Staff Writer

In Jurassic Park-fashion, an excursion of 4x4s ascended up steep terrain and skirted through sandy riverbeds during a site tour of the Riverpark Project last week. Scheduled by the city's Planning Commission, it was an opportunity to acquaint individuals with the proposed site and educate the public with detailed logistics.

As part of a development community by Newhall Land and Farming, the proposed site will include 1183 homes and a small retail center at the corner of Newhall Ranch Road and Bouquet Canyon Road. Single-dwelling homes will comprise 439 and the remaining 744 will comprise two apartment complexes. The larger complex will border Castaic Lake Water Agency and is referred to as the secondary ridgeline.

Many of the homes will offer a spectacular view, as they are located near the riverbed, said Marlee Lauffer, vice president of communications for Newhall Land. However, many are concerned the river will be lost while others are concerned homes will face potential floods in the future. For homes located in the river's 100-year flood zone, precautions have been taken and new technology utilized, Lauffer continued. Similar to the Bridgeport development, buried bank stabilization has proven quite successful. It will raise the area about 15 feet and will extend beyond the river corridor to about 100-feet. This new technology mixes natural soil with concrete and calls for the use of natural plants. In addition, a trail will run parallel to the corridor and add to the park-like setting, she said.

An extension of Newhall Ranch Road will cut across the property to join the city's Cross-Valley connector of Interstate 5 and the 14 freeway. In the future, the Santa Clarita Parkway will be completed to join the development to Soledad Canyon, but isn't currently scheduled for completion in this project.

As part of a vast valley of cascading hills and breathtaking views, the area also boasts of two Native American Village sites. One will be preserved while the other will be developed. However, before moving forward with any development the area will be studied and any artifacts will be collected. Jeff Hogan, associate planner for the city is unsure if they will find anything. Previously farming country, the land was used for agriculture purposes, he commented.

The site covers 700 acres with 87 oak trees scattered intermittently throughout. Many will remain to enhance the project's 400 acres of open space. "We tried to retain the natural environment," Lauffer said. However, a small number, approximately 15 oaks, will need to be relocated to another area. Three of these are heritage oak trees.

This area is also home to the Arroyo Toad, listed as an endangered species. In recent years, it has disappeared from 76 percent of its original historic range. With public trails and a 29-acre park, developers are confident they can protect the toad from further danger.

An environmental impact report is scheduled for release in mid-February and will address some potential areas of concern for many. In addition, a scheduled March 2 planning meeting will help to give residents a better idea of the site specifics. Depending on city approval, land development could begin as early as next year with a completed due date of two years, Lauffer said.

Letter No. 9

WATER RECLAMATION
SOLID WASTE MANAGEMENT

COUNTY SANITATION DISTRICTS
OF LOS ANGELES COUNTY

1955 Workman Mill Road, Whittier, CA 90601-1400
Mailing Address: P.O. Box 4998, Whittier, CA 90607-4998
Telephone: (562) 699-7411, FAX: (562) 699-5422
www.lacsd.org

JAMES F. STAHL
Chief Engineer and General Manager

March 16, 2004

File No. 31-150.10.26

RECEIVED
PLANNING DIVISION
MAR 18 2004
PLANNING AND BUILDING SERVICES
CITY OF SANTA CLARITA

Mr. Jeff Hogan, Associate Planner
City of Santa Clarita
23920 Valencia Boulevard, Suite 300
Santa Clarita, CA 91355-2196

Dear Mr. Hogan:

Notice of Completion/Availability on the Draft Environmental Impact Report
Riverpark Project

The County Sanitation Districts of Los Angeles County (Districts) received the above referenced Notice of Completion/Availability on March 3, 2004. Regarding solid waste management for the above-mentioned project in the City of Santa Clarita, the Districts offer the following comments:

Section 4.9, Solid Waste Disposal, Part 3, Existing Conditions, Subpart D, Landfill Expansion and Development Plans, of the Draft Environmental Impact Report currently states the following in reference to the status of the Puente Hills Landfill: "in the process of applying for expansion in order to provide additional capacity." The Draft Environmental Impact Report should be updated with the current tonnage limits and landfill life imposed by the current conditional use permit for the Puente Hills Landfill, which became effective November 1, 2003. Please note the following: the conditional use permit for the Puente Hills Landfill authorizes the disposal of a maximum of 13,200 tons per day. Typically, the landfill closes early due to this permit-imposed tonnage restriction. Disposal operations will continue under the conditional use permit until October 31, 2013, at which time the site will stop accepting waste for disposal. Permitted capacity and other information are detailed in the enclosed fact sheet. 1

In addition to the Puente Hills Landfill, the Puente Hills Materials Recovery Facility will also be available to the proposed project. The Puente Hills Materials Recovery Facility is scheduled to begin operating in September 2004. The facility is permitted to accept 4,400 tons per day and 24,000 tons per week of municipal solid waste. Permitted capacity and other information are detailed in the enclosed fact sheet. It is likely that the Puente Hills Materials Recovery Facility will start operating at 2,000 tons per day and, as market demand necessitates, will ultimately increase to full capacity. 2

If you have any questions regarding these comments, please contact the undersigned at the above listed telephone number, extension 2731.

Very truly yours,

James F. Stahl

John D. Kilgore
Supervising Engineer
Planning Section

JDK:MV:eg

Enclosures

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RECEIVED
PLANNING DIVISION
MAR 19 2004
PLANNING AND BUILDING SERVICES
CITY OF SANTA CLARITA

FACT SHEET
PUENTE HILLS LANDFILL

LOCATION:

2800 South Workman Mill Road
Whittier, CA 90601

Immediately southeast of the intersection of the San Gabriel Valley (I-605) Freeway and the Pomona (SR-60) Freeway, in unincorporated Los Angeles County.

PROJECT DESCRIPTION:

The 1365-acre Puente Hills Landfill site is owned and operated by the Sanitation Districts of Los Angeles County (Sanitation Districts) in compliance with federal, state and local standards. With the exception of certain holidays, the site is open to the public six days a week (Monday through Saturday) from 6:00 a.m. to 5:00 p.m. The Puente Hills Landfill operates under a local land use permit that is valid through October 31, 2013. The permit allows the landfill to accept a maximum of 13,200 tons of refuse per day.

The landfill operation is designed to eliminate or minimize any potential impacts on nearby residents. Refuse accepted for disposal is compacted by crawler tractors and compactors. Refuse is covered at the end of each workday with a combination of soil and various alternate daily cover materials, such as green waste, thermodegradable film, and foam. Various specific measures are employed to control potential nuisances due to noise, odor, litter, dust, and vectors and to minimize landfill traffic impacts and overall visual impacts.

BACKGROUND:

The site was first permitted as a privately owned landfill in 1957. In 1970, the Sanitation Districts purchased the site and took over operation of the landfill. Puente Hills Landfill accepts only non-hazardous solid and inert waste; the disposal of hazardous or liquid waste is not allowed. More than 101 million tons of refuse have been disposed of at the site.

Puente Hills Landfill operates in compliance with the following permits and requirements:

- Conditional Use Permit No. 02-027-(4) granted by the County Planning Commission on December 18, 2002.
- Solid Waste Facilities Permit (No. 19-AA-053) issued by the County of Los Angeles - Department of Health Services on July 11, 2003.
- Waste Discharge Requirements (Order No. 90-046, 91-035, 93-062, 93-070, 94-103, and 99-059) issued by the California Regional Water Quality Control Board, Los Angeles Region.

Revised November 2003

- **Dust and Litter Control**. Control of dust and litter is carried out on a continuous basis. Water trucks spray the access roads and excavation areas to control dust from truck traffic and landfill operations. Litter is controlled by litter fences and by the daily application of cover material. Sanitation Districts' employees routinely police the area for litter and debris. The Sanitation Districts enacted an ordinance, which requires vehicles using Puente Hills Landfill to cover their loads or pay an additional surcharge and be cited. Following three citations for uncovered loads, the customer faces suspension of disposal privileges. This ordinance acts as a deterrent to the littering of roadways on and off the Sanitation Districts' property.

- **Odor Control**. The Sanitation Districts have implemented several measures to control odors originating from incoming wastes, including, but not limited to, the use of wind machines or fans to dilute and disperse odors, the use of odor masking or neutralizing agents to reduce odors, and the rejection of odorous loads, where appropriate.

- **Neighborhood Response.** The Sanitation Districts have established a 24 hours a day neighborhood hotline (562) 692-5628, which allows residents to relate any landfill concerns to the Sanitation Districts. Sanitation Districts' personnel follow a standard procedure to investigate each concern and implement appropriate corrective actions, if necessary.

- **Illegally Deposited Wastes**. The Sanitation Districts and the County of Los Angeles - Department of Health Services monitor the disposal area on a continuous basis for illegally deposited hazardous, toxic or infectious wastes. All vehicles entering the site are screened for radioactive materials as they pass through the weigh scales. The Sanitation Districts have also instituted a load checking program consisting of a random selection of at least seven loads each day for a thorough search. If illegal wastes are found, they are transferred to appropriate off-site disposal facilities. The hauler whose load contained the illegal waste is charged for proper disposal and, for repeated violations, faces suspension of disposal privileges. Equipment operators, as well as inspectors, stationed in the active disposal area are trained to identify hazardous waste. This program acts as a strong deterrent to illegal disposal of wastes at the Puente Hills Landfill.

- **Landscape and Irrigation System**. Finished slopes of the landfill are landscaped, and irrigation systems are installed. Additional landscaping and irrigation systems will be installed as landfill operations progress. The Sanitation Districts have worked actively with surrounding communities to develop appropriate landscaping.

Revised November 2003

PUENTE HILLS MATERIALS RECOVERY FACILITY
FACT SHEET

LOCATION:

The Puente Hills Materials Recovery Facility (MRF) is located at 2808 Workman Mill Road, Whittier, California 90601. This location is approximately 14 miles east of downtown Los Angeles southeast of the intersection of the Pomona Freeway (SR-60) and the San Gabriel River Freeway (I-605) as shown in the attached map.

PROJECT DESCRIPTION:

The Puente Hills MRF will be owned and operated by the County Sanitation Districts of Los Angeles County (Sanitation Districts). The purpose of the Puente Hills MRF is to recover recyclable materials from commercial waste and to provide for the efficient transfer of the residual waste to permitted landfills for proper disposal. No waste or recyclables will be disposed of at the site.

The project is located on approximately 25 acres and comprises the processing building, administrative offices, scales, parking and maintenance areas. The processing building will be approximately 215,000 square feet is area and will be approximately 55 feet tall. Waste will be delivered to the processing building in collection trucks, which will discharge their loads inside of the enclosed building. Recyclable materials including various grades of paper and plastic will be recovered through a combination of manual and mechanical methods. Residual waste will be placed into large capacity trailers for transfer to permitted landfills. Initially, residual waste from the Puente Hills MRF will be directly hauled to landfills in trucks. By 2009, residual waste from the Puente Hills MRF will be delivered to rail yards for transfer to remote landfills via rail (waste-by-rail).

BACKGROUND:

The Puente Hills MRF is currently under construction with scheduled completion by late 2004. The facility is permitted to accept 4,400 tons per day and 24,000 tons per week of municipal solid waste. The disposal of liquid or hazardous waste will not be allowed.

PERMITS:

The Puente Hills MRF will be operated in compliance with the following permits, as well as other applicable technical permits:

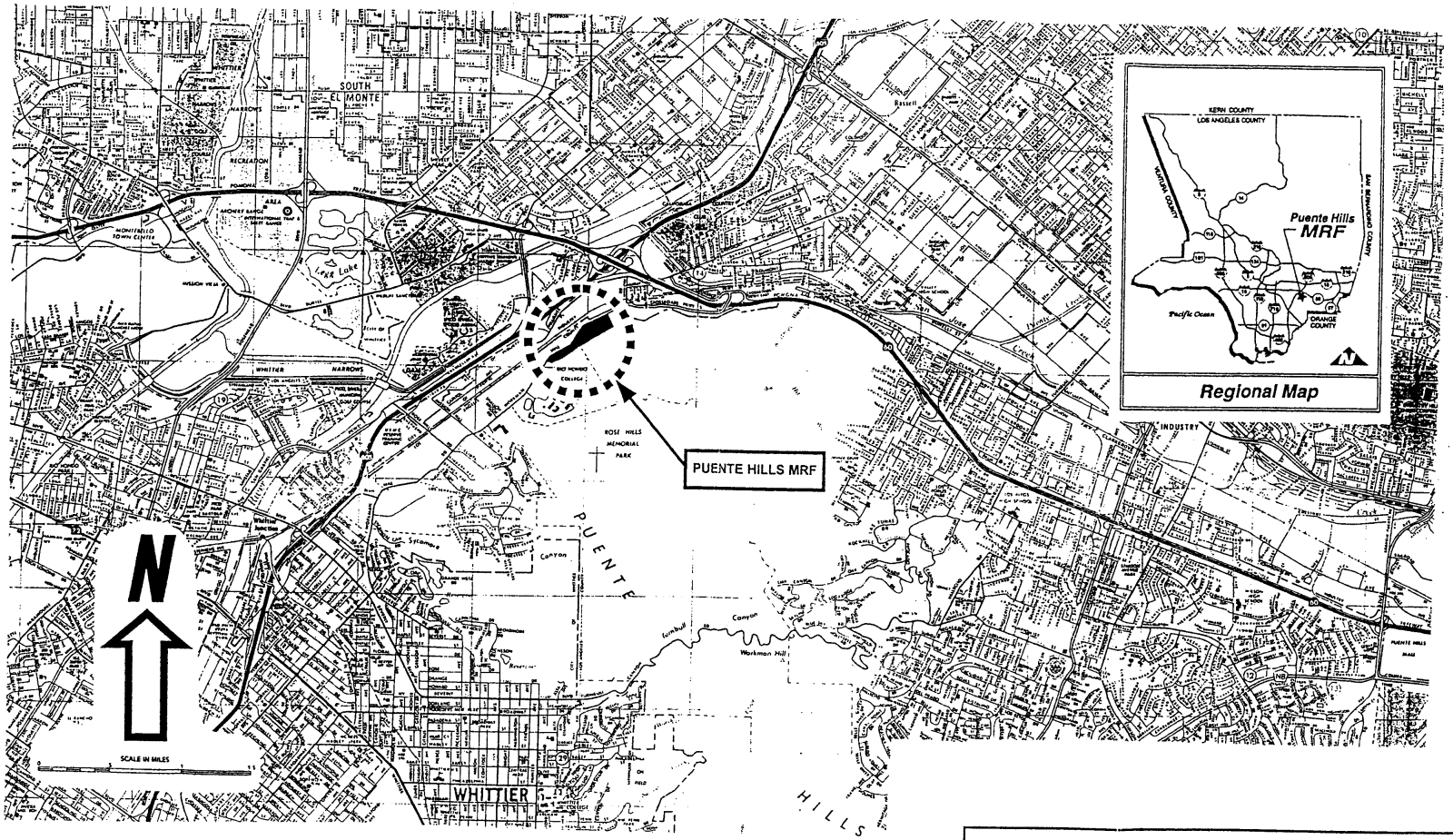
- Conditional Use Permit (CUP No. 92-251(4)) issued by the Los Angles County Board of Supervisors
- Oak Tree Permit (No. 92-251(4)) issued by the Los Angeles County Board of Supervisors.
- Solid Waste Facilities Permit (No. 19-AA-1043) issued by the Los Angeles County Department of Health Services.

ENVIRONMENTAL CONTROL FEATURES:

The Sanitation Districts will employ several environmental control systems to eliminate or reduce to minimal levels potential impacts on the environment and surrounding areas. These measures include:

- **Dust and Litter Control.** The Puente Hills MRF will be designed and operated to minimize the creation, emission, and accumulation of excessive dust, particulates, and litter. Measures to control dust at the Puente Hills MRF will include a water misting system inside the facility to remove dust and particulates from the air. Additionally, the site will be checked for litter and the parking lots, access roads and the site entrance will be swept daily to remove dirt, dust and litter. The Sanitation Districts will require all customers using the facility to cover their loads in order to reduce litter.

Last Updated: August 4, 2003



SITE LOCATION MAP

Letter No. 8

State of California – The Resources Agency ARNOLD SCHWARZENEGGER, *Governor*

DEPARTMENT OF FISH AND GAME
http://www.dfg.ca.gov
4949 Viewridge Avenue
San Diego, CA 92123
(858) 467-4201

May 6, 2004

BY FACSIMILE AND U.S. MAIL

Mr. Jeff Hogan
City of Santa Clarita
Department of Planning and Building Services
23920 Valencia Boulevard
Santa Clarita, CA 91355
Fax No.: (661) 259-8125

Draft Environmental Impact Report and Revised Biology Section for the Draft Environmental Impact Report for the Riverpark Project SCH # 2002091081, Los Angeles County

Dear Mr. Hogan:

The following statements and comments have been prepared pursuant to the Department of Fish and Game's (Department) authority as Trustee Agency with jurisdiction over natural resources affected by the project (CEQA Section 15386) and pursuant to our authority as a Responsible Agency under CEQA Section 15381 over those aspects of the proposed project that come under the purview of the California Endangered Species Act (Fish and Game Code Section 2050 et seq) and Fish and Game Code Section 1600 et seq.:

The Draft Environmental Impact Report (DEIR) for the proposed project includes development of 695.4 acres of land for single and multi-family uses and commercial uses to include 1,183 dwelling units, 40,000 square feet of commercial uses, a recreational trail system, a 29-acre active/passive park, associated infrastructure and 442 acres of open space area focusing around the Santa Clara River. The project would also include the extension of Newhall Ranch Road including the Newhall Ranch Road/Golden Valley Road Bridge over the Santa Clara River to the Golden Valley Road/Soledad Canyon Road flyover. The project would include the construction of a portion of Santa Clarita Parkway from Newhall Ranch Road south for approximately 1,500 square feet. The project is located at the eastern terminus of Newhall Ranch Road, east of Bouquet Canyon Road between Castaic Lake Water Agency property and Soledad Canyon Road in the central part of the City of Santa Clarita.

The majority of the project site is undeveloped and supports 14 plant communities, including riversidian sage scrub, inland holly-leaf cherry scrub, mulefat scrub, southern willow scrub, southern riparian scrub, mixed oak and grass and riverwash. Areas within the project site not supporting native vegetative communities are presently used and have been used historically for agricultural purposes with some existing buildings, disturbed areas and areas reverting back to ruderal and natural vegetative communities.

The Santa Clara River and several tributaries to the Santa Clara River are within the proposed project site. The project proposes various construction activities within the Santa Clara River including bank protection and removal of riparian habitat and will be addressed through the approved Natural Rivers Management Plan (NRMP). The Department's comments in this response letter will focus on impacts to six Department jurisdictional drainages, tributaries to the Santa Clara River which are not included within the NRMP.

Impacts to Biological Resources

1. Western Spadefoot - The revised biology section of the DEIR acknowledges the presence of western spadefoot toad, a California Species of Special Concern, within three of six seasonal ponds on the project site. All of the breeding ponds for western spadefoot are proposed for removal by the project.

   a. The continual loss of western spadefoot habitat within the Santa Clarita Valley, and Southern California as a whole, concerns the Department. The seasonal pools and associated uplands and floodplains habitats associated with the species are often lost with project development. Mitigation measures for this species are often experimental, and not always successful. The recent discovery of western spadefoot on the project site, despite past negative survey results for this species suggests the potential undocumented loss of occupied habitat for this species in the Santa Clarita area. These potential undocumented losses increase the importance of the known populations on the project site. The preservation, avoidance and protection of all existing seasonal pools which support or could support western spadefoot should be accomplished on the project site. (1)

   b. If the lead agency determines that avoidance of western spadefoot habitat is not feasible, creation of breeding pools and protection of adjacent unfragmented suitable upland habitat should be made a condition of project approval. The Department recommends the creation of at least two to three separate pools which are situated away from the developed footprint areas and not subject to human disturbances such as artificial night lighting, pollution, fuel management activities, etc. Human access to the pool should be discouraged with all proposed roads and recreational trails situated a minimum of 150 feet from the pools as the egg and larval stages of western spadefoot are susceptible to human disturbances such as collecting, and disturbances to the sites from foot traffic, bicycles, dirt bikes, pets, etc. Location of any created pool should be done in consultation with and approved by the Department as a condition of lead agency approval of the project. (2)

   c. The Department also recommends the relocation of the 16-foot wide equestrian trail from the portion of the Santa Clara River near the Los Angeles Aquaduct pipeline. This portion of the trail should be relocated adjacent to the bike/pedestrian trail located further up the hillside. The Department, in general, does not approve of equestrian trails within the 100-year flood plain for a variety of reasons; especially when other options are available. This particular section of the equestrian trail would come within 100 feet of areas currently being proposed by the project proponent for Spadefoot toad mitigation. Due to the size of the development, and the specific habitat requirements of the Spadefoot toad, few areas are suitable (3)

for mitigation. The Department requests the lead agency make the relocation of the trail a condition of approval for the project. Without trail relocation the Department may be unable to accept the mitigation measures for Spadefoot toad as adequate, and therefore meeting the lead agencies responsibilities under CEQA Section 15021. 3

2. San Diego Black-tailed jackrabbit - The DEIR states that the San Diego black-tailed jackrabbit is common where it occurs in the region and abundant in coastal Orange County and the high deserts of Los Angeles County; that displaced individuals of this jackrabbit species will disperse to remaining open space; and that individuals lost i.e. killed by the project is expected to be low. This conclusion is difficult to draw since population estimates were not submitted with the DEIR. 4

   a. It is the Department's opinion that the project will result in a cumulative adverse impact to San Diego black-tailed jackrabbit, a California Species of Special Concern. This subspecies is localized within the coastal plains of southern California including the Santa Clara River Valley. These areas have been and are continuing to be heavily developed and degraded. Jackrabbits do not adapt well to habitat losses and associated disturbances from human proximity. These disturbances include, but are not limited to, increased recreational uses, incursion of dogs and cats, shooting, homeless encampments, etc. all of which may be prohibited through mitigation measure but in reality are difficult to enforce. The assumption that displaced jackrabbits will somehow survive by dispersing into remaining degraded open areas of uncertain protected status does not meet the mitigation requirements set forth and described under Section 15021 of CEQA. Insufficient mitigation measure for this subspecies will further assist its decline and may in the future cause more restrictive regulatory measures to protect this resource. The Department recommends a more detailed discussion in the EIR of the project related impacts to San Diego black-tailed jackrabbit with a tangible habitat avoidance and/or preservation element. 5

3. Native Nesting Birds - Project impacts on nesting native birds should be evaluated. The proposed project will result in removal and/or disturbance of vegetation and ground substrates and therefore has the potential to directly impact nesting native bird species. 6

   a. Migratory nongame native bird species are protected by international treaty under the Federal Migratory Bird Treaty Act(MBTA) of 1918(50 C.F.R. Section 10.13). Sections 3503, 3503.5 and 3513 of the California Fish and Game Code prohibit take of all birds and their active nests including raptors and other migratory nongame birds (as listed under the Federal MBTA). 7

   b. Proposed project activities (including disturbances to native and non-native vegetation and man-made nesting substrates) should take place outside of the breeding bird season which generally runs from March 1- September 1 (as early as February 1 for raptors) to avoid take (including disturbances which would cause abandonment of active nests containing eggs and/or young). Take means to hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture or kill (Fish and Game Code Section 86). 8

   c. If the project activities cannot feasibly avoid the breeding bird season, the Department recommends that beginning thirty days prior to the disturbance of 9

suitable nesting habitat the project proponent should arrange for weekly bird surveys to detect any protected native birds in the habitat to be removed and any other such habitat within 300 feet of the construction work area (within 500 feet for raptors). The surveys should be conducted by a qualified biologist with experience in conducting breeding bird surveys. The surveys should continue on a weekly basis with the last survey being conducted no more than three days prior to the initiation of clearance/construction work. If a protected native bird is found, the project proponent should delay all clearance/ construction disturbance activities in suitable nesting habitat or within 300 feet of nesting habitat (within 500 feet for raptor nesting habitat) until August 31 or continue the surveys in order to locate any nests. If an active nest is located, clearing and construction within 300 feet of the nest (within 500 feet for raptor nests) shall be postponed until the nest is vacated and juveniles have fledged and when there is no evidence of a second attempt at nesting. Limits of construction to avoid a nest should be established in the field with flagging and stakes or construction fencing. Construction personnel should be instructed on the sensitivity of the area. The project proponent should record the results of the recommended protective measures described above to document compliance with applicable State and federal laws pertaining to the protection of native birds. 9

Impacts to Botanical Resources

1. Sage Scrub Habitat - The DEIR states that the proposed project will result in the loss of 22.6 acres of planted sage scrub and 76.3 acres of Riversidian sage scrub and that the loss of these vegetative communities would not be considered significant. The biological mitigation section in the DEIR does not discuss mitigation for loss of sage scrub habitat. 10

   a. Portions of the proposed project site are included by the U.S. Fish and Wildlife Service as proposed critical habitat for the coastal California gnatcatcher (CGC). Proposed loss of habitat for CGC should be considered a significant cumulative impact as this species has been observed in several locations within the Santa Clarita area on private lands which have been or are proposed for development. 11

   b. It is not clear in the DEIR if the planted sage scrub area to be developed was planted as mitigation for loss of this plant community for a previous project. Continued loss of habitat for CGC from development and human induced wildfire within and near areas designated as and/or considered for critical habitat does not favor the recovery of this species. Sage scrub habitat on the project site should be avoided and where infeasible preserved at an off site location or as a last resort, created within protected undeveloped areas on the project site. 12

2. Holly-leafed Cherry - Table 4.6-4 of the DEIR states that 8.3 acres of holly-leafed cherry will be temporarily impacted by the proposed project and 2.9 acres will be permanently impacted for a total of 11.2 acres impacted out of a total of 12.9 acres on the project site. 13

   a. The Department considers holly-leafed cherry woodland a declining vegetative community the loss of which would be considered a significant adverse impact to wildlife habitat. This vegetative community is being systematically eliminated and/or degraded within the Santa Clara River watershed by 14

development. It is unclear what temporary impacts to this plant community entails other than the removal of individuals and replanting of this species which will still result in an unacceptable impact to this resource. All holly-leafed cherry habitat should be avoided by project activities. Any project activity which may further result in additional loss of holly-leafed cherry habitat by facilitating future road projects or other developments in adjacent off site areas should be redesigned to avoid these impacts. 14

3. Sensitive Botanical Species - The DEIR states that additional field surveys shall be conducted to minimize direct losses to Parry's larkspur, slender mariposa lily and Plummer's mariposa lily. Identified plants discovered within the project footprint shall be removed and replanted onto cut slopes or other appropriate habitats. The DEIR further indicates that Resource Management and Monitoring Plan (RMMP) including the management, monitoring, success criteria and adaptive management guidelines for the mitigation of impacts to these species shall also be identified at a future time before grading permits are issued for the project. 15

   a. The Department generally does not support the use of relocation, salvage, and/or transplantation as mitigation for impacts to rare, threatened, or endangered plant species. Department studies have shown that these efforts are experimental in nature and largely unsuccessful.

   b. The Department recommends conducting comprehensive focused survey for special status plant species early in the project planning stage so that surveys may be done at optimum times of the year and during a year/s of ample rainfall to maximize detection. If special status species are found then project plans may be drawn to avoid these resources on the site and avoid the necessity of relocation as a mitigation proposal. 16

   c. If avoidance is not feasible the Department recommends the acquisition (at a minimum of a 2:1 mitigation ratio) and protection in perpetuity of habitat supporting the target species. Acquisition should occur at an area which has equal or superior habitat values for impacted species. Relocation of sensitive plant species should only be proposed as a last resort when avoidance has been demonstrated to be infeasible. All relocation plans including methods, monitoring and success criteria in the RMMP should be included in the EIR for public review for adequacy. If the RMMP is not disclosed during the public comment period for the proposed project, recommended measures by reviewing parties to address deficiencies need not be considered by the lead agency which is not in the best interest of assuring successful mitigation goals. The RMMP should be approved by the Department as a condition for project approval by the lead agency. 17

   d. In order to assure for any tangible mitigation the EIR should discuss land acquisition and protection in perpetuity for sensitive plant species as a backup to the proposed relocation plan if relocation efforts have shown to fail years later. A security should be established in the amount necessary for said land acquisition which can be drawn upon in the event that relocation measures fail for sensitive plant species. This subsequent measure to assure for successful mitigation should be made a condition of project approval. Please contact Ms. Mary Meyer, Plant Ecologist, at (805) 640-8019 to discuss further. 18

Impacts to Riparian Resources

1. Department Jurisdictional Drainages - The proposed project will result in the loss (filling in) of six tributary drainages to the Santa Clara River and that an amendment or variance to the Natural Rivers Management Plan will be implemented to mitigate for loss of riparian resources.

   a. The Department would prefer that the proposed project be redesigned to avoid the destruction of jurisdictional drainages. All drainages should be avoided and provided with substantial setbacks which preserve their value to on-site and off-site wildlife populations.

   b. Because the above referenced drainages are outside the NRMP planning area the Department will requires a separate Streambed Alteration Agreement (SAA), pursuant to Section 1600 et seq. of the Fish and Game Code, with the applicant prior to any direct or indirect impact (including preliminary geotechnical activities) of any Department jurisdictional streambed, bank or channel or associated riparian resources. The Department's issuance of a SAA is considered a project that is subject to CEQA. To facilitate our issuance of the Agreement, the Department as a responsible agency under CEQA may consider the local jurisdiction's (lead agency) document for the project. To minimize additional requirements by the Department under CEQA the document should fully identify the potential impacts to any, stream or riparian resources and provide adequate avoidance, mitigation, monitoring and reporting commitments for issuance of the Agreement. Mitigation ratios for the permanent loss of jurisdictional drainages are generally calculated at a 5:1 ratio. Early consultation is recommended, since modification of the proposed project may be required to avoid or reduce impacts to fish and wildlife resources.

2. Impacts to Mature Cottonwoods - Following a 3/12/04 site tour by Department staff it was the Department's understanding that bank protection was proposed to be pulled farther back out of the Santa Clara drainage although the NRMP had authorized the bank stabilization to encroach farther into the drainage at this location.

   a. Although pulling back bank stabilization reduces impacts to the Santa Clara River bed, the result of doing so at the described location will result in the loss of several mature cottonwood trees. The Department recommends pulling back the bank protection farther back to avoid destruction of these trees. Riparian woodlands along the Santa Clara are vital to nesting raptors and other bird species and provide important shading which helps to retain soil moisture for a multitude of wildlife species. As groundwater within the region continues to drop, establishing a riparian canopy along the river may become increasingly difficult with mitigation plantings being more dependent on supplemental water until their root system develops deep enough to tap into the water table. It is best to leave established mature trees along the river in place as these trees are continuing to survive changing conditions and past drought cycles.

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In conclusion, the Department recommends that the above concerns are addressed prior to lead agency approval of the proposed project. Mitigation suggestions should be made a condition of project approval by the lead agency.

Thank you for this opportunity to provide comment. Questions regarding this letter and further coordination on these issues should be directed to Mr. Scott Harris, Associate Wildlife Biologist, at (626) 797-3170.

Sincerely,

C. F. Raysbrook
Regional Manager

cc: Ms. Morgan Wehtje, Camarillo
Ms. Terri Dickerson, Laguna Niguel
Mr. Scott Harris, Mission Hills
Ms. Mary Meyer, Ojai
CFR-Chron; HCP-Chron
Department of Fish and Game

State Clearinghouse
Sacramento

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Letter No. 7

California Regional Water Quality Control Board

Los Angeles Region

Terry Tamminen
Secretary for Environmental Protection

Over 51 Years Serving Coastal Los Angeles and Ventura Counties
Recipient of the 2001 *Environmental Leadership Award* from Keep California Beautiful

320 W. 4th Street, Suite 200, Los Angeles, California 90013
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Arnold Schwarzenegger
Governor

April 29, 2004

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CITY OF SANTA CLARITA

Mr. Jeff Hogan, Associate Planner
City of Santa Clarita
23920 Valencia Boulevard, Suite 300
Santa Clarita, CA 91355-2196

REVIEW OF THE DRAFT PROGRAM ENVIRONMENTAL IMPACT REPORT FOR THE RIVERPARK PROJECT IN THE CITY OF SANTA CLARITA

Dear Mr. Hogan:

Thanks for the opportunity to review and comment on the Draft Program Environmental Impact Report (EIR) for Riverpark Project in the City of Santa Clarita. This letter summarizes our comments on the draft program EIR.

The Los Angeles Regional Water Quality Control Board (Regional Board) is a State agency that deals with water quality issues. Therefore, our review was limited to the sections on Water Quality.

We have several comments on the Water Quality section and Water Quality Technical Report:

Section 4.8.1 Water Quality

Pg. 27 - Better site designs are very effective Best Management Practices (BMPs) in preventing pollutants from entering storm and non-storm runoff. Please identify Better Site Design BMPs that are relevant to the project. (1)

Pg. 60 – To the extent possible, the City of Santa Clarita should be responsible for the inspection and maintenance of post-construction BMPs for this project. Home Owners Associations (HOA) are not always diligent in operating and maintaining BMPs. Also, the HOA can dissolve or be transferred to another entity. (2)

Pg. 60 – Please summarize inspection and maintenance schedule for the project BMPs on a table format. Also, if HOA ends up being responsible for operation and maintenance of project BMPs, there needs to be a legal agreement to ensure implementation of this program. In addition, the City of Santa Clarita must also conduct follow-up inspections on annual basis (at minimum) to make sure that post-construction BMPs are being properly maintained. (3)

Pg. 71, Table 4.8.1-11 – There should be some reduction in average annual runoff volume with the implementation of BMPs. For example, biofilters such as swales should result in decrease in runoff volumes due to evapotranspiration and infiltration. (4)

Pg. 95 - Los Angeles County Municipal Separate Storm Sewer System (MS4) Permit (Order No. 01-182) requires street sweeping twice a month for high traffic areas and no less than once a year for low traffic areas. Please increase the street sweeping frequency from once a month to twice a month for high traffic areas. 5

Appendix 4.8 Water Quality Technical Report

Pg. 4 – In accordance with the Los Angeles County MS4 Permit, the City of Santa Clarita must periodically inspect the legibility of the catch basin stencil or label. Catch basins with illegible stencils shall be recorded and re-stenciled or re-labeled within 180 days of inspection. 6

Pg. 6 – Common Area Drainage Facility Inspection and Cleaning must be performed per schedule outlined on pg. 48 of the Los Angeles County MS4 Permit. 7

Pg. 8 – The Los Angeles County SUSMP requires that runoff from approximately the 85th percentile storm to be treated. This is equivalent to 0.75-inch storm event based on downtown Los Angeles Rain gage. The Newhall Ranch area typically receives larger storms and more overall rainfall than downtown Los Angeles. For sizing criteria, please use rainfall data from a local rain gage. The Stormwater Management Model modeling analysis for the River Village Project (*Stormwater Quality Assessment and Water Quality Management Plan for the Newhall Ranch Development, December 30, 2002*) recommended a design storm depth of 1.15 inches to achieve 80 percent capture and treatment of stormwater runoff. 8

Pg. 11 – Please include discussion on sizing criteria for flow-based BMP such as Biofiltration Swales. Again, rainfall data from a local rain gage should be used for this analysis. 9

If you have any questions, please do not hesitate to contact me at (213) 620-2093.

Sincerely,

Michael Yang, P.E.
Associate Water Resources Control Engineer

cc:
Michael Lauffer, State Water Resources Control Board
Bruce Fujimoto, State Water Resources Control Board
Eugene Bromley, U.S. Environmental Protection Agency, Region 9
Dan Lafferty, Los Angeles County Department of Public Works

Letter No. 6

STATE OF CALIFORNIA–THE RESOURCES AGENCY ARNOLD SCHWARZENEGGER, *Governor*

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FAX (310) 589-3207

April 26, 2004

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Jeff Hogan
Associate Planner
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Santa Clarita, California 91355

Riverpark Revised Biology Section of the DEIR Comments
SCH# 2002091081

Dear Mr. Hogan:

The Santa Monica Mountains Conservancy (Conservancy) is concerned about the biological resources on the project site and Santa Clara River watershed.

Western spadefoot toads
The Revised Biology Section of the Draft Environmental Impact Report (DEIR) is being circulated in response to the discovery of western spadefoot toads on the proposed project site. Approximately 16 to 20 pairs of western spadefoot toads and many egg masses were discovered in March 2004. They were discovered in three seasonal rainpools on the proposed project site.

The locations where the toads occur will be destroyed by the proposed development. The development footprint was not changed at all upon the discovery of the toads on the proposed project site. The development footprint should be reduced in size to accommodate and preserve the toad habitat. 1

The proposed mitigation for the impacts to the toads is to create ponds in the undeveloped portion of the proposed project site and transplant the toads to the created ponds. The Revised Biology Section is deficient for failing to provide a detailed plan on the creation of the toad habitat. 2

The design and creation of the habitat must be accomplished by an expert, who has done the design and creation of numerous other functioning wetlands and vernal pools. The mitigation ratio for the created habitat must be 2:1 at a minimum. 3

Before the toads are transplanted into the newly created pools, the water quality must be surveyed and determined to be safe for the toads. The toads should only be transplanted during the breeding season to ensure that the maximum number of toads are transplanted. For 4

the best results, the toads should be collected in two consecutive years prior to construction activities taking place in existing occupied habitat. 5

Western spadefoot toads reach reproductive maturity at three years. One of the performance criteria of the project must include the identification of tadpoles in the created habitat. 6
Tadpoles should especially be in the ponds between years three and four after transplantation. 7

Fairy shrimp

When the project site was originally surveyed for the Draft Environmental Impact Report (DEIR), no seasonal pools were discovered. However in March 2004 and maybe in 2003, six seasonal pools were detected on the project site. Three of those pools had a long enough duration to sustain western spadefoot toads. The Revised Biology Section states for the federally endangered San Diego and Riverside fairy shrimps that they are not expected to occur on the proposed project site because the "soils present on site are not suitable to support vernal/seasonal pools." Fairy shrimp and western spadefoot toads can co-occur in the same ponds. Both fairy shrimp and spadefoot toads require water to remain in the ponds for a similar duration of time. 8 9

The Revised Biology Section is deficient for failing to perform surveys, following U.S. Fish and Wildlife Service protocols, for Riverside and San Diego fairy shrimp. These surveys for fairy shrimp must be done during the 2005 ponding season before any construction occurs. 10

Open Space

To adequately mitigate the permanent loss of river adjacent habitat, the undeveloped open space on the proposed project site must be dedicated to a park agency for management and maintenance. To adequately maintain and protect the western spadefoot toad habitat and open space, the funds for maintenance of the property should be raised through the establishment of a Community Facilities District (CFD). 11

The Conservancy appreciates the opportunity to comment. Please direct any questions or future documents to Susan Shanks of our staff at (310) 589-3200 ext. 124 and at the above Ramirez Canyon Park address.

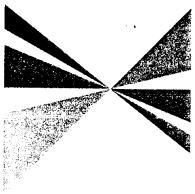
Sincerely,

Jerome C. Daniel

JEROME C. DANIEL
Chairperson

Letter No. 5

SOUTHERN CALIFORNIA



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Ventura County: Judy Mikels, Ventura County • Glen Becerra, Simi Valley • Carl Morehouse, San Buenaventura • Toni Young, Port Hueneme

Orange County Transportation Authority: Charles Smith, Orange County

Riverside County Transportation Commission: Robin Lowe, Hemet

Ventura County Transportation Commission: Bill Davis, Simi Valley

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April 26, 2004

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CITY OF SANTA CLARITA

Mr. Jeff Hogan
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RE: **Comments on the Draft Environmental Impact Report for the RiverPark Project – SCAG No. I 20040121**

Dear Mr. Hogan:

Thank you for submitting the **Draft Environmental Impact Report for the RiverPark Project** to SCAG for review and comment. As areawide clearinghouse for regionally significant projects, SCAG reviews the consistency of local plans, projects, and programs with regional plans. This activity is based on SCAG's responsibilities as a regional planning organization pursuant to state and federal laws and regulations. Guidance provided by these reviews is intended to assist local agencies and project sponsors to take actions that contribute to the attainment of regional goals and policies.

It is recognized that the proposed Project considers a Tentative Tract Map, Zone Change and General Plan Amendment, Conditional Use Permit, Review and Oak Tree Permit for the development of approximately 1,183 dwelling units. The proposed Project will be developed on approximately 695 acres, and is located east of Bouquet Canyon Road and north of Soledad Canyon Road in the City of Santa Clarita.

SCAG staff has evaluated the **Draft Environmental Impact Report for the RiverPark Project** for consistency with the Regional Comprehensive Plan and Guide (RCPG) and Regional Transportation Plan (RTP). The Draft EIR does not include an analysis of project consistency with relevant and applicable policies of SCAG's RCPG and RTP, which were outlined in our November 17, 2003 letter on the Notice of Preparation (NOP) for this Draft EIR. . It would be helpful if the Final EIR would provide a discussion and address the manner in which the proposed Project is consistent with or detracts from the achievement of RCPG and RTP policies. SCAG's November 17, 2003 letter is attached for your information. 1

We expect the Final EIR to specifically cite the appropriate SCAG policies and address the manner in which the Project is consistent with applicable core policies or supportive of applicable ancillary policies. Please use our policy numbers to refer to them in your Draft EIR. Also, we would encourage you to use a side-by-side comparison of SCAG policies with a discussion of the consistency or support of the policy with the proposed Project. 2

Based on the information provided in the Draft EIR, we are unable to determine whether the Project is consistent with SCAG policies. If you have any questions, please contact me at (213) 236-1867. Thank you.

Sincerely,

JEFFREY M. SMITH, AICP
Senior Regional Planner
Intergovernmental Review

Attachment: SCAG Letter, November 17, 2003 – SCAG No. I 20030603

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Ventura County: Judy Mikels, Ventura County • Glen Becerra, Simi Valley • Carl Morehouse, San Buenaventura • Toni Young, Port Hueneme

Riverside County Transportation Commission: Robin Lowe, Hemet

Ventura County Transportation Commission: Bill Davis, Simi Valley

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November 17, 2003

Mr. Jeff Hogan
Associate Planner
City of Santa Clarita
Department of Planning and Building Services
23920 Valencia Boulevard
Santa Clarita, CA 93155

RE: **Comments on the Revised Notice of Preparation for a Draft Environmental Impact Report for the Riverpark (Panhandle) Project – SCAG No. I 20030603**

Dear Mr. Hogan:

Thank you for submitting the **Revised Notice of Preparation for a Draft Environmental Impact Report for the Riverpark (Panhandle) Project** to SCAG for review and comment. As areawide clearinghouse for regionally significant projects, SCAG reviews the consistency of local plans, projects, and programs with regional plans. This activity is based on SCAG's responsibilities as a regional planning organization pursuant to state and federal laws and regulations. Guidance provided by these reviews is intended to assist local agencies and project sponsors to take actions that contribute to the attainment of regional goals and policies.

We have reviewed the **Revised Notice of Preparation**, and have determined that **the proposed Project is regionally significant per California Environmental Quality Act (CEQA) Guidelines (Section 15206).** The proposed Project considers the construction of more than 500 dwelling units. CEQA requires that EIRs discuss any inconsistencies between the proposed project and the applicable general plans and **regional plans (Section 15125 [d]).** If there are inconsistencies, an explanation and rationalization for such inconsistencies should be provided.

Policies of SCAG's Regional Comprehensive Plan and Guide and Regional Transportation Plan, which may be applicable to your project, are outlined in the attachment. **We expect the DEIR to specifically cite the appropriate SCAG policies and address the manner in which the Project is consistent with applicable core policies or supportive of applicable ancillary policies. Please use our policy numbers to refer to them in your DEIR. Also, we would encourage you to use a side-by-side comparison of SCAG policies with a discussion of the consistency or support of the policy with the Proposed Project.**

Please provide a minimum of 45 days for SCAG to review the DEIR when this document is available. If you have any questions regarding the attached comments, please contact me at (213) 236-1867. Thank you.

Sincerely,

JEFFREY M. SMITH, AICP
Senior Regional Planner
Intergovernmental Review

COMMENTS ON THE REVISED PROPOSAL TO DEVELOP A DRAFT ENVIRONMENTAL IMPACT REPORT FOR THE RIVERPARK (PANHANDLE) PROJECT SCAG NO. I 20020494

PROJECT DESCRIPTION

The proposed Project considers a Tentative Tract Map, Zone Change and General Plan Amendment, Conditional Use Permit, Review and Oak Tree Permit for the development of approximately 1,183 dwelling units. The proposed Project will be developed on approximately 695 acres, and is located east of Bouquet Canyon Road and north of Soledad Canyon Road in the City of Santa Clarita.

CONSISTENCY WITH REGIONAL COMPREHENSIVE PLAN AND GUIDE POLICIES

The **Growth Management Chapter (GMC)** of the Regional Comprehensive Plan and Guide (RCPG) contains the following policies that are particularly applicable and should be addressed in the Draft EIR for the Riverpark (Panhandle) Project.

3.01 The population, housing, and jobs forecasts, which are adopted by SCAG's Regional Council and that reflect local plans and policies, shall be used by SCAG in all phases of implementation and review.

Regional Growth Forecasts

The Draft EIR should reflect the most current SCAG forecasts which are the 2001 RTP (April 2001) Population, Household and Employment forecasts for the North Los Angeles County Council of Governments (NLACOG) subregion and the City of Santa Clarita. These forecasts are as follows:

NLACOG Subregion	2000	2005	2010	2015	2020	2025
Population	576,478	658,450	786,419	912,257	1,083,020	1,259,354
Household	174,293	211,038	264,936	319,701	378,169	442,773
Employment	187,780	218,429	250,111	268,842	285,963	304,163

City of S. Clarita	2000	2005	2010	2015	2020	2025
Population	146,415	151,226	166,822	182,158	202,970	224,960
Household	48,571	54,372	60,227	66,197	72,555	79,581
Employment	48,971	50,783	52,846	54,064	55,179	56,366

3.03 The timing, financing, and location of public facilities, utility systems, and transportation systems shall be used by SCAG to implement the region's growth policies.

GMC POLICIES RELATED TO THE RCPG GOAL TO IMPROVE THE REGIONAL STANDARD OF LIVING

The Growth Management goals to develop urban forms that enable individuals to spend less income on housing cost, that minimize public and private development costs, and that enable firms to be more competitive, strengthen the regional strategic goal to stimulate the regional economy. The evaluation of the proposed project in relation to the following policies would be intended to guide efforts toward achievement of such goals and does not infer regional interference with local land use powers.

3.05 Encourage patterns of urban development and land use, which reduce costs on infrastructure construction and make better use of existing facilities.

3.09 Support local jurisdictions' efforts to minimize the cost of infrastructure and public service delivery, and efforts to seek new sources of funding for development and the provision of services.

3.10 Support local jurisdictions' actions to minimize red tape and expedite the permitting process to maintain economic vitality and competitiveness.

GMC POLICIES RELATED TO THE RCPG GOAL TO IMPROVE THE REGIONAL QUALITY OF LIFE

The Growth Management goals to attain mobility and clean air goals and to develop urban forms that enhance quality of life, that accommodate a diversity of life styles, that preserve open space and natural resources, and that are aesthetically pleasing and preserve the character of communities, enhance the regional strategic goal of maintaining the regional quality of life. The evaluation of the proposed project in relation to the following policies would be intended to provide direction for plan implementation, and does not allude to regional mandates.

3.12 Encourage existing or proposed local jurisdictions' programs aimed at designing land uses which encourage the use of transit and thus reduce the need for roadway expansion, reduce the number of auto trips and vehicle miles traveled, and create opportunities for residents to walk and bike.

3.14 Support local plans to increase density of future development located at strategic points along the regional commuter rail, transit systems, and activity centers.

3.17 Support and encourage settlement patterns, which contain a range of urban densities

3.18 Encourage planned development in locations least likely to cause environmental impact.

3.19 SCAG shall support policies and actions that preserve open space areas identified in local, state and federal plans.

3.20 Support the protection of vital resources such as wetlands, groundwater recharge areas, woodlands, production lands, and land containing unique and endangered plants and animals.

3.21 Encourage the implementation of measures aimed at the preservation and protection of recorded and unrecorded cultural resources and archaeological sites.

3.22 Discourage development, or encourage the use of special design requirements, in areas with steep slopes, high fire, flood, and seismic hazards.

3.23 Encourage mitigation measures that reduce noise in certain locations, measures aimed at preservation of biological and ecological resources, measures that would reduce exposure to seismic hazards, minimize earthquake damage, and to develop emergency response and recovery plans.

GMC POLICIES RELATED TO THE RCPG GOAL TO PROVIDE SOCIAL, POLITICAL, AND CULTURAL EQUITY

The Growth Management Goal to develop urban forms that avoid economic and social polarization promotes the regional strategic goal of minimizing social and geographic disparities and of reaching equity among all segments of society. The evaluation of the proposed project in relation to the policy stated below is intended guide direction for the accomplishment of this goal, and does not infer regional mandates and interference with

local land use powers.

3.24 Encourage efforts of local jurisdictions in the implementation of programs that increase the supply and quality of housing and provide affordable housing as evaluated in the Regional Housing Needs Assessment.

3.27 Support local jurisdictions and other service providers in their efforts to develop sustainable communities and provide, equally to all members of society, accessible and effective services such as: public education, housing, health care, social services, recreational facilities, law enforcement, and fire protection.

REGIONAL TRANSPORTATION PLAN

The **Regional Transportation Plan (RTP)** also has goals, objectives, policies and actions pertinent to this proposed project. This RTP links the goal of sustaining mobility with the goals of fostering economic development, enhancing the environment, reducing energy consumption, promoting transportation-friendly development patterns, and encouraging fair and equitable access to residents affected by socio-economic, geographic and commercial limitations. Among the relevant goals, objectives, policies and actions of the RTP are the following:

Core Regional Transportation Plan Policies

4.01 Transportation investments shall be based on SCAG's adopted Regional Performance Indicators:

Mobility - Transportation Systems should meet the public need for improved access, and for safe, comfortable, convenient, faster and economical movements of people and goods.

- *Average Work Trip Travel Time in Minutes – 25 minutes (Auto)*
- *PM Peak Freeway Travel Speed – 45 minutes (Transit)*
- *PM Peak Non-Freeway Travel Speed*
- *Percent of PM Peak Travel in Delay (Fwy)*
- *Percent of PM Peak Travel in Delay (Non-Fwy)*

Accessibility - Transportation system should ensure the ease with which opportunities are reached. Transportation and land use measures should be employed to ensure minimal time and cost.

- *Work Opportunities within 45 Minutes door to door travel time (Mode Neutral)*
- *Average transit access time*

Environment - Transportation system should sustain development and preservation of the existing system and the environment. (All Trips)

- *CO, ROG, NOx, PM10, PM2.5 – Meet the applicable SIP Emission Budget and the Transportation Conformity requirements*

Reliability – Transportation system should have reasonable and dependable levels of service by mode. (All Trips)

- *Transit – 63%*
- *Highway – 76%*

Safety - Transportation systems should provide minimal accident, death and injury. (All Trips)

- *Fatalities Per Million Passenger Miles – 0*
- *Injury Accidents – 0*

Equity/Environmental Justice - The benefits of transportation investments should be equitably distributed among all ethnic, age and income groups. (All trips)

- *By Income Groups Share of Net Benefits – Equitable Distribution of Benefits among all Income Quintiles*

Cost-Effectiveness - Maximize return on transportation investment (All Trips). Air Quality, Mobility, Accessibility and Safety

- *Return on Total Investment – Optimize return on Transportation Investments*

4.02 Transportation investments shall mitigate environmental impacts to an acceptable level.

4.04 Transportation Control Measures shall be a priority.

4.16 Maintaining and operating the existing transportation system will be a priority over expanding capacity.

AIR QUALITY CHAPTER CORE ACTIONS

The **Air Quality Chapter** core actions related to the proposed project includes:

5.07 Determine specific programs and associated actions needed (e.g., indirect source rules, enhanced use of telecommunications, provision of community based shuttle services, provision of demand management based programs, or vehicle-miles-traveled/emission fees) so that options to command and control regulations can be

assessed.

5.11 Through the environmental document review process, ensure that plans at all levels of government (regional, air basin, county, subregional and local) consider air quality, land use, transportation and economic relationships to ensure consistency and minimize conflicts.

OPEN SPACE CHAPTER ANCILLARY GOALS

Outdoor Recreation

9.01 Provide adequate land resources to meet the outdoor recreation needs of the present and future residents in the region and to promote tourism in the region.

9.02 Increase the accessibility to open space lands for outdoor recreation.

9.03 Promote self-sustaining regional recreation resources and facilities.

Public Health and Safety

9.04 Maintain open space for adequate protection of lives and properties against natural and man-made hazards.

9.05 Minimize potentially hazardous developments in hillsides, canyons, areas susceptible to flooding, earthquakes, wildfire and other known hazards, and areas with limited access for emergency equipment.

Resource Production

9.07 Maintain adequate viable resource production land, particularly lands devoted to commercial agriculture and mining operations.

Resource Protection

9.08 Develop well-managed viable ecosystems or known habitats of rare, threatened and endangered species, including wetlands.

WATER QUALITY CHAPTER RECOMMENDATIONS AND POLICY OPTIONS

The **Water Quality Chapter** core recommendations and policy options relate to the two

water quality goals: to restore and maintain the chemical, physical and biological integrity of the nation's water; and, to achieve and maintain water quality objectives that are necessary to protect all beneficial uses of all waters.

11.07 Encourage water reclamation throughout the region where it is cost-effective, feasible, and appropriate to reduce reliance on imported water and wastewater discharges. Current administrative impediments to increased use of wastewater should be addressed.

CONCLUSIONS

All feasible measures needed to mitigate any potentially negative regional impacts associated with the proposed project should be implemented and monitored, as required by CEQA.

SOUTHERN CALIFORNIA ASSOCIATION OF GOVERNMENTS

Roles and Authorities

THE SOUTHERN CALIFORNIA ASSOCIATION OF GOVERNMENTS (SCAG) is a ***Joint Powers Agency*** established under California Government Code Section 6502 et seq. Under federal and state law, SCAG is designated as a Council of Governments (COG), a Regional Transportation Planning Agency (RTPA), and a Metropolitan Planning Organization (MPO). SCAG's mandated roles and responsibilities include the following:

SCAG is designated by the federal government as the Region's ***Metropolitan Planning Organization*** and mandated to maintain a continuing, cooperative, and comprehensive transportation planning process resulting in a Regional Transportation Plan and a Regional Transportation Improvement Program pursuant to 23 U.S.C. '134, 49 U.S.C. '5301 et seq., 23 C.F.R. '450, and 49 C.F.R. '613. SCAG is also the designated ***Regional Transportation Planning Agency,*** and as such is responsible for both preparation of the Regional Transportation Plan (RTP) and Regional Transportation Improvement Program (RTIP) under California Government Code Section 65080 and 65082 respectively.

SCAG is responsible for developing the demographic projections and the integrated land use, housing, employment, and transportation programs, measures, and strategies portions of the ***South Coast Air Quality Management Plan,*** pursuant to California Health and Safety Code Section 40460(b)-(c). SCAG is also designated under 42 U.S.C. '7504(a) as a ***Co-Lead Agency*** for air quality planning for the Central Coast and Southeast Desert Air Basin District.

SCAG is responsible under the Federal Clean Air Act for determining ***Conformity*** of Projects, Plans and Programs to the State Implementation Plan, pursuant to 42 U.S.C. '7506.

Pursuant to California Government Code Section 65089.2, SCAG is responsible for ***reviewing all Congestion Management Plans (CMPs) for consistency with regional transportation plans*** required by Section 65080 of the Government Code. SCAG must also evaluate the consistency and compatibility of such programs within the region.

SCAG is the authorized regional agency for ***Inter-Governmental Review*** of Programs proposed for federal financial assistance and direct development activities, pursuant to Presidential Executive Order 12,372 (replacing A-95 Review).

SCAG reviews, pursuant to Public Resources Code Sections 21083 and 21087, Environmental Impacts Reports of projects of regional significance for consistency with regional plans [California Environmental Quality Act Guidelines Sections 15206 and 15125(b)].

Pursuant to 33 U.S.C. '1288(a)(2) (Section 208 of the Federal Water Pollution Control Act), SCAG is the authorized ***Areawide Waste Treatment Management Planning Agency.***

SCAG is responsible for preparation of the ***Regional Housing Needs Assessment,*** pursuant to California Government Code Section 65584(a).

SCAG is responsible (with the Association of Bay Area Governments, the Sacramento Area Council of Governments, and the Association of Monterey Bay Area Governments) for preparing the ***Southern California Hazardous Waste Management Plan*** pursuant to California Health and Safety Code Section 25135.3.

Revised July 2001

Letter No. 4

STATE OF CALIFORNIA—BUSINESS, TRANSPORTATION AND HOUSING AGENCY ARNOLD SCHWARZENEGGER, Governor

DEPARTMENT OF TRANSPORTATION
DISTRICT 7, REGIONAL PLANNING
IGR/CEQA BRANCH
120 SO. SPRING ST.
LOS ANGELES, CA 90012
PHONE (213) 897-6536
FAX (213) 897-1337
E-Mail:NersesYerjanian@dot.ca.gov

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APR 2 8 2004
PLANNING AND BUILDING SERVICES
CITY OF SANTA CLARITA

Flex your power!
Be energy efficient!

Mr. Jeff Hogan
Planning Department
City of Santa Clarita
23920 Valencia Blvd., Suite 300
Santa Clarita, CA. 91355

RE: IGR/CEQA# 040301NY
DEIR/Riverpark Developement
SCH#2002091081
LA/14/28.08

April 21, 2004

Dear Mr. Hogan:

Thank you for including the California Department of Transportation (Caltrans) in the environmental review process for the **Riverpark** Project (1,183 du + 40,000SF Retail/Commercial).

Please reference the Department's **Traffic Impact Study Guideline** on the Internet at http://www.dot.ca.gov/hq/traffops/developserv/operationalsystems/reports/tisguide.pdf

- Apply the equitable share responsibility formula on page 2 of Appendix B **(Methodology for Calculating Equitable Mitigation Measures)** and set aside a portion of Transportation Impact Fees generated for the future State Highway improvement projects. The City may need to recalculate or establish an additional fee for this purpose. (1)

- Construction of the proposed project in or adjacent to the Santa Clara River ought to be coordinated with the construction of the Cross Valley Connector in order to minimize temporary impacts to the river. (2)

- The discussion of the cumulative impacts needs to also include whether or not the impacts are cumulatively considerable. If they are considered cumulatively considerable, a discussion as to the magnitude of the impact associated with this project based on the resource that is being cumulatively impacted is necessary. Also a discussion on if the mitigation measures suggested by this project that would possibly make these (3)

- cumulative impacts less than significant within the region. 3

- The proposed nature reserve area should include corridor tunnels under adjacent roadways to ensure connectivity with habitat north and south. 4

If you have any questions regarding this response, please call the Project Engineer/Coordinator Mr. Yerjanian at (213) 897-6536 and refer to IGR/CEQA 040301NY.

Sincerely,

Cheryl J. Powell
IGR/CEQA Branch Chief
Regional Transportation Planning

"Caltrans improves mobility across California"

Letter No. 3

State of California—Business, Transportation and Housing Agency ARNOLD SCHWARZENEGGER, Governor

DEPARTMENT OF CALIFORNIA HIGHWAY PATROL
28648 The Old Road
Valencia, CA 91355
(661)294-5540
(800) 735-2929 (TT/TDD)
(800) 735-2922 (Voice)

RECEIVED
PLANNING DIVISION
APR 14 2004
PLANNING AND BUILDING SERVICES
CITY OF SANTA CLARITA

April 6, 2004

File No.: 540.10868.9367

Mr. Jeff Hogan
Associate Planner
Impact Analysis Department
23920 Valencia Blvd.
Santa Clarita, Ca 90012

Dear Mr. Hogan:

This is in response to the Notice of Preparation of a draft Environmental Impact Report, dated March 3, 2004 for the Riverpark Project (02-175).

The proposed project will be located within the City of Santa Clarita. However, until an agreement is made between the City of Santa Clarita and the County of Los Angeles, this area will be within the jurisdiction of the California Highway Patrol. Therefore, traffic enforcement, emergency incident management, public service, assistance and accident investigation will be the responsibility of our agency. 1 2

In reviewing this project, State Clearinghouse Number 2002091081, our concern is what effect this projects will have on traffic. The project will increase traffic volume on Newhall Ranch Road, San Fernando Road, Bouquet Canyon, Valencia Blvd., Magic Mountain Parkway and Mc Bean Parkway, all of which connect to I-5 and or SR-14. The increased traffic will ultimately cause delays in emergency response times. Additionally, we have great concern for the purposed additional roadways which would necessitate additional resources and officers to provide traffic enforcement, emergency incident management, public service, assistance and accident investigation. 3

Lieutenant M. Odle will be our Department's contact person for the project. If you have any questions or concerns, he may be reached at the above address or telephone number.

Thank you for allowing us the opportunity to comment on this project.

Sincerely,

E. CONLEY, Captain
Commander
Newhall Area

Letter No. 2

California Regional Water Quality Control Board

Los Angeles Region

Over 51 Years Serving Coastal Los Angeles and Ventura Counties

Recipient of the 2001 *Environmental Leadership Award* from Keep California Beautiful

Terry Tamminen
Secretary for Environmental Protection

320 W. 4th Street, Suite 200, Los Angeles, California 90013
Phone (213) 576-6600 FAX (213) 576-6640 - Internet Address: http://www.swrcb.ca.gov/rwqcb4

Arnold Schwarzenegger
Governor

March 22, 2004

Mr. Jeff Hogan
Associate Planner
City of Santa Clarita
23920 Valencia Boulevard, Suite 300
Santa Clarita, CA 91355-2196

RECEIVED
PLANNING DIVISION
MAR 23 2004
PLANNING AND BUILDING SERVICES
CITY OF SANTA CLARITA

Dear Mr. Jeff Hogan,

Re: CEQA Documentation for Project in the Santa Clara Watershed

Riverpark Project
Master Case Nos. 02-175
SCH # 2002091081

We appreciate the opportunity to comment on the CEQA documentation for the above-mentioned project. For your information a list of permitting requirements and Regional Board Contacts is provided in Attachment A hereto.

The project site lies in the Santa Clara watershed that was listed as being impaired pursuant to Section 303 (d) of the Clean Water Act. Impairments listed in reaches downstream from the proposed project include nutrients and their effects, salts, coliform bacteria, and historic pesticides. The Los Angeles Regional Water Quality Control Board will be developing Total Maximum Daily Loads (TMDLs) for the watershed, but the proposed project is expected to proceed before applicable TMDLs are adopted. In the interim, the Regional Board must carefully evaluate the potential impacts of new projects that may discharge to impaired waterbodies.

Our review of your documentation shows that it does not include information on how this project will change the loading of these pollutants into the watershed. Please provide the following additional information for both the construction and operational phases of the project.

- For each constituent listed above, please provide an estimate of the concentration (ppb) and load (lbs/day) from non-point and point source discharges. 1
- Estimates of the amount of additional runoff generated by the project during wet and dry seasons. 2
- Estimate of the amount of increased or decreased percolation due to the project. 3

- Estimates of the net change in cubic feet per second of groundwater and surface water contributions under historic drought conditions (as compiled by local water purveyors, the Department of Water Resources, and others), and 10-year 50-year, and 100-year flood conditions. 4

We are specifically concerned about the lack of quantitative estimates concerning cumulative impacts of this project with other projects planned for the immediate vicinity within the decade. Please indicate your organizations plans to predict project impacts, mitigate those impacts, and document the effects of the project to prevent long term deterioration of the aquatic habitat and water quality in the Santa Clara River. 5

If you have any questions please call me at (213) 576 6683.

Sincerely,

Elizabeth Erickson
Associate Geologist, TMDL Unit
Los Angeles Regional Water Quality Control Board

EE
Attachments (1)
cc:
State Clearinghouse
File

ATTACHMENT A

✓ If the proposed project will result in a **discharge of dredge or fill into a surface water** (including a dry streambed), and is subject to a **federal license or permit**, the project may require a *Section 401 Water Quality Certification*, or waiver of Waste Discharge Requirements. For further information, please contact:

Valerie Carillo, Nonpoint Source Unit at (213) 576-6759.

✓ If the project involves **inland disposal of nonhazardous contaminated soils and materials**, the proposed project may be subject to *Waste Discharge Requirements*. For further information, please contact:

Rodney Nelson, Landfills Unit, at (213) 620-6119

****

✓ If the overall project area is **larger than five acres**, the proposed project may be subject to the State *Board's General Construction Activity Storm Water Permit*. For further information, please contact:

Tracy Woods, Statewide General Construction Activity Storm Water Permits at (213) 620-2095.

✓ If the project involves a facility that is proposing to discharge storm water associated with **industrial activity** (e.g., manufacturing, recycling and transportation facilities, etc.), the facility may be subject to the State Board's *General Industrial Activities Storm Water Permit*. For further information, please contact:

Kristie Chung, Statewide General Industrial Storm Water Permits at (213) 620-2283.

✓ If the proposed project involves requirements for new development and construction pertaining to **municipal storm water programs**, please contact:

Dan Radulescu, Municipal Storm Water Permits, Los Angeles County at (213) 620-2038;
Jeff Mack, Municipal Storm Water Permits, Ventura County at (213) 620-2121.

✓ The proposed project also shall comply with the local regulations associated with the applicable **Regional Board stormwater permit:**

Los Angeles County and Co-permittees:
NPDES No. CAS614001
Waste Discharge Requirements Order No. 96-054.

Long Beach County and Co-permittees:
NPDES CAS004003
Waste Discharge Requirements Order No. 99-060.

Ventura County and Co-permittees:
NPDES No. CAS004002
Waste Discharge Requirements Order No. 00-108.

****

✓ If the proposed project involves any construction and/or groundwater **dewatering to be discharged to surface waters,** the project may be subject to *NPDES/Waste Discharge Requirements*. For further information, please contact:

Augustine Anijielo, General Permitting and Special Projects Unit at (213) 576-6657(All Region 4 Watersheds).

✓ If the proposed project involves any construction and/or groundwater **dewatering to be discharged to land or groundwater,** the project may be subject to *Waste Discharge Requirements*. For further information, please contact:

Kwang-il Lee, Non-Chapter 15 Unit, at (213) 620-2269 (All Region 4 Watersheds).

Revised : March 11, 2004

Letter No. 1

California Regional Water Quality Control Board

Los Angeles Region

Over 51 Years Serving Coastal Los Angeles and Ventura Counties

Recipient of the 2001 *Environmental Leadership Award* from Keep California Beautiful

Terry Tamminen
Secretary for Environmental Protection

320 W. 4th Street, Suite 200, Los Angeles, California 90013
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Arnold Schwarzenegger
Governor

March 16, 2004

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MAR 2 3 2004

PLANNING AND BUILDING SERVICES
CITY OF SANTA CLARITA

Jeff Hogan, Associate Planner
City of Santa Clarita
23920 Valencia Blvd, Suite 300
Santa Clarita, CA 91355

Dear Jeff Hogan,

Re: CEQA Documentation for Project in the Santa Clara Watershed

Project Title : Riverpark (Panhandle)
Mater Case #02-175

We appreciate the opportunity to comment on the CEQA documentation for the above-mentioned project. For your information a list of permitting requirements and Regional Board Contacts is provided in Attachment A hereto.

The project site lies in the Santa Clara watershed that was listed as being impaired pursuant to Section 303 (d) of the Clean Water Act. Impairments listed in reaches downstream from the proposed project include nutrients and their effects, salts, coliform bacteria, and historic pesticides. The Los Angeles Regional Water Quality Control Board will be developing Total Maximum Daily Loads (TMDLs) for the watershed, but the proposed project is expected to proceed before applicable TMDLs are adopted. In the interim, the Regional Board must carefully evaluate the potential impacts of new projects that may discharge to impaired waterbodies.

Our review of your documentation shows that it does not include information on how this project will change the loading of these pollutants into the watershed. Please provide the following additional information for both the construction and operational phases of the project.

- For each constituent listed above, please provide an estimate of the concentration (ppb) and load (lbs/day) from non-point and point source discharges. 1
- Estimates of the amount of additional runoff generated by the project during wet and dry seasons. 2
- Estimate of the amount of increased or decreased percolation due to the project. 3

- Estimates of the net change in cubic feet per second of groundwater and surface water contributions under historic drought conditions (as compiled by local water purveyors, the Department of Water Resources, and others), and 10-year 50-year, and 100-year flood conditions. 4

If you have any questions please call me at (213) 576 6683.

Sincerely,

Elizabeth Erickson
Associate Geologist, TMDL Unit
Los Angeles Regional Water Quality Control Board

EE
Attachments (1)
cc:
State Clearinghouse
File

ATTACHMENT A

✓ If the proposed project will result in a **discharge of dredge or fill into a surface water** (including a dry streambed), and is subject to a **federal license or permit**, the project may require a *Section 401 Water Quality Certification*, or waiver of Waste Discharge Requirements. For further information, please contact:

Valerie Carillo, Nonpoint Source Unit at (213) 576-6759.

✓ If the project involves **inland disposal of nonhazardous contaminated soils and materials**, the proposed project may be subject to *Waste Discharge Requirements*. For further information, please contact:

Rodney Nelson, Landfills Unit, at (213) 620-6119

****

✓ If the overall project area is **larger than five acres**, the proposed project may be subject to the State *Board's General Construction Activity Storm Water Permit*. For further information, please contact:

Tracy Woods, Statewide General Construction Activity Storm Water Permits at (213) 620-2095.

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Kristie Chung, Statewide General Industrial Storm Water Permits at (213) 620-2283.

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Jeff Mack, Municipal Storm Water Permits, Ventura County at (213) 620-2121.

✓ The proposed project also shall comply with the local regulations associated with the applicable **Regional Board stormwater permit**:

Los Angeles County and Co-permittees:
NPDES No. CAS614001
Waste Discharge Requirements Order No. 96-054.

Long Beach County and Co-permittees:
NPDES CAS004003
Waste Discharge Requirements Order No. 99-060.

Ventura County and Co-permittees:
NPDES No. CAS004002
Waste Discharge Requirements Order No. 00-108.

****

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Augustine Anijielo, General Permitting and Special Projects Unit at (213) 576-6657(All Region 4 Watersheds).

✓ If the proposed project involves any construction and/or groundwater **dewatering to be discharged to land or groundwater**, the project may be subject to *Waste Discharge Requirements*. For further information, please contact:

Kwang-il Lee, Non-Chapter 15 Unit, at (213) 620-2269 (All Region 4 Watersheds).

Revised : March 11, 2004

Letter No. 54

A LENNAR/LNR COMPANY

March 22, 2005

RECEIVED AND MADE A
PART OF THE RECORD AT
3/22/05 MEETING
ITEM NO. 10
FROM: KAREN PEARSON

Karen Pearson
26617 Gavilan Drive
Santa Clarita, CA 91350

RE: AGREEMENT/ RIVERPARK PROJECT
MASTER CASE No. 02-175

Dear Ms Pearson:

Pursuant to our discussions, Newhall Land agrees to the following and agrees that any future owners shall be bound by the following:

1. Record a restriction on lot 526 of Vesting Tentative Tract Map 53425 (Riverpark) prohibiting grading, building, structures or parking on the lot as shown on the Emblem Exhibit dated 1/18/05 (attached). (This lot is surrounded on its north side and east side by residential fences, its west side by the Bouquet Center wall and its south side by the above proposed slump stone wall and will be preserved as open space. Karen Pearson's lot is adjacent to much of the north side of this lot.)

2. Construct a six foot high slump stone wall with vines and irrigation. Newhall Land will also provide landscaping and irrigation as shown on the attached Emblem exhibit dated 1/18/05 (attached) prior to occupancy of the residential units in Area D. This wall will be solidly attached to the hill such that people cannot pass between the fence and the hill to get from the Riverpark project to the lot described in the previous paragraph. It will also be attached to the fence which is behind the Bouquet Shopping Center such that people cannot pass between the fence and the wall.

3. A standard black wrought iron gate (5 ½ to 6 feet in height) shall be part of the slumpstone wall to allow for brush and debris maintenance, fire crews, landscape

1

THE NEWHALL LAND AND FARMING COMPANY
23823 VALENCIA BOULEVARD, VALENCIA, CALIFORNIA 91355-2194 • PHONE 661.255.4000 FAX 661.255.3960 WWW.NEWHALL.COM

landscape maintenance, or electrical repair access. The gate shall be locked at all time and only opened for the above referenced permitted maintenance activities.

4. Plant twenty 24 inch Box Trees as shown on the Emblem Exhibit dated 1/18/05. Irrigation will be provided to the satisfaction of the Director of Planning and Economic Development Services. The type of trees that shall be planted pursuant to the Exhibit may include but is not limited to a combination of the Scented Cedar, California Pepper Tree, and the African Fern Pine. All tree and shrub species shall be to the satisfaction of the Director of Planning and Economic Development Services.

5. Lot 526 shall be maintained by the Landscape Maintenance District (LMD) created for the Riverpark project and paid for by future Riverpark residents which shall include but not limited to weed and debris abatement. The City of Santa Clarita shall be responsible for the maintenance of the area indicated as being in the Landscape Maintenance District (LMD) . No costs for this LMD shall be levied on the existing property owners of the Emblem Tract.

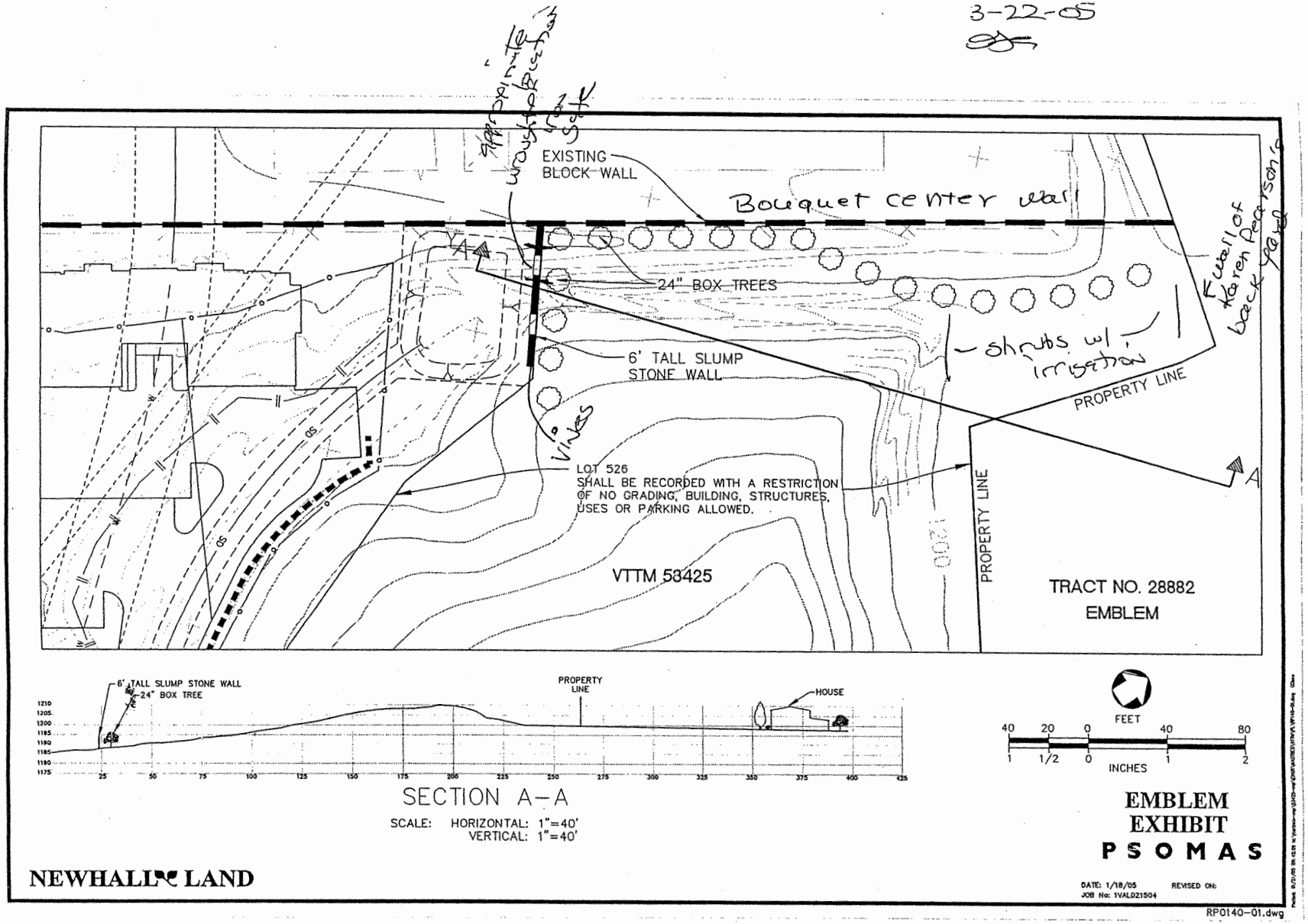
6. The crest of the hill, located within lot 526, which faces Emblem Elementary school and is directly adjacent to the homes along Gavelin Drive shall not be graded, bulldozed or altered and shall remain at its present height as illustrated on Vesting Tentative Tract Map 53425. The western end of nose of the hill shall remain as is as well.

1

As always, feel free to contact me at (661) 255-4003 if you have any questions regarding this letter or the Riverpark project.

Sincerely,

Glenn Adamick
Vice President, Forward Planning and Entitlements


3-22-05
EXISTING BLOCK WALL
Bouquet center wall
24" BOX TREES
6' TALL SLUMP STONE WALL
shrubs w/ irrigation
PROPERTY LINE
Vines
LOT 526
SHALL BE RECORDED WITH A RESTRICTION OF NO GRADING, BUILDING, STRUCTURES, USES OR PARKING ALLOWED.
VTTM 53425
PROPERTY LINE
TRACT NO. 28882
EMBLEM
6' TALL SLUMP STONE WALL
24" BOX TREE
PROPERTY LINE
HOUSE
SECTION A-A
SCALE: HORIZONTAL: 1"=40'
VERTICAL: 1"=40'
FEET
INCHES
EMBLEM
EXHIBIT
PSOMAS
NEWHALL LAND
DATE: 1/18/05
JOB No: 1VAL021504
REVISED ON:
RP0140-01.dwg

Letter No. 55

Petition to the Santa Clarita City Council Requesting a Landscape Maintenance District

This is a request that the hill between Emblem residents and the proposed Riverpark Development and that portion of land that belongs to this development and borders the residents on the western side of Gavilan Drive be included in a Landscape Maintenance District or LMD if this proposed development is approved. We further request that this LMD and all of the other agreements made between Newhall Land and Farming and existing residents of the Emblem tract be made part of the conditions of approval. This should provide greater certainty for the aforementioned lot and the maintenance of the hill than what would be provided by a Homeowners Association. We request this, with the understanding that Newhall Land and Farming agrees that the property levies for this LMD will be made to specified residents and owners in the Riverpark Development and none of the levies will be made against existing owners of the Emblem tract and that the LMD will reflect this. We also wish to stipulate that the agreements that have been made to maintain the existing height of the hill and to maintain the property adjacent to the property owners on the western side of Gavilan Drive shall be kept by the LMD.

1

Name	Address	Phone #
Karen Pearson (Print) yes	26617 Gavilan Dr.	296-4438 (if you choose)
Karen Pearson (Signature)	Santa Clarita, CA 91350	
ANITA NOGALES (Print) ✓	26614 GAVILAN DR	297 2496 (if you choose)
Anita Nogales (Signature)	SANTA CLARITA, CA 91350	
Francisco G. Nogales (Print) Signature ✓	26614 Gavilan DR. 91350	297-2496 (if you choose)
FRANCISCO G NOGALES (Signature)	Santa Clarita, 91350	
DORIS H SCHONERT (Print) ✓	26603 GAVILAN DR	296-2660 (if you choose)
Doris H Schonert (Signature)	SANTA CLARITA, CA 91350	
Kenneth G Schonert (Print) ✓	26603 Gavilan Dr	296-2660 (if you choose)
Kenneth G Schonert (Signature)	Santa Clarita CA 91350	

Petition prepared by Karen Pearson, resident of the Emblem tract: 26617 Gavilan Drive, Santa Clarita, CA 91350.
661 296 4438

Gav

Petition to the Santa Clarita City Council Requesting a Landscape Maintenance District

This is a request that the hill between Emblem residents and the proposed Riverpark Development and that portion of land that belongs to this development and borders the residents on the western side of Gavilan Drive be included in a Landscape Maintenance District or LMD if this proposed development is approved. We further request that this LMD and all of the other agreements made between Newhall Land and Farming and existing residents of the Emblem tract be made part of the conditions of approval. This should provide greater certainty for the aforementioned lot and the maintenance of the hill than what would be provided by a Homeowners Association. We request this, with the understanding that Newhall Land and Farming agrees that the property levies for this LMD will be made to specified residents and owners in the Riverpark Development and none of the levies will be made against existing owners of the Emblem tract and that the LMD will reflect this. We also wish to stipulate that the agreements that have been made to maintain the existing height of the hill and to maintain the property adjacent to the property owners on the western side of Gavilan Drive shall be kept by the LMD.

Name	Address	Phone #
HENRY BALSZ ✓ (Print)	26620 GAVILAN DR.	297-1981 (if you choose)
Henry Balsz (Signature)	Santa Clarita, CA	
DONA L. BALSZ ✓ (Print)	26620 GAVILAN DR	297-1981 (if you choose)
Dona L Balsz (Signature)	Santa Clarita, CA	
(Print)	Santa Clarita CA	661 510 3386 (if you choose)
MICHAELA LAWLER (Signature)		
MICHAEL W. ABERNETHY ✓ (Print)	26600 GAVILAN DRIVE	661 297 6380 (if you choose)
Michael W. Abernethy (Signature)	SAUGUS CA 91350	
Reynaldo Arroyo ✓ (Print)	26607 Gavilan Dr.	(661) 297.7451 (if you choose)
Reynaldo Arroyo (Signature)	Saugus, Ca 91350	

Petition prepared by Karen Pearson, resident of the Emblem tract: 26617 Gavilan Drive, Santa Clarita, CA 91350. 661 296 4438

GaV

Petition to the Santa Clarita City Council Requesting a Landscape Maintenance District

This is a request that the hill between Emblem residents and the proposed Riverpark Development and that portion of land that belongs to this development and borders the residents on the western side of Gavilan Drive be included in a Landscape Maintenance District or LMD if this proposed development is approved. We further request that this LMD and all of the other agreements made between Newhall Land and Farming and existing residents of the Emblem tract be made part of the conditions of approval. This should provide greater certainty for the aforementioned lot and the maintenance of the hill than what would be provided by a Homeowners Association. We request this, with the understanding that Newhall Land and Farming agrees that the property levies for this LMD will be made to specified residents and owners in the Riverpark Development and none of the levies will be made against existing owners of the Emblem tract and that the LMD will reflect this. We also wish to stipulate that the agreements that have been made to maintain the existing height of the hill and to maintain the property adjacent to the property owners on the western side of Gavilan Drive shall be kept by the LMD.

Name	Address	Phone #
ADRIANA ARROYO ✓	26607 GAVILAN DR.	(661)297-74
Print)		(if you choose)
Adriana Arroyo ✓	Saugus, Ca 91350	
ignature)		
SYDELL STOKES	25715 Hogan Dr. B-1	254-6750
Print)		(if you choose)
Sydell Stokes	Santa Clarita, CA 91355	
Signature)		
Print)		(if you choose)
Signature)		
Print)		(if you choose)
Signature)		
Print)		(if you choose)
Signature)		

Petition prepared by Karen Pearson, resident of the Emblem tract: 26617 Gavilan Drive, Santa Clarita, CA 91350.
661 296 4438

Gav

Letter No. 56

City of Santa Clarita - Request to Register Written Comments

Please complete the following information to register your written comments to the City Council, in lieu of speaking orally. Your comments will be considered part of the official proceedings. **(Please print)**

Meeting date: 3/22/05 Agenda item number: 10

Agenda Title or Subject to be addressed: Riverpark

Please check one: ☐ Support Recommendation ☒ Oppose Recommendation ☐ Neutral

Written Comment (Use other side if necessary):

We don't need to make my neighborhood into traffic central. I'm not against low density 1100 & flattening the hill is - ungodly + dangerous because of the flood plain

Name: Diana Shaw

Street Address: 21832 Grove Park Dr City: Saugus

Council requires that persons registering written comments who represent other individuals, groups or organizations disclose that relationship.

I declare that the foregoing is true and correct.

Representing: myself Signature: Diana Shaw

1

Letter No. 57

yes

City of Santa Clarita - Request to Register Written Comments

Please complete the following information to register your written comments to the City Council, in lieu of speaking orally. Your comments will be considered part of the official proceedings. **(Please print)**

Meeting date: 3/22/05 Agenda item number: 10 (Riverpark)

Agenda Title or Subject to be addressed: RIVER PARK

Please check one: ☐ Support Recommendation ☒ Oppose Recommendation ☐ Neutral

Written Comment (Use other side if necessary): CITY IS PLANNING TOO MANY HOUSES. OVER POPULATION IS NOT HELPING THE COMMUNITY. ALL THE PROBLEMS HAVE BEEN VOICED. PLEASE LISTEN.

Name: John Gonzalez

Street Address: 26604 Gavilan Dr City: Saugus

1

Council requires that persons registering written comments who represent other individuals, groups or organizations disclose that relationship.

I declare that the foregoing is true and correct.

Representing: SAVESCV.COM Signature: John Gonzalez

Letter No. 58

City of Santa Clarita - Request to Register Written Comments

Please complete the following information to register your written comments to the City Council, in lieu of speaking orally. Your comments will be considered part of the official proceedings. **(Please print)**

Meeting date: March 22, 2005 Agenda item number: 10

Agenda Title or Subject to be addressed: Riverpark "Development" ← misuse of the word!!

Please check one: ☐ Support Recommendation ☒ Oppose Recommendation ☐ Neutral

Written Comment (Use other side if necessary):

When will it dawn on you that we are already way over developed? The traffic is horrible, and we are losing our open spaces on a monthly basis. Enough is enough.

Name: Richard Squires

Street Address: 26800 Espuma Dr. City: Santa Clarita

1

Council requires that persons registering written comments who represent other individuals, groups or organizations disclose that relationship.

I declare that the foregoing is true and correct.

Representing: Myself Signature: Richard Squires

Letter No. 59

City of Santa Clarita - Request to Register Written Comments

Please complete the following information to register your written comments to the City Council, in lieu of speaking orally. Your comments will be considered part of the official proceedings. **(Please print)**

Meeting date: 3/22/05 Agenda item number: 10

Agenda Title or Subject to be addressed: RIVERPARK PROJECT

Please check one: ☐ Support Recommendation ☒ Oppose Recommendation ☐ Neutral

Written Comment (Use other side if necessary): 1100 units behind Vons, and so close to the flood plain, is foolishness. Bouquet Cyn Rd. is overcrowded now. Growth is good—Overbuilding is destructive. 1

Name: Phil Althouse

Street Address: 21832 Grovepark Dr. City: Saugus

Council requires that persons registering written comments who represent other individuals, groups or organizations disclose that relationship.

I declare that the foregoing is true and correct.

Representing: me Signature: Phil Althouse

Letter No. 60

✓

City of Santa Clarita - Request to Register Written Comments

Please complete the following information to register your written comments to the City Council, in lieu of speaking orally. Your comments will be considered part of the official proceedings. **(Please print)**

Meeting date: 3-22-05 Agenda item number: 10

Agenda Title or Subject to be addressed: River Park

Please check one: ❑ Support Recommendation ❑ Oppose Recommendation ❑ Neutral

Written Comment (Use other side if necessary): I am concerned about the destruction of the wild life habitat, increased traffic and loss of another of our hillsides. 1

Name: Joyce Evans

Street Address: 25339 Via Pacifica City: Valencia

Council requires that persons registering written comments who represent other individuals, groups or organizations disclose that relationship.

I declare that the foregoing is true and correct.

Representing: _____ Signature: Mrs. Joyce Evans

Letter No. 61

City of Santa Clarita - Request to Register Written Comments

Please complete the following information to register your written comments to the City Council, in lieu of speaking orally. Your comments will be considered part of the official proceedings. **(Please print)**

Meeting date: March 22, 2005 Agenda item number: 10

Agenda Title or Subject to be addressed: Riverpark Project

Please check one: ☐ Support Recommendation ☒ Oppose Recommendation ☐ Neutral

Written Comment (Use other side if necessary):

1

Name: Valerie Johnson

Street Address: 23110 Calvello Dr. City: Valencia

Council requires that persons registering written comments who represent other individuals, groups or organizations disclose that relationship.

I declare that the foregoing is true and correct.

Representing: _____ Signature: Valerie Johnson

Letter No. 62

City of Santa Clarita - Request to Register Written Comments

Please complete the following information to register your written comments to the City Council, in lieu of speaking orally. Your comments will be considered part of the official proceedings. **(Please print)**

Meeting date: March 22, 2005 Agenda item number: 10

Agenda Title or Subject to be addressed: Riverpark

Please check one: ☐ Support Recommendation ☒ Oppose Recommendation ☐ Neutral

Written Comment (Use other side if necessary): I would like to see "Riverpark" become parkland/open space with a nature center where field trips by school children could occur. Students already

Name: Mary Herr

Street Address: 27564 Elder View Dr. City: Valencia 91354

Council requires that persons registering written comments who represent other individuals, groups or organizations disclose that relationship.

I declare that the foregoing is true and correct.

Representing: _____ Signature: Mary A. Herr

1

visit CLWA; this nature center would be a great opportunity for children to learn river ecology. A nature center in the middle of town would make it easier for families to hike + experience nature. Preserving the river should be a high priority — it is beautiful to drive by, bike + walk along and it's free + requires little upkeep. Save the river! Please also make sure that the Newhall/Bouquet intersection doesn't become as bad as the Valencia/Bouquet intersection.

Thank you!

1

2

3

Letter No. 63

City of Santa Clarita - Request to Register Written Comments

Please complete the following information to register your written comments to the City Council, in lieu of speaking orally. Your comments will be considered part of the official proceedings. **(Please print)**

Meeting date: March 22, 2005 Agenda item number: 10

Agenda Title or Subject to be addressed: Riverpark

Please check one: ☐ Support Recommendation ☒ Oppose Recommendation ☐ Neutral

Written Comment (Use other side if necessary):

Dear City Council: Please reconsider what has been recommended to you. With what LA County is planning to be allowed to be built here plus the air pollution that we (1)

Over

Name: Judith McClure

Street Address: 2911 Sotuquacken Drive City: Canyon Country

Council requires that persons registering written comments who represent other individuals, groups or organizations disclose that relationship.

I declare that the foregoing is true and correct.

Representing: _____ Signature: Judith McClure

think will result plus the building in the flood plain that you are allowing, 1000 more homes is simply too many in the very heart of our city. Please rethink this housing project!!! It's just too much!

1

2

Letter No. 64

City of Santa Clarita - Request to Register Written Comments

Please complete the following information to register your written comments to the City Council, in lieu of speaking orally. Your comments will be considered part of the official proceedings. **(Please print)**

Meeting date: 3-22-05 Agenda item number: 10

Agenda Title or Subject to be addressed: RiverPark

Please check one: ☐ Support Recommendation ☒ Oppose Recommendation ☐ Neutral

Written Comment (Use other side if necessary): I am resident of Emblem Track having Riverpark near us will bring more traffic where it is gridlocked on Bouquet Now morning + night. We do

Name: Louise Hartwell

Street Address: 22570 Los Tigres Dr City: Santa Clarita

Council requires that persons registering written comments who represent other individuals, groups or organizations disclose that relationship.

I declare that the foregoing is true and correct.

Representing: _____ Signature: _____

1

2

not want our hill cut down it does not need to be lowered 2
Also Embden School will be crowed. We have one way
in + one way out. Our roads will not stand up to 3
that much traffic.

Letter No. 65

City of Santa Clarita - Request to Register Written Comments

Please complete the following information to register your written comments to the City Council, in lieu of speaking orally. Your comments will be considered part of the official proceedings. **(Please print)**

Meeting date: 3-22-05 Agenda item number: 10

Agenda Title or Subject to be addressed: River Park Project

Please check one: ☐ Support Recommendation ☒ Oppose Recommendation ☐ Neutral

Written Comment (Use other side if necessary): I oppose the destructive development known as Riverpark as it is now proposed. Take development out of flood plain. Allow for a wildlife corridor to the River. 1 2

Name: FRANK Ford 3

Street Address: 24603 Cordova Ct City: Valencia

Council requires that persons registering written comments who represent other individuals, groups or organizations disclose that relationship.

I declare that the foregoing is true and correct.

Representing: _____ Signature: _____

Please listen to the majority of the Actual Citizens — they don't want sprawl

Letter No. 66

City of Santa Clarita - Request to Register Written Comments

Please complete the following information to register your written comments to the City Council, in lieu of speaking orally. Your comments will be considered part of the official proceedings. **(Please print)**

Meeting date: 3-22-05 Agenda item number: 10

Agenda Title or Subject to be addressed: _____

Please check one: ☐ Support Recommendation ☒ Oppose Recommendation ☐ Neutral

Written Comment (Use other side if necessary): As far as I can see there are no real creeks or areas left. Certainly no space left for natural given ecology. When is development over development?

Name: Lacy Bates + Ed Fellon

Street Address: 25682 Alvarado City: Valencia

Council requires that persons registering written comments who represent other individuals, groups or organizations disclose that relationship.

I declare that the foregoing is true and correct.

Representing: _____ Signature: _____

1

Please complete the following information to register your written comments to the City Council, in lieu of speaking orally. Your comments will be considered part of the official proceedings. **(Please print)**

Meeting date: March 22, 2005 Agenda item number: #10

Agenda Title or Subject to be addressed: Riverpark

Please check one: ☐ Support Recommendation ☒ Oppose Recommendation ☐ Neutral

Written Comment (Use other side if necessary): In light of what LA County is intending to allow to be built and in that Newhall wants to build in the flood plain — PLEASE reconsider your decision. 1

Name: Mr. Roger McClure

Street Address: 29111 Lotusgarden Drive City: Canyon Country

Council requires that persons registering written comments who represent other individuals, groups or organizations disclose that relationship.

I declare that the foregoing is true and correct.

Representing: _____ Signature: [signature]

Letter No. 68

City of Santa Clarita - Request to Register Written Comments

Please complete the following information to register your written comments to the City Council, in lieu of speaking orally. Your comments will be considered part of the official proceedings. **(Please print)**

Meeting date: 3-22-05 Agenda item number: 10

Agenda Title or Subject to be addressed: River Park Project

Please check one: ❑ Support Recommendation ☑ ~~Oppose~~ Recommendation ❑ Neutral

Written Comment (Use other side if necessary): This project will destroy natural habitat & cause unbearable traffic & pollution. At the very least move homes back from flood plain. 1 2

Name: Carol Winkler

Street Address: 26893 Bouquet Canyon, C-341 City: Saugus

Council requires that persons registering written comments who represent other individuals, groups or organizations disclose that relationship.

I declare that the foregoing is true and correct.

Representing: _____ Signature: _____

Letter No. 69

yes

City of Santa Clarita - Request to Register Written Comments

Please complete the following information to register your written comments to the City Council, in lieu of speaking orally. Your comments will be considered part of the official proceedings. **(Please print)**

Meeting date: March 22 2005 Agenda item number: 10

Agenda Title or Subject to be addressed: RiverPark Project

Please check one: ☐ Support Recommendation ☒ Oppose Recommendation ☐ Neutral

Written Comment (Use other side if necessary): Comments attached

Friends of the Santa Clara River opposes close of public comment & approval proceedings until our concerns are addressed including buffer zones & floodplain protections

Name: Barbara Wample

Street Address: 28006 San Martinez Grande Cyn Rd City: Castaic

Council requires that persons registering written comments who represent other individuals, groups or organizations disclose that relationship.

Vice Chair I declare that the foregoing is true and correct.

Representing: Friends of the Santa Clara River Signature: Barbara Wample

Friends of the Santa Clara River
660 Randy Drive Newbury Park, California 91320 (805) 498 - 4323

January 19, 2005

RECEIVED AND MADE A PART OF THE RECORD AT 3/22/05 MEETING ITEM NO. 10 FROM: BARBARA WAMPOLE

Santa Clarita City Council
City of Santa Clarita
23920 Valencia Boulevard
Santa Clarita, CA 91355-2196

Board of Directors

Ron Bottorff
Chair
Barbara Wampole
Vice Chair
Ginnie Bottorff
Secretary
Lynne Plambeck
Treasurer

Affiliated Organizations

California Native Plant Society

Santa Clarita Organization for Planning the Environment (SCOPE)

Sierra Club, Angeles Chapter

Sierra Club, Los Padres Chapter

Surfrider Foundation

Ventura Audubon Society

Re: Riverpark Project

Dear City Council Members,

Friends of the Santa Clara River offers the following comments on the Riverpark Project.

Once again, those of us who have attempted over the years to care for the Santa Clara River are confronted with a large development project which cannot avoid having significant and degrading impacts on the River ecosystem.

The unprecedented growth in the Santa Clara watershed over the last few decades has caused an array of cumulative impacts to flora and fauna, not to mention air quality, water quality, aesthetics, traffic and nearly every other category addressed by the California Environmental Quality Act. Continued encroachment by development into the River floodplain and terrace lands has resulted in habitat loss and fragmentation which have been cited by many experts as the major causes for the decline of species and loss of biological diversity (Noss, 1987; Beier and Loe, 1992; Beier et al, 2002; Forman et al, 2003). Further, the continued filling and channelization of the River has altered and is altering the hydrology of the watershed, increasing storm runoff and decreasing water quality (the River is now impaired for ammonia, chloride, coliform, nitrate/nitrite and organic enrichment). These cumulative impacts were not adequately addressed in the subject EIR nor in other EIRs for projects in the Santa Clara watershed. Continuing failure to address and to act on these impacts will, we believe, turn a large section of the River, in and around Santa Clarita, into a biological "dead zone". 1

The Santa Clara River is the largest and one of the last undammed and relatively natural riverine systems remaining in southern California. Considering the southern California region as a whole, the U. S. Fish and Wildlife Service (Faber et al, 1989) has estimated that 95 to 97 percent of riparian communities have been eliminated due to human influences. Damage occurs primarily because (1) the river is channelized by hardening its banks; (2) riparian and terrace habitats have been lost and fragmented; (3) urban edge effects, including illegal ORV use, degrade riparian biological values; (4) adequate buffer zones protecting the riparian corridor have not been provided; and (5) the function of the river terrace area as wildlife habitat or wildlife corridor is eliminated.

We cite two scientific studies in support of our statement that urban development degrades adjacent biological resources. The first (Kelly et al, 1993) is a paper by two University of California Riverside scientists entitled "Buffer Zones for Ecological Reserves in California: Replacing Guesswork with Science". This paper shows that even nature reserves over a mile in

width suffer urban edge effects at their centers - and of course the Santa Clara River riparian corridor is much narrower than these reserves and even more susceptible to such effects. The second (Rottenborn, 1999) is a paper by a Stanford University scientist entitled "Predicting the impacts of urbanization on riparian bird communities". This paper shows impacts to bird communities out to a distance of 500 meters, or over 1500 feet, from the urban edge.

More studies are definitely needed on the impacts of development on riparian ecosystems. For the Santa Clarita area, development is occurring on 20 miles of the River and tributaries. This is an experiment on a large scale, with the fate of the River ecosystem in the balance. Creating larger buffer zones to conserve more of the riparian community is a must. To quote from the closing sentence in the Stanford paper: "The single most important step that can be taken to conserve riparian communities in the face of urbanization is to minimize development in and along floodplains by maintaining broad buffers of undeveloped land between developed areas and riparian habitats."

The Riverpark project will have impacts bringing into play the City's General Plan policies on Significant Ecological Areas. Policy 5.3 under Goal 5 states "New development must be sensitive to the Significant Ecological Areas through utilization of creative planning techniques to avoid and minimize disturbance of these and other sensitive areas." Only by creating an adequate buffer zone around Riverpark can this policy be effectively implemented. We suggest that among the most creative planning techniques which could and should be used here is the development and adoption of a Floodplain/Terrace Avoidance Alternative for Riverpark. The EIR Alternative 2 is a step in that direction but considers only the Q50 floodplain instead of the floodplain and terrace areas which are steadily becoming rarer in the River corridor and which provide high quality habitat for such species as the spadefoot toad and arroyo toad.

1

Besides larger buffer areas, establishing the east terminus of the River trail at Santa Clarita Parkway would greatly help in protecting riparian resources. Continuing the trail beyond the Parkway will negatively impact the eastern portion of the project area which has significant biological value. These impacts are related to increased disturbance by humans, off-highway vehicles and domestic animals.

Thank you for considering these comments.

Sincerely,

Barbara Wample for Ron Bottorff

Ron Bottorff, Chair Vice chair

References:

Beier, P. and S. Loe, A checklist for evaluating impacts to wildlife movement corridors, Wildlife Society Bulletin 20:434-440, 1992.

Faber et al, The Ecology of Riparian Habitats of the Southern California Coastal Region: A Community Profile, U.S, Department of Interior Biological Report 85(7-27), September 1989.

Forman. R.T.T. Land Mosaics: The Ecology of Landscapes and Regions, Cambridge University Press, 1995.

Kelly, Patrick J. and John T. Rotenberry, Buffer Zones for Ecological Reserves in California: Replacing Guesswork with Science, in Interface Between Ecology and Land Development in California, Southern California Academy of Sciences, 1993.

Noss, R. F., Protecting natural areas in fragmented landscapes, Natural Areas Journal 7:2-13, 1987.

Rottenborn, S.C. Predicting the impacts of urbanization on riparian bird communities, Biological Conservation 88 (1999).

Letter No. 70

City of Santa Clarita - Request to Register Written Comments

Please complete the following information to register your written comments to the City Council, in lieu of speaking orally. Your comments will be considered part of the official proceedings. **(Please print)**

Meeting date: MARCH 22, 2005 Agenda item number: 10

Agenda Title or Subject to be addressed: RIVERPARK DEVELOPMENT

Please check one: ☐ Support Recommendation ☑ Oppose Recommendation ☐ Neutral

Written Comment (Use other side if necessary): DESPITE THE "QUICK CASH" AND REVENUE (SHORT TERM) THAT RIVERPARK WILL BRING. IT WILL BE AT THE LONG TERM EXPENSE OF A DECREASE IN THE QUALITY OF LIVING THAT WILL IMPACT NOT ONLY THE IMMEDIATE NEIGHBORHOODS BUT ALL THE WAY DOWN →

1

Name: MARC FLORES

Street Address: 22315 ESPUELLA DR. City: SAUGUS SCV

Council requires that persons registering written comments who represent other individuals, groups or organizations disclose that relationship.

I declare that the foregoing is true and correct.

Representing: SELF Signature:

BOUQUET CYN. AND THE REST OF THE SCV. THINGS ARE GREAT NOW AND LIVING IN SCV IS STILL GREAT BUT IT IS HARD TO IGNORE THE FACT THAT IT IS BECOMING MORE CROWDED AND MORE AND MORE UNPLEASANT THE MORE HOUSING DEVELOPMENTS (INCL. RIVERPARK) ARE BUILT. THE RESIDENTIAL/COMMERCIAL/LIFE QUALITY EQUILIBRIUM IS IN DANGER OF BEING FURTHER DISRUPTED BY THE RIVERPARK DEVELOPMENT. PLEASE DENY AND TURN DOWN RIVERPARK, ALL OF IT. 2

ALSO, EVEN THOUGH ADDING MORE RESIDENTS INCREASES THE TAX BASE AND REVENUE, THE EXPENSE AND BEAURACRACY NEEDED TO SUPPORT THE INCREASED POPULATION CANCELS A TAX REVENUE INCREASE.

Letter No. 71

City of Santa Clarita - Request to Register Written Comments

Please complete the following information to register your written comments to the City Council, in lieu of speaking orally. Your comments will be considered part of the official proceedings. **(Please print)**

Meeting date: 3-22-2005 Agenda item number: 10

Agenda Title or Subject to be addressed: RIVER PARK

Please check one: ☐ Support Recommendation ☒ Oppose Recommendation ☐ Neutral

Written Comment (Use other side if necessary): ENOUGH IS ENOUGH
TRY JUST SAYING NO.
GOD WILL THANK YOU.

1

Name: BRUCE MCFARLAND

Street Address: 24307 MAGIC MTN PKWY City: VALENCIA

Council requires that persons registering written comments who represent other individuals, groups or organizations disclose that relationship.

I declare that the foregoing is true and correct.

Representing: SELF Signature:

Letter No. 72

City of Santa Clarita - Request to Register Written Comments

Please complete the following information to register your written comments to the City Council, in lieu of speaking orally. Your comments will be considered part of the official proceedings. **(Please print)**

Meeting date: 3-22-05 Agenda item number: 10

Agenda Title or Subject to be addressed: Riverpark project

Please check one: ☐ Support Recommendation ☒ Oppose Recommendation ☐ Neutral

Written Comment (Use other side if necessary):

1

Name: KEN Johnson

Street Address: 23110 Calvello Dr. City: Valencia

Council requires that persons registering written comments who represent other individuals, groups or organizations disclose that relationship.

I declare that the foregoing is true and correct.

Representing: _____ Signature: Ken Johnson

Letter No. 73

City of Santa Clarita - Request to Register Written Comments

Please complete the following information to register your written comments to the City Council, in lieu of speaking orally. Your comments will be considered part of the official proceedings. **(Please print)**

Meeting date: 3/22/05 Agenda item number: 10

Agenda Title or Subject to be addressed: RIVER PARK & RIVER PARKING LOT

Please check one: ☐ Support Recommendation ☒ Oppose Recommendation ☐ Neutral

Written Comment (Use other side if necessary):

SINCE MOVING INTO THE SANTA CLARITA VALLEY JUST OVER A YEAR AGO, I HAVE SEEN THIS AREA BEGIN TO DECLINE IN QUALITY BECAUSE OF OVERBUILDING, INCREASED DENSITY AND POLLUTION. 1

Name: JULIAN KRAININ

Street Address: 25211 SUMMERHILL LANE City: STEVENSON RANCH

Council requires that persons registering written comments who represent other individuals, groups or organizations disclose that relationship.

I declare that the foregoing is true and correct.

Representing: MYSELF Signature: Julian Krainin

Letter No. 74

City of Santa Clarita - Request to Register Written Comments

Please complete the following information to register your written comments to the City Council, in lieu of speaking orally. Your comments will be considered part of the official proceedings. **(Please print)**

Meeting date: March 22, 2005 Agenda item number: 10

Agenda Title or Subject to be addressed: Riverpark

Please check one: ☐ Support Recommendation ☒ Oppose Recommendation ☐ Neutral

Written Comment (Use other side if necessary): As a local teacher and 25 year resident, I can't believe you are even considering putting this "development" in the heart of our →

1

Name: Katherine Squires

Street Address: 26800 Espuma Dr. City: Saugus

Council requires that persons registering written comments who represent other individuals, groups or organizations disclose that relationship.

I declare that the foregoing is true and correct.

Representing: N/A Signature: Katherine Squires

community. Traffic will be worse & schools will be overcrowded.

1